



## Install and maintain hardware

### StorageGRID

NetApp

October 03, 2025

This PDF was generated from <https://docs.netapp.com/us-en/storagegrid-115/sg6000/sg6060-overview.html> on October 03, 2025. Always check [docs.netapp.com](https://docs.netapp.com) for the latest.

# Table of Contents

Install and maintain hardware .....	1
SG6000 storage appliances .....	1
SG6000 appliances overview .....	1
Installation and deployment overview .....	12
Preparing for installation .....	13
Installing the hardware .....	29
Configuring the hardware .....	46
Deploying an appliance Storage Node .....	87
Monitoring the storage appliance installation .....	90
Automating appliance installation and configuration .....	91
Overview of installation REST APIs .....	99
Troubleshooting the hardware installation .....	100
Maintaining the SG6000 appliance .....	108
SG5700 storage appliances .....	170
StorageGRID appliance overview .....	171
Installation and deployment overview .....	176
Preparing for installation .....	177
Installing the hardware .....	191
Configuring the hardware .....	201
Deploying an appliance Storage Node .....	235
Monitoring the storage appliance installation .....	238
Automating appliance installation and configuration .....	239
Overview of installation REST APIs .....	247
Troubleshooting the hardware installation .....	248
Maintaining the SG5700 appliance .....	251
SG5600 storage appliances .....	290
StorageGRID appliance overview .....	290
Installation and deployment overview .....	295
Preparing for installation .....	296
Installing the hardware .....	310
Configuring the hardware .....	322
Deploying an appliance Storage Node .....	352
Monitoring the storage appliance installation .....	356
Automating appliance installation and configuration .....	357
Overview of installation REST APIs .....	365
Troubleshooting the hardware installation .....	366
Maintaining the SG5600 appliance .....	369
SG100 & SG1000 services appliances .....	404
SG100 and SG1000 appliances overview .....	404
SG100 and SG1000 applications .....	407
Installation and deployment overview .....	408
Preparing for installation .....	409
Installing the hardware .....	422

Configuring StorageGRID connections . . . . .	428
Configuring the BMC interface . . . . .	450
Optional: Enabling node encryption . . . . .	458
Deploying a services appliance node . . . . .	460
Troubleshooting the hardware installation . . . . .	477
Maintaining the appliance . . . . .	484

# Install and maintain hardware

## SG6000 storage appliances

Learn how to install and maintain the StorageGRID SG6060 and SGF6024 appliances.

- [SG6000 appliances overview](#)
- [Installation and deployment overview](#)
- [Preparing for installation](#)
- [Installing the hardware](#)
- [Configuring the hardware](#)
- [Deploying an appliance Storage Node](#)
- [Monitoring the storage appliance installation](#)
- [Automating appliance installation and configuration](#)
- [Overview of installation REST APIs](#)
- [Troubleshooting the hardware installation](#)
- [Maintaining the SG6000 appliance](#)

### SG6000 appliances overview

The StorageGRID SG6000 appliances are integrated storage and computing platforms that operate as Storage Nodes in a StorageGRID system. These appliances can be used in a hybrid grid environment that combines appliance Storage Nodes and virtual (software-based) Storage Nodes.

The SG6000 appliances provide the following features:

- Available in two models:
  - SG6060, which includes 60 drives and supports expansion shelves.
  - SGF6024, which offers 24 solid state drives (SSDs).
- Integrate the storage and computing elements for a StorageGRID Storage Node.
- Include the StorageGRID Appliance Installer to simplify Storage Node deployment and configuration.
- Include SANtricity System Manager for managing and monitoring the storage controllers and drives.
- Include a baseboard management controller (BMC) for monitoring and diagnosing the hardware in the compute controller.
- Support up to four 10-GbE or 25-GbE connections to the StorageGRID Grid Network and Client Network.
- Support Federal Information Processing Standard (FIPS) drives. When these drives are used with the Drive Security feature in SANtricity System Manager, unauthorized access to data is prevented.

### SG6060 overview

The StorageGRID SG6060 appliance includes a compute controller and a storage controller shelf that contains two storage controllers and 60 drives. Optionally, 60-drive

expansion shelves can be added to the appliance.

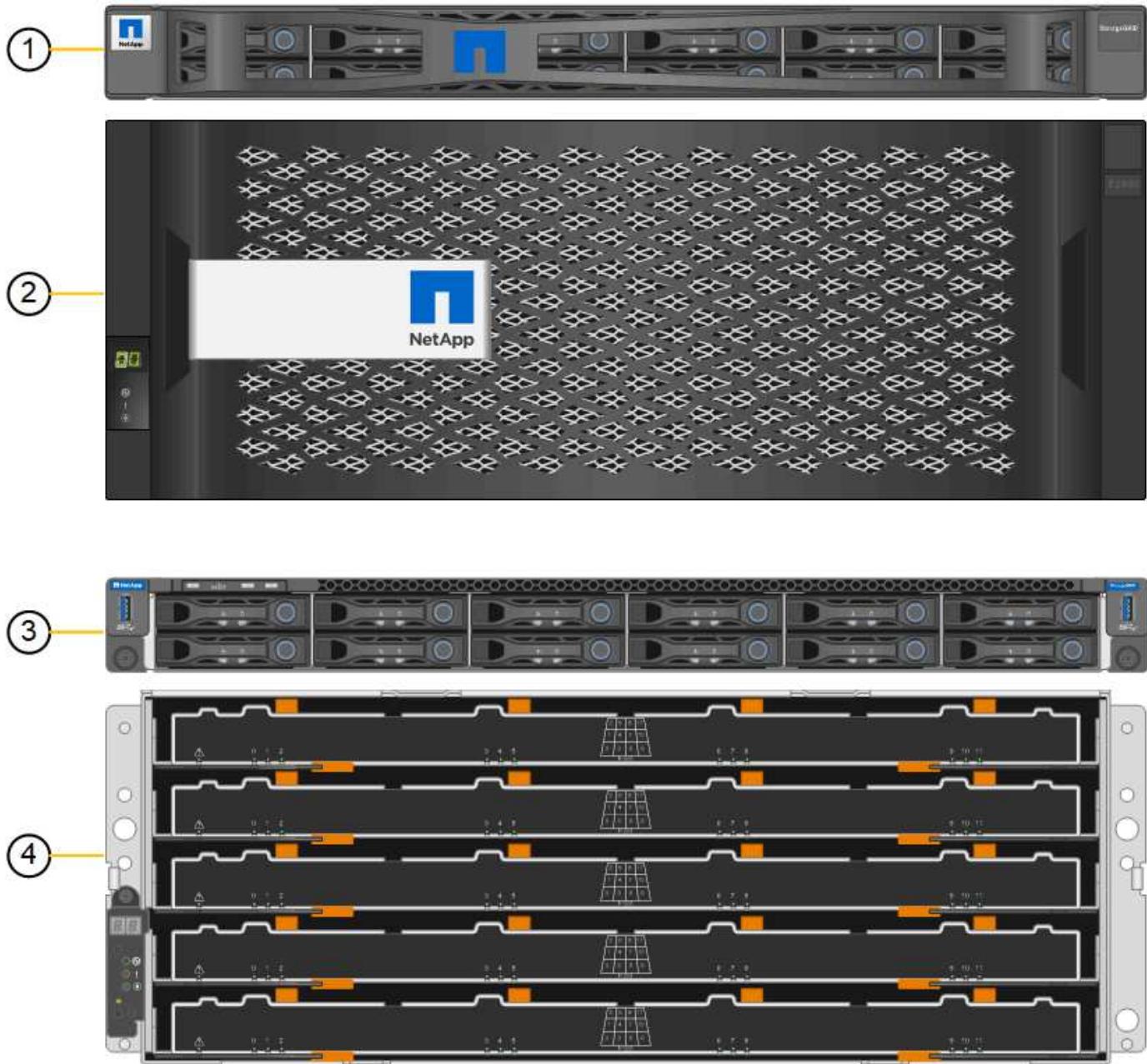
## SG6060 components

The SG6060 appliance includes the following components:

Component	Description
Compute controller	SG6000-CN controller, a one-rack unit (1U) server that includes: <ul style="list-style-type: none"><li>• 40 cores (80 threads)</li><li>• 192 GB RAM</li><li>• Up to 4 × 25 Gbps aggregate Ethernet bandwidth</li><li>• 4 × 16 Gbps Fibre Channel (FC) interconnect</li><li>• Baseboard management controller (BMC) that simplifies hardware management</li><li>• Redundant power supplies</li></ul>
Storage controller shelf	E-Series E2860 controller shelf (storage array), a 4U shelf that includes: <ul style="list-style-type: none"><li>• Two E-Series E2800 controllers (duplex configuration) to provide storage controller failover support</li><li>• Five-drawer drive shelf that holds sixty 3.5-inch drives (2 solid-state drives, or SSDs, and 58 NL-SAS drives)</li><li>• Redundant power supplies and fans</li></ul>
Optional: Storage expansion shelves	E-Series DE460C enclosure, a 4U shelf that includes: <ul style="list-style-type: none"><li>• Two input/output modules (IOMs)</li><li>• Five drawers, each holding 12 NL-SAS drives, for a total of 60 drives</li><li>• Redundant power supplies and fans</li></ul> Each SG6060 appliance can have one or two expansion shelves for a total of 180 drives. <b>Note:</b> Expansion shelves can be installed during initial deployment or added later.

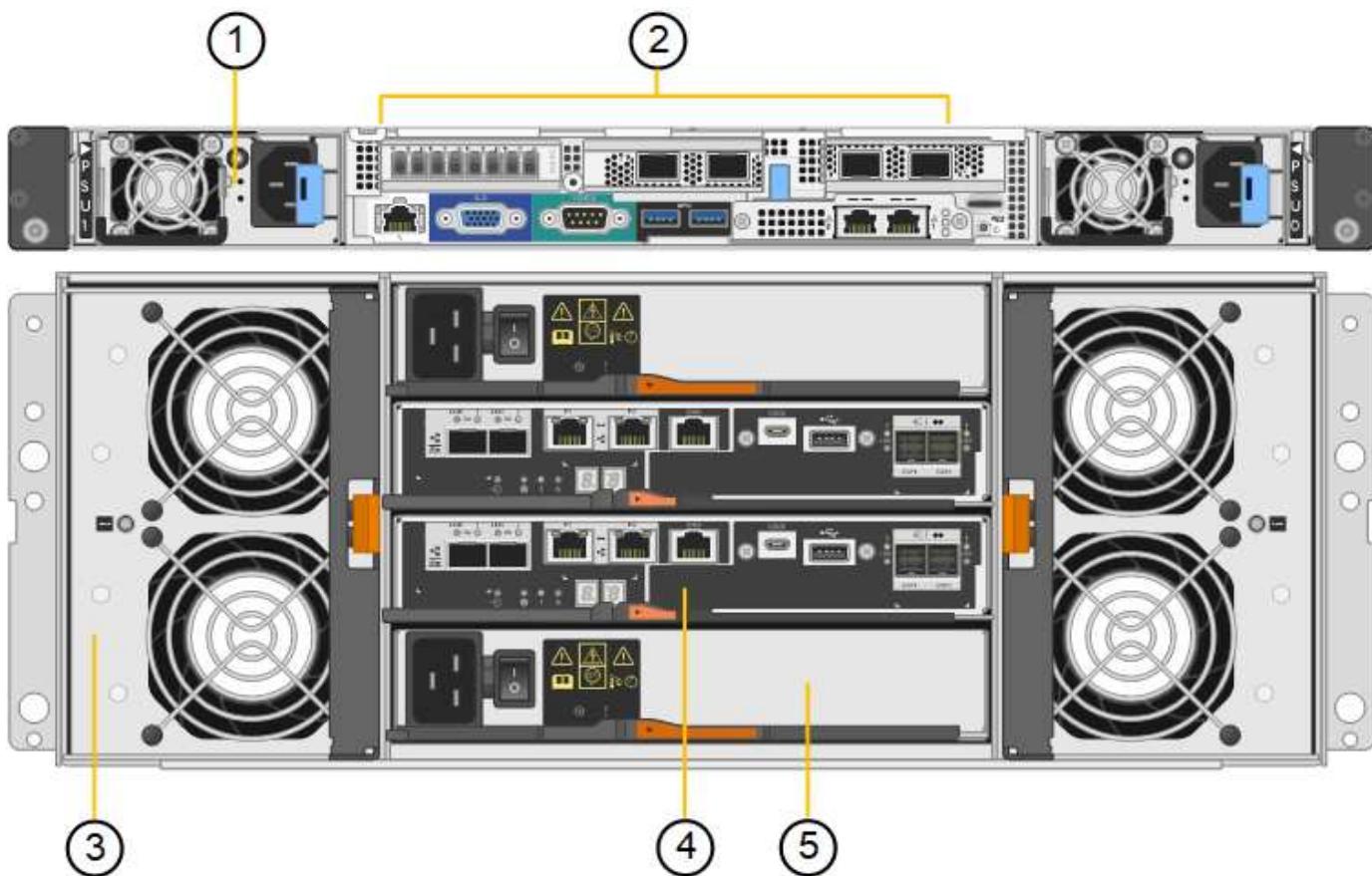
## SG6060 diagrams

This figure shows the front of the SG6060, which includes a 1U compute controller and a 4U shelf containing two storage controllers and 60 drives in five drive drawers.



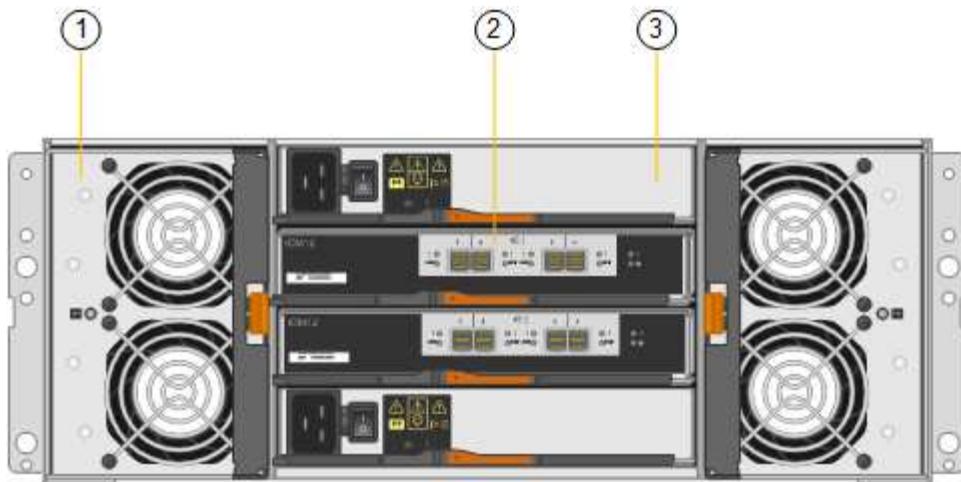
	Description
1	SG6000-CN compute controller with front bezel
2	E2860 controller shelf with front bezel (optional expansion shelf looks identical)
3	SG6000-CN compute controller with front bezel removed
4	E2860 controller shelf with front bezel removed (optional expansion shelf looks identical)

This figure shows the back of the SG6060, including the compute and storage controllers, fans, and power supplies.



	Description
1	Power supply (1 of 2) for SG6000-CN compute controller
2	Connectors for SG6000-CN compute controller
3	Fan (1 of 2) for E2860 controller shelf
4	E-Series E2800 storage controller (1 of 2) and connectors
5	Power supply (1 of 2) for E2860 controller shelf

This figure shows the back of the optional expansion shelf for the SG6060, including the input/output modules (IOMs), fans, and power supplies. Each SG6060 can be installed with one or two expansion shelves, which can be included in the initial installation or added later.



	Description
1	Fan (1 of 2) for expansion shelf
2	IOM (1 of 2) for expansion shelf
3	Power supply (1 of 2) for expansion shelf

## SGF6024 overview

The StorageGRID SGF6024 includes a compute controller and a storage controller shelf that holds 24 solid state drives.

## SGF6024 components

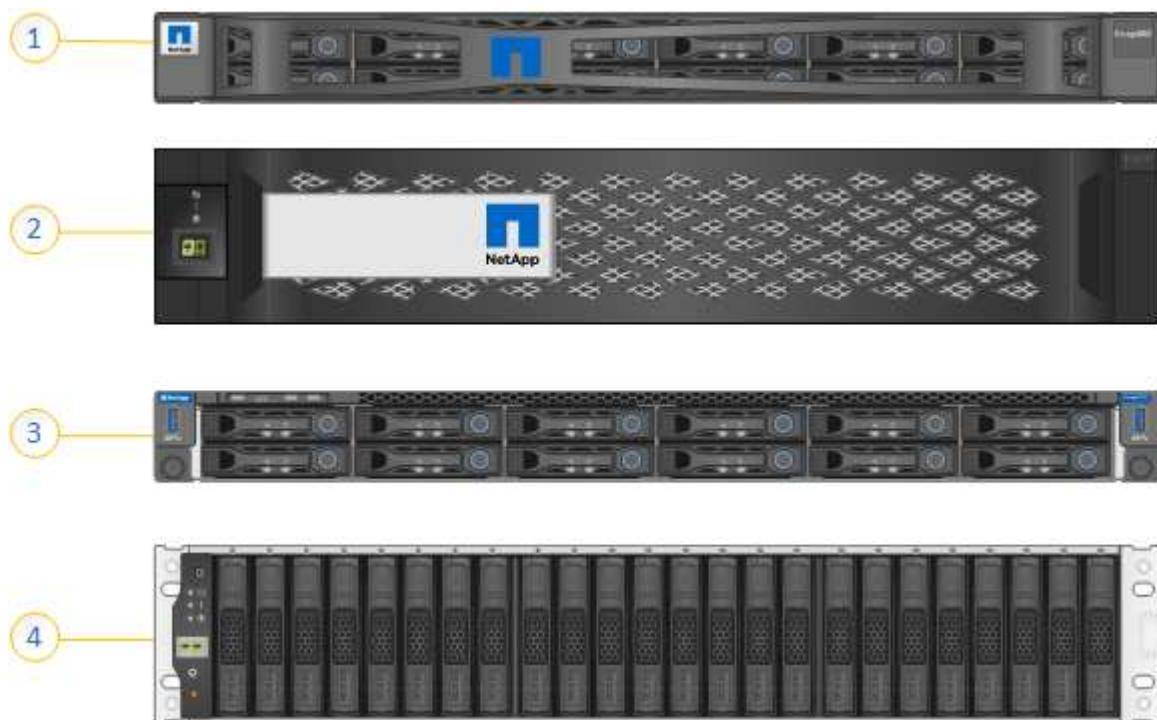
The SGF6024 appliance includes the following components:

Component	Description
Compute controller	<p>SG6000-CN controller, a one-rack unit (1U) server that includes:</p> <ul style="list-style-type: none"> <li>• 40 cores (80 threads)</li> <li>• 192 GB RAM</li> <li>• Up to 4 × 25 Gbps aggregate Ethernet bandwidth</li> <li>• 4 × 16 Gbps Fibre Channel (FC) interconnect</li> <li>• Baseboard management controller (BMC) that simplifies hardware management</li> <li>• Redundant power supplies</li> </ul>

Component	Description
Flash array (controller shelf)	<p>E-Series EF570 flash array (also known as a controller shelf), a 2U shelf that includes:</p> <ul style="list-style-type: none"> <li>Two E-Series EF570 controllers (duplex configuration) to provide storage controller failover support</li> <li>24 solid state drives (also known as SSDs or flash drives)</li> <li>Redundant power supplies and fans</li> </ul>

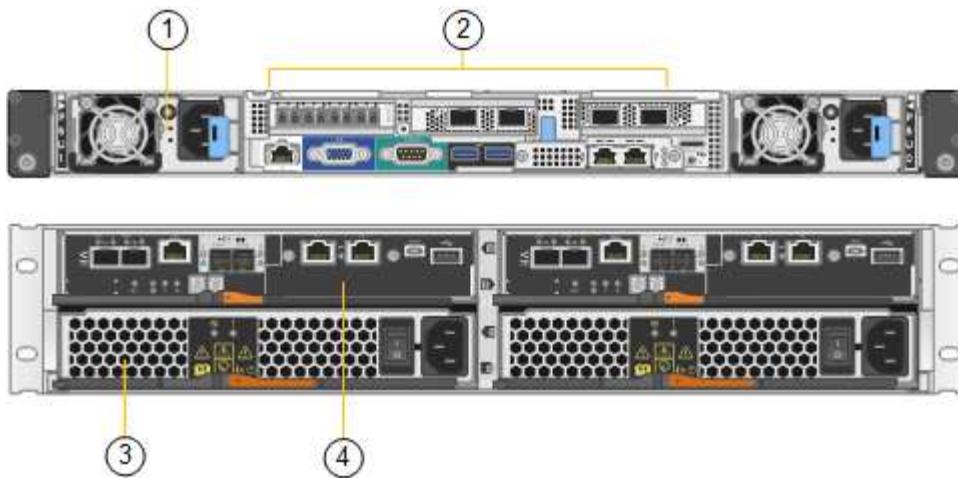
### SGF6024 diagrams

This figure shows the front of the SGF6024, which includes a 1U compute controller and a 2U enclosure containing two storage controllers and 24 flash drives.



	Description
1	SG6000-CN compute controller with front bezel
2	EF570 flash array with front bezel
3	SG6000-CN compute controller with front bezel removed
4	EF570 flash array with front bezel removed

This figure shows the back of the SGF6024, including the compute and storage controllers, fans, and power supplies.



	Description
1	Power supply (1 of 2) for SG6000-CN compute controller
2	Connectors for SG6000-CN compute controller
3	Power supply (1 of 2) for EF570 flash array
4	E-Series EF570 storage controller (1 of 2) and connectors

### Controllers in the SG6000 appliances

Each model of the StorageGRID SG6000 appliance includes an SG6000-CN compute controller in a 1U enclosure and duplex E-Series storage controllers in a 2U or 4U enclosure, depending on the model. Review the diagrams to learn more about each type of controller.

#### All appliances: SG6000-CN compute controller

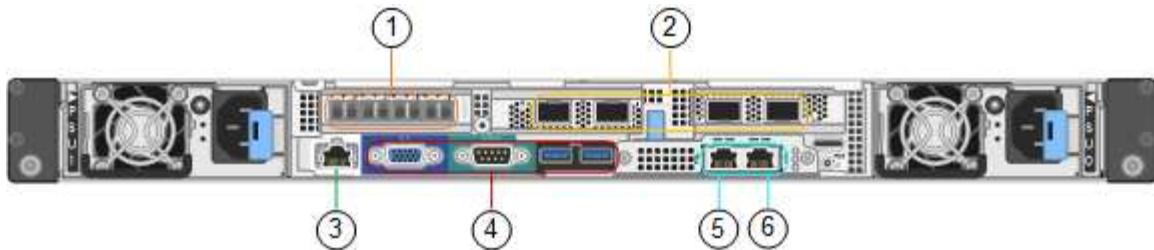
- Provides compute resources for the appliance.
- Includes the StorageGRID Appliance Installer.



StorageGRID software is not preinstalled on the appliance. This software is retrieved from the Admin Node when you deploy the appliance.

- Can connect to all three StorageGRID networks, including the Grid Network, the Admin Network, and the Client Network.
- Connects to the E-Series storage controllers and operates as the initiator.

This figure shows the connectors on the back of the SG6000-CN.



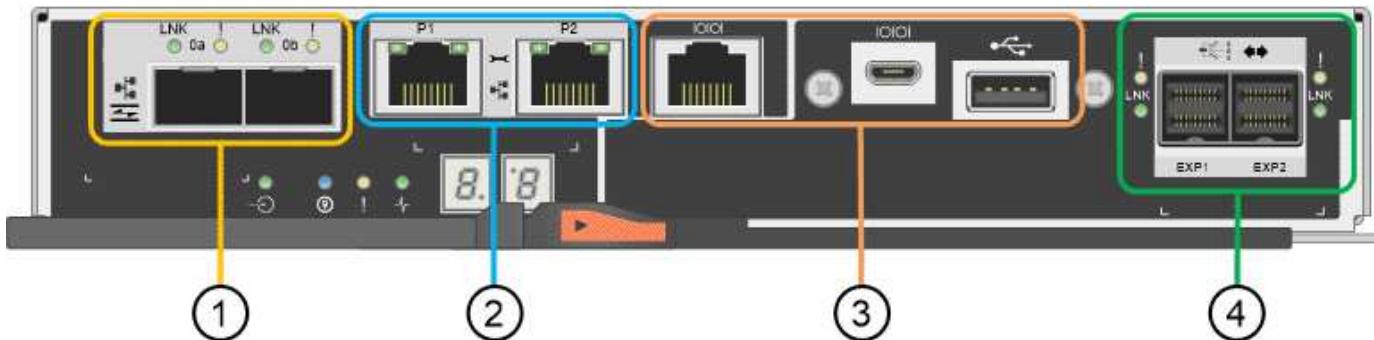
	Port	Type	Use
1	Interconnect ports 1-4	16-Gb/s Fibre Channel (FC), with integrated optics	Connect the SG6000-CN controller to the E2800 controllers (two connections to each E2800).
2	Network ports 1-4	10-GbE or 25-GbE, based on cable or SFP transceiver type, switch speed, and configured link speed	Connect to the Grid Network and the Client Network for StorageGRID.
3	BMC management port	1-GbE (RJ-45)	Connect to the SG6000-CN baseboard management controller.
4	Diagnostic and support ports	<ul style="list-style-type: none"> <li>• VGA</li> <li>• Serial, 115200 8-N-1</li> <li>• USB</li> </ul>	Reserved for technical support use.
5	Admin Network port 1	1-GbE (RJ-45)	Connect the SG6000-CN to the Admin Network for StorageGRID.

	Port	Type	Use
6	Admin Network port 2	1-GbE (RJ-45)	<p>Options:</p> <ul style="list-style-type: none"> <li>• Bond with management port 1 for a redundant connection to the Admin Network for StorageGRID.</li> <li>• Leave unwired and available for temporary local access (IP 169.254.0.1).</li> <li>• During installation, use port 2 for IP configuration if DHCP-assigned IP addresses are not available.</li> </ul>

#### SG6060: E2800 storage controllers

- Two controllers for failover support.
- Manage the storage of data on the drives.
- Function as standard E-Series controllers in a duplex configuration.
- Include SANtricity OS Software (controller firmware).
- Include SANtricity System Manager for monitoring storage hardware and for managing alerts, the AutoSupport feature, and the Drive Security feature.
- Connect to the SG6000-CN controller and provide access to the storage.

This figure shows the connectors on the back of each of the E2800 controllers.

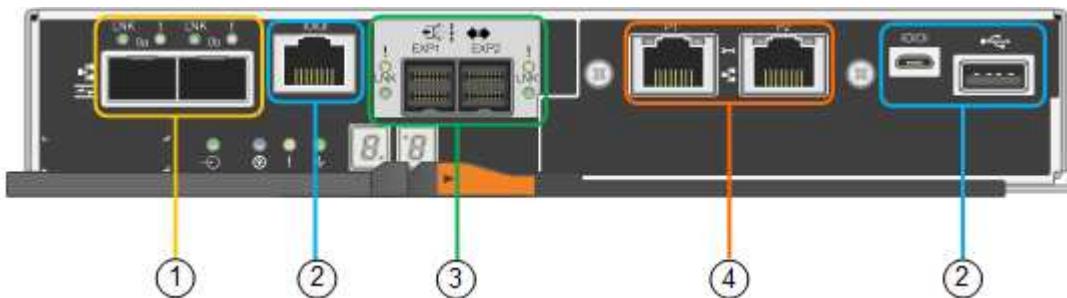


	Port	Type	Use
1	Interconnect ports 1 and 2	16-Gb/s FC optical SFPa	Connect each of the E2800 controllers to the SG6000-CN controller.  There are four connections to the SG6000-CN controller (two from each E2800).
2	Management ports 1 and 2	1-Gb (RJ-45) Ethernet	<ul style="list-style-type: none"> <li>• Port 1 connects to the network where you access SANtricity System Manager on a browser.</li> <li>• Port 2 is reserved for technical support use.</li> </ul>
3	Diagnostic and support ports	<ul style="list-style-type: none"> <li>• RJ-45 serial port</li> <li>• Micro USB serial port</li> <li>• USB port</li> </ul>	Reserved for technical support use.
4	Drive expansion ports 1 and 2	12Gb/s SAS	Connect the ports to the drive expansion ports on the IOMs in the expansion shelf.

#### SGF6024: EF570 storage controllers

- Two controllers for failover support.
- Manage the storage of data on the drives.
- Function as standard E-Series controllers in a duplex configuration.
- Include SANtricity OS Software (controller firmware).
- Include SANtricity System Manager for monitoring storage hardware and for managing alerts, the AutoSupport feature, and the Drive Security feature.
- Connect to the SG6000-CN controller and provide access to the flash storage.

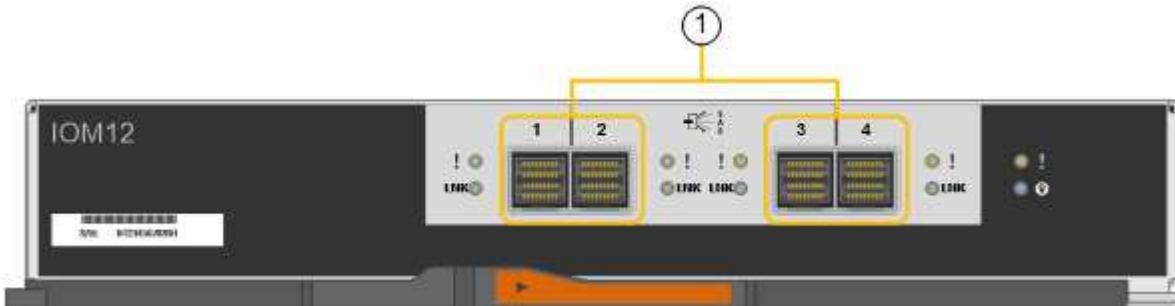
This figure shows the connectors on the back of each of the EF570 controllers.



	Port	Type	Use
1	Interconnect ports 1 and 2	16-Gb/s FC optical SFPa	Connect each of the EF570 controllers to the SG6000-CN controller.  There are four connections to the SG6000-CN controller (two from each EF570).
2	Diagnostic and support ports	<ul style="list-style-type: none"> <li>• RJ-45 serial port</li> <li>• Micro USB serial port</li> <li>• USB port</li> </ul>	Reserved for technical support use.
3	Drive expansion ports	12Gb/s SAS	Not used. The SGF6024 appliance does not support expansion drive shelves.
4	Management ports 1 and 2	1-Gb (RJ-45) Ethernet	<ul style="list-style-type: none"> <li>• Port 1 connects to the network where you access SANtricity System Manager on a browser.</li> <li>• Port 2 is reserved for technical support use.</li> </ul>

#### SG6060: Input/output modules for optional expansion shelves

The expansion shelf contains two input/output modules (IOMs) that connect to the storage controllers or to other expansion shelves.



	Port	Type	Use
1	Drive expansion ports 1-4	12Gb/s SAS	Connect each port to the storage controllers or additional expansion shelf (if any).

## Installation and deployment overview

You can install one or more StorageGRID storage appliances when you first deploy StorageGRID, or you can add appliance Storage Nodes later as part of an expansion. You might also need to install an appliance Storage Node as part of a recovery operation.

### What you'll need

Your StorageGRID system is using the required version of StorageGRID software.

Appliance	Required StorageGRID version
SG6060 with no expansion shelves	11.1.1 or later
SG6060 with expansion shelves (one or two)	11.3 or later  <b>Note:</b> If you add expansion shelves after the initial deployment, you must use version 11.4 or later.
SGF6024	11.3 or later

### Installation and deployment tasks

Adding a StorageGRID storage appliance to a StorageGRID system includes four primary steps:

1. Preparing for installation:
  - Preparing the installation site
  - Unpacking the boxes and checking the contents
  - Obtaining additional equipment and tools
  - Gathering IP addresses and network information
  - Optional: Configuring an external key management server (KMS) if you plan to encrypt all appliance data. See details about external key management in the instructions for administering StorageGRID.
2. Installing the hardware:
  - Registering the hardware
  - Installing the appliance into a cabinet or rack
  - Installing the drives
  - Installing optional expansion shelves (model SG6060 only; maximum of two expansion shelves)
  - Cabling the appliance
  - Connecting the power cords and applying power
  - Viewing boot-up status codes
3. Configuring the hardware:
  - Accessing SANtricity System Manager to configure SANtricity System Manager settings
  - Accessing StorageGRID Appliance Installer, setting a static IP address for management port 1 on the storage controller, and configuring the link and network IP settings required to connect to StorageGRID networks

- Accessing the baseboard management controller (BMC) interface on the SG6000-CN controller
- Optional: Enabling node encryption if you plan to use an external KMS to encrypt appliance data.
- Optional: Changing the RAID mode.

#### 4. Deploying the appliance as a Storage Node:

Task	Instructions
Deploying an appliance Storage Node in a new StorageGRID system	<a href="#">Deploying an appliance Storage Node</a>
Adding an appliance Storage Node to an existing StorageGRID system	Instructions for expanding a StorageGRID system
Deploying an appliance Storage Node as part of a Storage Node recovery operation	Instructions for recovery and maintenance

#### Related information

[Preparing for installation](#)

[Installing the hardware](#)

[Configuring the hardware](#)

[Expand your grid](#)

[Maintain & recover](#)

[Administer StorageGRID](#)

## Preparing for installation

Preparing to install a StorageGRID appliance entails preparing the site and obtaining all required hardware, cables, and tools. You should also gather IP addresses and network information.

#### Steps

- [Preparing the site \(SG6000\)](#)
- [Unpacking the boxes \(SG6000\)](#)
- [Obtaining additional equipment and tools \(SG6000\)](#)
- [Web browser requirements](#)
- [Reviewing appliance network connections](#)
- [Gathering installation information \(SG6000\)](#)

### Preparing the site (SG6000)

Before installing the appliance, you must make sure that the site and the cabinet or rack you plan to use meet the specifications for a StorageGRID appliance.

## Steps

1. Confirm that the site meets the requirements for temperature, humidity, altitude range, airflow, heat dissipation, wiring, power, and grounding. See the NetApp Hardware Universe for more information.
2. Confirm that your location provides 240-volt AC power for the SG6060 or 120-volt AC power for the SGF6024.
3. Obtain a 19-inch (48.3-cm) cabinet or rack to fit shelves of this size (without cables):

Type of shelf	Height	Width	Depth	Maximum weight
<b>E2860 controller shelf</b> for SG6060	6.87 in. (17.46 cm)	17.66 in. (44.86 cm)	38.25 in. (97.16 cm)	250 lb. (113 kg)
<b>Optional expansion shelf</b> for SG6060 (one or two)	6.87 in. (17.46 cm)	17.66 in. (44.86 cm)	38.25 in. (97.16 cm)	250 lb. (113 kg)
<b>EF570 controller shelf</b> for SGF6024	3.35 in. (8.50 cm)	17.66 in. (44.86 cm)	19.00 in. (48.26 cm)	51.74 lb. (23.47 kg)
<b>SG6000-CN controller</b> for each appliance	1.70 in. (4.32 cm)	17.32 in. (44.0 cm)	32.0 in. (81.3 cm)	39 lb. (17.7 kg)

4. Decide where you are going to install the appliance.



When installing the E2860 controller shelf or optional expansion shelves, install hardware from the bottom to the top of the rack or cabinet to prevent the equipment from tipping over. To ensure that the heaviest equipment is at the bottom of the cabinet or rack, install the SG6000-CN controller above the E2860 controller shelf and expansion shelves.



Before committing to the installation, verify that the 0.5m optic cables shipped with the appliance, or cables that you supply, are long enough for the planned layout.

## Related information

[NetApp Hardware Universe](#)

[NetApp Interoperability Matrix Tool](#)

## Unpacking the boxes (SG6000)

Before installing the StorageGRID appliance, unpack all boxes and compare the contents to the items on the packing slip.

### SG6060

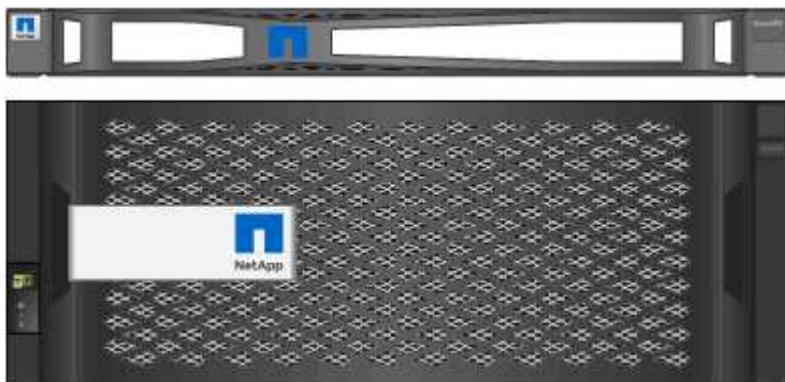
- **SG6000-CN controller**



- E2860 controller shelf with no drives installed



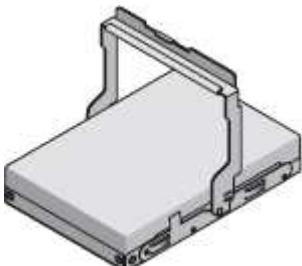
- Two front bezels



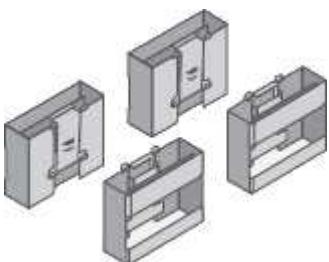
- Two rail kits with instructions



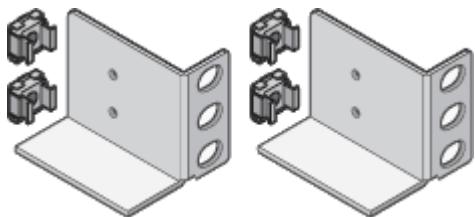
- 60 drives (2 SSD and 58 NL-SAS)



- Four handles

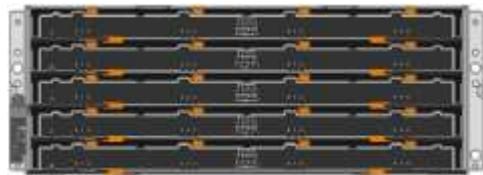


- Back brackets and cage nuts for square-hole rack installation



SG6060 expansion shelf

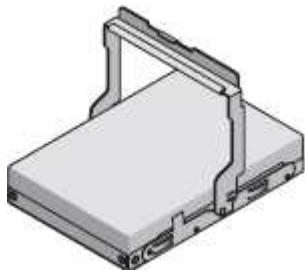
- Expansion shelf with no drives installed



- Front bezel



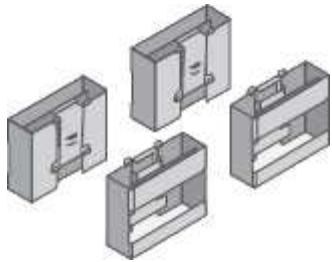
- 60 NL-SAS drives



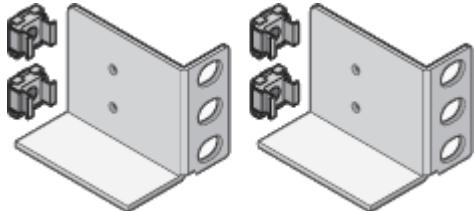
- One rail kit with instructions



- Four handles



- Back brackets and cage nuts for square-hole rack installation



SGF6024

- SG6000-CN controller



- EF570 flash array with 24 solid state (flash) drives installed



- Two front bezels



- Two rail kits with instructions



- Shelf endcaps



#### Cables and connectors

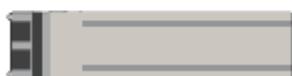
The shipment for the StorageGRID appliance includes the following cables and connectors:

- **Four power cords for your country**



Your cabinet might have special power cords that you use instead of the power cords that ship with the appliance.

- **Optical cables and SFP transceivers**



Four optical cables for the FC interconnect ports

Four SFP+ transceivers, which support 16-Gb/s FC

- **Optional: Two SAS cables for connecting each SG6060 expansion shelf**

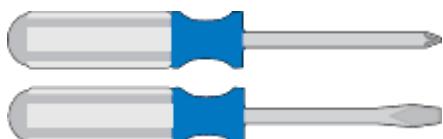


#### Obtaining additional equipment and tools (SG6000)

Before installing the StorageGRID appliance, confirm you have all of the additional equipment and tools that you need.

You need the following additional equipment to install and configure the hardware:

- **Screwdrivers**



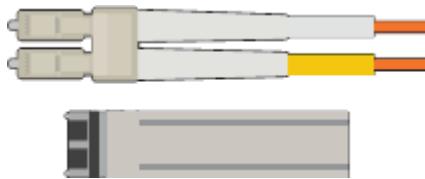
Phillips No. 2 screwdriver

Medium flat-blade screwdriver

- ESD wrist strap



- Optical cables and SFP transceivers



You need one of the following options:

- One to four TwinAx cables or optical cables for the 10/25-GbE ports you plan to use on the SG6000-CN controller
- One to four SFP+ transceivers for the 10/25-GbE ports if you will use optical cables and 10-GbE link speed
- One to four SFP28 transceivers for the 10/25-GbE ports if you will use optical cables and 25-GbE link speed

- RJ-45 (Cat5/Cat5e/Cat6) Ethernet cables



- Service laptop



Supported web browser

1-GbE (RJ-45) port

- Optional tools



Power drill with Phillips head bit

Flashlight

Mechanized lift for 60-drive shelves

### Web browser requirements

You must use a supported web browser.

Web browser	Minimum supported version
Google Chrome	87
Microsoft Edge	87
Mozilla Firefox	84

You should set the browser window to a recommended width.

Browser width	Pixels
Minimum	1024
Optimum	1280

### Reviewing appliance network connections

Before installing the StorageGRID appliance, you should understand which networks can be connected to the appliance.

When you deploy a StorageGRID appliance as a Storage Node in a StorageGRID system, you can connect it to the following networks:

- **Grid Network for StorageGRID:** The Grid Network is used for all internal StorageGRID traffic. It provides connectivity between all nodes in the grid, across all sites and subnets. The Grid Network is required.
- **Admin Network for StorageGRID:** The Admin Network is a closed network used for system administration and maintenance. The Admin Network is typically a private network and does not need to be routable between sites. The Admin Network is optional.
- **Client Network for StorageGRID:** The Client Network is an open network used to provide access to client applications, including S3 and Swift. The Client Network provides client protocol access to the grid, so the

Grid Network can be isolated and secured. The Client Network is optional.

- **Management network for SANtricity System Manager:** This network provides access to SANtricity System Manager on the storage controller, allowing you to monitor and manage the hardware components in the storage controller shelf. This management network can be the same as the Admin Network for StorageGRID, or it can be an independent management network.
- **BMC management network for the SG6000-CN controller:** This network provides access to the baseboard management controller in the SG6000-CN, allowing you to monitor and manage the hardware components in the SG6000-CN controller. This management network can be the same as the Admin Network for StorageGRID, or it can be an independent management network.



For detailed information about StorageGRID networks, see the *Grid Primer*.

## Related information

[Gathering installation information \(SG6000\)](#)

[Cabling the appliance \(SG6000\)](#)

[Port bond modes for the SG6000-CN controller](#)

[Network guidelines](#)

### Port bond modes for the SG6000-CN controller

When configuring network links for the SG6000-CN, you can use port bonding for the 10/25-GbE ports that connect to the Grid Network and optional Client Network, and the 1-GbE management ports that connect to the optional Admin Network. Port bonding helps protect your data by providing redundant paths between StorageGRID networks and the appliance.

## Related information

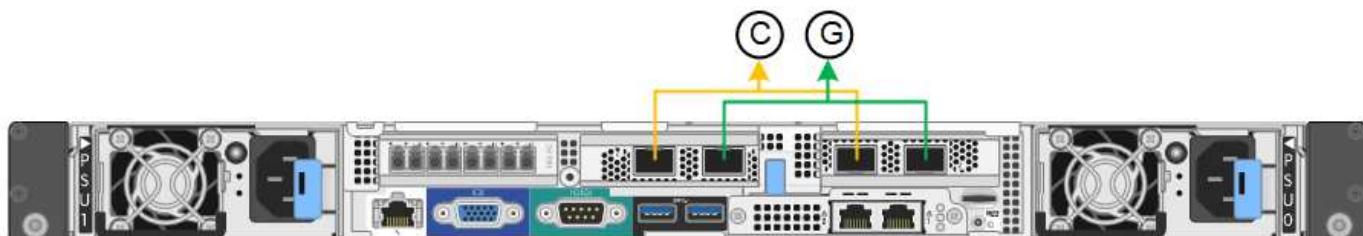
[Configuring network links \(SG6000\)](#)

### Network bond modes for the 10/25-GbE ports

The 10/25-GbE networking ports on the SG6000-CN controller support Fixed port bond mode or Aggregate port bond mode for the Grid Network and Client Network connections.

#### Fixed port bond mode

Fixed mode is the default configuration for the 10/25-GbE networking ports.



Which ports are bonded	
C	Ports 1 and 3 are bonded together for the Client Network, if this network is used.
G	Ports 2 and 4 are bonded together for the Grid Network.

When using Fixed port bond mode, the ports can be bonded using active-backup mode or Link Aggregation Control Protocol mode (LACP 802.3ad).

- In active-backup mode (default), only one port is active at a time. If the active port fails, its backup port automatically provides a failover connection. Port 4 provides a backup path for port 2 (Grid Network), and port 3 provides a backup path for port 1 (Client Network).
- In LACP mode, each pair of ports forms a logical channel between the controller and the network, allowing for higher throughput. If one port fails, the other port continues to provide the channel. Throughput is reduced, but connectivity is not impacted.

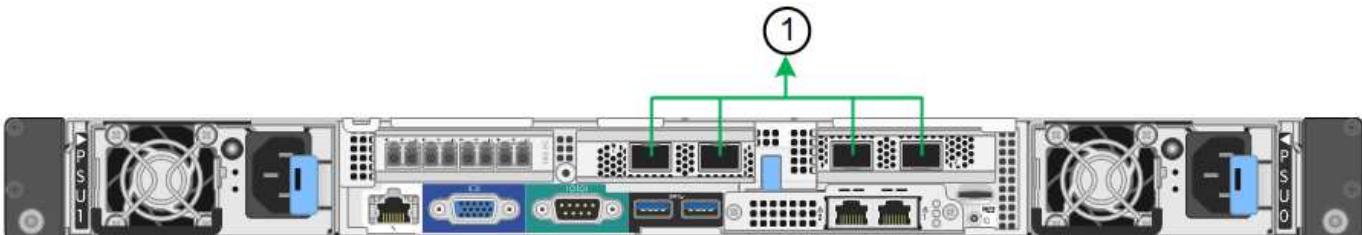


If you do not need redundant connections, you can use only one port for each network. However, be aware that an alert will be triggered in the Grid Manager after StorageGRID is installed, indicating that the link is down. Because this port is disconnected on purpose, you can safely disable this alert.

From the Grid Manager, select **Alert > Rules**, select the rule, and click **Edit rule**. Then, uncheck the **Enabled** check box.

### Aggregate port bond mode

Aggregate port bond mode significantly increases the throughput for each StorageGRID network and provides additional failover paths.



Which ports are bonded	
1	All connected ports are grouped in a single LACP bond, allowing all ports to be used for Grid Network and Client Network traffic.

If you plan to use aggregate port bond mode:

- You must use LACP network bond mode.
- You must specify a unique VLAN tag for each network. This VLAN tag will be added to each network packet to ensure that network traffic is routed to the correct network.
- The ports must be connected to switches that can support VLAN and LACP. If multiple switches are participating in the LACP bond, the switches must support multi-chassis link aggregation groups (MLAG), or equivalent.

- You must understand how to configure the switches to use VLAN, LACP, and MLAG, or equivalent.

If you do not want to use all four 10/25-GbE ports, you can use one, two, or three ports. Using more than one port maximizes the chance that some network connectivity will remain available if one of the 10/25-GbE ports fails.



If you choose to use fewer than four ports, be aware that one or more alarms will be raised in the Grid Manager after StorageGRID is installed, indicating that cables are unplugged. You can safely acknowledge the alarms to clear them.

### Network bond modes for the 1-GbE management ports

For the two 1-GbE management ports on the SG6000-CN controller, you can choose Independent network bond mode or Active-Backup network bond mode to connect to the optional Admin Network.

In Independent mode, only the management port on the left is connected to the Admin Network. This mode does not provide a redundant path. The management port on the right is unconnected and available for temporary local connections (uses IP address 169.254.0.1)

In Active-Backup mode, both management ports are connected to the Admin Network. Only one port is active at a time. If the active port fails, its backup port automatically provides a failover connection. Bonding these two physical ports into one logical management port provides a redundant path to the Admin Network.



If you need to make a temporary local connection to the SG6000-CN controller when the 1-GbE management ports are configured for Active-Backup mode, remove the cables from both management ports, plug your temporary cable into the management port on the right, and access the appliance using IP address 169.254.0.1.



Network bond mode	
A	Both management ports are bonded into one logical management port connected to the Admin Network.
I	The port on the left is connected to the Admin Network. The port on the right is available for temporary local connections (IP address 169.254.0.1).

### Gathering installation information (SG6000)

As you install and configure the StorageGRID appliance, you must make decisions and gather information about Ethernet switch ports, IP addresses, and port and network bond modes.

#### About this task

You can use the following tables to record the required information for each network you connect to the appliance. These values are required to install and configure the hardware.

#### Information needed to connect to SANtricity System Manager on the storage controllers

You must connect both of the storage controllers in the appliance (either the E2800 controllers or the EF570 controllers) to the management network you will use for SANtricity System Manager. The controllers are located in each appliance as follows:

- SG6060: Controller A is on the top, and controller B is on the bottom.
- SGF6024: Controller A is on the left, and controller B is on the right.

Information needed	Your value for controller A	Your value for controller B
Ethernet switch port you will connect to management port 1 (labeled as P1 on the controller)		
MAC address for management port 1 (printed on a label near port P1)		
DHCP-assigned IP address for management port 1, if available after power on  <b>Note:</b> If the network you will connect to the storage controller includes a DHCP server, the network administrator can use the MAC address to determine the IP address that was assigned by the DHCP server.		
Static IP address you plan to use for the appliance on the management network	For IPv4: <ul style="list-style-type: none"><li>• IPv4 address:</li><li>• Subnet mask:</li><li>• Gateway:</li></ul> For IPv6: <ul style="list-style-type: none"><li>• IPv6 address:</li><li>• Routable IP address:</li><li>• storage controller router IP address:</li></ul>	For IPv4: <ul style="list-style-type: none"><li>• IPv4 address:</li><li>• Subnet mask:</li><li>• Gateway:</li></ul> For IPv6: <ul style="list-style-type: none"><li>• IPv6 address:</li><li>• Routable IP address:</li><li>• storage controller router IP address:</li></ul>
IP address format	Choose one: <ul style="list-style-type: none"><li>• IPv4</li><li>• IPv6</li></ul>	Choose one: <ul style="list-style-type: none"><li>• IPv4</li><li>• IPv6</li></ul>

Information needed	Your value for controller A	Your value for controller B
Speed and duplex mode  <b>Note:</b> You must make sure the Ethernet switch for the SANtricity System Manager management network is set to autonegotiate.	Must be: <ul style="list-style-type: none"> <li>Autonegotiate (default)</li> </ul>	Must be: <ul style="list-style-type: none"> <li>Autonegotiate (default)</li> </ul>

#### Information needed to connect the SG6000-CN controller to the Admin Network

The Admin Network for StorageGRID is an optional network, used for system administration and maintenance. The appliance connects to the Admin Network using the following 1-GbE management ports on the SG6000-CN controller.



Information needed	Your value
Admin Network enabled	Choose one: <ul style="list-style-type: none"> <li>No</li> <li>Yes (default)</li> </ul>
Network bond mode	Choose one: <ul style="list-style-type: none"> <li>Independent (default)</li> <li>Active-Backup</li> </ul>
Switch port for the left port in the red circle in the diagram (default active port for Independent network bond mode)	
Switch port for the right port in the red circle in the diagram (Active-Backup network bond mode only)	

Information needed	Your value
<p>MAC address for the Admin Network port</p> <p><b>Note:</b> The MAC address label on the front of the SG6000-CN controller lists the MAC address for the BMC management port. To determine the MAC address for the Admin Network port, you must add <b>2</b> to the hexadecimal number on the label. For example, if the MAC address on the label ends in <b>09</b>, the MAC address for the Admin Port would end in <b>0B</b>. If the MAC address on the label ends in <b>(y)FF</b>, the MAC address for the Admin Port would end in <b>(y+1)01</b>. You can easily make this calculation by opening Calculator in Windows, setting it to Programmer mode, selecting Hex, typing the MAC address, then typing <b>+ 2 =</b>.</p>	
<p>DHCP-assigned IP address for the Admin Network port, if available after power on</p> <p><b>Note:</b> You can determine the DHCP-assigned IP address by using the MAC address to look up the assigned IP.</p>	<ul style="list-style-type: none"> <li>IPv4 address (CIDR):</li> <li>Gateway:</li> </ul>
<p>Static IP address you plan to use for the appliance Storage Node on the Admin Network</p> <p><b>Note:</b> If your network does not have a gateway, specify the same static IPv4 address for the gateway.</p>	<ul style="list-style-type: none"> <li>IPv4 address (CIDR):</li> <li>Gateway:</li> </ul>
Admin Network subnets (CIDR)	

#### Information needed to connect and configure the 10/25-GbE ports on the SG6000-CN controller

The four 10/25-GbE ports on the SG6000-CN controller connect to the StorageGRID Grid Network and the optional Client Network.

Information needed	Your value
Link speed	<p>Choose one:</p> <ul style="list-style-type: none"> <li>Auto (default)</li> <li>10 GbE</li> <li>25 GbE</li> </ul>
Port bond mode	<p>Choose one:</p> <ul style="list-style-type: none"> <li>Fixed (default)</li> <li>Aggregate</li> </ul>

Information needed	Your value
Switch port for port 1 (Client Network for Fixed mode)	
Switch port for port 2 (Grid Network for Fixed mode)	
Switch port for port 3 (Client Network for Fixed mode)	
Switch port for port 4 (Grid Network for Fixed mode)	

#### Information needed to connect the SG6000-CN controller to the Grid Network

The Grid Network for StorageGRID is a required network, used for all internal StorageGRID traffic. The appliance connects to the Grid Network using the 10/25-GbE ports on the SG6000-CN controller.

Information needed	Your value
Network bond mode	<p>Choose one:</p> <ul style="list-style-type: none"> <li>• Active-Backup (default)</li> <li>• LACP (802.3ad)</li> </ul>
VLAN tagging enabled	<p>Choose one:</p> <ul style="list-style-type: none"> <li>• No (default)</li> <li>• Yes</li> </ul>
VLAN tag(if VLAN tagging is enabled)	Enter a value between 0 and 4095:
DHCP-assigned IP address for the Grid Network, if available after power on	<ul style="list-style-type: none"> <li>• IPv4 address (CIDR):</li> <li>• Gateway:</li> </ul>
Static IP address you plan to use for the appliance Storage Node on the Grid Network  <b>Note:</b> If your network does not have a gateway, specify the same static IPv4 address for the gateway.	<ul style="list-style-type: none"> <li>• IPv4 address (CIDR):</li> <li>• Gateway:</li> </ul>
Grid Network subnets (CIDRs)	

#### Information needed to connect the SG6000-CN controller to the Client Network

The Client Network for StorageGRID is an optional network, typically used to provide client protocol access to the grid. The appliance connects to the Client Network using the 10/25-GbE ports on the SG6000-CN controller.

Information needed	Your value
Client Network enabled	Choose one: <ul style="list-style-type: none"> <li>• No (default)</li> <li>• Yes</li> </ul>
Network bond mode	Choose one: <ul style="list-style-type: none"> <li>• Active-Backup (default)</li> <li>• LACP (802.3ad)</li> </ul>
VLAN tagging enabled	Choose one: <ul style="list-style-type: none"> <li>• No (default)</li> <li>• Yes</li> </ul>
VLAN tag (If VLAN tagging is enabled)	Enter a value between 0 and 4095:
DHCP-assigned IP address for the Client Network, if available after power on	<ul style="list-style-type: none"> <li>• IPv4 address (CIDR):</li> <li>• Gateway:</li> </ul>
Static IP address you plan to use for the appliance Storage Node on the Client Network  <b>Note:</b> If the Client Network is enabled, the default route on the controller will use the gateway specified here.	<ul style="list-style-type: none"> <li>• IPv4 address (CIDR):</li> <li>• Gateway:</li> </ul>

#### Information needed to connect the SG6000-CN controller to the BMC management network

You can access the BMC interface on the SG6000-CN controller using the following 1-GbE management port. This port supports remote management of the controller hardware over Ethernet using the Intelligent Platform Management Interface (IPMI) standard.



Information needed	Your value
Ethernet switch port you will connect to the BMC management port (circled in the diagram)	
DHCP-assigned IP address for the BMC management network, if available after power on	<ul style="list-style-type: none"> <li>• IPv4 address (CIDR):</li> <li>• Gateway:</li> </ul>

Information needed	Your value
Static IP address you plan to use for the BMC management port	<ul style="list-style-type: none"> <li>IPv4 address (CIDR):</li> <li>Gateway:</li> </ul>

## Related information

[Controllers in the SG6000 appliances](#)

[Reviewing appliance network connections](#)

[Port bond modes for the SG6000-CN controller](#)

[Cabling the appliance \(SG6000\)](#)

[Configuring StorageGRID IP addresses](#)

## Installing the hardware

Hardware installation entails installing the SG6000-CN controller and the storage controller shelf into a cabinet or rack, connecting the cables, and applying power.

### Steps

- [Registering the hardware](#)
- [SG6060: Installing 60-drive shelves into a cabinet or rack](#)
- [SG6060: Installing the drives](#)
- [SGF6024: Installing 24-drive shelves into a cabinet or rack](#)
- [SG6000-CN: Installing into a cabinet or rack](#)
- [Cabling the appliance \(SG6000\)](#)
- [SG6060: Cabling the optional expansion shelves](#)
- [Connecting power cords and applying power \(SG6000\)](#)
- [Viewing status indicators and buttons on the SG6000-CN controller](#)
- [Viewing boot-up status codes for the SG6000 storage controllers](#)

## Registering the hardware

Registering the appliance hardware provides support benefits.

### Steps

- Locate the chassis serial number for the storage controller shelf.

You can find the number on the packing slip, in your confirmation email, or on the appliance after you unpack it.





There are several serial numbers on the storage appliance. The serial number on the storage controller shelf is the one that must be registered and used if you call for service or support on the appliance.

2. Go to the NetApp Support Site at [mysupport.netapp.com](https://mysupport.netapp.com).

3. Determine whether you need to register the hardware:

If you are a...	Follow these steps...
Existing NetApp customer	<ol style="list-style-type: none"><li>Sign in with your username and password.</li><li>Select <b>Products &gt; My Products</b>.</li><li>Confirm that the new serial number is listed.</li><li>If it is not, follow the instructions for new NetApp customers.</li></ol>
New NetApp customer	<ol style="list-style-type: none"><li>Click <b>Register Now</b>, and create an account.</li><li>Select <b>Products &gt; Register Products</b>.</li><li>Enter the product serial number and requested details.</li></ol> <p>After your registration is approved, you can download any required software. The approval process might take up to 24 hours.</p>

#### SG6060: Installing 60-drive shelves into a cabinet or rack

You must install a set of rails for the E2860 controller shelf in your cabinet or rack, and then slide the controller shelf onto the rails. If you are installing 60-drive expansion shelves, the same procedure applies.

##### What you'll need

- You have reviewed the Safety Notices document included in the box, and understand the precautions for moving and installing hardware.
- You have the instructions packaged with the rail kit.



Each 60-drive shelf weighs approximately 132 lb (60 kg) without drives installed. Four people or a mechanized lift are required to safely move the shelf.



To avoid damaging the hardware, never move the shelf if drives are installed. You must remove all drives before moving the shelf.



When installing the E2860 controller shelf or optional expansion shelves, install hardware from the bottom to the top of the rack or cabinet to prevent the equipment from tipping over. To ensure that the heaviest equipment is at the bottom of the cabinet or rack, install the SG6000-CN controller above the E2860 controller shelf and expansion shelves.



Before committing to the installation, verify that the 0.5m optic cables shipped with the appliance, or cables that you supply, are long enough for the planned layout.

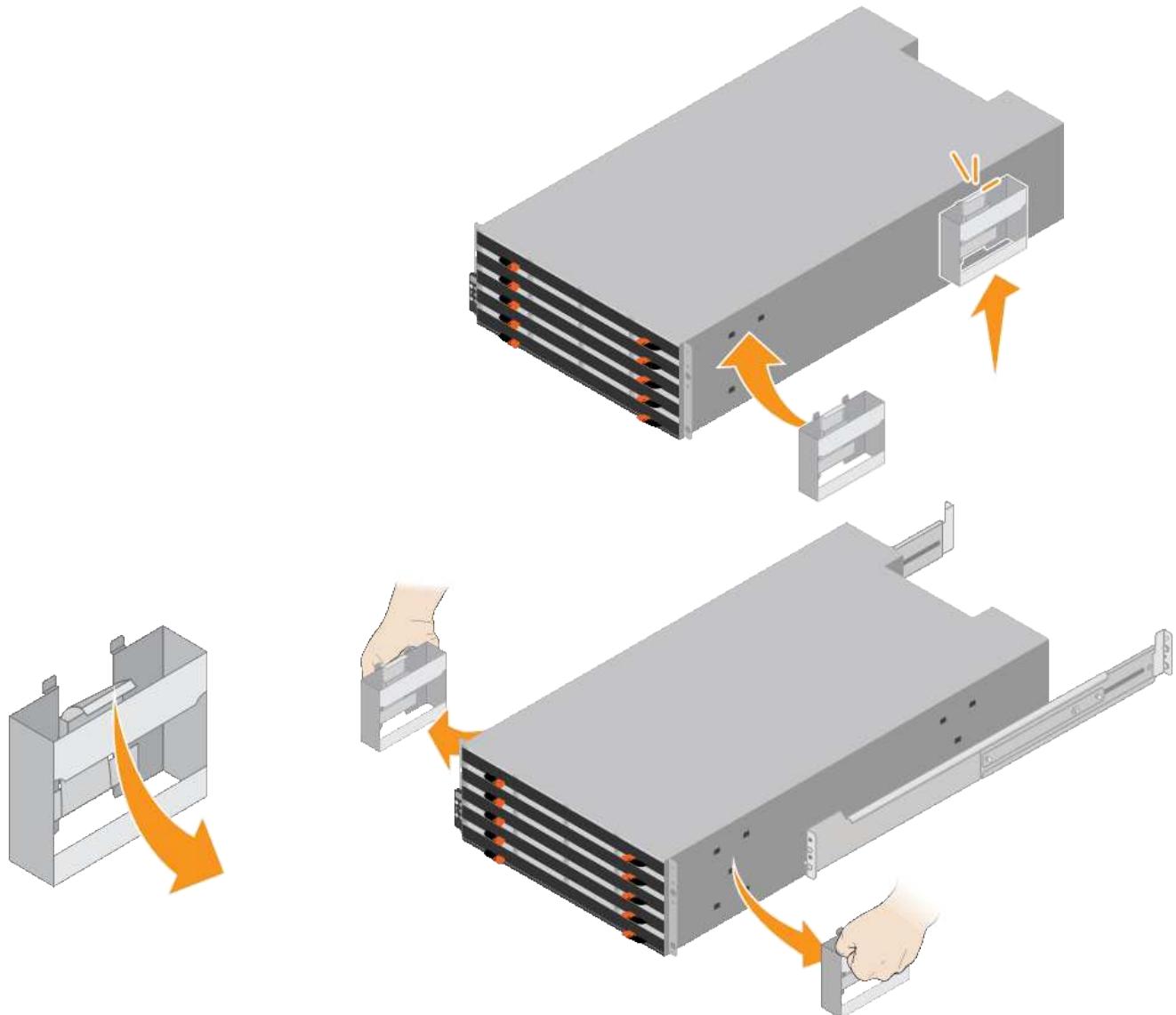
## Steps

1. Carefully follow the instructions for the rail kit to install the rails in your cabinet or rack.

For square hole cabinets, you must first install the provided cage nuts to secure the front and rear of the shelf with screws.

2. Remove the outer packing box for the appliance. Then, fold down the flaps on the inner box.
3. If you are lifting the appliance by hand, attach the four handles to the sides of the chassis.

Push up on each handle until it clicks into place.



4. Place the back of the shelf (the end with the connectors) on the rails.
5. Supporting the shelf from the bottom, slide it into the cabinet. If you are using the handles, use the thumb latches to detach one handle at a time as you slide the shelf in.

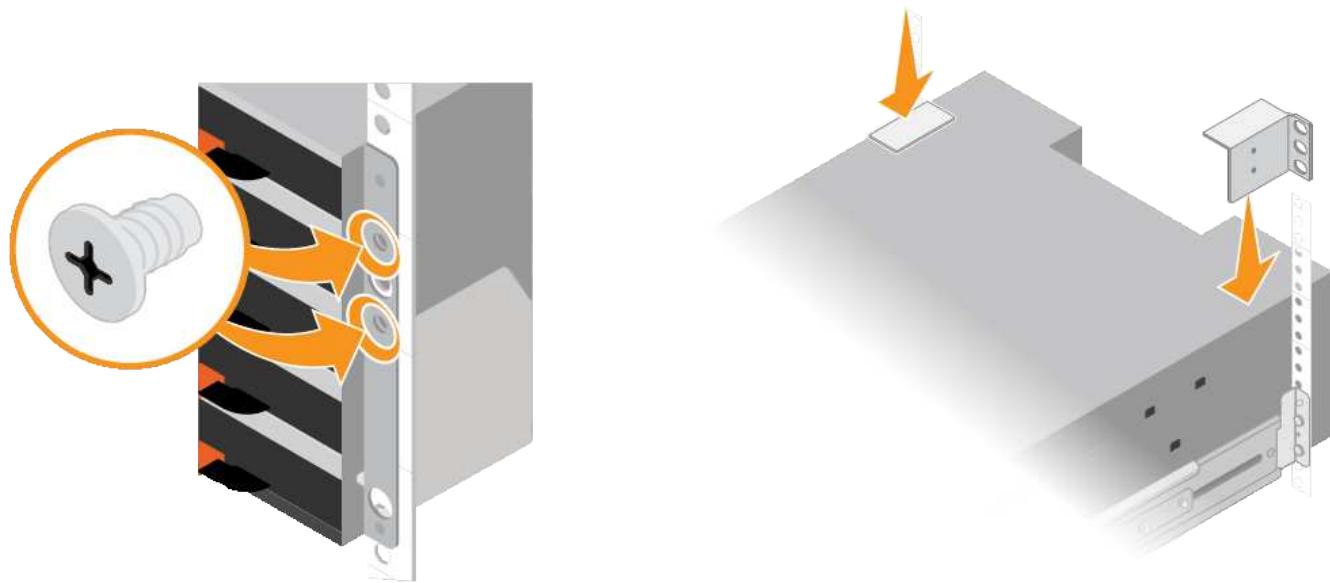
To remove the handles, pull back on the release latch, push down, then pull away from the shelf.

6. Secure the shelf to the front of the cabinet.

Insert screws into the first and third holes from the top of the shelf on both sides.

7. Secure the shelf to the rear of the cabinet.

Place two back brackets on each side of the upper rear section of the shelf. Insert screws into the first and third holes of each bracket.



8. Repeat these steps for any expansion shelves.

### SG6060: Installing the drives

After installing the 60-drive shelf into a cabinet or rack, you must install all 60 drives into the shelf. The shipment for the E2860 controller shelf includes two SSD drives, which you should install in the top drawer of the controller shelf. Each optional expansion shelf includes 60 HDD drives and no SSD drives.

#### What you'll need

You have installed the E2860 controller shelf or optional expansion shelves (one or two) in the cabinet or rack.



To avoid damaging the hardware, never move the shelf if drives are installed. You must remove all drives before moving the shelf.

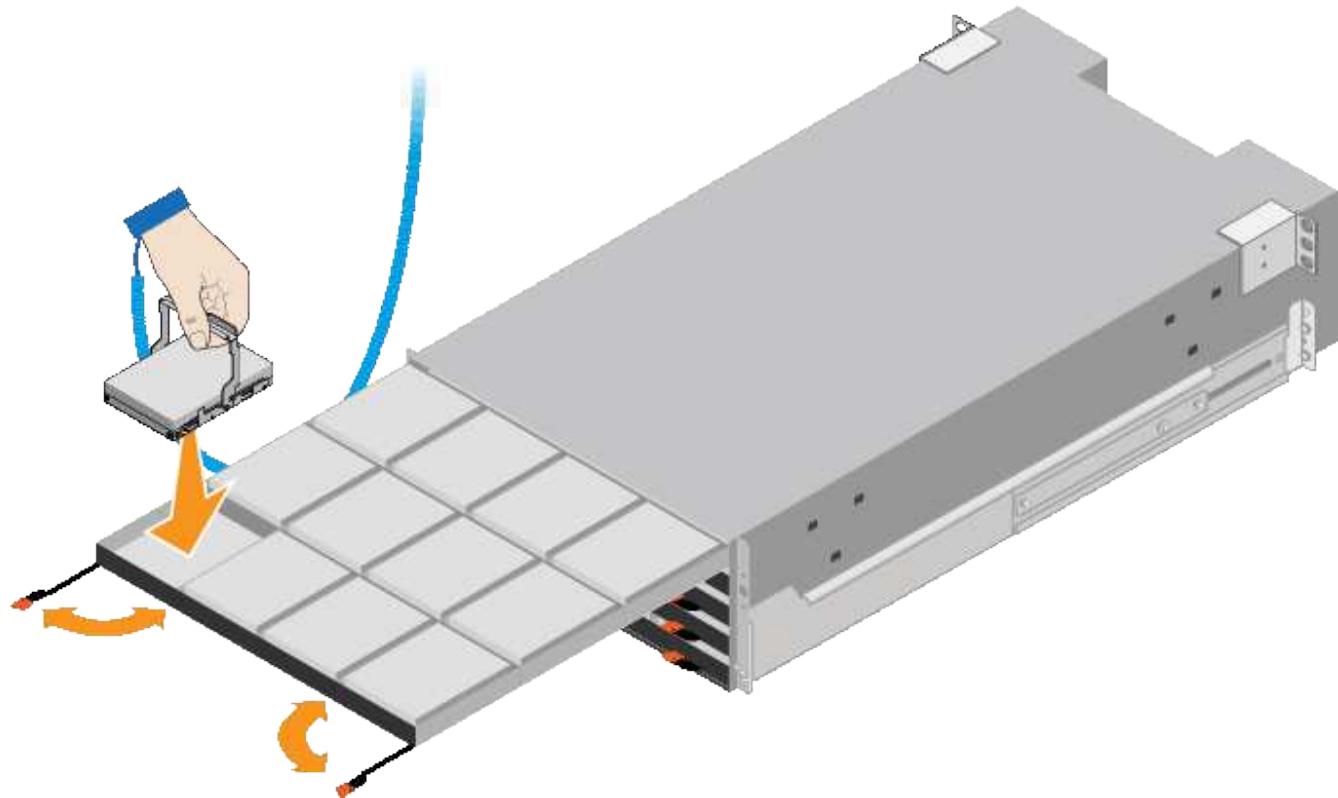
#### Steps

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 drives from their packaging.
3. Release the levers on the top drive drawer, and slide the drawer out using the levers.
4. Locate the two SSD drives.



Expansion shelves do not use SSD drives.

5. Raise each drive handle to a vertical position.
6. Install the two SSD drives in slots 0 and 1 (the first two slots along the lefthand side of the drawer).
7. Gently position each drive into its slot, and lower the raised drive handle until it clicks into place.



8. Install 10 HDD drives into the top drawer.
9. Slide the drawer back in by pushing on the center and closing both levers gently.



Stop pushing the drawer if you feel binding. Use the release levers at the front of the drawer to slide the drawer back out. Then, carefully reinsert the drawer into the slot.

10. Repeat these steps to install HDD drives into the other four drawers.



You must install all 60 drives to ensure correct operation.

11. Attach the front bezel to the shelf.
12. If you have expansion shelves, repeat these steps to install 12 HDD drives into each drawer of each expansion shelf.
13. Proceed to the instructions for installing the SG6000-CN into a cabinet or rack.

#### **SGF6024: Installing 24-drive shelves into a cabinet or rack**

You must install a set of rails for the EF570 controller shelf in your cabinet or rack, and then slide the array onto the rails.

## What you'll need

- You have reviewed the Safety Notices document included in the box, and understand the precautions for moving and installing hardware.
- You have the instructions packaged with the rail kit.

## Steps

1. Carefully follow the instructions for the rail kit to install the rails in your cabinet or rack.

For square hole cabinets, you must first install the provided cage nuts to secure the front and rear of the shelf with screws.

2. Remove the outer packing box for the appliance. Then, fold down the flaps on the inner box.
3. Place the back of the shelf (the end with the connectors) on the rails.



A fully loaded shelf weighs approximately 52 lb (24 kg). Two persons are required to safely move the enclosure.

4. Carefully slide the enclosure all the way onto the rails.



You might need to adjust the rails to ensure that the enclosure slides all the way onto the rails.

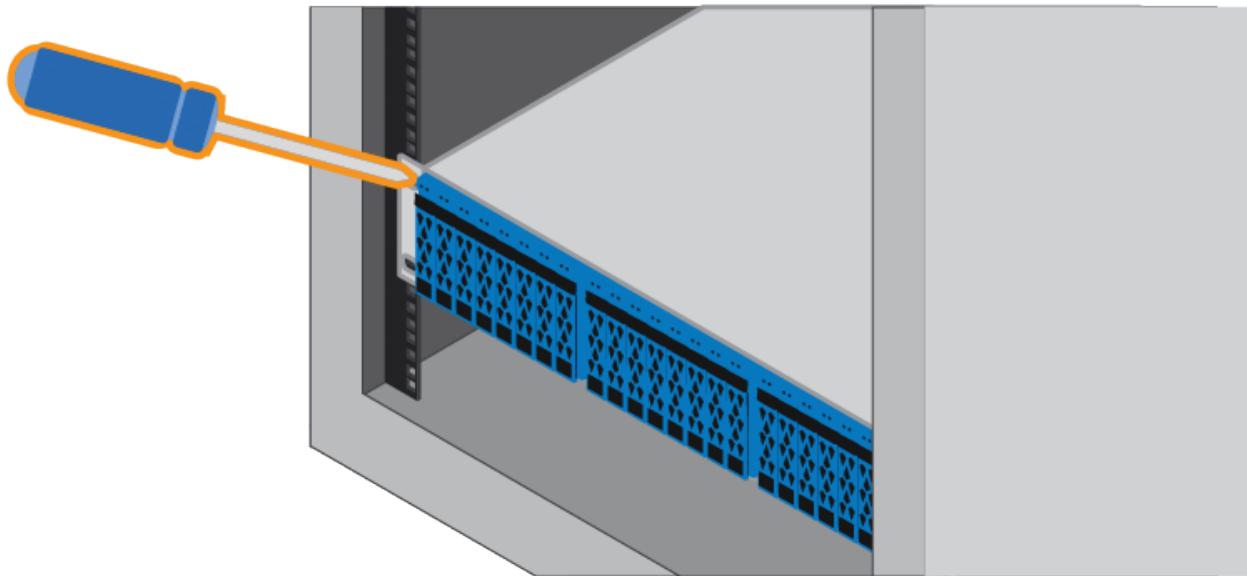


Do not place additional equipment on the rails after you finish installing the enclosure. The rails are not designed to bear additional weight.

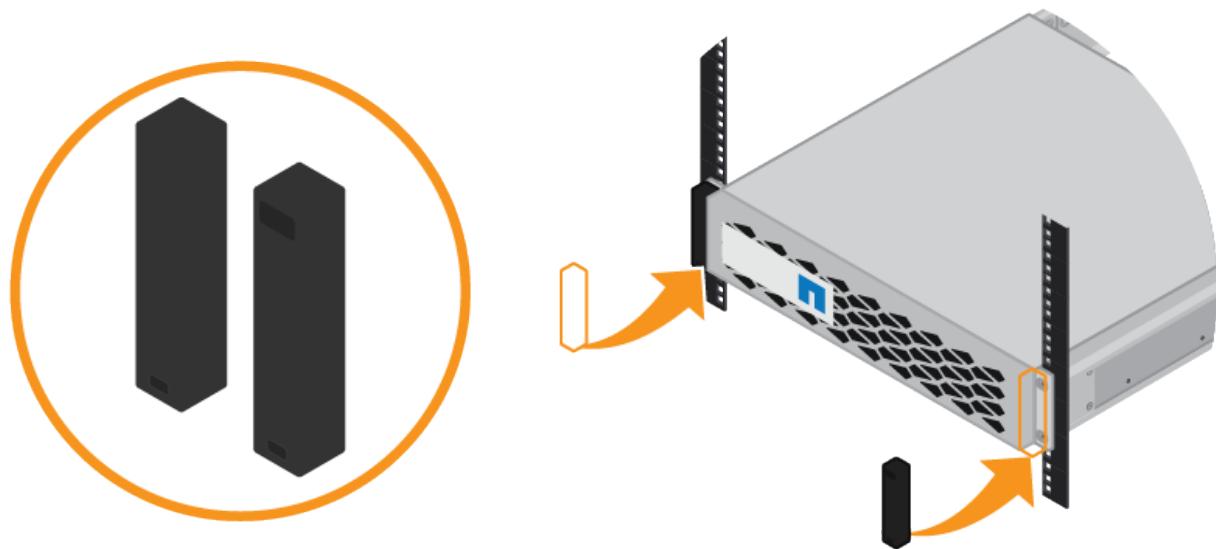


If applicable, you might need to remove the shelf end caps or the system bezel to secure the enclosure to the rack post; if so, you need to replace the end caps or bezel when you are done.

5. Secure the enclosure to the front of the cabinet or rack and rails by inserting two M5 screws through the mounting brackets (preinstalled on either side of the front of the enclosure), the holes on the rack or system cabinet, and the holes on the front of rails.



6. Secure the enclosure to the back of the rails by inserting two M5 screws through the brackets at the enclosure and the rail kit bracket.
7. If applicable, replace the shelf end caps or the system bezel.



#### SG6000-CN: Installing into a cabinet or rack

You must install a set of rails for the SG6000-CN controller in your cabinet or rack, and then slide the controller onto the rails.

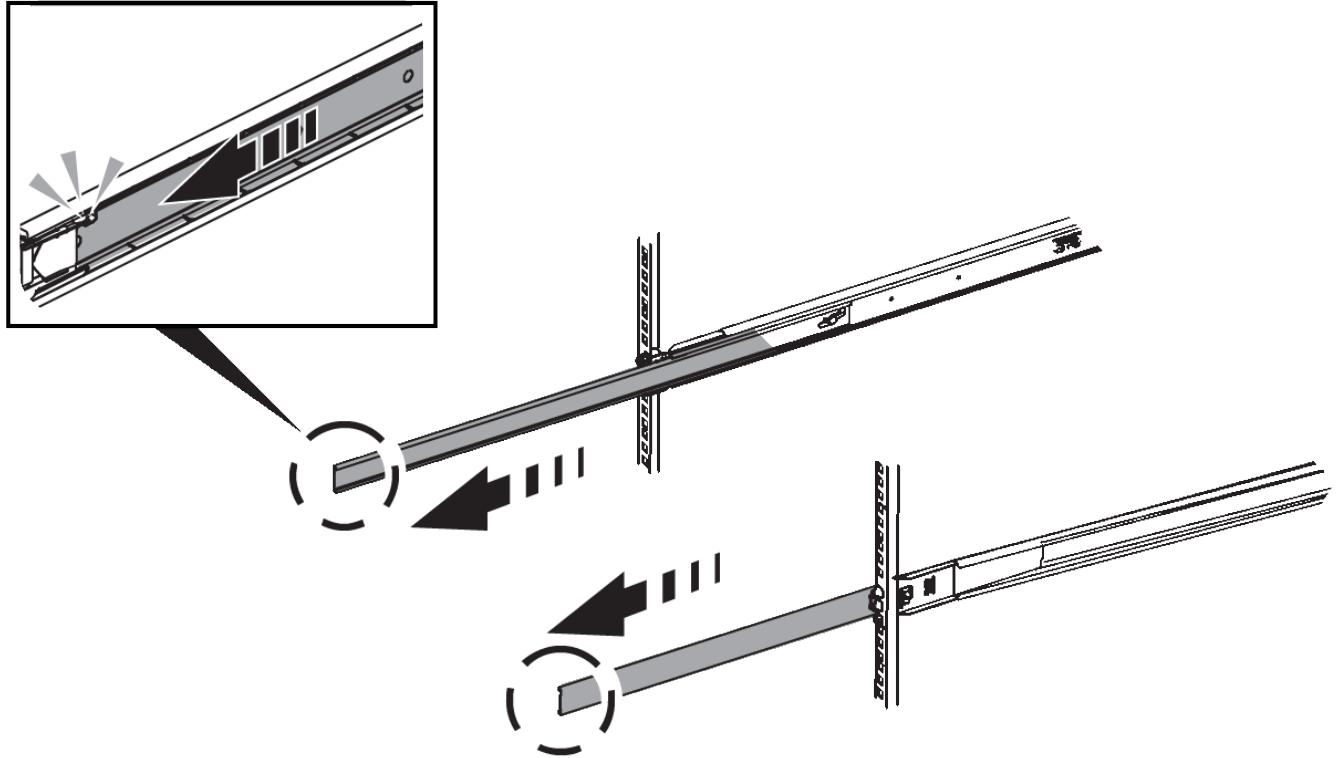
#### What you'll need

- You have reviewed the Safety Notices document included in the box, and understand the precautions for moving and installing hardware.

- You have the instructions packaged with the rail kit.
- You have installed the E2860 controller shelf and drives or the EF570 controller shelf.

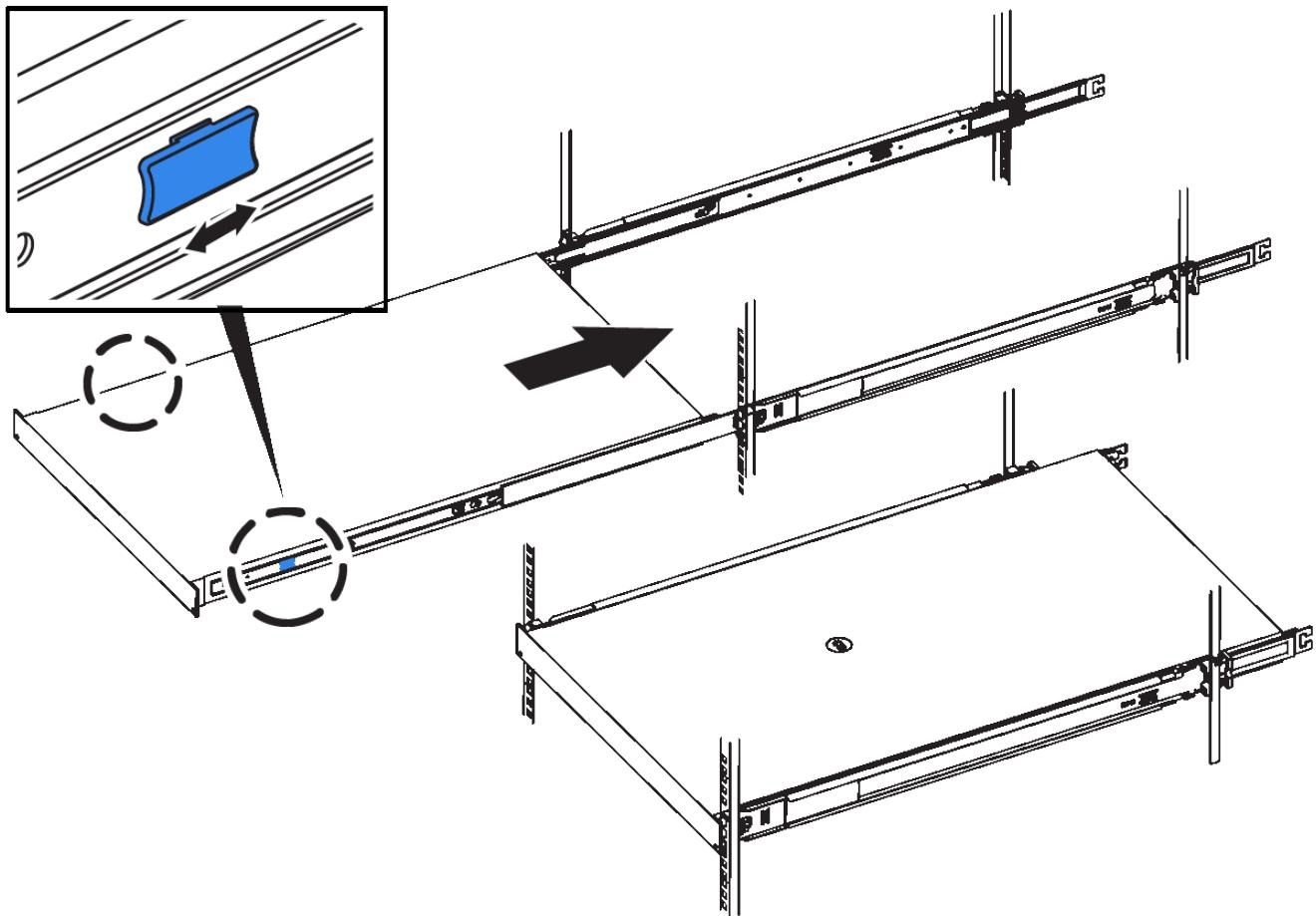
## Steps

1. Carefully follow the instructions for the rail kit to install the rails in your cabinet or rack.
2. On the two rails installed in the cabinet or rack, extend the movable parts of the rails until you hear a click.



3. Insert the SG6000-CN controller into the rails.
4. Slide the controller into the cabinet or rack.

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



Do not attach the front bezel until after you power on the controller.

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



### Cabling the appliance (SG6000)

You must connect the storage controllers to the SG6000-CN controller, connect the management ports on all three controllers, and connect the network ports on the SG6000-CN controller to the Grid Network and optional Client Network for StorageGRID.

#### What you'll need

- You have the four optical cables provided with the appliance for connecting the two storage controllers to the SG6000-CN controller.
- You have RJ-45 Ethernet cables (four minimum) for connecting the management ports.
- You have one of the following options for the network ports. These items are not provided with the appliance.
  - One to four TwinAx cables for connecting the four network ports.

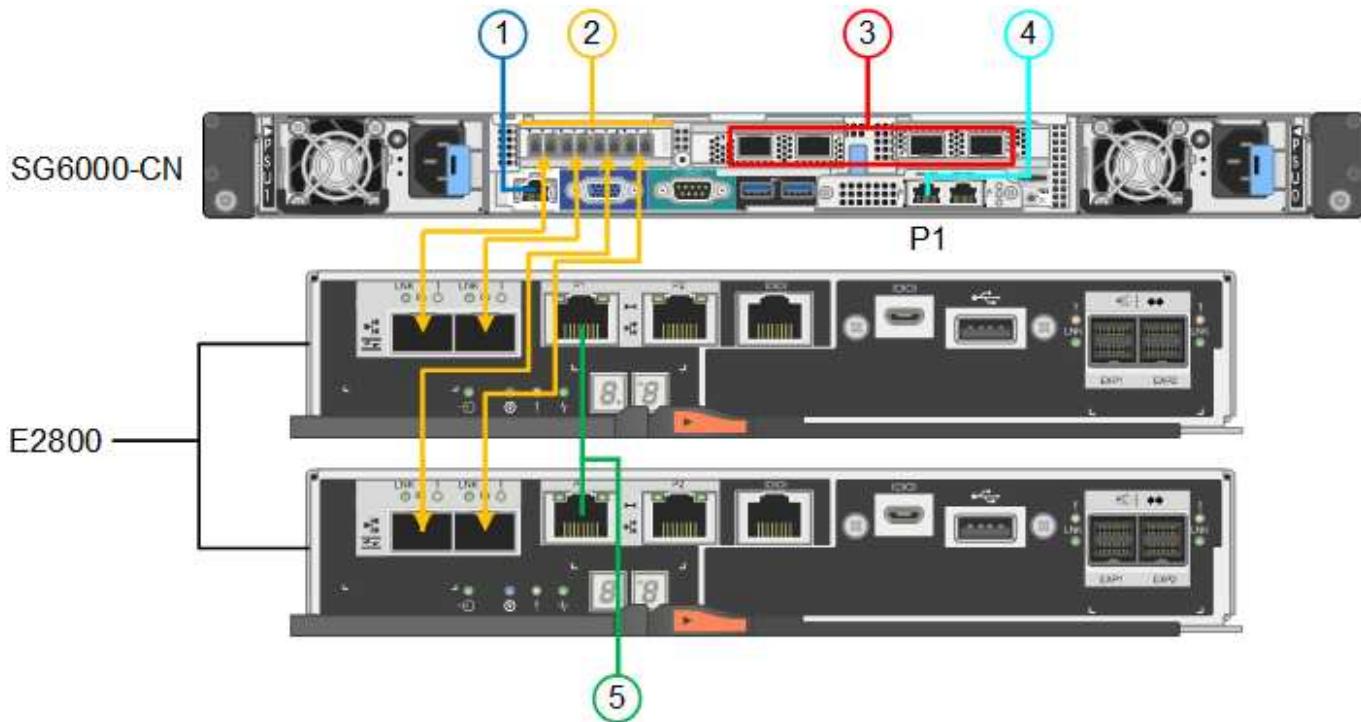
- One to four SFP+ or SFP28 transceivers if you plan to use optical cables for the ports.



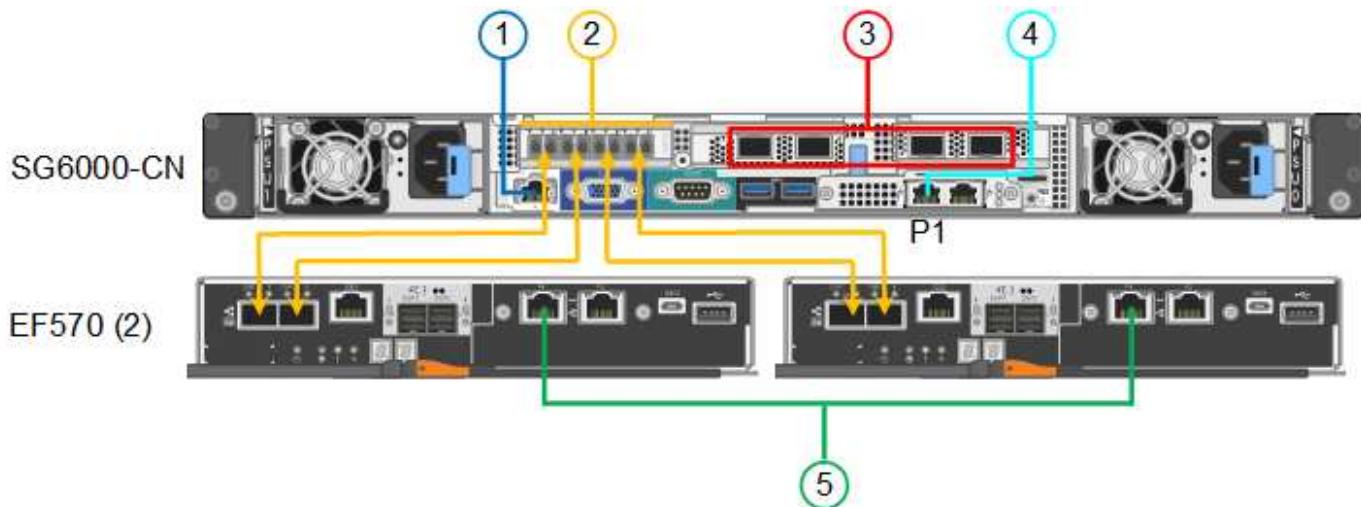
**Risk of exposure to laser radiation** — Do not disassemble or remove any part of an SFP transceiver. You might be exposed to laser radiation.

### About this task

The following figure shows the three controllers in the SG6060 appliance, with the SG6000-CN compute controller on the top and the two E2800 storage controllers on the bottom.



The following figure shows the three controllers in the SGF6024 appliance, with the SG6000-CN compute controller on the top and the two EF570 storage controllers side by side below the compute controller.



	Port	Type of port	Function
1	BMC management port on the SG6000-CN controller	1-GbE (RJ-45)	Connects to the network where you access the BMC interface.
2	FC connection ports: <ul style="list-style-type: none"> <li>• 4 on the SG6000-CN controller</li> <li>• 2 on each storage controller</li> </ul>	16-Gb/s FC optical SFP+	Connect each storage controller to the SG6000-CN controller.
3	Four network ports on the SG6000-CN controller	10/25-GbE	Connect to the Grid Network and the Client Network for StorageGRID.
4	Admin Network port on the SG6000-CN controller (labelled P1 in the figure)	1-GbE (RJ-45)  <b>Important:</b> This port operates only at 1000 baseT/full and does not support 10- or 100-megabit speeds.	Connects the SG6000-CN controller to the Admin Network for StorageGRID.
4	Rightmost RJ-45 port on the SG6000-CN controller	1-GbE (RJ-45)  <b>Important:</b> This port operates only at 1000 baseT/full and does not support 10- or 100-megabit speeds.	<ul style="list-style-type: none"> <li>• Can be bonded with management port 1 if you want a redundant connection to the Admin Network.</li> <li>• Can be left unwired and available for temporary local access (IP 169.254.0.1).</li> <li>• During installation, can be used to connect the SG6000-CN controller to a service laptop if DHCP-assigned IP addresses are not available.</li> </ul>
5	Management port 1 on each storage controller	1-GbE (RJ-45)	Connects to the network where you access SANtricity System Manager.

	Port	Type of port	Function
5	Management port 2 on each storage controller	1-GbE (RJ-45)	Reserved for technical support.

## Steps

1. Connect the BMC management port on the SG6000-CN controller to the management network, using an Ethernet cable.
2. Connect the two FC ports on each storage controller to the FC ports on the SG6000-CN controller, using four optical cables and four SFP+ transceivers for the storage controllers.
3. Connect the network ports on the SG6000-CN controller to the appropriate network switches, using TwinAx cables or optical cables and SFP+ or SFP28 transceivers.



The four network ports must use the same link speed. Install SFP+ transceivers if you plan to use 10-GbE link speeds. Install SFP28 transceivers if you plan to use 25-GbE link speeds.

- If you plan to use Fixed port bond mode (default), connect the ports to the StorageGRID Grid and Client Networks, as shown in the table.

Port	Connects to...
Port 1	Client Network (optional)
Port 2	Grid Network
Port 3	Client Network (optional)
Port 4	Grid Network

- If you plan to use the Aggregate port bond mode, connect one or more of the network ports to one or more switches. You should connect at least two of the four ports to avoid having a single point of failure. If you use more than one switch for a single LACP bond, the switches must support MLAG or equivalent.

4. If you plan to use the Admin Network for StorageGRID, connect the Admin Network port on the SG6000-CN controller to the Admin Network, using an Ethernet cable.
5. Connect management port 1 (P1) on each storage controller (the RJ-45 port on the left) to the management network for SANtricity System Manager, using an Ethernet cable.

Do not use management port 2 (P2) on the storage controllers (the RJ-45 port on the right). This port is reserved for technical support.

## Related information

[Port bond modes for the SG6000-CN controller](#)

[Reinstalling the SG6000-CN controller into a cabinet or rack](#)

## **SG6060: Cabling the optional expansion shelves**

If you are using expansion shelves, you must connect them to the E2860 controller shelf. You can have a maximum of two expansion shelves for each SG6060 appliance.

### **What you'll need**

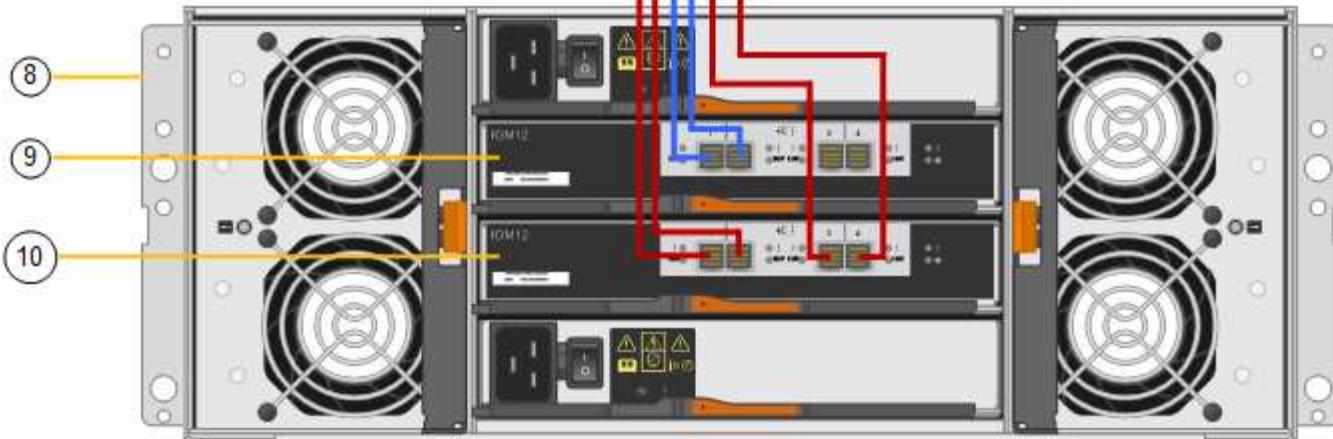
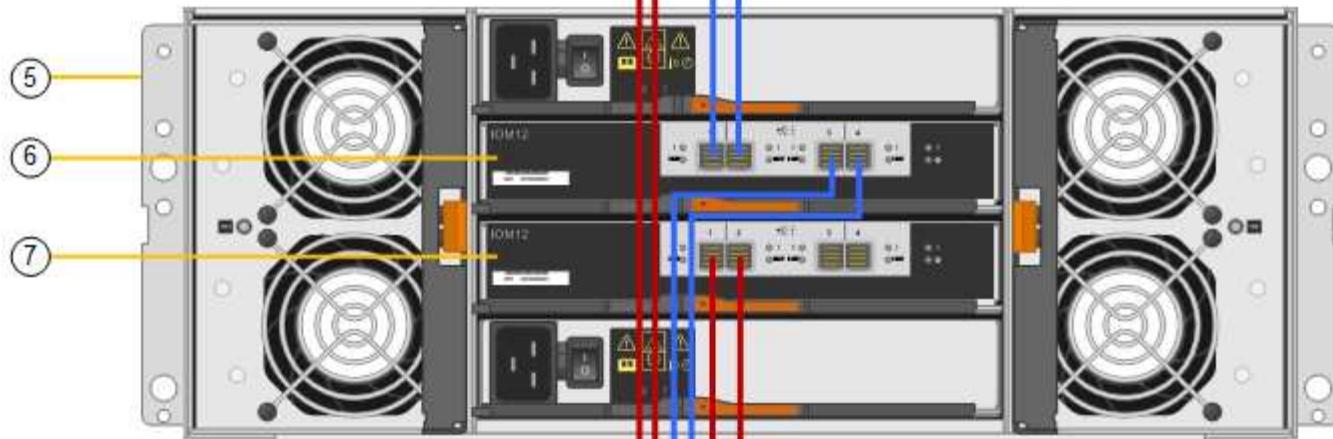
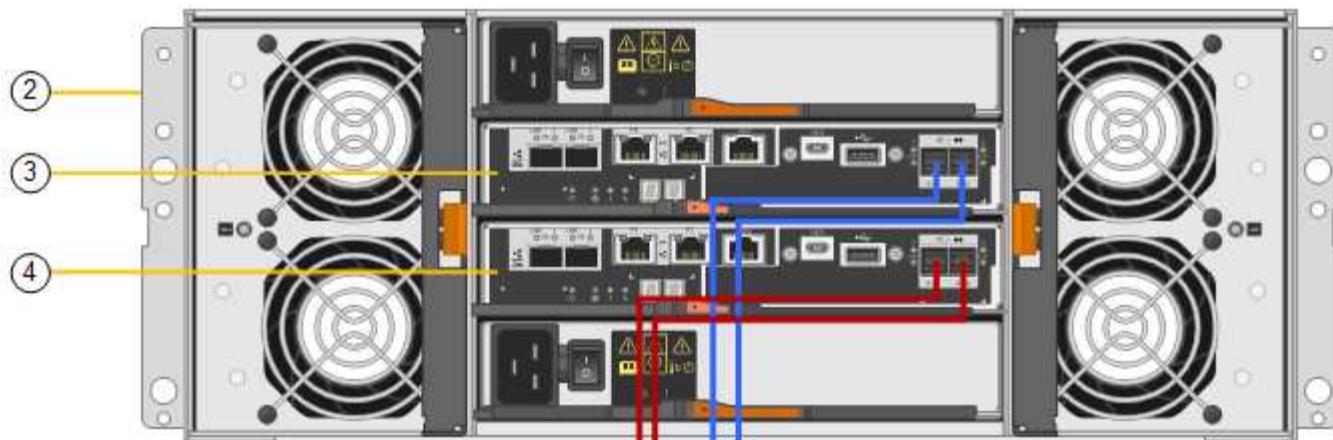
- You have the two SAS cables shipped with each expansion shelf.
- You have installed the expansion shelves in the cabinet or rack that contains the E2860 controller shelf.

### [\*\*SG6060: Installing 60-drive shelves into a cabinet or rack\*\*](#)

### **Step**

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.



	Description
1	SG6000-CN

	<b>Description</b>
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

### Connecting power cords and applying power (SG6000)

After connecting the network cables, you are ready to apply power to the SG6000-CN controller and to the two storage controllers or optional expansion shelves.

#### Steps

1. Confirm that both controllers in the storage controller shelf are off.



**Risk of electrical shock** — Before connecting the power cords, make sure that the power switches for each of the two storage controllers are off.

2. If you have expansion shelves, confirm that both of the IOM power switches are off.



**Risk of electrical shock** — Before connecting the power cords, make sure that the two power switches for each of the expansion shelves are off.

3. Connect a power cord to each of the two power supply units in the SG6000-CN controller.
4. Connect these two power cords to two different power distribution units (PDUs) in the cabinet or rack.
5. Connect a power cord to each of the two power supply units in the storage controller shelf.
6. If you have expansion shelves, connect a power cord to each of the two power supply units in each expansion shelf.
7. Connect the two power cords in each storage shelf (including the optional expansion shelves) to two different PDUs in the cabinet or rack.
8. If the power button on the front of the SG6000-CN controller is not currently illuminated blue, press the button to turn on power to the controller.

Do not press the power button again during the power-on process.

9. Turn on the two power switches on the back of the storage controller shelf. If you have expansion shelves, turn on the two power switches for each shelf.

- Do not turn off the power switches during the power-on process.
- The fans in the storage controller shelf and optional expansion shelves might be very loud when they first start up. The loud noise during start-up is normal.

10. After the components have booted up, check their status.

- Check the seven-segment display on the back of each storage controller. Refer to the article about viewing boot-up status codes for more information.
- Verify that the power button on the front of the SG6000-CN controller is lit.

11. If errors occur, correct any issues.

12. Attach the front bezel to the SG6000-CN controller.

#### Related information

[Viewing boot-up status codes for the SG6000 storage controllers](#)

[Viewing status indicators and buttons on the SG6000-CN controller](#)

[Reinstalling the SG6000-CN controller into a cabinet or rack](#)

#### Viewing status indicators and buttons on the SG6000-CN controller

The SG6000-CN controller includes indicators that help you determine the status of the controller, including the following indicators and buttons.



	Display	Description
1	Power button	<ul style="list-style-type: none"><li>• Blue: The controller is powered on.</li><li>• Off: The controller is powered off.</li></ul>
2	Reset button	<i>No indicator</i>  Use this button to perform a hard reset of the controller.

	Display	Description
3	Identify button	<ul style="list-style-type: none"> <li>• Blinking or solid blue: Identifies the controller in the cabinet or rack.</li> <li>• Off: The controller is not visually identifiable in the cabinet or rack.</li> </ul> <p>This button can be set to Blink, On (Solid), or Off.</p>
4	Alarm LED	<ul style="list-style-type: none"> <li>• Amber: An error has occurred.</li> </ul> <p><b>Note:</b> To view the boot-up and error codes, you must access the BMC interface.</p> <ul style="list-style-type: none"> <li>• Off: No errors are present.</li> </ul>

#### General boot-up codes

During boot-up or after a hard reset of the SG6000-CN controller, the following occurs:

1. The baseboard management controller (BMC) logs codes for the boot-up sequence, including any errors that occur.
2. The power button lights up.
3. If any errors occur during boot-up, the alarm LED lights up.

To view the boot-up and error codes, you must access the BMC interface.

#### Related information

[Troubleshooting the hardware installation](#)

[Configuring the BMC interface](#)

[Powering on the SG6000-CN controller and verifying operation](#)

#### Viewing boot-up status codes for the SG6000 storage controllers

Each storage controller has a seven-segment display that provides status codes as the controller powers up. The status codes are the same for both the E2800 controller and the EF570 controller.

#### About this task

For descriptions of these codes, see the E-Series system monitoring information for your storage controller type.

#### Steps

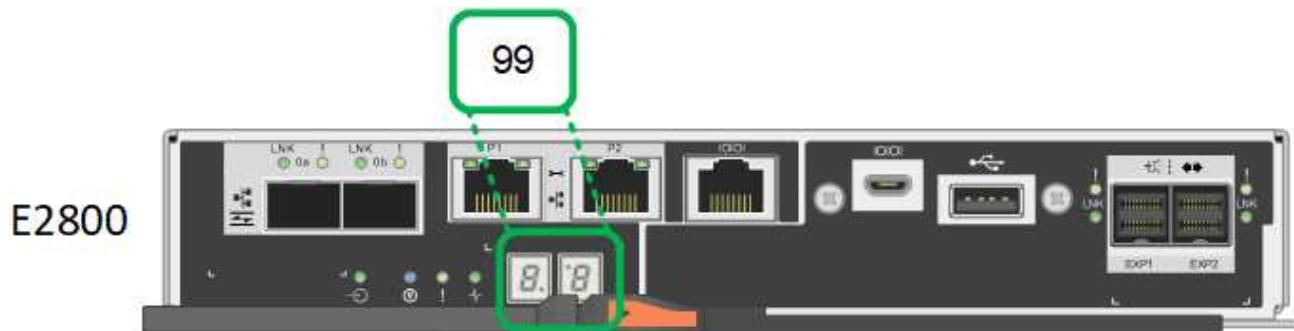
1. During boot-up, monitor progress by viewing the codes shown on the seven-segment display for each

storage controller.

The seven-segment display on each storage controller shows the repeating sequence **OS, Sd, blank** to indicate that the controller is performing start-of-day processing.

2. After the controllers have booted up, confirm that each storage controller shows 99, which is the default ID for an E-Series controller shelf.

Make sure this value is displayed on both storage controllers, as shown in this example E2800 controller.



3. If one or both controllers show other values, see the information about troubleshooting the hardware installation, and confirm you completed the installation steps correctly. If you are unable to resolve the problem, contact technical support.

#### Related information

[E5700 and E2800 System Monitoring Guide](#)

[Troubleshooting the hardware installation](#)

[NetApp Support](#)

[Powering on the SG6000-CN controller and verifying operation](#)

## Configuring the hardware

After applying power to the appliance, you must configure the network connections that will be used by StorageGRID. You must configure SANtricity System Manager, which is the software you will use to monitor the storage controllers and other hardware in the controller shelf. You must also ensure that you can access the BMC interface for the SG6000-CN controller.

#### Steps

- [Configuring StorageGRID connections](#)
- [Accessing and Configuring SANtricity System Manager](#)
- [Configuring the BMC interface](#)
- [Optional: Enabling node encryption](#)
- [Optional: Changing the RAID mode \(SG6000 only\)](#)
- [Optional: Remapping network ports for the appliance](#)

## Configuring StorageGRID connections

Before you can deploy a StorageGRID appliance as a Storage Node in a StorageGRID system, you must configure the connections between the appliance and the networks you plan to use. You can configure networking by browsing to the StorageGRID Appliance Installer, which is pre-installed on the SG6000-CN controller (the compute controller).

### Steps

- [Accessing the StorageGRID Appliance Installer](#)
- [Verifying and upgrading the StorageGRID Appliance Installer version](#)
- [Configuring network links \(SG6000\)](#)
- [Configuring StorageGRID IP addresses](#)
- [Verifying network connections](#)
- [Verifying port-level network connections](#)

#### Accessing the StorageGRID Appliance Installer

You must access the StorageGRID Appliance Installer to verify the installer version and configure the connections between the appliance and the three StorageGRID networks: the Grid Network, the Admin Network (optional), and the Client Network (optional).

#### What you'll need

- You are using any management client that can connect to the StorageGRID Admin Network, or you have a service laptop.
- The client or service laptop has a supported web browser.
- The SG6000-CN controller is connected to all of the StorageGRID networks you plan to use.
- You know the IP address, gateway, and subnet for the SG6000-CN controller on these networks.
- You have configured the network switches you plan to use.

#### About this task

To initially access the StorageGRID Appliance Installer, you can use the DHCP-assigned IP address for the Admin Network port on the SG6000-CN controller (assuming the controller is connected to the Admin Network), or you can connect a service laptop directly to the SG6000-CN controller.

### Steps

1. If possible, use the DHCP address for the Admin Network port on the SG6000-CN controller to access the StorageGRID Appliance Installer.



- a. Locate the MAC address label on the front of the SG6000-CN controller, and determine the MAC address for the Admin Network port.

The MAC address label lists the MAC address for the BMC management port.

To determine the MAC address for the Admin Network port, you must add **2** to the hexadecimal number

on the label. For example, if the MAC address on the label ends in **09**, the MAC address for the Admin Port would end in **0B**. If the MAC address on the label ends in **(y)FF**, the MAC address for the Admin Port would end in **(y+1)01**. You can easily make this calculation by opening Calculator in Windows, setting it to Programmer mode, selecting Hex, typing the MAC address, then typing **+ 2 =**.

- b. Provide the MAC address to your network administrator, so they can look up the DHCP address for the appliance on the Admin Network.
- c. From the client, enter this URL for the StorageGRID Appliance Installer:  
**[https://Appliance\\_Controller\\_IP:8443](https://Appliance_Controller_IP:8443)**

For *SG6000-CN\_Controller\_IP*, use the DHCP address.

- d. If you are prompted with a security alert, view and install the certificate using the browser's installation wizard.

The alert will not appear the next time you access this URL.

The StorageGRID Appliance Installer Home page appears. The information and messages shown when you first access this page depend on how your appliance is currently connected to StorageGRID networks. Error messages might appear that will be resolved in later steps.

# NetApp® StorageGRID® Appliance Installer

[Home](#)[Configure Networking](#)[Configure Hardware](#)[Monitor Installation](#)[Advanced](#)

## Home

**ⓘ** The installation is ready to be started. Review the settings below, and then click Start Installation.

### This Node

Node type

Storage

Node name

MM-2-108-SGA-lab25

[Cancel](#)

[Save](#)

### Primary Admin Node connection

Enable Admin Node discovery

Primary Admin Node IP

172.16.1.178

Connection state

Connection to 172.16.1.178 ready

[Cancel](#)

[Save](#)

### Installation

Current state

Ready to start installation of MM-2-108-SGA-lab25 into grid with Admin Node 172.16.1.178 running StorageGRID 11.2.0, using StorageGRID software downloaded from the Admin Node.

[Start Installation](#)

2. If you cannot obtain an IP address using DHCP, you can use a link-local connection.

- Connect a service laptop directly to the rightmost RJ-45 port on the SG6000-CN controller, using an Ethernet cable.



- Open a web browser on the service laptop.
- Enter this URL for the StorageGRID Appliance Installer:

<https://169.254.0.1:8443>

The StorageGRID Appliance Installer Home page appears. The information and messages shown when you first access this page depend on how your appliance is currently connected.



If you cannot access the Home page over a link-local connection, configure the service laptop IP address as 169.254.0.2, and try again.

## After you finish

After accessing the StorageGRID Appliance Installer:

- Verify that the StorageGRID Appliance Installer version on the appliance matches the software version installed on your StorageGRID system. Upgrade StorageGRID Appliance Installer, if necessary.

### [Verifying and upgrading the StorageGRID Appliance Installer version](#)

- Review any messages displayed on the StorageGRID Appliance Installer Home page and configure the link configuration and the IP configuration, as required.

## Related information

[Web browser requirements](#)

### **Verifying and upgrading the StorageGRID Appliance Installer version**

The StorageGRID Appliance Installer version on the appliance must match the software version installed on your StorageGRID system to ensure that all StorageGRID features are supported.

## What you'll need

You have accessed the StorageGRID Appliance Installer.

## About this task

StorageGRID appliances come from the factory preinstalled with the StorageGRID Appliance Installer. If you are adding an appliance to a recently upgraded StorageGRID system, you might need to manually upgrade the StorageGRID Appliance Installer before installing the appliance as a new node.

The StorageGRID Appliance Installer automatically upgrades when you upgrade to a new StorageGRID version. You do not need to upgrade the StorageGRID Appliance Installer on installed appliance nodes. This procedure is only required when you are installing an appliance that contains an earlier version of the StorageGRID Appliance Installer.

## Steps

- From the StorageGRID Appliance Installer, select **Advanced > Upgrade Firmware**.
- Compare the Current Firmware version to the software version installed on your StorageGRID system (from the Grid Manager select **Help > About**).

The second digit in the two versions should match. For example, if your StorageGRID system is running version 11.5.x.y, the StorageGRID Appliance Installer version should be 3.5.z.

- If the appliance has a down-level version of the StorageGRID Appliance Installer, go to the NetApp Downloads page for StorageGRID.

## NetApp Downloads: StorageGRID

Sign in with the username and password for your NetApp account.

4. Download the appropriate version of the **Support file for StorageGRID Appliances** and the corresponding checksum file.

The Support file for StorageGRID Appliances file is a `.zip` archive that contains the current and previous firmware versions for all StorageGRID appliance models, in subdirectories for each controller type.

After downloading the Support file for StorageGRID Appliances file, extract the `.zip` archive and see the `README` file for important information about installing the StorageGRID Appliance Installer.

5. Follow the instructions on the Upgrade Firmware page of the StorageGRID Appliance Installer to perform these steps:
  - a. Upload the appropriate support file (firmware image) for your controller type and the checksum file.
  - b. Upgrade the inactive partition.
  - c. Reboot and swap partitions.
  - d. Upgrade the second partition.

### Related information

[Accessing the StorageGRID Appliance Installer](#)

#### Configuring network links (SG6000)

You can configure network links for the ports used to connect the appliance to the Grid Network, the Client Network, and the Admin Network. You can set the link speed as well as the port and network bond modes.

#### What you'll need

If you are cloning an appliance node, configure network links for the target appliance for all links used by the source appliance node.

If you plan to use the 25-GbE link speed:

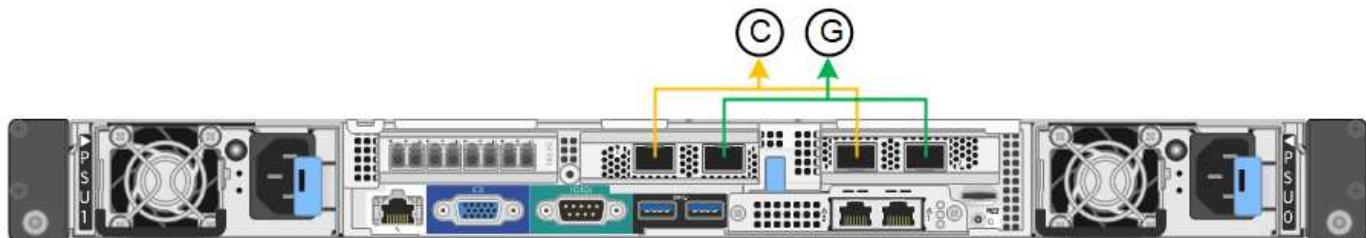
- You are using SFP28 TwinAx cables, or you have installed SFP28 transceivers in the network ports you plan to use.
- You have connected the network ports to switches that can support these features.
- You understand how to configure the switches to use this higher speed.

If you plan to use Aggregate port bond mode, LACP network bond mode, or VLAN tagging:

- You have connected the network ports on the appliance to switches that can support VLAN and LACP.
- If multiple switches are participating in the LACP bond, the switches support multi-chassis link aggregation groups (MLAG), or equivalent.
- You understand how to configure the switches to use VLAN, LACP, and MLAG or equivalent.
- You know the unique VLAN tag to use for each network. This VLAN tag will be added to each network packet to ensure that network traffic is routed to the correct network.

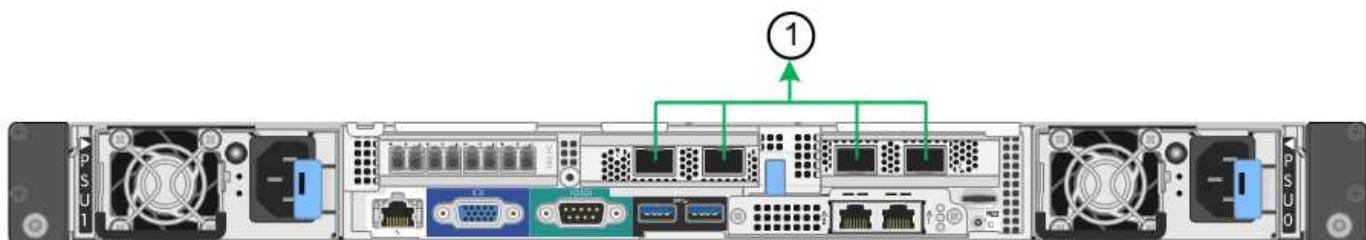
#### About this task

This figure shows how the four network ports are bonded in fixed port bond mode (default configuration).



Which ports are bonded	
C	Ports 1 and 3 are bonded together for the Client Network, if this network is used.
G	Ports 2 and 4 are bonded together for the Grid Network.

This figure shows how the four network ports are bonded in aggregate port bond mode.



Which ports are bonded	
1	All four ports are grouped in a single LACP bond, allowing all ports to be used for Grid Network and Client Network traffic.

The table summarizes the options for configuring the four network ports. The default settings are shown in bold. You only need to configure the settings on the Link Configuration page if you want to use a non-default setting.

- **Fixed (default) port bond mode**

Network bond mode	Client Network disabled (default)	Client Network enabled
<b>Active-Backup (default)</b>	<ul style="list-style-type: none"> <li>• Ports 2 and 4 use an active-backup bond for the Grid Network.</li> <li>• Ports 1 and 3 are not used.</li> <li>• A VLAN tag is optional.</li> </ul>	<ul style="list-style-type: none"> <li>• Ports 2 and 4 use an active-backup bond for the Grid Network.</li> <li>• Ports 1 and 3 use an active-backup bond for the Client Network.</li> <li>• VLAN tags can be specified for both networks for the convenience of the network administrator.</li> </ul>

Network bond mode	Client Network disabled (default)	Client Network enabled
LACP (802.3ad)	<ul style="list-style-type: none"> <li>Ports 2 and 4 use an LACP bond for the Grid Network.</li> <li>Ports 1 and 3 are not used.</li> <li>A VLAN tag is optional.</li> </ul>	<ul style="list-style-type: none"> <li>Ports 2 and 4 use an LACP bond for the Grid Network.</li> <li>Ports 1 and 3 use an LACP bond for the Client Network.</li> <li>VLAN tags can be specified for both networks for the convenience of the network administrator.</li> </ul>

- Aggregate port bond mode

Network bond mode	Client Network disabled (default)	Client Network enabled
LACP (802.3ad) only	<ul style="list-style-type: none"> <li>Ports 1-4 use a single LACP bond for the Grid Network.</li> <li>A single VLAN tag identifies Grid Network packets.</li> </ul>	<ul style="list-style-type: none"> <li>Ports 1-4 use a single LACP bond for the Grid Network and the Client Network.</li> <li>Two VLAN tags allow Grid Network packets to be segregated from Client Network packets.</li> </ul>

See “Network port connections for the SG6000-CN controller” for more information about port bond and network bond modes.

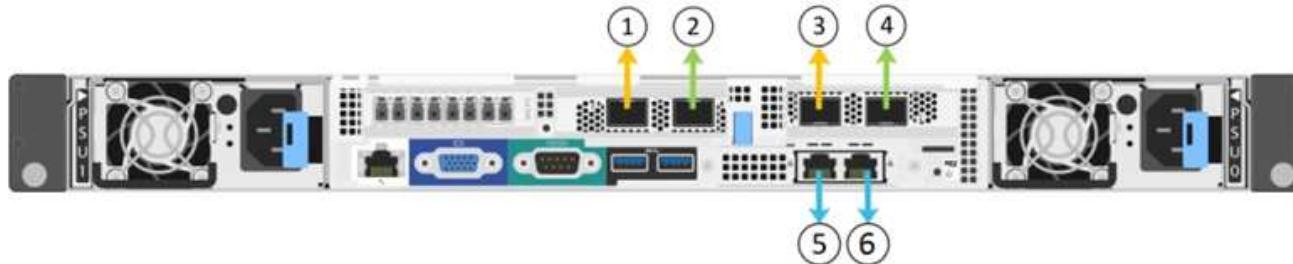
This figure shows how the two 1-GbE management ports on the SG6000-CN controller are bonded in Active-Backup network bond mode for the Admin Network.



### Steps

- From the StorageGRID Appliance Installer, click **Configure Networking > Link Configuration**.

The Network Link Configuration page displays a diagram of your appliance with the network and management ports numbered.



**⚠** You might lose your connection if you make changes to the network or link you are connected through. If you are not reconnected within 1 minute, re-enter the URL using one of the other IP addresses assigned to the appliance.

The Link Status table lists the link state (up/down) and speed (1/10/25/40/100 Gbps) of the numbered ports.

#### Link Status

Link	State	Speed (Gbps)
1	Up	10
2	Up	10
3	Down	N/A
4	Down	N/A
5	Up	1
6	Up	1

The first time you access this page:

- **Link Speed** is set to **10GbE**.
- **Port bond mode** is set to **Fixed**.
- **Network bond mode** is set to **Active-Backup** for the Grid Network.
- The **Admin Network** is enabled, and the network bond mode is set to **Independent**.
- The **Client Network** is disabled.

## Link Settings

Link speed

Port bond mode  Fixed  Aggregate

Choose Fixed port bond mode if you want to use ports 2 and 4 for the Grid Network and ports 1 and 3 for the Client Network (if enabled). Choose Aggregate port bond mode if you want all connected ports to share a single LACP bond for both the Grid and Client Networks.

## Grid Network

Enable network

Network bond mode  Active-Backup  LACP (802.3ad)

Enable VLAN (802.1q) tagging

MAC Addresses 50:6b:4b:42:d7:00 50:6b:4b:42:d7:01 50:6b:4b:42:d7:24 50:6b:4b:42:d7:25

If you are using DHCP, it is recommended that you configure a permanent DHCP reservation. Use all of these MAC addresses in the reservation to assign one IP address to this network interface.

## Admin Network

Enable network

Network bond mode  Independent  Active-Backup

Connect the Admin Network to port 5. Leave port 6 unconnected. If necessary, you can make a temporary direct Ethernet connection to port 6 and use link-local IP address 169.254.0.1 for access.

MAC Addresses d8:c4:97:2a:e4:95

If you are using DHCP, it is recommended that you configure a permanent DHCP reservation. Use all of these MAC addresses in the reservation to assign one IP address to this network interface.

## Client Network

Enable network

Enabling the Client Network causes the default gateway for this node to move to the Client Network. Before enabling the Client Network, ensure that you've added all necessary subnets to the Grid Network Subnet List. Otherwise, the connection to the node might be lost.

2. If you plan to use the 25-GbE link speed for the network ports, select **25GbE** from the Link speed drop-down list.

The network switches you are using for the Grid Network and the Client Network must also support and be configured for this speed. You must use SFP28 TwinAx cables or optical cables and SFP28 transceivers.

3. Enable or disable the StorageGRID networks you plan to use.

The Grid Network is required. You cannot disable this network.

- a. If the appliance is not connected to the Admin Network, unselect the **Enable network** check box for the Admin Network.

#### Admin Network

Enable network

- b. If the appliance is connected to the Client Network, select the **Enable network** check box for the Client Network.

The Client Network settings for the network ports are now shown.

4. Refer to the table, and configure the port bond mode and the network bond mode.

This example shows:

- **Aggregate** and **LACP** selected for the Grid and the Client networks. You must specify a unique VLAN tag for each network. You can select values between 0 and 4095.
- **Active-Backup** selected for the Admin Network.

## Link Settings

Link speed	10GbE
Port bond mode	<input type="radio"/> Fixed <input checked="" type="radio"/> Aggregate
Choose Fixed port bond mode if you want to use ports 2 and 4 for the Grid Network and ports 1 and 3 for the Client Network (if enabled). Choose Aggregate port bond mode if you want all connected ports to share a single LACP bond for both the Grid and Client Networks.	
<hr/>	
<b>Grid Network</b>	
Enable network	<input checked="" type="checkbox"/>
Network bond mode	<input type="radio"/> Active-Backup <input checked="" type="radio"/> LACP (802.3ad)
If the port bond mode is Aggregate, all bonds must be in LACP (802.3ad) mode.	
Enable VLAN (802.1q) tagging	<input checked="" type="checkbox"/>
VLAN (802.1q) tag	328
<hr/>	
<b>Admin Network</b>	
Enable network	<input checked="" type="checkbox"/>
Network bond mode	<input type="radio"/> Independent <input checked="" type="radio"/> Active-Backup
Connect the Admin Network to ports 5 and 6. If necessary, you can make a temporary direct Ethernet connection by disconnecting ports 5 and 6, then connecting to port 6 and using link-local IP address 169.254.0.1 for access.	
<hr/>	
<b>Client Network</b>	
Enable network	<input checked="" type="checkbox"/>
Network bond mode	<input type="radio"/> Active-Backup <input checked="" type="radio"/> LACP (802.3ad)
If the port bond mode is Aggregate, all bonds must be in LACP (802.3ad) mode.	
Enable VLAN (802.1q) tagging	<input checked="" type="checkbox"/>
VLAN (802.1q) tag	332

5. 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 are not 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://SG6000-CN\\_Controller\\_IP:8443](https://SG6000-CN_Controller_IP:8443)**

## Related information

[Port bond modes for the SG6000-CN controller](#)

[Configuring StorageGRID IP addresses](#)

## Configuring StorageGRID IP addresses

You use the StorageGRID Appliance Installer to configure the IP addresses and routing information used for the appliance Storage Node on the StorageGRID Grid, Admin, and Client Networks.

### About this task

You must either assign a static IP for the appliance on each connected network or assign a permanent lease for the address on the DHCP server.

If you want to change the link configuration, see the instructions for changing the link configuration of the SG6000-CN controller.

### Steps

1. In the StorageGRID Appliance Installer, select **Configure Networking > IP Configuration**.  
The IP Configuration page appears.
2. To configure the Grid Network, select either **Static** or **DHCP** in the **Grid Network** section of the page.

## Grid Network

The Grid Network is used for all internal StorageGRID traffic. The Grid Network provides connectivity between all nodes in the grid, across all sites and subnets. All hosts on the Grid Network must be able to talk to all other hosts. The Grid Network can consist of multiple subnets. Networks containing critical grid services, such as NTP, can also be added as Grid subnets.

IP  Static  DHCP

Assignment

IPv4 Address (CIDR)

Gateway

**⚠ All required Grid Network subnets must also be defined in the Grid Network Subnet List on the Primary Admin Node before starting installation.**

Subnets (CIDR)	<input type="text" value="172.18.0.0/21"/> <span style="color: red;">×</span>
	<input type="text" value="172.18.0.0/21"/> <span style="color: red;">×</span>
	<input type="text" value="192.168.0.0/21"/> <span style="color: green;">+ ×</span>
MTU	<input type="text" value="1500"/> <span style="border: 1px solid black; padding: 2px;">▼</span>

Cancel Save

3. If you selected **Static**, follow these steps to configure the Grid Network:

- Enter the static IPv4 address, using CIDR notation.
- Enter the gateway.

If your network does not have a gateway, re-enter the same static IPv4 address.

- If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.



For the best network performance, all nodes should be configured with similar MTU values on their Grid Network interfaces. The **Grid Network MTU mismatch** alert is triggered if there is a significant difference in MTU settings for the Grid Network on individual nodes. The MTU values do not have to be the same for all network types.

d. Click **Save**.

When you change the IP address, the gateway and list of subnets might also change.

If you lose your connection to the StorageGRID Appliance Installer, re-enter the URL using the new static IP address you just assigned. For example,

**`https://services_appliance_IP:8443`**

e. Confirm that the list of Grid Network subnets is correct.

If you have grid subnets, the Grid Network gateway is required. All grid subnets specified must be reachable through this gateway. These Grid Network subnets must also be defined in the Grid Network Subnet List on the primary Admin Node when you start StorageGRID installation.



The default route is not listed. If the Client Network is not enabled, the default route will use the Grid Network gateway.

- To add a subnet, click the insert icon  to the right of the last entry.
- To remove an unused subnet, click the delete icon .

f. Click **Save**.

4. If you selected **DHCP**, follow these steps to configure the Grid Network:

a. After you select the **DHCP** radio button, click **Save**.

The **IPv4 Address**, **Gateway**, and **Subnets** fields are automatically populated. If the DHCP server is set up to assign an MTU value, the **MTU** field is populated with that value, and the field becomes read-only.

Your web browser is automatically redirected to the new IP address for the StorageGRID Appliance Installer.

b. Confirm that the list of Grid Network subnets is correct.

If you have grid subnets, the Grid Network gateway is required. All grid subnets specified must be reachable through this gateway. These Grid Network subnets must also be defined in the Grid Network Subnet List on the primary Admin Node when you start StorageGRID installation.



The default route is not listed. If the Client Network is not enabled, the default route will use the Grid Network gateway.

- To add a subnet, click the insert icon  to the right of the last entry.
- To remove an unused subnet, click the delete icon .

c. If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.



For the best network performance, all nodes should be configured with similar MTU values on their Grid Network interfaces. The **Grid Network MTU mismatch** alert is triggered if there is a significant difference in MTU settings for the Grid Network on individual nodes. The MTU values do not have to be the same for all network types.

d. Click **Save**.

5. To configure the Admin Network, select either **Static** or **DHCP** in the **Admin Network** section of the page.



To configure the Admin Network, you must enable the Admin Network on the Link Configuration page.

## Admin Network

The Admin Network is a closed network used for system administration and maintenance. The Admin Network is typically a private network and does not need to be routable between sites.

IP Assignment  Static  DHCP

IPv4 Address (CIDR)

Gateway

Subnets (CIDR)  +

MTU  ▼

Cancel Save

6. If you selected **Static**, follow these steps to configure the Admin Network:

a. Enter the static IPv4 address, using CIDR notation, for Management Port 1 on the appliance.

Management Port 1 is the left of the two 1-GbE RJ45 ports on the right end of the appliance.

b. Enter the gateway.

If your network does not have a gateway, re-enter the same static IPv4 address.

c. If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as

9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.

d. Click **Save**.

When you change the IP address, the gateway and list of subnets might also change.

If you lose your connection to the StorageGRID Appliance Installer, re-enter the URL using the new static IP address you just assigned. For example,

**`https://services_appliance:8443`**

e. Confirm that the list of Admin Network subnets is correct.

You must verify that all subnets can be reached using the gateway you provided.



The default route cannot be made to use the Admin Network gateway.

- To add a subnet, click the insert icon  to the right of the last entry.
- To remove an unused subnet, click the delete icon .

f. Click **Save**.

7. If you selected **DHCP**, follow these steps to configure the Admin Network:

a. After you select the **DHCP** radio button, click **Save**.

The **IPv4 Address**, **Gateway**, and **Subnets** fields are automatically populated. If the DHCP server is set up to assign an MTU value, the **MTU** field is populated with that value, and the field becomes read-only.

Your web browser is automatically redirected to the new IP address for the StorageGRID Appliance Installer.

b. Confirm that the list of Admin Network subnets is correct.

You must verify that all subnets can be reached using the gateway you provided.



The default route cannot be made to use the Admin Network gateway.

- To add a subnet, click the insert icon  to the right of the last entry.
- To remove an unused subnet, click the delete icon .

c. If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.

d. Click **Save**.

8. To configure the Client Network, select either **Static** or **DHCP** in the **Client Network** section of the page.



To configure the Client Network, you must enable the Client Network on the Link Configuration page.

## Client Network

The Client Network is an open network used to provide access to client applications, including S3 and Swift. The Client Network enables grid nodes to communicate with any subnet reachable through the Client Network gateway. The Client Network does not become operational until you complete the StorageGRID configuration steps.

IP Assignment

Static     DHCP

IPv4 Address (CIDR)

Gateway

MTU

9. If you selected **Static**, follow these steps to configure the Client Network:

- Enter the static IPv4 address, using CIDR notation.
- Click **Save**.
- Confirm that the IP address for the Client Network gateway is correct.



If the Client Network is enabled, the default route is displayed. The default route uses the Client Network gateway and cannot be moved to another interface while the Client Network is enabled.

- If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.

10. If you selected **DHCP**, follow these steps to configure the Client Network:

- After you select the **DHCP** radio button, click **Save**.

The **IPv4 Address** and **Gateway** fields are automatically populated. If the DHCP server is set up to assign an MTU value, the **MTU** field is populated with that value, and the field becomes read-only.

Your web browser is automatically redirected to the new IP address for the StorageGRID Appliance Installer.

b. Confirm that the gateway is correct.



If the Client Network is enabled, the default route is displayed. The default route uses the Client Network gateway and cannot be moved to another interface while the Client Network is enabled.

c. If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.

## Related information

[Changing the link configuration of the SG6000-CN controller](#)

### Verifying network connections

You should confirm you can access the StorageGRID networks you are using from the appliance. To validate routing through network gateways, you should test connectivity between the StorageGRID Appliance Installer and IP addresses on different subnets. You can also verify the MTU setting.

#### Steps

1. From the menu bar of the StorageGRID Appliance Installer, click **Configure Networking > Ping and MTU Test**.

The Ping and MTU Test page appears.

#### Ping and MTU Test

Use a ping request to check the appliance's connectivity to a remote host. Select the network you want to check connectivity through, and enter the IP address of the host you want to reach. To verify the MTU setting for the entire path through the network to the destination, select Test MTU.

#### Ping and MTU Test

Network	<input type="text" value="Grid"/>
Destination IPv4 Address or FQDN	<input type="text"/>
Test MTU	<input type="checkbox"/>
<b>Test Connectivity</b>	

2. From the **Network** drop-down box, select the network you want to test: Grid, Admin, or Client.

3. Enter the IPv4 address or fully qualified domain name (FQDN) for a host on that network.

For example, you might want to ping the gateway on the network or the primary Admin Node.

4. Optionally, select the **Test MTU** check box to verify the MTU setting for the entire path through the network to the destination.

For example, you can test the path between the appliance node and a node at a different site.

5. Click **Test Connectivity**.

If the network connection is valid, the "Ping test passed" message appears, with the ping command output listed.

### Ping and MTU Test

Use a ping request to check the appliance's connectivity to a remote host. Select the network you want to check connectivity through, and enter the IP address of the host you want to reach. To verify the MTU setting for the entire path through the network to the destination, select Test MTU.

#### Ping and MTU Test

Network	<input type="text" value="Grid"/> <input type="button" value="▼"/>
Destination IPv4 Address or FQDN	<input type="text" value="10.96.104.223"/>
Test MTU	<input checked="" type="checkbox"/>
<input type="button" value="Test Connectivity"/>	

Ping test passed

Ping command output

```
PING 10.96.104.223 (10.96.104.223) 1472(1500) bytes of data.
1480 bytes from 10.96.104.223: icmp_seq=1 ttl=64 time=0.318 ms

--- 10.96.104.223 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 0.318/0.318/0.318/0.000 ms

Found MTU 1500 for 10.96.104.223 via br0
```

### Related information

[Configuring network links \(SG6000\)](#)

[Changing the MTU setting](#)

[Verifying port-level network connections](#)

To ensure that access between the StorageGRID Appliance Installer and other nodes is

not obstructed by firewalls, confirm that the StorageGRID Appliance Installer can connect to a specific TCP port or set of ports at the specified IP address or range of addresses.

## About this task

Using the list of ports provided in the StorageGRID Appliance Installer, you can test the connectivity between the appliance and the other nodes in your Grid Network.

Additionally, you can test connectivity on the Admin and Client Networks and on UDP ports, such as those used for external NFS or DNS servers. For a list of these ports, see the port reference in the StorageGRID networking guidelines.



The Grid Network ports listed in the port connectivity table are valid only for StorageGRID version 11.5.0. To verify which ports are correct for each node type, you should always consult the networking guidelines for your version of StorageGRID.

## Steps

1. From the StorageGRID Appliance Installer, click **Configure Networking > Port Connectivity Test (nmap)**.

The Port Connectivity Test page appears.

The port connectivity table lists node types that require TCP connectivity on the Grid Network. For each node type, the table lists the Grid Network ports that should be accessible to your appliance.

The following node types require TCP connectivity on the Grid Network.

Node Type	Grid Network Ports
Admin Node	22,80,443,1504,1505,1506,1508,7443,9999
Storage Node without ADC	22,1139,1502,1506,1511,7001,9042,9999,18002,18017,18019,18082,18083,18200
Storage Node with ADC	22,1139,1501,1502,1506,1511,7001,9042,9999,18000,18001,18002,18003,18017,18019,18082,18083,18200,19000
API Gateway	22,1506,1507,9999
Archive Node	22,1506,1509,9999,11139

You can test the connectivity between the appliance ports listed in the table and the other nodes in your Grid Network.

2. From the **Network** drop-down, select the network you want to test: **Grid**, **Admin**, or **Client**.
3. Specify a range of IPv4 addresses for the hosts on that network.

For example, you might want to probe the gateway on the network or the primary Admin Node.

Specify a range using a hyphen, as shown in the example.

4. Enter a TCP port number, a list of ports separated by commas, or a range of ports.

The following node types require TCP connectivity on the Grid Network.

Node Type	Grid Network Ports
Admin Node	22,80,443,1504,1505,1506,1508,7443,9999
Storage Node without ADC	22,1139,1502,1506,1511,7001,9042,9999,18002,18017,18019,18082,18083,18200
Storage Node with ADC	22,1139,1501,1502,1506,1511,7001,9042,9999,18000,18001,18002,18003,18017,18019,18082,18083,18200,19000
API Gateway	22,1506,1507,9999
Archive Node	22,1506,1509,9999,11139

#### Port Connectivity Test

Network

IPv4 Address Ranges

Port Ranges

Protocol  TCP  UDP

#### 5. Click Test Connectivity.

- If the selected port-level network connections are valid, the “Port connectivity test passed” message appears in a green banner. The nmap command output is listed below the banner.

Port connectivity test passed

Nmap command output. Note: Unreachable hosts will not appear in the output.

```
# Nmap 7.70 scan initiated Fri Nov 13 18:32:03 2020 as: /usr/bin/nmap -n -oN - -e br0 -p 22,2022 10.224.6.160-161
Nmap scan report for 10.224.6.160
Host is up (0.00072s latency).

PORT      STATE SERVICE
22/tcp    open  ssh
2022/tcp  open  down

Nmap scan report for 10.224.6.161
Host is up (0.00060s latency).

PORT      STATE SERVICE
22/tcp    open  ssh
2022/tcp  open  down

# Nmap done at Fri Nov 13 18:32:04 2020 -- 2 IP addresses (2 hosts up) scanned in 0.55 seconds
```

- If a port-level network connection is made to the remote host, but the host is not listening on one or more of the selected ports, the “Port connectivity test failed” message appears in a yellow banner. The nmap command output is listed below the banner.

Any remote port the host is not listening to has a state of “closed.” For example, you might see this yellow banner when the node you are trying to connect to is in a pre-installed state and the StorageGRID NMS service is not yet running on that node.

 Port connectivity test failed  
Connection not established. Services might not be listening on target ports.

Nmap command output. Note: Unreachable hosts will not appear in the output.

```
# Nmap 7.70 scan initiated Sat May 16 17:07:02 2020 as: /usr/bin/nmap -n -oN - -e br0 -p 22,80,443,1504,1505,1506,1508,7443,9999
Nmap scan report for 172.16.4.71
Host is up (0.00020s latency).

PORT      STATE  SERVICE
22/tcp    open   ssh
80/tcp    open   http
443/tcp   open   https
1504/tcp  closed  evb-elm
1505/tcp  open   funkproxy
1506/tcp  open   utcd
1508/tcp  open   diagmond
7443/tcp  open   oracleas-https
9999/tcp  open   abyss
MAC Address: 00:50:56:87:39:AE (VMware)

# Nmap done at Sat May 16 17:07:03 2020 -- 1 IP address (1 host up) scanned in 0.59 seconds
```

- If a port-level network connection cannot be made for one or more selected ports, the “Port connectivity test failed” message appears in a red banner. The nmap command output is listed below the banner.

The red banner indicates that a TCP connection attempt to a port on the remote host was made, but nothing was returned to the sender. When no response is returned, the port has a state of “filtered” and is likely blocked by a firewall.



Ports with “closed” are also listed.

 Port connectivity test failed  
Connection failed to one or more ports.

Nmap command output. Note: Unreachable hosts will not appear in the output.

```
# Nmap 7.70 scan initiated Sat May 16 17:11:01 2020 as: /usr/bin/nmap -n -oN - -e br0 -p 22,79,80,443,1504,1505,1506,1508,7443,9999 172.16.4.71
Nmap scan report for 172.16.4.71
Host is up (0.00029s latency).

PORT      STATE  SERVICE
22/tcp    open   ssh
79/tcp    filtered finger
80/tcp    open   http
443/tcp   open   https
1504/tcp  closed  evb-elm
1505/tcp  open   funkproxy
1506/tcp  open   utcd
1508/tcp  open   diagmond
7443/tcp  open   oracleas-https
9999/tcp  open   abyss
MAC Address: 00:50:56:87:39:AE (VMware)

# Nmap done at Sat May 16 17:11:02 2020 -- 1 IP address (1 host up) scanned in 1.60 seconds
```

## Related information

[Network guidelines](#)

## Accessing and Configuring SANtricity System Manager

You can use SANtricity System Manager to monitor the status of the storage controllers, storage disks, and other hardware components in the storage controller shelf. You can

also configure a proxy for E-Series AutoSupport that enables you to send AutoSupport messages from the appliance without the use of the management port.

## Steps

- [Setting up and Accessing SANtricity System Manager](#)
- [Reviewing the hardware status in SANtricity System Manager](#)
- [Setting the IP addresses for the storage controllers using the StorageGRID Appliance Installer](#)

### Setting up and Accessing SANtricity System Manager

You might need to access SANtricity System Manager on the storage controller to monitor the hardware in the storage controller shelf or to configure E-Series AutoSupport.

#### What you'll need

- You are using a supported web browser.
- To access SANtricity System Manager through Grid Manager, you must have installed StorageGRID, and you must have the Storage Appliance Administrator permission or Root Access permission.
- To access SANtricity System Manager using the StorageGRID Appliance Installer, you must have the SANtricity System Manager administrator username and password.
- To access SANtricity System Manager directly using a web browser, you must have the SANtricity System Manager administrator username and password.



You must have SANtricity firmware 8.70 or higher to access SANtricity System Manager using the Grid Manager or the StorageGRID Appliance Installer. You can check your firmware version by using the StorageGRID Appliance Installer and selecting **Help > About**.



Accessing SANtricity System Manager from the Grid Manager or from the Appliance Installer is generally meant only for monitoring your hardware and configuring E-Series AutoSupport. Many features and operations within SANtricity System Manager such as upgrading firmware do not apply to monitoring your StorageGRID appliance. To avoid issues, always follow the hardware installation and maintenance instructions for your appliance.

#### About this task

There are three ways to access SANtricity System Manager, depending upon what stage of the installation and configuration process you are in:

- If the appliance has not yet been deployed as a node in your StorageGRID system, you should use the Advanced tab in the StorageGRID Appliance Installer.  
 Once the node is deployed, you can no longer use the StorageGRID Appliance Installer to access SANtricity System Manager.
- If the appliance has been deployed as a node in your StorageGRID system, use the SANtricity System Manager tab on the Nodes page in Grid Manager.
- If you cannot use the StorageGRID Appliance Installer or Grid Manager, you can access SANtricity System Manager directly using a web browser connected to the management port.

This procedure includes steps for your initial access to SANtricity System Manager. If you have already set up SANtricity System Manager, go to the [configure hardware alerts](#) step.



Using either the Grid Manager or the StorageGRID Appliance Installer enables you to access SANtricity System Manager without having to configure or connect the management port of the appliance.

You use SANtricity System Manager to monitor the following:

- Performance data such as storage array level performance, I/O latency, CPU utilization, and throughput
- Hardware component status
- Support functions including viewing diagnostic data

You can use SANtricity System Manager to configure the following settings:

- Email alerts, SNMP alerts, or syslog alerts for the components in the storage controller shelf
- E-Series AutoSupport settings for the components in the storage controller shelf.

For additional details on E-Series AutoSupport, see the E-Series documentation center.

#### [NetApp E-Series Systems Documentation Site](#)

- Drive Security keys, which are needed to unlock secured drives (this step is required if the Drive Security feature is enabled)
- Administrator password for accessing SANtricity System Manager

### Steps

1. Do one of the following:

- Use the StorageGRID Appliance Installer and select **Advanced > SANtricity System Manager**
- Use the Grid Manager and select **Nodes > *appliance Storage Node* > SANtricity System Manager**



If these options are not available or the login page does not appear, you must use the IP address of the storage controller. Access SANtricity System Manager by browsing to the storage controller IP:

**`https://Storage_Controller_IP`**

The login page for SANtricity System Manager appears.

2. Set or enter the administrator password.



SANtricity System Manager uses a single administrator password that is shared among all users.

The Set Up wizard appears.

## Set Up SANtricity® System Manager



More (10 total) >

1 Welcome

2 Verify Hardware

3 Verify Hosts

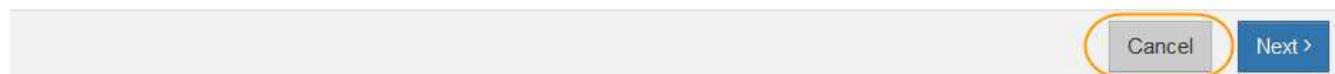
4 Select Applications

5 Define Workloads

6 Ac

Welcome to the SANtricity® System Manager! With System Manager, you can...

- Configure your storage array and set up alerts.
- Monitor and troubleshoot any problems when they occur.
- Keep track of how your system is performing in real time.



3. Select **Cancel** to close the wizard.



Do not complete the Set Up wizard for a StorageGRID appliance.

The SANtricity System Manager home page appears.

The SANtricity System Manager home page features a navigation menu on the left with options: Home, Storage, Hardware, Settings, and Support. The main content area includes:

- STORAGE ARRAY LEVEL PERFORMANCE:** A graph showing IOPS (Ready) and IOPS (Write) over time. The graph shows a peak around 10:30 AM.
- CAPACITY:** A circular progress bar showing 0% Free, with a total capacity of 223531.39 GB.
- STORAGE HIERARCHY:** A diagram showing the storage structure: Storage Array (1 Shelf, 80 Drives) containing 8 Pools (8 Volume Groups) which are mapped to 8 Hosts (8 Workloads) and 8 Heat Clusters (8 Volumes).

4. Configure hardware alerts.

- a. Select **Help** to access the online help for SANtricity System Manager.
  - b. Use the **Settings > Alerts** section of the online help to learn about alerts.
  - c. Follow the “How To” instructions to set up email alerts, SNMP alerts, or syslog alerts.
5. Manage AutoSupport for the components in the storage controller shelf.
  - a. Select **Help** to access the online help for SANtricity System Manager.
  - b. Use the **Support > Support Center** section of the online help to learn about the AutoSupport feature.
  - c. Follow the “How To” instructions to manage AutoSupport.

For specific instructions on configuring a StorageGrid proxy for sending E-Series AutoSupport messages without using the management port, go to the instructions for administering StorageGRID and search for "proxy settings for E-Series AutoSupport."

#### [Administer StorageGRID](#)

6. If the Drive Security feature is enabled for the appliance, create and manage the security key.
  - a. Select **Help** to access the online help for SANtricity System Manager.
  - b. Use the **Settings > System > Security key management** section of the online help to learn about Drive Security.
  - c. Follow the “How To” instructions to create and manage the security key.
7. Optionally, change the administrator password.
  - a. Select **Help** to access the online help for SANtricity System Manager.
  - b. Use the **Home > Storage array administration** section of the online help to learn about the administrator password.
  - c. Follow the “How To” instructions to change the password.

#### **Related information**

##### [Web browser requirements](#)

##### [Setting the IP addresses for the storage controllers using the StorageGRID Appliance Installer](#)

##### [Reviewing the hardware status in SANtricity System Manager](#)

You can use SANtricity System Manager to monitor and manage the individual hardware components in the storage controller shelf and to review hardware diagnostic and environmental information, such as component temperatures, as well as issues related to the drives.

#### **What you'll need**

- You are using a supported web browser.
- To access SANtricity System Manager through Grid Manager, you must have the Storage Appliance Administrator permission or Root Access permission.
- To access SANtricity System Manager using the StorageGRID Appliance Installer, you must have the SANtricity System Manager administrator username and password.
- To access SANtricity System Manager directly using a web browser, you must have the SANtricity System Manager administrator username and password.



You must have SANtricity firmware 8.70 or higher to access SANtricity System Manager using the Grid Manager or the StorageGRID Appliance Installer.



Accessing SANtricity System Manager from the Grid Manager or from the Appliance Installer is generally meant only for monitoring your hardware and configuring E-Series AutoSupport. Many features and operations within SANtricity System Manager such as upgrading firmware do not apply to monitoring your StorageGRID appliance. To avoid issues, always follow the hardware installation and maintenance instructions for your appliance.

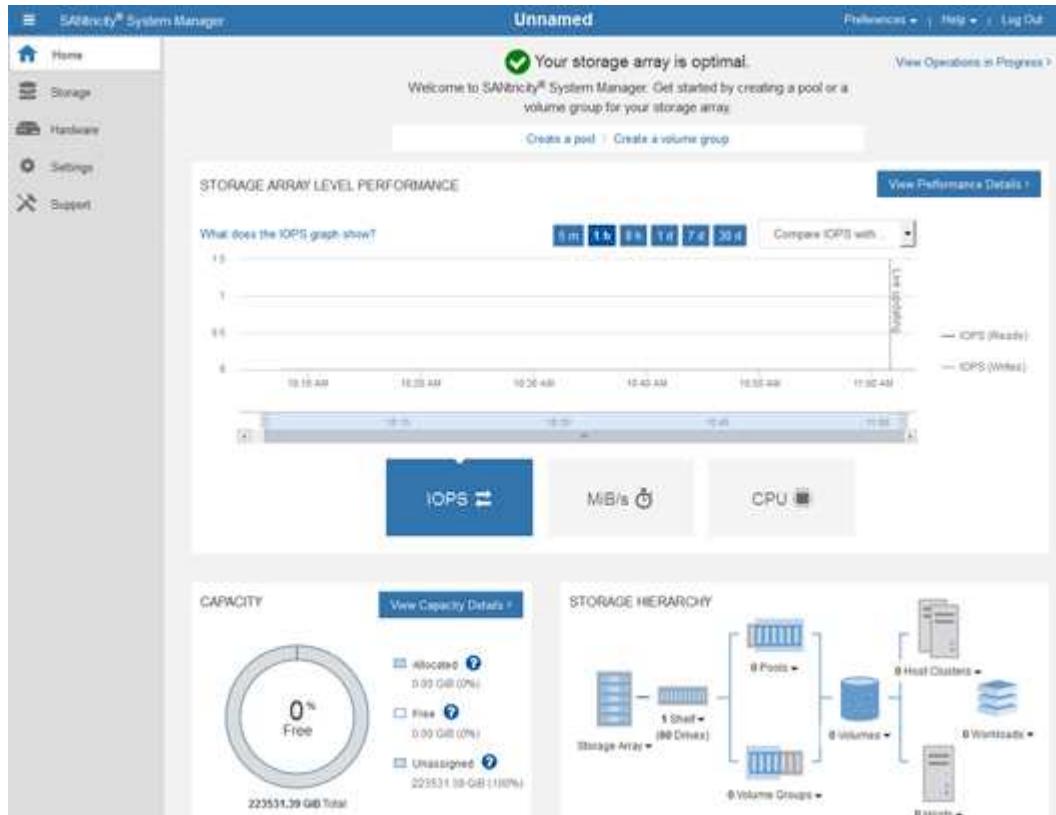
## Steps

1. Access SANtricity System Manager.

### Setting up and Accessing SANtricity System Manager

2. Enter the administrator username and password if required.
3. Click **Cancel** to close the Set Up wizard and to display the SANtricity System Manager home page.

The SANtricity System Manager home page appears. In SANtricity System Manager, the controller shelf is referred to as a storage array.



4. Review the information displayed for appliance hardware and confirm that all hardware components have a status of Optimal.
  - a. Click the **Hardware** tab.
  - b. Click **Show back of shelf**.

## HARDWARE

[Learn More >](#)

[Legend ▾](#)

Show status icon details 

Controller Shelf 99 ▾ |     

[Show front of shelf](#)



From the back of the shelf, you can view both storage controllers, the battery in each storage controller, the two power canisters, the two fan canisters, and expansion shelves (if any). You can also view component temperatures.

- c. To see the settings for each storage controller, select the controller, and select **View settings** from the context menu.
- d. To see the settings for other components in the back of the shelf, select the component you want to view.
- e. Click **Show front of shelf**, and select the component you want to view.

From the front of the shelf, you can view the drives and the drive drawers for the storage controller shelf or the expansion shelves (if any).

If the status of any component is Needs Attention, follow the steps in the Recovery Guru to resolve the issue or contact technical support.

### Setting the IP addresses for the storage controllers using the StorageGRID Appliance Installer

Management port 1 on each storage controller connects the appliance to the management network for SANtricity System Manager. If you cannot access to the SANtricity System Manager from the StorageGRID Appliance Installer, you must set a static IP address for each storage controller to ensure that you do not lose your management connection to the hardware and the controller firmware in the controller shelf.

#### What you'll need

- You are using any management client that can connect to the StorageGRID Admin Network, or you have a service laptop.
- The client or service laptop has a supported web browser.

## About this task

DHCP-assigned addresses can change at any time. Assign static IP addresses to the controllers to ensure consistent accessibility.



Follow this procedure only if you do not have access to SANtricity System Manager from the StorageGRID Appliance Installer (**Advanced > SANtricity System Manager**) or Grid Manager (**Nodes > SANtricity System Manager**).

## Steps

1. From the client, enter the URL for the StorageGRID Appliance Installer:

**https://Appliance\_Controller\_IP:8443**

For *Appliance\_Controller\_IP*, use the IP address for the appliance on any StorageGRID network.

The StorageGRID Appliance Installer Home page appears.

2. Select **Configure Hardware > Storage Controller Network Configuration**.

The Storage Controller Network Configuration page appears.

3. Depending on your network configuration, select **Enabled** for IPv4, IPv6, or both.
4. Make a note of the IPv4 address that is automatically displayed.

DHCP is the default method for assigning an IP address to the storage controller management port.



It might take a few minutes for the DHCP values to appear.

IPv4 Address Assignment	<input type="radio"/> Static	<input checked="" type="radio"/> DHCP
IPv4 Address (CIDR)	10.224.5.166/21	
Default Gateway	10.224.0.1	

5. Optionally, set a static IP address for the storage controller management port.



You should either assign a static IP for the management port or assign a permanent lease for the address on the DHCP server.

- a. Select **Static**.
- b. Enter the IPv4 address, using CIDR notation.
- c. Enter the default gateway.

IPv4 Address Assignment  Static  DHCP

IPv4 Address (CIDR)	10.224.2.200/21
Default Gateway	10.224.0.1

d. Click **Save**.

It might take a few minutes for your changes to be applied.

When you connect to SANtricity System Manager, you will use the new static IP address as the URL:  
**[https://Storage\\_Controller\\_IP](https://Storage_Controller_IP)**

## Configuring the BMC interface

The user interface for the baseboard management controller (BMC) on the SG6000-CN controller provides status information about the hardware and allows you to configure SNMP settings and other options for the SG6000-CN controller.

### Steps

- [Changing the root password for the BMC interface](#)
- [Setting the IP address for the BMC management port](#)
- [Accessing the BMC interface](#)
- [Configuring SNMP settings for the SG6000-CN controller](#)
- [Setting up email notifications for alerts](#)

### Changing the root password for the BMC interface

For security, you must change the password for the BMC's root user.

### What you'll need

- The management client is using a supported web browser.

### About this task

When you first install the appliance, the BMC uses a default password for the root user (root/calvin). You must change the password for the root user to secure your system.

### Steps

1. From the client, enter the URL for the StorageGRID Appliance Installer:  
**[https://Appliance\\_Controller\\_IP:8443](https://Appliance_Controller_IP:8443)**

For *Appliance\_Controller\_IP*, use the IP address for the appliance on any StorageGRID network.

The StorageGRID Appliance Installer Home page appears.

2. Select **Configure Hardware > BMC Configuration**.

NetApp® StorageGRID® Appliance Installer

Home	Configure Networking	Configure Hardware	Monitor Installation
Home	BMC Configuration	Storage Controller Network Configuration	

The Baseboard Management Controller Configuration page appears.

3. Enter a new password for the root account in the two fields provided.

### Baseboard Management Controller Configuration

#### User Settings

Root Password

.....

Confirm Root Password

.....

4. Click **Save**.

#### Setting the IP address for the BMC management port

Before you can access the BMC interface, you must configure the IP address for the BMC management port on the SG6000-CN controller.

#### What you'll need

- The management client is using a supported web browser.
- You are using any management client that can connect to a StorageGRID network.
- The BMC management port is connected to the management network you plan to use.



#### About this task

For support purposes, the BMC management port allows low-level hardware access.



You should only connect this port to a secure, trusted, internal management network. If no such network is available, leave the BMC port unconnected or blocked, unless a BMC connection is requested by technical support.

#### Steps

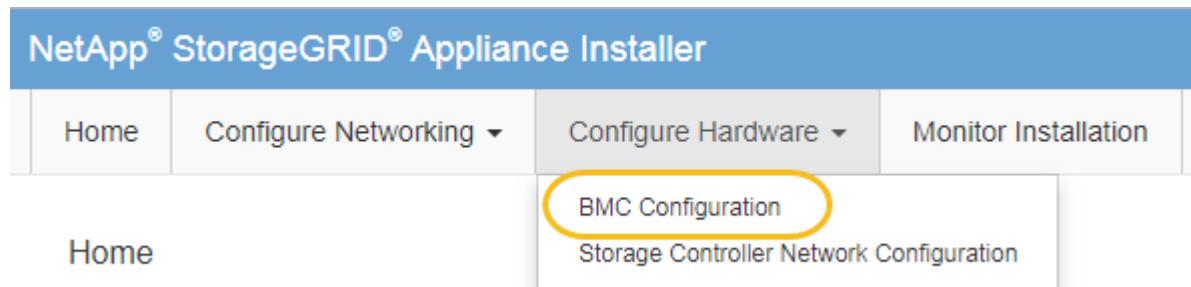
1. From the client, enter the URL for the StorageGRID Appliance Installer:

[https://SG6000-CN\\_Controller\\_IP:8443](https://SG6000-CN_Controller_IP:8443)

For SG6000-CN\_Controller\_IP, use the IP address for the appliance on any StorageGRID network.

The StorageGRID Appliance Installer Home page appears.

2. Select **Configure Hardware > BMC Configuration**.



The Baseboard Management Controller Configuration page appears.

3. Make a note of the IPv4 address that is automatically displayed.

DHCP is the default method for assigning an IP address to this port.



It might take a few minutes for the DHCP values to appear.

#### Baseboard Management Controller Configuration

##### LAN IP Settings

IP Assignment  Static  DHCP

MAC Address d8:c4:97:28:50:62

IPv4 Address (CIDR) 10.224.3.225/21

Default gateway 10.224.0.1

Cancel

Save

4. Optionally, set a static IP address for the BMC management port.



You should either assign a static IP for the BMC management port or assign a permanent lease for the address on the DHCP server.

a. Select **Static**.

b. Enter the IPv4 address, using CIDR notation.

c. Enter the default gateway.

## Baseboard Management Controller Configuration

### LAN IP Settings

IP Assignment  Static  DHCP

MAC Address d8:c4:97:28:50:62

IPv4 Address (CIDR) 10.224.3.225/21

Default gateway 10.224.0.1

**Cancel** **Save**

d. Click **Save**.

It might take a few minutes for your changes to be applied.

### Accessing the BMC interface

You can access the BMC interface on the SG6000-CN controller using the DHCP or static IP address for the BMC management port.

#### What you'll need

- The BMC management port on the SG6000-CN controller is connected to the management network you plan to use.



- The management client is using a supported web browser.

#### Steps

- Enter the URL for the BMC interface:

**`https://BMC_Port_IP`**

For `BMC_Port_IP`, use the DHCP or static IP address for the BMC management port.

The BMC sign-in page appears.

- Enter the root username and password, using the password you set when you changed the default root password:

**`root`**

**`password`**



root  
\*\*\*\*\*  
 Remember Username

**Sign me in**

# NetApp®

3. Select **Sign me in**.

The BMC dashboard appears.

The screenshot shows the BMC Dashboard. The left sidebar includes links for BMC, Dashboard, Sensor, System Inventory, FRU Information, BIOS POST Code, Server Identify, Logs & Reports, Settings, Remote Control, Power Control, Maintenance, and Sign out. The main dashboard features a 'Device Information' card with BMC Date&Time (17 Sep 2018 18:05:48) and a 'System Up Time' card showing 62 d 13 hrs. Below these are two 'Login Info' donut charts: one for Today (4 events) and one for 30 days (64 events). A green box on the right indicates 'Threshold Sensor Monitoring' is active with 'All threshold sensors are normal.'

4. Optionally, create additional users by selecting **Settings > User Management** and clicking on any "disabled" user.



When users sign in for the first time, they might be prompted to change their password for increased security.

## Related information

[Changing the root password for the BMC interface](#)

## Configuring SNMP settings for the SG6000-CN controller

If you are familiar with configuring SNMP for hardware, you can use the BMC interface to configure the SNMP settings for the SG6000-CN controller. You can provide secure community strings, enable SNMP Trap, and specify up to five SNMP destinations.

### What you'll need

- You know how to access the BMC dashboard.
- You have experience in configuring SNMP settings for SNMPv1-v2c equipment.

### Steps

1. From the BMC dashboard, select **Settings > SNMP Settings**.
2. On the SNMP Settings page, select **Enable SNMP V1/V2**, and then provide a Read-Only Community String and a Read-Write Community String.

The Read-Only Community String is like a user ID or password. You should change this value to prevent intruders from getting information about your network setup. The Read-Write Community String protects the device against unauthorized changes.
3. Optionally, select **Enable Trap**, and enter the required information.



Enter the Destination IP for each SNMP trap using an IP address. Fully qualified domain names are not supported.

Enable traps if you want the SG6000-CN controller to send immediate notifications to an SNMP console when it is in an unusual state. Traps might indicate hardware failures of various components or temperature thresholds being exceeded.

4. Optionally, click **Send Test Trap** to test your settings.
5. If the settings are correct, click **Save**.

### Setting up email notifications for alerts

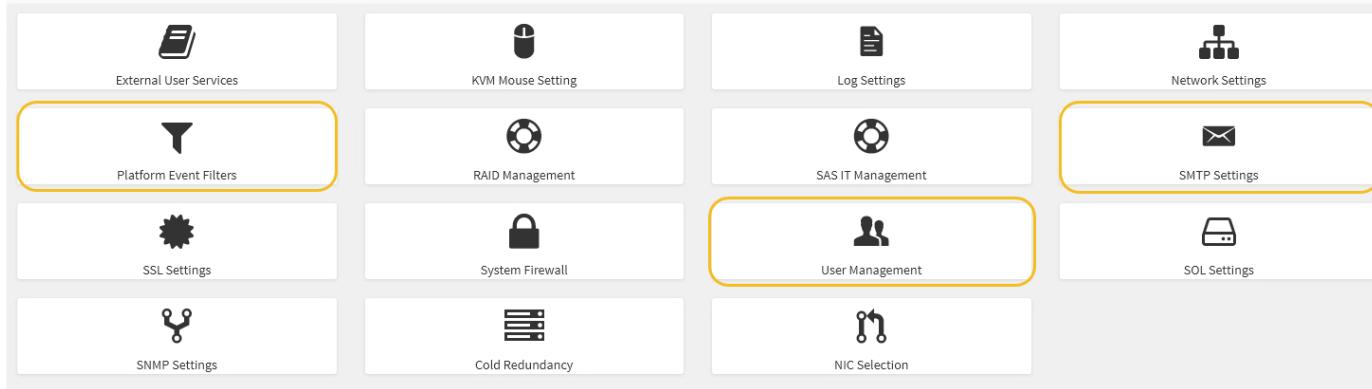
If you want email notifications to be sent when alerts occur, you must use the BMC interface to configure SMTP settings, users, LAN destinations, alert policies, and event filters.

### What you'll need

You know how to access the BMC dashboard.

### About this task

In the BMC interface, you use the **SMTP Settings**, **User Management**, and **Platform Event Filters** options on the Settings page to configure email notifications.



## Steps

1. Configure the SMTP settings.
  - a. Select **Settings > SMTP Settings**.
  - b. For Sender Email ID, enter a valid email address.

This email address is provided as the From address when the BMC sends email.

2. Set up users to receive alerts.
  - a. From the BMC dashboard, select **Settings > User Management**.
  - b. Add at least one user to receive alert notifications.

The email address you configure for a user is the address the BMC sends alert notifications to. For example, you could add a generic user, such as "notification-user," and use the email address of a technical support team email distribution list.

3. Configure the LAN destination for alerts.
  - a. Select **Settings > Platform Event Filters > LAN Destinations**.
  - b. Configure at least one LAN destination.
    - Select **Email** as the Destination Type.
    - For BMC Username, select a user name that you added earlier.
    - If you added multiple users and want all of them to receive notification emails, you must add a LAN Destination for each user.
  - c. Send a test alert.
4. Configure alert policies so you can define when and where the BMC sends alerts.
  - a. Select **Settings > Platform Event Filters > Alert Policies**.
  - b. Configure at least one alert policy for each LAN destination.
    - For Policy Group Number, select **1**.
    - For Policy Action, select **Always send alert to this destination**.
    - For LAN Channel, select **1**.
    - In the Destination Selector, select the LAN destination for the policy.
5. Configure event filters to direct alerts for different event types to the appropriate users.

- a. Select **Settings > Platform Event Filters > Event Filters**.
- b. For Alert Policy Group Number, enter **1**.
- c. Create filters for every event you want the Alert Policy Group to be notified about.
  - You can create event filters for power actions, specific sensor events, or all events.
  - If you are uncertain which events to monitor, select **All Sensors** for Sensor Type and **All Events** for Event Options. If you receive unwanted notifications, you can change your selections later.

### Optional: Enabling node encryption

If you enable node encryption, the disks in your appliance can be protected by secure key management server (KMS) encryption against physical loss or removal from the site. You must select and enable node encryption during appliance installation and cannot unselect node encryption once the KMS encryption process starts.

#### What you'll need

Review the information about KMS in the instructions for administering StorageGRID.

#### About this task

An appliance that has node encryption enabled connects to the external key management server (KMS) that is configured for the StorageGRID site. Each KMS (or KMS cluster) manages the encryption keys for all appliance nodes at the site. These keys encrypt and decrypt the data on each disk in an appliance that has node encryption enabled.

A KMS can be set up in Grid Manager before or after the appliance is installed in StorageGRID. See the information about KMS and appliance configuration in the instructions for administering StorageGRID for additional details.

- If a KMS is set up before installing the appliance, KMS-controlled encryption begins when you enable node encryption on the appliance and add it to a StorageGRID site where KMS is configured.
- If a KMS is not set up before you install the appliance, KMS-controlled encryption is performed on each appliance that has node encryption enabled as soon as a KMS is configured and available for the site that contains the appliance node.

 Any data that exists before an appliance that has node encryption enabled connects to the configured KMS is encrypted with a temporary key that is not secure. The appliance is not protected from removal or theft until the key is set to a value provided by the KMS.

Without the KMS key needed to decrypt the disk, data on the appliance cannot be retrieved and is effectively lost. This is the case whenever the decryption key cannot be retrieved from the KMS. The key becomes inaccessible if a customer clears the KMS configuration, a KMS key expires, connection to the KMS is lost, or the appliance is removed from the StorageGRID system where its KMS keys are installed.

#### Steps

1. Open a browser, and enter one of the IP addresses for the appliance's compute controller.

**`https://Controller_IP:8443`**

`Controller_IP` is the IP address of the compute controller (not the storage controller) on any of the three StorageGRID networks.

The StorageGRID Appliance Installer Home page appears.



After the appliance has been encrypted with a KMS key, the appliance disks cannot be decrypted without using the same KMS key.

## 2. Select **Configure Hardware > Node Encryption**.

NetApp® StorageGRID® Appliance Installer

Help ▾

Home Configure Networking ▾ Configure Hardware ▾ Monitor Installation Advanced ▾

**Node Encryption**

Node encryption allows you to use an external key management server (KMS) to encrypt all StorageGRID data on this appliance. If node encryption is enabled for the appliance and a KMS is configured for the site, you cannot access any data on the appliance unless the appliance can communicate with the KMS.

**Encryption Status**

**⚠** You can only enable node encryption for an appliance during installation. You cannot enable or disable the node encryption setting after the appliance is installed.

Enable node encryption

**Save**

**Key Management Server Details**

## 3. Select **Enable node encryption**.

You can unselect **Enable node encryption** without risk of data loss until you select **Save** and the appliance node accesses the KMS encryption keys in your StorageGRID system and begins disk encryption. You are not able to disable node encryption after the appliance is installed.



After you add an appliance that has node encryption enabled to a StorageGRID site that has a KMS, you cannot stop using KMS encryption for the node.

## 4. Select **Save**.

## 5. Deploy the appliance as a node in your StorageGRID system.

KMS-controlled encryption begins when the appliance accesses the KMS keys configured for your StorageGRID site. The installer displays progress messages during the KMS encryption process, which might take a few minutes depending on the number of disk volumes in the appliance.



Appliances are initially configured with a random non-KMS encryption key assigned to each disk volume. The disks are encrypted using this temporary encryption key, that is not secure, until the appliance that has node encryption enabled accesses the KMS keys configured for your StorageGRID site.

## After you finish

You can view node-encryption status, KMS details, and the certificates in use when the appliance node is in maintenance mode.

## Related information

[Administer StorageGRID](#)

[Monitoring node encryption in maintenance mode](#)

## Optional: Changing the RAID mode (SG6000 only)

You can change to a different RAID mode on the appliance to accommodate your storage and recovery requirements. You can only change the mode before deploying the appliance Storage Node.

### What you'll need

- You are using any client that can connect to StorageGRID.
- The client has a supported web browser.

### About this task

Before deploying the appliance as a Storage Node, you can choose one of the following volume configuration options:

- **DDP:** This mode uses two parity drives for every eight data drives. This is the default and recommended mode for all appliances. When compared to RAID6, DDP delivers better system performance, reduced rebuild times after drive failures, and ease of management. DDP also provides drawer loss protection in 60-drive appliances.
- **DDP16:** This mode uses two parity drives for every 16 data drives, which results in higher storage efficiency compared to DDP. When compared to RAID6, DDP16 delivers better system performance, reduced rebuild times after drive failures, ease of management, and comparable storage efficiency. To use DDP16 mode, your configuration must contain at least 20 drives. DDP16 does not provide drawer loss protection.
- **RAID6:** This mode uses two parity drives for every 16 or more data drives. To use RAID 6 mode, your configuration must contain at least 20 drives. Although RAID6 can increase storage efficiency of the appliance when compared to DDP, it is not recommended for most StorageGRID environments.



If any volumes have already been configured or if StorageGRID was previously installed, changing the RAID mode causes the volumes to be removed and replaced. Any data on those volumes will be lost.

### Steps

1. Open a browser, and enter one of the IP addresses for the appliance's compute controller.

**`https://Controller_IP:8443`**

*Controller\_IP* is the IP address of the compute controller (not the storage controller) on any of the three StorageGRID networks.

The StorageGRID Appliance Installer Home page appears.

2. Select **Advanced > RAID Mode**.
3. On the **Configure RAID Mode** page, select the desired RAID mode from the Mode drop-down list.
4. Click **Save**.

### Related information

[NetApp E-Series Systems Documentation Site](#)

## Optional: Remapping network ports for the appliance

You might need to remap the internal ports on the appliance Storage Node to different external ports. For example, you might need to remap ports because of a firewall issue.

### What you'll need

- You have previously accessed the StorageGRID Appliance Installer.
- You have not configured and do not plan to configure load balancer endpoints.



If you remap any ports, you cannot use the same ports to configure load balancer endpoints. If you want to configure load balancer endpoints and have already remapped ports, follow the steps in the recovery and maintenance instructions for removing port remaps.

### Steps

1. From the StorageGRID Appliance Installer, click **Configure Networking > Remap Ports**.

The Remap Port page appears.

2. From the **Network** drop-down box, select the network for the port you want to remap: Grid, Admin, or Client.
3. From the **Protocol** drop-down box, select the IP protocol: TCP or UDP.
4. From the **Remap Direction** drop-down box, select which traffic direction you want to remap for this port: Inbound, Outbound, or Bi-directional.
5. For **Original Port**, enter the number of the port you want to remap.
6. For **Mapped-To Port**, enter the number of the port you want to use instead.
7. Click **Add Rule**.

The new port mapping is added to the table, and the remapping takes effect immediately.

### Remap Ports

If required, you can remap the internal ports on the appliance Storage Node to different external ports. For example, you might need to remap ports because of a firewall issue.

	Network	Protocol	Remap Direction	Original Port	Mapped-To Port
<input checked="" type="radio"/>	Grid	TCP	Bi-directional	1800	1801

8. To remove a port mapping, select the radio button for the rule you want to remove, and click **Remove Selected Rule**.

## Deploying an appliance Storage Node

After installing and configuring the storage appliance, you can deploy it as a Storage Node in a StorageGRID system. When you deploy an appliance as a Storage Node, you use the StorageGRID Appliance Installer included on the appliance.

### What you'll need

- If you are cloning an appliance node, continue following the process in recovery and maintenance.

#### Maintain & recover

- The appliance has been installed in a rack or cabinet, connected to your networks, and powered on.
- Network links, IP addresses, and port remapping (if necessary) have been configured for the appliance using the StorageGRID Appliance Installer.
- You know one of the IP addresses assigned to the appliance's compute controller. You can use the IP address for any attached StorageGRID network.
- The primary Admin Node for the StorageGRID system has been deployed.
- All Grid Network subnets listed on the IP Configuration page of the StorageGRID Appliance Installer have been defined in the Grid Network Subnet List on the primary Admin Node.
- You have a service laptop with a supported web browser.

### About this task

Each storage appliance functions as a single Storage Node. Any appliance can connect to the Grid Network, the Admin Network, and the Client Network.

To deploy an appliance Storage Node in a StorageGRID system, you access the StorageGRID Appliance Installer and perform the following steps:

- You specify or confirm the IP address of the primary Admin Node and the name of the Storage Node.
- You start the deployment and wait as volumes are configured and the software is installed.
- When the installation pauses partway through the appliance installation tasks, you resume the installation by signing into the Grid Manager, approving all grid nodes, and completing the StorageGRID installation and deployment processes.



If you need to deploy multiple appliance nodes at one time, you can automate the installation process by using the `configure-sga.py` Appliance Installation script.

- If you are performing an expansion or recovery operation, follow the appropriate instructions:
  - To add an appliance Storage Node to an existing StorageGRID system, see the instructions for expanding a StorageGRID system.
  - To deploy an appliance Storage Node as part of a recovery operation, see instructions for recovery and maintenance.

### Steps

1. Open a browser, and enter one of the IP addresses for the appliance's compute controller.

**[https://Controller\\_IP:8443](https://Controller_IP:8443)**

The StorageGRID Appliance Installer Home page appears.

NetApp® StorageGRID® Appliance Installer

Home	Configure Networking ▾	Configure Hardware ▾	Monitor Installation	Advanced ▾
------	------------------------	----------------------	----------------------	------------

## Home

ⓘ The installation is ready to be started. Review the settings below, and then click Start Installation.

### Primary Admin Node connection

Enable Admin Node discovery

Primary Admin Node IP

Connection state Connection to 172.16.4.210 ready

### Node name

Node name

### Installation

Current state Ready to start installation of NetApp-SGA into grid with Admin Node 172.16.4.210.

2. In the **Primary Admin Node connection** section, determine whether you need to specify the IP address for the primary Admin Node.

If you have previously installed other nodes in this data center, the StorageGRID Appliance Installer can discover this IP address automatically, assuming the primary Admin Node, or at least one other grid node with ADMIN\_IP configured, is present on the same subnet.

3. If this IP address is not shown or you need to change it, specify the address:

Option	Description
Manual IP entry	<ol style="list-style-type: none"> <li>Unselect the <b>Enable Admin Node discovery</b> check box.</li> <li>Enter the IP address manually.</li> <li>Click <b>Save</b>.</li> <li>Wait for the connection state for the new IP address to become ready.</li> </ol>
Automatic discovery of all connected primary Admin Nodes	<ol style="list-style-type: none"> <li>Select the <b>Enable Admin Node discovery</b> check box.</li> <li>Wait for the list of discovered IP addresses to be displayed.</li> <li>Select the primary Admin Node for the grid where this appliance Storage Node will be deployed.</li> <li>Click <b>Save</b>.</li> <li>Wait for the connection state for the new IP address to become ready.</li> </ol>

4. In the **Node name** field, enter the name you want to use for this appliance node, and click **Save**.

The node name is assigned to this appliance node in the StorageGRID system. It is shown on the Nodes page (Overview tab) in the Grid Manager. If required, you can change the name when you approve the node.

5. In the **Installation** section, confirm that the current state is "Ready to start installation of *node name* into grid with primary Admin Node *admin\_ip*" and that the **Start Installation** button is enabled.

If the **Start Installation** button is not enabled, you might need to change the network configuration or port settings. For instructions, see the installation and maintenance instructions for your appliance.



If you are deploying the Storage Node appliance as a node cloning target, stop the deployment process here and continue the node cloning procedure in recovery and maintenance.

[Maintain & recover](#)

6. From the StorageGRID Appliance Installer home page, click **Start Installation**.

The Current state changes to "Installation is in progress," and the Monitor Installation page is displayed.



If you need to access the Monitor Installation page manually, click **Monitor Installation**.

7. If your grid includes multiple appliance Storage Nodes, repeat these steps for each appliance.



If you need to deploy multiple appliance Storage Nodes at one time, you can automate the installation process by using the `configure-sga.py` Appliance Installation script. This script applies only to Storage Nodes.

## Related information

[Expand your grid](#)

[Maintain & recover](#)

## Monitoring the storage appliance installation

The StorageGRID Appliance Installer provides status until installation is complete. When the software installation is complete, the appliance is rebooted.

### Steps

1. To monitor the installation progress, click **Monitor Installation**.

The Monitor Installation page shows the installation progress.

Monitor Installation

1. Configure storage		
Step	Progress	Status
Connect to storage controller	<div style="width: 100%; background-color: green;"></div>	Complete
Clear existing configuration	<div style="width: 100%; background-color: green;"></div>	Complete
Configure volumes	<div style="width: 25%; background-color: blue;"></div>	Creating volume StorageGRID-obj-00
Configure host settings	<div style="width: 0%; background-color: grey;"></div>	Pending

2. Install OS		
3. Install StorageGRID	<div style="width: 0%; background-color: grey;"></div>	Pending
4. Finalize installation	<div style="width: 0%; background-color: grey;"></div>	Pending

The blue status bar indicates which task is currently in progress. Green status bars indicate tasks that have completed successfully.



The installer ensures that tasks completed in a previous install are not re-run. If you are re-running an installation, any tasks that do not need to be re-run are shown with a green status bar and a status of "Skipped."

2. Review the progress of the first two installation stages.

### 1. Configure storage

During this stage, the installer connects to the storage controller, clears any existing configuration, communicates with SANtricity software to configure volumes, and configures host settings.

### 2. Install OS

During this stage, the installer copies the base operating system image for StorageGRID to the appliance.

3. Continue monitoring the installation progress until the **Install StorageGRID** stage pauses and a message appears on the embedded console, prompting you to approve this node on the Admin Node using the Grid Manager. Go to the next step.

Home	Configure Networking ▾	Configure Hardware ▾	Monitor Installation	Advanced ▾	
------	------------------------	----------------------	----------------------	------------	--

## Monitor Installation

1. Configure storage	Complete
2. Install OS	Complete
3. Install StorageGRID	Running
4. Finalize installation	Pending

Connected (unencrypted) to: QEMU

```
/platform.type=: Device or resource busy
[2017-07-31T22:09:12.362566]    INFO -- [INSG] NOTICE: seeding /var/local with c
ontainer data
[2017-07-31T22:09:12.366205]    INFO -- [INSG] Fixing permissions
[2017-07-31T22:09:12.369633]    INFO -- [INSG] Enabling syslog
[2017-07-31T22:09:12.511533]    INFO -- [INSG] Stopping system logging: syslog-n
g.
[2017-07-31T22:09:12.570096]    INFO -- [INSG] Starting system logging: syslog-n
g.
[2017-07-31T22:09:12.576360]    INFO -- [INSG] Beginning negotiation for downloa
d of node configuration
[2017-07-31T22:09:12.581363]    INFO -- [INSG]
[2017-07-31T22:09:12.585066]    INFO -- [INSG]
[2017-07-31T22:09:12.588314]    INFO -- [INSG]
[2017-07-31T22:09:12.591851]    INFO -- [INSG]
[2017-07-31T22:09:12.594886]    INFO -- [INSG]
[2017-07-31T22:09:12.598360]    INFO -- [INSG]
[2017-07-31T22:09:12.601324]    INFO -- [INSG]
[2017-07-31T22:09:12.604759]    INFO -- [INSG]
[2017-07-31T22:09:12.607800]    INFO -- [INSG]
[2017-07-31T22:09:12.610985]    INFO -- [INSG]
[2017-07-31T22:09:12.614597]    INFO -- [INSG]
[2017-07-31T22:09:12.618282]    INFO -- [INSG] Please approve this node on the A
dmin Node GMI to proceed...
```

4. Go to the Grid Manager, approve the pending storage node, and complete the StorageGRID installation process.

When you click **Install** from the Grid Manager, Stage 3 completes and stage 4, **Finalize Installation**, begins. When stage 4 completes, the controller is rebooted.

## Automating appliance installation and configuration

You can automate the installation and configuration of your appliances and configuration of the whole StorageGRID system.

### About this task

Automating installation and configuration can be useful for deploying multiple StorageGRID instances or one large, complex StorageGRID instance.

To automate installation and configuration, use one or more of the following options:

- Create a JSON file that specifies the configuration settings for your appliances. Upload the JSON file using the StorageGRID Appliance Installer.



You can use the same file to configure more than one appliance.

- Use the `StorageGRIDconfigure-sga.py` Python script to automate the configuration of your appliances.
- Use additional Python scripts to configure other components of the whole StorageGRID system (the "grid").



You can use StorageGRID automation Python scripts directly, or you can use them as examples of how to use the StorageGRID Installation REST API in grid deployment and configuration tools you develop yourself. See the information about downloading and extracting the StorageGRID installation files in the Recovery and Maintenance instructions.

## Automating appliance configuration using the StorageGRID Appliance Installer

You can automate the configuration of an appliance by using a JSON file that contains the configuration information. You upload the file using the StorageGRID Appliance Installer.

### What you'll need

- Your appliance must be on the latest firmware compatible with StorageGRID 11.5 or higher.
- You must be connected to the StorageGRID Appliance Installer on the appliance you are configuring using a supported browser.

### About this task

You can automate appliance configuration tasks such as configuring the following:

- Grid Network, Admin Network, and Client Network IP addresses
- BMC interface
- Network links
  - Port bond mode
  - Network bond mode
  - Link speed

Configuring your appliance using an uploaded JSON file is often more efficient than performing the configuration manually using multiple pages in the StorageGRID Appliance Installer, especially if you have to configure many nodes. You must apply the configuration file for each node one at a time.



Experienced users who want to automate both the installation and configuration of their appliances can use the `configure-sga.py` script.

[Automating installation and configuration of appliance nodes using the configure-sga.py script](#)

### Steps

1. Generate the JSON file using one of the following methods:

- The ConfigBuilder application

[ConfigBuilder.netapp.com](https://ConfigBuilder.netapp.com)

- The `configure-sga.py` appliance configuration script. You can download the script from StorageGRID Appliance Installer (**Help > Appliance Configuration Script**). See the instructions on automating the configuration using the `configure-sga.py` script.

[Automating installation and configuration of appliance nodes using the `configure-sga.py` script](#)

The node names in the JSON file must follow these requirements:

- Must be a valid hostname containing at least 1 and no more than 32 characters
- Can use letters, numbers, and hyphens are allowed
- Cannot start or end with a hyphen or contain only numbers



Ensure that the node names (the top-level names) in the JSON file are unique, or you will not be able to configure more than one node using the JSON file.

2. Select **Advanced > Update Appliance Configuration**.

The Update Appliance Configuration page appears.

#### Update Appliance Configuration

Use a JSON file to update this appliance's configuration. You can generate the JSON file from the [ConfigBuilder](#) application or from the [appliance configuration script](#).

**⚠** You might lose your connection if the applied configuration from the JSON file includes "link\_config" and/or "networks" sections. If you are not reconnected within 1 minute, re-enter the URL using one of the other IP addresses assigned to the appliance.

#### Upload JSON

JSON configuration	<input type="button" value="Browse"/>
Node name	<input type="button" value="-- Upload a file"/>
<input type="button" value="Apply JSON configuration"/>	

3. Select the JSON file with the configuration you want to upload.

- Select **Browse**.
- Locate and select the file.
- Select **Open**.

The file is uploaded and validated. When the validation process is complete, the file name is shown

next to a green check mark.



You might lose connection to the appliance if the configuration from the JSON file includes sections for "link\_config", "networks", or both. If you are not reconnected within 1 minute, re-enter the appliance URL using one of the other IP addresses assigned to the appliance.

#### Upload JSON

JSON configuration	<input type="button" value="Browse"/> <span>✓ appliances.orig.json</span>
Node name	-- Select a node ▾
<input type="button" value="Apply JSON configuration"/>	

The **Node name** drop down is populated with the top-level node names defined in the JSON file.



If the file is not valid, the file name is shown in red and an error message is displayed in a yellow banner. The invalid file is not applied to the appliance. You can use ConfigBuilder to ensure you have a valid JSON file.

4. Select a node from the list in the **Node name** drop down.

The **Apply JSON configuration** button is enabled.

#### Upload JSON

JSON configuration	<input type="button" value="Browse"/> <span>✓ appliances.orig.json</span>
Node name	Lab-80-1000 ▾
<input type="button" value="Apply JSON configuration"/>	

5. Select **Apply JSON configuration**.

The configuration is applied to the selected node.

### Automating installation and configuration of appliance nodes using the `configure-sga.py` script

You can use the `configure-sga.py` script to automate many of the installation and configuration tasks for StorageGRID appliance nodes, including installing and configuring a primary Admin Node. This script can be useful if you have a large number of appliances to configure. You can also use the script to generate a JSON file that contains appliance configuration information.

## What you'll need

- The appliance has been installed in a rack, connected to your networks, and powered on.
- Network links and IP addresses have been configured for the primary Admin Node using the StorageGRID Appliance Installer.
- If you are installing the primary Admin Node, you know its IP address.
- If you are installing and configuring other nodes, the primary Admin Node has been deployed, and you know its IP address.
- For all nodes other than the primary Admin Node, all Grid Network subnets listed on the IP Configuration page of the StorageGRID Appliance Installer have been defined in the Grid Network Subnet List on the primary Admin Node.
- You have downloaded the `configure-sga.py` file. The file is included in the installation archive, or you can access it by clicking **Help > Appliance Installation Script** in the StorageGRID Appliance Installer.



This procedure is for advanced users with some experience using command-line interfaces. Alternatively, you can also use the StorageGRID Appliance Installer to automate the configuration.

[Automating appliance configuration using the StorageGRID Appliance Installer](#)

## Steps

1. Log in to the Linux machine you are using to run the Python script.
2. For general help with the script syntax and to see a list of the available parameters, enter the following:

```
configure-sga.py --help
```

The `configure-sga.py` script uses five subcommands:

- `advanced` for advanced StorageGRID appliance interactions, including BMC configuration and creating a JSON file containing the current configuration of the appliance
- `configure` for configuring the RAID mode, node name, and networking parameters
- `install` for starting a StorageGRID installation
- `monitor` for monitoring a StorageGRID installation
- `reboot` for rebooting the appliance

If you enter a subcommand (`advanced`, `configure`, `install`, `monitor`, or `reboot`) argument followed by the `--help` option you will get a different help text providing more detail on the options available within that subcommand:

```
configure-sga.py subcommand --help
```

3. To confirm the current configuration of the appliance node, enter the following where `SGA-install-ip` is any one of the IP addresses for the appliance node:

```
configure-sga.py configure SGA-INSTALL-IP
```

The results show current IP information for the appliance, including the IP address of the primary Admin Node and information about the Admin, Grid, and Client Networks.

```
Connecting to +https://10.224.2.30:8443+ (Checking version and
connectivity.)
2021/02/25 16:25:11: Performing GET on /api/versions... Received 200
2021/02/25 16:25:11: Performing GET on /api/v2/system-info... Received
200
2021/02/25 16:25:11: Performing GET on /api/v2/admin-connection...
Received 200
2021/02/25 16:25:11: Performing GET on /api/v2/link-config... Received
200
2021/02/25 16:25:11: Performing GET on /api/v2/networks... Received 200
2021/02/25 16:25:11: Performing GET on /api/v2/system-config... Received
200
```

#### StorageGRID Appliance

```
Name: LAB-SGA-2-30
Node type: storage
```

#### StorageGRID primary Admin Node

```
IP: 172.16.1.170
State: unknown
Message: Initializing...
Version: Unknown
```

#### Network Link Configuration

##### Link Status

Link	State	Speed (Gbps)
1	Up	10
2	Up	10
3	Up	10
4	Up	10
5	Up	1
6	Down	N/A

##### Link Settings

```
Port bond mode: FIXED
Link speed: 10GBE
```

```
Grid Network: ENABLED
Bonding mode: active-backup
VLAN: novlan
MAC Addresses: 00:a0:98:59:8e:8a 00:a0:98:59:8e:82
```

```
Admin Network: ENABLED
Bonding mode: no-bond
MAC Addresses: 00:80:e5:29:70:f4
```

```
Client Network:      ENABLED
Bonding mode:       active-backup
VLAN:               novlan
MAC Addresses:      00:a0:98:59:8e:89  00:a0:98:59:8e:81
```

#### Grid Network

```
CIDR:      172.16.2.30/21 (Static)
MAC:       00:A0:98:59:8E:8A
Gateway:   172.16.0.1
Subnets:   172.17.0.0/21
           172.18.0.0/21
           192.168.0.0/21
MTU:       1500
```

#### Admin Network

```
CIDR:      10.224.2.30/21 (Static)
MAC:       00:80:E5:29:70:F4
Gateway:   10.224.0.1
Subnets:   10.0.0.0/8
           172.19.0.0/16
           172.21.0.0/16
MTU:       1500
```

#### Client Network

```
CIDR:      47.47.2.30/21 (Static)
MAC:       00:A0:98:59:8E:89
Gateway:   47.47.0.1
MTU:       2000
```

```
#####
##### If you are satisfied with this configuration, #####
##### execute the script with the "install" sub-command. #####
#####
```

4. If you need to change any of the values in the current configuration, use the `configure` subcommand to update them. For example, if you want to change the IP address that the appliance uses for connection to the primary Admin Node to 172.16.2.99, enter the following:  
`configure-sga.py configure --admin-ip 172.16.2.99 SGA-INSTALL-IP`
5. If you want to back up the appliance configuration to a JSON file, use the `advanced` and `backup-file` subcommands. For example, if you want to back up the configuration of an appliance with IP address `SGA-INSTALL-IP` to a file named `appliance-SG1000.json`, enter the following:  
`configure-sga.py advanced --backup-file appliance-SG1000.json SGA-INSTALL-IP`

The JSON file containing the configuration information is written to the same directory you executed the script from.



Check that the top-level node name in the generated JSON file matches the appliance name. Do not make any changes to this file unless you are an experienced user and have a thorough understanding of StorageGRID APIs.

6. When you are satisfied with the appliance configuration, use the `install` and `monitor` subcommands to install the appliance:

```
configure-sga.py install --monitor SGA-INSTALL-IP
```

7. If you want to reboot the appliance, enter the following:

```
configure-sga.py reboot SGA-INSTALL-IP
```

## Automating the configuration of StorageGRID

After deploying the grid nodes, you can automate the configuration of the StorageGRID system.

### What you'll need

- You know the location of the following files from the installation archive.

Filename	Description
<code>configure-storagegrid.py</code>	Python script used to automate the configuration
<code>configure-storagegrid.sample.json</code>	Sample configuration file for use with the script
<code>configure-storagegrid.blank.json</code>	Blank configuration file for use with the script

- You have created a `configure-storagegrid.json` configuration file. To create this file, you can modify the sample configuration file (`configure-storagegrid.sample.json`) or the blank configuration file (`configure-storagegrid.blank.json`).

### About this task

You can use the `configure-storagegrid.py` Python script and the `configure-storagegrid.json` configuration file to automate the configuration of your StorageGRID system.



You can also configure the system using the Grid Manager or the Installation API.

### Steps

1. Log in to the Linux machine you are using to run the Python script.
2. Change to the directory where you extracted the installation archive.

For example:

```
cd StorageGRID-Webscale-version/platform
```

where `platform` is `debs`, `rpms`, or `vsphere`.

3. Run the Python script and use the configuration file you created.

For example:

```
./configure-storagegrid.py ./configure-storagegrid.json --start-install
```

## After you finish

A Recovery Package `.zip` file is generated during the configuration process, and it is downloaded to the directory where you are running the installation and configuration process. You must back up the Recovery Package file so that you can recover the StorageGRID system if one or more grid nodes fails. For example, copy it to a secure, backed up network location and to a secure cloud storage location.



The Recovery Package file must be secured because it contains encryption keys and passwords that can be used to obtain data from the StorageGRID system.

If you specified that random passwords should be generated, you need to extract the `Passwords.txt` file and look for the passwords required to access your StorageGRID system.

```
#####
##### The StorageGRID "recovery package" has been downloaded as: #####
#####           ./sgws-recovery-package-994078-rev1.zip           #####
#####   Safeguard this file as it will be needed in case of a   #####
#####           StorageGRID node recovery.                      #####
#################################################################
```

Your StorageGRID system is installed and configured when a confirmation message is displayed.

```
StorageGRID has been configured and installed.
```

## Overview of installation REST APIs

StorageGRID provides two REST APIs for performing installation tasks: the StorageGRID Installation API and the StorageGRID Appliance Installer API.

Both APIs use the Swagger open source API platform to provide the API documentation. Swagger allows both developers and non-developers to interact with the API in a user interface that illustrates how the API responds to parameters and options. This documentation assumes that you are familiar with standard web technologies and the JSON (JavaScript Object Notation) data format.



Any API operations you perform using the API Docs webpage are live operations. Be careful not to create, update, or delete configuration data or other data by mistake.

Each REST API command includes the API's URL, an HTTP action, any required or optional URL parameters, and an expected API response.

### StorageGRID Installation API

The StorageGRID Installation API is only available when you are initially configuring your StorageGRID system, and in the event that you need to perform a primary Admin Node recovery. The Installation API can be accessed over HTTPS from the Grid Manager.

To access the API documentation, go to the installation web page on the primary Admin Node and select **Help > API Documentation** from the menu bar.

The StorageGRID Installation API includes the following sections:

- **config** — Operations related to the product release and versions of the API. You can list the product release version and the major versions of the API supported by that release.
- **grid** — Grid-level configuration operations. You can get and update grid settings, including grid details, Grid Network subnets, grid passwords, and NTP and DNS server IP addresses.
- **nodes** — Node-level configuration operations. You can retrieve a list of grid nodes, delete a grid node, configure a grid node, view a grid node, and reset a grid node's configuration.
- **provision** — Provisioning operations. You can start the provisioning operation and view the status of the provisioning operation.
- **recovery** — Primary Admin Node recovery operations. You can reset information, upload the Recover Package, start the recovery, and view the status of the recovery operation.
- **recovery-package** — Operations to download the Recovery Package.
- **sites** — Site-level configuration operations. You can create, view, delete, and modify a site.

## StorageGRID Appliance Installer API

The StorageGRID Appliance Installer API can be accessed over HTTPS from *Controller\_IP*:8443.

To access the API documentation, go to the StorageGRID Appliance Installer on the appliance and select **Help > API Docs** from the menu bar.

The StorageGRID Appliance Installer API includes the following sections:

- **clone** — Operations to configure and control node cloning.
- **encryption** — Operations to manage encryption and view encryption status.
- **hardware configuration** — Operations to configure system settings on attached hardware.
- **installation** — Operations for starting the appliance installation and for monitoring installation status.
- **networking** — Operations related to the Grid, Admin, and Client Network configuration for a StorageGRID appliance and appliance port settings.
- **setup** — Operations to help with initial appliance installation setup including requests to get information about the system and update the primary Admin Node IP.
- **support** — Operations for rebooting the controller and getting logs.
- **upgrade** — Operations related to upgrading appliance firmware.
- **uploadsg** — Operations for uploading StorageGRID installation files.

## Troubleshooting the hardware installation

If you encounter issues during the installation, you might find it helpful to review troubleshooting information related to hardware setup and connectivity issues.

### Related information

[Hardware setup appears to hang](#)

## Viewing boot-up codes for the SG6000-CN controller

When you apply power to the appliance, the BMC logs a series of boot-up codes for the SG6000-CN controller. You can view these codes in several ways.

### What you'll need

- You know how to access the BMC dashboard.
- If you want to use a kernel-based virtual machine (KVM), you have experience deploying and using KVM applications.
- If you want to use serial-over-LAN (SOL), you have experience using IPMI SOL console applications.

### Steps

1. Select one of the following methods for viewing the boot-up codes for the appliance controller, and gather the required equipment.

Method	Required equipment
VGA console	<ul style="list-style-type: none"><li>• VGA-capable monitor</li><li>• VGA cable</li></ul>
KVM	<ul style="list-style-type: none"><li>• KVM application</li><li>• RJ-45 cable</li></ul>
Serial port	<ul style="list-style-type: none"><li>• DB-9 serial cable</li><li>• Virtual serial terminal</li></ul>
SOL	<ul style="list-style-type: none"><li>• Virtual serial terminal</li></ul>

2. If you are using a VGA console, perform these steps:
  - a. Connect a VGA-capable monitor to the VGA port on the back of the appliance.
  - b. View the codes displayed on the monitor.
3. If you are using BMC KVM, perform these steps:
  - a. Connect to the BMC management port and log into the BMC web interface.
  - b. Select **Remote Control**.
  - c. Launch the KVM.
  - d. View the codes on the virtual monitor.
4. If you are using a serial port and terminal, perform these steps:
  - a. Connect to the DB-9 serial port on the back of the appliance.
  - b. Use settings 115200 8-N-1.
  - c. View the codes printed over the serial terminal.
5. If you are using SOL, perform these steps:

- Connect to the IPMI SOL using the BMC IP address and login credentials.

```
ipmitool -I lanplus -H 10.224.3.91 -U root -P calvin sol activate
```

- View the codes on the virtual serial terminal.

- Use the table to look up the codes for your appliance.

Code	Indicates
HI	The master boot script has started.
HP	The system is checking to see if the network interface card (NIC) firmware needs to be updated.
RB	The system is rebooting after applying firmware updates.
FP	The hardware subsystem firmware update checks have been completed. Inter-controller communication services are starting.
HE	<p>For an appliance Storage Node only:</p> <p>The system is awaiting connectivity with the storage controllers and synchronizing with the SANtricity operating system.</p> <p><b>Note:</b> If the boot-up procedure does not progress past this stage, perform these steps:</p> <ol style="list-style-type: none"> <li>Confirm that the four interconnect cables between the SG6000-CN controller and the two storage controllers are securely connected.</li> <li>As required, replace one or more of the cables, and try again.</li> <li>If this does not resolve the issue, contact technical support.</li> </ol>
HC	The system is checking for existing StorageGRID installation data.
HO	The StorageGRID Appliance Installer is running.
HA	StorageGRID is running.

#### Viewing error codes for the SG6000-CN controller

If a hardware error occurs when the SG6000-CN controller is booting up, the BMC logs an error code. As required, you can view these error codes using the BMC interface, and

then work with technical support to resolve the issue.

### What you'll need

- You know how to access the BMC dashboard.

### Steps

1. From the BMC dashboard, select **BIOS POST Code**.
2. Review the information displayed for Current Code and the Previous Code.

If any of the following error codes are shown, work with technical support to resolve the issue.

Code	Indicates
0x0E	Microcode not found
0x0F	Microcode not loaded
0x50	Memory initialization error. Invalid memory type or incompatible memory speed.
0x51	Memory initialization error. SPD reading has failed.
0x52	Memory initialization error. Invalid memory size or memory modules do not match.
0x53	Memory initialization error. No usable memory detected.
0x54	Unspecified memory initialization error
0x55	Memory not installed
0x56	Invalid CPU type or speed
0x57	CPU mismatch
0x58	CPU self-test failed, or possible CPU cache error
0x59	CPU micro-code is not found, or micro-code update failed
0x5A	Internal CPU error
0x5B	Reset PPI is not available
0x5C	PEI phase BMC self-test failure

Code	Indicates
0xD0	CPU initialization error
0xD1	North bridge initialization error
0xD2	South bridge initialization error
0xD3	Some architectural protocols are not available
0xD4	PCI resource allocation error. Out of resources.
0xD5	No space for legacy option ROM
0xD6	No console output devices are found
0xD7	No console input devices are found
0xD8	Invalid password
0xD9	Error loading boot option (LoadImage returned error)
0xDA	Boot option failed (StartImage returned error)
0xDB	Flash update failed
0xDC	Reset protocol is not available
0xDD	DXE phase BMC self-test failure
0xE8	MRC: ERR_NO_MEMORY
0xE9	MRC: ERR_LT_LOCK
0xEA	MRC: ERR_DDR_INIT
0xEB	MRC: ERR_MEM_TEST
0xEC	MRC: ERR_VENDOR_SPECIFIC
0xED	MRC: ERR_DIMM_COMPAT
0xEE	MRC: ERR_MRC_COMPATIBILITY

Code	Indicates
0xEF	MRC: ERR_MRC_STRUCT
0xF0	MRC: ERR_SET_VDD
0xF1	MRC: ERR_IOT_MEM_BUFFER
0xF2	MRC: ERR_RC_INTERNAL
0xF3	MRC: ERR_INVALID_REG_ACCESS
0xF4	MRC: ERR_SET_MC_FREQ
0xF5	MRC: ERR_READ_MC_FREQ
0x70	MRC: ERR_DIMM_CHANNEL
0x74	MRC: ERR_BIST_CHECK
0xF6	MRC: ERR_SMBUS
0xF7	MRC: ERR_PCU
0xF8	MRC: ERR_NGN
0xF9	MRC: ERR_INTERLEAVE_FAILURE

### Hardware setup appears to hang

The StorageGRID Appliance Installer might not be available if hardware faults or cabling errors prevent the storage controllers or the SG6000-CN controller from completing their boot-up processing.

#### Steps

1. For the storage controllers, watch the codes on the seven-segment displays.

While the hardware is initializing during power up, the two seven-segment displays show a sequence of codes. When the hardware boots successfully, both seven-segment displays show 99.

2. Review the LEDs on the SG6000-CN controller and the boot-up and error codes displayed in the BMC.
3. If you need help resolving an issue, contact technical support.

#### Related information

[Viewing boot-up status codes for the SG6000 storage controllers](#)

[E5700 and E2800 System Monitoring Guide](#)

[Viewing status indicators and buttons on the SG6000-CN controller](#)

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

[Viewing error codes for the SG6000-CN controller](#)

## Troubleshooting connection issues

If you encounter connection issues during the StorageGRID appliance installation, you should perform the corrective action steps listed.

### Unable to connect to the appliance

If you cannot connect to the appliance, there might be a network issue, or the hardware installation might not have been completed successfully.

#### Steps

1. If you are unable to connect to SANtricity System Manager:
  - a. Try to ping the appliance using the IP address for either storage controller on the management network for SANtricity System Manager:  
**`ping Storage_Controller_IP`**
  - b. If you receive no response from the ping, confirm you are using the correct IP address.  
  
Use the IP address for management port 1 on either storage controller.
  - c. If the IP address is correct, check appliance cabling and the network setup.  
  
If that does not resolve the issue, contact technical support.
  - d. If the ping was successful, open a web browser.
  - e. Enter the URL for SANtricity System Manager:  
**`https://Storage_Controller_IP`**  
  
The log in page for SANtricity System Manager appears.
2. If you are unable to connect to the SG6000-CN controller:
  - a. Try to ping the appliance using the IP address for the SG6000-CN controller:  
**`ping SG6000-CN_Controller_IP`**
  - b. If you receive no response from the ping, confirm you are using the correct IP address.  
  
You can use the IP address of the appliance on the Grid Network, the Admin Network, or the Client Network.
  - c. If the IP address is correct, check appliance cabling, SFP transceivers, and the network setup.  
  
If that does not resolve the issue, contact technical support.
  - d. If the ping was successful, open a web browser.
  - e. Enter the URL for the StorageGRID Appliance Installer:  
**`https://SG6000-CN_Controller_IP:8443`**

The Home page appears.

#### Expansion shelves do not appear in Appliance Installer

If you have installed expansion shelves for the SG6060 and they do not appear in the StorageGRID Appliance Installer, you should verify that the shelves have been completely installed and powered on.

#### About this task

You can verify that the expansion shelves are connected to the appliance by viewing the following information in the StorageGRID Appliance Installer:

- The **Home** page contains a message about expansion shelves.

 The storage system contains 2 expansion shelves.

- The **Advanced > RAID Mode** page indicates by number of drives whether or not the appliance includes expansion shelves. For example, in the following screen shot, two SSDs and 178 HDDs are shown. An SG6060 with two expansion shelves contains 180 total drives.

#### Configure RAID Mode

This appliance contains the following drives.

Type	Size	Number of drives
SSD	800 GB	2
HDD	11.8 TB	178

If the StorageGRID Appliance Installer pages do not indicate that expansion shelves are present, follow this procedure.

#### Steps

1. Verify that all required cables have been firmly connected.
2. Verify that you have powered on the expansion shelves.
3. If you need help resolving an issue, contact technical support.

#### Related information

[SG6060: Cabling the optional expansion shelves](#)

[Connecting power cords and applying power \(SG6000\)](#)

#### Rebooting the SG6000-CN controller while the StorageGRID Appliance Installer is running

You might need to reboot the SG6000-CN controller while the StorageGRID Appliance Installer is running. For example, you might need to reboot the controller if the installation fails.

#### About this task

This procedure only applies when the SG6000-CN controller is running the StorageGRID Appliance Installer. Once the installation is completed, this step no longer works because the StorageGRID Appliance Installer is no longer available.

## Steps

1. From the StorageGRID Appliance Installer, click **Advanced > Reboot Controller**, and then select one of these options:
  - Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
  - Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



The SG6000-CN controller is rebooted.

## Maintaining the SG6000 appliance

You might need to perform maintenance procedures on the SG6000 appliance. The procedures in this section assume that the appliance has already been deployed as a Storage Node in a StorageGRID system.

## Steps

- Placing an appliance into maintenance mode
- Upgrading SANtricity OS on the storage controllers
- Upgrading drive firmware using SANtricity System Manager
- Adding an expansion shelf to a deployed SG6060
- Turning the controller identify LED on and off
- Locating the controller in a data center
- Replacing a storage controller
- Replacing hardware components in the storage controller shelf
- Replacing hardware components in the optional 60-drive expansion shelf
- Shutting down the SG6000-CN controller

- Powering on the SG6000-CN controller and verifying operation
- Replacing the SG6000-CN controller
- Replacing a power supply in the SG6000-CN controller
- Removing the SG6000-CN controller from a cabinet or rack
- Reinstalling the SG6000-CN controller into a cabinet or rack
- Removing the SG6000-CN controller cover
- Reinstalling the SG6000-CN controller cover
- Replacing the Fibre Channel HBA in the SG6000-CN controller
- Changing the link configuration of the SG6000-CN controller
- Changing the MTU setting
- Checking the DNS server configuration
- Monitoring node encryption in maintenance mode

### **Placing an appliance into maintenance mode**

You must place the appliance into maintenance mode before performing specific maintenance procedures.

#### **What you'll need**

- You must be signed in to the Grid Manager using a supported browser.
- You must have the Maintenance or Root Access permission. For details, see the instructions for administering StorageGRID.

#### **About this task**

Placing a StorageGRID appliance into maintenance mode might make the appliance unavailable for remote access.



The password and host key for a StorageGRID appliance in maintenance mode remain the same as they were when the appliance was in service.

#### **Steps**

1. From the Grid Manager, select **Nodes**.
2. From the tree view of the Nodes page, select the appliance Storage Node.
3. Select **Tasks**.

## Reboot

Shuts down and restarts the node.

**Reboot**

## Maintenance Mode

Places the appliance's compute controller into maintenance mode.

**Maintenance Mode**

### 4. Select **Maintenance Mode**.

A confirmation dialog box appears.

#### **⚠ Enter Maintenance Mode on SGA-106-15**

You must place the appliance's compute controller into maintenance mode to perform certain maintenance procedures on the appliance.

Attention: All StorageGRID services on this node will be shut down. Wait a few minutes for the node to reboot into maintenance mode.

If you are ready to start, enter the provisioning passphrase and click **OK**.

Provisioning Passphrase

**Cancel**

**OK**

### 5. Enter the provisioning passphrase, and select **OK**.

A progress bar and a series of messages, including "Request Sent," "Stopping StorageGRID," and "Rebooting," indicate that the appliance is completing the steps for entering maintenance mode.

## Reboot

Shuts down and restarts the node.

Reboot

## Maintenance Mode

**Attention:** Your request has been sent, but the appliance might take 10-15 minutes to enter maintenance mode. Do not perform maintenance procedures until this tab indicates maintenance mode is ready, or data could become corrupted.



Request Sent

When the appliance is in maintenance mode, a confirmation message lists the URLs you can use to access the StorageGRID Appliance Installer.

## Reboot

Shuts down and restarts the node.

Reboot

## Maintenance Mode

This node is currently in maintenance mode. Navigate to one of the URLs listed below and perform any necessary maintenance procedures.

- <https://172.16.2.106:8443>
- <https://10.224.2.106:8443>
- <https://47.47.2.106:8443>
- <https://169.254.0.1:8443>

When you are done with any required maintenance procedures, you must exit maintenance mode by clicking Reboot Controller from the StorageGRID Appliance Installer.

6. To access the StorageGRID Appliance Installer, browse to any of the URLs displayed.

If possible, use the URL containing the IP address of the appliance's Admin Network port.

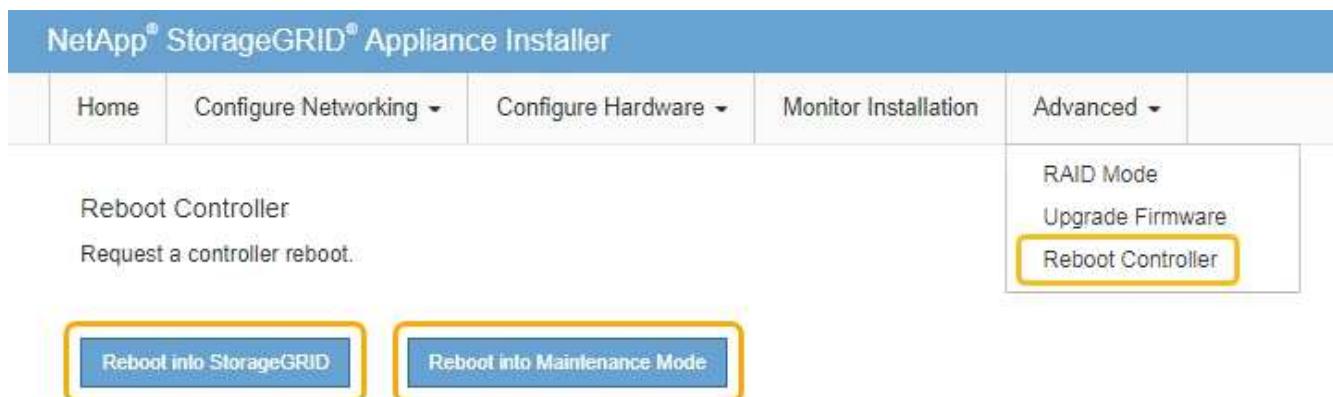


Accessing <https://169.254.0.1:8443> requires a direct connection to the local management port.

7. From the StorageGRID Appliance Installer, confirm that the appliance is in maintenance mode.

**⚠** This node is in maintenance mode. Perform any required maintenance procedures. If you want to exit maintenance mode manually to resume normal operation, go to Advanced > Reboot Controller to **reboot** the controller.

8. Perform any required maintenance tasks.
9. After completing maintenance tasks, exit maintenance mode and resume normal node operation. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select **Reboot into StorageGRID**.



NetApp® StorageGRID® Appliance Installer

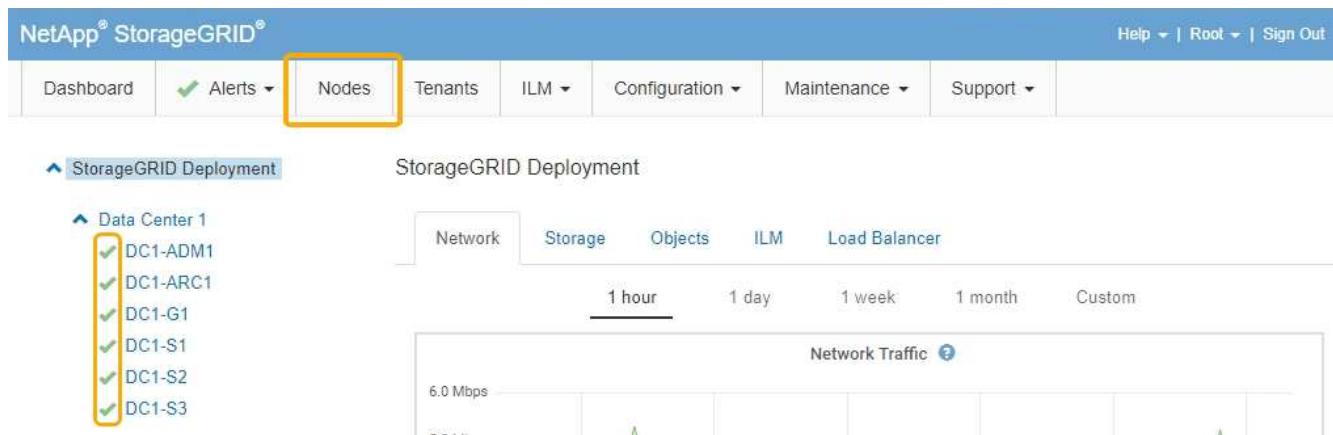
Home Configure Networking ▾ Configure Hardware ▾ Monitor Installation Advanced ▾

RAID Mode  
Upgrade Firmware  
**Reboot Controller**

Reboot Controller  
Request a controller reboot.

**Reboot into StorageGRID** **Reboot into Maintenance Mode**

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** tab should display a normal status **✓** for the appliance node, indicating that no alerts are active and the node is connected to the grid.



NetApp® StorageGRID®

Help ▾ | Root ▾ | Sign Out

Dashboard Alerts ▾ **Nodes** Tenants ILM ▾ Configuration ▾ Maintenance ▾ Support ▾

▲ StorageGRID Deployment StorageGRID Deployment

▲ Data Center 1

- ✓ DC1-ADM1
- ✓ DC1-ARC1
- ✓ DC1-G1
- ✓ DC1-S1
- ✓ DC1-S2
- ✓ DC1-S3

Network Storage Objects ILM Load Balancer

1 hour 1 day 1 week 1 month Custom

6.0 Mbps

Network Traffic

## Upgrading SANtricity OS on the 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. If you need assistance, contact technical support.

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.

### [Upgrading SANtricity OS on the storage controllers using the 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.

### [Upgrading SANtricity OS on the 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.

#### **Related information**

[NetApp Interoperability Matrix Tool](#)

[NetApp Downloads: SANtricity OS](#)

[Monitor & troubleshoot](#)

### [Upgrading SANtricity OS on the storage controllers using the 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.

#### **What you'll need**

- 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 must have the Maintenance permission.
- You must be signed in to the Grid Manager using a supported browser.
- You must have the provisioning passphrase.
- You must have access to the NetApp downloads page for SANtricity OS.

#### **About this task**

You cannot 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. It might take more than 30 minutes to load the SANtricity OS on each node and up to 90 minutes to reboot each StorageGRID storage appliance.



The following steps are only applicable when you are using the Grid Manager to perform the upgrade. The storage controllers in the SG6000 series appliances cannot 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 do not need to apply a separate NVSRAM upgrade file.

## Steps

1. From a service laptop, download the new SANtricity OS Software file from the NetApp support site.

Be sure to choose the correct SANtricity OS version for the storage controllers in your appliance. The SG6060 uses the E2800 controller, and the SGF6024 uses the EF570 controller.

### NetApp Downloads: SANtricity OS

2. Sign in to the Grid Manager using a supported browser.
3. Select **Maintenance**. Then, in the System section of the menu, select **Software Update**.

The Software Update page appears.

#### Software Update

You can upgrade StorageGRID software, apply a hotfix, or upgrade the SANtricity OS software on StorageGRID storage appliances.

- To perform a major version upgrade of StorageGRID, see the [Instructions for upgrading StorageGRID](#), and then select **StorageGRID Upgrade**.
- To apply a hotfix to all nodes in your system, see "Hotfix procedure" in the [recovery and maintenance instructions](#), and then select **StorageGRID Hotfix**.
- To upgrade SANtricity OS software on a storage controller, see "Upgrading SANtricity OS Software on the storage controllers" in the installation and maintenance instructions for your storage appliance, and then select **SANtricity OS**:
  - SG6000 appliance installation and maintenance
  - SG5700 appliance installation and maintenance
  - SG5600 appliance installation and maintenance



StorageGRID Upgrade

StorageGRID Hotfix

SANtricity OS

4. Click **SANtricity OS**.

The SANtricity OS page appears.

## SANtricity OS

You can use this page to upgrade the SANtricity OS software on storage controllers in a storage appliance. Before installing the new software, confirm the storage controllers are Nominal (**Nodes > appliance node > Hardware**) and ready for an upgrade. A health check is automatically performed as part of the upgrade process and valid NVSRAM is automatically installed based on the appliance type and new software version. The software upgrade can take up to 30 minutes per appliance. When the upgrade is complete, the node will be automatically rebooted to activate the SANtricity OS on the storage controllers. If you have multiple types of appliances, repeat this procedure to install the appropriate OS software for each type.

### SANtricity OS Upgrade File

SANtricity OS Upgrade File

**Browse**

?

### Passphrase

Provisioning Passphrase

?

**Start**

5. Select the SANtricity OS upgrade file you downloaded from the NetApp support site.

- Click **Browse**.
- Locate and select the file.
- Click **Open**.

The file is uploaded and validated. When the validation process is done, the file name is shown in the Details field.



Do not change the file name since it is part of the verification process.

## SANtricity OS

You can use this page to upgrade the SANtricity OS software on storage controllers in a storage appliance. Before installing the new software, confirm the storage controllers are Nominal (**Nodes > appliance node > Hardware**) and ready for an upgrade. A health check is automatically performed as part of the upgrade process and valid NVSRAM is automatically installed based on the appliance type and new software version. The software upgrade can take up to 30 minutes per appliance. When the upgrade is complete, the node will be automatically rebooted to activate the SANtricity OS on the storage controllers. If you have multiple types of appliances, repeat this procedure to install the appropriate OS software for each type.

### SANtricity OS Upgrade File



SANtricity OS Upgrade File   RC\_...dlp

Details  RC\_...dlp

**Passphrase**

Provisioning Passphrase

**Start**

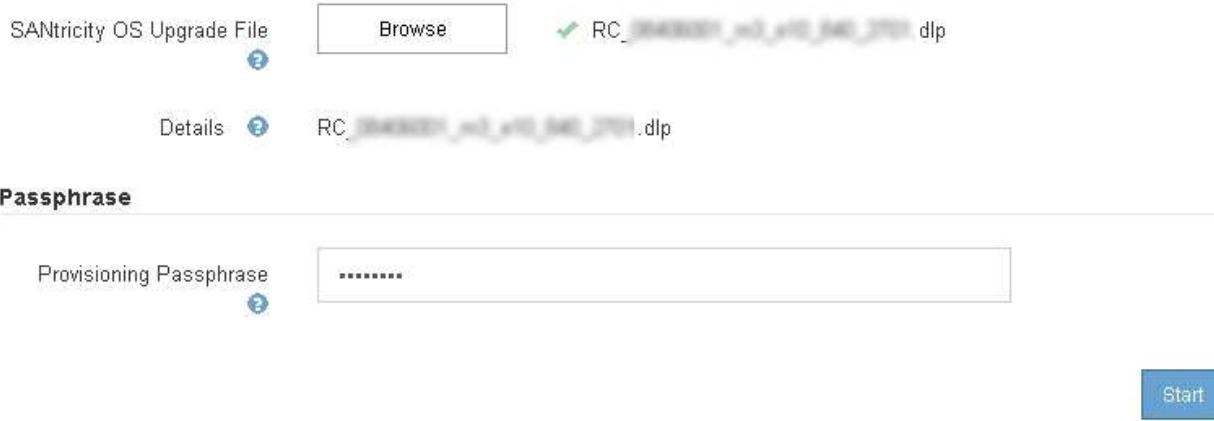
6. Enter the provisioning passphrase.

The **Start** button is enabled.

## SANtricity OS

You can use this page to upgrade the SANtricity OS software on storage controllers in a storage appliance. Before installing the new software, confirm the storage controllers are Nominal (**Nodes > appliance node > Hardware**) and ready for an upgrade. A health check is automatically performed as part of the upgrade process and valid NVSRAM is automatically installed based on the appliance type and new software version. The software upgrade can take up to 30 minutes per appliance. When the upgrade is complete, the node will be automatically rebooted to activate the SANtricity OS on the storage controllers. If you have multiple types of appliances, repeat this procedure to install the appropriate OS software for each type.

### SANtricity OS Upgrade File



SANtricity OS Upgrade File   RC\_...dlp

Details  RC\_...dlp

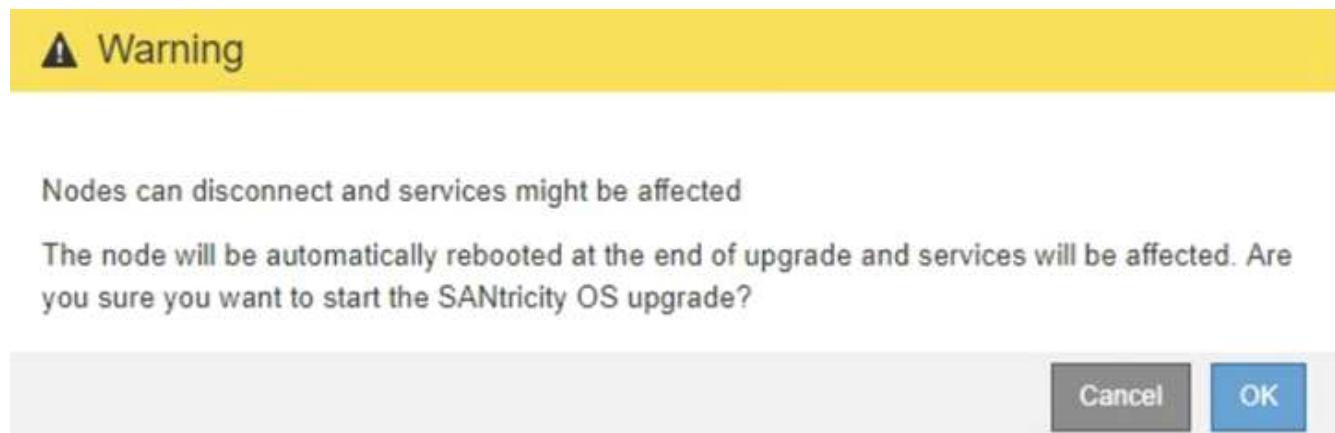
**Passphrase**

Provisioning Passphrase  \*\*\*\*\*

**Start**

7. Click **Start**.

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



8. Click **OK** 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 click **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 Storage Nodes, including software-based Storage Nodes. You must approve the upgrade for all Storage Nodes, even though a SANtricity OS upgrade has no effect on software-based Storage Nodes. The upgrade message returned for software-based Storage Nodes is "SANtricity OS upgrade is not applicable to this node."

#### SANtricity OS Upgrade Progress

Storage Nodes - 0 out of 4 completed							Approve All	Remove All
Site	Name	Progress	Stage	Details	Action		Search	
RTP Lab 1	DT-10-224-1-181-S1		Waiting for you to approve		Approve			
RTP Lab 1	DT-10-224-1-182-S2		Waiting for you to approve		Approve			
RTP Lab 1	DT-10-224-1-183-S3		Waiting for you to approve		Approve			
RTP Lab 1	NetApp-SGA-Lab2-002-024		Waiting for you to approve		Approve			

9. Optionally, sort the list of nodes in ascending or descending order by **Site**, **Name**, **Progress**, **Stage**, or **Details**. Or, enter a term in the **Search** box to search for specific nodes.

You can scroll through the list of nodes by using the left and right arrows at the bottom right corner of the section.

10. Approve the grid nodes you are ready to add to the upgrade queue. Approved nodes of the same type are upgraded one at a time.



Do not 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. Later, when the node is upgraded, the appliance node is rebooted. These operations might cause service interruptions for clients that are communicating with the node.

- Click either of the **Approve All** buttons 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(s).

- Click one or more **Approve** buttons to add one or more nodes to the SANtricity OS upgrade queue.



You can delay applying a SANtricity OS upgrade to a node, but the SANtricity OS upgrade process will not be complete until you approve the SANtricity OS upgrade on all the listed Storage Nodes.

After you click **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. For nodes intentionally not upgraded, the process will show stage of Complete with one of the following messages in the Details column:

- Storage Node was already upgraded.
- SANtricity OS upgrade is not applicable to this node.
- SANtricity OS file is not compatible with this node.

The message “SANtricity OS upgrade is not applicable to this node” indicates that the node does not have a storage controller that can be managed by the StorageGRID system. This message will appear for non-appliance Storage Nodes. You can complete the SANtricity OS upgrade process without upgrading the node displaying this message.

The message “SANtricity OS file is not compatible with this node” indicates that the node requires a SANtricity OS file different than the one the process is attempting to install. After you complete the current SANtricity OS upgrade, download the SANtricity OS appropriate for the node and repeat the upgrade process.

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

As shown in the example, 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.

▲ Storage Nodes - 1 out of 9 completed

Approve All   Remove All

Search 

Site	Name	Progress	Stage	Details	Action
Raleigh	RAL-S1-101-196	Queued			
Raleigh	RAL-S2-101-197	Complete			
Raleigh	RAL-S3-101-198	Queued			
Sunnyvale	SVL-S1-101-199	Queued			
Sunnyvale	SVL-S2-101-93		Waiting for you to approve		
Sunnyvale	-SVL-S3-101-94		Waiting for you to approve		
Vancouver	VTC-S1-101-193		Waiting for you to approve		
Vancouver	-VTC-S2-101-194		Waiting for you to approve		
Vancouver	-VTC-S3-101-195		Waiting for you to approve		

12. 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 being applied, the upgrade has failed for that node. The appliance might need to be placed in maintenance mode to recover from the failure. Contact technical support before continuing.

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: "You must use maintenance mode to upgrade SANtricity OS on this node. See the installation and maintenance instructions for your appliance. After the upgrade, you can use this utility for future upgrades." To resolve the error, do the following:

- Use maintenance mode to upgrade SANtricity OS on the node that shows a stage of Error.
- Use the Grid Manager to re-start 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 date and time the SANtricity OS upgrade was completed.

SANtricity OS upgrade completed at 2020-04-07 13:26:02 EDT.

**SANtricity OS Upgrade File**

SANtricity OS Upgrade File 

Passphrase

Provisioning Passphrase 

13. 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](#)

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

### Upgrading SANtricity OS on the 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.

#### What you'll need

- 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, the SG6000-CN controller has been placed in maintenance mode.



Maintenance mode interrupts the connection to the storage controller.

[Placing an appliance into maintenance mode](#)

#### About this task

Do not 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. From a service laptop, access SANtricity System Manager and sign in.
2. Download the new SANtricity OS Software file and NVSRAM file to the management client.

The NVSRAM is specific to the StorageGRID appliance. Do not use the standard NVSRAM download.

3. 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. Do not defer activation.

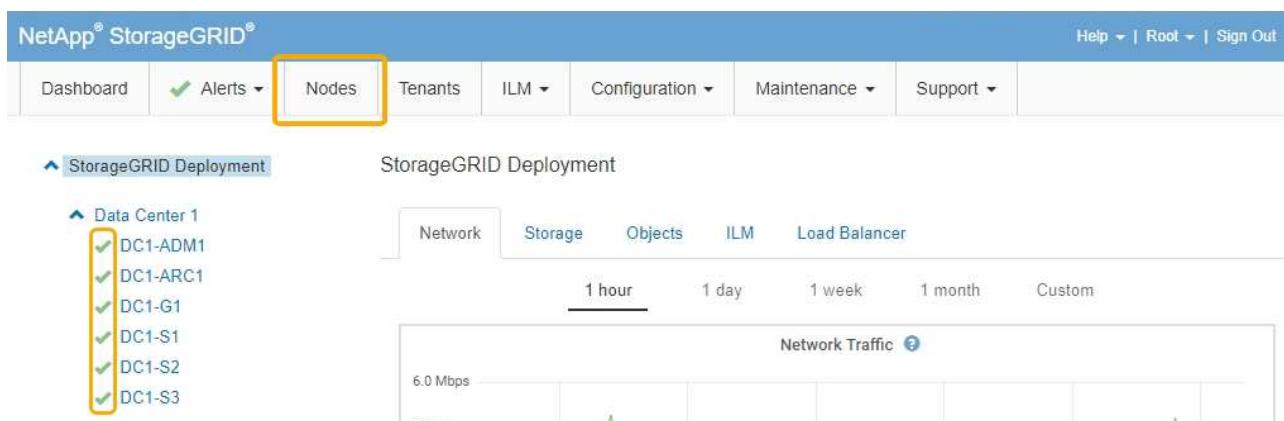
4. Once the upgrade operation has completed, reboot the node. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:
  - Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
  - Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in

maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



The screenshot shows the 'Reboot Controller' button highlighted with a yellow box. Other buttons like 'RAID Mode', 'Upgrade Firmware', and 'Reboot Controller' are also visible.

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** tab should display a normal status  for the appliance node, indicating that no alerts are active and the node is connected to the grid.



The screenshot shows the 'Nodes' tab highlighted with a yellow box. The interface displays a list of nodes under 'Data Center 1' with green checkmarks next to them, indicating they are in an optimal state. A network traffic graph is also visible.

## Related information

[NetApp Interoperability Matrix Tool](#)

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

## Upgrading drive firmware using SANtricity System Manager

You upgrade your drive firmware to make sure you have all the latest features and bug fixes.

### What you'll need

- The storage appliance has an Optimal status.
- All drives have an Optimal status.
- You have the latest version of SANtricity System Manager installed that is compatible with your StorageGRID version.
- You have placed the StorageGRID appliance in maintenance mode.

## Placing an appliance into maintenance mode



Maintenance mode interrupts the connection to the storage controller, stopping all I/O activity and placing all drives offline.



Do not 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 policies.

### 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 > *appliance Storage Node* > SANtricity System Manager**



If these options are not available or the SANtricity System Manager login page does not appear, access SANtricity System Manager by browsing to the storage controller IP:  
**[https://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 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	Associated Drives
MS02, KPM51VUG800G	<a href="#">View drives</a>

Total rows: 1

Select up to four drive firmware files: [Browse...](#)

In this example:

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

Select **View drives** in the Associated Drives column to display where these drives are installed in your storage appliance.

d. Close the Upgrade Drive Firmware window.

4. Download and prepare the available drive firmware upgrade:

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

The E-Series Disk Firmware page displays.

- 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
Drive Part Number	Descriptions	KPM51VUG800G	Firmware Rev. (Download)	MS02 Fixes Bug 1194908 MS03 Fixes Bug 1334862	04-Sep-2020
E-X4041C	SSD, 800GB, SAS, PI	KPM51VUG800G	MS03		

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

5. Install the drive firmware upgrade:

- From SANtricity System Manager, under Drive Firmware upgrade, select **Begin Upgrade**.
- 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.

- 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 **Proposed Firmware**. If you must change this firmware, select **Back**.

- d. Select **Offline (parallel)** upgrade.

You can use the offline upgrade method because the appliance is in maintenance mode, where I/O activity is stopped for all drives and all volumes.

- 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 any of the following errors occur during the upgrade procedure, take the appropriate recommended action.

- **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 are not 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.

6. Once the upgrade operation has completed, reboot the appliance. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:

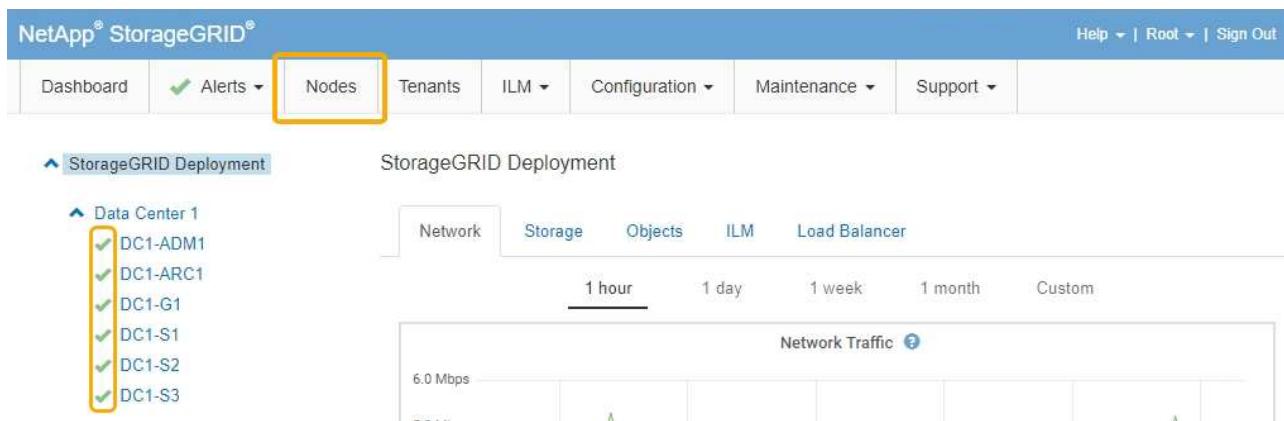
- Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
- Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in

maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



The screenshot shows the 'Reboot Controller' section of the StorageGRID Appliance Installer. It includes a 'Reboot Controller' button, a 'Request a controller reboot.' link, and a 'Reboot Controller' link in the 'Advanced' dropdown menu, all highlighted with yellow boxes.

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** tab should display a normal status  for the appliance node, indicating that no alerts are active and the node is connected to the grid.



The screenshot shows the StorageGRID Grid Manager interface. The 'Nodes' tab is highlighted with a yellow box. The 'StorageGRID Deployment' section shows a list of nodes under 'Data Center 1', with all nodes marked as green (normal status). A 'Network' tab is selected, showing a graph of 'Network Traffic' over a 1-hour period at 6.0 Mbps.

## Related information

[Upgrading SANtricity OS on the storage controllers](#)

## Adding an expansion shelf to a deployed SG6060

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

### What you'll need

- 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.

[Locating the controller in a 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.

[SG6060: Installing 60-drive shelves into a cabinet or rack](#)

2. Follow the instructions for installing the drives.

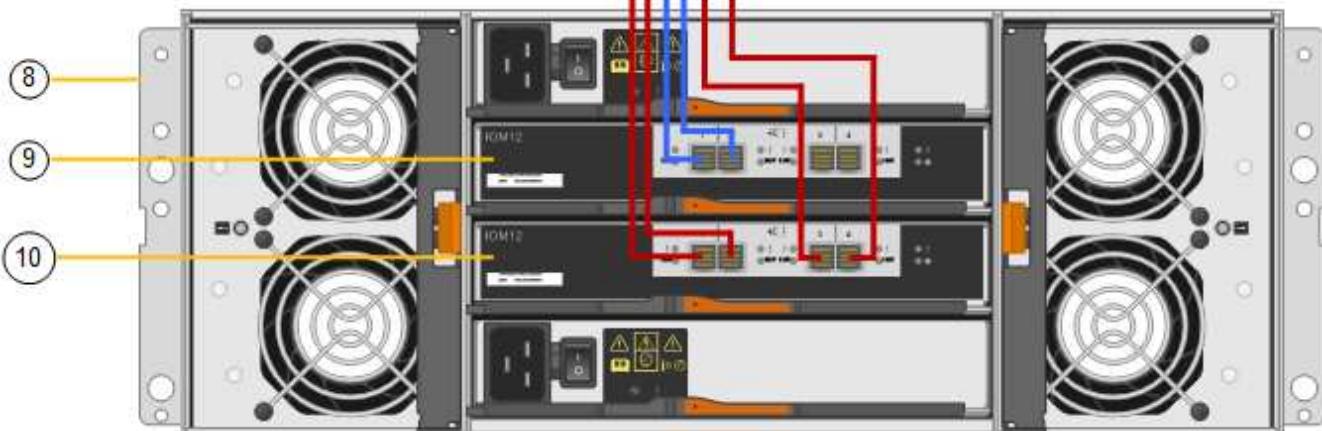
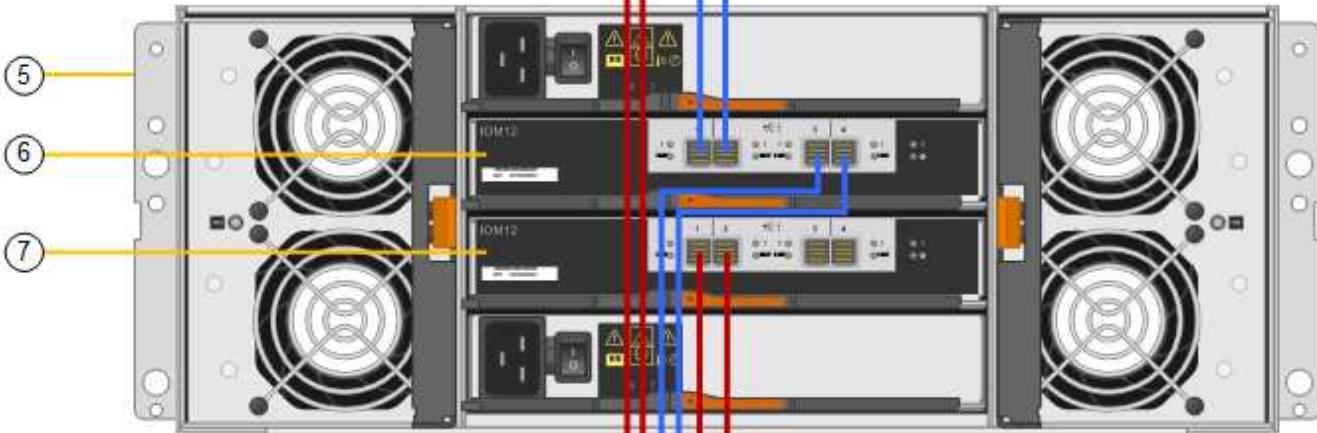
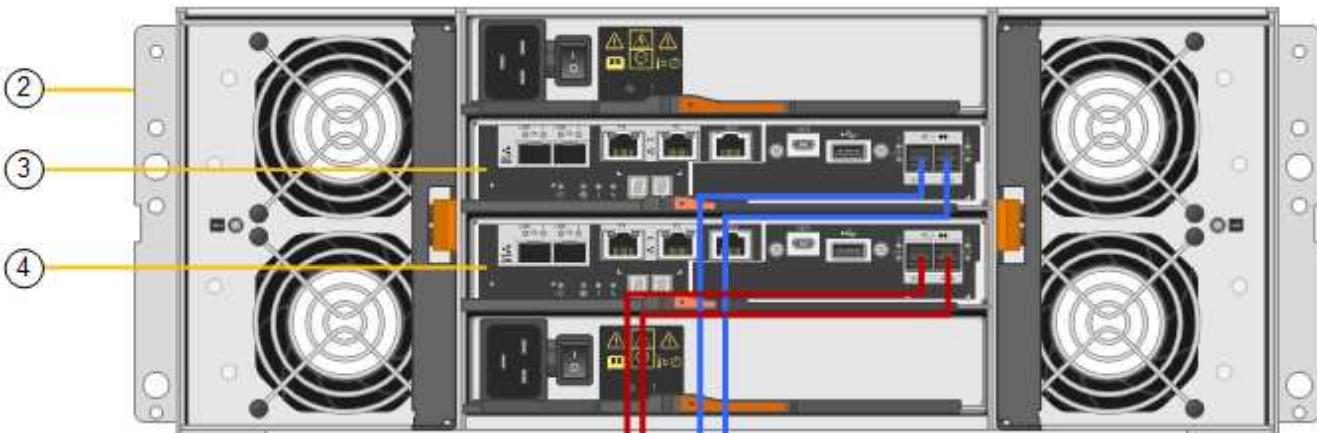
[SG6060: Installing the drives](#)

3. From the Grid Manager, place the SG6000-CN controller into maintenance mode.

[Placing an appliance 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.



	Description
1	SG6000-CN

	<b>Description</b>
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.
    - Do not 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 are not 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 are not detected.

The screenshot shows a configuration page for adding expansion shelves. At the top, there are two informational messages:

- 1 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.
- 2 The storage system contains 2 expansion shelves.

The main configuration area is titled "This Node". It includes fields for "Node type" (Storage) and "Node name" (NetApp-SGA), with "Save" and "Cancel" buttons.

The "Primary Admin Node connection" section shows "Enable Admin Node discovery" (unchecked), "Primary Admin Node IP" (172.16.4.71), and "Connection state" (Connection to 172.16.4.71 ready), with "Save" and "Cancel" buttons.

The "Installation" section shows "Current state" (Ready to start configuration of 1 attached but unconfigured expansion shelf) and a "Start Expansion" button, which is highlighted with a yellow box.

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%; background-color: #2e6b2e;"></div>	Complete	
Clear existing configuration	<div style="width: 100%; background-color: #2e6b2e;"></div>	Skipped	
Configure volumes	<div style="width: 50%; background-color: #2e6b2e;"></div>	Creating volume StorageGRID-obj-22	
Configure caching	<div style="width: 0%; background-color: #2e6b2e;"></div>	Pending	
Configure host settings	<div style="width: 0%; background-color: #2e6b2e;"></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.



If the appliance does not rejoin the grid, go to the StorageGRID Appliance Installer Home page, select **Advanced > Reboot Controller**, and then select **Reboot into Maintenance Mode**.

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

The screenshot shows the StorageGRID Appliance Installer interface with the **Tasks** tab selected. There are two main sections:

- Reboot**: Described as "Shuts down and restarts the node." with a **Reboot** button.
- Maintenance Mode**: Described as "Places the appliance's compute controller into maintenance mode." with a **Maintenance Mode** button.

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

- In the Grid Manager, select **Nodes** and verify that the appliance Storage Node has a green checkmark icon.

The green checkmark icon means that no alerts are active and the node is connected to the grid. For a description of node icons, see the instructions for monitoring and troubleshooting StorageGRID.

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

Storage Shelves												
Shelf Chassis Serial Number	Shelf ID	Shelf Status	IOM Status	Power Supply Status	Drawer Status	Fan Status	Drive Slots	Data Drives	Data Drive Size	Cache Drives	Cache Drive Size	Configuration Status
721924500063	99	Nominal 	N/A	Nominal	Nominal	Nominal	60	58	9.80 TB	2	800.17 GB	Configured (in use)
721929500038	0	Nominal 	Nominal	Nominal	Nominal	Nominal	60	60	9.80 TB	0	0 bytes	Configured (in use)
721929500039	1	Nominal 	Nominal	Nominal	Nominal	Nominal	60	60	9.80 TB	0	0 bytes	Configured (in use)

## Related information

[Unpacking the boxes \(SG6000\)](#)

[SG6060: Installing 60-drive shelves into a cabinet or rack](#)

[SG6060: Installing the drives](#)

[Monitor & troubleshoot](#)

## Turning the controller identify LED on and off

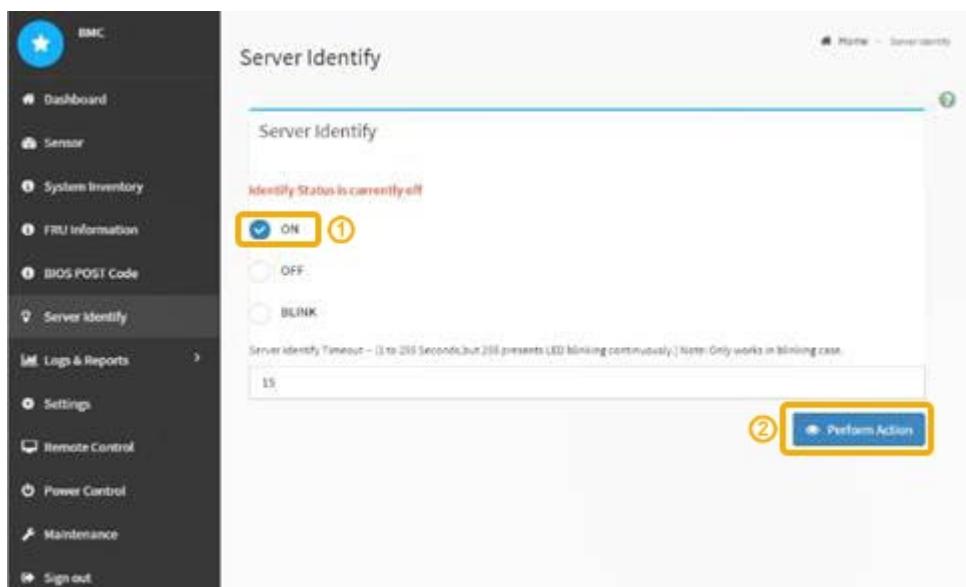
The blue identify LED on the front and back of the controller can be turned on to help locate the appliance in a data center.

### What you'll need

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

### Steps

1. Access the controller BMC interface.
2. Select **Server Identify**.
3. Select **ON** and then select **Perform Action**.



## Result

The blue identify LEDs light on the front (shown) and rear of the controller.



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

#### After you finish

To turn off the controller identify LED:

- Press the identify LED switch on the controller front panel.
- From the controller BMC interface, select **Server Identify**, select **OFF** and then select **Perform Action**.

The blue identify LEDs on the front and rear of the controller go off.



#### Related information

[Verifying the Fibre Channel HBA to replace](#)

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

[Accessing the BMC interface](#)

#### Locating the controller in a data center

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

#### What you'll need

- You have determined which controller requires maintenance.

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

## Turning the controller identify LED on and off

### 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.

## Turning the controller identify LED on and off

### Related information

[Removing the Fibre Channel HBA](#)

[Removing the SG6000-CN controller from a cabinet or rack](#)

[Shutting down the SG6000-CN controller](#)

### Replacing a storage controller

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

### What you'll need

- 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 the E-Series instructions for replacing a controller in duplex configuration.



Refer to the E-Series instructions only when directed or if you need more details to perform a specific step. Do not rely on the E-Series instructions to replace a controller in the StorageGRID appliance, because the procedures are not the same.

- You have physically located the storage appliance where you are replacing the controller in the data center.

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

#### **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.

Because the storage controller shelf 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.



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

When you replace a controller, you must remove the battery from the original controller and install it in the replacement controller.



The storage controllers in the appliance do not include host interface cards (HIC).

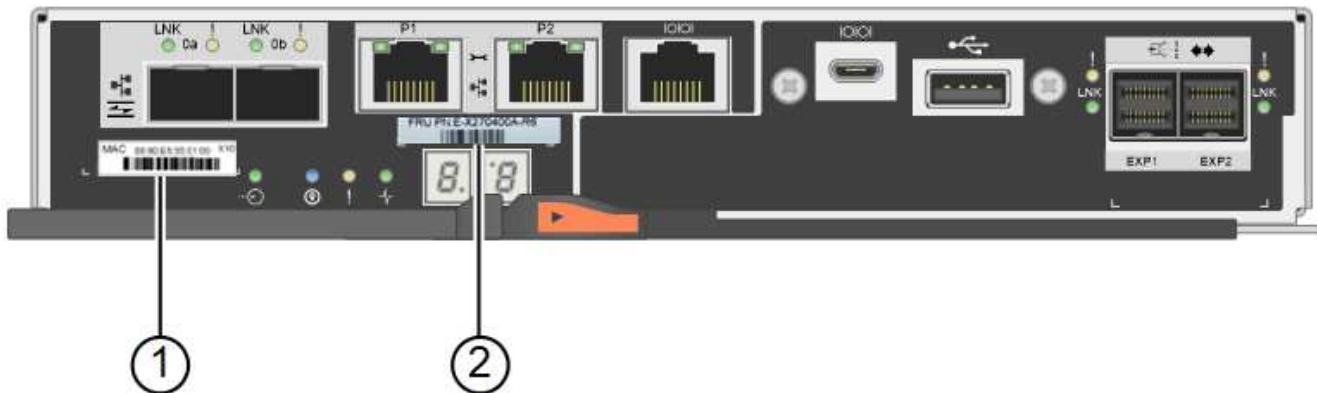
#### **Steps**

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.

This figure shows the E2800 controller. The procedure for replacing the EF570 controller is identical.



Label	Label	Description
1	MAC address	The MAC address for management port 1 ("P1"). 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. Prepare to remove the controller.

You use SANtricity System Manager to perform these steps. As needed for additional details, reference the E-Series instructions for replacing the storage controller.

- 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 are not the same, do not attempt this procedure.

- Back up the configuration database.

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

- 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 in case the replacement does not resolve the problem.

d. Take the controller you plan to replace offline.

4. Remove the controller from the appliance:

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

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

- 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.
- 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.

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

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

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

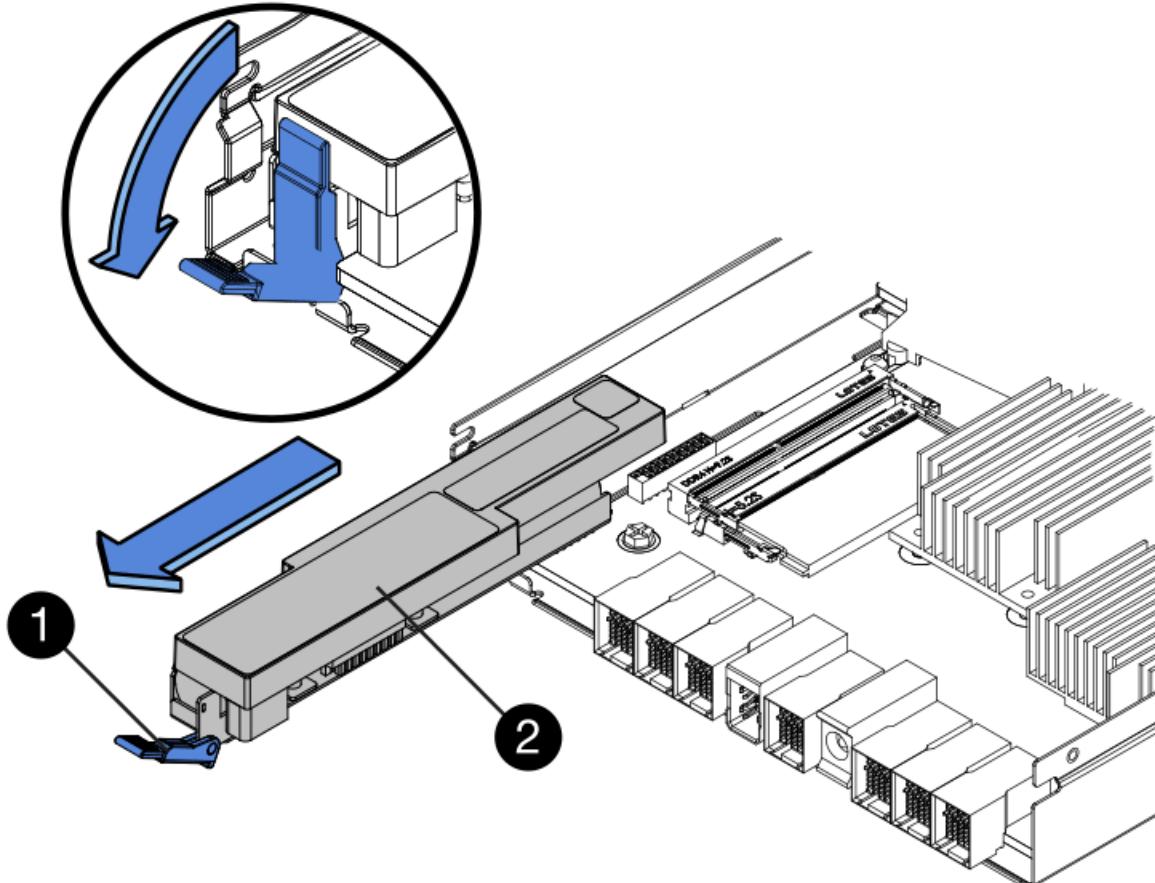
If this green LED is on, the controller is still using battery power. You must wait for this LED to go off before removing any components.



Item	Description
	Internal Cache Active LED

Item	Description
	Battery

- b. Locate the blue release latch for the battery.
- c. Unlatch the battery by pushing the release latch down and away from the controller.



Item	Description
	Battery release latch
	Battery

- d. Lift up on the battery, and slide it out of the controller.
- e. Remove the cover from the replacement controller.
- f. Orient the replacement controller so that the slot for the battery faces toward you.
- g. 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.

- h. 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.

- i. 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 in the slot on the controller:



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



- j. Replace the controller cover.

6. 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. 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.

## 7. 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.

## 8. Confirm that the new controller is Optimal, and collect support data.

### Related information

[NetApp E-Series Systems Documentation Site](#)

### Replacing hardware components in the storage controller shelf

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

### What you'll need

- 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.

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

### About this task

To replace the battery in the storage controller, see the instructions in these 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

FRU	See instructions
Drive	E-Series: <ul style="list-style-type: none"> <li>• Replace drive (60-drive)</li> <li>• Replace drive (12-drive or 24-drive)</li> </ul>
Power canister	E-Series <ul style="list-style-type: none"> <li>• Replace power canister (60-drive)</li> <li>• Replace power supply (12-drive or 24-drive)</li> </ul>
Fan canister (60-drive shelves only)	E-Series: Replace fan canister (60-drive)
Drive drawer (60-drive shelves only)	E-Series: Replace drive drawer (60-drive)

## Related information

[NetApp E-Series Systems Documentation Site](#)

[Replacing a storage controller](#)

## Replacing hardware components in the optional 60-drive expansion shelf

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

### What you'll need

- 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.

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

### About this task

To replace an input/output module (IOM) in a 60-drive expansion shelf, see the instructions in these 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)

## Shutting down the SG6000-CN controller

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

### What you'll need

- You have physically located the SG6000-CN controller requiring maintenance in the data center.

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

- The appliance has been placed maintenance mode.

#### [Placing an appliance into maintenance mode](#)

### 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 normally expected. See the information about determining node connection states in the instructions for managing objects with information lifecycle management.

 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. When the appliance has been placed maintenance mode, shut down the SG6000-CN controller:



You must perform a controlled shut down of the controller by entering the commands specified below. Shutting down the controller using the power switch will result in data loss.

- 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. 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:

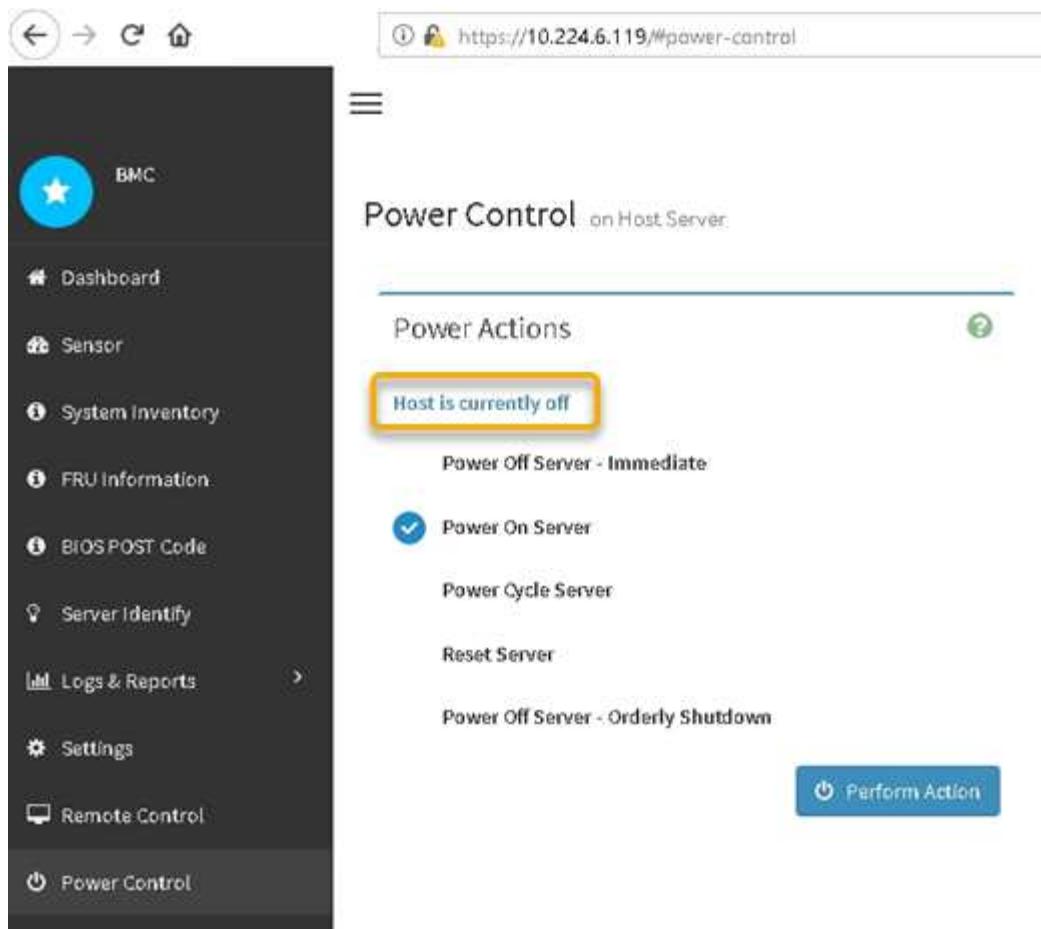
- Look at the blue power LED on the front of the controller and confirm that it is off.



- 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.  
[Accessing the BMC interface](#)
  - ii. Select **Power Control**.
  - iii. Verify that the Power Actions indicates that the host is currently off.



## Related information

[Removing the SG6000-CN controller from a cabinet or rack](#)

## Powering on the SG6000-CN controller and verifying operation

Power on the controller after completing maintenance.

### What you'll need

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

[Reinstalling the SG6000-CN controller into a cabinet or rack](#)

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

[Locating the controller in a 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:

- Access the controller BMC interface.

#### Accessing the BMC interface

- Select **Power Control**.
- Select **Power On Server** and then select **Perform Action**.

A screenshot of the BMC interface. The top navigation bar shows the URL https://10.224.6.119/#power-control. The left sidebar has a 'BMC' icon and a list of options: Dashboard, Sensor, System Inventory, FRU Information, BIOS POST Code, Server Identify, Logs &amp; Reports, Settings, Remote Control, and Power Control (which is highlighted). The main content area is titled 'Power Control on Host Server'. It shows a 'Power Actions' section with 'Host is currently off'. Under 'Power Off Server - Immediate', the 'Power On Server' button is highlighted with a yellow box and a circled '1'. Under 'Power Off Server - Orderly Shutdown', the 'Perform Action' button is highlighted with a yellow box and a circled '2'.

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
```

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 Gbit16 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.



Do not take another appliance node offline unless this appliance has a green icon.

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

#### Related information

[Viewing status indicators and buttons on the SG6000-CN controller](#)

[Viewing boot-up status codes for the SG6000 storage controllers](#)

## Replacing the SG6000-CN controller

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

### What you'll need

- 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.

#### [Locating the controller in a 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 cannot 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. If the SG6000-CN controller is functioning sufficiently to allow for a controlled shutdown, shut down the SG6000-CN controller.

#### [Shutting down the SG6000-CN controller](#)

The green Cache Active LED on the back of the E2800 controller is on when cached data needs to be written to the drives. You must wait for this LED to turn off.

2. Use one of two methods to verify that the power for the SG6000-CN controller is off:
  - The power indicator LED on the front of the controller is off.
  - The Power Control page of the BMC interface indicates that the controller is off.
3. If the StorageGRID networks attached to the controller use DHCP servers, update DNS/network and IP address settings.
  - a. Locate the MAC address label on the front of the SG6000-CN controller, and determine the MAC address for the Admin Network port.

The MAC address label lists the MAC address for the BMC management port.

To determine the MAC address for the Admin Network port, you must add **2** to the hexadecimal number on the label. For example, if the MAC address on the label ends in **09**, the MAC address for the Admin Port would end in **0B**. If the MAC address on the label ends in **(y)FF**, the MAC address for the Admin Port would end in **(y+1)01**. You can easily make this calculation by opening Calculator in Windows, setting it to Programmer mode, selecting Hex, typing the MAC address, then typing **+ 2 =**.

b. 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.



You must ensure that all IP addresses for the original controller have been updated before you apply power to the replacement controller. Otherwise, the controller will obtain new DHCP IP addresses when it boots up and might not be able to reconnect to StorageGRID. This step applies to all StorageGRID networks that are attached to the controller.



If the original controller used static IP address, the new controller will automatically adopt the IP addresses of the controller you removed.

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, do not 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.

5. Confirm that the appliance Storage Node appears in the Grid Manager and that no alarms appear.

6. From the Grid Manager, select **Nodes**, and verify that the BMC IP address for the node controller is correct.

If the node controller IP address is not valid or is not in the expected range, reconfigure the IP address as described in the recovery and maintenance instructions.

## Maintain & recover

### Related information

[SG6000-CN: Installing into a cabinet or rack](#)

[Viewing status indicators and buttons on the SG6000-CN controller](#)

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

### Replacing a power supply 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.

### What you'll need

- You have unpacked the replacement power supply unit.
- You have physically located the controller where you are replacing the power supply in the data center.

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

- You have confirmed that the other power supply is installed and running.

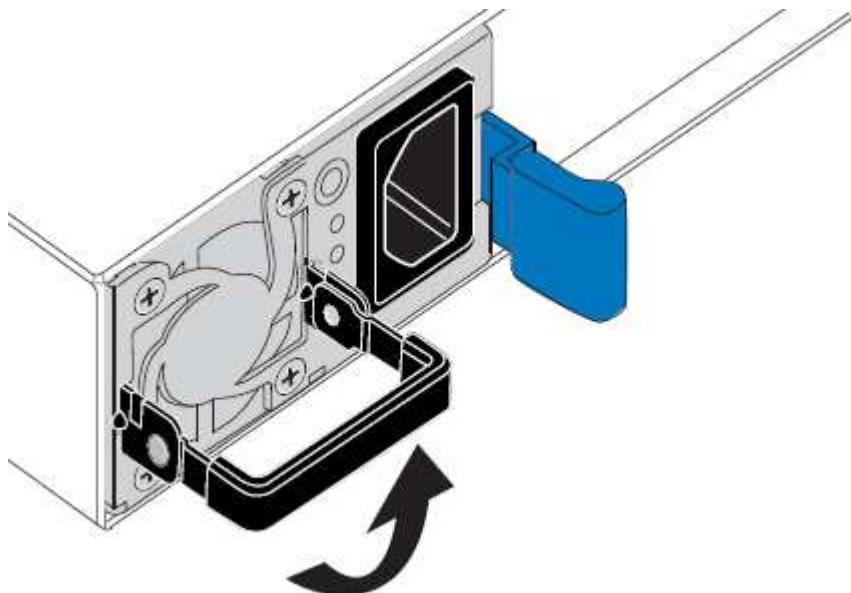
## About this task

The figure shows the two power supply units for the SG6000-CN controller, which are accessible from the back of the controller.

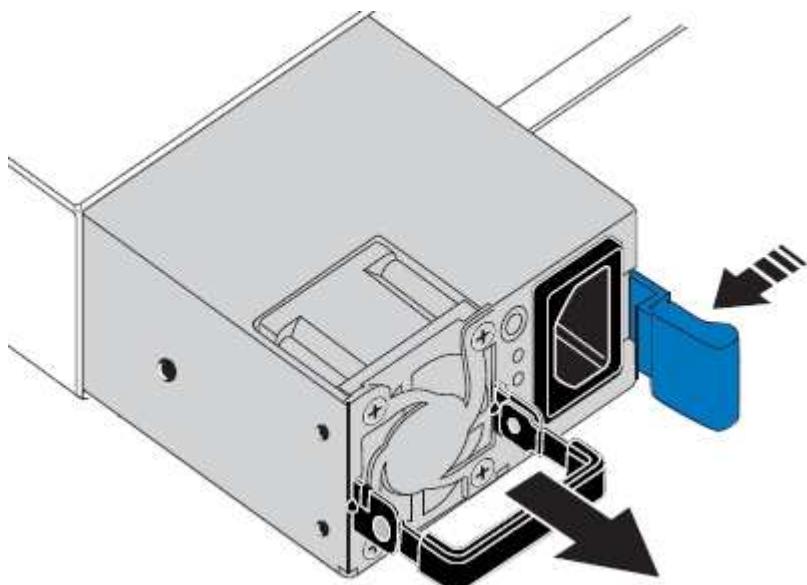


## Steps

1. Unplug the power cord from the power supply.
2. Lift the cam handle.

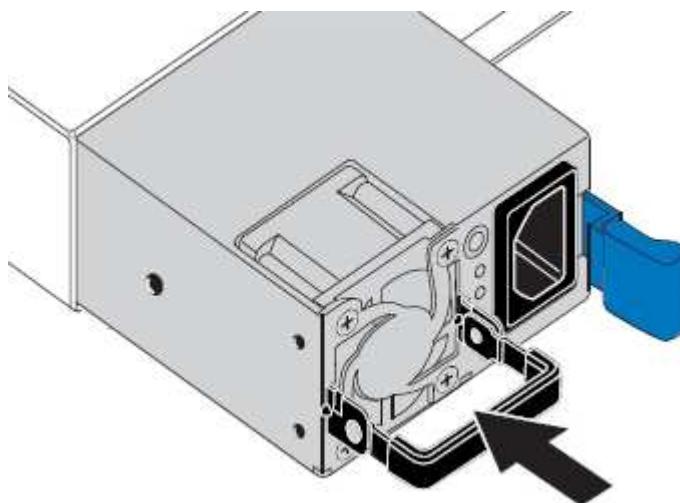


3. Press the blue latch and pull the power supply out.



4. Slide the replacement power supply into the chassis.

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



5. Push the cam handle down to secure the power supply.

6. Attach the power cord to the power supply, and ensure that the green LED comes on.

### Removing the SG6000-CN controller from a 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.

#### What you'll need

- 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.

#### Locating the controller in a data center

- You have shut down the SG6000-CN controller.

#### Shutting down the SG6000-CN controller



Do not 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, do not 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.

#### Related information

[Removing the SG6000-CN controller cover](#)

#### Reinstalling the SG6000-CN controller into a cabinet or rack

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

#### What you'll need

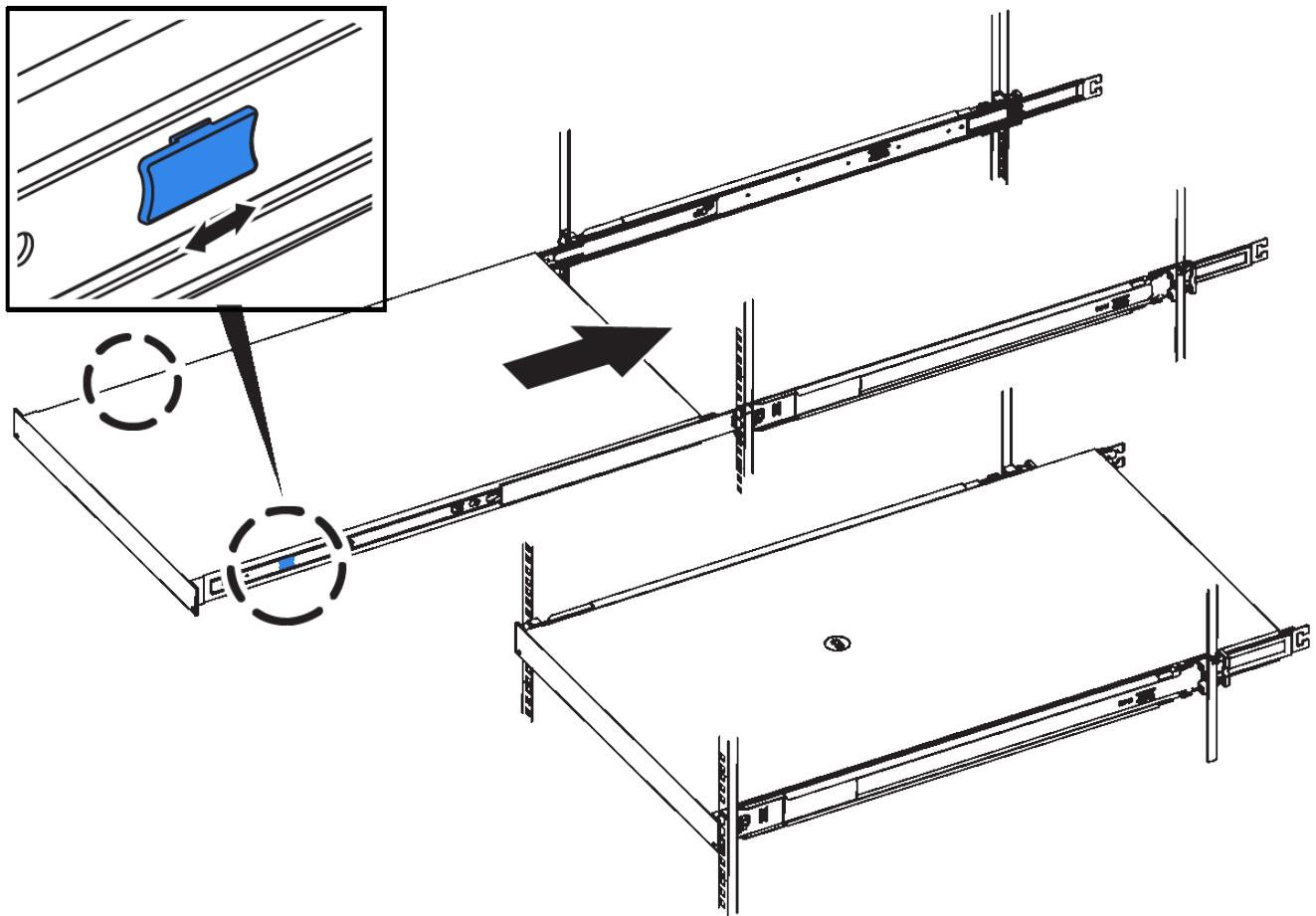
You have reinstalled the controller cover.

[Reinstalling the 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 cannot move the controller any further, pull the blue latches on both sides of the chassis to slide the controller all the way in.



Do not 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, do not twist, fold, pinch, or step on the cables.

#### [Cabling the appliance \(SG6000\)](#)

5. Reconnect the controller power cables.

#### [Connecting power cords and applying power \(SG6000\)](#)

#### **After you finish**

The controller can be restarted.

#### [Powering on the SG6000-CN controller and verifying operation](#)

## Removing the SG6000-CN controller cover

Remove the controller cover to access internal components for maintenance.

### What you'll need

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

### Removing the SG6000-CN controller from a 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.

#### Related information

[Removing the Fibre Channel HBA](#)

## Reinstalling the SG6000-CN controller cover

Reinstall the controller cover when internal hardware maintenance is complete.

### What you'll need

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.

### [Reinstalling the SG6000-CN controller into a cabinet or rack](#)

#### Replacing the Fibre Channel HBA in the SG6000-CN controller

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.

##### Verifying the Fibre Channel HBA to replace

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

##### What you'll need

- 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 must be signed in to the Grid Manager using a supported browser.

##### Steps

1. From the Grid Manager, select **Nodes**.
2. From the tree view of 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 to 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.

Storage Appliance Chassis Serial Number	721005600100
Appliance Model	SG6060
Storage Controller Name	StorageGRID-xcb-3-228-sn
Storage Controller A Management IP	10.224.9.230
Storage Controller B Management IP	10.224.9.234
Storage Controller WWID	600009800001c25000000000544a0003
Storage Appliance Chassis Serial Number	721005600100
Storage Hardware	Nominal
Storage Controller Failed Drive Count	0
Storage Controller A	Nominal
Storage Controller B	Nominal
Storage Controller Power Supply A	Nominal
Storage Controller Power Supply B	Nominal
Storage Data Drive Type	NL-SAS HDD
Storage Data Drive Size	8.00 TB
Storage RAID Mode	DOP
Storage Connectivity	Nominal
Overall Power Supply	Nominal
Compute Controller BMC IP	10.224.9.109
Compute Controller Serial Number	721005600009
Compute Hardware	Nominal
Compute Controller CPU Temperature	Nominal
Compute Controller Chassis Temperature	Nominal

- 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, select a different node from the tree view.
- If the serial numbers do not 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.

#### Turning the controller identify LED on and off

#### Related information

##### [Removing the Fibre Channel HBA](#)

##### [Removing the 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.

#### What you'll need

- You have the correct replacement Fibre Channel HBA.

- You have determined which SG6000-CN controller contains the Fibre Channel HBA to replace.

#### [Verifying the Fibre Channel HBA to replace](#)

- You have physically located the SG6000-CN controller where you are replacing the Fibre Channel HBA in the data center.

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

- You have removed the controller cover.

#### [Removing the SG6000-CN 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 normally expected. See the information about determining node connection states in the instructions for managing objects with information lifecycle management.



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 managing objects with information lifecycle management.

### **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. Do not use excessive force.
6. Place the adapter on a flat anti-static surface.

#### After you finish

Install the replacement Fibre Channel HBA.

#### [Reinstalling the Fibre Channel HBA](#)

#### Related information

[Reinstalling the Fibre Channel HBA](#)

[Administer StorageGRID](#)

[Monitor & troubleshoot](#)

[Manage objects with ILM](#)

#### [Reinstalling the Fibre Channel HBA](#)

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

#### What you'll need

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

#### [Removing the 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.

#### [Reinstalling the SG6000-CN controller cover](#)

#### **Changing the link configuration of the 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.

## What you'll need

The appliance has been placed maintenance mode.

### Placing an appliance into maintenance mode

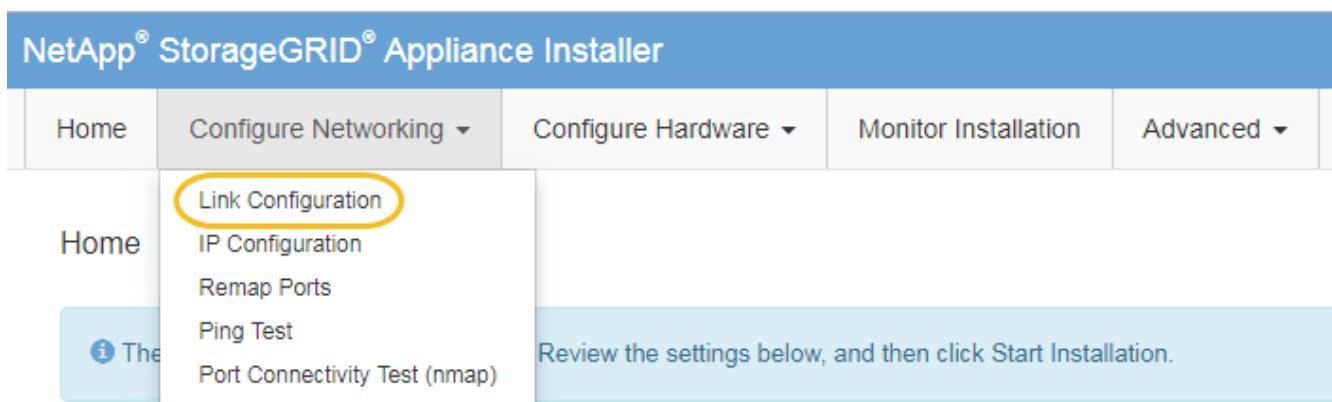
#### About this task

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 on the options, see [Configuring network links \(SG6000\)](#).

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 are not 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](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 instructions for configuring IP addresses.

### Configuring StorageGRID IP addresses

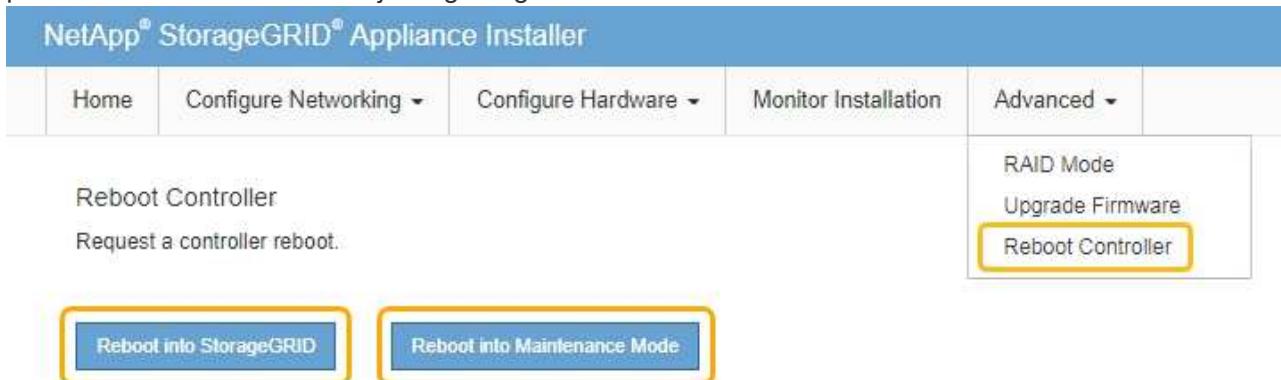
4. Select **Configure Networking > Ping Test** from the menu.
5. Use the Ping Test tool to check connectivity to IP addresses on any networks that might have been affected by the link configuration changes you made in the [link configuration changes](#) step.

In addition to any other tests you choose to perform, confirm that you can ping the Grid Network IP address

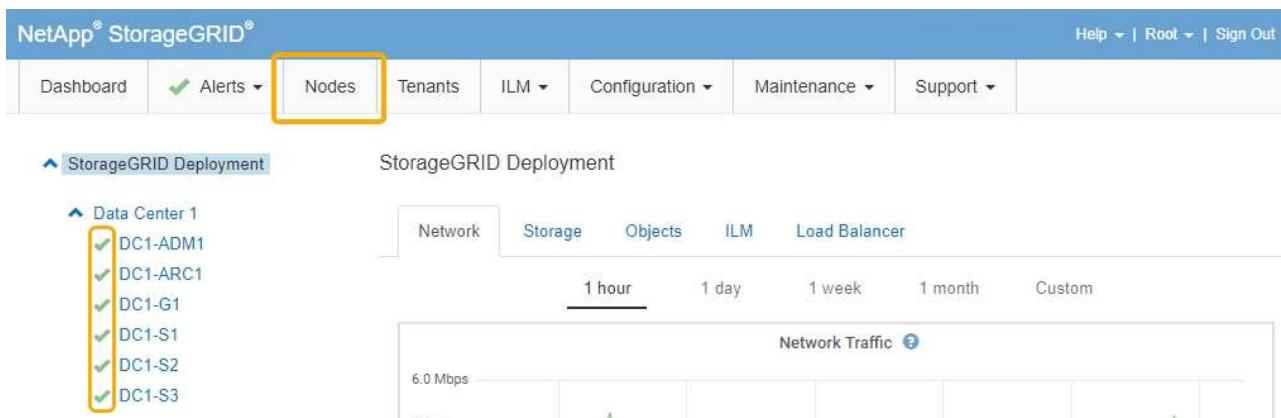
of the primary Admin Node, and the Grid Network IP address of at least one other Storage Node. If necessary, return to the [link configuration changes](#) step and correct any link configuration issues.

6. When you are satisfied that your link configuration changes are working, reboot the node. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:

- Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
- Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



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** tab should display a normal status  for the appliance node, indicating that no alerts are active and the node is connected to the grid.



## Changing the MTU setting

You can change the MTU setting that you assigned when you configured IP addresses for the appliance node.

### What you'll need

The appliance has been placed maintenance mode.

## Placing an appliance into maintenance mode

### Steps

1. From the StorageGRID Appliance Installer, select **Configure Networking > IP Configuration**.
2. Make the desired changes to the MTU settings for the Grid Network, Admin Network, and Client Network.

#### Grid Network

The Grid Network is used for all internal StorageGRID traffic. The Grid Network provides connectivity between all nodes in the grid, across all sites and subnets. All hosts on the Grid Network must be able to talk to all other hosts. The Grid Network can consist of multiple subnets. Networks containing critical grid services, such as NTP, can also be added as Grid subnets.

IP  Static  DHCP

Assignment

IPv4 Address (CIDR)

Gateway

**⚠** All required Grid Network subnets must also be defined in the Grid Network Subnet List on the Primary Admin Node before starting installation.

Subnets (CIDR)	<input type="text" value="172.18.0.0/21"/> <span style="color: red;">×</span>
	<input type="text" value="172.18.0.0/21"/> <span style="color: red;">×</span>
	<input type="text" value="192.168.0.0/21"/> <span style="color: green;">+ ×</span>
MTU	<input type="text" value="1500"/> <span style="border: 1px solid black; padding: 2px;">▼</span>
	<span style="background-color: #668d4c; color: white; padding: 5px 10px; border-radius: 5px; display: inline-block;">Cancel</span> <span style="background-color: #337ab7; color: white; padding: 5px 10px; border-radius: 5px; display: inline-block; margin-top: 5px;">Save</span>



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.

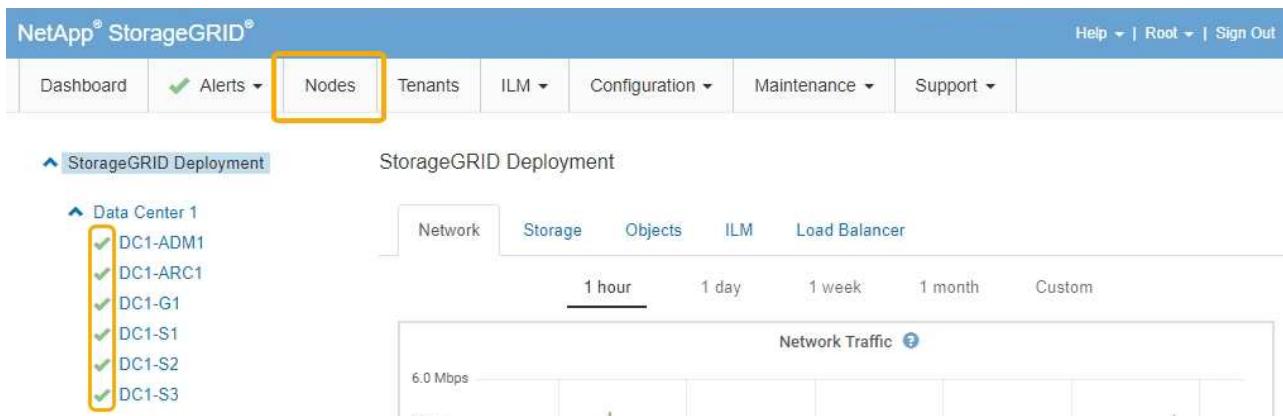


For the best network performance, all nodes should be configured with similar MTU values on their Grid Network interfaces. The **Grid Network MTU mismatch** alert is triggered if there is a significant difference in MTU settings for the Grid Network on individual nodes. The MTU values do not have to be the same for all network types.

3. When you are satisfied with the settings, select **Save**.
4. Reboot the node. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:
  - Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
  - Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



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** tab should display a normal status for the appliance node, indicating that no alerts are active and the node is connected to the grid.



## Related information

[Administer StorageGRID](#)

## Checking the DNS server configuration

You can check and temporarily change the domain name system (DNS) servers that are currently in use by this appliance node.

### What you'll need

The appliance has been placed maintenance mode.

#### [Placing an appliance into maintenance mode](#)

### About this task

You might need to change the DNS server settings if an encrypted appliance cannot connect to the key management server (KMS) or KMS cluster because the hostname for the KMS was specified as a domain name instead of an IP address. Any changes that you make to the DNS settings for the appliance are temporary and are lost when you exit maintenance mode. To make these changes permanent, specify the DNS servers in Grid Manager (**Maintenance > Network > DNS Servers**).

- Temporary changes to the DNS configuration are necessary only for node-encrypted appliances where the KMS server is defined using a fully qualified domain name, instead of an IP address, for the hostname.
- When a node-encrypted appliance connects to a KMS using a domain name, it must connect to one of the DNS servers defined for the grid. One of these DNS servers then translates the domain name into an IP address.
- If the node cannot reach a DNS server for the grid, or if you changed the grid-wide DNS settings when a node-encrypted appliance node was offline, the node is unable to connect to the KMS. Encrypted data on the appliance cannot be decrypted until the DNS issue is resolved.

To resolve a DNS issue preventing KMS connection, specify the IP address of one or more DNS servers in the StorageGRID Appliance Installer. These temporary DNS settings allow the appliance to connect to the KMS and decrypt data on the node.

For example, if the DNS server for the grid changes while an encrypted node was offline, the node will not be able to reach the KMS when it comes back online, since it is still using the previous DNS values. Entering the new DNS server IP address in the StorageGRID Appliance Installer allows a temporary KMS connection to decrypt the node data.

### Steps

1. From the StorageGRID Appliance Installer, select **Configure Networking > DNS Configuration**.
2. Verify that the DNS servers specified are correct.

## DNS Servers

⚠ Configuration changes made on this page will not be passed to the StorageGRID software after appliance installation.

Servers	
Server 1	10.224.223.135
Server 2	10.224.223.136

**Cancel** **Save**

3. If required, change the DNS servers.



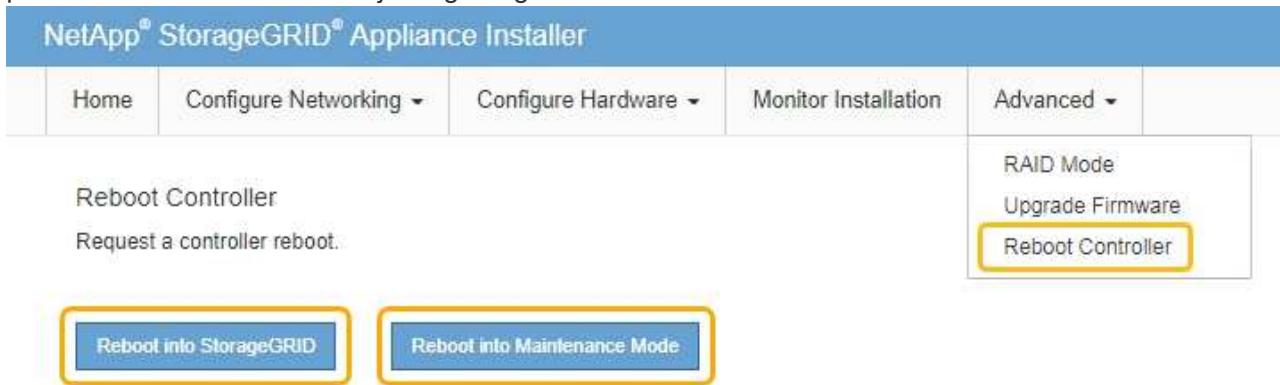
Changes made to the DNS settings are temporary and are lost when you exit maintenance mode.

4. When you are satisfied with the temporary DNS settings, select **Save**.

The node uses the DNS server settings specified on this page to reconnect to the KMS, allowing data on the node to be decrypted.

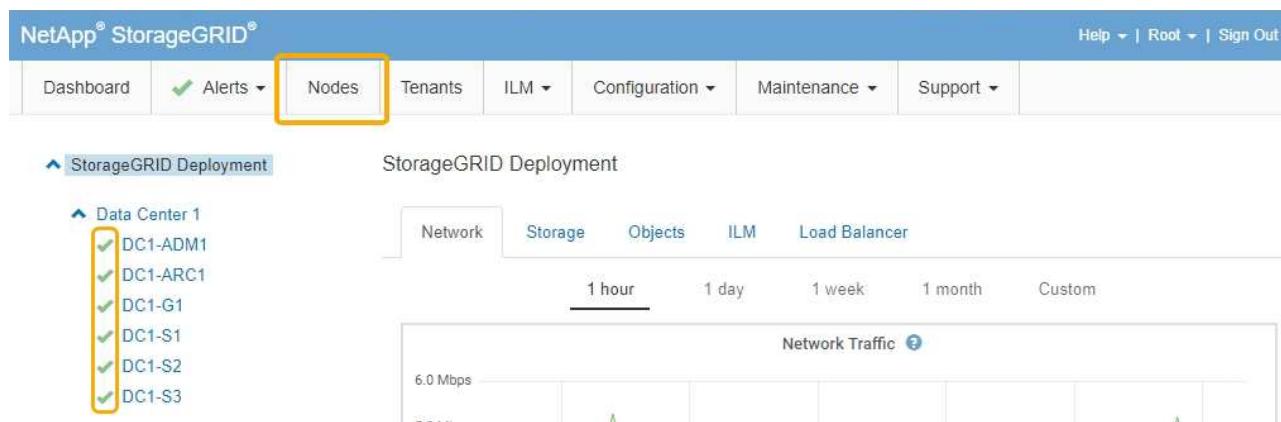
5. After node data is decrypted, reboot the node. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:

- Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
- Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



When the node reboots and rejoins the grid, it uses the system-wide DNS servers listed in the Grid Manager. After rejoining the grid, the appliance will no longer use the temporary DNS servers specified in the StorageGRID Appliance Installer while the appliance was in maintenance mode.

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** tab should display a normal status  for the appliance node, indicating that no alerts are active and the node is connected to the grid.



The screenshot shows the NetApp StorageGRID web interface. The top navigation bar includes links for Dashboard, Alerts (with a green checkmark), Nodes (highlighted with a yellow box), Tenants, ILM, Configuration, Maintenance, and Support. Below the navigation is a breadcrumb trail: StorageGRID Deployment > StorageGRID Deployment. The main content area shows a list of nodes under 'Data Center 1'. The nodes listed are DC1-ADM1, DC1-ARC1, DC1-G1, DC1-S1, DC1-S2, and DC1-S3, each with a green checkmark next to its name. To the right of the node list are tabs for Network, Storage, Objects, ILM, and Load Balancer, with 'Network' selected. Below these tabs is a time range selector with options for 1 hour, 1 day, 1 week, 1 month, and Custom, with '1 hour' selected. At the bottom of the interface is a chart titled 'Network Traffic' showing a single data series at 6.0 Mbps.

### Monitoring node encryption in maintenance mode

If you enabled node encryption for the appliance during installation, you can monitor the node-encryption status of each appliance node, including the node-encryption state and key management server (KMS) details.

#### What you'll need

- Node encryption must have been enabled for the appliance during installation. You cannot enable node encryption after the appliance is installed.
- The appliance has been placed into maintenance mode.

#### [Placing an appliance into maintenance mode](#)

#### Steps

1. From the StorageGRID Appliance Installer, select **Configure Hardware > Node Encryption**.

## Node Encryption

Node encryption allows you to use an external key management server (KMS) to encrypt all StorageGRID data on this appliance. If node encryption is enabled for the appliance and a KMS is configured for the site, you cannot access any data on the appliance unless the appliance can communicate with the KMS.

### Encryption Status

**⚠** You can only enable node encryption for an appliance during installation. You cannot enable or disable the node encryption setting after the appliance is installed.

Enable node encryption

**Save**

### Key Management Server Details

View the status and configuration details for the KMS that manages the encryption key for this appliance. You must use the Grid Manager to make configuration changes.

KMS display name	thales
External key UID	41b0306abcce451facfce01b1b4870ae1c1ec6bd5e3849d790223766baf35c57
Hostnames	10.96.99.164 10.96.99.165
Port	5696

**Server certificate** 

**Client certificate** 

### Clear KMS Key

**⚠** Do not clear the KMS key if you need to access or preserve any data on this appliance.

If you want to reinstall this appliance node (for example, in another grid), you must clear the KMS key. When the KMS key is cleared, all data on this appliance is deleted.

**Clear KMS Key and Delete Data**

The Node Encryption page includes these three sections:

- Encryption Status shows whether node encryption is enabled or disabled for the appliance.
- Key Management Server Details shows information about the KMS being used to encrypt the appliance. You can expand the server and client certificate sections to view certificate details and status.
  - To address issues with the certificates themselves, such as renewing expired certificates, see the information about KMS in the instructions for administering StorageGRID.
  - If there are unexpected problems connecting to KMS hosts, verify that the domain name system (DNS) servers are correct and that appliance networking is correctly configured.

#### Checking the DNS server configuration

- If you are unable to resolve your certificate issues, contact technical support.
- Clear KMS Key disables node encryption for the appliance, removes the association between the appliance and the key management server that was configured for the StorageGRID site, and deletes

all data from the appliance. You must clear the KMS key before you can install the appliance into another StorageGRID system.

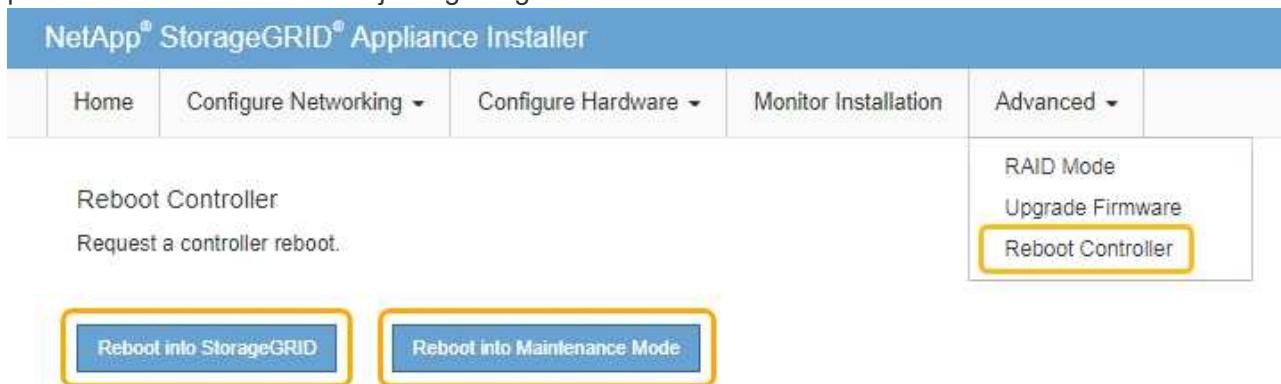
#### Clearing the key management server configuration



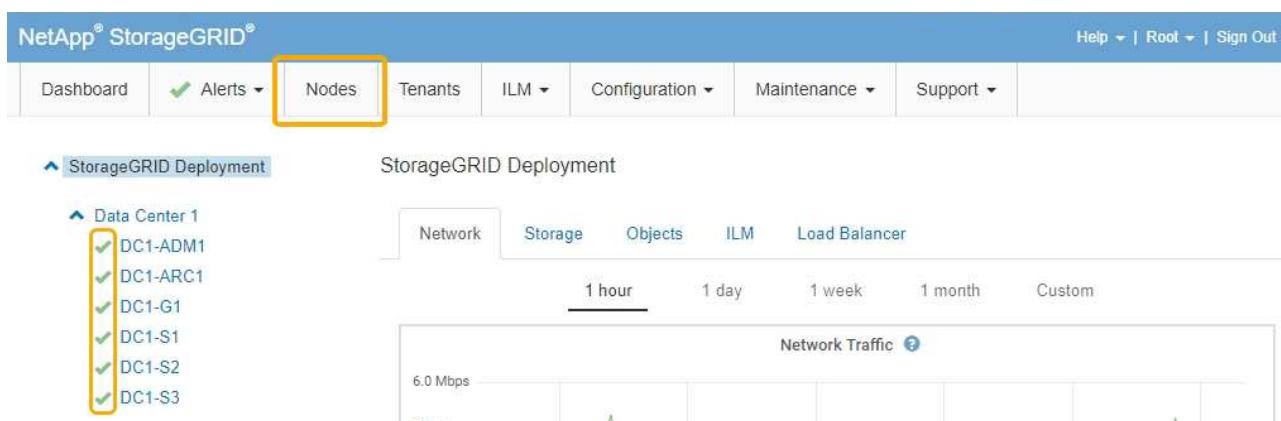
Clearing the KMS configuration deletes data from the appliance, rendering it permanently inaccessible. This data is not recoverable.

2. When you are done checking node-encryption status, reboot the node. From the StorageGRID Appliance Installer, select **Advanced** > **Reboot Controller**, and then select one of these options:

- Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
- Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



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** tab should display a normal status for the appliance node, indicating that no alerts are active and the node is connected to the grid.



#### Related information

[Administer StorageGRID](#)

## Clearing the key management server configuration

Clearing the key management server (KMS) configuration disables node encryption on your appliance. After clearing the KMS configuration, the data on your appliance is permanently deleted and is no longer accessible. This data is not recoverable.

### What you'll need

If you need to preserve data on the appliance, you must perform a node decommission procedure before you clear the KMS configuration.



When KMS is cleared, data on the appliance will be permanently deleted and no longer accessible. This data is not recoverable.

Decommission the node to move any data it contains to other nodes in StorageGRID. See the recovery and maintenance instructions for grid node decommissioning.

### About this task

Clearing the appliance KMS configuration disables node encryption, removing the association between the appliance node and the KMS configuration for the StorageGRID site. Data on the appliance is then deleted and the appliance is left in a pre-install state. This process cannot be reversed.

You must clear the KMS configuration:

- Before you can install the appliance into another StorageGRID system, that does not use a KMS or that uses a different KMS.



Do not clear the KMS configuration if you plan to reinstall an appliance node in a StorageGRID system that uses the same KMS key.

- Before you can recover and reinstall a node where the KMS configuration was lost and the KMS key is not recoverable.
- Before returning any appliance that was previously in use at your site.
- After decommissioning a appliance that had node encryption enabled.



Decommission the appliance before clearing KMS to move its data to other nodes in your StorageGRID system. Clearing KMS before decommissioning the appliance will result in data loss and might render the appliance inoperable.

### Steps

1. Open a browser, and enter one of the IP addresses for the appliance's compute controller.

[https://Controller\\_IP:8443](https://Controller_IP:8443)

*Controller\_IP* is the IP address of the compute controller (not the storage controller) on any of the three StorageGRID networks.

The StorageGRID Appliance Installer Home page appears.

2. Select **Configure Hardware > Node Encryption**.

## Node Encryption

Node encryption allows you to use an external key management server (KMS) to encrypt all StorageGRID data on this appliance. If node encryption is enabled for the appliance and a KMS is configured for the site, you cannot access any data on the appliance unless the appliance can communicate with the KMS.

### Encryption Status

**⚠** You can only enable node encryption for an appliance during installation. You cannot enable or disable the node encryption setting after the appliance is installed.

Enable node encryption

**Save**

### Key Management Server Details

View the status and configuration details for the KMS that manages the encryption key for this appliance. You must use the Grid Manager to make configuration changes.

KMS display name thales

External key UID 41b0306abcce451facfce01b1b4870ae1c1ec6bd5e3849d790223766baf35c57

Hostnames 10.96.99.164  
10.96.99.165

Port 5696

**Server certificate** **>**

**Client certificate** **>**

### Clear KMS Key

**⚠** Do not clear the KMS key if you need to access or preserve any data on this appliance.

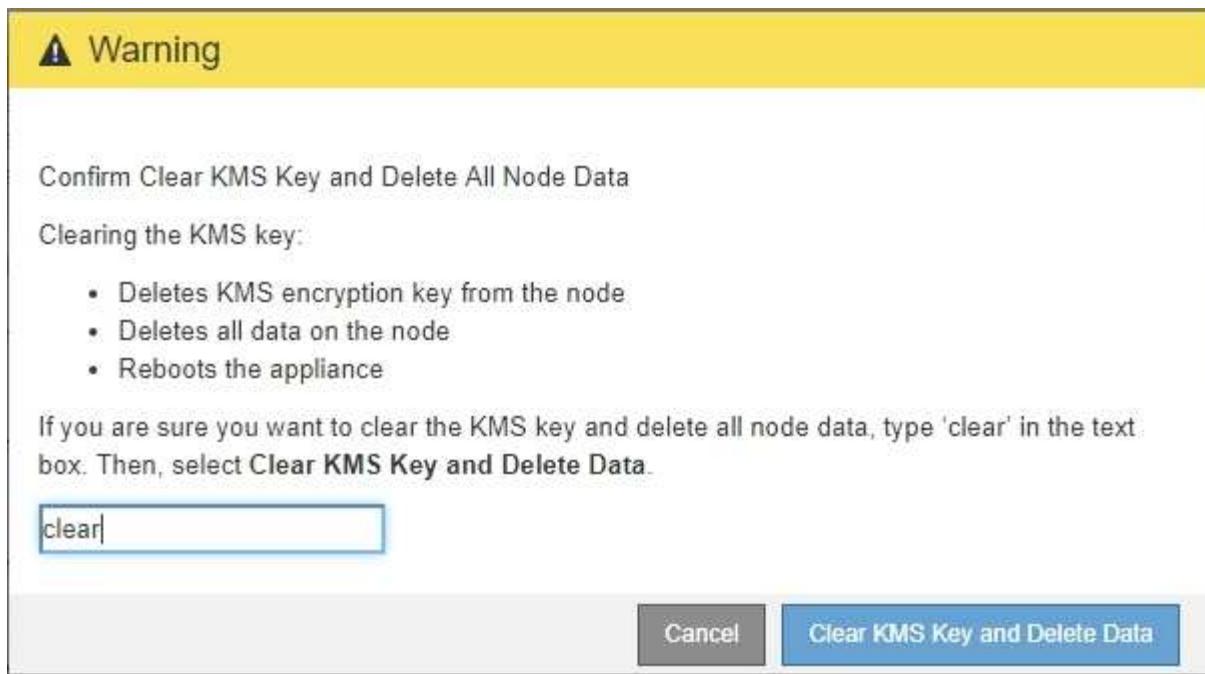
If you want to reinstall this appliance node (for example, in another grid), you must clear the KMS key. When the KMS key is cleared, all data on this appliance is deleted.

**Clear KMS Key and Delete Data**



If the KMS configuration is cleared, data on the appliance will be permanently deleted. This data is not recoverable.

3. At the bottom of the window, select **Clear KMS Key and Delete Data**.
4. If you are sure that you want to clear the KMS configuration, type **clear**  
and select **Clear KMS Key and Delete Data**.



The KMS encryption key and all data are deleted from the node, and the appliance reboots. This can take up to 20 minutes.

5. Open a browser, and enter one of the IP addresses for the appliance's compute controller.

**[https://Controller\\_IP:8443](https://Controller_IP:8443)**

*Controller\_IP* is the IP address of the compute controller (not the storage controller) on any of the three StorageGRID networks.

The StorageGRID Appliance Installer Home page appears.

6. Select **Configure Hardware > Node Encryption**.
7. Verify that node encryption is disabled and that the key and certificate information in **Key Management Server Details** and the **Clear KMS Key and Delete Data** control are removed from the window.

Node encryption cannot be reenabled on the appliance until it is reinstalled in a grid.

#### After you finish

After the appliance reboots and you have verified that KMS has been cleared and that the appliance is in a pre-install state, you can physically remove the appliance from your StorageGRID system. See the recovery and maintenance instructions for information about preparing an appliance for reinstallation.

#### Related information

[Administer StorageGRID](#)

[Maintain & recover](#)

## SG5700 storage appliances

Learn how to install and maintain StorageGRID SG5712 and SG5760 appliances.

- [StorageGRID appliance overview](#)

- [Installation and deployment overview](#)
- [Preparing for installation](#)
- [Installing the hardware](#)
- [Configuring the hardware](#)
- [Deploying an appliance Storage Node](#)
- [Monitoring the storage appliance installation](#)
- [Automating appliance installation and configuration](#)
- [Overview of installation REST APIs](#)
- [Troubleshooting the hardware installation](#)
- [Maintaining the SG5700 appliance](#)

## StorageGRID appliance overview

The SG5700 StorageGRID appliance is an integrated storage and computing platform that operates as a Storage Node in a StorageGRID grid. The appliance can be used in a hybrid grid environment that combines appliance Storage Nodes and virtual (software-based) Storage Nodes.

The StorageGRID SG5700 appliance provides the following features:

- Integrates the storage and computing elements for a StorageGRID Storage Node.
- Includes the StorageGRID Appliance Installer to simplify Storage Node deployment and configuration.
- Includes E-Series SANtricity System Manager for hardware management and monitoring.
- Supports up to four 10-GbE or 25-GbE connections to the StorageGRID Grid Network and Client Network.
- Supports Full Disk Encryption (FDE) drives or Federal Information Processing Standard (FIPS) drives. When these drives are used with the Drive Security feature in SANtricity System Manager, unauthorized access to data is prevented.

The SG5700 appliance is available in two models: the SG5712 and the SG5760. Both models include the following components:

Component	SG5712	SG5760
Compute controller	E5700SG controller	E5700SG controller
Storage controller	E-Series E2800 controller	E-Series E2800 controller
Chassis	E-Series DE212C enclosure, a two rack-unit (2U) enclosure	E-Series DE460C enclosure, a four rack-unit (4U) enclosure
Drives	12 NL-SAS drives (3.5-inch)	60 NL-SAS drives (3.5-inch)
Redundant power supplies and fans	Two power-fan canisters	Two power canisters and two fan canisters

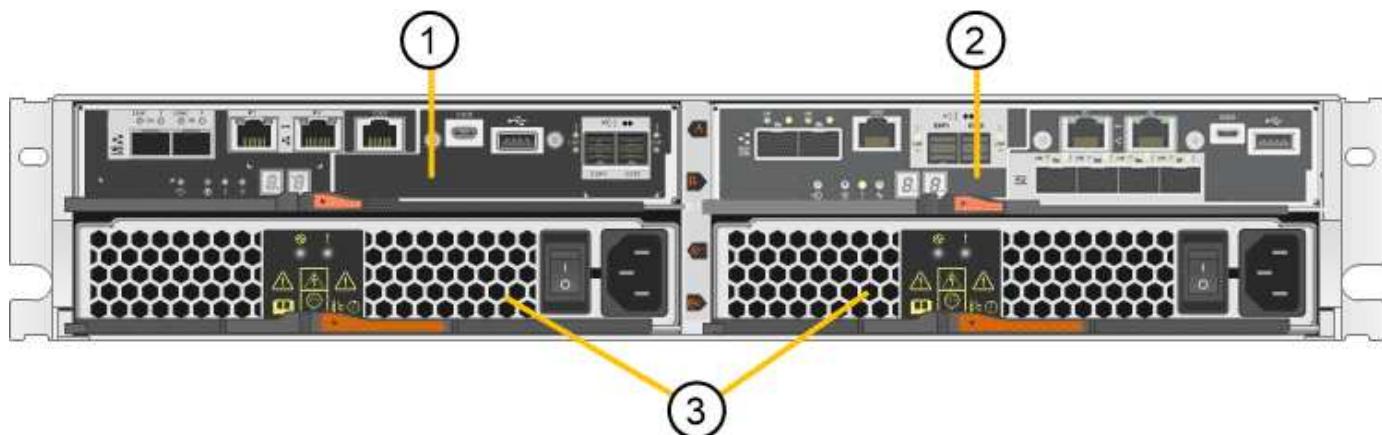
The maximum raw storage available in the StorageGRID appliance is fixed, based on the number of drives in each enclosure. You cannot expand the available storage by adding a shelf with additional drives.

## Model SG5712

This figure shows the front and back of the SG5712 model, a 2U enclosure that holds 12 drives.



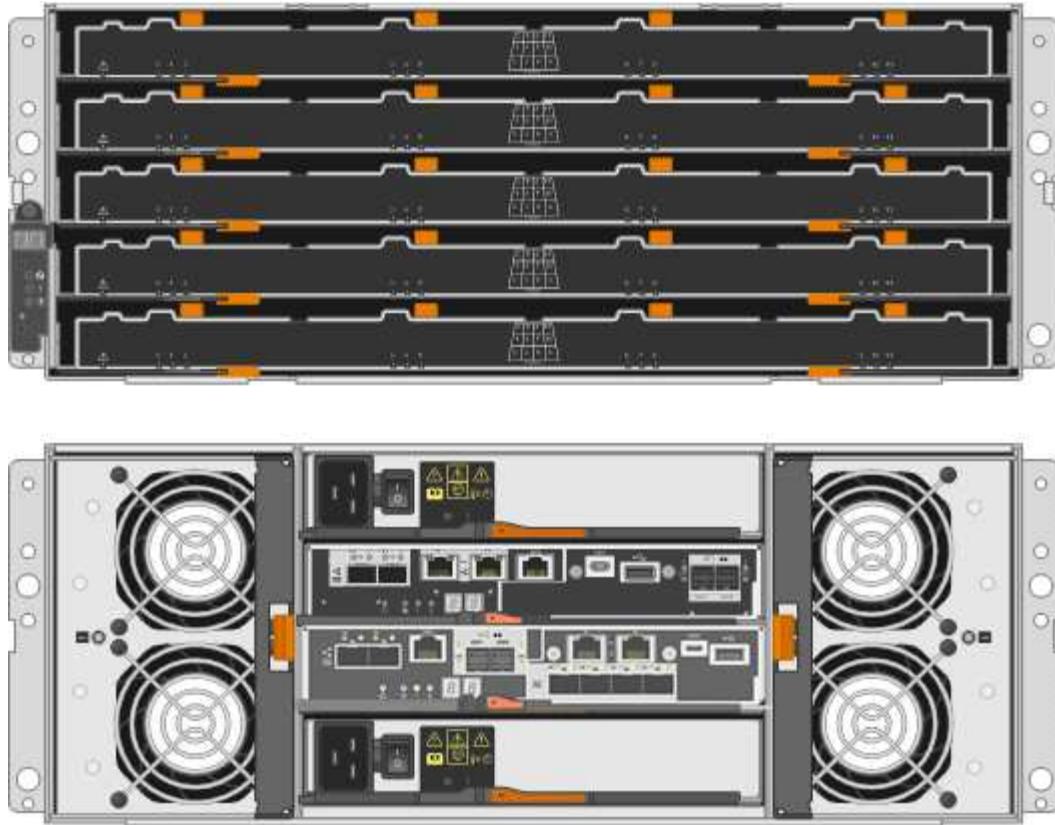
The SG5712 includes two controllers and two power-fan canisters.



	Description
1	E2800 controller (storage controller)
2	E5700SG controller (compute controller)
3	Power-fan canisters

## Model SG5760

This figure shows the front and back of the SG5760 model, a 4U enclosure that holds 60 drives in 5 drive drawers.



The SG5760 includes two controllers, two fan canisters, and two power canisters.

	Description
1	E2800 controller (storage controller)
2	E5700SG controller (compute controller)
3	Fan canister (1 of 2)
4	Power canister (1 of 2)

#### Related information

[NetApp E-Series Systems Documentation Site](#)

#### Controllers in the StorageGRID appliance

Both the SG5712 and SG5760 models of the StorageGRID appliance include an E5700SG controller and an E2800 controller. You should review the diagrams to learn the differences between the controllers.

#### E5700SG controller

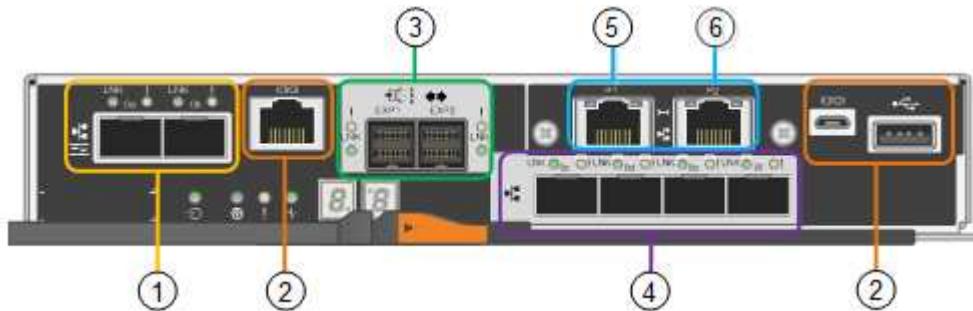
- Operates as the compute server for the appliance.
- Includes the StorageGRID Appliance Installer.



StorageGRID software is not preinstalled on the appliance. This software is accessed from the Admin Node when you deploy the appliance.

- Can connect to all three StorageGRID networks, including the Grid Network, the Admin Network, and the Client Network.
- Connects to the E2800 controller and operates as the initiator.

This figure shows the connectors on the back of the E5700SG controller.



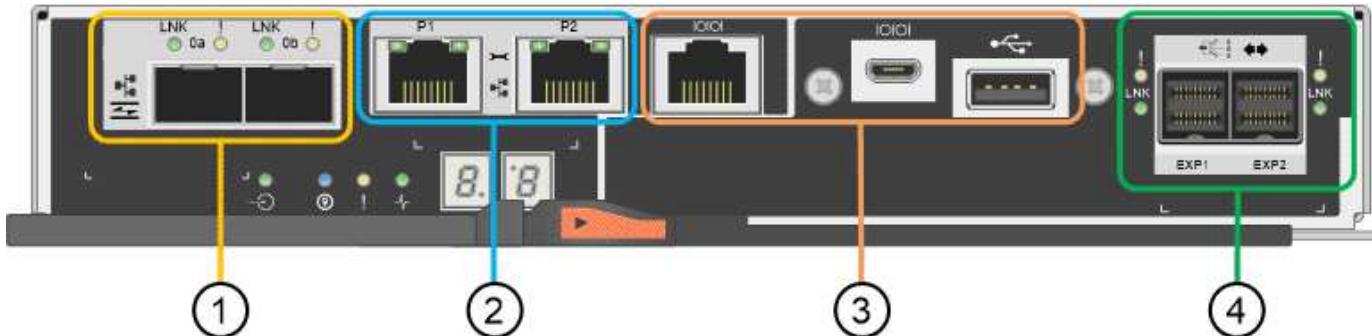
	<b>Port</b>	<b>Type</b>	<b>Use</b>
1	Interconnect ports 1 and 2	16Gb/s Fibre Channel (FC), optical SFPa	Connect the E5700SG controller to the E2800 controller.
2	Diagnostic and support ports	<ul style="list-style-type: none"><li>• RJ-45 serial port</li><li>• Micro USB serial port</li><li>• USB port</li></ul>	Reserved for technical support.
3	Drive expansion ports	12Gb/s SAS	Not used. StorageGRID appliances do not support expansion drive shelves.
4	Network ports 1-4	10-GbE or 25-GbE, based on SFP transceiver type, switch speed, and configured link speed	Connect to the Grid Network and the Client Network for StorageGRID.
5	Management port 1	1-Gb (RJ-45) Ethernet	Connect to the Admin Network for StorageGRID.

	Port	Type	Use
6	Management port 2	1-Gb (RJ-45) Ethernet	<p>Options:</p> <ul style="list-style-type: none"> <li>Bond with management port 1 for a redundant connection to the Admin Network for StorageGRID.</li> <li>Leave unwired and available for temporary local access (IP 169.254.0.1).</li> <li>During installation, use port 2 for IP configuration if DHCP-assigned IP addresses are not available.</li> </ul>

#### E2800 controller

- Operates as the storage controller for the appliance.
- Manages the storage of data on the drives.
- Functions as a standard E-Series controller in simplex mode.
- Includes SANtricity OS Software (controller firmware).
- Includes SANtricity System Manager for monitoring appliance hardware and for managing alerts, the AutoSupport feature, and the Drive Security feature.
- Connects to the E5700SG controller and operates as the target.

This figure shows the connectors on the back of the E2800 controller.



	Port	Type	Use
1	Interconnect ports 1 and 2	16Gb/s FC optical SFPs	Connect the E2800 controller to the E5700SG controller.
2	Management ports 1 and 2	1-Gb (RJ-45) Ethernet	<ul style="list-style-type: none"> <li>Port 1 connects to the network where you access SANtricity System Manager on a browser.</li> <li>Port 2 is reserved for technical support use.</li> </ul>

	<b>Port</b>	<b>Type</b>	<b>Use</b>
3	Diagnostic and support ports	<ul style="list-style-type: none"> <li>• RJ-45 serial port</li> <li>• Micro USB serial port</li> <li>• USB port</li> </ul>	Reserved for technical support use.
4	Drive expansion ports.	12Gb/s SAS	Not used. StorageGRID appliances do not support expansion drive shelves.

## Installation and deployment overview

You can install one or more StorageGRID appliances when you first deploy StorageGRID, or you can add appliance Storage Nodes later as part of an expansion. You might also need to install an appliance Storage Node as part of a recovery operation.

Adding a StorageGRID storage appliance to a StorageGRID system includes four primary steps:

1. Preparing for installation:

- Preparing the installation site
- Unpacking the boxes and checking the contents
- Obtaining additional equipment and tools
- Gathering IP addresses and network information
- Optional: Configuring an external key management server (KMS) if you plan to encrypt all appliance data. See details about external key management in the instructions for administering StorageGRID.

2. Installing the hardware:

- Registering the hardware
- Installing the appliance into a cabinet or rack
- Installing the drives (SG5760 only)
- Cabling the appliance
- Connecting the power cords and applying power
- Viewing boot-up status codes

3. Configuring the hardware:

- Accessing SANtricity System Manager, setting a static IP address for management port 1 on the E2800 controller, and configuring SANtricity System Manager settings
- Accessing StorageGRID Appliance Installer and configuring the link and network IP settings required to connect to StorageGRID networks
- Optional: Enabling node encryption if you plan to use an external KMS to encrypt appliance data.
- Optional: Changing the RAID mode.

4. Deploying the appliance as a Storage Node:

Task	Instructions
Deploying an appliance Storage Node in a new StorageGRID system	<a href="#">Deploying an appliance Storage Node</a>
Adding an appliance Storage Node to an existing StorageGRID system	Instructions for expanding a StorageGRID system
Deploying an appliance Storage Node as part of a Storage Node recovery operation	Instructions for recovery and maintenance

## Related information

[Preparing for installation](#)

[Installing the hardware](#)

[Configuring the hardware](#)

[Install VMware](#)

[Install Red Hat Enterprise Linux or CentOS](#)

[Install Ubuntu or Debian](#)

[SG100 & SG1000 services appliances](#)

[Expand your grid](#)

[Maintain & recover](#)

[Administer StorageGRID](#)

## Preparing for installation

Preparing to install a StorageGRID appliance entails preparing the site and obtaining all required hardware, cables, and tools. You should also gather IP addresses and network information.

### Steps

- [Preparing the site \(SG5700\)](#)
- [Unpacking the boxes \(SG5700\)](#)
- [Obtaining additional equipment and tools \(SG5700\)](#)
- [Web browser requirements](#)
- [Reviewing appliance network connections](#)
- [Gathering installation information \(SG5700\)](#)

### Preparing the site (SG5700)

Before installing the appliance, you must make sure that the site and the cabinet or rack

you plan to use meet the specifications for a StorageGRID appliance.

## Steps

1. Confirm that the site meets the requirements for temperature, humidity, altitude range, airflow, heat dissipation, wiring, power, and grounding. See the NetApp Hardware Universe for more information.
2. If you are installing the SG5760 model, confirm that your location provides 240-volt AC power.
3. Obtain a 19-inch (48.3-cm) cabinet or rack to fit shelves of this size (without cables):

Appliance model	Height	Width	Depth	Maximum weight
SG5712 (12 drives)	3.41 in. (8.68 cm)	17.6 in. (44.7 cm)	21.1 in. (53.6 cm)	63.9 lb (29.0 kg)
SG5760 (60 drives)	6.87 in. (17.46 cm)	17.66 in. (44.86 cm)	38.25 in. (97.16 cm)	250 lb. (113 kg)

4. Install any required network switches. See the NetApp Interoperability Matrix Tool for compatibility information.

## Related information

[NetApp Hardware Universe](#)

[NetApp Interoperability Matrix Tool](#)

## Unpacking the boxes (SG5700)

Before installing the StorageGRID appliance, unpack all boxes and compare the contents to the items on the packing slip.

- **SG5712 appliance with 12 drives installed**



- **SG5760 appliance with no drives installed**



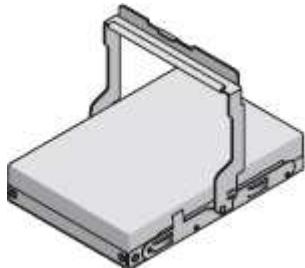
- **Front bezel for the appliance**



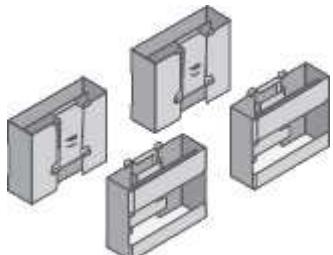
- Rail kit with instructions



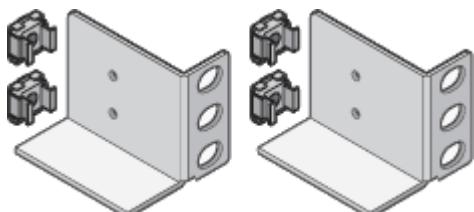
- SG5760: Sixty drives



- SG5760: Handles



- SG5760: Back brackets and cage nuts for square-hole rack installation



#### Cables and connectors

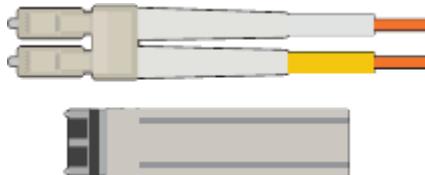
The shipment for the StorageGRID appliance includes the following cables and connectors:

- Two power cords for your country



Your cabinet might have special power cords that you use instead of the power cords that ship with the appliance.

- **Optical cables and SFP transceivers**



Two optical cables for the FC interconnect ports

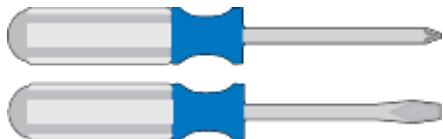
Eight SFP+ transceivers, compatible with both the four 16Gb/s FC interconnect ports and the four 10-GbE network ports

#### **Obtaining additional equipment and tools (SG5700)**

Before installing the StorageGRID appliance, confirm you have all of the additional equipment and tools that you need.

You need the following additional equipment to install and configure the hardware:

- **Screwdrivers**



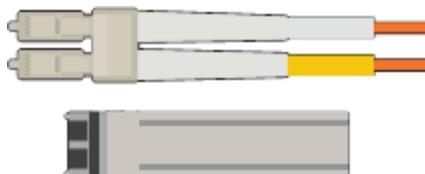
Phillips No. 2 screwdriver

Medium flat-blade screwdriver

- **ESD wrist strap**



- **Optical cables and SFP transceivers**



Optical cables for the 10/25-GbE ports you plan to use

Optional: SFP28 transceivers if you want to use 25-GbE link speed

- **Ethernet cables**



- **Service laptop**



Supported web browser

SSH client, such as PuTTY

1-Gb (RJ-45) Ethernet port

- **Optional tools**



Power drill with Phillips head bit

Flashlight

Mechanized lift for SG5760

### **Web browser requirements**

You must use a supported web browser.

Web browser	Minimum supported version
Google Chrome	87
Microsoft Edge	87
Mozilla Firefox	84

You should set the browser window to a recommended width.

Browser width	Pixels
Minimum	1024
Optimum	1280

## Reviewing appliance network connections

Before installing the StorageGRID appliance, you should understand which networks can be connected to the appliance and how the ports on each controller are used.

### StorageGRID appliance networks

When you deploy a StorageGRID appliance as a Storage Node in a StorageGRID grid, you can connect it to the following networks:

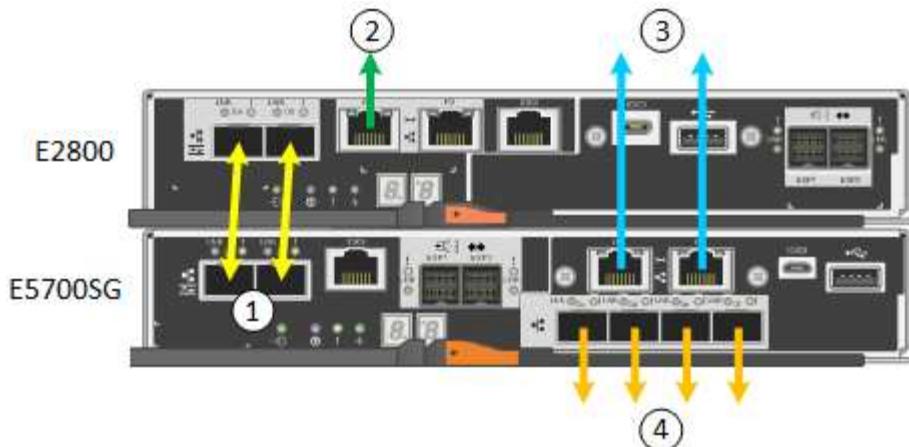
- **Grid Network for StorageGRID:** The Grid Network is used for all internal StorageGRID traffic. It provides connectivity between all nodes in the grid, across all sites and subnets. The Grid Network is required.
- **Admin Network for StorageGRID:** The Admin Network is a closed network used for system administration and maintenance. The Admin Network is typically a private network and does not need to be routable between sites. The Admin Network is optional.
- **Client Network for StorageGRID:** The Client Network is an open network used to provide access to client applications, including S3 and Swift. The Client Network provides client protocol access to the grid, so the Grid Network can be isolated and secured. The Client Network is optional.
- **Management network for SANtricity System Manager:** This network provides access to SANtricity System Manager on the E2800 controller, allowing you to monitor and manage the hardware components in the appliance. This management network can be the same as the Admin Network for StorageGRID, or it can be an independent management network.



For detailed information about StorageGRID networks, see the *Grid Primer*.

### StorageGRID appliance connections

When you install a StorageGRID appliance, you must connect the two controllers to each other and to the required networks. The figure shows the two controllers in the SG5760, with the E2800 controller on the top and the E5700SG controller on the bottom. In the SG5712, the E2800 controller is to the left of the E5700SG controller.



	Port	Type of port	Function
1	Two interconnect ports on each controller	16Gb/s FC optical SFP+	Connect the two controllers to each other.
2	Management port 1 on the E2800 controller	1-GbE (RJ-45)	Connects to the network where you access SANtricity System Manager. You can use the Admin Network for StorageGRID or an independent management network.
2	Management port 2 on the E2800 controller	1-GbE (RJ-45)	Reserved for technical support.
3	Management port 1 on the E5700SG controller	1-GbE (RJ-45)	Connects the E5700SG controller to the Admin Network for StorageGRID.
3	Management port 2 on the E5700SG controller	1-GbE (RJ-45)	<ul style="list-style-type: none"> <li>• Can be bonded with management port 1 if you want a redundant connection to the Admin Network.</li> <li>• Can be left unwired and available for temporary local access (IP 169.254.0.1).</li> <li>• During installation, can be used to connect the E5700SG controller to a service laptop if DHCP-assigned IP addresses are not available.</li> </ul>

Port	Type of port	Function
4	10/25-GbE ports 1-4 on the E5700SG controller  <b>Note:</b> The SFP+ transceivers included with the appliance support 10-GbE link speeds. If you want to use 25-GbE link speeds for the four network ports, you must provide SFP28 transceivers.	Connect to the Grid Network and the Client Network for StorageGRID. See “10/25-GbE port connections for the E5700SG controller.”

## Related information

[Gathering installation information \(SG5700\)](#)

[Cabling the appliance \(SG5700\)](#)

[Port bond modes for E5700SG controller ports](#)

[Network guidelines](#)

[Install VMware](#)

[Install Red Hat Enterprise Linux or CentOS](#)

[Install Ubuntu or Debian](#)

## Port bond modes for E5700SG controller ports

When configuring network links for the E5700SG controller ports, you can use port bonding for the 10/25-GbE ports that connect to the Grid Network and optional Client Network, and the 1-GbE management ports that connect to the optional Admin Network. Port bonding helps protect your data by providing redundant paths between StorageGRID networks and the appliance.

## Related information

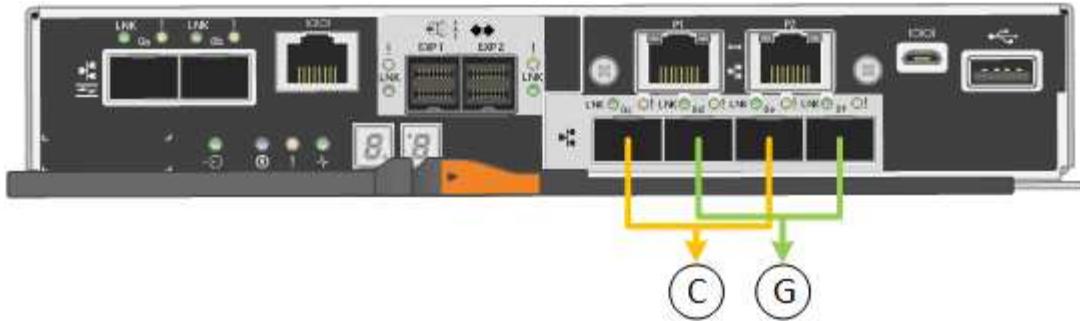
[Configuring network links \(SG5700\)](#)

## Network bond modes for the 10/25-GbE ports

The 10/25-GbE networking ports on the E5700SG controller support Fixed port bond mode or Aggregate port bond mode for the Grid Network and Client Network connections.

### Fixed port bond mode

Fixed mode is the default configuration for the 10/25-GbE networking ports.



Which ports are bonded	
C	Ports 1 and 3 are bonded together for the Client Network, if this network is used.
G	Ports 2 and 4 are bonded together for the Grid Network.

When using Fixed port bond mode, you can use one of two network bond modes: Active-Backup or Link Aggregation Control Protocol (LACP).

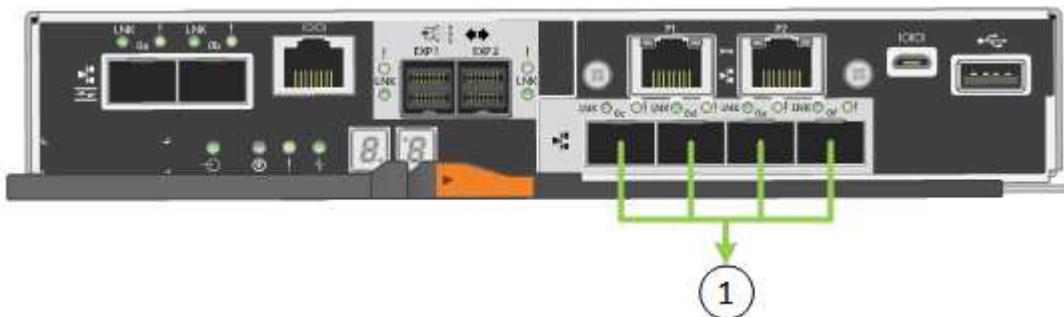
- In Active-Backup mode (default), only one port is active at a time. If the active port fails, its backup port automatically provides a failover connection. Port 4 provides a backup path for port 2 (Grid Network), and port 3 provides a backup path for port 1 (Client Network).
- In LACP mode, each pair of ports forms a logical channel between the controller and the network, allowing for higher throughput. If one port fails, the other port continues to provide the channel. Throughput is reduced, but connectivity is not impacted.



If you do not need redundant connections, you can use only one port for each network. However, be aware that an alarm will be raised in the Grid Manager after StorageGRID is installed, indicating that a cable is unplugged. You can safely acknowledge this alarm to clear it.

### Aggregate port bond mode

Aggregate port bond mode significantly increases the throughput for each StorageGRID network and provides additional failover paths.



Which ports are bonded	
1	All connected ports are grouped in a single LACP bond, allowing all ports to be used for Grid Network and Client Network traffic.

If you plan to use Aggregate port bond mode:

- You must use LACP network bond mode.
- You must specify a unique VLAN tag for each network. This VLAN tag will be added to each network packet to ensure that network traffic is routed to the correct network.
- The ports must be connected to switches that can support VLAN and LACP. If multiple switches are participating in the LACP bond, the switches must support multi-chassis link aggregation groups (MLAG), or equivalent.
- You must understand how to configure the switches to use VLAN, LACP, and MLAG, or equivalent.

If you do not want to use all four 10/25-GbE ports, you can use one, two, or three ports. Using more than one port maximizes the chance that some network connectivity will remain available if one of the 10/25-GbE ports fails.



If you choose to use fewer than four ports, be aware that one or more alarms will be raised in the Grid Manager after StorageGRID is installed, indicating that cables are unplugged. You can safely acknowledge the alarms to clear them.

### Network bond modes for the 1-GbE management ports

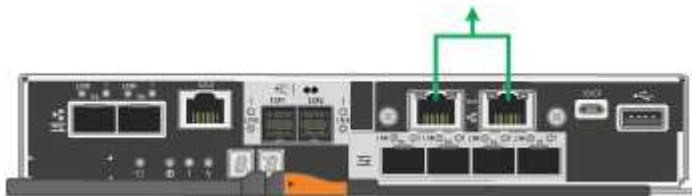
For the two 1-GbE management ports on the E5700SG controller, you can choose Independent network bond mode or Active-Backup network bond mode to connect to the optional Admin Network.

In Independent mode, only management port 1 is connected to the Admin Network. This mode does not provide a redundant path. Management port 2 is left unwired and available for temporary local connections (use IP address 169.254.0.1)

In Active-Backup mode, both management ports 1 and 2 are connected to the Admin Network. Only one port is active at a time. If the active port fails, its backup port automatically provides a failover connection. Bonding these two physical ports into one logical management port provides a redundant path to the Admin Network.



If you need to make a temporary local connection to the E5700SG controller when the 1-GbE management ports are configured for Active-Backup mode, remove the cables from both management ports, plug your temporary cable into management port 2, and access the appliance using IP address 169.254.0.1.



### Gathering installation information (SG5700)

As you install and configure the StorageGRID appliance, you must make decisions and gather information about Ethernet switch ports, IP addresses, and port and network bond modes.

#### About this task

You can use the following tables to record the required information for each network you connect to the appliance. These values are required to install and configure the hardware.

#### Information needed to connect to SANtricity System Manager on the E2800 controller

You must connect the E2800 controller to the management network you will use for SANtricity System Manager.

Information needed	Your value
Ethernet switch port you will connect to management port 1	
MAC address for management port 1 (printed on a label near port P1)	
DHCP-assigned IP address for management port 1, if available after power on  <b>Note:</b> If the network you will connect to the E2800 controller includes a DHCP server, the network administrator can use the MAC address to determine the IP address that was assigned by the DHCP server.	
Speed and duplex mode  <b>Note:</b> You must make sure the Ethernet switch for the SANtricity System Manager management network is set to autonegotiate.	Must be: <ul style="list-style-type: none"><li>Autonegotiate (default)</li></ul>
IP address format	Choose one: <ul style="list-style-type: none"><li>IPv4</li><li>IPv6</li></ul>
Static IP address you plan to use for the appliance on the management network	For IPv4: <ul style="list-style-type: none"><li>IPv4 address:</li><li>Subnet mask:</li><li>Gateway:</li></ul> For IPv6: <ul style="list-style-type: none"><li>IPv6 address:</li><li>Routable IP address:</li><li>E2800 controller router IP address:</li></ul>

## Information needed to connect the E5700SG controller to the Admin Network

The Admin Network for StorageGRID is an optional network, used for system administration and maintenance. The appliance connects to the Admin Network using the 1-GbE management ports on the E5700SG controller.

Information needed	Your value
Admin Network enabled	Choose one: <ul style="list-style-type: none"><li>• No</li><li>• Yes (default)</li></ul>
Network bond mode	Choose one: <ul style="list-style-type: none"><li>• Independent</li><li>• Active-Backup</li></ul>
Switch port for port 1	
Switch port for port 2 (Active-Backup network bond mode only)	
DHCP-assigned IP address for management port 1, if available after power on  <b>Note:</b> If the Admin Network includes a DHCP server, the E5700SG controller displays the DHCP-assigned IP address on its seven-segment display after it boots up. You can also determine the DHCP-assigned IP address by using the MAC address to look up the assigned IP.	<ul style="list-style-type: none"><li>• IPv4 address (CIDR):</li><li>• Gateway:</li></ul>
Static IP address you plan to use for the appliance Storage Node on the Admin Network  <b>Note:</b> If your network does not have a gateway, specify the same static IPv4 address for the gateway.	<ul style="list-style-type: none"><li>• IPv4 address (CIDR):</li><li>• Gateway:</li></ul>
Admin Network subnets (CIDR)	

## Information needed to connect and configure the 10/25-GbE ports on the E5700SG controller

The four 10/25-GbE ports on the E5700SG controller connect to the StorageGRID Grid Network and Client Network.



See "10/25-GbE port connections for the E5700SG controller" for more information about the options for these ports.

Information needed	Your value
Link speed  <b>Note:</b> If you select 25 GbE, you must install SPF28 transceivers. Auto-negotiation is not supported, so you must also configure the ports and the connected switches for 25GbE.	Choose one: <ul style="list-style-type: none"><li>• 10 GbE (default)</li><li>• 25 GbE</li></ul>
Port bond mode	Choose one: <ul style="list-style-type: none"><li>• Fixed (default)</li><li>• Aggregate</li></ul>
Switch port for port 1 (Client Network)	
Switch port for port 2 (Grid Network)	
Switch port for port 3 (Client Network)	
Switch port for port 4 (Grid Network)	

#### Information needed to connect the E5700SG controller to the Grid Network

The Grid Network for StorageGRID is a required network, used for all internal StorageGRID traffic. The appliance connects to the Grid Network using the 10/25-GbE ports on the E5700SG controller.



See "10/25-GbE port connections for the E5700SG controller" for more information about the options for these ports.

Information needed	Your value
Network bond mode	Choose one: <ul style="list-style-type: none"><li>• Active-Backup (default)</li><li>• LACP (802.3ad)</li></ul>
VLAN tagging enabled	Choose one: <ul style="list-style-type: none"><li>• No (default)</li><li>• Yes</li></ul>
VLAN tag(if VLAN tagging is enabled)	Enter a value between 0 and 4095:

Information needed	Your value
<p>DHCP-assigned IP address for the Grid Network, if available after power on</p> <p><b>Note:</b> If the Grid Network includes a DHCP server, the E5700SG controller displays the DHCP-assigned IP address for the Grid Network on its seven-segment display after it boots up.</p>	<ul style="list-style-type: none"> <li>IPv4 address (CIDR):</li> <li>Gateway:</li> </ul>
<p>Static IP address you plan to use for the appliance Storage Node on the Grid Network</p> <p><b>Note:</b> If your network does not have a gateway, specify the same static IPv4 address for the gateway.</p>	<ul style="list-style-type: none"> <li>IPv4 address (CIDR):</li> <li>Gateway:</li> </ul>
<p>Grid Network subnets (CIDR)</p> <p><b>Note:</b> If the Client Network is not enabled, the default route on the controller will use the gateway specified here.</p>	

#### Information needed to connect the E5700SG controller to the Client Network

The Client Network for StorageGRID is an optional network, typically used to provide client protocol access to the grid. The appliance connects to the Client Network using the 10/25-GbE ports on the E5700SG controller.



See "10/25-GbE port connections for the E5700SG controller" for more information about the options for these ports.

Information needed	Your value
Client Network enabled	<p>Choose one:</p> <ul style="list-style-type: none"> <li>No (default)</li> <li>Yes</li> </ul>
Network bond mode	<p>Choose one:</p> <ul style="list-style-type: none"> <li>Active-Backup (default)</li> <li>LACP (802.3ad)</li> </ul>
VLAN tagging enabled	<p>Choose one:</p> <ul style="list-style-type: none"> <li>No (default)</li> <li>Yes</li> </ul>

Information needed	Your value
VLAN tag  (if VLAN tagging is enabled)	Enter a value between 0 and 4095:
DHCP-assigned IP address for the Client Network, if available after power on	<ul style="list-style-type: none"> <li>• IPv4 address (CIDR):</li> <li>• Gateway:</li> </ul>
Static IP address you plan to use for the appliance Storage Node on the Client Network  <b>Note:</b> If the Client Network is enabled, the default route on the controller will use the gateway specified here.	<ul style="list-style-type: none"> <li>• IPv4 address (CIDR):</li> <li>• Gateway:</li> </ul>

## Related information

[Reviewing appliance network connections](#)

[Port bond modes for E5700SG controller ports](#)

[Configuring the hardware](#)

## Installing the hardware

Hardware installation entails installing the appliance into a cabinet or rack, connecting the cables, and applying power.

### Steps

- [Registering the hardware](#)
- [Installing the appliance in a cabinet or rack \(SG5700\)](#)
- [Cabling the appliance \(SG5700\)](#)
- [Connecting power cords and applying power \(SG5700\)](#)
- [Viewing SG5700 boot-up status codes](#)

## Registering the hardware

Registering the appliance hardware provides support benefits.

### Steps

1. Locate the chassis serial number.

You can find the number on the packing slip, in your confirmation email, or on the appliance after you unpack it.



2. Go to the NetApp Support Site at [mysupport.netapp.com](http://mysupport.netapp.com).

3. Determine whether you need to register the hardware:

If you are a...	Follow these steps...
Existing NetApp customer	<ol style="list-style-type: none"><li>a. Sign in with your username and password.</li><li>b. Select <b>Products &gt; My Products</b>.</li><li>c. Confirm that the new serial number is listed.</li><li>d. If it is not, follow the instructions for new NetApp customers.</li></ol>
New NetApp customer	<ol style="list-style-type: none"><li>a. Click <b>Register Now</b>, and create an account.</li><li>b. Select <b>Products &gt; Register Products</b>.</li><li>c. Enter the product serial number and requested details.</li></ol> <p>After your registration is approved, you can download any required software. The approval process might take up to 24 hours.</p>

### Installing the appliance in a cabinet or rack (SG5700)

You must install rails in your cabinet or rack and then slide the appliance onto the rails. If you have an SG5760, you must also install the drives after installing the appliance.

#### What you'll need

- You have reviewed the Safety Notices document included in the box, and understand the precautions for moving and installing hardware.
- You have the instructions packaged with the rail kit.
- You have the *Installation and Setup Instructions* for the appliance.



Install hardware from the bottom of the rack or cabinet or rack up to prevent the equipment from tipping over.



The SG5712 weighs approximately 64 lb (29 kg) when fully loaded with drives. Two people or a mechanized lift are required to safely move the SG5712.



The SG5760 weighs approximately 132 lb (60 kg) with no drives installed. Four people or a mechanized lift are required to safely move an empty SG5760.



To avoid damaging the hardware, never move an SG5760 if drives are installed. You must remove all drives before moving the shelf.

#### Steps

1. Carefully follow the instructions for the rail kit to install the rails in your cabinet or rack.
2. If you have an SG5760, follow these steps to prepare for moving the appliance.

- a. Remove the outer packing box. Then, fold down the flaps on the inner box.
- b. If you are lifting the SG5760 by hand, attach the four handles to the sides of the chassis.

You remove these handles as you slide the appliance onto the rails.

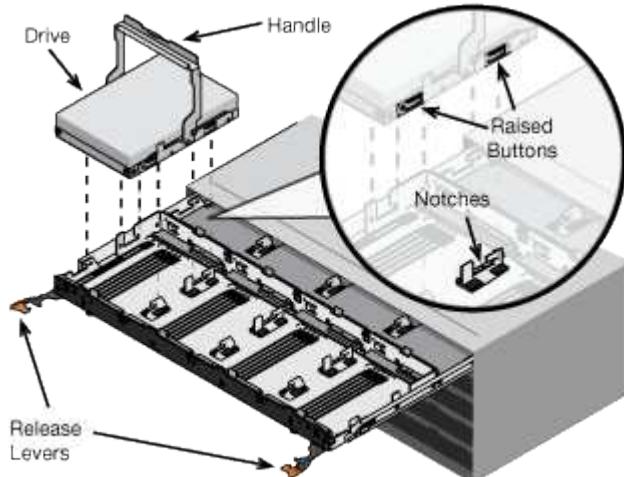
3. See the *Installation and Setup Instructions*, and slide the appliance in the cabinet or rack.
4. See the *Installation and Setup Instructions*, and secure the appliance to the cabinet or rack.

If you have an SG5760, use the back brackets to secure the appliance to the rear of the rack or cabinet. Use the cage nuts if your rack or cabinet has square holes.

5. If you have an SG5760, install 12 drives in each of the 5 drive drawers.

You must install all 60 drives to ensure correct operation.

- a. Put on the ESD wristband, and remove the drives from their packaging.
- b. Release the levers on the top drive drawer, and slide the drawer out using the levers.
- c. Raise the drive handle to vertical, and align the buttons on the drive with the notches on the drawer.



- d. Pressing gently on the top of the drive, rotate the drive handle down until the drive snaps into place.
- e. After installing the first 12 drives, slide the drawer back in by pushing on the center and closing both levers gently.
- f. Repeat these steps for the other four drawers.

6. Attach the front bezel.

### Cabling the appliance (SG5700)

You must connect the two controllers to each other, connect the management ports on each controller, and connect the 10/25-GbE ports on the E5700SG controller to the Grid Network and optional Client Network for StorageGRID.

### What you'll need

- You have unpacked the following items, which are included with the appliance:
  - Two power cords.

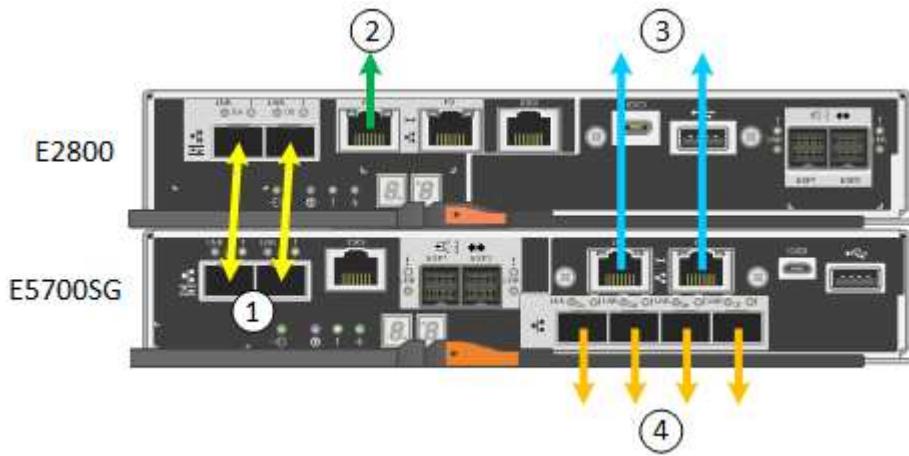
- Two optical cables for the FC interconnect ports on the controllers.
- Eight SFP+ transceivers, which support either 10-GbE or 16-Gbps FC. The transceivers can be used with the two interconnect ports on both controllers and with the four 10/25-GbE network ports on the E5700SG controller, assuming you want the network ports to use a 10-GbE link speed.
- You have obtained the following items, which are not included with the appliance:
  - One to four optical cables for the 10/25-GbE ports you plan to use.
  - One to four SFP28 transceivers, if you plan to use 25-GbE link speed.
  - Ethernet cables for connecting the management ports.



**Risk of exposure to laser radiation** — Do not disassemble or remove any part of an SFP transceiver. You might be exposed to laser radiation.

#### About this task

The figure shows the two controllers in the SG5760, with the E2800 controller on the top and the E5700SG controller on the bottom. In the SG5712, the E2800 controller is to the left of the E5700SG controller when viewed from the back.



	Port	Type of port	Function
1	Two interconnect ports on each controller	16Gb/s FC optical SFP+	Connect the two controllers to each other.
2	Management port 1 on the E2800 controller	1-GbE (RJ-45)	Connects to the network where you access SANtricity System Manager. You can use the Admin Network for StorageGRID or an independent management network.
2	Management port 2 on the E2800 controller	1-GbE (RJ-45)	Reserved for technical support.

	Port	Type of port	Function
3	Management port 1 on the E5700SG controller	1-GbE (RJ-45)	Connects the E5700SG controller to the Admin Network for StorageGRID.
3	Management port 2 on the E5700SG controller	1-GbE (RJ-45)	<ul style="list-style-type: none"> <li>• Can be bonded with management port 1 if you want a redundant connection to the Admin Network.</li> <li>• Can be left unwired and available for temporary local access (IP 169.254.0.1).</li> <li>• During installation, can be used to connect the E5700SG controller to a service laptop if DHCP-assigned IP addresses are not available.</li> </ul>
4	10/25-GbE ports 1-4 on the E5700SG controller	10-GbE or 25-GbE  <b>Note:</b> The SFP+ transceivers included with the appliance support 10-GbE link speeds. If you want to use 25-GbE link speeds for the four network ports, you must provide SFP28 transceivers.	Connect to the Grid Network and the Client Network for StorageGRID. See “10/25-GbE port connections for the E5700SG controller.”

## Steps

1. Connect the E2800 controller to the E5700SG controller, using two optical cables and four of the eight SFP+ transceivers.

Connect this port...	To this port...
Interconnect port 1 on the E2800 controller	Interconnect port 1 on the E5700SG controller
Interconnect port 2 on the E2800 controller	Interconnect port 2 on the E5700SG controller

2. Connect management port 1 (P1) on the E2800 controller (the RJ-45 port on the left) to the management network for SANtricity System Manager, using an Ethernet cable.

Do not use management port 2 (P2) on the E2800 controller (the RJ-45 port on the right). This port is reserved for technical support.

3. If you plan to use the Admin Network for StorageGRID, connect management port 1 on the E5700SG controller (the RJ-45 port on the left) to the Admin Network, using an Ethernet cable.

If you plan to use active-backup network bond mode for the Admin Network, connect management port 2 on the E5700SG controller (the RJ-45 port on the right) to the Admin Network, using an Ethernet cable.

4. Connect the 10/25-GbE ports on the E5700SG controller to the appropriate network switches, using optical cables and SFP+ or SFP28 transceivers.



All ports must use the same link speed. Install SFP+ transceivers if you plan to use 10-GbE link speeds. Install SFP28 transceivers if you plan to use 25-GbE link speeds.

- If you plan to use Fixed port bond mode (default), connect the ports to the StorageGRID Grid and Client Networks, as shown in the table.

Port	Connects to...
Port 1	Client Network (optional)
Port 2	Grid Network
Port 3	Client Network (optional)
Port 4	Grid Network

- If you plan to use the Aggregate port bond mode, connect one or more of the network ports to one or more switches. You should connect at least two of the four ports to avoid having a single point of failure. If you use more than one switch for a single LACP bond, the switches must support MLAG or equivalent.

## Related information

[Accessing the StorageGRID Appliance Installer](#)

[Port bond modes for E5700SG controller ports](#)

## Connecting power cords and applying power (SG5700)

When you apply power to the appliance, both controllers boot up.

## What you'll need

Both appliance power switches must be off before connecting power.



**Risk of electrical shock**— Before connecting the power cords, make sure that the two power switches on the appliance are off.

## Steps

1. Confirm that the two power switches on the appliance are off.

2. Connect the two power cords to the appliance.
3. Connect the two power cords to different power distribution units (PDUs) in the cabinet or rack.
4. Turn on the two power switches on the appliance.
  - Do not turn off the power switches during the power-on process.
  - The fans are very loud when they first start up. The loud noise during start-up is normal.
5. After the controllers have booted up, check their seven-segment displays.

### Viewing SG5700 boot-up status codes

The seven-segment displays on each controller show status and error codes as the appliance powers up.

#### About this task

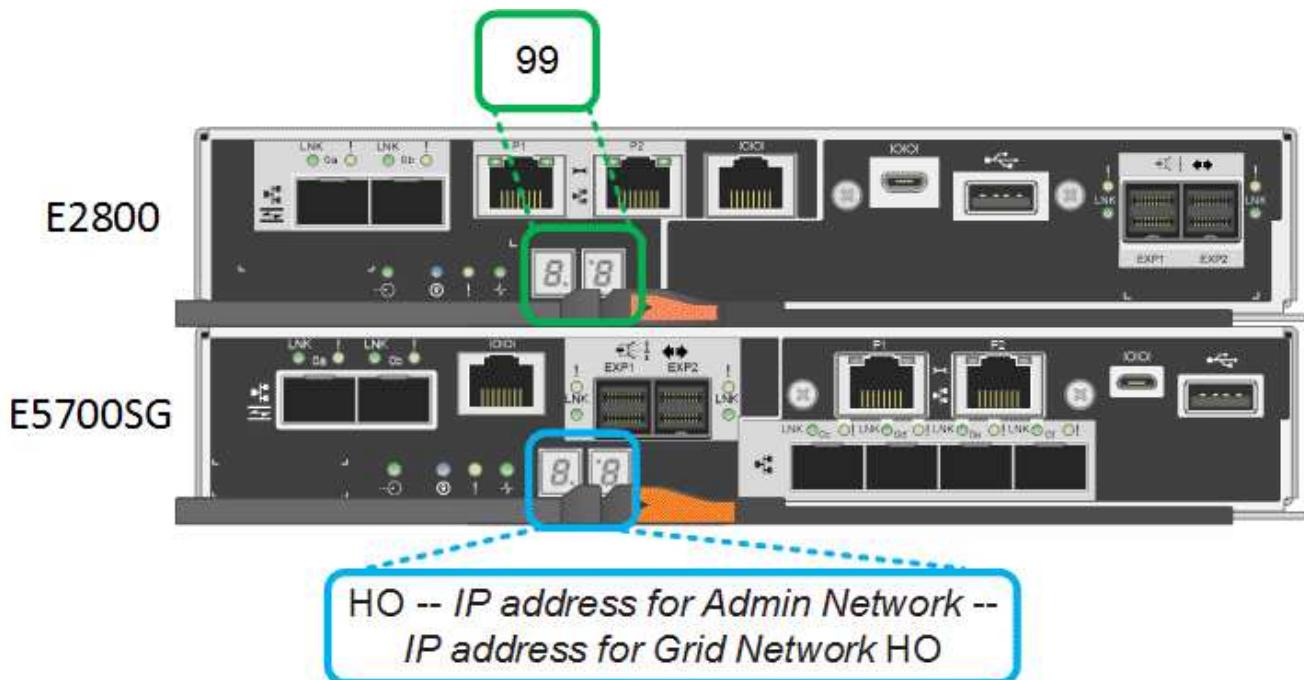
The E2800 controller and the E5700SG controller display different statuses and error codes.

To understand what these codes mean, see the following resources:

Controller	Reference
E2800 controller	<p><i>E5700 and E2800 System Monitoring Guide</i></p> <p><b>Note:</b> The codes listed for the E-Series E5700 controller do not apply to the E5700SG controller in the appliance.</p>
E5700SG controller	"Status indicators on the E5700SG controller"

#### Steps

1. During boot-up, monitor progress by viewing the codes shown on the seven-segment displays.
  - The seven-segment display on the E2800 controller shows the repeating sequence **OS**, **Sd**, **blank** to indicate that it is performing start-of-day processing.
  - The seven-segment display on the E5700SG controller shows a sequence of codes, ending with **AA** and **FF**.
2. After the controllers have booted up, confirm the seven-segment displays show the following:



Controller	Seven-segment display
E2800 controller	Shows 99, which is the default ID for an E-Series controller shelf.
E5700SG controller	<p>Shows HO, followed by a repeating sequence of two numbers.</p> <div style="border: 1px solid black; padding: 10px; margin-top: 10px;">           HO -- IP address for Admin Network -- IP address for Grid Network HO         </div> <p>In the sequence, the first set of numbers is the DHCP-assigned IP address for the controller's management port 1. This address is used to connect the controller to the Admin Network for StorageGRID. The second set of numbers is the DHCP-assigned IP address used to connect the appliance to the Grid Network for StorageGRID.</p> <p><b>Note:</b> If an IP address could not be assigned using DHCP, 0.0.0.0 is displayed.</p>

3. If the seven-segment displays show other values, see “Troubleshooting the hardware installation,” and confirm you completed the installation steps correctly. If you are unable to resolve the problem, contact technical support.

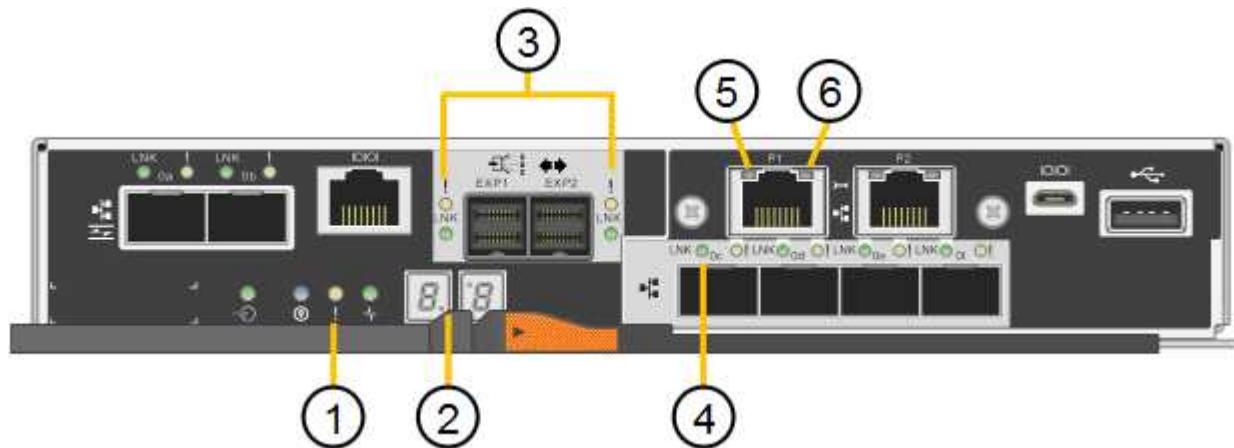
#### Related information

[Status indicators on the E5700SG controller](#)

## Status indicators on the E5700SG controller

The seven-segment display and the LEDs on the E5700SG controller show status and error codes while the appliance powers up and while the hardware is initializing. You can use these displays to determine status and troubleshoot errors.

After the StorageGRID Appliance Installer has started, you should periodically review the status indicators on the E5700SG controller.



	Display	Description
1	Attention LED	Amber: The controller is faulty and requires operator attention, or the installation script was not found. Off: The controller is operating normally.
2	Seven-segment display	Shows a diagnostic code Seven-segment display sequences enable you to understand errors and the operational state of the appliance.
3	Expansion Port Attention LEDs	Amber: These LEDs are always amber (no link established) because the appliance does not use the expansion ports.
4	Host Port Link Status LEDs	Green: The link is up. Off: The link is down.
5	Ethernet Link State LEDs	Green: A link is established. Off: No link is established.

	Display	Description
6	Ethernet Activity LEDs	<p>Green: The link between the management port and the device to which it is connected (such as an Ethernet switch) is up.</p> <p>Off: There is no link between the controller and the connected device.</p> <p>Blinking Green: There is Ethernet activity.</p>

## General boot-up codes

During boot-up or after a hard reset of the appliance, the following occurs:

1. The seven-segment display on the E5700SG controller shows a general sequence of codes that is not specific to the controller. The general sequence ends with the codes AA and FF.
2. Boot-up codes that are specific to the E5700SG controller appear.

## E5700SG controller boot-up codes

During a normal boot-up of the appliance, the seven-segment display on the E5700SG controller shows the following codes in the order listed:

Code	Indicates
HI	The master boot script has started.
PP	The system is checking to see if the FPGA needs to be updated.
HP	The system is checking to see if the 10/25-GbE controller firmware needs to be updated.
RB	The system is rebooting after applying firmware updates.
FP	The hardware subsystem firmware update checks have been completed. Inter-controller communication services are starting.
HE	<p>The system is awaiting connectivity with the E2800 controller and synchronizing with the SANtricity operating system.</p> <p><b>Note:</b> If this boot procedure does not progress past this stage, check the connections between the two controllers.</p>
HC	The system is checking for existing StorageGRID installation data.
HO	The StorageGRID Appliance Installer is running.
HA	StorageGRID is running.

## E5700SG controller error codes

These codes represent error conditions that might be shown on the E5700SG controller as the appliance boots up. Additional two-digit hexadecimal codes are displayed if specific low-level hardware errors occur. If any of these codes persists for more than a second or two, or if you are unable to resolve the error by following one of the prescribed troubleshooting procedures, contact technical support.

Code	Indicates
22	No master boot record found on any boot device.
23	The internal flash disk is not connected.
2A, 2B	Stuck bus, unable to read DIMM SPD data.
40	Invalid DIMMs.
41	Invalid DIMMs.
42	Memory test failed.
51	SPD reading failure.
92 to 96	PCI bus initialization.
A0 to A3	SATA drive initialization.
AB	Alternate boot code.
AE	Booting OS.
EA	DDR4 training failed.
E8	No memory installed.
EU	The installation script was not found.
EP	Installation or communication with the E2800 controller has failed.

### Related information

[Troubleshooting the hardware installation](#)

[NetApp Support](#)

## Configuring the hardware

After applying power to the appliance, you must configure SANtricity System Manager,

which is the software you will use to monitor the hardware. You must also configure the network connections that will be used by StorageGRID.

## Steps

- [Configuring StorageGRID connections](#)
- [Accessing and Configuring SANtricity System Manager](#)
- [Optional: Enabling node encryption](#)
- [Optional: Changing the RAID mode \(SG5760 only\)](#)
- [Optional: Remapping network ports for the appliance](#)

### Configuring StorageGRID connections

Before you can deploy a StorageGRID appliance as a Storage Node in a StorageGRID grid, you must configure the connections between the appliance and the networks you plan to use. You can configure networking by browsing to the StorageGRID Appliance Installer, which is included on the E5700SG controller (the compute controller in the appliance).

## Steps

- [Accessing the StorageGRID Appliance Installer](#)
- [Verifying and upgrading the StorageGRID Appliance Installer version](#)
- [Configuring network links \(SG5700\)](#)
- [Setting the IP configuration](#)
- [Verifying network connections](#)
- [Verifying port-level network connections](#)

### Accessing the StorageGRID Appliance Installer

You must access the StorageGRID Appliance Installer to configure the connections between the appliance and the three StorageGRID networks: the Grid Network, the Admin Network (optional), and the Client Network (optional).

#### What you'll need

- You are using a supported web browser.
- The appliance is connected to all of the StorageGRID networks you plan to use.
- You know the IP address, gateway, and subnet for the appliance on these networks.
- You have configured the network switches you plan to use.

#### About this task

When you first access the StorageGRID Appliance Installer, you can use the DHCP-assigned IP address for the Admin Network (assuming the appliance is connected to the Admin Network) or the DHCP-assigned IP address for the Grid Network. Using the IP address for the Admin Network is preferred. Otherwise, if you access the StorageGRID Appliance Installer using the DHCP address for the Grid Network, you might lose connection with the StorageGRID Appliance Installer when you change link settings and when you enter a static IP.

## Steps

1. Obtain the DHCP address for the appliance on the Admin Network (if it is connected) or the Grid Network (if the Admin Network is not connected).

You can do either of the following:

- Look at the seven-segment display on the E5700SG controller. If management port 1 and 10/25-GbE ports 2 and 4 on the E5700SG controller are connected to networks with DHCP servers, the controller attempts to obtain dynamically assigned IP addresses when you power on the enclosure. After the controller has completed the power-on process, its seven-segment display shows **HO**, followed by a repeating sequence of two numbers.

HO -- IP address for Admin Network -- IP address for Grid Network HO

In the sequence:

- The first set of numbers is the DHCP address for the appliance Storage Node on the Admin Network, if it is connected. This IP address is assigned to management port 1 on the E5700SG controller.
- The second set of numbers is the DHCP address for the appliance Storage Node on the Grid Network. This IP address is assigned to 10/25-GbE ports 2 and 4 when you first apply power to the appliance.



If an IP address could not be assigned using DHCP, 0.0.0.0 is displayed.

- Provide the MAC address for management port 1 to your network administrator, so they can look up the DHCP address for this port on the Admin Network. The MAC address is printed on a label on the E5700SG controller, next to the port.

2. If you were able to obtain either of the DHCP addresses:

- a. Open a web browser on the service laptop.
- b. Enter this URL for the StorageGRID Appliance Installer:

**[https://E5700SG\\_Controller\\_IP:8443](https://E5700SG_Controller_IP:8443)**

For *E5700SG\_Controller\_IP*, use the DHCP address for the controller (use the IP address for the Admin Network if you have it).

- c. If you are prompted with a security alert, view and install the certificate using the browser's installation wizard.

The alert will not appear the next time you access this URL.

The StorageGRID Appliance Installer Home page appears. The information and messages shown when you first access this page depend on how your appliance is currently connected to StorageGRID networks. Error messages might appear that will be resolved in later steps.

# NetApp® StorageGRID® Appliance Installer

[Home](#)[Configure Networking](#)[Configure Hardware](#)[Monitor Installation](#)[Advanced](#)

## Home

**ⓘ** The installation is ready to be started. Review the settings below, and then click Start Installation.

### This Node

Node type

Storage

Node name

MM-2-108-SGA-lab25

[Cancel](#)

[Save](#)

### Primary Admin Node connection

Enable Admin Node discovery

Primary Admin Node IP

172.16.1.178

Connection state

Connection to 172.16.1.178 ready

[Cancel](#)

[Save](#)

### Installation

Current state

Ready to start installation of MM-2-108-SGA-lab25 into grid with Admin Node 172.16.1.178 running StorageGRID 11.2.0, using StorageGRID software downloaded from the Admin Node.

[Start Installation](#)

3. If the E5700SG controller could not acquire an IP address using DHCP:

a. Connect the service laptop to management port 2 on the E5700SG controller, using an Ethernet cable.



b. Open a web browser on the service laptop.

- c. Enter this URL for the StorageGRID Appliance Installer:

**<https://169.254.0.1:8443>**

The StorageGRID Appliance Installer Home page appears. The information and messages shown when you first access this page depend on how your appliance is currently connected.



If you cannot access the Home page over a link-local connection, configure the service laptop IP address as 169.254.0.2, and try again.

4. Review any messages displayed on the Home page and configure the link configuration and the IP configuration, as required.

## Related information

[Web browser requirements](#)

### Verifying and upgrading the StorageGRID Appliance Installer version

The StorageGRID Appliance Installer version on the appliance must match the software version installed on your StorageGRID system to ensure that all StorageGRID features are supported.

#### What you'll need

You have accessed the StorageGRID Appliance Installer.

#### About this task

StorageGRID appliances come from the factory preinstalled with the StorageGRID Appliance Installer. If you are adding an appliance to a recently upgraded StorageGRID system, you might need to manually upgrade the StorageGRID Appliance Installer before installing the appliance as a new node.

The StorageGRID Appliance Installer automatically upgrades when you upgrade to a new StorageGRID version. You do not need to upgrade the StorageGRID Appliance Installer on installed appliance nodes. This procedure is only required when you are installing an appliance that contains an earlier version of the StorageGRID Appliance Installer.

#### Steps

1. From the StorageGRID Appliance Installer, select **Advanced > Upgrade Firmware**.
2. Compare the Current Firmware version to the software version installed on your StorageGRID system (from the Grid Manager select **Help > About**).

The second digit in the two versions should match. For example, if your StorageGRID system is running version 11.5.x.y, the StorageGRID Appliance Installer version should be 3.5.z.

3. If the appliance has a down-level version of the StorageGRID Appliance Installer, go to the NetApp Downloads page for StorageGRID.

[NetApp Downloads: StorageGRID](#)

Sign in with the username and password for your NetApp account.

4. Download the appropriate version of the **Support file for StorageGRID Appliances** and the corresponding checksum file.

The Support file for StorageGRID Appliances file is a .zip archive that contains the current and previous firmware versions for all StorageGRID appliance models, in subdirectories for each controller type.

After downloading the Support file for StorageGRID Appliances file, extract the .zip archive and see the README file for important information about installing the StorageGRID Appliance Installer.

5. Follow the instructions on the Upgrade Firmware page of the StorageGRID Appliance Installer to perform these steps:

- a. Upload the appropriate support file (firmware image) for your controller type and the checksum file.
- b. Upgrade the inactive partition.
- c. Reboot and swap partitions.
- d. Upgrade the second partition.

## Related information

[Accessing the StorageGRID Appliance Installer](#)

### Configuring network links (SG5700)

You can configure network links for the ports used to connect the appliance to the Grid Network, the Client Network, and the Admin Network. You can set the link speed as well as the port and network bond modes.

#### What you'll need

If you plan to use the 25-GbE link speed for the 10/25-GbE ports:

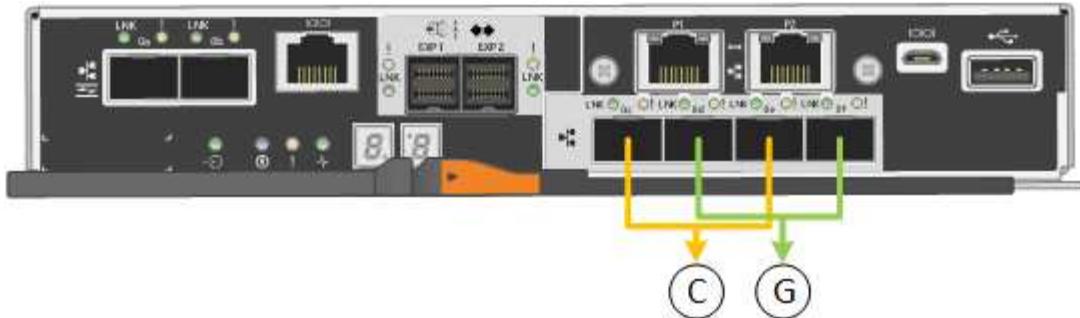
- You have installed SFP28 transceivers in the ports you plan to use.
- You have connected the ports to switches that can support these features.
- You understand how to configure the switches to use this higher speed.

If you plan to use Aggregate port bond mode, LACP network bond mode, or VLAN tagging for the 10/25-GbE ports:

- You have connected the ports on the appliance to switches that can support VLAN and LACP.
- If multiple switches are participating in the LACP bond, the switches support multi-chassis link aggregation groups (MLAG), or equivalent.
- You understand how to configure the switches to use VLAN, LACP, and MLAG or equivalent.
- You know the unique VLAN tag to use for each network. This VLAN tag will be added to each network packet to ensure that network traffic is routed to the correct network.
- If you plan to use Active-Backup mode for the Admin Network, you have connected Ethernet cables to both management ports on the controller.

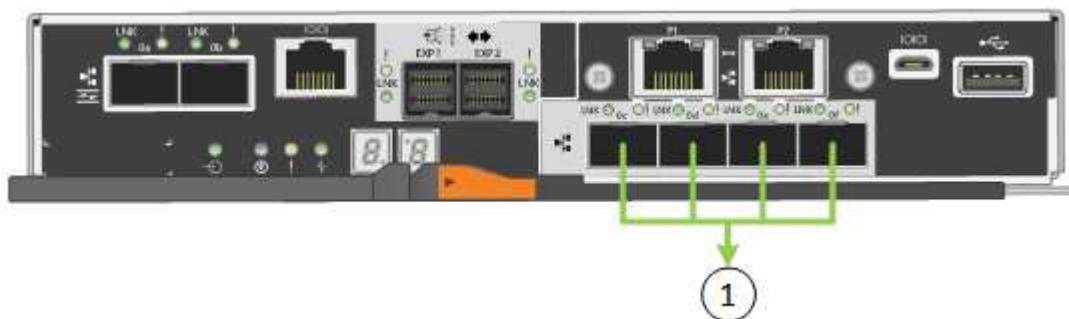
#### About this task

This figure shows how the four 10/25-GbE ports are bonded in Fixed port bond mode (default configuration).



Which ports are bonded	
C	Ports 1 and 3 are bonded together for the Client Network, if this network is used.
G	Ports 2 and 4 are bonded together for the Grid Network.

This figure shows how the four 10/25-GbE ports are bonded in Aggregate port bond mode.



Which ports are bonded	
1	All four ports are grouped in a single LACP bond, allowing all ports to be used for Grid Network and Client Network traffic.

The table summarizes the options for configuring the four 10/25-GbE ports. The default settings are shown in bold. You only need to configure the settings on the Link Configuration page if you want to use a non-default setting.

- **Fixed (default) port bond mode**

Network bond mode	Client Network disabled (default)	Client Network enabled
<b>Active-Backup (default)</b>	<ul style="list-style-type: none"> <li>• Ports 2 and 4 use an active-backup bond for the Grid Network.</li> <li>• Ports 1 and 3 are not used.</li> <li>• A VLAN tag is optional.</li> </ul>	<ul style="list-style-type: none"> <li>• Ports 2 and 4 use an active-backup bond for the Grid Network.</li> <li>• Ports 1 and 3 use an active-backup bond for the Client Network.</li> <li>• VLAN tags can be specified for both networks for the convenience of the network administrator.</li> </ul>

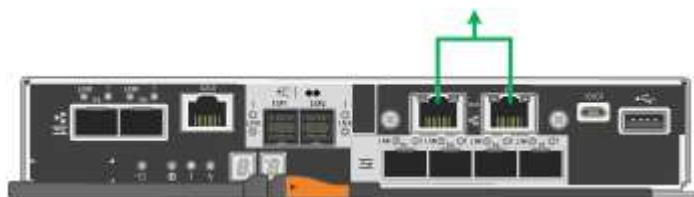
Network bond mode	Client Network disabled (default)	Client Network enabled
LACP (802.3ad)	<ul style="list-style-type: none"> <li>Ports 2 and 4 use an LACP bond for the Grid Network.</li> <li>Ports 1 and 3 are not used.</li> <li>A VLAN tag is optional.</li> </ul>	<ul style="list-style-type: none"> <li>Ports 2 and 4 use an LACP bond for the Grid Network.</li> <li>Ports 1 and 3 use an LACP bond for the Client Network.</li> <li>VLAN tags can be specified for both networks for the convenience of the network administrator.</li> </ul>

- Aggregate port bond mode

Network bond mode	Client Network disabled (default)	Client Network enabled
LACP (802.3ad) only	<ul style="list-style-type: none"> <li>Ports 1-4 use a single LACP bond for the Grid Network.</li> <li>A single VLAN tag identifies Grid Network packets.</li> </ul>	<ul style="list-style-type: none"> <li>Ports 1-4 use a single LACP bond for the Grid Network and the Client Network.</li> <li>Two VLAN tags allow Grid Network packets to be segregated from Client Network packets.</li> </ul>

See the information about 10/25-GbE port connections for the E5700SG controller for more information about port bond and network bond modes.

This figure shows how the two 1-GbE management ports on the E5700SG controller are bonded in Active-Backup network bond mode for the Admin Network.

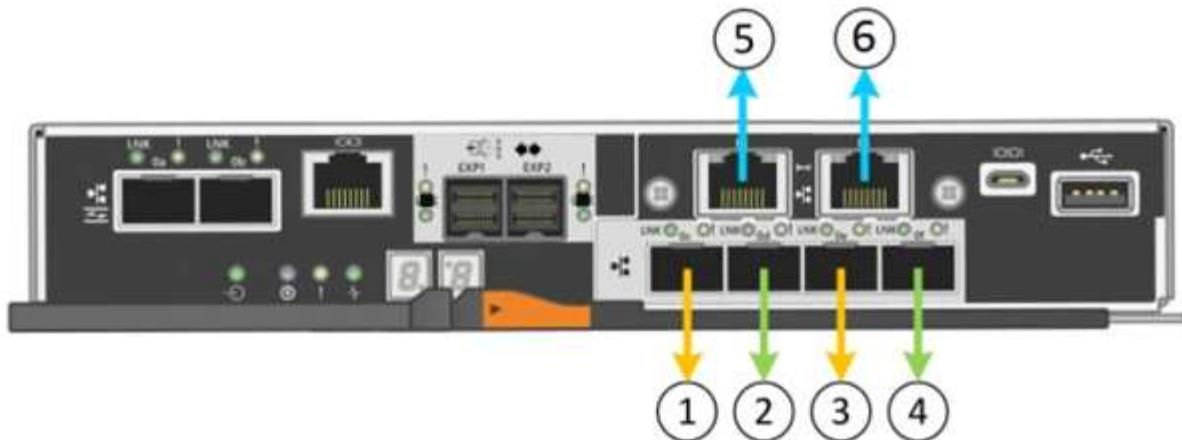


### Steps

- From the menu bar of the StorageGRID Appliance Installer, click **Configure Networking > Link Configuration**.

The Network Link Configuration page displays a diagram of your appliance with the network and management ports numbered.

## Network Link Configuration



**⚠** You might lose your connection if you make changes to the network or link you are connected through. If you are not reconnected within 1 minute, re-enter the URL using one of the other IP addresses assigned to the appliance.

The Link Status table lists the link state (up/down) and speed (1/10/25/40/100 Gbps) of the numbered ports.

### Link Status

Link	State	Speed (Gbps)
1	Up	25
2	Up	25
3	Up	25
4	Up	25
5	Up	1
6	Up	1

The first time you access this page:

- **Link Speed** is set to **10GbE**.
- **Port bond mode** is set to **Fixed**.
- **Network bond mode** for the Grid Network is set to **Active-Backup**.
- The **Admin Network** is enabled, and the network bond mode is set to **Independent**.
- The **Client Network** is disabled.

## Link Settings

Link speed

Port bond mode  Fixed  Aggregate  
Choose Fixed port bond mode if you want to use ports 2 and 4 for the Grid Network and ports 1 and 3 for the Client Network (if enabled). Choose Aggregate port bond mode if you want all connected ports to share a single LACP bond for both the Grid and Client Networks.

## Grid Network

Enable network

Network bond mode  Active-Backup  LACP (802.3ad)

Enable VLAN (802.1q) tagging

MAC Addresses 50:6b:4b:42:d7:00 50:6b:4b:42:d7:01 50:6b:4b:42:d7:24 50:6b:4b:42:d7:25  
If you are using DHCP, it is recommended that you configure a permanent DHCP reservation. Use all of these MAC addresses in the reservation to assign one IP address to this network interface.

## Admin Network

Enable network

Network bond mode  Independent  Active-Backup  
Connect the Admin Network to port 5. Leave port 6 unconnected. If necessary, you can make a temporary direct Ethernet connection to port 6 and use link-local IP address 169.254.0.1 for access.

MAC Addresses d8:c4:97:2a:e4:95  
If you are using DHCP, it is recommended that you configure a permanent DHCP reservation. Use all of these MAC addresses in the reservation to assign one IP address to this network interface.

## Client Network

Enable network

Enabling the Client Network causes the default gateway for this node to move to the Client Network. Before enabling the Client Network, ensure that you've added all necessary subnets to the Grid Network Subnet List. Otherwise, the connection to the node might be lost.

2. If you plan to use the 25-GbE link speed for the 10/25 GbE ports, select **25GbE** from the Link speed drop-down list.

The network switches you are using for the Grid Network and the Client Network must also support and be configured for this speed. SFP28 transceivers must be installed in the ports.

3. Enable or disable the StorageGRID networks you plan to use.

The Grid Network is required. You cannot disable this network.

- a. If the appliance is not connected to the Admin Network, unselect the **Enable network** check box for the Admin Network.

#### **Admin Network**

Enable network

- b. If the appliance is connected to the Client Network, select the **Enable network** check box for the Client Network.

The Client Network settings for the 10/25-GbE ports are now shown.

4. Refer to the table, and configure the port bond mode and the network bond mode.

The example shows:

- **Aggregate** and **LACP** selected for the Grid and the Client networks. You must specify a unique VLAN tag for each network. You can select values between 0 and 4095.
- **Active-Backup** selected for the Admin Network.

## Link Settings

Link speed	10GbE
Port bond mode	<input type="radio"/> Fixed <input checked="" type="radio"/> Aggregate
Choose Fixed port bond mode if you want to use ports 2 and 4 for the Grid Network and ports 1 and 3 for the Client Network (if enabled). Choose Aggregate port bond mode if you want all connected ports to share a single LACP bond for both the Grid and Client Networks.	
<b>Grid Network</b>	
Enable network	<input checked="" type="checkbox"/>
Network bond mode	<input type="radio"/> Active-Backup <input checked="" type="radio"/> LACP (802.3ad)
If the port bond mode is Aggregate, all bonds must be in LACP (802.3ad) mode.	
Enable VLAN (802.1q) tagging	<input checked="" type="checkbox"/>
VLAN (802.1q) tag	328
<b>Admin Network</b>	
Enable network	<input checked="" type="checkbox"/>
Network bond mode	<input type="radio"/> Independent <input checked="" type="radio"/> Active-Backup
Connect the Admin Network to ports 5 and 6. If necessary, you can make a temporary direct Ethernet connection by disconnecting ports 5 and 6, then connecting to port 6 and using link-local IP address 169.254.0.1 for access.	
<b>Client Network</b>	
Enable network	<input checked="" type="checkbox"/>
Network bond mode	<input type="radio"/> Active-Backup <input checked="" type="radio"/> LACP (802.3ad)
If the port bond mode is Aggregate, all bonds must be in LACP (802.3ad) mode.	
Enable VLAN (802.1q) tagging	<input checked="" type="checkbox"/>
VLAN (802.1q) tag	332

5. 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 are not 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://E5700SG\\_Controller\\_IP:8443](https://E5700SG_Controller_IP:8443)

## Related information

[Port bond modes for E5700SG controller ports](#)

[Setting the IP configuration](#)

You use the StorageGRID Appliance Installer to configure the IP addresses and routing information used for the appliance Storage Node on the StorageGRID Grid, Admin, and

## Client Networks.

### About this task

You must either assign a static IP for the appliance on each connected network or assign a permanent lease for the address on the DHCP server.

If you want to change the link configuration, see the instructions for changing the link configuration of the E5700SG controller.

### Steps

1. In the StorageGRID Appliance Installer, select **Configure Networking > IP Configuration**.  
The IP Configuration page appears.
2. To configure the Grid Network, select either **Static** or **DHCP** in the **Grid Network** section of the page.

## Grid Network

The Grid Network is used for all internal StorageGRID traffic. The Grid Network provides connectivity between all nodes in the grid, across all sites and subnets. All hosts on the Grid Network must be able to talk to all other hosts. The Grid Network can consist of multiple subnets. Networks containing critical grid services, such as NTP, can also be added as Grid subnets.

IP  Static  DHCP

Assignment

IPv4 Address (CIDR)

Gateway

**⚠ All required Grid Network subnets must also be defined in the Grid Network Subnet List on the Primary Admin Node before starting installation.**

Subnets (CIDR)	<input type="text" value="172.18.0.0/21"/> <span style="color: red;">×</span>
	<input type="text" value="172.18.0.0/21"/> <span style="color: red;">×</span>
	<input type="text" value="192.168.0.0/21"/> <span style="color: green;">+ ×</span>
MTU	<input type="text" value="1500"/> <span style="border: 1px solid black; padding: 2px;">▼</span>

Cancel Save

3. If you selected **Static**, follow these steps to configure the Grid Network:

- Enter the static IPv4 address, using CIDR notation.
- Enter the gateway.

If your network does not have a gateway, re-enter the same static IPv4 address.

- If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.



For the best network performance, all nodes should be configured with similar MTU values on their Grid Network interfaces. The **Grid Network MTU mismatch** alert is triggered if there is a significant difference in MTU settings for the Grid Network on individual nodes. The MTU values do not have to be the same for all network types.

d. Click **Save**.

When you change the IP address, the gateway and list of subnets might also change.

If you lose your connection to the StorageGRID Appliance Installer, re-enter the URL using the new static IP address you just assigned. For example,

**`https://services_appliance_IP:8443`**

e. Confirm that the list of Grid Network subnets is correct.

If you have grid subnets, the Grid Network gateway is required. All grid subnets specified must be reachable through this gateway. These Grid Network subnets must also be defined in the Grid Network Subnet List on the primary Admin Node when you start StorageGRID installation.



The default route is not listed. If the Client Network is not enabled, the default route will use the Grid Network gateway.

- To add a subnet, click the insert icon  to the right of the last entry.
- To remove an unused subnet, click the delete icon .

f. Click **Save**.

4. If you selected **DHCP**, follow these steps to configure the Grid Network:

a. After you select the **DHCP** radio button, click **Save**.

The **IPv4 Address**, **Gateway**, and **Subnets** fields are automatically populated. If the DHCP server is set up to assign an MTU value, the **MTU** field is populated with that value, and the field becomes read-only.

Your web browser is automatically redirected to the new IP address for the StorageGRID Appliance Installer.

b. Confirm that the list of Grid Network subnets is correct.

If you have grid subnets, the Grid Network gateway is required. All grid subnets specified must be reachable through this gateway. These Grid Network subnets must also be defined in the Grid Network Subnet List on the primary Admin Node when you start StorageGRID installation.



The default route is not listed. If the Client Network is not enabled, the default route will use the Grid Network gateway.

- To add a subnet, click the insert icon  to the right of the last entry.
- To remove an unused subnet, click the delete icon .

c. If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.



For the best network performance, all nodes should be configured with similar MTU values on their Grid Network interfaces. The **Grid Network MTU mismatch** alert is triggered if there is a significant difference in MTU settings for the Grid Network on individual nodes. The MTU values do not have to be the same for all network types.

d. Click **Save**.

5. To configure the Admin Network, select either **Static** or **DHCP** in the Admin Network section of the page.



To configure the Admin Network, you must enable the Admin Network on the Link Configuration page.

## Admin Network

The Admin Network is a closed network used for system administration and maintenance. The Admin Network is typically a private network and does not need to be routable between sites.

IP Assignment	<input checked="" type="radio"/> Static <input type="radio"/> DHCP
IPv4 Address (CIDR)	<input type="text" value="10.224.3.72/21"/>
Gateway	<input type="text" value="10.224.0.1"/>
Subnets (CIDR)	<input type="text" value="0.0.0.0/32"/> <span style="color: #666;">+</span>
MTU	<input type="text" value="1500"/> <span style="border: 1px solid #ccc; padding: 0 5px;">▼</span>
<span style="background-color: #666; color: white; padding: 5px 10px; border-radius: 5px;">Cancel</span> <span style="background-color: #0070C0; color: white; padding: 5px 10px; border-radius: 5px; border: 1px solid #0070C0;">Save</span>	

6. If you selected **Static**, follow these steps to configure the Admin Network:

a. Enter the static IPv4 address, using CIDR notation, for Management Port 1 on the appliance.

Management Port 1 is the left of the two 1-GbE RJ45 ports on the right end of the appliance.

b. Enter the gateway.

If your network does not have a gateway, re-enter the same static IPv4 address.

c. If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as

9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.

d. Click **Save**.

When you change the IP address, the gateway and list of subnets might also change.

If you lose your connection to the StorageGRID Appliance Installer, re-enter the URL using the new static IP address you just assigned. For example,

**https://services\_appliance:8443**

e. Confirm that the list of Admin Network subnets is correct.

You must verify that all subnets can be reached using the gateway you provided.



The default route cannot be made to use the Admin Network gateway.

- To add a subnet, click the insert icon  to the right of the last entry.
- To remove an unused subnet, click the delete icon .

f. Click **Save**.

7. If you selected **DHCP**, follow these steps to configure the Admin Network:

a. After you select the **DHCP** radio button, click **Save**.

The **IPv4 Address**, **Gateway**, and **Subnets** fields are automatically populated. If the DHCP server is set up to assign an MTU value, the **MTU** field is populated with that value, and the field becomes read-only.

Your web browser is automatically redirected to the new IP address for the StorageGRID Appliance Installer.

b. Confirm that the list of Admin Network subnets is correct.

You must verify that all subnets can be reached using the gateway you provided.



The default route cannot be made to use the Admin Network gateway.

- To add a subnet, click the insert icon  to the right of the last entry.
- To remove an unused subnet, click the delete icon .

c. If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.

d. Click **Save**.

8. To configure the Client Network, select either **Static** or **DHCP** in the **Client Network** section of the page.



To configure the Client Network, you must enable the Client Network on the Link Configuration page.

## Client Network

The Client Network is an open network used to provide access to client applications, including S3 and Swift. The Client Network enables grid nodes to communicate with any subnet reachable through the Client Network gateway. The Client Network does not become operational until you complete the StorageGRID configuration steps.

IP Assignment

Static     DHCP

IPv4 Address (CIDR)

Gateway

MTU

9. If you selected **Static**, follow these steps to configure the Client Network:

- Enter the static IPv4 address, using CIDR notation.
- Click **Save**.
- Confirm that the IP address for the Client Network gateway is correct.



If the Client Network is enabled, the default route is displayed. The default route uses the Client Network gateway and cannot be moved to another interface while the Client Network is enabled.

- If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.

10. If you selected **DHCP**, follow these steps to configure the Client Network:

- After you select the **DHCP** radio button, click **Save**.

The **IPv4 Address** and **Gateway** fields are automatically populated. If the DHCP server is set up to assign an MTU value, the **MTU** field is populated with that value, and the field becomes read-only.

Your web browser is automatically redirected to the new IP address for the StorageGRID Appliance Installer.

b. Confirm that the gateway is correct.



If the Client Network is enabled, the default route is displayed. The default route uses the Client Network gateway and cannot be moved to another interface while the Client Network is enabled.

c. If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.

## Related information

[Changing the link configuration of the E5700SG controller](#)

### Verifying network connections

You should confirm you can access the StorageGRID networks you are using from the appliance. To validate routing through network gateways, you should test connectivity between the StorageGRID Appliance Installer and IP addresses on different subnets. You can also verify the MTU setting.

### Steps

1. From the menu bar of the StorageGRID Appliance Installer, click **Configure Networking > Ping and MTU Test**.

The Ping and MTU Test page appears.

#### Ping and MTU Test

Use a ping request to check the appliance's connectivity to a remote host. Select the network you want to check connectivity through, and enter the IP address of the host you want to reach. To verify the MTU setting for the entire path through the network to the destination, select Test MTU.

#### Ping and MTU Test

Network	<input type="text" value="Grid"/>
Destination IPv4 Address or FQDN	<input type="text"/>
Test MTU	<input type="checkbox"/>
<b>Test Connectivity</b>	

2. From the **Network** drop-down box, select the network you want to test: Grid, Admin, or Client.

3. Enter the IPv4 address or fully qualified domain name (FQDN) for a host on that network.

For example, you might want to ping the gateway on the network or the primary Admin Node.

4. Optionally, select the **Test MTU** check box to verify the MTU setting for the entire path through the network to the destination.

For example, you can test the path between the appliance node and a node at a different site.

5. Click **Test Connectivity**.

If the network connection is valid, the "Ping test passed" message appears, with the ping command output listed.

### Ping and MTU Test

Use a ping request to check the appliance's connectivity to a remote host. Select the network you want to check connectivity through, and enter the IP address of the host you want to reach. To verify the MTU setting for the entire path through the network to the destination, select Test MTU.

#### Ping and MTU Test

Network	<input type="text" value="Grid"/> <input type="button" value="▼"/>
Destination IPv4 Address or FQDN	<input type="text" value="10.96.104.223"/>
Test MTU	<input checked="" type="checkbox"/>
<input type="button" value="Test Connectivity"/>	
Ping test passed	
Ping command output	
<pre>PING 10.96.104.223 (10.96.104.223) 1472(1500) bytes of data. 1480 bytes from 10.96.104.223: icmp_seq=1 ttl=64 time=0.318 ms  --- 10.96.104.223 ping statistics --- 1 packets transmitted, 1 received, 0% packet loss, time 0ms rtt min/avg/max/mdev = 0.318/0.318/0.318/0.000 ms  Found MTU 1500 for 10.96.104.223 via br0</pre>	

### Related information

[Configuring network links \(SG5700\)](#)

[Changing the MTU setting](#)

[Verifying port-level network connections](#)

To ensure that access between the StorageGRID Appliance Installer and other nodes is

not obstructed by firewalls, confirm that the StorageGRID Appliance Installer can connect to a specific TCP port or set of ports at the specified IP address or range of addresses.

## About this task

Using the list of ports provided in the StorageGRID Appliance Installer, you can test the connectivity between the appliance and the other nodes in your Grid Network.

Additionally, you can test connectivity on the Admin and Client Networks and on UDP ports, such as those used for external NFS or DNS servers. For a list of these ports, see the port reference in the StorageGRID networking guidelines.



The Grid Network ports listed in the port connectivity table are valid only for StorageGRID version 11.5.0. To verify which ports are correct for each node type, you should always consult the networking guidelines for your version of StorageGRID.

## Steps

1. From the StorageGRID Appliance Installer, click **Configure Networking > Port Connectivity Test (nmap)**.

The Port Connectivity Test page appears.

The port connectivity table lists node types that require TCP connectivity on the Grid Network. For each node type, the table lists the Grid Network ports that should be accessible to your appliance.

The following node types require TCP connectivity on the Grid Network.

Node Type	Grid Network Ports
Admin Node	22,80,443,1504,1505,1506,1508,7443,9999
Storage Node without ADC	22,1139,1502,1506,1511,7001,9042,9999,18002,18017,18019,18082,18083,18200
Storage Node with ADC	22,1139,1501,1502,1506,1511,7001,9042,9999,18000,18001,18002,18003,18017,18019,18082,18083,18200,19000
API Gateway	22,1506,1507,9999
Archive Node	22,1506,1509,9999,11139

You can test the connectivity between the appliance ports listed in the table and the other nodes in your Grid Network.

2. From the **Network** drop-down, select the network you want to test: **Grid**, **Admin**, or **Client**.
3. Specify a range of IPv4 addresses for the hosts on that network.

For example, you might want to probe the gateway on the network or the primary Admin Node.

Specify a range using a hyphen, as shown in the example.

4. Enter a TCP port number, a list of ports separated by commas, or a range of ports.

The following node types require TCP connectivity on the Grid Network.

Node Type	Grid Network Ports
Admin Node	22,80,443,1504,1505,1506,1508,7443,9999
Storage Node without ADC	22,1139,1502,1506,1511,7001,9042,9999,18002,18017,18019,18082,18083,18200
Storage Node with ADC	22,1139,1501,1502,1506,1511,7001,9042,9999,18000,18001,18002,18003,18017,18019,18082,18083,18200,19000
API Gateway	22,1506,1507,9999
Archive Node	22,1506,1509,9999,11139

#### Port Connectivity Test

Network

IPv4 Address Ranges

Port Ranges

Protocol  TCP  UDP

#### 5. Click Test Connectivity.

- If the selected port-level network connections are valid, the “Port connectivity test passed” message appears in a green banner. The nmap command output is listed below the banner.

Port connectivity test passed

Nmap command output. Note: Unreachable hosts will not appear in the output.

```
# Nmap 7.70 scan initiated Fri Nov 13 18:32:03 2020 as: /usr/bin/nmap -n -oN - -e br0 -p 22,2022 10.224.6.160-161
Nmap scan report for 10.224.6.160
Host is up (0.00072s latency).

PORT      STATE SERVICE
22/tcp    open  ssh
2022/tcp  open  down

Nmap scan report for 10.224.6.161
Host is up (0.00060s latency).

PORT      STATE SERVICE
22/tcp    open  ssh
2022/tcp  open  down

# Nmap done at Fri Nov 13 18:32:04 2020 -- 2 IP addresses (2 hosts up) scanned in 0.55 seconds
```

- If a port-level network connection is made to the remote host, but the host is not listening on one or more of the selected ports, the “Port connectivity test failed” message appears in a yellow banner. The nmap command output is listed below the banner.

Any remote port the host is not listening to has a state of “closed.” For example, you might see this yellow banner when the node you are trying to connect to is in a pre-installed state and the StorageGRID NMS service is not yet running on that node.

 Port connectivity test failed  
Connection not established. Services might not be listening on target ports.

Nmap command output. Note: Unreachable hosts will not appear in the output.

```
# Nmap 7.70 scan initiated Sat May 16 17:07:02 2020 as: /usr/bin/nmap -n -oN - -e br0 -p 22,80,443,1504,1505,1506,1508,7443,9999
Nmap scan report for 172.16.4.71
Host is up (0.00020s latency).

PORT      STATE    SERVICE
22/tcp    open     ssh
80/tcp    open     http
443/tcp   open     https
1504/tcp  closed   evb-elm
1505/tcp  open     funkproxy
1506/tcp  open     utcd
1508/tcp  open     diagmond
7443/tcp  open     oracleas-https
9999/tcp  open     abyss
MAC Address: 00:50:56:87:39:AE (VMware)

# Nmap done at Sat May 16 17:07:03 2020 -- 1 IP address (1 host up) scanned in 0.59 seconds
```

- If a port-level network connection cannot be made for one or more selected ports, the “Port connectivity test failed” message appears in a red banner. The nmap command output is listed below the banner.

The red banner indicates that a TCP connection attempt to a port on the remote host was made, but nothing was returned to the sender. When no response is returned, the port has a state of “filtered” and is likely blocked by a firewall.



Ports with “closed” are also listed.

 Port connectivity test failed  
Connection failed to one or more ports.

Nmap command output. Note: Unreachable hosts will not appear in the output.

```
# Nmap 7.70 scan initiated Sat May 16 17:11:01 2020 as: /usr/bin/nmap -n -oN - -e br0 -p 22,79,80,443,1504,1505,1506,1508,7443,9999 172.16.4.71
Nmap scan report for 172.16.4.71
Host is up (0.00029s latency).

PORT      STATE    SERVICE
22/tcp    open     ssh
79/tcp    filtered finger
80/tcp    open     http
443/tcp   open     https
1504/tcp  closed   evb-elm
1505/tcp  open     funkproxy
1506/tcp  open     utcd
1508/tcp  open     diagmond
7443/tcp  open     oracleas-https
9999/tcp  open     abyss
MAC Address: 00:50:56:87:39:AE (VMware)

# Nmap done at Sat May 16 17:11:02 2020 -- 1 IP address (1 host up) scanned in 1.60 seconds
```

## Related information

[Network guidelines](#)

## Accessing and Configuring SANtricity System Manager

You can use SANtricity System Manager to monitor the status of the storage controllers, storage disks, and other hardware components in the storage controller shelf. You can

also configure a proxy for E-Series AutoSupport that enables you to send AutoSupport messages from the appliance without the use of the management port.

#### Setting up and Accessing SANtricity System Manager

You might need to access SANtricity System Manager on the storage controller to monitor the hardware in the storage controller shelf or to configure E-Series AutoSupport.

#### What you'll need

- You are using a supported web browser.
- To access SANtricity System Manager through Grid Manager, you must have installed StorageGRID, and you must have the Storage Appliance Administrator permission or Root Access permission.
- To access SANtricity System Manager using the StorageGRID Appliance Installer, you must have the SANtricity System Manager administrator username and password.
- To access SANtricity System Manager directly using a web browser, you must have the SANtricity System Manager administrator username and password.



You must have SANtricity firmware 8.70 or higher to access SANtricity System Manager using the Grid Manager or the StorageGRID Appliance Installer. You can check your firmware version by using the StorageGRID Appliance Installer and selecting **Help > About**.



Accessing SANtricity System Manager from the Grid Manager or from the Appliance Installer is generally meant only for monitoring your hardware and configuring E-Series AutoSupport. Many features and operations within SANtricity System Manager such as upgrading firmware do not apply to monitoring your StorageGRID appliance. To avoid issues, always follow the hardware installation and maintenance instructions for your appliance.

#### About this task

There are three ways to access SANtricity System Manager, depending upon what stage of the installation and configuration process you are in:

- If the appliance has not yet been deployed as a node in your StorageGRID system, you should use the Advanced tab in the StorageGRID Appliance Installer.
  - Once the node is deployed, you can no longer use the StorageGRID Appliance Installer to access SANtricity System Manager.
- If the appliance has been deployed as a node in your StorageGRID system, use the SANtricity System Manager tab on the Nodes page in Grid Manager.
- If you cannot use the StorageGRID Appliance Installer or Grid Manager, you can access SANtricity System Manager directly using a web browser connected to the management port.

This procedure includes steps for your initial access to SANtricity System Manager. If you have already set up SANtricity System Manager, go to the [Configure hardware alerts](#) step.



Using either the Grid Manager or the StorageGRID Appliance Installer enables you to access SANtricity System Manager without having to configure or connect the management port of the appliance.

You use SANtricity System Manager to monitor the following:

- Performance data such as storage array level performance, I/O latency, CPU utilization, and throughput
- Hardware component status
- Support functions including viewing diagnostic data

You can use SANtricity System Manager to configure the following settings:

- Email alerts, SNMP alerts, or syslog alerts for the components in the storage controller shelf
- E-Series AutoSupport settings for the components in the storage controller shelf.

For additional details on E-Series AutoSupport, see the E-Series documentation center.

#### [NetApp E-Series Systems Documentation Site](#)

- Drive Security keys, which are needed to unlock secured drives (this step is required if the Drive Security feature is enabled)
- Administrator password for accessing SANtricity System Manager

### Steps

1. Do one of the following:
  - Use the StorageGRID Appliance Installer and select **Advanced > SANtricity System Manager**
  - Use the Grid Manager and select **Nodes > *appliance Storage Node* > SANtricity System Manager**



If these options are not available or the login page does not appear, you must use the IP address of the storage controller. Access SANtricity System Manager by browsing to the storage controller IP:

**`https://Storage_Controller_IP`**

The login page for SANtricity System Manager appears.

2. Set or enter the administrator password.



SANtricity System Manager uses a single administrator password that is shared among all users.

The Set Up wizard appears.

## Set Up SANtricity® System Manager



More (10 total) >

1 Welcome

2 Verify Hardware

3 Verify Hosts

4 Select Applications

5 Define Workloads

6 Ac

Welcome to the SANtricity® System Manager! With System Manager, you can...

- Configure your storage array and set up alerts.
- Monitor and troubleshoot any problems when they occur.
- Keep track of how your system is performing in real time.

Cancel

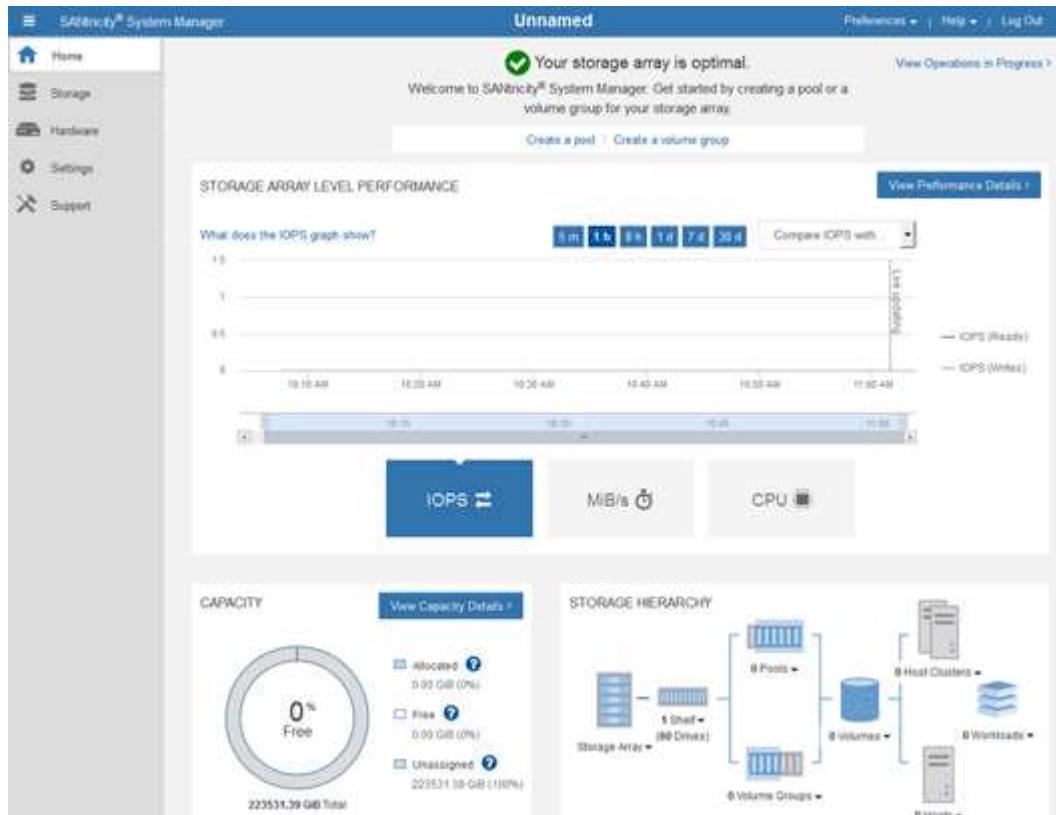
Next >

3. Select **Cancel** to close the wizard.



Do not complete the Set Up wizard for a StorageGRID appliance.

The SANtricity System Manager home page appears.



4. Configure hardware alerts.

- a. Select **Help** to access the online help for SANtricity System Manager.
- b. Use the **Settings > Alerts** section of the online help to learn about alerts.
- c. Follow the "How To" instructions to set up email alerts, SNMP alerts, or syslog alerts.

5. Manage AutoSupport for the components in the storage controller shelf.

- a. Select **Help** to access the online help for SANtricity System Manager.
- b. Use the **Support > Support Center** section of the online help to learn about the AutoSupport feature.
- c. Follow the "How To" instructions to manage AutoSupport.

For specific instructions on configuring a StorageGrid proxy for sending E-Series AutoSupport messages without using the management port, go to the instructions for administering StorageGRID and search for "proxy settings for E-Series AutoSupport."

#### [Administer StorageGRID](#)

6. If the Drive Security feature is enabled for the appliance, create and manage the security key.
  - a. Select **Help** to access the online help for SANtricity System Manager.
  - b. Use the **Settings > System > Security key management** section of the online help to learn about Drive Security.
  - c. Follow the "How To" instructions to create and manage the security key.
7. Optionally, change the administrator password.
  - a. Select **Help** to access the online help for SANtricity System Manager.
  - b. Use the **Home > Storage array administration** section of the online help to learn about the administrator password.
  - c. Follow the "How To" instructions to change the password.

#### **Reviewing the hardware status in SANtricity System Manager**

You can use SANtricity System Manager to monitor and manage the individual hardware components in the storage controller shelf and to review hardware diagnostic and environmental information, such as component temperatures, as well as issues related to the drives.

#### **What you'll need**

- You are using a supported web browser.
- To access SANtricity System Manager through Grid Manager, you must have the Storage Appliance Administrator permission or Root Access permission.
- To access SANtricity System Manager using the StorageGRID Appliance Installer, you must have the SANtricity System Manager administrator username and password.
- To access SANtricity System Manager directly using a web browser, you must have the SANtricity System Manager administrator username and password.



You must have SANtricity firmware 8.70 or higher to access SANtricity System Manager using the Grid Manager or the StorageGRID Appliance Installer.



Accessing SANtricity System Manager from the Grid Manager or from the Appliance Installer is generally meant only for monitoring your hardware and configuring E-Series AutoSupport. Many features and operations within SANtricity System Manager such as upgrading firmware do not apply to monitoring your StorageGRID appliance. To avoid issues, always follow the hardware installation and maintenance instructions for your appliance.

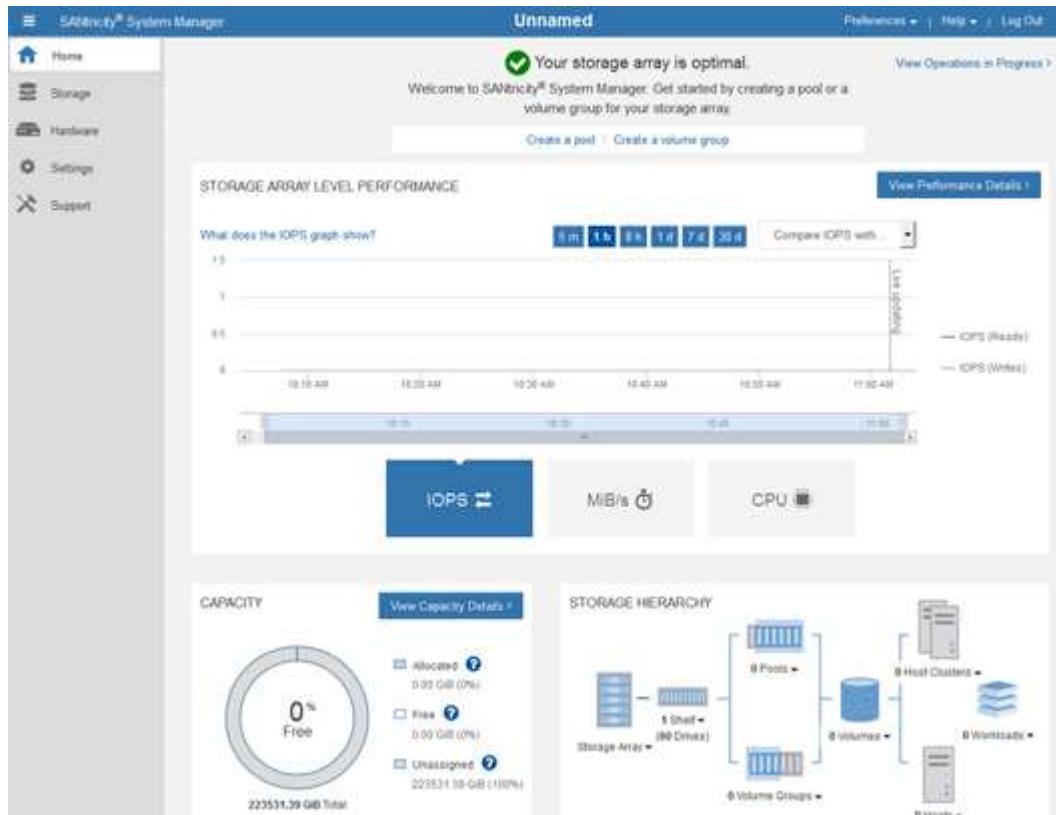
## Steps

1. Access SANtricity System Manager.

### Setting up and Accessing SANtricity System Manager

2. Enter the administrator username and password if required.
3. Click **Cancel** to close the Set Up wizard and to display the SANtricity System Manager home page.

The SANtricity System Manager home page appears. In SANtricity System Manager, the controller shelf is referred to as a storage array.



4. Review the information displayed for appliance hardware and confirm that all hardware components have a status of Optimal.
  - a. Click the **Hardware** tab.
  - b. Click **Show back of shelf**.

## HARDWARE

[Learn More >](#)

[Legend ▾](#)

Show status icon details 

Controller Shelf 99 ▾ |     

[Show front of shelf](#)



From the back of the shelf, you can view both storage controllers, the battery in each storage controller, the two power canisters, the two fan canisters, and expansion shelves (if any). You can also view component temperatures.

- c. To see the settings for each storage controller, select the controller, and select **View settings** from the context menu.
- d. To see the settings for other components in the back of the shelf, select the component you want to view.
- e. Click **Show front of shelf**, and select the component you want to view.

From the front of the shelf, you can view the drives and the drive drawers for the storage controller shelf or the expansion shelves (if any).

If the status of any component is Needs Attention, follow the steps in the Recovery Guru to resolve the issue or contact technical support.

### Setting the IP addresses for the storage controllers using the StorageGRID Appliance Installer

Management port 1 on each storage controller connects the appliance to the management network for SANtricity System Manager. If you cannot access to the SANtricity System Manager from the StorageGRID Appliance Installer, you must set a static IP address for each storage controller to ensure that you do not lose your management connection to the hardware and the controller firmware in the controller shelf.

#### What you'll need

- You are using any management client that can connect to the StorageGRID Admin Network, or you have a service laptop.
- The client or service laptop has a supported web browser.

## About this task

DHCP-assigned addresses can change at any time. Assign static IP addresses to the controllers to ensure consistent accessibility.



Follow this procedure only if you do not have access to SANtricity System Manager from the StorageGRID Appliance Installer (**Advanced > SANtricity System Manager**) or Grid Manager (**Nodes > SANtricity System Manager**).

## Steps

1. From the client, enter the URL for the StorageGRID Appliance Installer:

**`https://Appliance_Controller_IP:8443`**

For `Appliance_Controller_IP`, use the IP address for the appliance on any StorageGRID network.

The StorageGRID Appliance Installer Home page appears.

2. Select **Configure Hardware > Storage Controller Network Configuration**.

The Storage Controller Network Configuration page appears.

3. Depending on your network configuration, select **Enabled** for IPv4, IPv6, or both.
4. Make a note of the IPv4 address that is automatically displayed.

DHCP is the default method for assigning an IP address to the storage controller management port.



It might take a few minutes for the DHCP values to appear.

IPv4 Address Assignment	<input type="radio"/> Static <input checked="" type="radio"/> DHCP
IPv4 Address (CIDR)	10.224.5.166/21
Default Gateway	10.224.0.1

5. Optionally, set a static IP address for the storage controller management port.



You should either assign a static IP for the management port or assign a permanent lease for the address on the DHCP server.

- a. Select **Static**.
- b. Enter the IPv4 address, using CIDR notation.
- c. Enter the default gateway.

IPv4 Address Assignment  Static  DHCP

IPv4 Address (CIDR)	10.224.2.200/21
Default Gateway	10.224.0.1

d. Click **Save**.

It might take a few minutes for your changes to be applied.

When you connect to SANtricity System Manager, you will use the new static IP address as the URL:  
**[https://Storage\\_Controller\\_IP](https://Storage_Controller_IP)**

#### Optional: Enabling node encryption

If you enable node encryption, the disks in your appliance can be protected by secure key management server (KMS) encryption against physical loss or removal from the site. You must select and enable node encryption during appliance installation and cannot unselect node encryption once the KMS encryption process starts.

#### What you'll need

Review the information about KMS in the instructions for administering StorageGRID.

#### About this task

An appliance that has node encryption enabled connects to the external key management server (KMS) that is configured for the StorageGRID site. Each KMS (or KMS cluster) manages the encryption keys for all appliance nodes at the site. These keys encrypt and decrypt the data on each disk in an appliance that has node encryption enabled.

A KMS can be set up in Grid Manager before or after the appliance is installed in StorageGRID. See the information about KMS and appliance configuration in the instructions for administering StorageGRID for additional details.

- If a KMS is set up before installing the appliance, KMS-controlled encryption begins when you enable node encryption on the appliance and add it to a StorageGRID site where KMS is configured.
- If a KMS is not set up before you install the appliance, KMS-controlled encryption is performed on each appliance that has node encryption enabled as soon as a KMS is configured and available for the site that contains the appliance node.



Any data that exists before an appliance that has node encryption enabled connects to the configured KMS is encrypted with a temporary key that is not secure. The appliance is not protected from removal or theft until the key is set to a value provided by the KMS.

Without the KMS key needed to decrypt the disk, data on the appliance cannot be retrieved and is effectively lost. This is the case whenever the decryption key cannot be retrieved from the KMS. The key becomes inaccessible if a customer clears the KMS configuration, a KMS key expires, connection to the KMS is lost, or the appliance is removed from the StorageGRID system where its KMS keys are installed.

#### Steps

1. Open a browser, and enter one of the IP addresses for the appliance's compute controller.

**[https://Controller\\_IP:8443](https://Controller_IP:8443)**

*Controller\_IP* is the IP address of the compute controller (not the storage controller) on any of the three StorageGRID networks.

The StorageGRID Appliance Installer Home page appears.



After the appliance has been encrypted with a KMS key, the appliance disks cannot be decrypted without using the same KMS key.

2. Select **Configure Hardware > Node Encryption**.

NetApp® StorageGRID® Appliance Installer

Home Configure Networking ▾ Configure Hardware ▾ Monitor Installation Advanced ▾

Help ▾

**Node Encryption**

Node encryption allows you to use an external key management server (KMS) to encrypt all StorageGRID data on this appliance. If node encryption is enabled for the appliance and a KMS is configured for the site, you cannot access any data on the appliance unless the appliance can communicate with the KMS.

**Encryption Status**

**⚠** You can only enable node encryption for an appliance during installation. You cannot enable or disable the node encryption setting after the appliance is installed.

Enable node encryption

**Save**

**Key Management Server Details**

3. Select **Enable node encryption**.

You can unselect **Enable node encryption** without risk of data loss until you select **Save** and the appliance node accesses the KMS encryption keys in your StorageGRID system and begins disk encryption. You are not able to disable node encryption after the appliance is installed.



After you add an appliance that has node encryption enabled to a StorageGRID site that has a KMS, you cannot stop using KMS encryption for the node.

4. Select **Save**.

5. Deploy the appliance as a node in your StorageGRID system.

KMS-controlled encryption begins when the appliance accesses the KMS keys configured for your StorageGRID site. The installer displays progress messages during the KMS encryption process, which might take a few minutes depending on the number of disk volumes in the appliance.



Appliances are initially configured with a random non-KMS encryption key assigned to each disk volume. The disks are encrypted using this temporary encryption key, that is not secure, until the appliance that has node encryption enabled accesses the KMS keys configured for your StorageGRID site.

## After you finish

You can view node-encryption status, KMS details, and the certificates in use when the appliance node is in

maintenance mode.

## Related information

[Administer StorageGRID](#)

[Monitoring node encryption in maintenance mode](#)

### Optional: Changing the RAID mode (SG5760 only)

If you have an SG5760 with 60 drives, you can change to a different RAID mode to accommodate your storage and recovery requirements. You can only change the mode before deploying the StorageGRID appliance Storage Node.

#### What you'll need

- You have an SG5760. If you have an SG5712, you must use DDP mode.
- You are using any client that can connect to StorageGRID.
- The client has a supported web browser.

#### About this task

Before deploying the SG5760 appliance as a Storage Node, you can choose one of the following volume configuration options:

- **DDP:** This mode uses two parity drives for every eight data drives. This is the default and recommended mode for all appliances. When compared to RAID6, DDP delivers better system performance, reduced rebuild times after drive failures, and ease of management. DDP also provides drawer loss protection in 60-drive appliances.
- **DDP16:** This mode uses two parity drives for every 16 data drives, which results in higher storage efficiency compared to DDP. When compared to RAID6, DDP16 delivers better system performance, reduced rebuild times after drive failures, ease of management, and comparable storage efficiency. To use DDP16 mode, your configuration must contain at least 20 drives. DDP16 does not provide drawer loss protection.
- **RAID6:** This mode uses two parity drives for every 16 or more data drives. To use RAID 6 mode, your configuration must contain at least 20 drives. Although RAID6 can increase storage efficiency of the appliance when compared to DDP, it is not recommended for most StorageGRID environments.

 If any volumes have already been configured or if StorageGRID was previously installed, changing the RAID mode causes the volumes to be removed and replaced. Any data on those volumes will be lost.

#### Steps

1. Using the service laptop, open a web browser and access the StorageGRID Appliance Installer:  
[https://E5700SG\\_Controller\\_IP:8443](https://E5700SG_Controller_IP:8443)  
Where *E5700SG\_Controller\_IP* is any of the IP addresses for the E5700SG controller.
2. Select **Advanced > RAID Mode**.
3. On the **Configure RAID Mode** page, select the desired RAID mode from the Mode drop-down list.
4. Click **Save**.

## Related information

## Optional: Remapping network ports for the appliance

You might need to remap the internal ports on the appliance Storage Node to different external ports. For example, you might need to remap ports because of a firewall issue.

### What you'll need

- You have previously accessed the StorageGRID Appliance Installer.
- You have not configured and do not plan to configure load balancer endpoints.



If you remap any ports, you cannot use the same ports to configure load balancer endpoints. If you want to configure load balancer endpoints and have already remapped ports, follow the steps in the recovery and maintenance instructions for removing port remaps.

### Steps

1. From the menu bar of the StorageGRID Appliance Installer, click **Configure Networking > Remap Ports**.  
The Remap Port page appears.
2. From the **Network** drop-down box, select the network for the port you want to remap: Grid, Admin, or Client.
3. From the **Protocol** drop-down box, select the IP protocol: TCP or UDP.
4. From the **Remap Direction** drop-down box, select which traffic direction you want to remap for this port: Inbound, Outbound, or Bi-directional.
5. For **Original Port**, enter the number of the port you want to remap.
6. For **Mapped-To Port**, enter the number of the port you want to use instead.
7. Click **Add Rule**.

The new port mapping is added to the table, and the remapping takes effect immediately.

### Remap Ports

If required, you can remap the internal ports on the appliance Storage Node to different external ports. For example, you might need to remap ports because of a firewall issue.

Network	Protocol	Remap Direction	Original Port	Mapped-To Port
Grid	TCP	Bi-directional	1800	1801

8. To remove a port mapping, select the radio button for the rule you want to remove, and click **Remove Selected Rule**.

## Deploying an appliance Storage Node

After installing and configuring the storage appliance, you can deploy it as a Storage Node in a StorageGRID system. When you deploy an appliance as a Storage Node, you use the StorageGRID Appliance Installer included on the appliance.

### What you'll need

- If you are cloning an appliance node, continue following the process in recovery and maintenance.

#### Maintain & recover

- The appliance has been installed in a rack or cabinet, connected to your networks, and powered on.
- Network links, IP addresses, and port remapping (if necessary) have been configured for the appliance using the StorageGRID Appliance Installer.
- You know one of the IP addresses assigned to the appliance's compute controller. You can use the IP address for any attached StorageGRID network.
- The primary Admin Node for the StorageGRID system has been deployed.
- All Grid Network subnets listed on the IP Configuration page of the StorageGRID Appliance Installer have been defined in the Grid Network Subnet List on the primary Admin Node.
- You have a service laptop with a supported web browser.

### About this task

Each storage appliance functions as a single Storage Node. Any appliance can connect to the Grid Network, the Admin Network, and the Client Network.

To deploy an appliance Storage Node in a StorageGRID system, you access the StorageGRID Appliance Installer and perform the following steps:

- You specify or confirm the IP address of the primary Admin Node and the name of the Storage Node.
- You start the deployment and wait as volumes are configured and the software is installed.
- When the installation pauses partway through the appliance installation tasks, you resume the installation by signing into the Grid Manager, approving all grid nodes, and completing the StorageGRID installation and deployment processes.



If you need to deploy multiple appliance nodes at one time, you can automate the installation process by using the `configure-sga.py` Appliance Installation script.

- If you are performing an expansion or recovery operation, follow the appropriate instructions:
  - To add an appliance Storage Node to an existing StorageGRID system, see the instructions for expanding a StorageGRID system.
  - To deploy an appliance Storage Node as part of a recovery operation, see instructions for recovery and maintenance.

### Steps

1. Open a browser, and enter one of the IP addresses for the appliance's compute controller.

**[https://Controller\\_IP:8443](https://Controller_IP:8443)**

The StorageGRID Appliance Installer Home page appears.

NetApp® StorageGRID® Appliance Installer

Home	Configure Networking ▾	Configure Hardware ▾	Monitor Installation	Advanced ▾
------	------------------------	----------------------	----------------------	------------

## Home

ⓘ The installation is ready to be started. Review the settings below, and then click Start Installation.

### Primary Admin Node connection

Enable Admin Node discovery

Primary Admin Node IP

Connection state Connection to 172.16.4.210 ready

### Node name

Node name

### Installation

Current state Ready to start installation of NetApp-SGA into grid with Admin Node 172.16.4.210.

2. In the **Primary Admin Node connection** section, determine whether you need to specify the IP address for the primary Admin Node.

If you have previously installed other nodes in this data center, the StorageGRID Appliance Installer can discover this IP address automatically, assuming the primary Admin Node, or at least one other grid node with ADMIN\_IP configured, is present on the same subnet.

3. If this IP address is not shown or you need to change it, specify the address:

Option	Description
Manual IP entry	<ol style="list-style-type: none"> <li>Unselect the <b>Enable Admin Node discovery</b> check box.</li> <li>Enter the IP address manually.</li> <li>Click <b>Save</b>.</li> <li>Wait for the connection state for the new IP address to become ready.</li> </ol>
Automatic discovery of all connected primary Admin Nodes	<ol style="list-style-type: none"> <li>Select the <b>Enable Admin Node discovery</b> check box.</li> <li>Wait for the list of discovered IP addresses to be displayed.</li> <li>Select the primary Admin Node for the grid where this appliance Storage Node will be deployed.</li> <li>Click <b>Save</b>.</li> <li>Wait for the connection state for the new IP address to become ready.</li> </ol>

4. In the **Node name** field, enter the name you want to use for this appliance node, and click **Save**.

The node name is assigned to this appliance node in the StorageGRID system. It is shown on the Nodes page (Overview tab) in the Grid Manager. If required, you can change the name when you approve the node.

5. In the **Installation** section, confirm that the current state is "Ready to start installation of *node name* into grid with primary Admin Node *admin\_ip*" and that the **Start Installation** button is enabled.

If the **Start Installation** button is not enabled, you might need to change the network configuration or port settings. For instructions, see the installation and maintenance instructions for your appliance.



If you are deploying the Storage Node appliance as a node cloning target, stop the deployment process here and continue the node cloning procedure in [Maintain & recover](#).

6. From the StorageGRID Appliance Installer home page, click **Start Installation**.

The Current state changes to "Installation is in progress," and the Monitor Installation page is displayed.



If you need to access the Monitor Installation page manually, click **Monitor Installation**.

7. If your grid includes multiple appliance Storage Nodes, repeat these steps for each appliance.



If you need to deploy multiple appliance Storage Nodes at one time, you can automate the installation process by using the `configure-sga.py` Appliance Installation script. This script applies only to Storage Nodes.

## Related information

[Expand your grid](#)

[Maintain & recover](#)

## Monitoring the storage appliance installation

The StorageGRID Appliance Installer provides status until installation is complete. When the software installation is complete, the appliance is rebooted.

### Steps

1. To monitor the installation progress, click **Monitor Installation**.

The Monitor Installation page shows the installation progress.

Monitor Installation

1. Configure storage		
Step	Progress	Status
Connect to storage controller	<div style="width: 100%; background-color: green;"></div>	Complete
Clear existing configuration	<div style="width: 100%; background-color: green;"></div>	Complete
Configure volumes	<div style="width: 25%; background-color: blue;"></div>	Creating volume StorageGRID-obj-00
Configure host settings		Pending
2. Install OS		
3. Install StorageGRID		Pending
4. Finalize installation		Pending

The blue status bar indicates which task is currently in progress. Green status bars indicate tasks that have completed successfully.



The installer ensures that tasks completed in a previous install are not re-run. If you are re-running an installation, any tasks that do not need to be re-run are shown with a green status bar and a status of "Skipped."

2. Review the progress of the first two installation stages.

### 1. Configure storage

During this stage, the installer connects to the storage controller, clears any existing configuration, communicates with SANtricity software to configure volumes, and configures host settings.

### 2. Install OS

During this stage, the installer copies the base operating system image for StorageGRID to the appliance.

3. Continue monitoring the installation progress until the **Install StorageGRID** stage pauses and a message appears on the embedded console, prompting you to approve this node on the Admin Node using the Grid Manager. Go to the next step.

Home	Configure Networking ▾	Configure Hardware ▾	Monitor Installation	Advanced ▾	
------	------------------------	----------------------	----------------------	------------	--

## Monitor Installation

1. Configure storage	Complete
2. Install OS	Complete
3. Install StorageGRID	Running
4. Finalize installation	Pending

Connected (unencrypted) to: QEMU

```
/platform.type=: Device or resource busy
[2017-07-31T22:09:12.362566]    INFO -- [INSG] NOTICE: seeding /var/local with c
ontainer data
[2017-07-31T22:09:12.366205]    INFO -- [INSG] Fixing permissions
[2017-07-31T22:09:12.369633]    INFO -- [INSG] Enabling syslog
[2017-07-31T22:09:12.511533]    INFO -- [INSG] Stopping system logging: syslog-n
g.
[2017-07-31T22:09:12.570096]    INFO -- [INSG] Starting system logging: syslog-n
g.
[2017-07-31T22:09:12.576360]    INFO -- [INSG] Beginning negotiation for downloa
d of node configuration
[2017-07-31T22:09:12.581363]    INFO -- [INSG]
[2017-07-31T22:09:12.585066]    INFO -- [INSG]
[2017-07-31T22:09:12.588314]    INFO -- [INSG]
[2017-07-31T22:09:12.591851]    INFO -- [INSG]
[2017-07-31T22:09:12.594886]    INFO -- [INSG]
[2017-07-31T22:09:12.598360]    INFO -- [INSG]
[2017-07-31T22:09:12.601324]    INFO -- [INSG]
[2017-07-31T22:09:12.604759]    INFO -- [INSG]
[2017-07-31T22:09:12.607800]    INFO -- [INSG]
[2017-07-31T22:09:12.610985]    INFO -- [INSG]
[2017-07-31T22:09:12.614597]    INFO -- [INSG]
[2017-07-31T22:09:12.618282]    INFO -- [INSG] Please approve this node on the A
dmin Node GMI to proceed...
```

4. Go to the Grid Manager, approve the pending storage node, and complete the StorageGRID installation process.

When you click **Install** from the Grid Manager, Stage 3 completes and stage 4, **Finalize Installation**, begins. When stage 4 completes, the controller is rebooted.

## Automating appliance installation and configuration

You can automate the installation and configuration of your appliances and configuration of the whole StorageGRID system.

### About this task

Automating installation and configuration can be useful for deploying multiple StorageGRID instances or one large, complex StorageGRID instance.

To automate installation and configuration, use one or more of the following options:

- Create a JSON file that specifies the configuration settings for your appliances. Upload the JSON file using the StorageGRID Appliance Installer.



You can use the same file to configure more than one appliance.

- Use the `StorageGRIDconfigure-sga.py` Python script to automate the configuration of your appliances.
- Use additional Python scripts to configure other components of the whole StorageGRID system (the "grid").



You can use StorageGRID automation Python scripts directly, or you can use them as examples of how to use the StorageGRID Installation REST API in grid deployment and configuration tools you develop yourself. See the information about downloading and extracting the StorageGRID installation files in the Recovery and Maintenance instructions.

## Automating appliance configuration using the StorageGRID Appliance Installer

You can automate the configuration of an appliance by using a JSON file that contains the configuration information. You upload the file using the StorageGRID Appliance Installer.

### What you'll need

- Your appliance must be on the latest firmware compatible with StorageGRID 11.5 or higher.
- You must be connected to the StorageGRID Appliance Installer on the appliance you are configuring using a supported browser.

### About this task

You can automate appliance configuration tasks such as configuring the following:

- Grid Network, Admin Network, and Client Network IP addresses
- BMC interface
- Network links
  - Port bond mode
  - Network bond mode
  - Link speed

Configuring your appliance using an uploaded JSON file is often more efficient than performing the configuration manually using multiple pages in the StorageGRID Appliance Installer, especially if you have to configure many nodes. You must apply the configuration file for each node one at a time.



Experienced users who want to automate both the installation and configuration of their appliances can use the `configure-sga.py` script.

[Automating installation and configuration of appliance nodes using the configure-sga.py script](#)

### Steps

1. Generate the JSON file using one of the following methods:

- The ConfigBuilder application

[ConfigBuilder.netapp.com](https://ConfigBuilder.netapp.com)

- The `configure-sga.py` appliance configuration script. You can download the script from StorageGRID Appliance Installer (**Help > Appliance Configuration Script**). See the instructions on automating the configuration using the `configure-sga.py` script.

[Automating installation and configuration of appliance nodes using the `configure-sga.py` script](#)

The node names in the JSON file must follow these requirements:

- Must be a valid hostname containing at least 1 and no more than 32 characters
- Can use letters, numbers, and hyphens are allowed
- Cannot start or end with a hyphen or contain only numbers



Ensure that the node names (the top-level names) in the JSON file are unique, or you will not be able to configure more than one node using the JSON file.

2. Select **Advanced > Update Appliance Configuration**.

The Update Appliance Configuration page appears.

### Update Appliance Configuration

Use a JSON file to update this appliance's configuration. You can generate the JSON file from the [ConfigBuilder](#) application or from the [appliance configuration script](#).

**⚠** You might lose your connection if the applied configuration from the JSON file includes "link\_config" and/or "networks" sections. If you are not reconnected within 1 minute, re-enter the URL using one of the other IP addresses assigned to the appliance.

#### Upload JSON

JSON configuration	<input type="button" value="Browse"/>
Node name	<input type="button" value="-- Upload a file ▾"/>
<input type="button" value="Apply JSON configuration"/>	

3. Select the JSON file with the configuration you want to upload.

- Select **Browse**.
- Locate and select the file.
- Select **Open**.

The file is uploaded and validated. When the validation process is complete, the file name is shown

next to a green check mark.



You might lose connection to the appliance if the configuration from the JSON file includes sections for "link\_config", "networks", or both. If you are not reconnected within 1 minute, re-enter the appliance URL using one of the other IP addresses assigned to the appliance.

#### Upload JSON

JSON configuration	<input type="button" value="Browse"/> <span>✓ appliances.orig.json</span>
Node name	-- Select a node ▾
<input type="button" value="Apply JSON configuration"/>	

The **Node name** drop down is populated with the top-level node names defined in the JSON file.



If the file is not valid, the file name is shown in red and an error message is displayed in a yellow banner. The invalid file is not applied to the appliance. You can use ConfigBuilder to ensure you have a valid JSON file.

4. Select a node from the list in the **Node name** drop down.

The **Apply JSON configuration** button is enabled.

#### Upload JSON

JSON configuration	<input type="button" value="Browse"/> <span>✓ appliances.orig.json</span>
Node name	Lab-80-1000 ▾
<input type="button" value="Apply JSON configuration"/>	

5. Select **Apply JSON configuration**.

The configuration is applied to the selected node.

### Automating installation and configuration of appliance nodes using the `configure-sga.py` script

You can use the `configure-sga.py` script to automate many of the installation and configuration tasks for StorageGRID appliance nodes, including installing and configuring a primary Admin Node. This script can be useful if you have a large number of appliances to configure. You can also use the script to generate a JSON file that contains appliance configuration information.

## About this task

- The appliance has been installed in a rack, connected to your networks, and powered on.
- Network links and IP addresses have been configured for the primary Admin Node using the StorageGRID Appliance Installer.
- If you are installing the primary Admin Node, you know its IP address.
- If you are installing and configuring other nodes, the primary Admin Node has been deployed, and you know its IP address.
- For all nodes other than the primary Admin Node, all Grid Network subnets listed on the IP Configuration page of the StorageGRID Appliance Installer have been defined in the Grid Network Subnet List on the primary Admin Node.
- You have downloaded the `configure-sga.py` file. The file is included in the installation archive, or you can access it by clicking **Help > Appliance Installation Script** in the StorageGRID Appliance Installer.

This procedure is for advanced users with some experience using command-line interfaces.



Alternatively, you can also use the StorageGRID Appliance Installer to automate the configuration.

[Automating appliance configuration using the StorageGRID Appliance Installer](#)

## Steps

1. Log in to the Linux machine you are using to run the Python script.
2. For general help with the script syntax and to see a list of the available parameters, enter the following:

```
configure-sga.py --help
```

The `configure-sga.py` script uses five subcommands:

- `advanced` for advanced StorageGRID appliance interactions, including BMC configuration and creating a JSON file containing the current configuration of the appliance
- `configure` for configuring the RAID mode, node name, and networking parameters
- `install` for starting a StorageGRID installation
- `monitor` for monitoring a StorageGRID installation
- `reboot` for rebooting the appliance

If you enter a subcommand (advanced, configure, install, monitor, or reboot) argument followed by the `--help` option you will get a different help text providing more detail on the options available within that subcommand:

```
configure-sga.py subcommand --help
```

3. To confirm the current configuration of the appliance node, enter the following where `SGA-install-ip` is any one of the IP addresses for the appliance node:

```
configure-sga.py configure SGA-INSTALL-IP
```

The results show current IP information for the appliance, including the IP address of the primary Admin Node and information about the Admin, Grid, and Client Networks.

```
Connecting to +https://10.224.2.30:8443+ (Checking version and
```

```
connectivity.)  
2021/02/25 16:25:11: Performing GET on /api/versions... Received 200  
2021/02/25 16:25:11: Performing GET on /api/v2/system-info... Received  
200  
2021/02/25 16:25:11: Performing GET on /api/v2/admin-connection...  
Received 200  
2021/02/25 16:25:11: Performing GET on /api/v2/link-config... Received  
200  
2021/02/25 16:25:11: Performing GET on /api/v2/networks... Received 200  
2021/02/25 16:25:11: Performing GET on /api/v2/system-config... Received  
200
```

#### StorageGRID Appliance

```
Name: LAB-SGA-2-30  
Node type: storage
```

#### StorageGRID primary Admin Node

```
IP: 172.16.1.170  
State: unknown  
Message: Initializing...  
Version: Unknown
```

#### Network Link Configuration

##### Link Status

Link	State	Speed (Gbps)
1	Up	10
2	Up	10
3	Up	10
4	Up	10
5	Up	1
6	Down	N/A

##### Link Settings

```
Port bond mode: FIXED  
Link speed: 10GBE
```

```
Grid Network: ENABLED  
Bonding mode: active-backup  
VLAN: novlan  
MAC Addresses: 00:a0:98:59:8e:8a 00:a0:98:59:8e:82
```

```
Admin Network: ENABLED  
Bonding mode: no-bond  
MAC Addresses: 00:80:e5:29:70:f4
```

```
Client Network:      ENABLED
Bonding mode:       active-backup
VLAN:               novlan
MAC Addresses:      00:a0:98:59:8e:89  00:a0:98:59:8e:81
```

#### Grid Network

```
CIDR:      172.16.2.30/21 (Static)
MAC:       00:A0:98:59:8E:8A
Gateway:   172.16.0.1
Subnets:   172.17.0.0/21
           172.18.0.0/21
           192.168.0.0/21
MTU:       1500
```

#### Admin Network

```
CIDR:      10.224.2.30/21 (Static)
MAC:       00:80:E5:29:70:F4
Gateway:   10.224.0.1
Subnets:   10.0.0.0/8
           172.19.0.0/16
           172.21.0.0/16
MTU:       1500
```

#### Client Network

```
CIDR:      47.47.2.30/21 (Static)
MAC:       00:A0:98:59:8E:89
Gateway:   47.47.0.1
MTU:       2000
```

```
#####
##### If you are satisfied with this configuration, #####
##### execute the script with the "install" sub-command. #####
#####
```

4. If you need to change any of the values in the current configuration, use the `configure` subcommand to update them. For example, if you want to change the IP address that the appliance uses for connection to the primary Admin Node to 172.16.2.99, enter the following:  
`configure-sga.py configure --admin-ip 172.16.2.99 SGA-INSTALL-IP`
5. If you want to back up the appliance configuration to a JSON file, use the `advanced` and `backup-file` subcommands. For example, if you want to back up the configuration of an appliance with IP address `SGA-INSTALL-IP` to a file named `appliance-SG1000.json`, enter the following:  
`configure-sga.py advanced --backup-file appliance-SG1000.json SGA-INSTALL-IP`

The JSON file containing the configuration information is written to the same directory you executed the script from.



Check that the top-level node name in the generated JSON file matches the appliance name. Do not make any changes to this file unless you are an experienced user and have a thorough understanding of StorageGRID APIs.

6. When you are satisfied with the appliance configuration, use the `install` and `monitor` subcommands to install the appliance:

```
configure-sga.py install --monitor SGA-INSTALL-IP
```

7. If you want to reboot the appliance, enter the following:

```
configure-sga.py reboot SGA-INSTALL-IP
```

## Automating the configuration of StorageGRID

After deploying the grid nodes, you can automate the configuration of the StorageGRID system.

### What you'll need

- You know the location of the following files from the installation archive.

Filename	Description
<code>configure-storagegrid.py</code>	Python script used to automate the configuration
<code>configure-storagegrid.sample.json</code>	Sample configuration file for use with the script
<code>configure-storagegrid.blank.json</code>	Blank configuration file for use with the script

- You have created a `configure-storagegrid.json` configuration file. To create this file, you can modify the sample configuration file (`configure-storagegrid.sample.json`) or the blank configuration file (`configure-storagegrid.blank.json`).

### About this task

You can use the `configure-storagegrid.py` Python script and the `configure-storagegrid.json` configuration file to automate the configuration of your StorageGRID system.



You can also configure the system using the Grid Manager or the Installation API.

### Steps

1. Log in to the Linux machine you are using to run the Python script.
2. Change to the directory where you extracted the installation archive.

For example:

```
cd StorageGRID-Webscale-version/platform
```

where `platform` is `debs`, `rpms`, or `vsphere`.

3. Run the Python script and use the configuration file you created.

For example:

```
./configure-storagegrid.py ./configure-storagegrid.json --start-install
```

## After you finish

A Recovery Package `.zip` file is generated during the configuration process, and it is downloaded to the directory where you are running the installation and configuration process. You must back up the Recovery Package file so that you can recover the StorageGRID system if one or more grid nodes fails. For example, copy it to a secure, backed up network location and to a secure cloud storage location.



The Recovery Package file must be secured because it contains encryption keys and passwords that can be used to obtain data from the StorageGRID system.

If you specified that random passwords should be generated, you need to extract the `Passwords.txt` file and look for the passwords required to access your StorageGRID system.

```
#####
##### The StorageGRID "recovery package" has been downloaded as: #####
#####           ./sgws-recovery-package-994078-rev1.zip           #####
#####   Safeguard this file as it will be needed in case of a   #####
#####           StorageGRID node recovery.                      #####
#################################################################
```

Your StorageGRID system is installed and configured when a confirmation message is displayed.

```
StorageGRID has been configured and installed.
```

## Overview of installation REST APIs

StorageGRID provides two REST APIs for performing installation tasks: the StorageGRID Installation API and the StorageGRID Appliance Installer API.

Both APIs use the Swagger open source API platform to provide the API documentation. Swagger allows both developers and non-developers to interact with the API in a user interface that illustrates how the API responds to parameters and options. This documentation assumes that you are familiar with standard web technologies and the JSON (JavaScript Object Notation) data format.



Any API operations you perform using the API Docs webpage are live operations. Be careful not to create, update, or delete configuration data or other data by mistake.

Each REST API command includes the API's URL, an HTTP action, any required or optional URL parameters, and an expected API response.

### StorageGRID Installation API

The StorageGRID Installation API is only available when you are initially configuring your StorageGRID system, and in the event that you need to perform a primary Admin Node recovery. The Installation API can be accessed over HTTPS from the Grid Manager.

To access the API documentation, go to the installation web page on the primary Admin Node and select **Help > API Documentation** from the menu bar.

The StorageGRID Installation API includes the following sections:

- **config** — Operations related to the product release and versions of the API. You can list the product release version and the major versions of the API supported by that release.
- **grid** — Grid-level configuration operations. You can get and update grid settings, including grid details, Grid Network subnets, grid passwords, and NTP and DNS server IP addresses.
- **nodes** — Node-level configuration operations. You can retrieve a list of grid nodes, delete a grid node, configure a grid node, view a grid node, and reset a grid node's configuration.
- **provision** — Provisioning operations. You can start the provisioning operation and view the status of the provisioning operation.
- **recovery** — Primary Admin Node recovery operations. You can reset information, upload the Recover Package, start the recovery, and view the status of the recovery operation.
- **recovery-package** — Operations to download the Recovery Package.
- **sites** — Site-level configuration operations. You can create, view, delete, and modify a site.

## StorageGRID Appliance Installer API

The StorageGRID Appliance Installer API can be accessed over HTTPS from *Controller\_IP*:8443.

To access the API documentation, go to the StorageGRID Appliance Installer on the appliance and select **Help > API Docs** from the menu bar.

The StorageGRID Appliance Installer API includes the following sections:

- **clone** — Operations to configure and control node cloning.
- **encryption** — Operations to manage encryption and view encryption status.
- **hardware configuration** — Operations to configure system settings on attached hardware.
- **installation** — Operations for starting the appliance installation and for monitoring installation status.
- **networking** — Operations related to the Grid, Admin, and Client Network configuration for a StorageGRID appliance and appliance port settings.
- **setup** — Operations to help with initial appliance installation setup including requests to get information about the system and update the primary Admin Node IP.
- **support** — Operations for rebooting the controller and getting logs.
- **upgrade** — Operations related to upgrading appliance firmware.
- **uploadsg** — Operations for uploading StorageGRID installation files.

## Troubleshooting the hardware installation

If you encounter issues during the installation, you might find it helpful to review troubleshooting information related to hardware setup and connectivity issues.

### Related information

[Hardware setup appears to hang](#)

## Troubleshooting connection issues

### Hardware setup appears to hang

The StorageGRID Appliance Installer might not be available if hardware faults or cabling errors prevent the E5700SG controller from completing its boot-up processing.

#### Steps

1. Watch the codes on the seven-segment displays.

While the hardware is initializing during power up, the two seven-segment displays show a sequence of codes. When the hardware boots successfully, the seven-segment displays show different codes for each controller.

2. Review the codes on the seven-segment display for the E5700SG controller.



The installation and provisioning take time. Some installation phases do not report updates to the StorageGRID Appliance Installer for several minutes.

If an error occurs, the seven-segment display flashes a sequence, such as HE.

3. To understand what these codes mean, see the following resources:

Controller	Reference
E5700SG controller	<ul style="list-style-type: none"><li>“Status indicators on the E5700SG controller”</li><li>“HE error: Error synchronizing with SANtricity OS Software”</li></ul>
E2800 controller	<p><i>E5700 and E2800 System Monitoring Guide</i></p> <p><b>Note:</b> The codes described for the E-Series E5700 controller do not apply to the E5700SG controller in the appliance.</p>

4. If this does not resolve the issue, contact technical support.

#### Related information

[Status indicators on the E5700SG controller](#)

[HE error: Error synchronizing with SANtricity OS Software](#)

[NetApp E-Series Systems Documentation Site](#)

[HE error: Error synchronizing with SANtricity OS Software](#)

The seven-segment display on the compute controller shows an HE error code if the StorageGRID Appliance Installer cannot synchronize with SANtricity OS Software.

#### About this task

If an HE error code is displayed, perform this corrective action.

## Steps

1. Check the two interconnect cables between the two controllers, and confirm that the cables and SFP+ transceivers are securely connected.
2. As required, replace one or both of the cables or SFP+ transceivers, and try again.
3. If this does not resolve the issue, contact technical support.

## Troubleshooting connection issues

If you encounter connection issues during the StorageGRID appliance installation, you should perform the corrective action steps listed.

### Unable to connect to the appliance

If you cannot connect to the appliance, there might be a network issue, or the hardware installation might not have been completed successfully.

## Steps

1. If you are unable to connect to SANtricity System Manager:
  - a. Try to ping the appliance using the IP address for the E2800 controller on the management network for SANtricity System Manager:  
**ping E2800\_Controller\_IP**
  - b. If you receive no response from the ping, confirm you are using the correct IP address.

Use the IP address for management port 1 on the E2800 controller.

- c. If the IP address is correct, check appliance cabling and the network setup.

If that does not resolve the issue, contact technical support.

- d. If the ping was successful, open a web browser.
- e. Enter the URL for SANtricity System Manager:  
**https://E2800\_Controller\_IP**

The log in page for SANtricity System Manager appears.

2. If you are unable to connect to the E5700SG controller:

- a. Try to ping the appliance using the IP address for the E5700SG controller:  
**ping E5700SG\_Controller\_IP**
- b. If you receive no response from the ping, confirm you are using the correct IP address.

You can use the IP address of the appliance on the Grid Network, the Admin Network, or the Client Network.

- c. If the IP address is correct, check appliance cabling, SFP transceivers, and the network setup.

If that does not resolve the issue, contact technical support.

- d. If the ping was successful, open a web browser.
- e. Enter the URL for the StorageGRID Appliance Installer:

[https://E5700SG\\_Controller\\_IP:8443](https://E5700SG_Controller_IP:8443)

The Home page appears.

## Rebooting the controller while the StorageGRID Appliance Installer is running

You might need to reboot the compute controller while the StorageGRID Appliance Installer is running. For example, you might need to reboot the controller if the installation fails.

### About this task

This procedure only applies when the compute controller is running the StorageGRID Appliance Installer. Once the installation is completed, this step no longer works because the StorageGRID Appliance Installer is no longer available.

### Steps

1. From the StorageGRID Appliance Installer, click **Advanced > Reboot Controller**, and then select one of these options:
  - Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
  - Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



The SG6000-CN controller is rebooted.

## Maintaining the SG5700 appliance

You might need to upgrade the SANtricity OS Software on the E2800 controller, change the Ethernet link configuration of the E5700SG controller, replace the E2800 controller or the E5700SG controller, or replace specific components. The procedures in this section assume that the appliance has already been deployed as a Storage Node in a StorageGRID system.

### Steps

- Placing an appliance into maintenance mode
- Upgrading SANtricity OS on the storage controller
- Upgrading drive firmware using SANtricity System Manager
- Replacing the E2800 controller
- Replacing the E5700SG controller
- Replacing other hardware components
- Changing the link configuration of the E5700SG controller
- Changing the MTU setting
- Checking the DNS server configuration
- Monitoring node encryption in maintenance mode

### **Placing an appliance into maintenance mode**

You must place the appliance into maintenance mode before performing specific maintenance procedures.

#### **What you'll need**

- You must be signed in to the Grid Manager using a supported browser.
- You must have the Maintenance or Root Access permission. For details, see the instructions for administering StorageGRID.

#### **About this task**

Placing a StorageGRID appliance into maintenance mode might make the appliance unavailable for remote access.



The password and host key for a StorageGRID appliance in maintenance mode remain the same as they were when the appliance was in service.

#### **Steps**

1. From the Grid Manager, select **Nodes**.
2. From the tree view of the Nodes page, select the appliance Storage Node.
3. Select **Tasks**.

## Reboot

Shuts down and restarts the node.

**Reboot**

## Maintenance Mode

Places the appliance's compute controller into maintenance mode.

**Maintenance Mode**

### 4. Select **Maintenance Mode**.

A confirmation dialog box appears.

#### **⚠ Enter Maintenance Mode on SGA-106-15**

You must place the appliance's compute controller into maintenance mode to perform certain maintenance procedures on the appliance.

Attention: All StorageGRID services on this node will be shut down. Wait a few minutes for the node to reboot into maintenance mode.

If you are ready to start, enter the provisioning passphrase and click **OK**.

Provisioning Passphrase

**Cancel**

**OK**

### 5. Enter the provisioning passphrase, and select **OK**.

A progress bar and a series of messages, including "Request Sent," "Stopping StorageGRID," and "Rebooting," indicate that the appliance is completing the steps for entering maintenance mode.

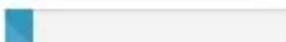
## Reboot

Shuts down and restarts the node.

Reboot

## Maintenance Mode

**Attention:** Your request has been sent, but the appliance might take 10-15 minutes to enter maintenance mode. Do not perform maintenance procedures until this tab indicates maintenance mode is ready, or data could become corrupted.



Request Sent

When the appliance is in maintenance mode, a confirmation message lists the URLs you can use to access the StorageGRID Appliance Installer.

## Reboot

Shuts down and restarts the node.

Reboot

## Maintenance Mode

This node is currently in maintenance mode. Navigate to one of the URLs listed below and perform any necessary maintenance procedures.

- <https://172.16.2.106:8443>
- <https://10.224.2.106:8443>
- <https://47.47.2.106:8443>
- <https://169.254.0.1:8443>

When you are done with any required maintenance procedures, you must exit maintenance mode by clicking Reboot Controller from the StorageGRID Appliance Installer.

6. To access the StorageGRID Appliance Installer, browse to any of the URLs displayed.

If possible, use the URL containing the IP address of the appliance's Admin Network port.

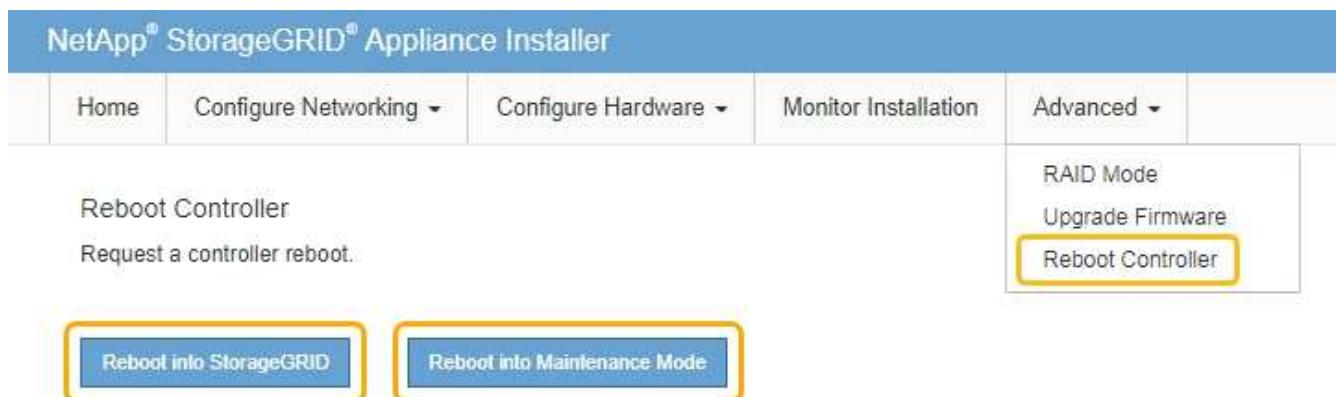


Accessing <https://169.254.0.1:8443> requires a direct connection to the local management port.

7. From the StorageGRID Appliance Installer, confirm that the appliance is in maintenance mode.

**⚠** This node is in maintenance mode. Perform any required maintenance procedures. If you want to exit maintenance mode manually to resume normal operation, go to Advanced > Reboot Controller to **reboot** the controller.

8. Perform any required maintenance tasks.
9. After completing maintenance tasks, exit maintenance mode and resume normal node operation. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select **Reboot into StorageGRID**.



NetApp® StorageGRID® Appliance Installer

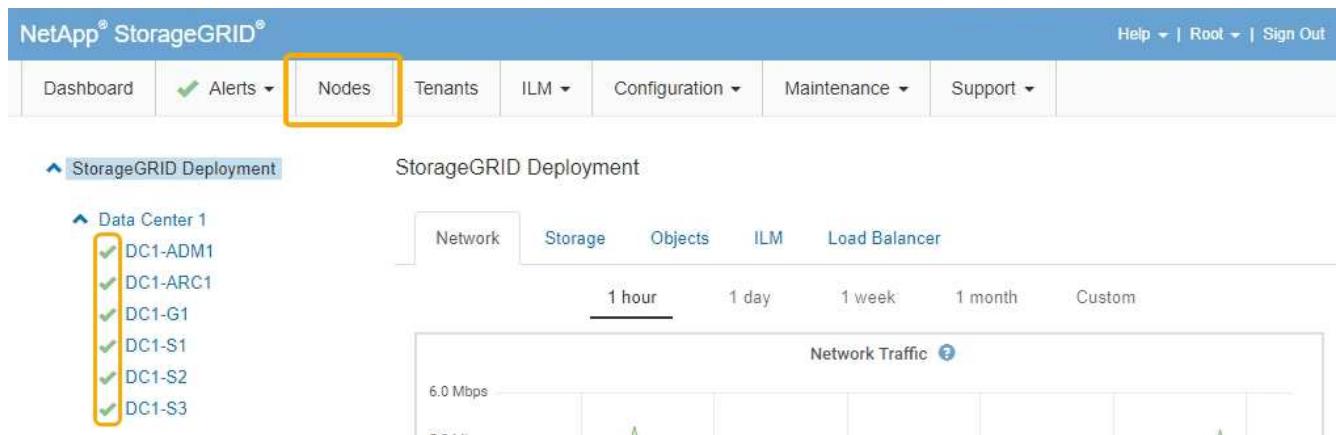
Home Configure Networking ▾ Configure Hardware ▾ Monitor Installation Advanced ▾

RAID Mode  
Upgrade Firmware  
**Reboot Controller**

Reboot Controller  
Request a controller reboot.

**Reboot into StorageGRID** **Reboot into Maintenance Mode**

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** tab should display a normal status **✓** for the appliance node, indicating that no alerts are active and the node is connected to the grid.



NetApp® StorageGRID®

Help ▾ | Root ▾ | Sign Out

Dashboard Alerts ▾ **Nodes** Tenants ILM ▾ Configuration ▾ Maintenance ▾ Support ▾

▲ StorageGRID Deployment StorageGRID Deployment

▲ Data Center 1

- ✓ DC1-ADM1
- ✓ DC1-ARC1
- ✓ DC1-G1
- ✓ DC1-S1
- ✓ DC1-S2
- ✓ DC1-S3

Network Storage Objects ILM Load Balancer

1 hour 1 day 1 week 1 month Custom

6.0 Mbps

Network Traffic

### Upgrading SANtricity OS on the storage controller

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. If you need assistance, contact technical support.

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

## Upgrading SANtricity OS on the storage controllers using the 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.

### Upgrading SANtricity OS on the E2800 controller using maintenance mode

#### Related information

[NetApp Interoperability Matrix Tool](#)

[NetApp Downloads: SANtricity OS](#)

[Monitor & troubleshoot](#)

## Upgrading SANtricity OS on the storage controllers using the 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.

#### What you'll need

- 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 must have the Maintenance permission.
- You must be signed in to the Grid Manager using a supported browser.
- You must have the provisioning passphrase.
- You must have access to the NetApp downloads page for SANtricity OS.

#### About this task

You cannot 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. It might take more than 30 minutes to load the SANtricity OS on each node and up to 90 minutes to reboot each StorageGRID storage appliance.

 The following steps are only applicable when you are using the Grid Manager to perform the upgrade. The storage controllers in the SG5700 series appliance cannot 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 do not need to apply a separate NVSRAM upgrade file.

#### Steps

1. From a service laptop, download the new SANtricity OS Software file from the NetApp support site.

Be sure to choose the SANtricity OS version for the E2800 storage controllers.

[NetApp Downloads: SANtricity OS](#)

2. Sign in to the Grid Manager using a supported browser.
3. Select **Maintenance**. Then, in the System section of the menu, select **Software Update**.

The Software Update page appears.

### Software Update

You can upgrade StorageGRID software, apply a hotfix, or upgrade the SANtricity OS software on StorageGRID storage appliances.

- To perform a major version upgrade of StorageGRID, see the [instructions for upgrading StorageGRID](#), and then select **StorageGRID Upgrade**.
- To apply a hotfix to all nodes in your system, see "Hotfix procedure" in the [recovery and maintenance instructions](#), and then select **StorageGRID Hotfix**.
- To upgrade SANtricity OS software on a storage controller, see "Upgrading SANtricity OS Software on the storage controllers" in the [installation and maintenance instructions](#) for your storage appliance, and then select **SANtricity OS**:

[SG6000 appliance installation and maintenance](#)

[SG5700 appliance installation and maintenance](#)

[SG5600 appliance installation and maintenance](#)

StorageGRID Upgrade

StorageGRID Hotfix

SANtricity OS

4. Click **SANtricity OS**.

The SANtricity OS page appears.

### SANtricity OS

You can use this page to upgrade the SANtricity OS software on storage controllers in a storage appliance. Before installing the new software, confirm the storage controllers are Nominal (**Nodes > appliance node > Hardware**) and ready for an upgrade. A health check is automatically performed as part of the upgrade process and valid NVSRAM is automatically installed based on the appliance type and new software version. The software upgrade can take up to 30 minutes per appliance. When the upgrade is complete, the node will be automatically rebooted to activate the SANtricity OS on the storage controllers. If you have multiple types of appliances, repeat this procedure to install the appropriate OS software for each type.

#### SANtricity OS Upgrade File

SANtricity OS Upgrade File



[Browse](#)

#### Passphrase

Provisioning Passphrase



[Start](#)

5. Select the SANtricity OS upgrade file you downloaded from the NetApp support site.

a. Click **Browse**.

b. Locate and select the file.

c. Click **Open**.

The file is uploaded and validated. When the validation process is done, the file name is shown in the Details field.



Do not change the file name since it is part of the verification process.

#### SANtricity OS

You can use this page to upgrade the SANtricity OS software on storage controllers in a storage appliance. Before installing the new software, confirm the storage controllers are Nominal (**Nodes > appliance node > Hardware**) and ready for an upgrade. A health check is automatically performed as part of the upgrade process and valid NVSRAM is automatically installed based on the appliance type and new software version. The software upgrade can take up to 30 minutes per appliance. When the upgrade is complete, the node will be automatically rebooted to activate the SANtricity OS on the storage controllers. If you have multiple types of appliances, repeat this procedure to install the appropriate OS software for each type.

#### SANtricity OS Upgrade File

SANtricity OS Upgrade File  RC\_20240801\_10\_10\_000.dlp

Details RC\_20240801\_10\_10\_000.dlp

#### Passphrase

Provisioning Passphrase

6. Enter the provisioning passphrase.

The **Start** button is enabled.

## SANtricity OS

You can use this page to upgrade the SANtricity OS software on storage controllers in a storage appliance. Before installing the new software, confirm the storage controllers are Nominal (**Nodes > appliance node > Hardware**) and ready for an upgrade. A health check is automatically performed as part of the upgrade process and valid NVSRAM is automatically installed based on the appliance type and new software version. The software upgrade can take up to 30 minutes per appliance. When the upgrade is complete, the node will be automatically rebooted to activate the SANtricity OS on the storage controllers. If you have multiple types of appliances, repeat this procedure to install the appropriate OS software for each type.

### SANtricity OS Upgrade File

SANtricity OS Upgrade File  ✓ RC\_10000001\_node1\_10\_040\_7701.dlp

Details  RC\_10000001\_node1\_10\_040\_7701.dlp

### Passphrase

Provisioning Passphrase

#### 7. Click **Start**.

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

#### ⚠ Warning

Nodes can disconnect and services might be affected

The node will be automatically rebooted at the end of upgrade and services will be affected. Are you sure you want to start the SANtricity OS upgrade?

#### 8. Click **OK** to stage the SANtricity OS upgrade file to the primary Admin Node.

When the SANtricity OS upgrade starts:

- 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 click **Start** again.

- 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 Storage Nodes, including software-based Storage Nodes. You must approve the upgrade for all Storage Nodes, even though a SANtricity OS upgrade has no effect on software-based Storage Nodes. The upgrade message returned for software-based Storage Nodes is “SANtricity OS upgrade is not applicable to this node.”

#### SANtricity OS Upgrade Progress

Storage Nodes - 0 out of 4 completed							Approve All	Remove All
Site	Name	Progress	Stage	Details	Action	Search		
RTP Lab 1	DT-10-224-1-181-S1		Waiting for you to approve		<button>Approve</button>			
RTP Lab 1	DT-10-224-1-182-S2		Waiting for you to approve		<button>Approve</button>			
RTP Lab 1	DT-10-224-1-183-S3		Waiting for you to approve		<button>Approve</button>			
RTP Lab 1	NetApp-SGA-Lab2-002-024		Waiting for you to approve		<button>Approve</button>			

9. Optionally, sort the list of nodes in ascending or descending order by **Site**, **Name**, **Progress**, **Stage**, or **Details**. Or, enter a term in the **Search** box to search for specific nodes.

You can scroll through the list of nodes by using the left and right arrows at the bottom right corner of the section.

10. Approve the grid nodes you are ready to add to the upgrade queue. Approved nodes of the same type are upgraded one at a time.



Do not 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. Later, when the node is upgraded, the appliance node is rebooted. These operations might cause service interruptions for clients that are communicating with the node.

- Click either of the **Approve All** buttons 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(s).

- Click one or more **Approve** buttons to add one or more nodes to the SANtricity OS upgrade queue.



You can delay applying a SANtricity OS upgrade to a node, but the SANtricity OS upgrade process will not be complete until you approve the SANtricity OS upgrade on all the listed Storage Nodes.

After you click **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. For nodes intentionally not upgraded, the process will show stage of Complete with one of the following messages in the Details column:

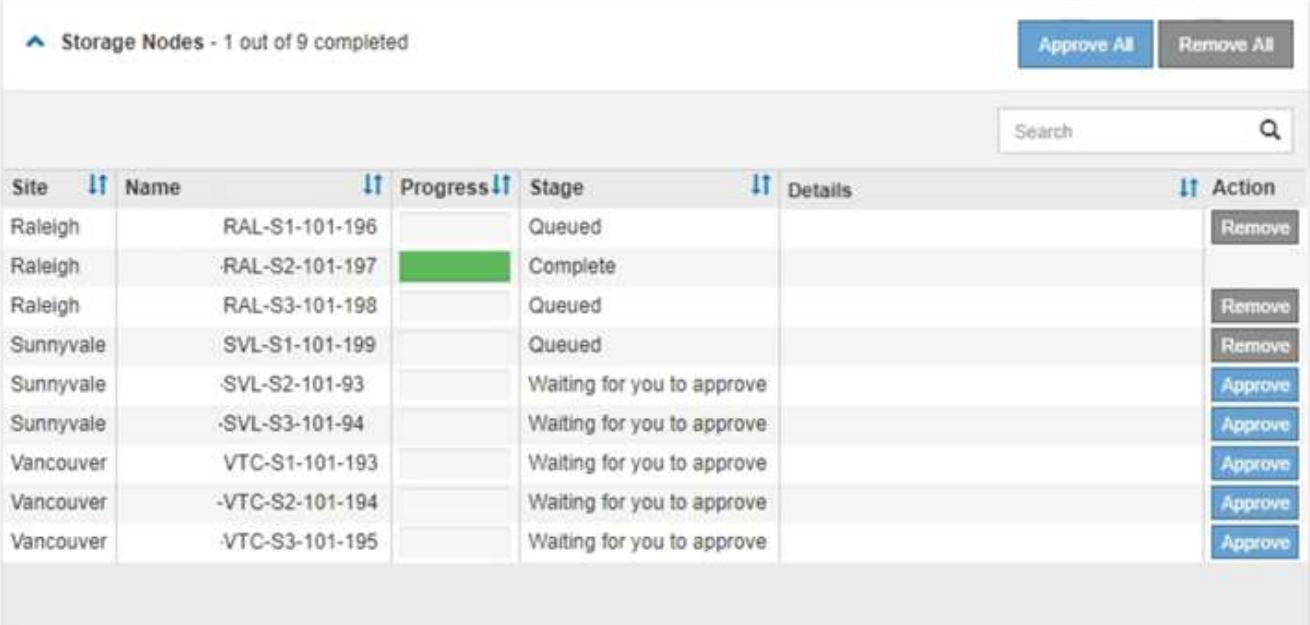
- Storage Node was already upgraded.
- SANtricity OS upgrade is not applicable to this node.
- SANtricity OS file is not compatible with this node.

The message “SANtricity OS upgrade is not applicable to this node” indicates that the node does not have a storage controller that can be managed by the StorageGRID system. This message will appear for non-appliance Storage Nodes. You can complete the SANtricity OS upgrade process without upgrading the node displaying this message.

The message “SANtricity OS file is not compatible with this node” indicates that the node requires a SANtricity OS file different than the one the process is attempting to install. After you complete the current SANtricity OS upgrade, download the SANtricity OS appropriate for the node and repeat the upgrade process.

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

As shown in the example, 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.



Storage Nodes - 1 out of 9 completed						
Site	Name	Progress	Stage	Details	Action	
Raleigh	RAL-S1-101-196		Queued		<span>Remove</span>	
Raleigh	RAL-S2-101-197	<div style="width: 100%;">Complete</div>	Complete		<span>Remove</span>	
Raleigh	RAL-S3-101-198		Queued		<span>Remove</span>	
Sunnyvale	SVL-S1-101-199		Queued		<span>Remove</span>	
Sunnyvale	SVL-S2-101-93		Waiting for you to approve		<span>Approve</span>	
Sunnyvale	SVL-S3-101-94		Waiting for you to approve		<span>Approve</span>	
Vancouver	VTC-S1-101-193		Waiting for you to approve		<span>Approve</span>	
Vancouver	VTC-S2-101-194		Waiting for you to approve		<span>Approve</span>	
Vancouver	VTC-S3-101-195		Waiting for you to approve		<span>Approve</span>	

12. 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 being applied, the upgrade has failed for that node. The appliance might need to be placed in maintenance mode to recover from the failure. Contact technical support before continuing.

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: “You must use maintenance mode to upgrade SANtricity OS on this node. See the installation and maintenance instructions for your appliance. After the upgrade, you can use this utility for

future upgrades." 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 re-start 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 date and time the SANtricity OS upgrade was completed.



13. 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

[Upgrading SANtricity OS on the E2800 controller using maintenance mode](#)

[Upgrading SANtricity OS on the E2800 controller 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.

## What you'll need

- 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 must place the E5700SG controller into maintenance mode, which interrupts the connection to the E2800 controller. Putting a StorageGRID appliance into maintenance mode might make the appliance unavailable for remote access.

[Placing an appliance into maintenance mode](#)

## About this task

Do not 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. From a service laptop, access SANtricity System Manager and sign in.
2. Download the new SANtricity OS Software file and NVSRAM file to the management client.



The NVSRAM is specific to the StorageGRID appliance. Do not use the standard NVSRAM download.

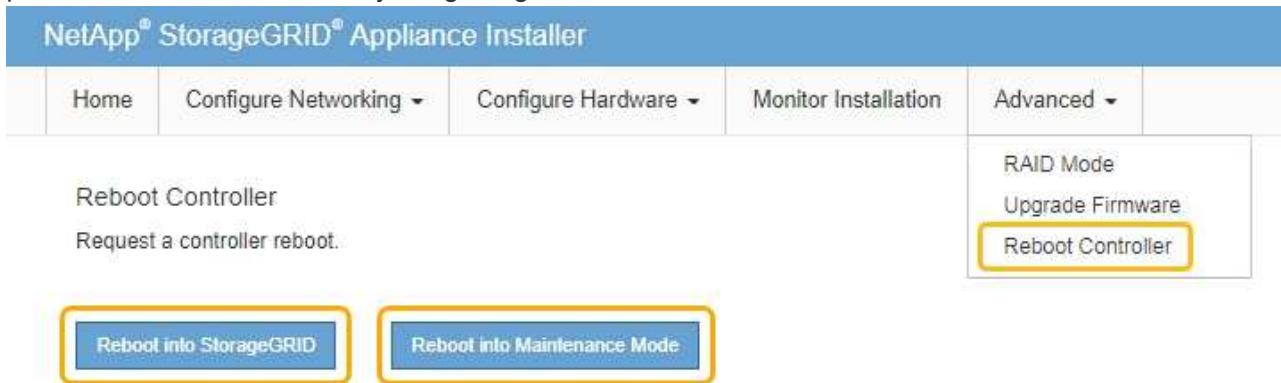
3. Follow the instructions in the *E2800 and E5700 SANtricity Software and Firmware Upgrade Guide* or the SANtricity System Manager online help to upgrade the E2800 controller's firmware and NVSRAM.



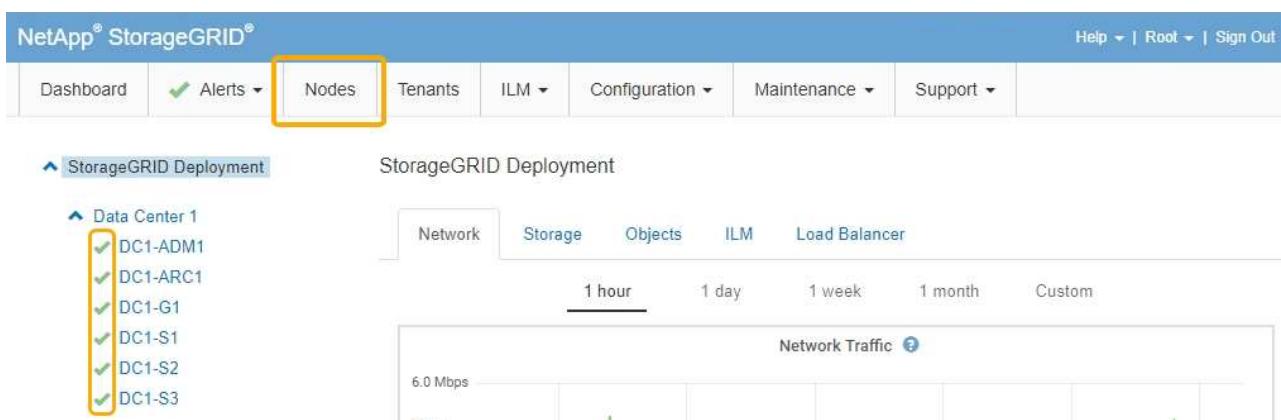
Activate the upgrade files immediately. Do not defer activation.

4. Once the upgrade operation has completed, reboot the node. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:

- Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
- Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



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** tab should display a normal status for the appliance node, indicating that no alerts are active and the node is connected to the grid.



## Related information

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

### Upgrading drive firmware using SANtricity System Manager

You upgrade your drive firmware to make sure you have all the latest features and bug fixes.

#### What you'll need

- The storage appliance has an Optimal status.
- All drives have an Optimal status.
- You have the latest version of SANtricity System Manager installed that is compatible with your StorageGRID version.
- You have placed the StorageGRID appliance in maintenance mode.

#### Placing an appliance into maintenance mode



Maintenance mode interrupts the connection to the storage controller, stopping all I/O activity and placing all drives offline.



Do not 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 policies.

#### 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 > *appliance Storage Node* > SANtricity System Manager**



If these options are not available or the SANtricity System Manager login page does not appear, access SANtricity System Manager by browsing to the storage controller IP:  
**[https://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 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

### 2 Select Drives

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

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

Current Drive Firmware	Associated Drives
------------------------	-------------------

MS02, KPM51VUG800G	<a href="#">View drives</a>
--------------------	-----------------------------

Total rows: 1



Select up to four drive firmware files: [Browse...](#)

In this example:

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

Select **View drives** in the Associated Drives column to display where these drives are installed in your storage appliance.

- d. 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 web 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.

## E-Series Disk Firmware

[Download all current E-Series Disk Firmware](#)

Drive Part Number	Descriptions	Drive Identifier	Firmware Rev. (Download)	Notes and Config Info	Release Date
Drive Part Number	Descriptions	KPM51VUG800G	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 **Proposed Firmware**. If you must change this firmware, select **Back**.

d. Select **Offline (parallel)** upgrade.

You can use the offline upgrade method because the appliance is in maintenance mode, where I/O activity is stopped for all drives and all volumes.

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 any of the following errors occur during the upgrade procedure, take the appropriate recommended action.

- **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 are not 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**

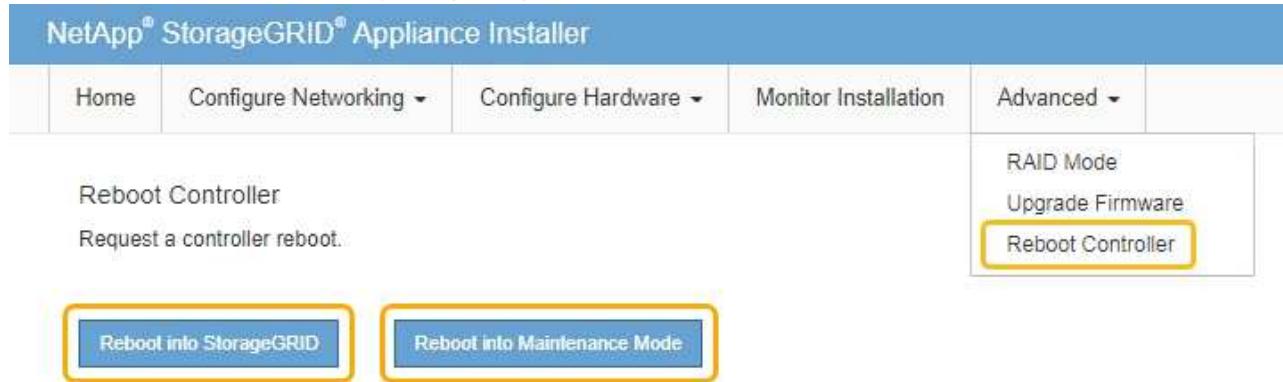
Contact technical support to resolve this issue.

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

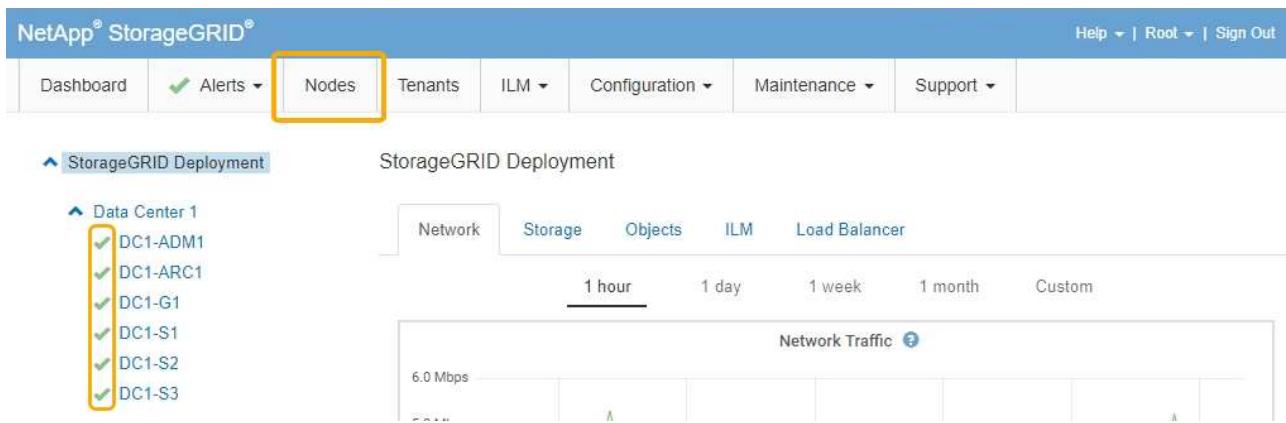
Contact technical support to resolve this issue.

6. Once the upgrade operation has completed, reboot the appliance. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:

- Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
- Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



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** tab should display a normal status for the appliance node, indicating that no alerts are active and the node is connected to the grid.



## Related information

[Upgrading SANtricity OS on the storage controller](#)

## Replacing the E2800 controller

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

### About this task

- You have a replacement controller with the same part number as the controller you are replacing.
- You have downloaded the instructions for replacing the simplex configuration of a failed E2800 controller canister.



Refer to the E-Series instructions only when directed or if you need more details to perform a specific step. Do not rely on the E-Series instructions to replace a controller in the StorageGRID appliance, because the procedures are not the same.

- You have labels to identify each cable that is connected to the controller.
- If all drives are secured, you have reviewed the steps in the simplex E2800 controller replacement procedure, which include downloading and installing E-Series SANtricity Storage Manager from the NetApp Support Site and then using the Enterprise Management Window (EMW) to unlock the secured drives after you have replaced the controller.



You will not be able to use the appliance until you unlock the drives with the saved key.

- You must have specific access permissions.
- You must be signed in to the Grid Manager using a supported browser.

### About this task

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.
- The amber Attention LED on the controller is on, indicating that the controller has a fault.

The appliance Storage Node will not be accessible when you replace the controller. If the E2800 controller is functioning sufficiently, you can place the E5700SG controller into maintenance mode.

## Placing an appliance into maintenance mode

When you replace a controller, you must remove the battery from the original controller and install it in the replacement controller.



The E2800 controller in the appliance does not include a host interface card (HIC).

### Steps

1. Follow the instructions in the E2800 controller replacement procedure to prepare to remove the controller.

You use SANtricity System Manager to perform these steps.

- a. Make a note of which version of SANtricity OS software is currently installed on the controller.
- b. Make a note of which version of NVSRAM is currently installed.
- c. If the Drive Security feature is enabled, be sure a saved key exists and that you know the pass phrase required to install it.



**Possible loss of data access** -- If all drives in the appliance are security enabled, the new controller will not be able to access the appliance until you unlock the secured drives using the Enterprise Management Window in SANtricity Storage Manager.

- d. Back up the configuration database.

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

- e. 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 in case the replacement does not resolve the problem.

2. If the StorageGRID appliance is running in a StorageGRID system, place the E5700SG controller into maintenance mode.

## Placing an appliance into maintenance mode

3. If the E2800 controller is functioning sufficiently to allow for a controlled shutdown, confirm that all operations have completed.

- a. From the home page of SANtricity System Manager, select **View Operations in Progress**.
- b. Confirm that all operations have completed.

4. Remove the controller from the appliance:

- a. Put on an ESD wristband or take other antistatic precautions.
- b. Label the cables and then disconnect the cables and SFPs.



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

- c. 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.

d. 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.

e. Place the controller on a flat, static-free surface with the removable cover facing up.

f. Remove the cover by pressing down on the button and sliding the cover off.

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

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

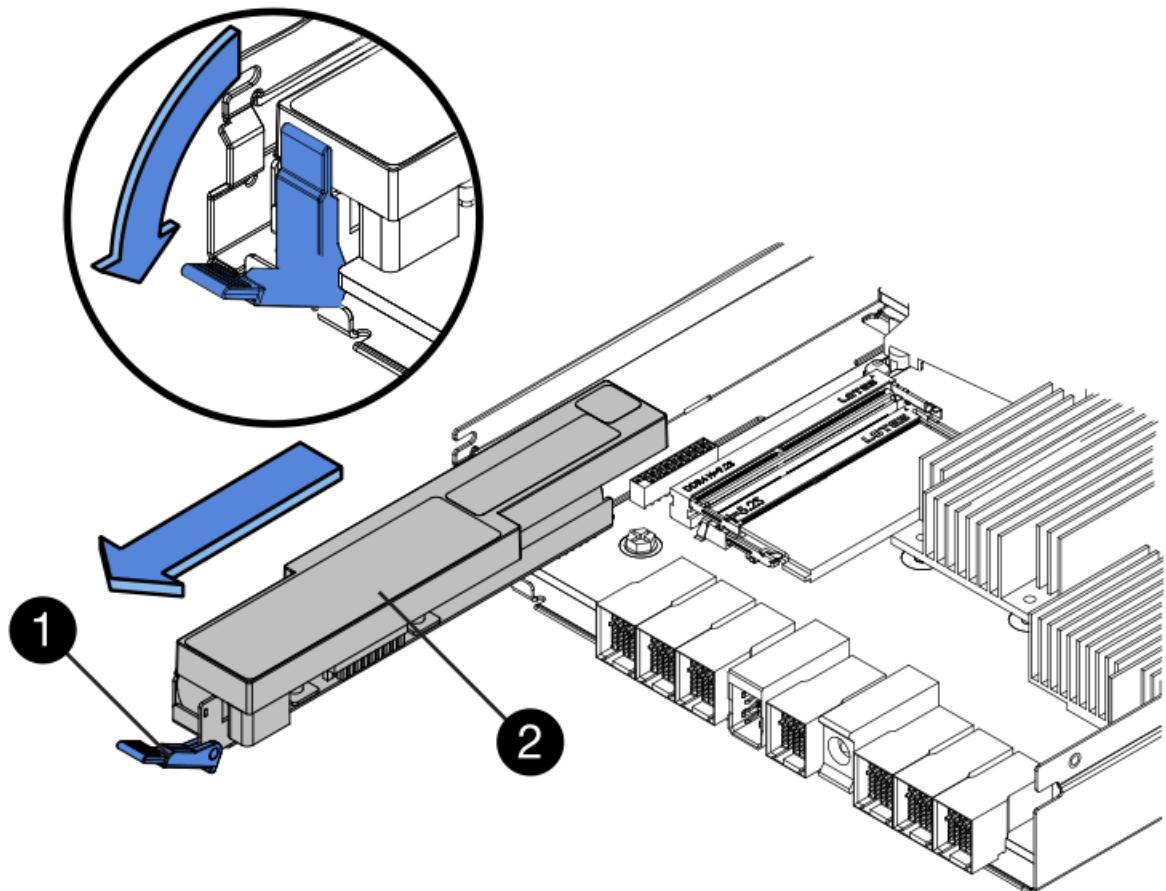
If this green LED is on, the controller is still using battery power. You must wait for this LED to go off before removing any components.



Item	Description
	Internal Cache Active LED
	Battery

b. Locate the blue release latch for the battery.

c. Unlatch the battery by pushing the release latch down and away from the controller.



Item	Description
	Battery release latch
	Battery

- d. Lift up on the battery, and slide it out of the controller.
- e. Remove the cover from the replacement controller.
- f. Orient the replacement controller so that the slot for the battery faces toward you.
- g. 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.

- h. 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.

- i. 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 in the slot on the controller:



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



j. Replace the controller cover.

6. Install the replacement controller into the appliance.

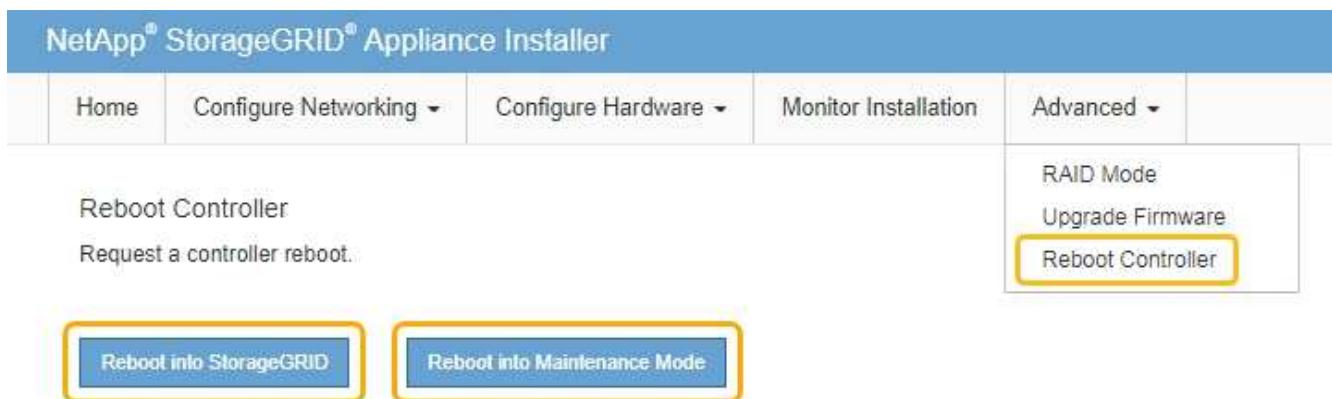
- Turn the controller over, so that the removable cover faces down.
- With the cam handle in the open position, slide the controller all the way into the appliance.
- Move the cam handle to the left to lock the controller in place.
- Replace the cables and SFPs.
- Wait for the E2800 controller to reboot. Verify that the seven-segment display shows a state of 99.
- Determine how you will assign an IP address to the replacement controller.



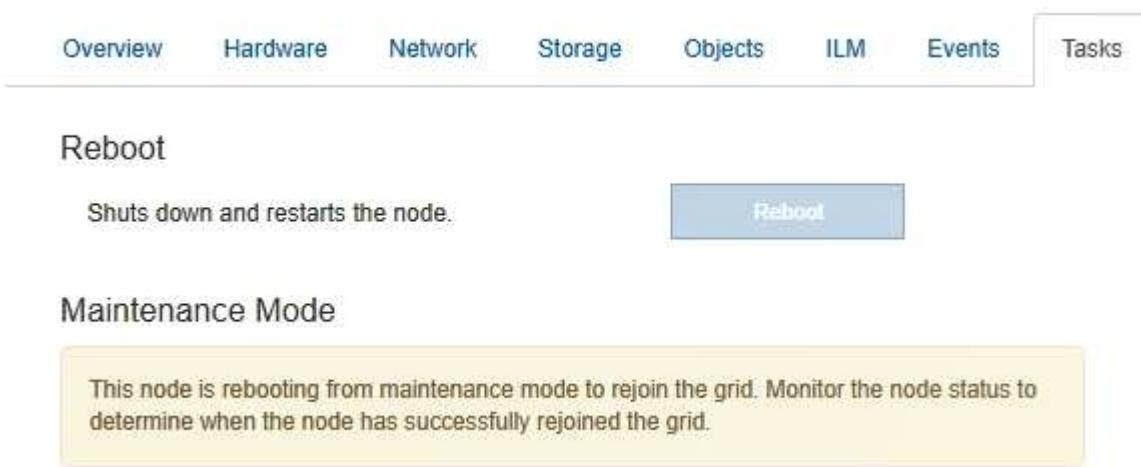
The steps for assigning an IP address to the replacement controller depend on whether you connected management port 1 to a network with a DHCP server and on whether all drives are secured.

- If management port 1 is connected to a network with a DHCP server, the new controller will obtain its IP address from the DHCP server. This value might be different than the original controller's IP address.
- If all drives are secured, you must use the Enterprise Management Window (EMW) in SANtricity Storage Manager to unlock the secured drives. You cannot access the new controller until you unlock the drives with the saved key. See the E-Series instructions for replacing a simplex E2800 controller.

7. If the appliance uses secured drives, follow the instructions in the E2800 controller replacement procedure to import the drive security key.
8. Return the appliance to normal operating mode. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select **Reboot into StorageGRID**.



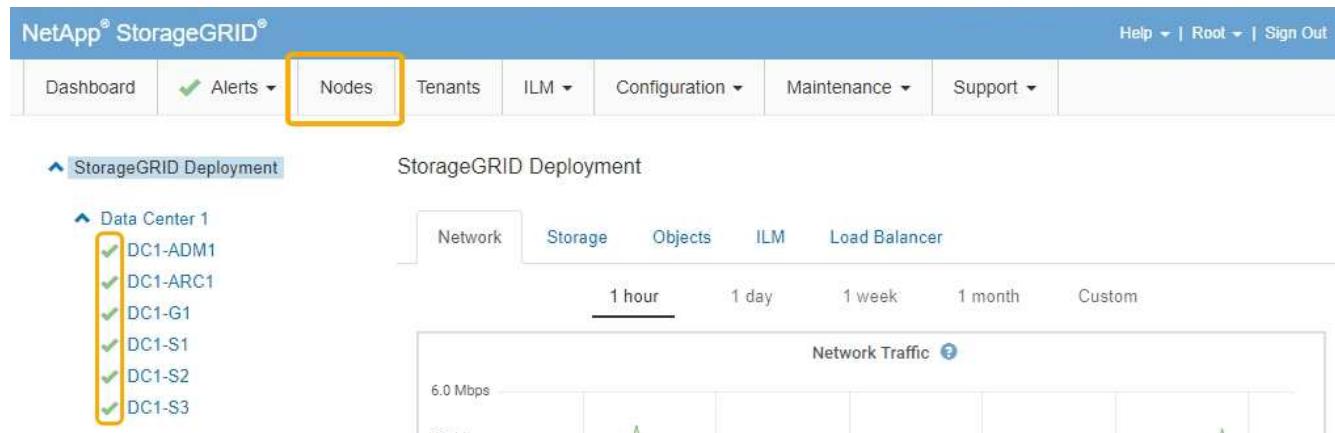
During the reboot, the following screen appears:



The appliance reboots and rejoins the grid. This process can take up to 20 minutes.

9. Confirm that the reboot is complete and that the node has rejoined the grid. In the Grid Manager, verify that

the **Nodes** tab displays a normal status  for the appliance node, indicating that no alerts are active and the node is connected to the grid.



10. From SANtricity System Manager, confirm that the new controller is Optimal, and collect support data.

#### Related information

[NetApp E-Series Systems Documentation Site](#)

### Replacing the E5700SG controller

You might need to replace the E5700SG controller if it is not functioning optimally or if it has failed.

#### What you'll need

- You have a replacement controller with the same part number as the controller you are replacing.
- You have downloaded the E-Series instructions for replacing a failed E5700 controller.



Use the E-Series instructions for reference only if you need more details to perform a specific step. Do not rely on the E-Series instructions to replace a controller in the StorageGRID appliance, because the procedures are not the same. For example, the E-Series instructions for the E5700 controller describe how to remove the battery and the host interface card (HIC) from a failed controller and install them in a replacement controller. These steps do not apply to the E5700SG controller.

- You have labels to identify each cable that is connected to the controller.
- The appliance has been placed maintenance mode.

#### [Placing an appliance into maintenance mode](#)

#### About this task

The appliance Storage Node will not be accessible when you replace the controller. If the E5700SG 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 cannot 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. When the appliance has been placed maintenance mode, shut down the E5700SG controller.
  - a. Log in to the grid node:
    - 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 E5700SG controller:  
`shutdown -h now`
  - c. Wait for any data in cache memory to be written to the drives.

The green Cache Active LED on the back of the E2800 controller is on when cached data needs to be written to the drives. You must wait for this LED to turn off.

  2. Turn off the power.
    - a. From the home page of SANtricity System Manager, select **View Operations in Progress**.
    - b. Confirm that all operations have completed.
    - c. Turn off both power switches on the appliance.
    - d. Wait for all LEDs to turn off.
  3. If the StorageGRID networks attached to the controller use DHCP servers:
    - a. Note the MAC addresses for the ports on the replacement controller (located on labels on the controller).
    - b. Ask your network administrator to update the IP address settings for the original controller to reflect the MAC addresses for the replacement controller.
  4. Remove the controller from the appliance:
    - a. Put on an ESD wristband or take other antistatic precautions.
    - b. Label the cables and then disconnect the cables and SFPs.

 You must ensure that the IP addresses for the original controller have been updated before you apply power to the replacement controller. Otherwise, the controller will obtain new DHCP IP addresses when it boots up and might not be able to reconnect to StorageGRID. This step applies to all StorageGRID networks that are attached to the controller.

## 4. Remove the controller from the appliance:

- a. Put on an ESD wristband or take other antistatic precautions.
- b. Label the cables and then disconnect the cables and SFPs.



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

- c. 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.
- d. 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. 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.
6. Power on the appliance, and monitor the controller LEDs and seven-segment displays.

After the controllers have successfully booted up, the seven-segment displays should show the following:

- E2800 controller:

The final state is 99.

- E5700SG controller:

The final state is HA.

7. Confirm that the appliance Storage Node appears in the Grid Manager and that no alarms appear.

## Related information

[NetApp E-Series Systems Documentation Site](#)

## Replacing other hardware components

You might need to replace a controller battery, drive, fan, or power supply, in the StorageGRID appliance.

### What you'll need

- You have the E-Series hardware replacement procedure.
- The appliance has been placed maintenance mode if the component replacement procedure requires that you shut down the appliance.

[Placing an appliance into maintenance mode](#)

### About this task

To replace the battery in the E2800 controller, see the instructions in these instructions for replacing the E2800 controller. Those instructions describe how to remove the controller from the appliance, remove the battery from the controller, install the battery, and replace the controller.

To replace a drive, power-fan canister, fan canister, power canister, or drive drawer in the appliance, access the E-Series procedures for maintaining E2800 hardware.

## SG5712 component replacement instructions

FRU	See E-Series instructions for
Drive	Replacing a drive in E2800 12-drive or 24-drive shelves
Power-fan canister	Replacing a power-fan canister in E2800 shelves

## SG5760 component replacement instructions

FRU	See E-Series instructions for
Drive	Replacing a drive in E2860 shelves
Power canister	Replacing a power canister in E2860 shelves
Fan canister	Replacing a fan canister in E2860 shelves
Drive drawer	Replacing a drive drawer in E2860 shelves

### Related information

[Replacing the E2800 controller](#)

[NetApp E-Series Systems Documentation Site](#)

### Changing the link configuration of the E5700SG controller

You can change the Ethernet link configuration of the E5700SG controller. You can change the port bond mode, the network bond mode, and the link speed.

#### What you'll need

You must place the E5700SG controller into maintenance mode. Putting a StorageGRID appliance into maintenance mode might make the appliance unavailable for remote access.

[Placing an appliance into maintenance mode](#)

#### About this task

Options for changing the Ethernet link configuration of the E5700SG 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 from 10-GbE to 25-GbE, or from 25-GbE to 10-GbE

#### Steps

1. Select **Configure Networking > Link Configuration** from the menu.

# NetApp® StorageGRID® Appliance Installer

The screenshot shows the StorageGRID Appliance Installer interface. The top navigation bar includes 'Home', 'Configure Networking', 'Configure Hardware', 'Monitor Installation', and 'Advanced'. The 'Configure Networking' dropdown is open, showing 'Link Configuration' (which is highlighted with a yellow oval), 'IP Configuration', 'Remap Ports', 'Ping Test', and 'Port Connectivity Test (nmap)'. A tooltip 'The link configuration changes you make here affect the entire StorageGRID system.' is visible. The main content area has a light blue background and contains the text: 'Review the settings below, and then click Start Installation.'

## 2. Make the desired changes to the link configuration.

For more information on the options, see “Configuring 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 are not 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://E5700SG\\_Controller\\_IP:8443](https://E5700SG_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 instructions for configuring IP addresses.

### Setting the IP configuration

## 4. From the StorageGRID Appliance Installer, select **Configure Networking > Ping Test**.

## 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 [Change link configuration](#) step.

In addition to any other tests you choose to perform, confirm that you can ping the grid IP address of the primary Admin Node, and the grid IP address of at least one other Storage Node. If necessary, correct any link configuration issues.

## 6. Once you are satisfied that your link configuration changes are working, reboot the node. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:

- Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
- Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.

NetApp® StorageGRID® Appliance Installer

Home	Configure Networking ▾	Configure Hardware ▾	Monitor Installation	Advanced ▾	
<p>Reboot Controller Request a controller reboot.</p>					<p>RAID Mode Upgrade Firmware Reboot Controller</p>
<p><b>Reboot into StorageGRID</b></p>			<p><b>Reboot into Maintenance Mode</b></p>		

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** tab should display a normal status  for the appliance node, indicating that no alerts are active and the node is connected to the grid.

NetApp® StorageGRID®

Dashboard	Alerts ▾	<b>Nodes</b>	Tenants	ILM ▾	Configuration ▾	Maintenance ▾	Support ▾	
-----------	----------	--------------	---------	-------	-----------------	---------------	-----------	--

Help ▾ | Root ▾ | Sign Out

**StorageGRID Deployment**

**Nodes**

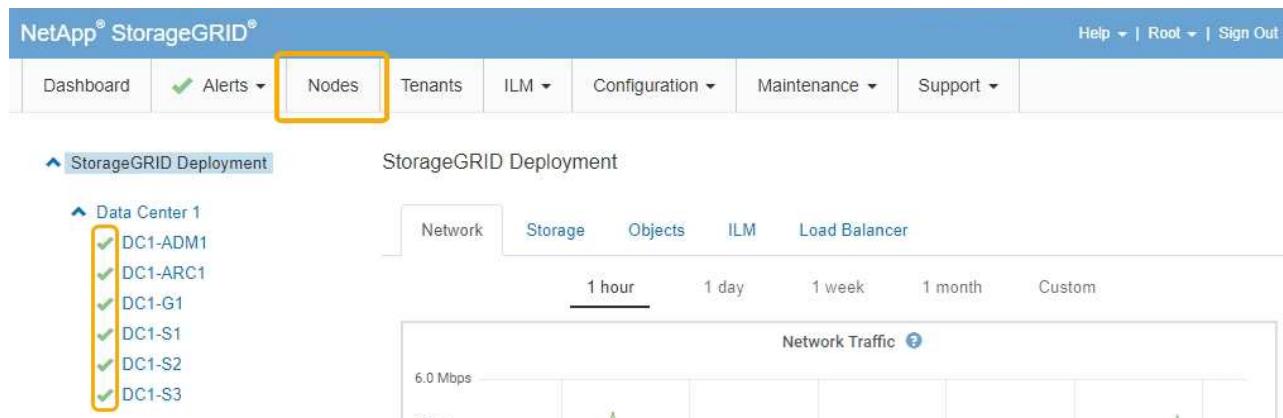
**StorageGRID Deployment**

**Network** **Storage** **Objects** **ILM** **Load Balancer**

1 hour 1 day 1 week 1 month Custom

Network Traffic 

6.0 Mbps



## Related information

[Configuring network links \(SG5700\)](#)

## Changing the MTU setting

You can change the MTU setting that you assigned when you configured IP addresses for the appliance node.

### What you'll need

The appliance has been placed maintenance mode.

### Placing an appliance into maintenance mode

#### Steps

1. From the StorageGRID Appliance Installer, select **Configure Networking > IP Configuration**.
2. Make the desired changes to the MTU settings for the Grid Network, Admin Network, and Client Network.

## Grid Network

The Grid Network is used for all internal StorageGRID traffic. The Grid Network provides connectivity between all nodes in the grid, across all sites and subnets. All hosts on the Grid Network must be able to talk to all other hosts. The Grid Network can consist of multiple subnets. Networks containing critical grid services, such as NTP, can also be added as Grid subnets.

IP  Static  DHCP

Assignment

IPv4 Address (CIDR)

Gateway

**⚠** All required Grid Network subnets must also be defined in the Grid Network Subnet List on the Primary Admin Node before starting installation.

Subnets (CIDR)	<input type="text" value="172.18.0.0/21"/> <span style="color: red;">×</span>
	<input type="text" value="172.18.0.0/21"/> <span style="color: red;">×</span>
	<input type="text" value="192.168.0.0/21"/> <span style="color: green;">+ ×</span>
MTU	<input type="text" value="1500"/> <span style="border: 1px solid black; padding: 2px;">▲</span>

Cancel Save



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.



For the best network performance, all nodes should be configured with similar MTU values on their Grid Network interfaces. The **Grid Network MTU mismatch** alert is triggered if there is a significant difference in MTU settings for the Grid Network on individual nodes. The MTU values do not have to be the same for all network types.

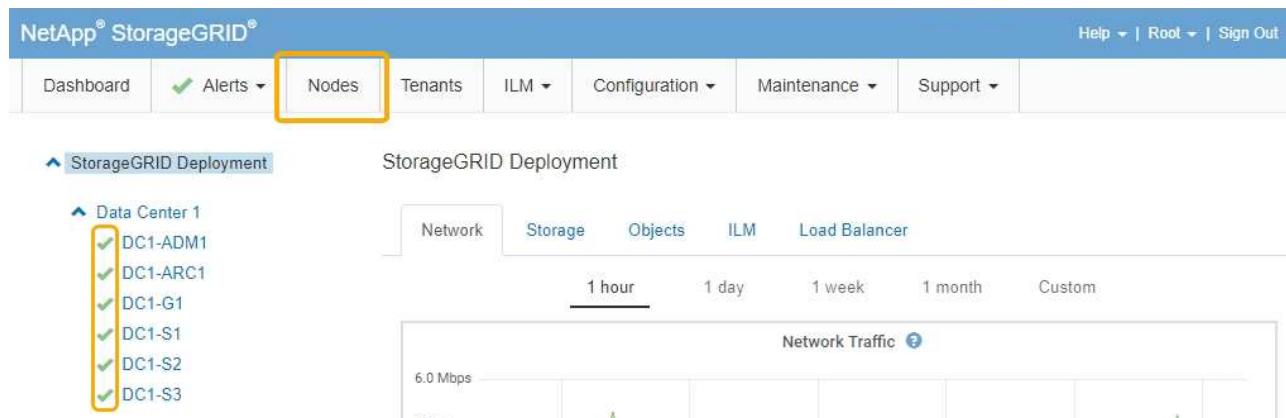
- When you are satisfied with the settings, select **Save**.
- Reboot the node. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:
  - Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this

option if you are done working in maintenance mode and are ready to return the node to normal operation.

- Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



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** tab should display a normal status for the appliance node, indicating that no alerts are active and the node is connected to the grid.



## Related information

[Administer StorageGRID](#)

### Checking the DNS server configuration

You can check and temporarily change the domain name system (DNS) servers that are currently in use by this appliance node.

### What you'll need

The appliance has been placed maintenance mode.

### Placing an appliance into maintenance mode

### About this task

You might need to change the DNS server settings if an encrypted appliance cannot connect to the key management server (KMS) or KMS cluster because the hostname for the KMS was specified as a domain name instead of an IP address. Any changes that you make to the DNS settings for the appliance are temporary and are lost when you exit maintenance mode. To make these changes permanent, specify the DNS servers in Grid Manager (**Maintenance > Network > DNS Servers**).

- Temporary changes to the DNS configuration are necessary only for node-encrypted appliances where the KMS server is defined using a fully qualified domain name, instead of an IP address, for the hostname.
- When a node-encrypted appliance connects to a KMS using a domain name, it must connect to one of the DNS servers defined for the grid. One of these DNS servers then translates the domain name into an IP address.
- If the node cannot reach a DNS server for the grid, or if you changed the grid-wide DNS settings when a node-encrypted appliance node was offline, the node is unable to connect to the KMS. Encrypted data on the appliance cannot be decrypted until the DNS issue is resolved.

To resolve a DNS issue preventing KMS connection, specify the IP address of one or more DNS servers in the StorageGRID Appliance Installer. These temporary DNS settings allow the appliance to connect to the KMS and decrypt data on the node.

For example, if the DNS server for the grid changes while an encrypted node was offline, the node will not be able to reach the KMS when it comes back online, since it is still using the previous DNS values. Entering the new DNS server IP address in the StorageGRID Appliance Installer allows a temporary KMS connection to decrypt the node data.

## Steps

1. From the StorageGRID Appliance Installer, select **Configure Networking > DNS Configuration**.
2. Verify that the DNS servers specified are correct.

### DNS Servers

 Configuration changes made on this page will not be passed to the StorageGRID software after appliance installation.

#### Servers

Server 1	<input type="text" value="10.224.223.135"/>	
Server 2	<input type="text" value="10.224.223.136"/>	 

3. If required, change the DNS servers.



Changes made to the DNS settings are temporary and are lost when you exit maintenance mode.

4. When you are satisfied with the temporary DNS settings, select **Save**.

The node uses the DNS server settings specified on this page to reconnect to the KMS, allowing data on the node to be decrypted.

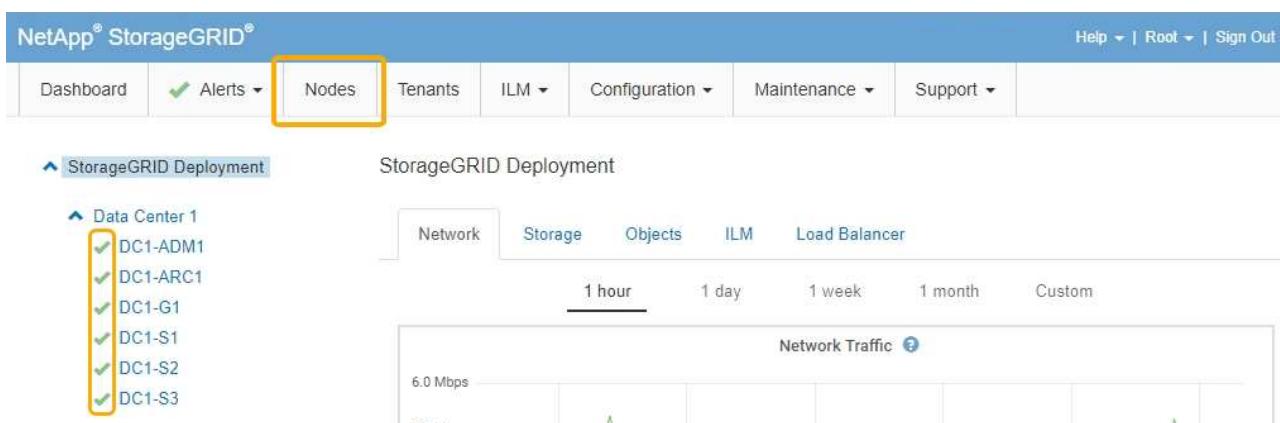
5. After node data is decrypted, reboot the node. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:

- Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
- Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



When the node reboots and rejoins the grid, it uses the system-wide DNS servers listed in the Grid Manager. After rejoining the grid, the appliance will no longer use the temporary DNS servers specified in the StorageGRID Appliance Installer while the appliance was in maintenance mode.

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** tab should display a normal status for the appliance node, indicating that no alerts are active and the node is connected to the grid.



### Monitoring node encryption in maintenance mode

If you enabled node encryption for the appliance during installation, you can monitor the node-encryption status of each appliance node, including the node-encryption state and key management server (KMS) details.

## What you'll need

- Node encryption must have been enabled for the appliance during installation. You cannot enable node encryption after the appliance is installed.
- The appliance has been placed into maintenance mode.

### Placing an appliance into maintenance mode

## Steps

1. From the StorageGRID Appliance Installer, select **Configure Hardware > Node Encryption**.

### Node Encryption

Node encryption allows you to use an external key management server (KMS) to encrypt all StorageGRID data on this appliance. If node encryption is enabled for the appliance and a KMS is configured for the site, you cannot access any data on the appliance unless the appliance can communicate with the KMS.

#### Encryption Status

**⚠** You can only enable node encryption for an appliance during installation. You cannot enable or disable the node encryption setting after the appliance is installed.

Enable node encryption

**Save**

#### Key Management Server Details

View the status and configuration details for the KMS that manages the encryption key for this appliance. You must use the Grid Manager to make configuration changes.

KMS display name thales

External key UID 41b0306abcce451facfce01b1b4870ae1c1ec6bd5e3849d790223766baf35c57

Hostnames 10.96.99.164  
10.96.99.165

Port 5696

#### Server certificate



#### Client certificate



#### Clear KMS Key

**⚠** Do not clear the KMS key if you need to access or preserve any data on this appliance.

If you want to reinstall this appliance node (for example, in another grid), you must clear the KMS key. When the KMS key is cleared, all data on this appliance is deleted.

**Clear KMS Key and Delete Data**

The Node Encryption page includes these three sections:

- Encryption Status shows whether node encryption is enabled or disabled for the appliance.
- Key Management Server Details shows information about the KMS being used to encrypt the appliance. You can expand the server and client certificate sections to view certificate details and status.

- To address issues with the certificates themselves, such as renewing expired certificates, see the information about KMS in the instructions for administering StorageGRID.
- If there are unexpected problems connecting to KMS hosts, verify that the domain name system (DNS) servers are correct and that appliance networking is correctly configured.

### Checking the DNS server configuration

- If you are unable to resolve your certificate issues, contact technical support.
- Clear KMS Key disables node encryption for the appliance, removes the association between the appliance and the key management server that was configured for the StorageGRID site, and deletes all data from the appliance. You must clear the KMS key before you can install the appliance into another StorageGRID system.

### Clearing the key management server configuration



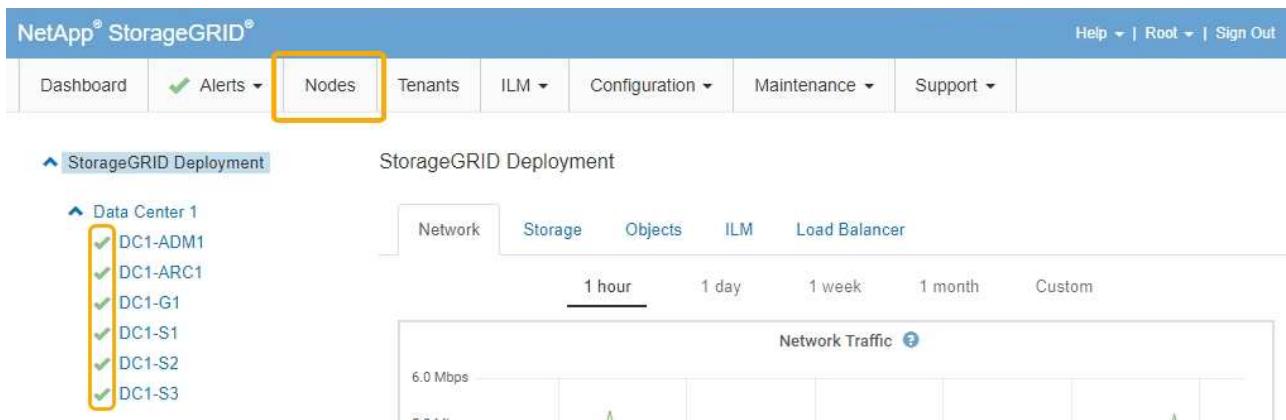
Clearing the KMS configuration deletes data from the appliance, rendering it permanently inaccessible. This data is not recoverable.

2. When you are done checking node-encryption status, reboot the node. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:

- Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
- Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



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** tab should display a normal status for the appliance node, indicating that no alerts are active and the node is connected to the grid.



## Related information

[Administer StorageGRID](#)

### Clearing the key management server configuration

Clearing the key management server (KMS) configuration disables node encryption on your appliance. After clearing the KMS configuration, the data on your appliance is permanently deleted and is no longer accessible. This data is not recoverable.

#### What you'll need

If you need to preserve data on the appliance, you must perform a node decommission procedure before you clear the KMS configuration.



When KMS is cleared, data on the appliance will be permanently deleted and no longer accessible. This data is not recoverable.

Decommission the node to move any data it contains to other nodes in StorageGRID. See the recovery and maintenance instructions for grid node decommissioning.

#### About this task

Clearing the appliance KMS configuration disables node encryption, removing the association between the appliance node and the KMS configuration for the StorageGRID site. Data on the appliance is then deleted and the appliance is left in a pre-install state. This process cannot be reversed.

You must clear the KMS configuration:

- Before you can install the appliance into another StorageGRID system, that does not use a KMS or that uses a different KMS.



Do not clear the KMS configuration if you plan to reinstall an appliance node in a StorageGRID system that uses the same KMS key.

- Before you can recover and reinstall a node where the KMS configuration was lost and the KMS key is not recoverable.
- Before returning any appliance that was previously in use at your site.
- After decommissioning a appliance that had node encryption enabled.



Decommission the appliance before clearing KMS to move its data to other nodes in your StorageGRID system. Clearing KMS before decommissioning the appliance will result in data loss and might render the appliance inoperable.

## Steps

1. Open a browser, and enter one of the IP addresses for the appliance's compute controller.

**[https://Controller\\_IP:8443](https://Controller_IP:8443)**

*Controller\_IP* is the IP address of the compute controller (not the storage controller) on any of the three StorageGRID networks.

The StorageGRID Appliance Installer Home page appears.

2. Select **Configure Hardware > Node Encryption**.

### Node Encryption

Node encryption allows you to use an external key management server (KMS) to encrypt all StorageGRID data on this appliance. If node encryption is enabled for the appliance and a KMS is configured for the site, you cannot access any data on the appliance unless the appliance can communicate with the KMS.

#### Encryption Status

**⚠** You can only enable node encryption for an appliance during installation. You cannot enable or disable the node encryption setting after the appliance is installed.

Enable node encryption

**Save**

#### Key Management Server Details

View the status and configuration details for the KMS that manages the encryption key for this appliance. You must use the Grid Manager to make configuration changes.

KMS display name thales

External key UID 41b0306abcce451facfce01b1b4870ae1c1ec6bd5e3849d790223766baf35c57

Hostnames 10.96.99.164  
10.96.99.165

Port 5696

**Server certificate**

**Client certificate**

#### Clear KMS Key

**⚠** Do not clear the KMS key if you need to access or preserve any data on this appliance.

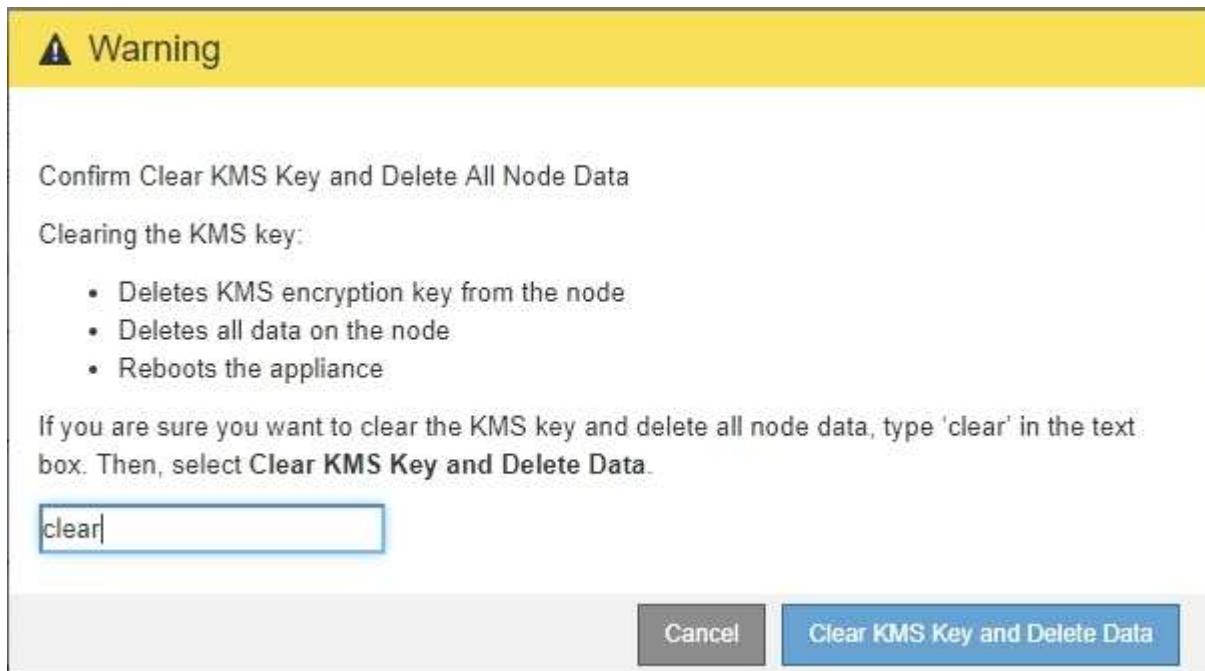
If you want to reinstall this appliance node (for example, in another grid), you must clear the KMS key. When the KMS key is cleared, all data on this appliance is deleted.

**Clear KMS Key and Delete Data**



If the KMS configuration is cleared, data on the appliance will be permanently deleted. This data is not recoverable.

3. At the bottom of the window, select **Clear KMS Key and Delete Data**.
4. If you are sure that you want to clear the KMS configuration, type **clear** and select **Clear KMS Key and Delete Data**.



The KMS encryption key and all data are deleted from the node, and the appliance reboots. This can take up to 20 minutes.

5. Open a browser, and enter one of the IP addresses for the appliance's compute controller.  
**[https://Controller\\_IP:8443](https://Controller_IP:8443)**  
*Controller\_IP* is the IP address of the compute controller (not the storage controller) on any of the three StorageGRID networks.
6. Select **Configure Hardware > Node Encryption**.
7. Verify that node encryption is disabled and that the key and certificate information in **Key Management Server Details** and the **Clear KMS Key and Delete Data** control are removed from the window.

Node encryption cannot be reenabled on the appliance until it is reinstalled in a grid.

#### After you finish

After the appliance reboots and you have verified that KMS has been cleared and that the appliance is in a pre-install state, you can physically remove the appliance from your StorageGRID system. See the recovery and maintenance instructions for information about preparing an appliance for reinstallation.

#### Related information

[Administer StorageGRID](#)

## SG5600 storage appliances

Learn how to install and maintain StorageGRID SG5612 and SG5660 appliances.

- [StorageGRID appliance overview](#)
- [Installation and deployment overview](#)
- [Preparing for installation](#)
- [Installing the hardware](#)
- [Configuring the hardware](#)
- [Deploying an appliance Storage Node](#)
- [Monitoring the storage appliance installation](#)
- [Automating appliance installation and configuration](#)
- [Overview of installation REST APIs](#)
- [Troubleshooting the hardware installation](#)
- [Maintaining the SG5600 appliance](#)

### StorageGRID appliance overview

The StorageGRID SG5600 appliance is an integrated storage and computing platform that operates as a Storage Node in a StorageGRID grid.

The StorageGRID SG5600 appliance includes the following components:

Component	Description
E5600SG controller	<p>Compute server</p> <p>The E5600SG controller runs the Linux operating system and the StorageGRID software.</p> <p>This controller connects to the following:</p> <ul style="list-style-type: none"><li>• The Admin, Grid, and Client Networks for the StorageGRID system</li><li>• The E2700 controller, using dual SAS paths (active/active) with the E5600SG controller operating as the initiator</li></ul>

Component	Description
E2700 controller	<p>Storage controller The E2700 controller operates as a standard E-Series storage array in simplex mode, and runs the SANtricity operating system (controller firmware).</p> <p>This controller connects to the following:</p> <ul style="list-style-type: none"> <li>• The management network where SANtricity Storage Manager is installed</li> <li>• The E5600SG controller, using dual SAS paths (active/active) with the E2700 controller operating as the target</li> </ul>

The SG5600 appliance also includes the following components, depending on the model:

Component	Model SG5612	Model SG5660
Drives	12 NL-SAS drives	60 NL-SAS drives
Enclosure	DE1600 enclosure, a two rack-unit (2U) chassis that houses the drives and the controllers	DE6600 enclosure, a four rack-unit (4U) chassis that houses the drives and the controllers
Power supplies and fans	Two power-fan canisters	Two power supplies and two fans



The E5600SG controller is highly customized for use in the StorageGRID appliance. All other components operate as described in E-Series documentation, except as indicated in these instructions.

The maximum raw storage available on each StorageGRID appliance Storage Node is fixed, based on the appliance model and configuration. You cannot expand the available storage by adding a shelf with additional drives.

## StorageGRID appliance features

The StorageGRID SG5600 appliance provides an integrated storage solution for creating a new StorageGRID system or for expanding the capacity of an existing system.

The StorageGRID appliance provides the following features:

- Combines the StorageGRID Storage Node computing and storage elements into a single, efficient, integrated solution
- Simplifies the installation and configuration of a Storage Node, automating most of the process required
- Provides a high-density storage solution with two enclosure options: one that is 2U and one that is 4U
- Uses 10-GbE IP interfaces directly to the Storage Node, without the need for intermediate storage interfaces such as FC or iSCSI

- Can be used in a hybrid grid environment that uses StorageGRID appliances and virtual (software-based) Storage Nodes
- Includes preconfigured storage and comes preloaded with the StorageGRID Appliance Installer (on the E5600SG controller) for field-ready software deployment and integration

## Hardware diagrams

The SG5612 and SG5660 models of the StorageGRID appliance both include an E2700 controller and an E5600SG controller. You should review the diagrams to learn the differences between the models and the controllers.

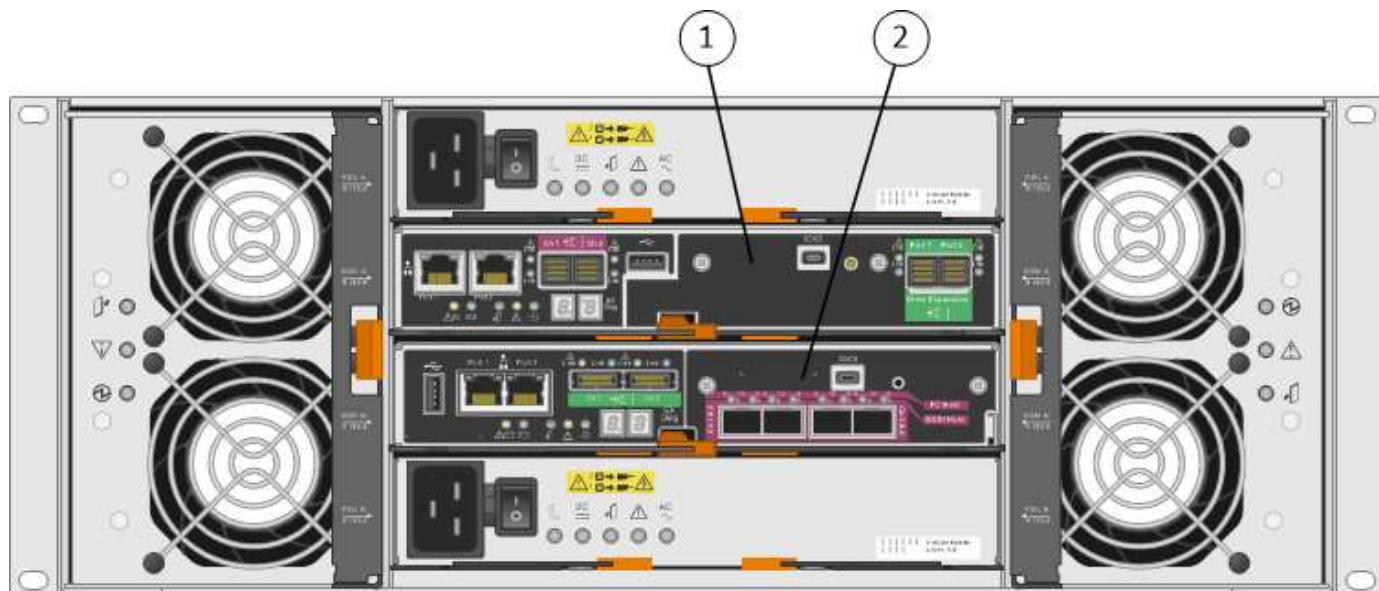
### Model SG5612 2U: Rear view of the E2700 controller and E5600SG controller



	Description
1	E2700 controller
2	E5600SG controller

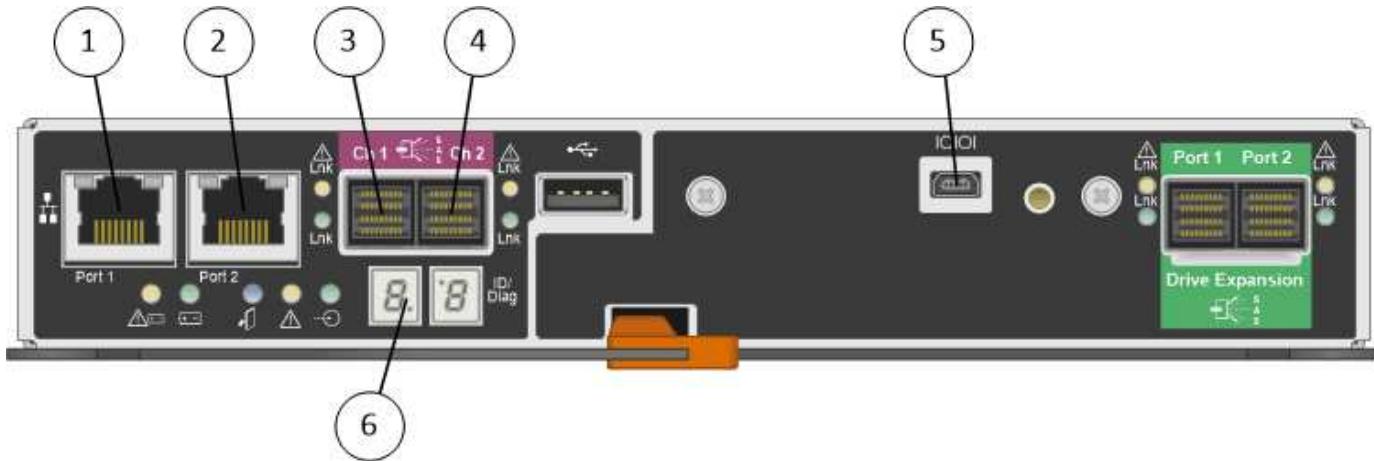
### Model SG5660 4U: Rear view of the E2700 controller and E5600SG controller

The E2700 controller is above the E5600SG controller.



	Description
1	E2700 controller
2	E5600SG controller

Rear view of the E2700 controller

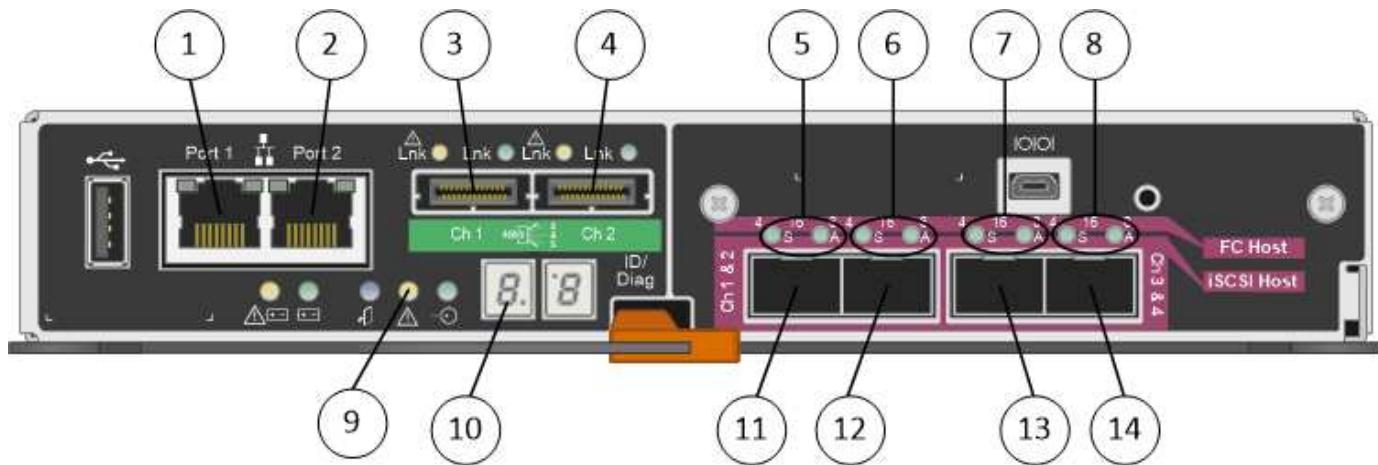


	Description
1	Management port 1 (Connect to the network where SANtricity Storage Manager is installed.)
2	Management port 2 (Use during installation to connect to a laptop.)
3	SAS interconnect port 1
4	SAS interconnect port 2
5	Serial connection port
6	Seven-segment display



The two SAS ports labeled Drive Expansion (green) on the rear of the E2700 controller are not used. The StorageGRID appliance does not support expansion drive shelves.

Rear view of the E5600SG controller



	<b>Description</b>
1	Management port 1 (Connect to the Admin network for StorageGRID.)
2	Management port 2 Options: <ul style="list-style-type: none"> <li>Bond with management port 1 for a redundant connection to the Admin Network for StorageGRID.</li> <li>Leave unwired and available for temporary local access (IP 169.254.0.1).</li> <li>During installation, use for IP configuration if DHCP-assigned IP addresses are not available.</li> </ul>
3	SAS interconnect port 1
4	SAS interconnect port 2
5	Fault and Active LEDs for 10-GbE network port 1
6	Fault and Active LEDs for 10-GbE network port 2
7	Fault and Active LEDs for 10-GbE network port 3
8	Fault and Active LEDs for 10-GbE network port 4
9	Needs Attention LED
10	Seven-segment display
11	10-GbE network port 1
12	10-GbE network port 2
13	10-GbE network port 3

	Description
14	10-GbE network port 4



The host interface card (HIC) on the StorageGRID appliance E5600SG controller supports only 10-Gb Ethernet connections. It cannot be used for iSCSI connections.

## Installation and deployment overview

You can install one or more StorageGRID appliances when you first deploy StorageGRID, or you can add appliance Storage Nodes later as part of an expansion. You might also need to install an appliance Storage Node as part of a recovery operation.

Adding a StorageGRID storage appliance to a StorageGRID system includes four primary steps:

### 1. Preparing for installation:

- Preparing the installation site
- Unpacking the boxes and checking the contents
- Obtaining additional equipment and tools
- Gathering IP addresses and network information
- Optional: Configuring an external key management server (KMS) if you plan to encrypt all appliance data. See details about external key management in the instructions for administering StorageGRID.

### 2. Installing the hardware:

- Registering the hardware
- Installing the appliance into a cabinet or rack
- Installing the drives (SG5660 only)
- Cabling the appliance
- Connecting the power cords and applying power
- Viewing boot-up status codes

### 3. Configuring the hardware:

- Accessing SANtricity Storage Manager, setting a static IP address for management port 1 on the E2700 controller, and configuring SANtricity Storage Manager settings
- Accessing StorageGRID Appliance Installer and configuring the link and network IP settings required to connect to StorageGRID networks
- Optional: Enabling node encryption if you plan to use an external KMS to encrypt appliance data.
- Optional: Changing the RAID mode.

### 4. Deploying the appliance as a Storage Node:

Task	Refer to
Deploying an appliance Storage Node in a new StorageGRID system	<a href="#">Deploying an appliance Storage Node</a>

Task	Refer to
Adding an appliance Storage Node to an existing StorageGRID system	Instructions for expanding a StorageGRID system
Deploying an appliance Storage Node as part of a Storage Node recovery operation	Instructions for recovery and maintenance

## Related information

[Preparing for installation](#)

[Installing the hardware](#)

[Configuring the hardware](#)

[Expand your grid](#)

[Maintain & recover](#)

[Administer StorageGRID](#)

## Preparing for installation

Preparing to install a StorageGRID appliance entails preparing the site and obtaining all required hardware, cables, and tools. You should also gather IP addresses and network information.

### Steps

- [Preparing the site \(SG5600\)](#)
- [Unpacking the boxes \(SG5600\)](#)
- [Obtaining additional equipment and tools \(SG5600\)](#)
- [Service laptop requirements](#)
- [Web browser requirements](#)
- [Reviewing appliance network connections](#)
- [Gathering installation information \(SG5600\)](#)

### Preparing the site (SG5600)

Before installing the appliance, you must make sure that the site and the cabinet or rack you plan to use meet the specifications for a StorageGRID appliance.

### Steps

1. Confirm that the site meets the requirements for temperature, humidity, altitude range, airflow, heat dissipation, wiring, power, and grounding. See the NetApp Hardware Universe for more information.
2. Obtain a 19-inch (48.3-cm) cabinet or rack to fit shelves of this size (without cables):

Appliance model	Height	Width	Depth	Maximum weight
SG5612 (12 drives)	3.40 in. (8.64 cm)	19.0 in. (48.26 cm)	21.75 in. (55.25 cm)	59.5 lb (27 kg)
SG5660 (60 drives)	7.00 in. (17.78 cm)	17.75 in. (45.08 cm)	32.50 in. (82.55 cm)	236.2 lb. (107.1 kg)

3. Install any required network switches. See the NetApp Interoperability Matrix Tool for compatibility information.

## Related information

[NetApp Hardware Universe](#)

[NetApp Interoperability](#)

### Unpacking the boxes (SG5600)

Before installing the StorageGRID appliance, unpack all boxes and compare the contents to the items on the packing slip.

- **SG5660 enclosure, a 4U chassis with 60 drives**



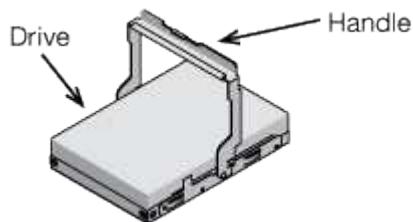
- **SG5612 enclosure, a 2U chassis with 12 drives**



- **4U bezel or 2U endcaps**

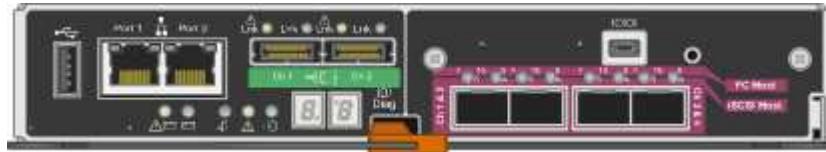


- **NL-SAS drives**



Drives are preinstalled in the 2U SG5612, but not in the 4U SG5660 for shipment safety.

- **E5600SG controller**



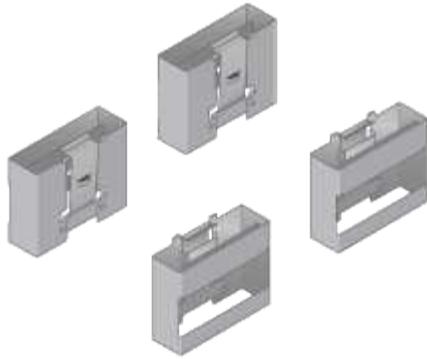
- **E2700 controller**



- **Mounting rails and screws**



- **Enclosure handles (4U enclosures only)**



#### Cables and connectors

The shipment for the StorageGRID appliance includes the following cables and connectors:

- **Power cords for your country**



The appliance ships with two AC power cords for connecting to an external power source, such as a wall plug. Your cabinet might have special power cords that you use instead of the power cords that ship with the appliance.

- **SAS interconnect cables**



Two 0.5-meter SAS interconnect cables with mini-SAS-HD and mini-SAS connectors.

The square connector plugs into the E2700 controller, and the rectangular connector plugs into the E5600SG controller.

#### Obtaining additional equipment and tools (SG5600)

Before installing the SG5600 appliance, confirm you have all of the additional equipment and tools that you need.

- **Screwdrivers**



Phillips No. 2 screwdriver

Medium flat-blade screwdrivers

- **ESD wrist strap**



- **Ethernet cables**



- **Ethernet switch**



- **Service laptop**



## Service laptop requirements

Before you install the StorageGRID appliance hardware, you should check to see if the service laptop has the minimum required resources.

The service laptop, which is needed for the hardware installation, must meet the following requirements:

- Microsoft Windows operating system
- Network port
- Supported web browser
- NetApp SANtricity Storage Manager version 11.40 or later
- SSH client (for example, PuTTY)

### Related information

[Web browser requirements](#)

[NetApp Documentation: SANtricity Storage Manager](#)

### Web browser requirements

You must use a supported web browser.

Web browser	Minimum supported version
Google Chrome	87
Microsoft Edge	87
Mozilla Firefox	84

You should set the browser window to a recommended width.

Browser width	Pixels
Minimum	1024
Optimum	1280

## Reviewing appliance network connections

Before installing the StorageGRID appliance, you should understand which networks can be connected to the appliance and how the ports on each controller are used.

### StorageGRID appliance networks

When you deploy a StorageGRID appliance as a Storage Node, you can connect it to the following networks:

- **Grid Network for StorageGRID:** The Grid Network is used for all internal StorageGRID traffic. It provides connectivity between all nodes in the grid, across all sites and subnets. The Grid Network is required.

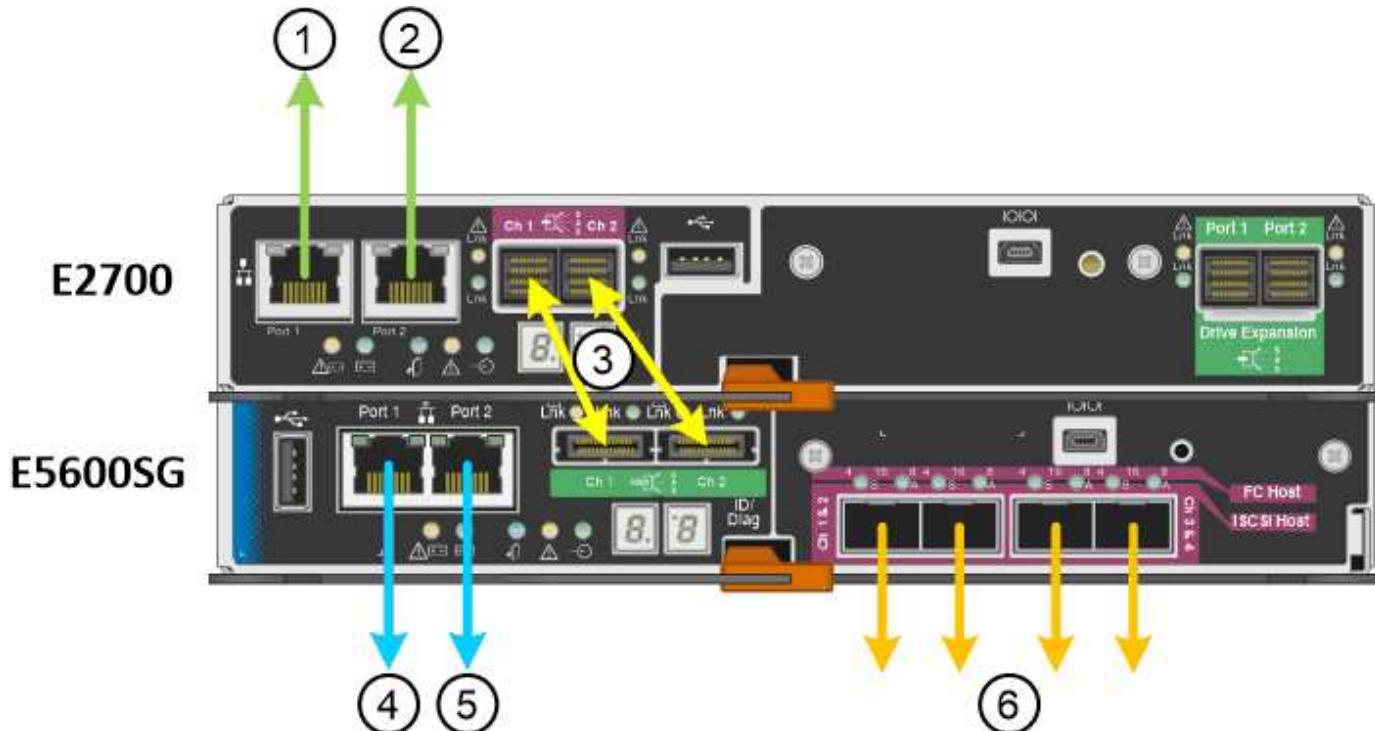
- **Admin Network for StorageGRID:** The Admin Network is a closed network used for system administration and maintenance. The Admin Network is typically a private network and does not need to be routable between sites. The Admin Network is optional.
- **Client Network for StorageGRID:** The Client Network is an open network used to provide access to client applications, including S3 and Swift. The Client Network provides client protocol access to the grid, so the Grid Network can be isolated and secured. The Client Network is optional.
- **Management network for SANtricity Storage Manager:** The E2700 controller connects to the management network where SANtricity Storage Manager is installed, allowing you to monitor and manage the hardware components in the appliance. This management network can be the same as the Admin Network for StorageGRID, or it can be an independent management network.



For detailed information about StorageGRID networks, see the *Grid Primer*.

#### StorageGRID appliance connections

When you install a StorageGRID appliance, you must connect the two controllers to each other and to the required networks. The figure shows the two controllers in the SG5660, with the E2700 controller on the top and the E5600SG controller on the bottom. In the SG5612, the E2700 controller is to the left of the E5600SG controller.



Item	Port	Type of port	Function
1	Management port 1 on the E2700 controller	1-Gb (RJ-45) Ethernet	Connects the E2700 controller to the network where SANtricity Storage Manager is installed.
2	Management port 2 on the E2700 controller	1-Gb (RJ-45) Ethernet	Connects the E2700 controller to a service laptop during installation.

Item	Port	Type of port	Function
3	Two SAS interconnect ports on each controller, labelled Ch 1 and Ch 2	E2700 controller: mini-SAS-HD  E5600SG controller: mini-SAS	Connect the two controllers to each other.
4	Management port 1 on the E5600SG controller	1-Gb (RJ-45) Ethernet	Connects the E5600SG controller to the Admin Network for StorageGRID.
5	Management port 2 on the E5600SG controller	1-Gb (RJ-45) Ethernet	<ul style="list-style-type: none"> <li>• Can be bonded with management port 1 if you want a redundant connection to the Admin Network.</li> <li>• Can be left unwired and available for temporary local access (IP 169.254.0.1).</li> <li>• Can be used to connect the E5600SG controller to a service laptop during installation, if a DHCP-assigned IP address is not available.</li> </ul>
6	Four network ports on the E5600SG controller	10-GbE (optical)	Connect to the Grid Network and the Client Network for StorageGRID. See “10-GbE port connections for the E5600SG controller.”

## Related information

[Port bond modes for the E5600SG controller ports](#)

[Gathering installation information \(SG5600\)](#)

[Cabling the appliance \(SG5600\)](#)

[Network guidelines](#)

[Install VMware](#)

[Install Red Hat Enterprise Linux or CentOS](#)

[Install Ubuntu or Debian](#)

## Port bond modes for the E5600SG controller ports

When configuring network links for the E5600SG controller ports, you can use port bonding for the 10-GbE ports that connect to the Grid Network and optional Client Network, and the 1-GbE management ports that connect to the optional Admin Network. Port bonding helps protect your data by providing redundant paths between StorageGRID networks and the appliance.

### Related information

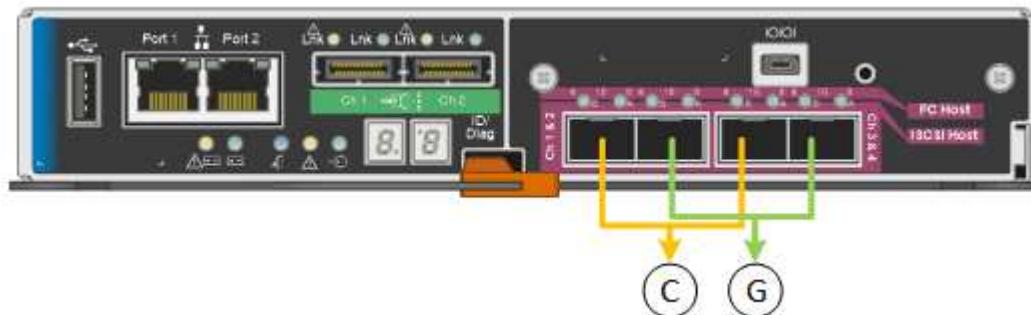
[Configuring network links \(SG5600\)](#)

### Network bond modes for the 10-GbE ports

The 10-GbE networking ports on the E5600SG controller support Fixed port bond mode or Aggregate port bond mode for the Grid Network and Client Network connections.

#### Fixed port bond mode

Fixed mode is the default configuration for the 10-GbE networking ports.



Which ports are bonded	
C	Ports 1 and 3 are bonded together for the Client Network, if this network is used.
G	Ports 2 and 4 are bonded together for the Grid Network.

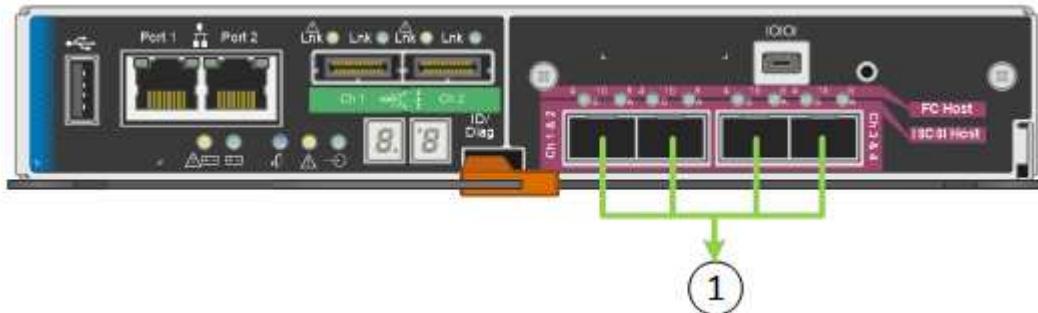
When using Fixed port bond mode, the ports can be bonded using active-backup mode or Link Aggregation Control Protocol mode (LACP 802.3ad).

- In active-backup mode (default), only one port is active at a time. If the active port fails, its backup port automatically provides a failover connection. Port 4 provides a backup path for port 2 (Grid Network), and port 3 provides a backup path for port 1 (Client Network).
- In LACP mode, each pair of ports forms a logical channel between the controller and the network, allowing for higher throughput. If one port fails, the other port continues to provide the channel. Throughput is reduced, but connectivity is not impacted.

 If you do not need redundant connections, you can use only one port for each network. However, be aware that an alarm will be raised in the Grid Manager after StorageGRID is installed, indicating that a cable is unplugged. You can safely acknowledge this alarm to clear it.

## Aggregate port bond mode

Aggregate port bond mode significantly increases the throughput for each StorageGRID network and provides additional failover paths.



Which ports are bonded	
1	All connected ports are grouped in a single LACP bond, allowing all ports to be used for Grid Network and Client Network traffic.

If you plan to use Aggregate port bond mode:

- You must use LACP network bond mode.
- You must specify a unique VLAN tag for each network. This VLAN tag will be added to each network packet to ensure that network traffic is routed to the correct network.
- The ports must be connected to switches that can support VLAN and LACP. If multiple switches are participating in the LACP bond, the switches must support multi-chassis link aggregation groups (MLAG), or equivalent.
- You must understand how to configure the switches to use VLAN, LACP, and MLAG, or equivalent.

If you do not want to use all four 10-GbE ports, you can use one, two, or three ports. Using more than one port maximizes the chance that some network connectivity will remain available if one of the 10-GbE ports fails.



If you choose to use fewer than four ports, be aware that one or more alarms will be raised in the Grid Manager after StorageGRID is installed, indicating that cables are unplugged. You can safely acknowledge the alarms to clear them.

## Network bond modes for the 1-GbE management ports

For the two 1-GbE management ports on the E5600SG controller, you can choose Independent network bond mode or Active-Backup network bond mode to connect to the optional Admin Network.

In Independent mode, only management port 1 is connected to the Admin Network. This mode does not provide a redundant path. Management port 2 is left unwired and available for temporary local connections (use IP address 169.254.0.1)

In Active-Backup mode, both management ports 1 and 2 are connected to the Admin Network. Only one port is active at a time. If the active port fails, its backup port automatically provides a failover connection. Bonding these two physical ports into one logical management port provides a redundant path to the Admin Network.



If you need to make a temporary local connection to the E5600SG controller when the 1-GbE management ports are configured for Active-Backup mode, remove the cables from both management ports, plug your temporary cable into management port 2, and access the appliance using IP address 169.254.0.1.



## Gathering installation information (SG5600)

As you install and configure the StorageGRID appliance, you must make decisions and gather information about Ethernet switch ports, IP addresses, and port and network bond modes.

### About this task

You can use the following tables to record information for each network you connect to the appliance. These values are required to install and configure the hardware.

#### Information needed to connect the E2700 controller to SANtricity Storage Manager

You must connect the E2700 controller to the management network you will use for SANtricity Storage Manager.

Information needed	Your value
Ethernet switch port you will connect to management port 1	
MAC address for management port 1 (printed on a label near port P1)	
DHCP-assigned IP address for management port 1, if available after power on  <b>Note:</b> If the network you will connect to the E2700 controller includes a DHCP server, the network administrator can use the MAC address to determine the IP address that was assigned by the DHCP server.	
Speed and duplex mode  <b>Note:</b> You must make sure the Ethernet switch for the SANtricity Storage Manager management network is set to autonegotiate.	Must be: <ul style="list-style-type: none"><li>Autonegotiate (default)</li></ul>

Information needed	Your value
IP address format	Choose one: <ul style="list-style-type: none"> <li>• IPv4</li> <li>• IPv6</li> </ul>
Static IP address you plan to use for the appliance on the management network	For IPv4: <ul style="list-style-type: none"> <li>• IPv4 address:</li> <li>• Subnet mask:</li> <li>• Gateway:</li> </ul> For IPv6: <ul style="list-style-type: none"> <li>• IPv6 address:</li> <li>• Routable IP address:</li> <li>• E2700 controller router IP address:</li> </ul>

#### Information needed to connect the E5600SG controller to the Admin Network

The Admin Network for StorageGRID is an optional network, used for system administration and maintenance. The appliance connects to the Admin Network using the 1-GbE management ports on the E5600SG controller.

Information needed	Your value
Admin Network enabled	Choose one: <ul style="list-style-type: none"> <li>• No</li> <li>• Yes (default)</li> </ul>
Network bond mode	Choose one: <ul style="list-style-type: none"> <li>• Independent</li> <li>• Active-Backup</li> </ul>
Switch port for management port 1 (P1)	
Switch port for management port 2 (P2; Active-Backup network bond mode only)	
MAC address for management port 1 (printed on a label near port P1)	

Information needed	Your value
<p>DHCP-assigned IP address for management port 1, if available after power on</p> <p><b>Note:</b> If the Admin Network includes a DHCP server, the E5600SG controller displays the DHCP-assigned IP address on its seven-segment display after it boots up. You can also determine the DHCP-assigned IP address by using the MAC address to look up the assigned IP.</p>	<ul style="list-style-type: none"> <li>IPv4 address (CIDR):</li> <li>Gateway:</li> </ul>
<p>Static IP address you plan to use for the appliance Storage Node on the Admin Network</p> <p><b>Note:</b> If your network does not have a gateway, specify the same static IPv4 address for the gateway.</p>	<ul style="list-style-type: none"> <li>IPv4 address (CIDR):</li> <li>Gateway:</li> </ul>
Admin Network subnets (CIDR)	

#### Information needed to connect and configure the 10-GbE ports on the E5600SG controller

The four 10-GbE ports on the E5600SG controller connect to the StorageGRID Grid Network and Client Network.



See "10-GbE port connections for the E5600SG controller" for more information about the options for these ports.

Information needed	Your value
Port bond mode	<p>Choose one:</p> <ul style="list-style-type: none"> <li>Fixed (default)</li> <li>Aggregate</li> </ul>
Switch port for port 1 (Client Network for Fixed mode)	
Switch port for port 2 (Grid Network for Fixed mode)	
Switch port for port 3 (Client Network for Fixed mode)	
Switch port for port 4 (Grid Network for Fixed mode)	

#### Information needed to connect the E5600SG controller to the Grid Network

The Grid Network for StorageGRID is a required network, used for all internal StorageGRID traffic. The appliance connects to the Grid Network using the 10-GbE ports on the E5600SG controller.



See "10-GbE port connections for the E5600SG controller" for more information about the options for these ports.

Information needed	Your value
Network bond mode	<p>Choose one:</p> <ul style="list-style-type: none"><li>• Active-Backup (default)</li><li>• LACP (802.3ad)</li></ul>
VLAN tagging enabled	<p>Choose one:</p> <ul style="list-style-type: none"><li>• No (default)</li><li>• Yes</li></ul>
VLAN tag(if VLAN tagging is enabled)	Enter a value between 0 and 4095:
DHCP-assigned IP address for the Grid Network, if available after power on  <b>Note:</b> If the Grid Network includes a DHCP server, the E5600SG controller displays the DHCP-assigned IP address for the Grid Network on its seven-segment display after it boots up.	<ul style="list-style-type: none"><li>• IPv4 address (CIDR):</li><li>• Gateway:</li></ul>
Static IP address you plan to use for the appliance Storage Node on the Grid Network  <b>Note:</b> If your network does not have a gateway, specify the same static IPv4 address for the gateway.	<ul style="list-style-type: none"><li>• IPv4 address (CIDR):</li><li>• Gateway:</li></ul>
Grid Network subnets (CIDR)  <b>Note:</b> If the Client Network is not enabled, the default route on the controller will use the gateway specified here.	

#### Information needed to connect the E5600SG controller to the Client Network

The Client Network for StorageGRID is an optional network, used to provide client protocol access to the grid. The appliance connects to the Client Network using the 10-GbE ports on the E5600SG controller.



See "10-GbE port connections for the E5600SG controller" for more information about the options for these ports.

Information needed	Your value
Client Network enabled	Choose one: <ul style="list-style-type: none"> <li>• No (default)</li> <li>• Yes</li> </ul>
Network bond mode	Choose one: <ul style="list-style-type: none"> <li>• Active-Backup (default)</li> <li>• LACP (802.3ad)</li> </ul>
VLAN tagging enabled	Choose one: <ul style="list-style-type: none"> <li>• No (default)</li> <li>• Yes</li> </ul>
VLAN tag(if VLAN tagging is enabled)	Enter a value between 0 and 4095:
DHCP-assigned IP address for the Client Network, if available after power on	<ul style="list-style-type: none"> <li>• IPv4 address (CIDR):</li> <li>• Gateway:</li> </ul>
Static IP address you plan to use for the appliance Storage Node on the Client Network  <b>Note:</b> If the Client Network is enabled, the default route on the controller will use the gateway specified here.	<ul style="list-style-type: none"> <li>• IPv4 address (CIDR):</li> <li>• Gateway:</li> </ul>

## Related information

[Reviewing appliance network connections](#)

[Configuring the hardware](#)

[Port bond modes for the E5600SG controller ports](#)

## Installing the hardware

Hardware installation includes several major tasks, including installing hardware components, cabling those components, and configuring ports.

### Steps

- [Registering the hardware](#)
- [Installing the appliance in a cabinet or rack \(SG5600\)](#)
- [Cabling the appliance \(SG5600\)](#)
- [Connecting the AC power cords \(SG5600\)](#)
- [Turning power on \(SG5600\)](#)

- Viewing boot-up status and reviewing error codes on the SG5600 controllers

## Registering the hardware

Registering the appliance hardware provides support benefits.

### Steps

1. Locate the chassis serial number.

You can find the number on the packing slip, in your confirmation email, or on the appliance after you unpack it.



2. Go to the NetApp Support Site at [mysupport.netapp.com](http://mysupport.netapp.com).
3. Determine whether you need to register the hardware:

If you are a...	Follow these steps...
Existing NetApp customer	<ol style="list-style-type: none"> <li>Sign in with your username and password.</li> <li>Select <b>Products &gt; My Products</b>.</li> <li>Confirm that the new serial number is listed.</li> <li>If it is not, follow the instructions for new NetApp customers.</li> </ol>
New NetApp customer	<ol style="list-style-type: none"> <li>Click <b>Register Now</b>, and create an account.</li> <li>Select <b>Products &gt; Register Products</b>.</li> <li>Enter the product serial number and requested details.</li> </ol> <p>After your registration is approved, you can download any required software. The approval process might take up to 24 hours.</p>

## Installing the appliance in a cabinet or rack (SG5600)

You must install rails in your cabinet or rack and then slide the appliance onto the rails. If you have an SG5660, you must also install the drives after installing the appliance.

### What you'll need

- You have reviewed the Safety Notices document included in the box, and understand the precautions for moving and installing hardware.
- You have the E-Series installation instructions for the hardware.



Install hardware from the bottom of the rack or cabinet or rack up to prevent the equipment from tipping over.

- ! The SG5612 weighs approximately 60 lb (27 kg) when fully loaded with drives. Two people or a mechanized lift are required to safely move the SG5612.
- ! The SG5660 weighs approximately 132 lb (60 kg) with no drives installed. Four people or a mechanized lift are required to safely move an empty SG5660.
- ! To avoid damaging the hardware, never move an SG5660 if drives are installed. You must remove all drives before moving the appliance.

## About this task

Complete the following tasks to install the SG5660 appliance in a cabinet or rack.

- **Install the mounting rails**

Install the mounting rails in the cabinet or rack.

See the E-Series installation instructions for the E2700 or the E5600.

- **Install the appliance in the cabinet or rack**

Slide the appliance into the cabinet or rack, and secure it.

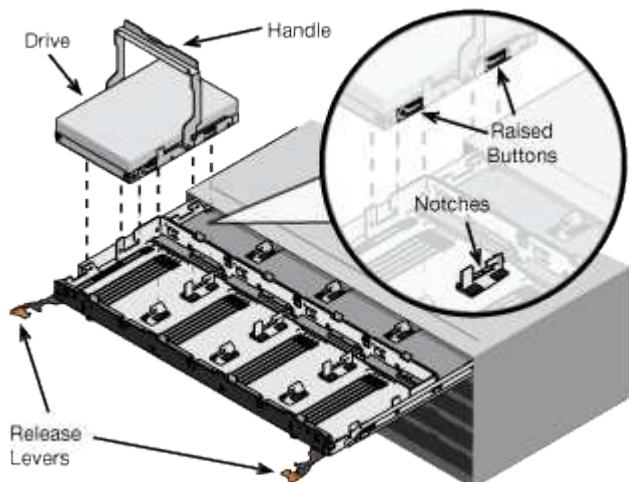
- i If you are lifting the SG5660 by hand, attach the four handles to the sides of the chassis. You remove these handles as you slide the appliance onto the rails.

- **Install the drives**

If you have an SG5660, install 12 drives in each of the 5 drive drawers.

You must install all 60 drives to ensure correct operation.

- Put on the ESD wristband, and remove the drives from their packaging.
- Release the levers on the top drive drawer, and slide the drawer out using the levers.
- Raise the drive handle to vertical, and align the buttons on the drive with the notches on the drawer.



- Pressing gently on the top of the drive, rotate the drive handle down until the drive snaps into place.

e. After installing the first 12 drives, slide the drawer back in by pushing on the center and closing both levers gently.

f. Repeat these steps for the other four drawers.

- **Attach the front bezel**

**SG5612:** Attach the left and right end caps to the front.

**SG5660:** Attach the bezel to the front.

#### Related information

[E2700 Controller-Drive Tray and Related Drive Trays Installation Guide](#)

[E5600 Controller-Drive Tray and Related Drive Trays Installation Guide](#)

#### Cabling the appliance (SG5600)

You must connect the two controllers to each other with SAS interconnect cables, connect the management ports to the appropriate management network, and connect the 10 GbE ports on the E5600SG controller to the Grid Network and optional Client Network for StorageGRID.

#### What you'll need

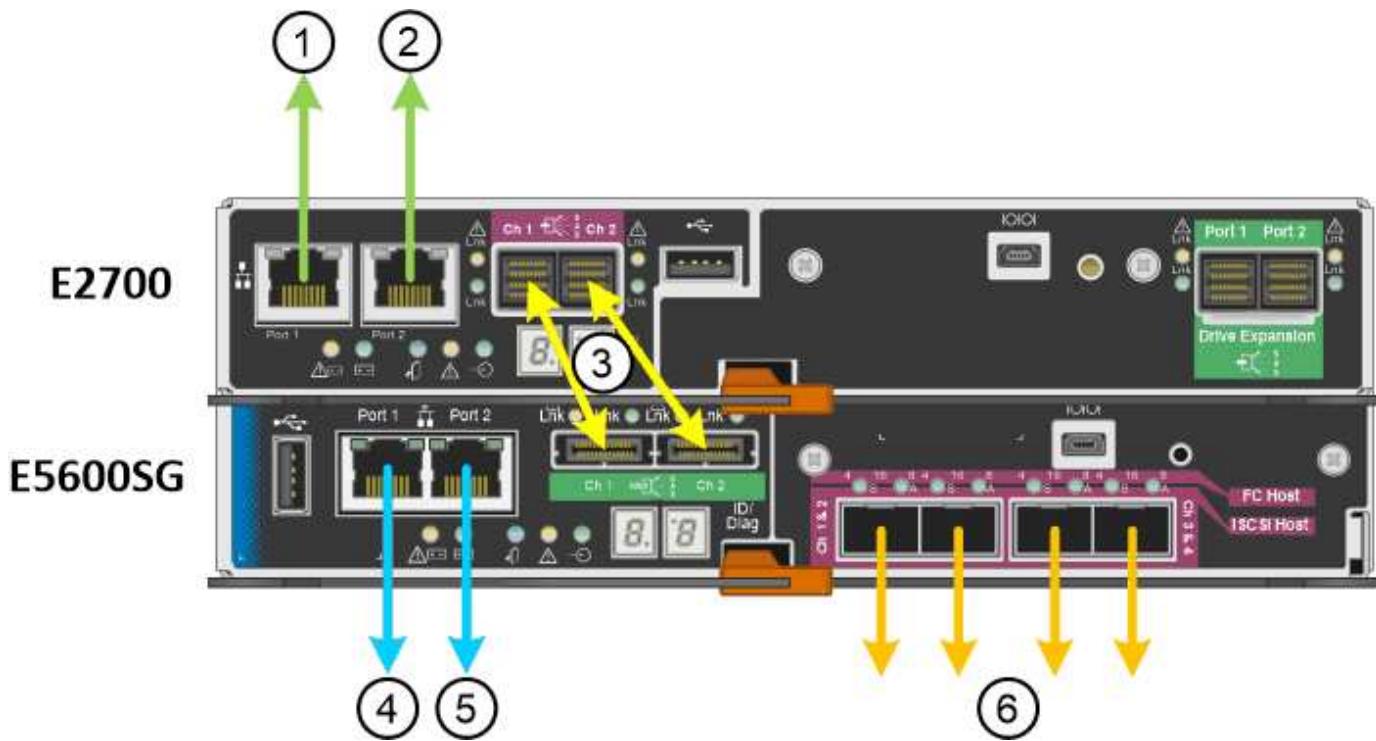
- You have Ethernet cables for connecting the management ports.
- You have optical cables for connecting the four 10-GbE ports (these are not provided with the appliance).



**Risk of exposure to laser radiation** — Do not disassemble or remove any part of an SFP transceiver. You might be exposed to laser radiation.

#### About this task

When connecting the cables, refer to the following diagram, which shows the E2700 controller on the top and the E5600SG controller on the bottom. The diagram shows the SG5660 model; the controllers in the SG5612 model are side by side instead of stacked.



Item	Port	Type of port	Function
1	Management port 1 on the E7200 controller	1-Gb (RJ-45) Ethernet	Connects the E7200 controller to the network where SANtricity Storage Manager is installed.
2	Management port 2 on the E7200 controller	1-Gb (RJ-45) Ethernet	Connects the E7200 controller to a service laptop during installation.
3	Two SAS interconnect ports on each controller, labelled Ch 1 and Ch 2	E7200 controller: mini-SAS-HD E5600SG controller: mini-SAS	Connect the two controllers to each other.
4	Management port 1 on the E5600SG controller	1-Gb (RJ-45) Ethernet	Connects the E5600SG controller to the Admin Network for StorageGRID.

Item	Port	Type of port	Function
5	Management port 2 on the E5600SG controller	1-Gb (RJ-45) Ethernet	<ul style="list-style-type: none"> <li>• Can be bonded with management port 1 if you want a redundant connection to the Admin Network.</li> <li>• Can be left unwired and available for temporary local access (IP 169.254.0.1).</li> <li>• Can be used to connect the E5600SG controller to a service laptop during installation if DHCP-assigned IP addresses are not available.</li> </ul>
6	Four network ports on the E5600SG controller	10-GbE (optical)	Connect the E5600SG controller to the Grid Network and to the Client Network (if used) for StorageGRID. The ports can be bonded together to provide redundant paths to the controller.

## Steps

1. Connect the E2700 controller to the E5600SG controller, using the two SAS interconnect cables.

Connect this port...	To this port...
SAS interconnect port 1 (labeled Ch 1) on the E2700 controller	SAS interconnect port 1 (labeled Ch 1) on the E5600SG controller
SAS interconnect port 2 (labeled Ch 2) on the E2700 controller	SAS interconnect port 2 (labeled Ch 2) on the E5600SG controller

Use the square connector (mini-SAS HD) for the E2700 controller, and use the rectangular connector (mini-SAS) for the E5600SG controller.



Make sure the pull tabs on the SAS connectors are at the bottom, and carefully insert each connector until it clicks into place. Do not push on the connector if there is any resistance. Verify the position of the pull tab before continuing.

2. Connect the E2700 controller to the management network where SANtricity Storage Manager software is installed, using an Ethernet cable.

Connect this port...	To this port...
Port 1 on the E2700 controller (the RJ-45 port on the left)	Switch port on the management network used for SANtricity Storage Manager
Port 2 on the E2700 controller	Service laptop, if not using DHCP

3. If you plan to use the Admin Network for StorageGRID, connect the E5600SG controller, using an Ethernet cable.

Connect this port...	To this port...
Port 1 on the E5600SG controller (the RJ-45 port on the left)	Switch port on the Admin Network for StorageGRID
Port 2 on the E5600SG controller	Service laptop, if not using DHCP

4. Connect the 10-GbE ports on the E5600SG controller to the appropriate network switches, using optical cables and SFP+ transceivers.

- If you plan to use Fixed port bond mode (default), connect the ports to the StorageGRID Grid and Client Networks, as shown in the table.

Port	Connects to...
Port 1	Client Network (optional)
Port 2	Grid Network
Port 3	Client Network (optional)
Port 4	Grid Network

- If you plan to use the Aggregate port bond mode, connect one or more of the network ports to one or more switches. You should connect at least two of the four ports to avoid having a single point of failure. If you use more than one switch for a single LACP bond, the switches must support MLAG or equivalent.

## Related information

[Port bond modes for the E5600SG controller ports](#)

[Accessing the StorageGRID Appliance Installer](#)

## Connecting the AC power cords (SG5600)

You must connect the AC power cords to the external power source and to the AC power connector on each controller. After you have connected the power cords, you can turn the power on.

## What you'll need

Both appliance power switches must be off before connecting power.



**Risk of electrical shock** — Before connecting the power cords, make sure that the two power switches on the appliance are off.

## About this task

- You should use separate power sources for each power supply.

Connecting to independent power sources maintains power redundancy.

- You can use the power cords shipped with the controller with typical outlets used in the destination country, such as wall receptacles of an uninterrupted power supply (UPS).

However, these power cords are not intended for use in most EIA-compliant cabinets.

## Steps

1. Turn off the power switches in the enclosure or chassis.
2. Turn off the power switches on the controllers.
3. Connect the primary power cords from the cabinet to the external power sources.
4. Connect the power cords to the AC power connector on each controller.

## Turning power on (SG5600)

Powering on the enclosure provides power to both controllers.

## Steps

1. Turn on the two power supply switches at the rear of the enclosure.

While the power is being applied, the LEDs on the controllers go on and off intermittently.

The power-on process can take up to ten minutes to complete. The controllers reboot several times during the initial startup sequence, which causes the fans to ramp up and down and the LEDs to flash.

2. Check the Power LED and the Host Link Active LEDs on each controller to verify that the power was turned on.
3. Wait for all drives to show a persistent green LED, indicating that they have come online.
4. Check for green LEDs on the front and rear of the enclosure.

If you see any amber LEDs, make a note of their locations.

5. Look at the seven-segment display for the E5600SG controller.

This display shows **HO**, followed by a repeating sequence of two digits.

HO -- IP address for Admin Network -- IP address for Grid Network HO

In the sequence, the first set of numbers is the DHCP-assigned IP address for the controller's management port 1. This address is used to connect the controller to the Admin Network for StorageGRID. The second set of numbers is the DHCP-assigned IP address used to connect the appliance to the Grid Network for



If an IP address could not be assigned using DHCP, 0.0.0.0 is displayed.

## Viewing boot-up status and reviewing error codes on the SG5600 controllers

The seven-segment display on each controller shows status and error codes when the appliance powers up, while the hardware is initializing, and when the hardware fails and must back out of the initialization. If you are monitoring the progress or troubleshooting, you should watch the sequence of the codes as they appear.

### About this task

The status and error codes for the E5600SG controller are not the same as those for the E2700 controller.

### Steps

1. During boot-up, view the codes shown on the seven-segment displays to monitor progress.
2. To review error codes for the E5600SG controller, see the seven-segment display status and error code information.
3. To review error codes for the E2700 controller, see the E2700 controller documentation on the Support Site.

### Related information

[E5600SG controller seven-segment display codes](#)

[NetApp Documentation: E2700 Series](#)

### E5600SG controller seven-segment display codes

The seven-segment display on the E5600SG controller shows status and error codes while the appliance powers up and while the hardware is initializing. You can use these codes to determine status and troubleshoot errors.

When reviewing status and error codes on the E5600SG controller, you should look at the following types of codes:

- **General boot-up codes**

Represent the standard boot-up events.

- **Normal boot-up codes**

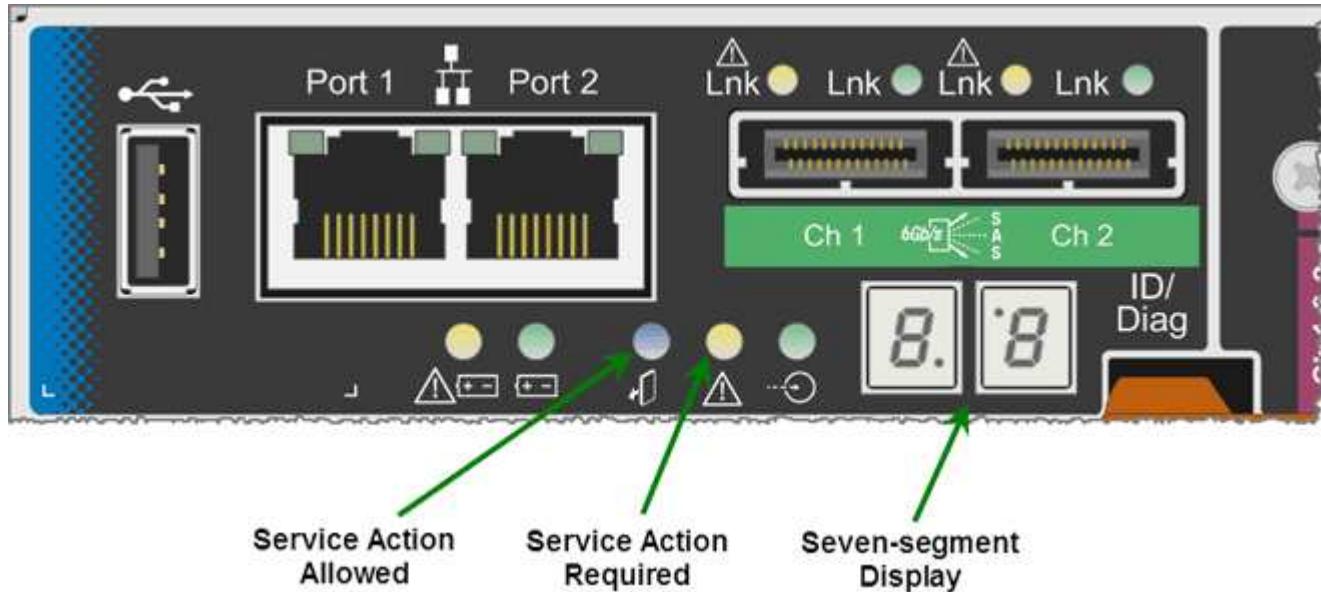
Represent the normal boot-up events that occur in the appliance.

- **Error codes**

Indicate issues during the boot-up events.

StorageGRID controls only the following LEDs on the E5600SG controller and only after the StorageGRID Appliance Installer has started:

- Service Action Allowed LED
- Service Action Required LED
- Seven-segment display



The decimal points on the seven-segment display are not used by the StorageGRID appliance:

- The upper decimal point adjacent to the least significant digit is the platform diagnostic LED.  
This is turned on during reset and initial hardware configuration. Otherwise, it is turned off.
- The lower decimal point adjacent to the most significant digit is turned off.

To diagnose other issues, you might want to look at these resources:

- To see all other hardware and environmental diagnostic information, see the E-Series operating system hardware diagnostics.

This includes looking for hardware issues such as power, temperature, and disk drives. The appliance relies on the E-Series operating system to monitor all platform environmental statuses.

- To determine firmware and driver issues, look at the link lights on the SAS and network ports.

For details, see the E-Series E5600 documentation.

### General boot-up codes

During boot-up or after a hard reset of the hardware, the Service Action Allowed and the Service Action Required LEDs come on while the hardware is initializing. The seven-segment display shows a sequence of codes that are the same for E-Series hardware and not specific to the E5600SG controller.

During boot-up, the Field Programmable Gate Array (FPGA) controls the functions and initialization on the hardware.

Code	Indication
19	FPGA initialization.
68	FPGA initialization.
...	FPGA initialization. This is a quick succession of codes.
AA	Platform BIOS booting.
FF	Bios boot-up complete. This is an intermediate state before E5600SG controller initializes and manages LEDs to indicate status.

After the AA and FF codes appear, either the normal boot-up codes appear or error codes appear. Additionally, the Service Action Allowed and the Service Action Required LEDs are turned off.

### Normal boot-up codes

These codes represent the normal boot-up events that occur in the appliance, in chronological order.

Code	Indication
HI	The master boot script has started.
PP	The platform FPGA firmware is checking for updates.
HP	The host interface card (HIC) is checking for updates.
RB	After firmware updates, the system is rebooting, if necessary.
FP	The firmware update checks have been completed. Starting the process (utmagent) to communicate with and manage the E2700 controller. This process facilitates appliance provisioning.
HE	The system is synchronizing with the E-Series operating system.
HC	The StorageGRID installation is being checked.
HO	Installation management and active interfacing are occurring.
HA	The Linux operating system and StorageGRID are running.

## E5600SG controller error codes

These codes represent error conditions that might be shown on the E5600SG controller as the appliance boots up. Additional two-digit hexadecimal codes are displayed if specific low-level hardware errors occur. If any of these codes persists for more than a second or two, or if you are unable to resolve the error by following one of the prescribed troubleshooting procedures, contact technical support.

Code	Indication
22	No master boot record found on any boot device.
23	No SATA drive installed.
2A, 2B	Stuck bus, unable to read DIMM SPD data.
40	Invalid DIMMs.
41	Invalid DIMMs.
42	Memory test failed.
51	SPD reading failure.
92 to 96	PCI bus initialization.
A0 to A3	SATA drive initialization.
AB	Alternate boot code.
AE	Booting OS.
EA	DDR3 training failed.
E8	No memory installed.
EU	The installation script was not found.
EP	"ManageSGA" code indicates that pregrid communication with the E2700 controller failed.

### Related information

[Troubleshooting the hardware installation](#)

[NetApp Support](#)

## Configuring the hardware

After applying power to the appliance, you must configure SANtricity Storage Manager, which is the software you will use to monitor the hardware. You must also configure the network connections that will be used by StorageGRID.

### Steps

- [Configuring StorageGRID connections](#)
- [Configuring SANtricity Storage Manager](#)
- [Optional: Enabling node encryption](#)
- [Optional: Changing to RAID6 mode \(SG5660 only\)](#)
- [Optional: Remapping network ports for the appliance](#)

### Configuring StorageGRID connections

Before you can deploy a StorageGRID appliance as a Storage Node in a StorageGRID grid, you must configure the connections between the appliance and the networks you plan to use. You can configure networking by browsing to the StorageGRID Appliance Installer, which is included on the E5600SG controller (the compute controller in the appliance).

### Steps

- [Accessing the StorageGRID Appliance Installer](#)
- [Verifying and upgrading the StorageGRID Appliance Installer version](#)
- [Configuring network links \(SG5600\)](#)
- [Setting the IP configuration](#)
- [Verifying network connections](#)
- [Verifying port-level network connections](#)

### Accessing the StorageGRID Appliance Installer

You must access the StorageGRID Appliance Installer to configure the connections between the appliance and the three StorageGRID networks: the Grid Network, the Admin Network (optional), and the Client Network (optional).

### What you'll need

- You are using a supported web browser.
- The appliance is connected to all of the StorageGRID networks you plan to use.
- You know the IP address, gateway, and subnet for the appliance on these networks.
- You have configured the network switches you plan to use.

### About this task

When you first access the StorageGRID Appliance Installer, you can use the DHCP-assigned IP address for the Admin Network (assuming the appliance is connected to the Admin Network) or the DHCP-assigned IP address for the Grid Network. Using the IP address for the Admin Network is preferred. Otherwise, if you access the StorageGRID Appliance Installer using the DHCP address for the Grid Network, you might lose

connection with the StorageGRID Appliance Installer when you change link settings and when you enter a static IP.

## Steps

1. Obtain the DHCP address for the appliance on the Admin Network (if it is connected) or the Grid Network (if the Admin Network is not connected).

You can do either of the following:

- Provide the MAC address for management port 1 to your network administrator, so they can look up the DHCP address for this port on the Admin Network. The MAC address is printed on a label on the E5600SG controller, next to the port.
- Look at the seven-segment display on the E5600SG controller. If management port 1 and 10-GbE ports 2 and 4 on the E5600SG controller are connected to networks with DHCP servers, the controller attempts to obtain dynamically assigned IP addresses when you power on the enclosure. After the controller has completed the power-on process, its seven-segment display shows **HO**, followed by a repeating sequence of two numbers.

HO -- IP address for Admin Network -- IP address for Grid Network HO

In the sequence:

- The first set of numbers is the DHCP address for the appliance Storage Node on the Admin Network, if it is connected. This IP address is assigned to management port 1 on the E5600SG controller.
- The second set of numbers is the DHCP address for the appliance Storage Node on the Grid Network. This IP address is assigned to 10-GbE ports 2 and 4 when you first apply power to the appliance.



If an IP address could not be assigned using DHCP, 0.0.0.0 is displayed.

2. If you were able to obtain either of the DHCP addresses:

- a. Open a web browser on the service laptop.
- b. Enter this URL for the StorageGRID Appliance Installer:

**[https://E5600SG\\_Controller\\_IP:8443](https://E5600SG_Controller_IP:8443)**

For *E5600SG\_Controller\_IP*, use the DHCP address for the controller (use the IP address for the Admin Network if you have it).

- c. If you are prompted with a security alert, view and install the certificate using the browser's installation wizard.

The alert will not appear the next time you access this URL.

The StorageGRID Appliance Installer Home page appears. The information and messages shown when you first access this page depend on how your appliance is currently connected to StorageGRID networks. Error messages might appear that will be resolved in later steps.

# NetApp® StorageGRID® Appliance Installer

[Home](#)[Configure Networking](#)[Configure Hardware](#)[Monitor Installation](#)[Advanced](#)

## Home

**ⓘ** The installation is ready to be started. Review the settings below, and then click Start Installation.

### This Node

Node type

Storage

Node name

MM-2-108-SGA-lab25

[Cancel](#)

[Save](#)

### Primary Admin Node connection

Enable Admin Node discovery

Primary Admin Node IP

172.16.1.178

Connection state

Connection to 172.16.1.178 ready

[Cancel](#)

[Save](#)

### Installation

Current state

Ready to start installation of MM-2-108-SGA-lab25 into grid with Admin Node 172.16.1.178 running StorageGRID 11.2.0, using StorageGRID software downloaded from the Admin Node.

[Start Installation](#)

3. If the E5600SG controller could not acquire an IP address using DHCP:

a. Connect the service laptop to management port 2 on the E5600SG controller, using an Ethernet cable.



b. Open a web browser on the service laptop.

- c. Enter this URL for the StorageGRID Appliance Installer:

**<https://169.254.0.1:8443>**

The StorageGRID Appliance Installer Home page appears. The information and messages shown when you first access this page depend on how your appliance is currently connected.



If you cannot access the Home page over a link-local connection, configure the service laptop IP address as 169.254.0.2, and try again.

4. Review any messages displayed on the Home page and configure the link configuration and the IP configuration, as required.

## Related information

### [Web browser requirements](#)

#### **Verifying and upgrading the StorageGRID Appliance Installer version**

The StorageGRID Appliance Installer version on the appliance must match the software version installed on your StorageGRID system to ensure that all StorageGRID features are supported.

#### **What you'll need**

You have accessed the StorageGRID Appliance Installer.

StorageGRID appliances come from the factory preinstalled with the StorageGRID Appliance Installer. If you are adding an appliance to a recently upgraded StorageGRID system, you might need to manually upgrade the StorageGRID Appliance Installer before installing the appliance as a new node.

The StorageGRID Appliance Installer automatically upgrades when you upgrade to a new StorageGRID version. You do not need to upgrade the StorageGRID Appliance Installer on installed appliance nodes. This procedure is only required when you are installing an appliance that contains an earlier version of the StorageGRID Appliance Installer.

#### **Steps**

1. From the StorageGRID Appliance Installer, select **Advanced > Upgrade Firmware**.
2. Compare the Current Firmware version to the software version installed on your StorageGRID system (from the Grid Manager select **Help > About**).

The second digit in the two versions should match. For example, if your StorageGRID system is running version 11.5.x.y, the StorageGRID Appliance Installer version should be 3.5.z.

3. If the appliance has a down-level version of the StorageGRID Appliance Installer, go to the NetApp Downloads page for StorageGRID.

### [NetApp Downloads: StorageGRID](#)

Sign in with the username and password for your NetApp account.

4. Download the appropriate version of the **Support file for StorageGRID Appliances** and the corresponding checksum file.

The Support file for StorageGRID Appliances file is a .zip archive that contains the current and previous

firmware versions for all StorageGRID appliance models, in subdirectories for each controller type.

After downloading the Support file for StorageGRID Appliances file, extract the .zip archive and see the README file for important information about installing the StorageGRID Appliance Installer.

5. Follow the instructions on the Upgrade Firmware page of the StorageGRID Appliance Installer to perform these steps:

- a. Upload the appropriate support file (firmware image) for your controller type and the checksum file.
- b. Upgrade the inactive partition.
- c. Reboot and swap partitions.
- d. Upgrade the second partition.

## Related information

[Accessing the StorageGRID Appliance Installer](#)

### Configuring network links (SG5600)

You can configure network links for the ports used to connect the appliance to the Grid Network, the Client Network, and the Admin Network. You can set the link speed as well as the port and network bond modes.

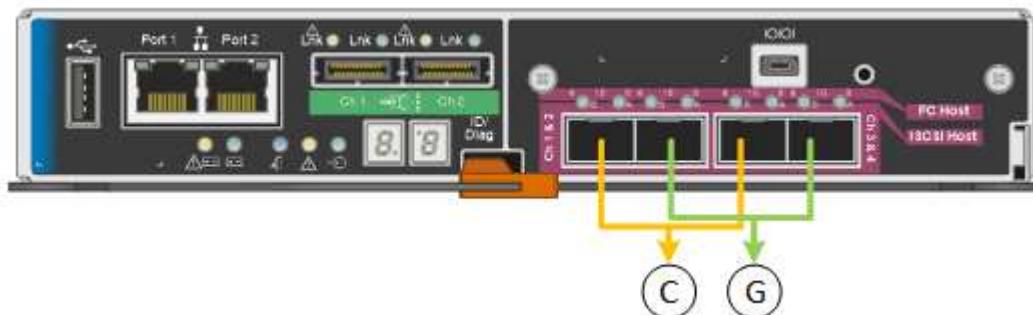
#### What you'll need

If you plan to use Aggregate port bond mode, LACP network bond mode, or VLAN tagging:

- You have connected the 10-GbE ports on the appliance to switches that can support VLAN and LACP.
- If multiple switches are participating in the LACP bond, the switches support multi-chassis link aggregation groups (MLAG), or equivalent.
- You understand how to configure the switches to use VLAN, LACP, and MLAG or equivalent.
- You know the unique VLAN tag to use for each network. This VLAN tag will be added to each network packet to ensure that network traffic is routed to the correct network.

#### About this task

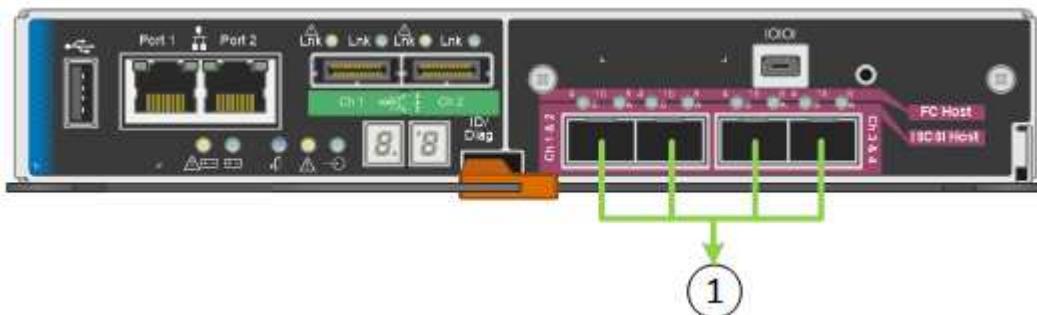
This figure shows how the four 10-GbE ports are bonded in fixed port bond mode (default configuration).



	Which ports are bonded
C	Ports 1 and 3 are bonded together for the Client Network, if this network is used.

Which ports are bonded	
G	Ports 2 and 4 are bonded together for the Grid Network.

This figure shows how the four 10-GbE ports are bonded in aggregate port bond mode.



Which ports are bonded	
1	All four ports are grouped in a single LACP bond, allowing all ports to be used for Grid Network and Client Network traffic.

The table summarizes the options for configuring the four 10-GbE ports. You only need to configure the settings on the Link Configuration page if you want to use a non-default setting.

- **Fixed (default) port bond mode**

Network bond mode	Client Network disabled (default)	Client Network enabled
<b>Active-Backup (default)</b>	<ul style="list-style-type: none"> <li>• Ports 2 and 4 use an active-backup bond for the Grid Network.</li> <li>• Ports 1 and 3 are not used.</li> <li>• A VLAN tag is optional.</li> </ul>	<ul style="list-style-type: none"> <li>• Ports 2 and 4 use an active-backup bond for the Grid Network.</li> <li>• Ports 1 and 3 use an active-backup bond for the Client Network.</li> <li>• VLAN tags can be specified for both networks for the convenience of the network administrator.</li> </ul>
<b>LACP (802.3ad)</b>	<ul style="list-style-type: none"> <li>• Ports 2 and 4 use an LACP bond for the Grid Network.</li> <li>• Ports 1 and 3 are not used.</li> <li>• A VLAN tag is optional.</li> </ul>	<ul style="list-style-type: none"> <li>• Ports 2 and 4 use an LACP bond for the Grid Network.</li> <li>• Ports 1 and 3 use an LACP bond for the Client Network.</li> <li>• VLAN tags can be specified for both networks for the convenience of the network administrator.</li> </ul>

- **Aggregate port bond mode**

Network bond mode	Client Network disabled (default)	Client Network enabled
LACP (802.3ad) only	<ul style="list-style-type: none"> <li>Ports 1-4 use a single LACP bond for the Grid Network.</li> <li>A single VLAN tag identifies Grid Network packets.</li> </ul>	<ul style="list-style-type: none"> <li>Ports 1-4 use a single LACP bond for the Grid Network and the Client Network.</li> <li>Two VLAN tags allow Grid Network packets to be segregated from Client Network packets.</li> </ul>

See “10-GbE port connections for the E5600SG controller” for more information about port bond and network bond modes.

This figure shows how the two 1-GbE management ports on the E5600SG controller are bonded in Active-Backup network bond mode for the Admin Network.

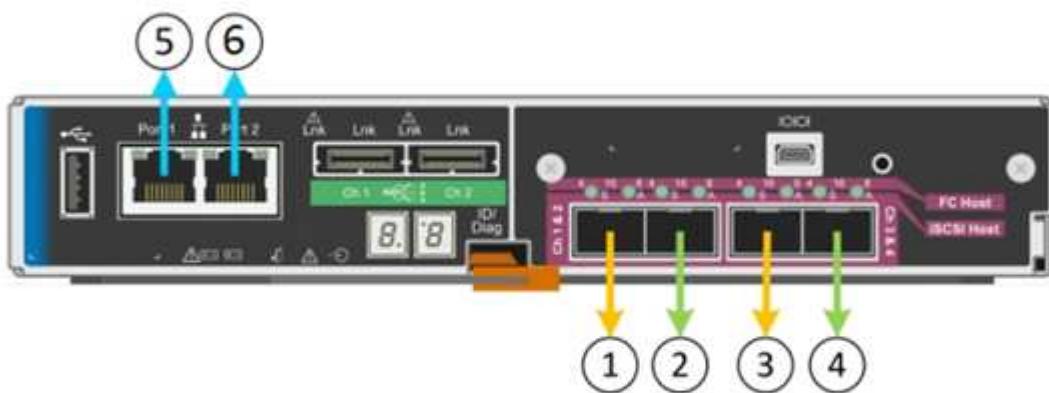


## Steps

1. From the menu bar of the StorageGRID Appliance Installer, click **Configure Networking > Link Configuration**.

The Network Link Configuration page displays a diagram of your appliance with the network and management ports numbered.

Network Link Configuration



**⚠** You might lose your connection if you make changes to the network or link you are connected through. If you are not reconnected within 1 minute, re-enter the URL using one of the other IP addresses assigned to the appliance.

The Link Status table lists the link state (up/down) and speed (1/10/25/40/100 Gbps) of the numbered ports.

## Link Status

Link	State	Speed (Gbps)
1	Down	N/A
2	Up	10
3	Up	10
4	Down	N/A
5	Up	1
6	Up	1

The first time you access this page:

- **Link Speed** is set to **10GbE**. This is the only link speed available for the E5600SG controller.
- **Port bond mode** is set to **Fixed**.
- **Network bond mode** for the Grid Network is set to **Active-Backup**.
- The **Admin Network** is enabled, and the network bond mode is set to **Independent**.
- The **Client Network** is disabled.

## Link Settings

Link speed

Port bond mode  Fixed  Aggregate  
Choose Fixed port bond mode if you want to use ports 2 and 4 for the Grid Network and ports 1 and 3 for the Client Network (if enabled). Choose Aggregate port bond mode if you want all connected ports to share a single LACP bond for both the Grid and Client Networks.

## Grid Network

Enable network

Network bond mode  Active-Backup  LACP (802.3ad)

Enable VLAN (802.1q) tagging

MAC Addresses 50:6b:4b:42:d7:00 50:6b:4b:42:d7:01 50:6b:4b:42:d7:24 50:6b:4b:42:d7:25  
If you are using DHCP, it is recommended that you configure a permanent DHCP reservation. Use all of these MAC addresses in the reservation to assign one IP address to this network interface.

## Admin Network

Enable network

Network bond mode  Independent  Active-Backup  
Connect the Admin Network to port 5. Leave port 6 unconnected. If necessary, you can make a temporary direct Ethernet connection to port 6 and use link-local IP address 169.254.0.1 for access.

MAC Addresses d8:c4:97:2a:e4:95  
If you are using DHCP, it is recommended that you configure a permanent DHCP reservation. Use all of these MAC addresses in the reservation to assign one IP address to this network interface.

## Client Network

Enable network

Enabling the Client Network causes the default gateway for this node to move to the Client Network. Before enabling the Client Network, ensure that you've added all necessary subnets to the Grid Network Subnet List. Otherwise, the connection to the node might be lost.

## 2. Enable or disable the StorageGRID networks you plan to use.

The Grid Network is required. You cannot disable this network.

- If the appliance is not connected to the Admin Network, unselect the **Enable network** check box for the Admin Network.

## Admin Network

Enable network

b. If the appliance is connected to the Client Network, select the **Enable network** check box for the Client Network.

The Client Network settings for the 10-GbE ports are now shown.

3. Refer to the table, and configure the port bond mode and the network bond mode.

The example shows:

- **Aggregate** and **LACP** selected for the Grid and the Client networks. You must specify a unique VLAN tag for each network. You can select values between 0 and 4095.
- **Active-Backup** selected for the Admin Network.

## Link Settings

Link speed	10GbE
Port bond mode	<input type="radio"/> Fixed <input checked="" type="radio"/> Aggregate
Choose Fixed port bond mode if you want to use ports 2 and 4 for the Grid Network and ports 1 and 3 for the Client Network (if enabled). Choose Aggregate port bond mode if you want all connected ports to share a single LACP bond for both the Grid and Client Networks.	
<b>Grid Network</b>	
Enable network	<input checked="" type="checkbox"/>
Network bond mode	<input type="radio"/> Active-Backup <input checked="" type="radio"/> LACP (802.3ad)
If the port bond mode is Aggregate, all bonds must be in LACP (802.3ad) mode.	
Enable VLAN (802.1q) tagging	<input checked="" type="checkbox"/>
VLAN (802.1q) tag	328
<b>Admin Network</b>	
Enable network	<input checked="" type="checkbox"/>
Network bond mode	<input type="radio"/> Independent <input checked="" type="radio"/> Active-Backup
Connect the Admin Network to ports 5 and 6. If necessary, you can make a temporary direct Ethernet connection by disconnecting ports 5 and 6, then connecting to port 6 and using link-local IP address 169.254.0.1 for access.	
<b>Client Network</b>	
Enable network	<input checked="" type="checkbox"/>
Network bond mode	<input type="radio"/> Active-Backup <input checked="" type="radio"/> LACP (802.3ad)
If the port bond mode is Aggregate, all bonds must be in LACP (802.3ad) mode.	
Enable VLAN (802.1q) tagging	<input checked="" type="checkbox"/>
VLAN (802.1q) tag	332

4. 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 are not 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://E5600SG\\_Controller\\_IP:8443](https://E5600SG_Controller_IP:8443)**

## Related information

[Port bond modes for the E5600SG controller ports](#)

[Setting the IP configuration](#)

You use the StorageGRID Appliance Installer to configure the IP addresses and routing information used for the appliance Storage Node on the StorageGRID Grid, Admin, and

## Client Networks.

### About this task

You must either assign a static IP for the appliance on each connected network or assign a permanent lease for the address on the DHCP server.

If you want to change the link configuration, see the instructions for changing the link configuration of the E5600SG controller.

### Steps

1. In the StorageGRID Appliance Installer, select **Configure Networking > IP Configuration**.  
The IP Configuration page appears.
2. To configure the Grid Network, select either **Static** or **DHCP** in the **Grid Network** section of the page.

## Grid Network

The Grid Network is used for all internal StorageGRID traffic. The Grid Network provides connectivity between all nodes in the grid, across all sites and subnets. All hosts on the Grid Network must be able to talk to all other hosts. The Grid Network can consist of multiple subnets. Networks containing critical grid services, such as NTP, can also be added as Grid subnets.

IP  Static  DHCP

Assignment

IPv4 Address (CIDR)

Gateway

**⚠ All required Grid Network subnets must also be defined in the Grid Network Subnet List on the Primary Admin Node before starting installation.**

Subnets (CIDR)	<input type="text" value="172.18.0.0/21"/> <span style="color: red;">×</span>
	<input type="text" value="172.18.0.0/21"/> <span style="color: red;">×</span>
	<input type="text" value="192.168.0.0/21"/> <span style="color: green;">+ ×</span>
MTU	<input type="text" value="1500"/> <span style="border: 1px solid black; padding: 2px;">▼</span>

Cancel Save

3. If you selected **Static**, follow these steps to configure the Grid Network:

- Enter the static IPv4 address, using CIDR notation.
- Enter the gateway.

If your network does not have a gateway, re-enter the same static IPv4 address.

- If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.



For the best network performance, all nodes should be configured with similar MTU values on their Grid Network interfaces. The **Grid Network MTU mismatch** alert is triggered if there is a significant difference in MTU settings for the Grid Network on individual nodes. The MTU values do not have to be the same for all network types.

d. Click **Save**.

When you change the IP address, the gateway and list of subnets might also change.

If you lose your connection to the StorageGRID Appliance Installer, re-enter the URL using the new static IP address you just assigned. For example,

**`https://services_appliance_IP:8443`**

e. Confirm that the list of Grid Network subnets is correct.

If you have grid subnets, the Grid Network gateway is required. All grid subnets specified must be reachable through this gateway. These Grid Network subnets must also be defined in the Grid Network Subnet List on the primary Admin Node when you start StorageGRID installation.



The default route is not listed. If the Client Network is not enabled, the default route will use the Grid Network gateway.

- To add a subnet, click the insert icon  to the right of the last entry.
- To remove an unused subnet, click the delete icon .

f. Click **Save**.

4. If you selected **DHCP**, follow these steps to configure the Grid Network:

a. After you select the **DHCP** radio button, click **Save**.

The **IPv4 Address**, **Gateway**, and **Subnets** fields are automatically populated. If the DHCP server is set up to assign an MTU value, the **MTU** field is populated with that value, and the field becomes read-only.

Your web browser is automatically redirected to the new IP address for the StorageGRID Appliance Installer.

b. Confirm that the list of Grid Network subnets is correct.

If you have grid subnets, the Grid Network gateway is required. All grid subnets specified must be reachable through this gateway. These Grid Network subnets must also be defined in the Grid Network Subnet List on the primary Admin Node when you start StorageGRID installation.



The default route is not listed. If the Client Network is not enabled, the default route will use the Grid Network gateway.

- To add a subnet, click the insert icon  to the right of the last entry.
- To remove an unused subnet, click the delete icon .

c. If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.



For the best network performance, all nodes should be configured with similar MTU values on their Grid Network interfaces. The **Grid Network MTU mismatch** alert is triggered if there is a significant difference in MTU settings for the Grid Network on individual nodes. The MTU values do not have to be the same for all network types.

d. Click **Save**.

5. To configure the Admin Network, select either **Static** or **DHCP** in the Admin Network section of the page.



To configure the Admin Network, you must enable the Admin Network on the Link Configuration page.

## Admin Network

The Admin Network is a closed network used for system administration and maintenance. The Admin Network is typically a private network and does not need to be routable between sites.

IP Assignment  Static  DHCP

IPv4 Address (CIDR)

Gateway

Subnets (CIDR)  +

MTU  ▼

Cancel Save

6. If you selected **Static**, follow these steps to configure the Admin Network:

a. Enter the static IPv4 address, using CIDR notation, for Management Port 1 on the appliance.

Management Port 1 is the left of the two 1-GbE RJ45 ports on the right end of the appliance.

b. Enter the gateway.

If your network does not have a gateway, re-enter the same static IPv4 address.

c. If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as

9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.

d. Click **Save**.

When you change the IP address, the gateway and list of subnets might also change.

If you lose your connection to the StorageGRID Appliance Installer, re-enter the URL using the new static IP address you just assigned. For example,

**`https://services_appliance:8443`**

e. Confirm that the list of Admin Network subnets is correct.

You must verify that all subnets can be reached using the gateway you provided.



The default route cannot be made to use the Admin Network gateway.

- To add a subnet, click the insert icon  to the right of the last entry.
- To remove an unused subnet, click the delete icon .

f. Click **Save**.

7. If you selected **DHCP**, follow these steps to configure the Admin Network:

a. After you select the **DHCP** radio button, click **Save**.

The **IPv4 Address**, **Gateway**, and **Subnets** fields are automatically populated. If the DHCP server is set up to assign an MTU value, the **MTU** field is populated with that value, and the field becomes read-only.

Your web browser is automatically redirected to the new IP address for the StorageGRID Appliance Installer.

b. Confirm that the list of Admin Network subnets is correct.

You must verify that all subnets can be reached using the gateway you provided.



The default route cannot be made to use the Admin Network gateway.

- To add a subnet, click the insert icon  to the right of the last entry.
- To remove an unused subnet, click the delete icon .

c. If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.

d. Click **Save**.

8. To configure the Client Network, select either **Static** or **DHCP** in the **Client Network** section of the page.



To configure the Client Network, you must enable the Client Network on the Link Configuration page.

## Client Network

The Client Network is an open network used to provide access to client applications, including S3 and Swift. The Client Network enables grid nodes to communicate with any subnet reachable through the Client Network gateway. The Client Network does not become operational until you complete the StorageGRID configuration steps.

IP Assignment

Static     DHCP

IPv4 Address (CIDR)

Gateway

MTU

9. If you selected **Static**, follow these steps to configure the Client Network:

- Enter the static IPv4 address, using CIDR notation.
- Click **Save**.
- Confirm that the IP address for the Client Network gateway is correct.



If the Client Network is enabled, the default route is displayed. The default route uses the Client Network gateway and cannot be moved to another interface while the Client Network is enabled.

- If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.

10. If you selected **DHCP**, follow these steps to configure the Client Network:

- After you select the **DHCP** radio button, click **Save**.

The **IPv4 Address** and **Gateway** fields are automatically populated. If the DHCP server is set up to assign an MTU value, the **MTU** field is populated with that value, and the field becomes read-only.

Your web browser is automatically redirected to the new IP address for the StorageGRID Appliance Installer.

b. Confirm that the gateway is correct.



If the Client Network is enabled, the default route is displayed. The default route uses the Client Network gateway and cannot be moved to another interface while the Client Network is enabled.

c. If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.

## Related information

[Changing the link configuration of the E5600SG controller](#)

### Verifying network connections

You should confirm you can access the StorageGRID networks you are using from the appliance. To validate routing through network gateways, you should test connectivity between the StorageGRID Appliance Installer and IP addresses on different subnets. You can also verify the MTU setting.

### Steps

1. From the menu bar of the StorageGRID Appliance Installer, click **Configure Networking > Ping and MTU Test**.

The Ping and MTU Test page appears.

#### Ping and MTU Test

Use a ping request to check the appliance's connectivity to a remote host. Select the network you want to check connectivity through, and enter the IP address of the host you want to reach. To verify the MTU setting for the entire path through the network to the destination, select Test MTU.

#### Ping and MTU Test

Network	<input type="text" value="Grid"/>
Destination IPv4 Address or FQDN	<input type="text"/>
Test MTU	<input type="checkbox"/>
<b>Test Connectivity</b>	

2. From the **Network** drop-down box, select the network you want to test: Grid, Admin, or Client.

3. Enter the IPv4 address or fully qualified domain name (FQDN) for a host on that network.

For example, you might want to ping the gateway on the network or the primary Admin Node.

4. Optionally, select the **Test MTU** check box to verify the MTU setting for the entire path through the network to the destination.

For example, you can test the path between the appliance node and a node at a different site.

5. Click **Test Connectivity**.

If the network connection is valid, the "Ping test passed" message appears, with the ping command output listed.

### Ping and MTU Test

Use a ping request to check the appliance's connectivity to a remote host. Select the network you want to check connectivity through, and enter the IP address of the host you want to reach. To verify the MTU setting for the entire path through the network to the destination, select Test MTU.

#### Ping and MTU Test

Network	<input type="text" value="Grid"/> <input type="button" value="▼"/>
Destination IPv4 Address or FQDN	<input type="text" value="10.96.104.223"/>
Test MTU	<input checked="" type="checkbox"/>
<input type="button" value="Test Connectivity"/>	
Ping test passed	
Ping command output	
<pre>PING 10.96.104.223 (10.96.104.223) 1472(1500) bytes of data. 1480 bytes from 10.96.104.223: icmp_seq=1 ttl=64 time=0.318 ms  --- 10.96.104.223 ping statistics --- 1 packets transmitted, 1 received, 0% packet loss, time 0ms rtt min/avg/max/mdev = 0.318/0.318/0.318/0.000 ms  Found MTU 1500 for 10.96.104.223 via br0</pre>	

### Related information

[Configuring network links \(SG5600\)](#)

[Changing the MTU setting](#)

[Verifying port-level network connections](#)

To ensure that access between the StorageGRID Appliance Installer and other nodes is

not obstructed by firewalls, confirm that the StorageGRID Appliance Installer can connect to a specific TCP port or set of ports at the specified IP address or range of addresses.

## About this task

Using the list of ports provided in the StorageGRID Appliance Installer, you can test the connectivity between the appliance and the other nodes in your Grid Network.

Additionally, you can test connectivity on the Admin and Client Networks and on UDP ports, such as those used for external NFS or DNS servers. For a list of these ports, see the port reference in the StorageGRID networking guidelines.



The Grid Network ports listed in the port connectivity table are valid only for StorageGRID version 11.5.0. To verify which ports are correct for each node type, you should always consult the networking guidelines for your version of StorageGRID.

## Steps

1. From the StorageGRID Appliance Installer, click **Configure Networking > Port Connectivity Test (nmap)**.

The Port Connectivity Test page appears.

The port connectivity table lists node types that require TCP connectivity on the Grid Network. For each node type, the table lists the Grid Network ports that should be accessible to your appliance.

The following node types require TCP connectivity on the Grid Network.

Node Type	Grid Network Ports
Admin Node	22,80,443,1504,1505,1506,1508,7443,9999
Storage Node without ADC	22,1139,1502,1506,1511,7001,9042,9999,18002,18017,18019,18082,18083,18200
Storage Node with ADC	22,1139,1501,1502,1506,1511,7001,9042,9999,18000,18001,18002,18003,18017,18019,18082,18083,18200,19000
API Gateway	22,1506,1507,9999
Archive Node	22,1506,1509,9999,11139

You can test the connectivity between the appliance ports listed in the table and the other nodes in your Grid Network.

2. From the **Network** drop-down, select the network you want to test: **Grid**, **Admin**, or **Client**.
3. Specify a range of IPv4 addresses for the hosts on that network.

For example, you might want to probe the gateway on the network or the primary Admin Node.

Specify a range using a hyphen, as shown in the example.

4. Enter a TCP port number, a list of ports separated by commas, or a range of ports.

The following node types require TCP connectivity on the Grid Network.

Node Type	Grid Network Ports
Admin Node	22,80,443,1504,1505,1506,1508,7443,9999
Storage Node without ADC	22,1139,1502,1506,1511,7001,9042,9999,18002,18017,18019,18082,18083,18200
Storage Node with ADC	22,1139,1501,1502,1506,1511,7001,9042,9999,18000,18001,18002,18003,18017,18019,18082,18083,18200,19000
API Gateway	22,1506,1507,9999
Archive Node	22,1506,1509,9999,11139

#### Port Connectivity Test

Network

IPv4 Address Ranges

Port Ranges

Protocol  TCP  UDP

#### 5. Click **Test Connectivity**.

- If the selected port-level network connections are valid, the “Port connectivity test passed” message appears in a green banner. The nmap command output is listed below the banner.

Port connectivity test passed

Nmap command output. Note: Unreachable hosts will not appear in the output.

```
# Nmap 7.70 scan initiated Fri Nov 13 18:32:03 2020 as: /usr/bin/nmap -n -oN - -e br0 -p 22,2022 10.224.6.160-161
Nmap scan report for 10.224.6.160
Host is up (0.00072s latency).

PORT      STATE SERVICE
22/tcp    open  ssh
2022/tcp  open  down

Nmap scan report for 10.224.6.161
Host is up (0.00060s latency).

PORT      STATE SERVICE
22/tcp    open  ssh
2022/tcp  open  down

# Nmap done at Fri Nov 13 18:32:04 2020 -- 2 IP addresses (2 hosts up) scanned in 0.55 seconds
```

- If a port-level network connection is made to the remote host, but the host is not listening on one or more of the selected ports, the “Port connectivity test failed” message appears in a yellow banner. The nmap command output is listed below the banner.

Any remote port the host is not listening to has a state of “closed.” For example, you might see this yellow banner when the node you are trying to connect to is in a pre-installed state and the StorageGRID NMS service is not yet running on that node.

 Port connectivity test failed  
Connection not established. Services might not be listening on target ports.

Nmap command output. Note: Unreachable hosts will not appear in the output.

```
# Nmap 7.70 scan initiated Sat May 16 17:07:02 2020 as: /usr/bin/nmap -n -oN - -e br0 -p 22,80,443,1504,1505,1506,1508,7443,9999
Nmap scan report for 172.16.4.71
Host is up (0.00020s latency).

PORT      STATE    SERVICE
22/tcp    open     ssh
80/tcp    open     http
443/tcp   open     https
1504/tcp  closed   evb-elm
1505/tcp  open     funkproxy
1506/tcp  open     utcd
1508/tcp  open     diagmond
7443/tcp  open     oracleas-https
9999/tcp  open     abyss
MAC Address: 00:50:56:87:39:AE (VMware)

# Nmap done at Sat May 16 17:07:03 2020 -- 1 IP address (1 host up) scanned in 0.59 seconds
```

- If a port-level network connection cannot be made for one or more selected ports, the “Port connectivity test failed” message appears in a red banner. The nmap command output is listed below the banner.

The red banner indicates that a TCP connection attempt to a port on the remote host was made, but nothing was returned to the sender. When no response is returned, the port has a state of “filtered” and is likely blocked by a firewall.



Ports with “closed” are also listed.

 Port connectivity test failed  
Connection failed to one or more ports.

Nmap command output. Note: Unreachable hosts will not appear in the output.

```
# Nmap 7.70 scan initiated Sat May 16 17:11:01 2020 as: /usr/bin/nmap -n -oN - -e br0 -p 22,79,80,443,1504,1505,1506,1508,7443,9999 172.16.4.71
Nmap scan report for 172.16.4.71
Host is up (0.00029s latency).

PORT      STATE    SERVICE
22/tcp    open     ssh
79/tcp    filtered finger
80/tcp    open     http
443/tcp   open     https
1504/tcp  closed   evb-elm
1505/tcp  open     funkproxy
1506/tcp  open     utcd
1508/tcp  open     diagmond
7443/tcp  open     oracleas-https
9999/tcp  open     abyss
MAC Address: 00:50:56:87:39:AE (VMware)

# Nmap done at Sat May 16 17:11:02 2020 -- 1 IP address (1 host up) scanned in 1.60 seconds
```

## Related information

[Network guidelines](#)

## Configuring SANtricity Storage Manager

You can use SANtricity Storage Manager to monitor the status of the storage disks and hardware components in your StorageGRID appliance. To access this software, you must

know the IP address of management port 1 on the E2700 controller (the storage controller in the appliance).

## Steps

- [Setting the IP address for the E2700 controller](#)
- [Adding the appliance to SANtricity Storage Manager](#)
- [Setting up SANtricity Storage Manager](#)

### Setting the IP address for the E2700 controller

Management port 1 on the E2700 controller connects the appliance to the management network for SANtricity Storage Manager. You must set a static IP address for the E2700 controller to ensure that you do not lose your management connection to the hardware and the controller firmware in the StorageGRID appliance.

#### What you'll need

You are using a supported web browser.

#### About this task

DHCP-assigned addresses could change at any time. Assign a static IP address to the controller to ensure consistent accessibility.

## Steps

1. From the client, enter the URL for the StorageGRID Appliance Installer:

**[https://E5600SG\\_Controller\\_IP:8443](https://E5600SG_Controller_IP:8443)**

For *E5600SG\_Controller\_IP*, use the IP address for the appliance on any StorageGRID network.

The StorageGRID Appliance Installer Home page appears.

2. Select **Hardware Configuration > Storage Controller Network Configuration**.

The Storage Controller Network Configuration page appears.

3. Depending on your network configuration, select **Enabled** for IPv4, IPv6, or both.
4. Make a note of the IPv4 address that is automatically displayed.

DHCP is the default method for assigning an IP address to this port.



It might take a few minutes for the DHCP values to appear.

IPv4 Address Assignment	<input type="radio"/> Static <input checked="" type="radio"/> DHCP
IPv4 Address (CIDR)	10.224.5.166/21
Default Gateway	10.224.0.1

5. Optionally, set a static IP address for the E2700 controller management port.



You should either assign a static IP for the management port or assign a permanent lease for the address on the DHCP server.

- a. Select **Static**.
- b. Enter the IPv4 address, using CIDR notation.
- c. Enter the default gateway.

IPv4 Address Assignment

Static  DHCP

IPv4 Address (CIDR)	10.224.2.200/21
Default Gateway	10.224.0.1

- d. Click **Save**.

It might take a few minutes for your changes to be applied.

When you connect to SANtricity Storage Manager, you will use the new static IP address as the URL:  
**[https://E2700\\_Controller\\_IP](https://E2700_Controller_IP)**

## Related information

[NetApp Documentation: SANtricity Storage Manager](#)

### Adding the appliance to SANtricity Storage Manager

You connect the E2700 controller in the appliance to SANtricity Storage Manager and then add the appliance as a storage array.

#### What you'll need

You are using a supported web browser.

#### About this task

For detailed instructions, see the SANtricity Storage Manager documentation.

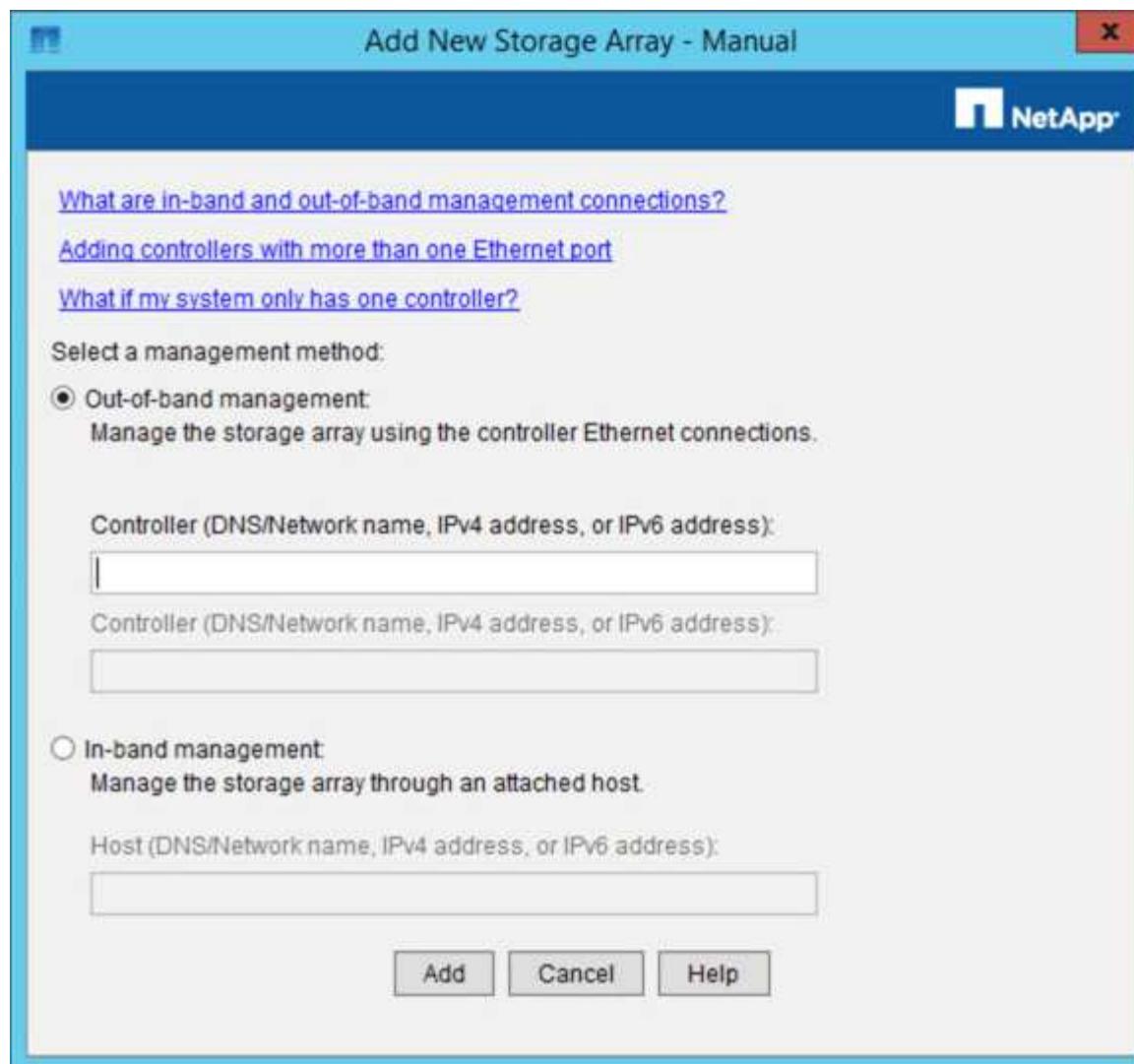
#### Steps

1. Open a web browser, and enter the IP address as the URL for SANtricity Storage Manager:  
**[https://E2700\\_Controller\\_IP](https://E2700_Controller_IP)**

The login page for SANtricity Storage Manager appears.

2. On the **Select Addition Method** page, select **Manual**, and click **OK**.
3. Select **Edit > Add Storage Array**.

The Add New Storage Array - Manual page appears.



4. In the **Out-of-band management** box, enter one of the following values:

- **Using DHCP:** The IP address assigned by the DHCP server to management port 1 on the E2700 controller
- **Not using DHCP:** 192.168.128.101



Only one of the appliance's controllers is connected to SANtricity Storage Manager, so you only need to enter one IP address.

5. Click **Add**.

#### Related information

[NetApp Documentation: SANtricity Storage Manager](#)

#### Setting up SANtricity Storage Manager

After accessing SANtricity Storage Manager, you can use it to configure hardware settings. Typically, you configure these settings before deploying the appliance as a Storage Node in a StorageGRID system.

#### Steps

- [Configuring AutoSupport](#)
- [Verifying receipt of AutoSupport](#)
- [Configuring email and SNMP trap alert notifications](#)
- [Setting passwords for SANtricity Storage Manager](#)

## Configuring AutoSupport

The AutoSupport tool collects data in a customer support bundle from the appliance and automatically sends the data to technical support. Configuring AutoSupport assists technical support with remote troubleshooting and problem analysis.

### What you'll need

- The AutoSupport feature must be enabled and activated on the appliance.

The AutoSupport feature is activated and deactivated globally on a storage management station.

- The Storage Manager Event Monitor must be running on at least one machine with access to the appliance and, preferably, on no more than one machine.

### About this task

All of the data is compressed into a single compressed archive file format (.7z) at the location you specify.

AutoSupport provides the following types of messages:

Message types	Description
Event messages	<ul style="list-style-type: none"> <li>• Sent when a support event on the managed appliance occurs</li> <li>• Include system configuration and diagnostic information</li> </ul>
Daily messages	<ul style="list-style-type: none"> <li>• Sent once every day during a user configurable time interval in the local time of the appliance</li> <li>• Include the current system event logs and performance data</li> </ul>
Weekly messages	<ul style="list-style-type: none"> <li>• Sent once every week during a user configurable time interval in the local time of the appliance</li> <li>• Include configuration and system state information</li> </ul>

### Steps

1. From the Enterprise Management Window in SANtricity Storage Manager, select the **Devices** tab, and then select **Discovered Storage Arrays**.
2. Select **Tools > AutoSupport > Configuration**.
3. Use SANtricity Storage Manager online help, if needed, to complete the task.

### Related information

## Verifying receipt of AutoSupport

You should verify that technical support is receiving your AutoSupport messages. You can find the status of AutoSupport for your systems on the Active IQ portal. Verifying receipt of these messages ensures that technical support has your information if you need assistance.

### About this task

AutoSupport can show one of the following statuses:

- **ON**

An ON status indicates that technical support is currently receiving AutoSupport messages from the system.

- **OFF**

An OFF status suggests that you might have disabled AutoSupport because technical support has not received a Weekly Log from the system in the last 15 calendar days or there might have been a change in your environment or configuration (as an example).

- **DECLINE**

A DECLINE status means that you have notified technical support that you will not enable AutoSupport.

After technical support receives a Weekly Log from the system, the AutoSupport status changes to ON.

### Steps

1. Go to the NetApp Support Site at [mysupport.netapp.com](https://mysupport.netapp.com), and sign in to the Active IQ portal.
2. If the AutoSupport status is OFF, and you believe that is incorrect, complete the following:
  - a. Check your system configuration to ensure that you have turned AutoSupport on.
  - b. Check your network environment and configuration to ensure that the system can send messages to technical support.

## Configuring email and SNMP trap alert notifications

SANtricity Storage Manager can notify you when the status of the appliance or one of its components changes. This is called an alert notification. You can receive alert notifications by two different methods: email and SNMP traps. You must configure the alert notifications you want to receive.

### Steps

1. From the Enterprise Management Window in SANtricity Storage Manager, select the **Devices** tab, and then select a node.
2. Select **Edit > Configure Alerts**.
3. Select the **Email** tab to configure email alert notifications.
4. Select the **SNMP** tab to configure SNMP trap alert notifications.

5. Use SANtricity Storage Manager online help, if needed, to complete the task.

## Setting passwords for SANtricity Storage Manager

You can set the passwords used for the appliance in SANtricity Storage Manager. Setting passwords maintains system security.

### Steps

1. From the Enterprise Management Window in SANtricity Storage Manager, double-click the controller.
2. From the Array Management Window, select the **Storage Array** menu, and select **Security > Set Password**.
3. Configure the passwords.
4. Use SANtricity Storage Manager online help, if needed, to complete the task.

### Optional: Enabling node encryption

If you enable node encryption, the disks in your appliance can be protected by secure key management server (KMS) encryption against physical loss or removal from the site. You must select and enable node encryption during appliance installation and cannot unselect node encryption once the KMS encryption process starts.

#### What you'll need

Review the information about KMS in the instructions for administering StorageGRID.

#### About this task

An appliance that has node encryption enabled connects to the external key management server (KMS) that is configured for the StorageGRID site. Each KMS (or KMS cluster) manages the encryption keys for all appliance nodes at the site. These keys encrypt and decrypt the data on each disk in an appliance that has node encryption enabled.

A KMS can be set up in Grid Manager before or after the appliance is installed in StorageGRID. See the information about KMS and appliance configuration in the instructions for administering StorageGRID for additional details.

- If a KMS is set up before installing the appliance, KMS-controlled encryption begins when you enable node encryption on the appliance and add it to a StorageGRID site where KMS is configured.
- If a KMS is not set up before you install the appliance, KMS-controlled encryption is performed on each appliance that has node encryption enabled as soon as a KMS is configured and available for the site that contains the appliance node.



Any data that exists before an appliance that has node encryption enabled connects to the configured KMS is encrypted with a temporary key that is not secure. The appliance is not protected from removal or theft until the key is set to a value provided by the KMS.

Without the KMS key needed to decrypt the disk, data on the appliance cannot be retrieved and is effectively lost. This is the case whenever the decryption key cannot be retrieved from the KMS. The key becomes inaccessible if a customer clears the KMS configuration, a KMS key expires, connection to the KMS is lost, or the appliance is removed from the StorageGRID system where its KMS keys are installed.

### Steps

1. Open a browser, and enter one of the IP addresses for the appliance's compute controller.

**[https://Controller\\_IP:8443](https://Controller_IP:8443)**

*Controller\_IP* is the IP address of the compute controller (not the storage controller) on any of the three StorageGRID networks.

The StorageGRID Appliance Installer Home page appears.



After the appliance has been encrypted with a KMS key, the appliance disks cannot be decrypted without using the same KMS key.

2. Select **Configure Hardware > Node Encryption**.

NetApp® StorageGRID® Appliance Installer

Home Configure Networking ▾ Configure Hardware ▾ Monitor Installation Advanced ▾

Help ▾

**Node Encryption**

Node encryption allows you to use an external key management server (KMS) to encrypt all StorageGRID data on this appliance. If node encryption is enabled for the appliance and a KMS is configured for the site, you cannot access any data on the appliance unless the appliance can communicate with the KMS.

**Encryption Status**

**⚠** You can only enable node encryption for an appliance during installation. You cannot enable or disable the node encryption setting after the appliance is installed.

Enable node encryption

**Save**

**Key Management Server Details**

3. Select **Enable node encryption**.

You can unselect **Enable node encryption** without risk of data loss until you select **Save** and the appliance node accesses the KMS encryption keys in your StorageGRID system and begins disk encryption. You are not able to disable node encryption after the appliance is installed.



After you add an appliance that has node encryption enabled to a StorageGRID site that has a KMS, you cannot stop using KMS encryption for the node.

4. Select **Save**.

5. Deploy the appliance as a node in your StorageGRID system.

KMS-controlled encryption begins when the appliance accesses the KMS keys configured for your StorageGRID site. The installer displays progress messages during the KMS encryption process, which might take a few minutes depending on the number of disk volumes in the appliance.



Appliances are initially configured with a random non-KMS encryption key assigned to each disk volume. The disks are encrypted using this temporary encryption key, that is not secure, until the appliance that has node encryption enabled accesses the KMS keys configured for your StorageGRID site.

## After you finish

You can view node-encryption status, KMS details, and the certificates in use when the appliance node is in

maintenance mode.

## Related information

[Administer StorageGRID](#)

[Monitoring node encryption in maintenance mode](#)

### Optional: Changing to RAID6 mode (SG5660 only)

If you have an SG5660 with 60 drives, you can change the volume configuration from its default and recommended setting, Dynamic Disk Pools (DDP), to RAID6. You can only change the mode before deploying the StorageGRID appliance Storage Node.

#### What you'll need

- You have an SG5660. The SG5612 does not support RAID6. If you have an SG5612, you must use DDP mode.



If any volumes have already been configured or if StorageGRID was previously installed, changing the RAID mode causes the volumes to be removed and replaced. Any data on those volumes will be lost.

#### About this task

Before deploying a StorageGRID appliance Storage Node, you can choose from two volume configuration options:

- **Dynamic Disk Pools (DDP)** — This is the default and recommended setting. DDP is an enhanced hardware data protection scheme that delivers better system performance, reduced rebuild times after drive failures, and ease of management.
- **RAID6** — This is a hardware protection scheme that uses parity stripes on each disk, and allows for two disk failures within the RAID set before any data is lost.



Using RAID6 is not recommended for most StorageGRID environments. Although RAID6 can increase storage efficiency to 88% (compared to 80% for DDP), DDP mode provides more efficient recovery from drive failures.

#### Steps

1. Using the service laptop, open a web browser and access the StorageGRID Appliance Installer:  
**[https://E5600SG\\_Controller\\_IP:8443](https://E5600SG_Controller_IP:8443)**  
Where *E5600SG\_Controller\_IP* is any of the IP addresses for the E5600SG controller.
2. From the menu bar, select **Advanced > RAID Mode**.
3. On the **Configure RAID Mode** page, select **RAID6** from the Mode drop-down list.
4. Click **Save**.

### Optional: Remapping network ports for the appliance

You might need to remap the internal ports on the appliance Storage Node to different external ports. For example, you might need to remap ports because of a firewall issue.

## What you'll need

- You have previously accessed the StorageGRID Appliance Installer.
- You have not configured and do not plan to configure load balancer endpoints.



If you remap any ports, you cannot use the same ports to configure load balancer endpoints. If you want to configure load balancer endpoints and have already remapped ports, follow the steps in the recovery and maintenance instructions for removing port remaps.

## Steps

1. From the menu bar of the StorageGRID Appliance Installer, click **Configure Networking > Remap Ports**.  
The Remap Port page appears.
2. From the **Network** drop-down box, select the network for the port you want to remap: Grid, Admin, or Client.
3. From the **Protocol** drop-down box, select the IP protocol: TCP or UDP.
4. From the **Remap Direction** drop-down box, select which traffic direction you want to remap for this port: Inbound, Outbound, or Bi-directional.
5. For **Original Port**, enter the number of the port you want to remap.
6. For **Mapped-To Port**, enter the number of the port you want to use instead.
7. Click **Add Rule**.

The new port mapping is added to the table, and the remapping takes effect immediately.

### Remap Ports

If required, you can remap the internal ports on the appliance Storage Node to different external ports. For example, you might need to remap ports because of a firewall issue.

	Network	Protocol	Remap Direction	Original Port	Mapped-To Port
<input checked="" type="radio"/>	Grid	TCP	Bi-directional	1800	1801

8. To remove a port mapping, select the radio button for the rule you want to remove, and click **Remove Selected Rule**.

## Related information

[Maintain & recover](#)

## Deploying an appliance Storage Node

After installing and configuring the storage appliance, you can deploy it as a Storage Node in a StorageGRID system. When you deploy an appliance as a Storage Node, you

use the StorageGRID Appliance Installer included on the appliance.

## What you'll need

- If you are cloning an appliance node, continue following the process in recovery and maintenance.

### Maintain & recover

- The appliance has been installed in a rack or cabinet, connected to your networks, and powered on.
- Network links, IP addresses, and port remapping (if necessary) have been configured for the appliance using the StorageGRID Appliance Installer.
- You know one of the IP addresses assigned to the appliance's compute controller. You can use the IP address for any attached StorageGRID network.
- The primary Admin Node for the StorageGRID system has been deployed.
- All Grid Network subnets listed on the IP Configuration page of the StorageGRID Appliance Installer have been defined in the Grid Network Subnet List on the primary Admin Node.
- You have a service laptop with a supported web browser.

## About this task

Each storage appliance functions as a single Storage Node. Any appliance can connect to the Grid Network, the Admin Network, and the Client Network

To deploy an appliance Storage Node in a StorageGRID system, you access the StorageGRID Appliance Installer and perform the following steps:

- You specify or confirm the IP address of the primary Admin Node and the name of the Storage Node.
- You start the deployment and wait as volumes are configured and the software is installed.
- When the installation pauses partway through the appliance installation tasks, you resume the installation by signing into the Grid Manager, approving all grid nodes, and completing the StorageGRID installation and deployment processes.



If you need to deploy multiple appliance nodes at one time, you can automate the installation process by using the `configure-sga.py` Appliance Installation script.

- If you are performing an expansion or recovery operation, follow the appropriate instructions:
  - To add an appliance Storage Node to an existing StorageGRID system, see the instructions for expanding a StorageGRID system.
  - To deploy an appliance Storage Node as part of a recovery operation, see instructions for recovery and maintenance.

## Steps

1. Open a browser, and enter one of the IP addresses for the appliance's compute controller.

**`https://Controller_IP:8443`**

The StorageGRID Appliance Installer Home page appears.

NetApp® StorageGRID® Appliance Installer

Home Configure Networking ▾ Configure Hardware ▾ Monitor Installation Advanced ▾

## Home

ⓘ The installation is ready to be started. Review the settings below, and then click Start Installation.

### Primary Admin Node connection

Enable Admin Node discovery

Primary Admin Node IP

Connection state Connection to 172.16.4.210 ready

### Node name

Node name

### Installation

Current state Ready to start installation of NetApp-SGA into grid with Admin Node 172.16.4.210.

2. In the **Primary Admin Node** connection section, determine whether you need to specify the IP address for the primary Admin Node.

If you have previously installed other nodes in this data center, the StorageGRID Appliance Installer can discover this IP address automatically, assuming the primary Admin Node, or at least one other grid node with ADMIN\_IP configured, is present on the same subnet.

3. If this IP address is not shown or you need to change it, specify the address:

Option	Description
Manual IP entry	<ol style="list-style-type: none"> <li>a. Unselect the <b>Enable Admin Node discovery</b> check box.</li> <li>b. Enter the IP address manually.</li> <li>c. Click <b>Save</b>.</li> <li>d. Wait for the connection state for the new IP address to become ready.</li> </ol>
Automatic discovery of all connected primary Admin Nodes	<ol style="list-style-type: none"> <li>a. Select the <b>Enable Admin Node discovery</b> check box.</li> <li>b. Wait for the list of discovered IP addresses to be displayed.</li> <li>c. Select the primary Admin Node for the grid where this appliance Storage Node will be deployed.</li> <li>d. Click <b>Save</b>.</li> <li>e. Wait for the connection state for the new IP address to become ready.</li> </ol>

4. In the **Node name** field, enter the name you want to use for this appliance node, and click **Save**.

The node name is assigned to this appliance node in the StorageGRID system. It is shown on the Nodes page (Overview tab) in the Grid Manager. If required, you can change the name when you approve the node.

5. In the Installation section, confirm that the current state is "Ready to start installation of *node\_name* into grid with primary Admin Node *admin\_ip*" and that the **Start Installation** button is enabled.

If the **Start Installation** button is not enabled, you might need to change the network configuration or port settings. For instructions, see the installation and maintenance instructions for your appliance.



If you are deploying the Storage Node appliance as a node cloning target, stop the deployment process here and continue the node cloning procedure in recovery and maintenance.

#### Maintain & recover

6. From the StorageGRID Appliance Installer home page, click **Start Installation**.

The Current state changes to "Installation is in progress," and the Monitor Installation page is displayed.



If you need to access the Monitor Installation page manually, click **Monitor Installation**.

7. If your grid includes multiple appliance Storage Nodes, repeat these steps for each appliance.



If you need to deploy multiple appliance Storage Nodes at one time, you can automate the installation process by using the `configure-sga.py` appliance installation script. This script applies only to Storage Nodes.

## Related information

[Expand your grid](#)

[Maintain & recover](#)

## Monitoring the storage appliance installation

The StorageGRID Appliance Installer provides status until installation is complete. When the software installation is complete, the appliance is rebooted.

### Steps

1. To monitor the installation progress, click **Monitor Installation**.

The Monitor Installation page shows the installation progress.

Monitor Installation

1. Configure storage		
Step	Progress	Status
Connect to storage controller	<div style="width: 100%; background-color: green;"></div>	Complete
Clear existing configuration	<div style="width: 100%; background-color: green;"></div>	Complete
Configure volumes	<div style="width: 25%; background-color: blue;"></div>	Creating volume StorageGRID-obj-00
Configure host settings		Pending

2. Install OS		
3. Install StorageGRID		Pending
4. Finalize installation		Pending

The blue status bar indicates which task is currently in progress. Green status bars indicate tasks that have completed successfully.



The installer ensures that tasks completed in a previous install are not re-run. If you are re-running an installation, any tasks that do not need to be re-run are shown with a green status bar and a status of “Skipped.”

2. Review the progress of the first two installation stages.

### 1. Configure storage

During this stage, the installer connects to the storage controller, clears any existing configuration, communicates with SANtricity software to configure volumes, and configures host settings.

### 2. Install OS

During this stage, the installer copies the base operating system image for StorageGRID to the appliance.

3. Continue monitoring the installation progress until the **Install StorageGRID** stage pauses and a message appears on the embedded console, prompting you to approve this node on the Admin Node using the Grid

Manager. Go to the next step.



NetApp® StorageGRID® Appliance Installer

Help ▾

Home Configure Networking ▾ Configure Hardware ▾ Monitor Installation Advanced ▾

## Monitor Installation

1. Configure storage	Complete
2. Install OS	Complete
3. Install StorageGRID	Running
4. Finalize installation	Pending

Connected (unencrypted) to: QEMU

```
/platform.type=: Device or resource busy
[2017-07-31T22:09:12.362566]    INFO -- [INSG] NOTICE: seeding /var/local with c
ontainer data
[2017-07-31T22:09:12.366205]    INFO -- [INSG] Fixing permissions
[2017-07-31T22:09:12.369633]    INFO -- [INSG] Enabling syslog
[2017-07-31T22:09:12.511533]    INFO -- [INSG] Stopping system logging: syslog-n
g.
[2017-07-31T22:09:12.570096]    INFO -- [INSG] Starting system logging: syslog-n
g.
[2017-07-31T22:09:12.576360]    INFO -- [INSG] Beginning negotiation for downloa
d of node configuration
[2017-07-31T22:09:12.581363]    INFO -- [INSG]
[2017-07-31T22:09:12.585066]    INFO -- [INSG]
[2017-07-31T22:09:12.588314]    INFO -- [INSG]
[2017-07-31T22:09:12.591851]    INFO -- [INSG]
[2017-07-31T22:09:12.594886]    INFO -- [INSG]
[2017-07-31T22:09:12.598360]    INFO -- [INSG]
[2017-07-31T22:09:12.601324]    INFO -- [INSG]
[2017-07-31T22:09:12.604759]    INFO -- [INSG]
[2017-07-31T22:09:12.607800]    INFO -- [INSG]
[2017-07-31T22:09:12.610985]    INFO -- [INSG]
[2017-07-31T22:09:12.614597]    INFO -- [INSG]
[2017-07-31T22:09:12.618282]    INFO -- [INSG] Please approve this node on the A
dmin Node GMI to proceed...
```

4. Go to the Grid Manager, approve the pending storage node, and complete the StorageGRID installation process.

When you click **Install** from the Grid Manager, Stage 3 completes and stage 4, **Finalize Installation**, begins. When stage 4 completes, the controller is rebooted.

## Automating appliance installation and configuration

You can automate the installation and configuration of your appliances and configuration of the whole StorageGRID system.

## About this task

Automating installation and configuration can be useful for deploying multiple StorageGRID instances or one large, complex StorageGRID instance.

To automate installation and configuration, use one or more of the following options:

- Create a JSON file that specifies the configuration settings for your appliances. Upload the JSON file using the StorageGRID Appliance Installer.



You can use the same file to configure more than one appliance.

- Use the `StorageGRIDconfigure-sga.py` Python script to automate the configuration of your appliances.
- Use additional Python scripts to configure other components of the whole StorageGRID system (the "grid").



You can use StorageGRID automation Python scripts directly, or you can use them as examples of how to use the StorageGRID Installation REST API in grid deployment and configuration tools you develop yourself. See the information about downloading and extracting the StorageGRID installation files in the Recovery and Maintenance instructions.

## Automating appliance configuration using the StorageGRID Appliance Installer

You can automate the configuration of an appliance by using a JSON file that contains the configuration information. You upload the file using the StorageGRID Appliance Installer.

### What you'll need

- Your appliance must be on the latest firmware compatible with StorageGRID 11.5 or higher.
- You must be connected to the StorageGRID Appliance Installer on the appliance you are configuring using a supported browser.

### About this task

You can automate appliance configuration tasks such as configuring the following:

- Grid Network, Admin Network, and Client Network IP addresses
- BMC interface
- Network links
  - Port bond mode
  - Network bond mode
  - Link speed

Configuring your appliance using an uploaded JSON file is often more efficient than performing the configuration manually using multiple pages in the StorageGRID Appliance Installer, especially if you have to configure many nodes. You must apply the configuration file for each node one at a time.



Experienced users who want to automate both the installation and configuration of their appliances can use the `configure-sga.py` script.

[Automating installation and configuration of appliance nodes using the configure-sga.py script](#)

## Steps

### 1. Generate the JSON file using one of the following methods:

- The ConfigBuilder application

[ConfigBuilder.netapp.com](https://ConfigBuilder.netapp.com)

- The `configure-sga.py` appliance configuration script. You can download the script from StorageGRID Appliance Installer (**Help > Appliance Configuration Script**). See the instructions on automating the configuration using the `configure-sga.py` script.

[Automating installation and configuration of appliance nodes using the `configure-sga.py` script](#)

The node names in the JSON file must follow these requirements:

- Must be a valid hostname containing at least 1 and no more than 32 characters
- Can use letters, numbers, and hyphens are allowed
- Cannot start or end with a hyphen or contain only numbers



Ensure that the node names (the top-level names) in the JSON file are unique, or you will not be able to configure more than one node using the JSON file.

### 2. Select **Advanced > Update Appliance Configuration**.

The Update Appliance Configuration page appears.

#### Update Appliance Configuration

Use a JSON file to update this appliance's configuration. You can generate the JSON file from the [ConfigBuilder](#) application or from the [appliance configuration script](#).

**⚠** You might lose your connection if the applied configuration from the JSON file includes "link\_config" and/or "networks" sections. If you are not reconnected within 1 minute, re-enter the URL using one of the other IP addresses assigned to the appliance.

#### Upload JSON

JSON configuration	<input type="button" value="Browse"/>
Node name	<input type="button" value="-- Upload a file ▾"/>
<input type="button" value="Apply JSON configuration"/>	

### 3. Select the JSON file with the configuration you want to upload.

- Select **Browse**.
- Locate and select the file.
- Select **Open**.

The file is uploaded and validated. When the validation process is complete, the file name is shown next to a green check mark.



You might lose connection to the appliance if the configuration from the JSON file includes sections for "link\_config", "networks", or both. If you are not reconnected within 1 minute, re-enter the appliance URL using one of the other IP addresses assigned to the appliance.

#### Upload JSON

JSON configuration	<input type="button" value="Browse"/>	<input checked="" type="button" value="✓ appliances.orig.json"/>
Node name	<input type="button" value="-- Select a node ▾"/>	
<input type="button" value="Apply JSON configuration"/>		

The **Node name** drop down is populated with the top-level node names defined in the JSON file.



If the file is not valid, the file name is shown in red and an error message is displayed in a yellow banner. The invalid file is not applied to the appliance. You can use ConfigBuilder to ensure you have a valid JSON file.

4. Select a node from the list in the **Node name** drop down.

The **Apply JSON configuration** button is enabled.

#### Upload JSON

JSON configuration	<input type="button" value="Browse"/>	<input checked="" type="button" value="✓ appliances.orig.json"/>
Node name	<input type="button" value="Lab-80-1000 ▾"/>	
<input type="button" value="Apply JSON configuration"/>		

5. Select **Apply JSON configuration**.

The configuration is applied to the selected node.

#### Automating installation and configuration of appliance nodes using the `configure-sga.py` script

You can use the `configure-sga.py` script to automate many of the installation and configuration tasks for StorageGRID appliance nodes, including installing and configuring a primary Admin Node. This script can be useful if you have a large number of appliances to configure. You can also use the script to generate a JSON file that contains appliance

configuration information.

## What you'll need

- The appliance has been installed in a rack, connected to your networks, and powered on.
- Network links and IP addresses have been configured for the primary Admin Node using the StorageGRID Appliance Installer.
- If you are installing the primary Admin Node, you know its IP address.
- If you are installing and configuring other nodes, the primary Admin Node has been deployed, and you know its IP address.
- For all nodes other than the primary Admin Node, all Grid Network subnets listed on the IP Configuration page of the StorageGRID Appliance Installer have been defined in the Grid Network Subnet List on the primary Admin Node.
- You have downloaded the `configure-sga.py` file. The file is included in the installation archive, or you can access it by clicking **Help > Appliance Installation Script** in the StorageGRID Appliance Installer.

This procedure is for advanced users with some experience using command-line interfaces.



Alternatively, you can also use the StorageGRID Appliance Installer to automate the configuration.

[Automating appliance configuration using the StorageGRID Appliance Installer](#)

## Steps

1. Log in to the Linux machine you are using to run the Python script.
2. For general help with the script syntax and to see a list of the available parameters, enter the following:

```
configure-sga.py --help
```

The `configure-sga.py` script uses five subcommands:

- `advanced` for advanced StorageGRID appliance interactions, including BMC configuration and creating a JSON file containing the current configuration of the appliance
- `configure` for configuring the RAID mode, node name, and networking parameters
- `install` for starting a StorageGRID installation
- `monitor` for monitoring a StorageGRID installation
- `reboot` for rebooting the appliance

If you enter a subcommand (`advanced`, `configure`, `install`, `monitor`, or `reboot`) argument followed by the `--help` option you will get a different help text providing more detail on the options available within that subcommand:

```
configure-sga.py subcommand --help
```

3. To confirm the current configuration of the appliance node, enter the following where `SGA-install-ip` is any one of the IP addresses for the appliance node:

```
configure-sga.py configure SGA-INSTALL-IP
```

The results show current IP information for the appliance, including the IP address of the primary Admin Node and information about the Admin, Grid, and Client Networks.

```
Connecting to +https://10.224.2.30:8443+ (Checking version and
connectivity.)
2021/02/25 16:25:11: Performing GET on /api/versions... Received 200
2021/02/25 16:25:11: Performing GET on /api/v2/system-info... Received
200
2021/02/25 16:25:11: Performing GET on /api/v2/admin-connection...
Received 200
2021/02/25 16:25:11: Performing GET on /api/v2/link-config... Received
200
2021/02/25 16:25:11: Performing GET on /api/v2/networks... Received 200
2021/02/25 16:25:11: Performing GET on /api/v2/system-config... Received
200
```

#### StorageGRID Appliance

```
Name: LAB-SGA-2-30
Node type: storage
```

#### StorageGRID primary Admin Node

```
IP: 172.16.1.170
State: unknown
Message: Initializing...
Version: Unknown
```

#### Network Link Configuration

##### Link Status

Link	State	Speed (Gbps)
1	Up	10
2	Up	10
3	Up	10
4	Up	10
5	Up	1
6	Down	N/A

##### Link Settings

```
Port bond mode: FIXED
Link speed: 10GBE
```

```
Grid Network: ENABLED
Bonding mode: active-backup
VLAN: novlan
MAC Addresses: 00:a0:98:59:8e:8a 00:a0:98:59:8e:82
```

```
Admin Network: ENABLED
Bonding mode: no-bond
MAC Addresses: 00:80:e5:29:70:f4
```

```
Client Network:      ENABLED
      Bonding mode:    active-backup
        VLAN:          novlan
  MAC Addresses:    00:a0:98:59:8e:89  00:a0:98:59:8e:81
```

#### Grid Network

```
CIDR:      172.16.2.30/21 (Static)
MAC:       00:A0:98:59:8E:8A
Gateway:   172.16.0.1
Subnets:   172.17.0.0/21
           172.18.0.0/21
           192.168.0.0/21
MTU:       1500
```

#### Admin Network

```
CIDR:      10.224.2.30/21 (Static)
MAC:       00:80:E5:29:70:F4
Gateway:   10.224.0.1
Subnets:   10.0.0.0/8
           172.19.0.0/16
           172.21.0.0/16
MTU:       1500
```

#### Client Network

```
CIDR:      47.47.2.30/21 (Static)
MAC:       00:A0:98:59:8E:89
Gateway:   47.47.0.1
MTU:       2000
```

```
#####
##### If you are satisfied with this configuration, #####
##### execute the script with the "install" sub-command. #####
#####
```

4. If you need to change any of the values in the current configuration, use the `configure` subcommand to update them. For example, if you want to change the IP address that the appliance uses for connection to the primary Admin Node to 172.16.2.99, enter the following:

```
configure-sga.py configure --admin-ip 172.16.2.99 SGA-INSTALL-IP
```

5. If you want to back up the appliance configuration to a JSON file, use the `advanced` and `backup-file` subcommands. For example, if you want to back up the configuration of an appliance with IP address *SGA-INSTALL-IP* to a file named `appliance-SG1000.json`, enter the following:

```
configure-sga.py advanced --backup-file appliance-SG1000.json SGA-INSTALL-IP
```

The JSON file containing the configuration information is written to the same directory you executed the script from.



Check that the top-level node name in the generated JSON file matches the appliance name. Do not make any changes to this file unless you are an experienced user and have a thorough understanding of StorageGRID APIs.

6. When you are satisfied with the appliance configuration, use the `install` and `monitor` subcommands to install the appliance:

```
configure-sga.py install --monitor SGA-INSTALL-IP
```

7. If you want to reboot the appliance, enter the following:

```
configure-sga.py reboot SGA-INSTALL-IP
```

## Automating the configuration of StorageGRID

After deploying the grid nodes, you can automate the configuration of the StorageGRID system.

### What you'll need

- You know the location of the following files from the installation archive.

Filename	Description
<code>configure-storagegrid.py</code>	Python script used to automate the configuration
<code>configure-storagegrid.sample.json</code>	Sample configuration file for use with the script
<code>configure-storagegrid.blank.json</code>	Blank configuration file for use with the script

- You have created a `configure-storagegrid.json` configuration file. To create this file, you can modify the sample configuration file (`configure-storagegrid.sample.json`) or the blank configuration file (`configure-storagegrid.blank.json`).

### About this task

You can use the `configure-storagegrid.py` Python script and the `configure-storagegrid.json` configuration file to automate the configuration of your StorageGRID system.



You can also configure the system using the Grid Manager or the Installation API.

### Steps

1. Log in to the Linux machine you are using to run the Python script.
2. Change to the directory where you extracted the installation archive.

For example:

```
cd StorageGRID-Webscale-version/platform
```

where `platform` is `debs`, `rpms`, or `vsphere`.

3. Run the Python script and use the configuration file you created.

For example:

```
./configure-storagegrid.py ./configure-storagegrid.json --start-install
```

## After you finish

A Recovery Package `.zip` file is generated during the configuration process, and it is downloaded to the directory where you are running the installation and configuration process. You must back up the Recovery Package file so that you can recover the StorageGRID system if one or more grid nodes fails. For example, copy it to a secure, backed up network location and to a secure cloud storage location.



The Recovery Package file must be secured because it contains encryption keys and passwords that can be used to obtain data from the StorageGRID system.

If you specified that random passwords should be generated, you need to extract the `Passwords.txt` file and look for the passwords required to access your StorageGRID system.

```
#####
##### The StorageGRID "recovery package" has been downloaded as: #####
#####           ./sgws-recovery-package-994078-rev1.zip           #####
#####   Safeguard this file as it will be needed in case of a   #####
#####           StorageGRID node recovery.                      #####
#################################################################
```

Your StorageGRID system is installed and configured when a confirmation message is displayed.

```
StorageGRID has been configured and installed.
```

## Overview of installation REST APIs

StorageGRID provides two REST APIs for performing installation tasks: the StorageGRID Installation API and the StorageGRID Appliance Installer API.

Both APIs use the Swagger open source API platform to provide the API documentation. Swagger allows both developers and non-developers to interact with the API in a user interface that illustrates how the API responds to parameters and options. This documentation assumes that you are familiar with standard web technologies and the JSON (JavaScript Object Notation) data format.



Any API operations you perform using the API Docs webpage are live operations. Be careful not to create, update, or delete configuration data or other data by mistake.

Each REST API command includes the API's URL, an HTTP action, any required or optional URL parameters, and an expected API response.

### StorageGRID Installation API

The StorageGRID Installation API is only available when you are initially configuring your StorageGRID system, and in the event that you need to perform a primary Admin Node recovery. The Installation API can be accessed over HTTPS from the Grid Manager.

To access the API documentation, go to the installation web page on the primary Admin Node and select **Help > API Documentation** from the menu bar.

The StorageGRID Installation API includes the following sections:

- **config** — Operations related to the product release and versions of the API. You can list the product release version and the major versions of the API supported by that release.
- **grid** — Grid-level configuration operations. You can get and update grid settings, including grid details, Grid Network subnets, grid passwords, and NTP and DNS server IP addresses.
- **nodes** — Node-level configuration operations. You can retrieve a list of grid nodes, delete a grid node, configure a grid node, view a grid node, and reset a grid node's configuration.
- **provision** — Provisioning operations. You can start the provisioning operation and view the status of the provisioning operation.
- **recovery** — Primary Admin Node recovery operations. You can reset information, upload the Recover Package, start the recovery, and view the status of the recovery operation.
- **recovery-package** — Operations to download the Recovery Package.
- **sites** — Site-level configuration operations. You can create, view, delete, and modify a site.

## StorageGRID Appliance Installer API

The StorageGRID Appliance Installer API can be accessed over HTTPS from *Controller\_IP*:8443.

To access the API documentation, go to the StorageGRID Appliance Installer on the appliance and select **Help > API Docs** from the menu bar.

The StorageGRID Appliance Installer API includes the following sections:

- **clone** — Operations to configure and control node cloning.
- **encryption** — Operations to manage encryption and view encryption status.
- **hardware configuration** — Operations to configure system settings on attached hardware.
- **installation** — Operations for starting the appliance installation and for monitoring installation status.
- **networking** — Operations related to the Grid, Admin, and Client Network configuration for a StorageGRID appliance and appliance port settings.
- **setup** — Operations to help with initial appliance installation setup including requests to get information about the system and update the primary Admin Node IP.
- **support** — Operations for rebooting the controller and getting logs.
- **upgrade** — Operations related to upgrading appliance firmware.
- **uploadsg** — Operations for uploading StorageGRID installation files.

## Troubleshooting the hardware installation

If you encounter issues during the installation, you might find it helpful to review troubleshooting information related to hardware setup and connectivity issues.

### Related information

[Hardware setup appears to hang](#)

## Troubleshooting connection issues

### Hardware setup appears to hang

The StorageGRID Appliance Installer might not be available if hardware faults or cabling errors prevent the E5600SG controller from completing its boot-up processing.

#### Steps

1. Check the Needs Attention LED on either controller and look for a flashing error code.

During power up, the Service Action Allowed and Service Action Required LEDs are turned on while the hardware is initializing. The upper decimal point of the lower digit, called the *diagnostic LED*, also illuminates. The seven-segment display runs through a sequence of codes that are common for both controllers. This is normal and is not an indication of an error. When the hardware boots successfully, the Service Action LEDs are turned off, and the displays are driven by the firmware.

2. Review the codes on the seven-segment display for the E5600SG controller.



The installation and provisioning take time. Some installation phases do not report updates to the StorageGRID Appliance Installer for several minutes.

If an error occurs, the seven-segment display flashes a sequence, such as HE.

3. To understand what these codes mean, see the following resources:

Controller	Reference
E5600SG controller	<ul style="list-style-type: none"><li>“HE error: Error synchronizing with SANtricity OS Software”</li><li>“E5600SG controller seven-segment display codes”</li></ul>
E2700 controller	E-Series documentation  <b>Note:</b> The codes described for the E-Series E5600 controller do not apply to the E5600SG controller in the appliance.

4. If this does not resolve the issue, contact technical support.

#### Related information

[E5600SG controller seven-segment display codes](#)

[HE error: Error synchronizing with SANtricity OS Software](#)

[E2700 Controller-Drive Tray and Related Drive Trays Installation Guide](#)

[NetApp Documentation: E2700 Series](#)

[HE error: Error synchronizing with SANtricity OS Software](#)

The seven-segment display on the compute controller shows an HE error code if the

## StorageGRID Appliance Installer cannot synchronize with SANtricity OS Software.

### About this task

If an HE error code is displayed, perform this corrective action.

### Steps

1. Check the integrity of the two SAS interconnect cables, and confirm they are securely connected.
2. As required, replace one or both of the cables, and try again.
3. If this does not resolve the issue, contact technical support.

### Troubleshooting connection issues

If you encounter connection issues during the StorageGRID appliance installation, you should perform the corrective action steps listed.

#### Unable to connect to StorageGRID appliance over the network

If you cannot connect to the appliance, there might be a network issue, or the hardware installation might not have been completed successfully.

- **Issue**

You cannot connect to the appliance.

- **Cause**

This could occur if there is a network issue or the hardware installation did not complete successfully.

- **Corrective action**

- a. Ping the appliance:

`ping E5600_controller_IP`

- b. Access the StorageGRID Appliance Installer by opening a browser and entering the following:

`https://Management_Port_IP:8443`

For Management\_Port\_IP, enter the IP address for management port 1 on the E5600SG controller (provisioned during the physical installation).

- c. Click **Configure Admin network**, and check the IP.

- d. If you receive a response from the ping, check that port 8443 is open in the firewalls.

- e. Reboot the appliance.

- f. Refresh the installation web page.

- g. If this does not resolve the connection issue, contact technical support from the NetApp Support Site at [mysupport.netapp.com](http://mysupport.netapp.com).

### Related information

[E5600SG controller seven-segment display codes](#)

## Rebooting the controller while the StorageGRID Appliance Installer is running

You might need to reboot the compute controller while the StorageGRID Appliance Installer is running. For example, you might need to reboot the controller if the installation fails.

### About this task

This procedure only applies when the compute controller is running the StorageGRID Appliance Installer. Once the installation is completed, this step no longer works because the StorageGRID Appliance Installer is no longer available.

### Steps

1. From the StorageGRID Appliance Installer, click **Advanced > Reboot Controller**, and then select one of these options:
  - Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
  - Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



The SG6000-CN controller is rebooted.

## Maintaining the SG5600 appliance

You might need to upgrade the SANtricity OS Software on the E2700 controller, replace the E2700 controller or the E5600SG controller, or replace specific components. The procedures in this section assume that the appliance has already been deployed as a Storage Node in a StorageGRID system.

### Steps

- [Placing an appliance into maintenance mode](#)
- [Upgrading SANtricity OS on the storage controllers using the Grid Manager](#)
- [Upgrading SANtricity OS on the E2700 controller using maintenance mode](#)
- [Upgrading drive firmware using SANtricity Storage Manager](#)

- Replacing the E2700 controller
- Replacing the E5600SG controller
- Replacing other hardware components
- Changing the link configuration of the E5600SG controller
- Changing the MTU setting
- Checking the DNS server configuration
- Monitoring node encryption in maintenance mode

### Placing an appliance into maintenance mode

You must place the appliance into maintenance mode before performing specific maintenance procedures.

#### What you'll need

- You must be signed in to the Grid Manager using a supported browser.
- You must have the Maintenance or Root Access permission. For details, see the instructions for administering StorageGRID.

#### About this task

Placing a StorageGRID appliance into maintenance mode might make the appliance unavailable for remote access.



The password and host key for a StorageGRID appliance in maintenance mode remain the same as they were when the appliance was in service.

#### Steps

1. From the Grid Manager, select **Nodes**.
2. From the tree view of the Nodes page, select the appliance Storage Node.
3. Select **Tasks**.

Overview    Hardware    Network    Storage    Objects    ILM    Events    **Tasks**

#### Reboot

Shuts down and restarts the node.

**Reboot**

#### Maintenance Mode

Places the appliance's compute controller into maintenance mode.

**Maintenance Mode**

4. Select **Maintenance Mode**.

A confirmation dialog box appears.

## ⚠ Enter Maintenance Mode on SGA-106-15

You must place the appliance's compute controller into maintenance mode to perform certain maintenance procedures on the appliance.

Attention: All StorageGRID services on this node will be shut down. Wait a few minutes for the node to reboot into maintenance mode.

If you are ready to start, enter the provisioning passphrase and click OK.

Provisioning Passphrase

Cancel

OK

5. Enter the provisioning passphrase, and select **OK**.

A progress bar and a series of messages, including "Request Sent," "Stopping StorageGRID," and "Rebooting," indicate that the appliance is completing the steps for entering maintenance mode.

Overview    Hardware    Network    Storage    Objects    ILM    Events    **Tasks**

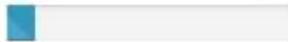
### Reboot

Shuts down and restarts the node.

Reboot

### Maintenance Mode

Attention: Your request has been sent, but the appliance might take 10-15 minutes to enter maintenance mode. Do not perform maintenance procedures until this tab indicates maintenance mode is ready, or data could become corrupted.



Request Sent

When the appliance is in maintenance mode, a confirmation message lists the URLs you can use to access the StorageGRID Appliance Installer.

## Reboot

Shuts down and restarts the node.

Reboot

## Maintenance Mode

This node is currently in maintenance mode. Navigate to one of the URLs listed below and perform any necessary maintenance procedures.

- <https://172.16.2.106:8443>
- <https://10.224.2.106:8443>
- <https://47.47.2.106:8443>
- <https://169.254.0.1:8443>

When you are done with any required maintenance procedures, you must exit maintenance mode by clicking **Reboot Controller** from the StorageGRID Appliance Installer.

6. To access the StorageGRID Appliance Installer, browse to any of the URLs displayed.

If possible, use the URL containing the IP address of the appliance's Admin Network port.



Accessing <https://169.254.0.1:8443> requires a direct connection to the local management port.

7. From the StorageGRID Appliance Installer, confirm that the appliance is in maintenance mode.

This node is in maintenance mode. Perform any required maintenance procedures. If you want to exit maintenance mode manually to resume normal operation, go to Advanced > Reboot Controller to **reboot** the controller.

8. Perform any required maintenance tasks.

9. After completing maintenance tasks, exit maintenance mode and resume normal node operation. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select **Reboot into StorageGRID**.

NetApp® StorageGRID® Appliance Installer

Home Configure Networking ▾ Configure Hardware ▾ Monitor Installation Advanced ▾

Reboot Controller Request a controller reboot.

RAID Mode Upgrade Firmware Reboot Controller

**Reboot into StorageGRID** **Reboot into Maintenance Mode**

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** tab should display a normal status  for the appliance node, indicating that no alerts are active and the node is connected to the grid.

NetApp® StorageGRID®

Help ▾ | Root ▾ | Sign Out

Dashboard Alerts ▾ **Nodes** Tenants ILM ▾ Configuration ▾ Maintenance ▾ Support ▾

**StorageGRID Deployment**

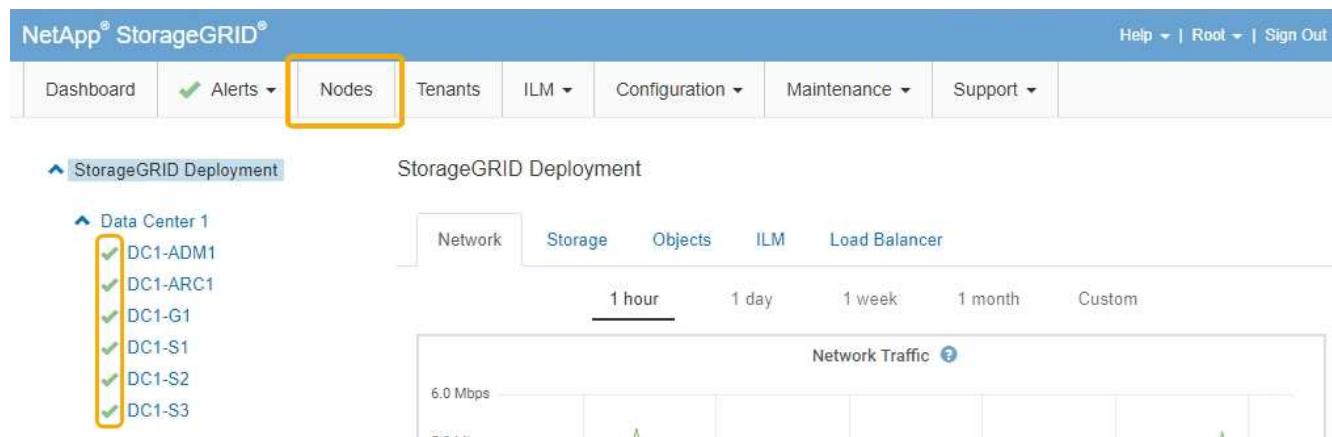
**Nodes**

**StorageGRID Deployment**

**Network** **Storage** **Objects** **ILM** **Load Balancer**

1 hour 1 day 1 week 1 month Custom

6.0 Mbps



## Upgrading SANtricity OS on the storage controllers using the Grid Manager

Use the Grid Manager to apply a SANtricity OS upgrade.

### What you'll need

- 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 must have the Maintenance permission.
- You must be signed in to the Grid Manager using a supported browser.
- You must have the provisioning passphrase.
- You must have access to the NetApp downloads page for SANtricity OS.

### About this task

You cannot 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. It might take more than 30 minutes to load the SANtricity OS on each node and up to 90 minutes to reboot each StorageGRID storage appliance.



The following steps are only applicable when you are using the Grid Manager to perform the upgrade.



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

## Steps

1. From a service laptop, download the new SANtricity OS file from the NetApp support site.

Be sure to choose the SANtricity OS version for the E2700 storage controller.

2. Sign in to the Grid Manager using a supported browser.
3. Select **Maintenance**. Then, in the System section of the menu, select **Software Update**.

The Software Update page appears.

### Software Update

You can upgrade StorageGRID software, apply a hotfix, or upgrade the SANtricity OS software on StorageGRID storage appliances.

- To perform a major version upgrade of StorageGRID, see the [Instructions for upgrading StorageGRID](#), and then select **StorageGRID Upgrade**.
- To apply a hotfix to all nodes in your system, see "Hotfix procedure" in the [recovery and maintenance instructions](#), and then select **StorageGRID Hotfix**.
- To upgrade SANtricity OS software on a storage controller, see "Upgrading SANtricity OS Software on the storage controllers" in the [installation and maintenance instructions](#) for your storage appliance, and then select **SANtricity OS**:
  - [SG6000 appliance installation and maintenance](#)
  - [SG5700 appliance installation and maintenance](#)
  - [SG5600 appliance installation and maintenance](#)

[StorageGRID Upgrade](#)

[StorageGRID Hotfix](#)

[SANtricity OS](#)

4. Click **SANtricity OS**.

The SANtricity OS page appears.

## SANtricity OS

You can use this page to upgrade the SANtricity OS software on storage controllers in a storage appliance. Before installing the new software, confirm the storage controllers are Nominal (**Nodes > appliance node > Hardware**) and ready for an upgrade. A health check is automatically performed as part of the upgrade process and valid NVSRAM is automatically installed based on the appliance type and new software version. The software upgrade can take up to 30 minutes per appliance. When the upgrade is complete, the node will be automatically rebooted to activate the SANtricity OS on the storage controllers. If you have multiple types of appliances, repeat this procedure to install the appropriate OS software for each type.

### SANtricity OS Upgrade File

SANtricity OS Upgrade File

**Browse**

?

### Passphrase

Provisioning Passphrase

?

**Start**

5. Select the SANtricity OS upgrade file you downloaded from the NetApp support site.

- Click **Browse**.
- Locate and select the file.
- Click **Open**.

The file is uploaded and validated. When the validation process is done, the file name is shown in the Details field.



Do not change the file name since it is part of the verification process.

## SANtricity OS

You can use this page to upgrade the SANtricity OS software on storage controllers in a storage appliance. Before installing the new software, confirm the storage controllers are Nominal (**Nodes > appliance node > Hardware**) and ready for an upgrade. A health check is automatically performed as part of the upgrade process and valid NVSRAM is automatically installed based on the appliance type and new software version. The software upgrade can take up to 30 minutes per appliance. When the upgrade is complete, the node will be automatically rebooted to activate the SANtricity OS on the storage controllers. If you have multiple types of appliances, repeat this procedure to install the appropriate OS software for each type.

### SANtricity OS Upgrade File

SANtricity OS Upgrade File   RC\_...dlp

Details  RC\_...dlp

**Passphrase**

Provisioning Passphrase

**Start**

6. Enter the provisioning passphrase.

The **Start** button is enabled.

## SANtricity OS

You can use this page to upgrade the SANtricity OS software on storage controllers in a storage appliance. Before installing the new software, confirm the storage controllers are Nominal (**Nodes > appliance node > Hardware**) and ready for an upgrade. A health check is automatically performed as part of the upgrade process and valid NVSRAM is automatically installed based on the appliance type and new software version. The software upgrade can take up to 30 minutes per appliance. When the upgrade is complete, the node will be automatically rebooted to activate the SANtricity OS on the storage controllers. If you have multiple types of appliances, repeat this procedure to install the appropriate OS software for each type.

### SANtricity OS Upgrade File

SANtricity OS Upgrade File   RC\_...dlp

Details  RC\_...dlp

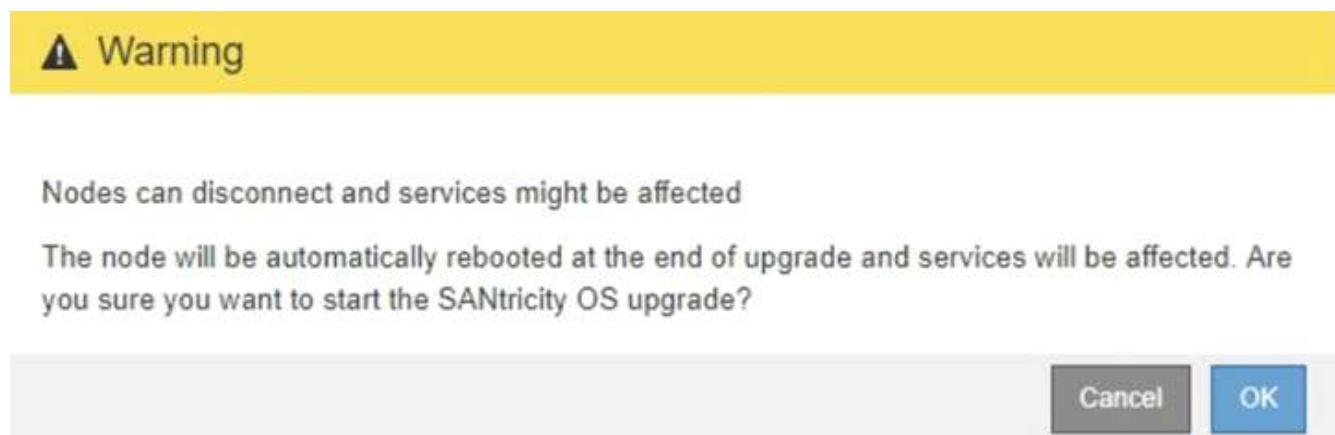
**Passphrase**

Provisioning Passphrase  \*\*\*\*\*

**Start**

7. Click **Start**.

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



8. Click **OK** 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 click **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 Storage Nodes, including software-based Storage Nodes. You must approve the upgrade for all Storage Nodes, even though a SANtricity OS upgrade has no effect on software-based Storage Nodes. The upgrade message returned for software-based Storage Nodes is "SANtricity OS upgrade is not applicable to this node."

#### SANtricity OS Upgrade Progress

Storage Nodes - 0 out of 4 completed							Approve All	Remove All
Site	Name	Progress	Stage	Details	Action		Search	Clear
RTP Lab 1	DT-10-224-1-181-S1		Waiting for you to approve		<a href="#">Approve</a>			
RTP Lab 1	DT-10-224-1-182-S2		Waiting for you to approve		<a href="#">Approve</a>			
RTP Lab 1	DT-10-224-1-183-S3		Waiting for you to approve		<a href="#">Approve</a>			
RTP Lab 1	NetApp-SGA-Lab2-002-024		Waiting for you to approve		<a href="#">Approve</a>			

9. Optionally, sort the list of nodes in ascending or descending order by **Site**, **Name**, **Progress**, **Stage**, or **Details**. Or, enter a term in the **Search** box to search for specific nodes.

You can scroll through the list of nodes by using the left and right arrows at the bottom right corner of the section.

10. Approve the grid nodes you are ready to add to the upgrade queue. Approved nodes of the same type are upgraded one at a time.



Do not 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. Later, when the node is upgraded, the appliance node is rebooted. These operations might cause service interruptions for clients that are communicating with the node.

- Click either of the **Approve All** buttons 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(s).

- Click one or more **Approve** buttons to add one or more nodes to the SANtricity OS upgrade queue.



You can delay applying a SANtricity OS upgrade to a node, but the SANtricity OS upgrade process will not be complete until you approve the SANtricity OS upgrade on all the listed Storage Nodes.

After you click **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. For nodes intentionally not upgraded, the process will show stage of Complete with one of the following messages in the Details column:

- Storage Node was already upgraded.
- SANtricity OS upgrade is not applicable to this node.
- SANtricity OS file is not compatible with this node.

The message “SANtricity OS upgrade is not applicable to this node” indicates that the node does not have a storage controller that can be managed by the StorageGRID system. This message will appear for non-appliance Storage Nodes. You can complete the SANtricity OS upgrade process without upgrading the node displaying this message.

The message “SANtricity OS file is not compatible with this node” indicates that the node requires a SANtricity OS file different than the one the process is attempting to install. After you complete the current SANtricity OS upgrade, download the SANtricity OS appropriate for the node and repeat the upgrade process.

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

As shown in the example, 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.

▲ Storage Nodes - 1 out of 9 completed

Approve All Remove All

Search 

Site	Name	Progress	Stage	Details	Action
Raleigh	RAL-S1-101-196	Queued			
Raleigh	RAL-S2-101-197	Complete			
Raleigh	RAL-S3-101-198	Queued			
Sunnyvale	SVL-S1-101-199	Queued			
Sunnyvale	SVL-S2-101-93		Waiting for you to approve		
Sunnyvale	SVL-S3-101-94		Waiting for you to approve		
Vancouver	VTC-S1-101-193		Waiting for you to approve		
Vancouver	-VTC-S2-101-194		Waiting for you to approve		
Vancouver	-VTC-S3-101-195		Waiting for you to approve		

12. 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 being applied, the upgrade has failed for that node. The appliance might need to be placed in maintenance mode to recover from the failure. Contact technical support before continuing.

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: "You must use maintenance mode to upgrade SANtricity OS on this node. See the installation and maintenance instructions for your appliance. After the upgrade, you can use this utility for future upgrades." To resolve the error, do the following:

- Use maintenance mode to upgrade SANtricity OS on the node that shows a stage of Error.
- Use the Grid Manager to re-start 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 date and time the SANtricity OS upgrade was completed.

SANtricity OS upgrade completed at 2020-04-07 13:26:02 EDT.

**SANtricity OS Upgrade File**

SANtricity OS Upgrade File 

Passphrase

Provisioning Passphrase 

13. 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

[Upgrading SANtricity OS on the E2700 controller using maintenance mode](#)

### Upgrading SANtricity OS on the E2700 controller using maintenance mode

If you are unable to upgrade the SANtricity OS Software using the Grid Manager, use the maintenance mode procedure to apply the upgrade.

#### What you'll need

- 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 must place the E5600SG controller into maintenance mode if you are not using the Grid Manager. Placing the controller into maintenance mode interrupts the connection to the E2700 controller. Before changing the link configuration, you must place the E5600SG controller into maintenance mode. Putting a StorageGRID appliance into maintenance mode might make the appliance unavailable for remote access.

[Placing an appliance into maintenance mode](#)

#### About this task

Do not 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. From a service laptop, access SANtricity Storage Manager, and sign in.
2. Download the new SANtricity OS Software file and NVSRAM file to the management client.
  - The NVSRAM is specific to the StorageGRID appliance. Do not use the standard NVSRAM download.
  - If you need to upgrade the NVSRAM in the E2700 controller, you must confirm that the SANtricity OS file you downloaded was designated as compatible with StorageGRID appliances.
  - Activate the upgrade files immediately. Do not defer activation.
3. Follow the instructions in the *E2700 and E5600 SANtricity Software and Firmware Upgrade instructions* or the SANtricity Storage Manager online help, and upgrade the E2700 controller's firmware, NVSRAM, or both.
4. Once the upgrade operation has completed, reboot the node. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:
  - Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this

option if you are done working in maintenance mode and are ready to return the node to normal operation.

- Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.

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** tab should display a normal status for the appliance node, indicating that no alerts are active and the node is connected to the grid.

## Upgrading drive firmware using SANtricity Storage Manager

You upgrade your drive firmware to make sure you have all the latest features and bug fixes.

### What you'll need

- The storage appliance has an Optimal status.
- All drives have an Optimal status.
- You have the latest version of SANtricity Storage Manager installed that is compatible with your StorageGRID version.

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

[Upgrading SANtricity OS on the E2700 controller using maintenance mode](#)

- You have placed the StorageGRID appliance in maintenance mode.

### Placing an appliance into maintenance mode



Maintenance mode interrupts the connection to the storage controller, stopping all I/O activity and placing all drives offline.



Do not 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 policies.

### Steps

1. Open a web browser, and enter the IP address as the URL for SANtricity Storage Manager:  
`https://E2700\_Controller\_IP`

2. Enter the SANtricity Storage Manager administrator username and password, if required.
3. From SANtricity Enterprise Management, select the **Devices** tab.

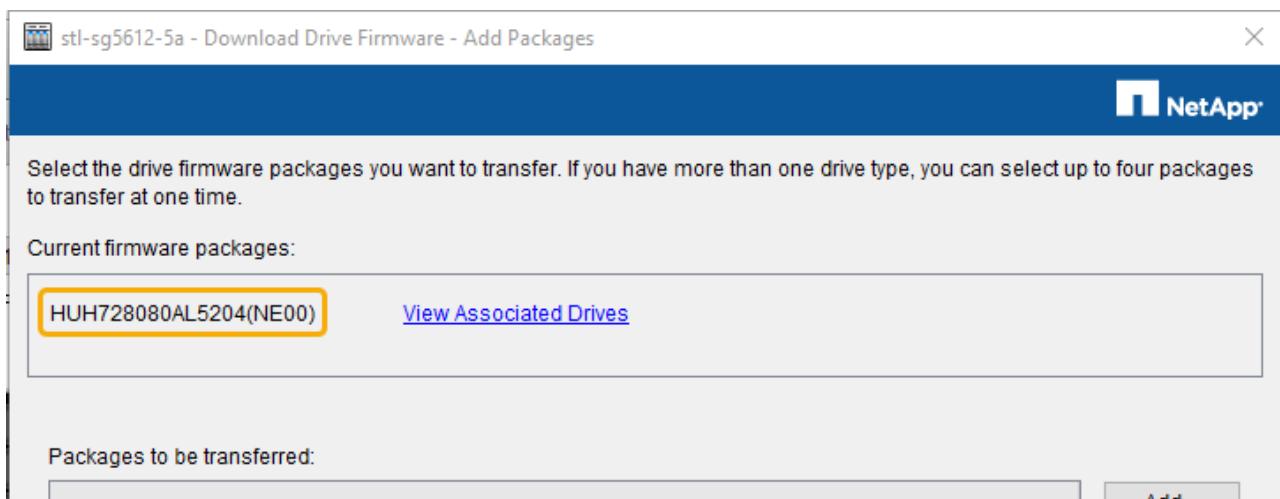
The SANtricity Array Management window opens.

4. From SANtricity Array Management, double-click the Storage Array with the drives to upgrade.
5. Verify that both the Storage Array and drives have an Optimal status.
6. Verify the drive firmware version currently installed in the storage appliance:

- a. From SANtricity Enterprise Management, select **Upgrade > Drive Firmware**.

The Download Drive Firmware - Add Packages window displays the drive firmware files currently in use.

- b. Note current drive firmware revisions and drive identifiers under Current firmware packages.



In this example:

- The drive firmware revision is **NE00**.
- The drive identifier is **HUh728080AL5204**.

Select **View Associated Drives** to display where these drives are installed in your storage appliance.

7. Download and prepare the available drive firmware upgrade:

- Open your web browser, navigate to NetApp Support web site, and log in using your ID and password.

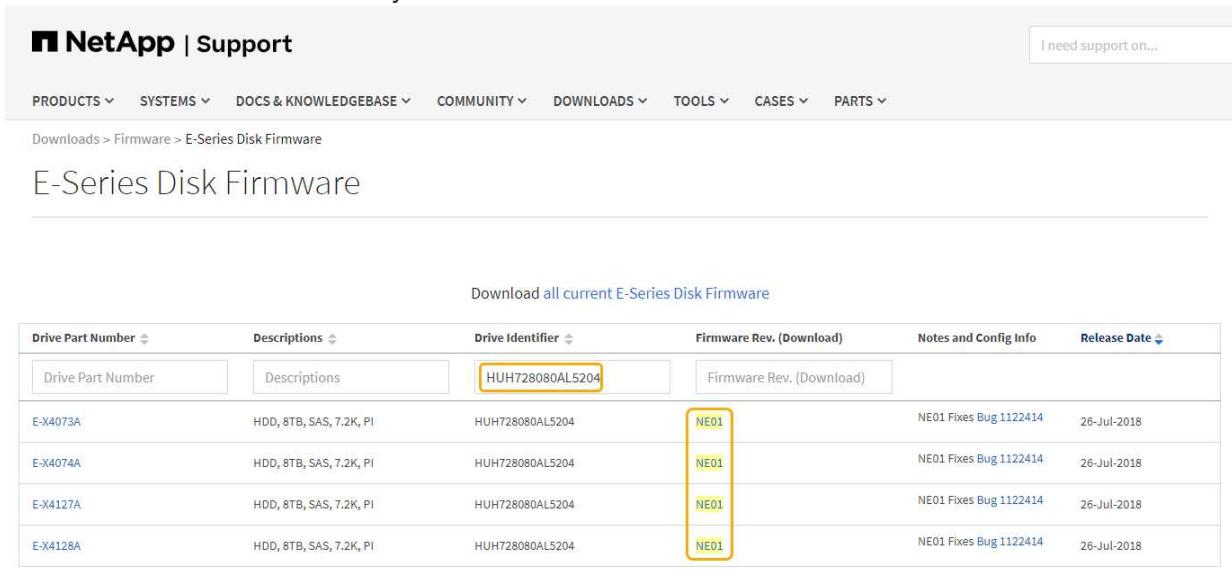
[NetApp Support](#)

- On the NetApp Support web site, select the **Downloads** tab, and then select **E-Series Disk Drive Firmware**.

The E-Series Disk Firmware page displays.

- 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
E-X4073A	HDD, 8TB, SAS, 7.2K, PI	HUH728080AL5204	<a href="#">NE01</a>	NE01 Fixes Bug 1122414	26-Jul-2018
E-X4074A	HDD, 8TB, SAS, 7.2K, PI	HUH728080AL5204	<a href="#">NE01</a>	NE01 Fixes Bug 1122414	26-Jul-2018
E-X4127A	HDD, 8TB, SAS, 7.2K, PI	HUH728080AL5204	<a href="#">NE01</a>	NE01 Fixes Bug 1122414	26-Jul-2018
E-X4128A	HDD, 8TB, SAS, 7.2K, PI	HUH728080AL5204	<a href="#">NE01</a>	NE01 Fixes Bug 1122414	26-Jul-2018

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

8. Install the drive firmware upgrade:

- From the SANtricity Storage Manager Download Drive Firmware - Add Packages window, select **Add**.
- Navigate to the directory that contains the firmware files and select up to four firmware files.

Drive firmware files have a filename similar to

D\_HUC101212CSS600\_30602291\_MS01\_2800\_0002.dlp

Selecting more than one firmware file to upgrade the firmware of the same drive might result in a file conflict error. If a file conflict error occurs, an error dialog appears. To resolve this error, select **OK** and remove all other firmware files except the one that you want to use for upgrading the firmware of the drive. To remove a firmware file, select the firmware file in the Packages to Be Transferred information area, and select **Remove**. In addition, you can only select up to four drive firmware packages at one time.

- Select **OK**.

The system updates the Packages to be transferred information area with the firmware files you selected.

d. Select **Next**.

The Download Drive Firmware - Select Drives window opens.

- All drives in the appliance are scanned for configuration information and upgrade eligibility.
- You are presented with a selection (depending on what variety of drives you have in the storage array) of compatible drives that can be upgraded with the firmware you selected. The drives capable of being upgraded as an online operation are displayed by default.
- The selected firmware for the drive appears in the Proposed Firmware information area. If you must change the firmware, select **Back** to return to the previous dialog.

e. From the Drive upgrade capability, select the **Parallel** download operation or **All**.

You can use either of these upgrade methods because the appliance is in maintenance mode, where I/O activity is stopped for all drives and all volumes.

f. In Compatible Drives, select the drives for which you want to upgrade the selected firmware files.

- For one or more drives, select each drive you want to upgrade.
- For all compatible drives, select **Select all**.

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

g. Select **Finish**; then, type **yes** and select **OK**.

- The drive firmware download and upgrade begins, with Download Drive Firmware - Progress indicating the status of the firmware transfer for all drives.
- The status of each drive participating in the upgrade appears in the Transfer Progress column of Devices updated.

A parallel drive firmware upgrade operation can take as much as 90 seconds to complete if all drives are upgraded on a 24-drive system. On a larger system, the execution time is slightly longer.

h. During the firmware upgrade process, you can:

- Select **Stop** to stop the firmware upgrade in progress. Any firmware upgrade currently in progress are completed. Any drives that have attempted firmware upgrade show their individual status. Any remaining drives are listed with a status of Not attempted.



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

- Select **Save As** to save a text report of the firmware upgrade progress summary. The report saves with a default .log file extension. If you want to change the file extension or directory, change the parameters in Save Drive Download Log.

i. Use Download Drive Firmware - Progress to monitor the progress of the drive firmware upgrades. The Drives Updated area contains a list of drives that are scheduled for firmware upgrade and the transfer status of each drive's download and upgrade.

The progress and status of each drive that is participating in the upgrade appears in the Transfer Progress column. Take the appropriate recommended action if any errors occur during the upgrade.

- **Pending**

This status is shown for an online firmware download operation that has been scheduled but has not yet started.

- **In progress**

The firmware is being transferred to the drive.

- **Reconstruction in progress**

This status is shown if a volume transfer takes place during the rapid reconstruction of a drive. This is typically due to a controller reset or failure and the controller owner transfers the volume.

The system will initiate a full reconstruction of the drive.

- **Failed - partial**

The firmware was only partially transferred to the drive before a problem prevented the rest of the file from being transferred.

- **Failed - invalid state**

The firmware is not valid.

- **Failed - other**

The firmware could not be downloaded, possibly because of a physical problem with the drive.

- **Not attempted**

The firmware was not downloaded, which may be due to a number of different reasons such as the download was stopped before it could occur, or the drive did not qualify for the upgrade, or the download could not occur due to an error.

- **Successful**

The firmware was downloaded successfully.

9. After the drive firmware upgrade completes:

- To close the Drive Firmware Download Wizard, select **Close**.
- To start the wizard again, select **Transfer More**.

10. Once the upgrade operation has completed, reboot the appliance. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:

- Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
- Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.

NetApp® StorageGRID® Appliance Installer

Home	Configure Networking ▾	Configure Hardware ▾	Monitor Installation	Advanced ▾	
Reboot Controller Request a controller reboot.					RAID Mode Upgrade Firmware <b>Reboot Controller</b>
			<b>Reboot into StorageGRID</b>	<b>Reboot into Maintenance Mode</b>	

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** tab should display a normal status  for the appliance node, indicating that no alerts are active and the node is connected to the grid.

NetApp® StorageGRID®

Dashboard	Alerts ▾	<b>Nodes</b>	Tenants	ILM ▾	Configuration ▾	Maintenance ▾	Support ▾	Help ▾   Root ▾   Sign Out
-----------	----------	--------------	---------	-------	-----------------	---------------	-----------	----------------------------

**StorageGRID Deployment**

**Nodes**

**StorageGRID Deployment**

**Network** **Storage** **Objects** **ILM** **Load Balancer**

1 hour 1 day 1 week 1 month Custom

**Network Traffic** 

**DC1-ADM1** **DC1-ARC1** **DC1-G1** **DC1-S1** **DC1-S2** **DC1-S3**

## Replacing the E2700 controller

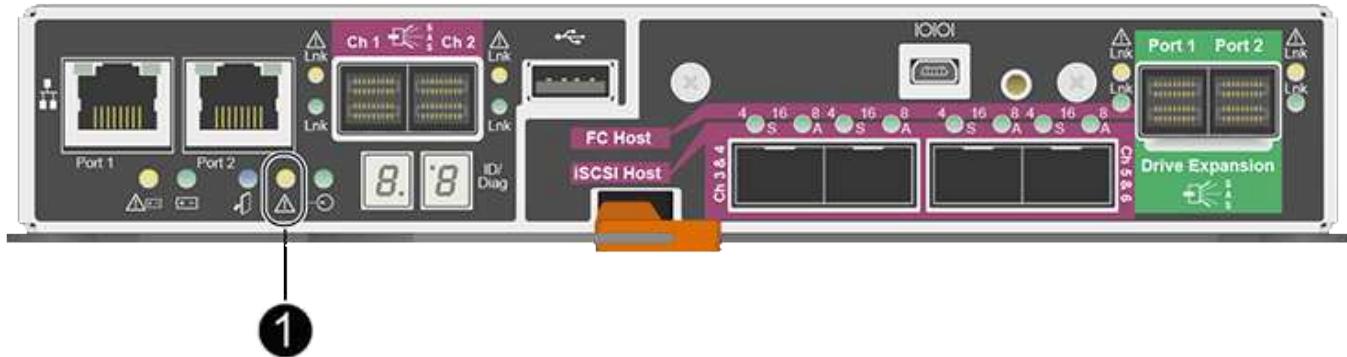
You might need to replace the E2700 controller if it is not functioning optimally or it has failed.

### What you'll need

- 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 antistatic protection.
- You must have the Maintenance or Root Access permission. For details, see the instructions for administering StorageGRID.

### About this task

You can determine if you have a failed controller by checking the amber Service Action Required LED on the controller (shown as 1 in the illustration). If this LED is on, the controller should be replaced.



The appliance Storage Node will not be accessible when you replace the controller. If the E2700 controller is functioning sufficiently, you can place the E5600SG controller into maintenance mode.

When you replace a controller, you must remove the battery from the original controller and install it in the replacement controller.

## Steps

1. Prepare to remove the controller.

You use SANtricity Storage Manager to perform these steps.

- Make a note of which version of SANtricity OS software is currently installed on the controller.
- Make a note of which version of NVSRAM is currently installed.
- If the Drive Security feature is enabled, be sure a saved key exists and that you know the pass phrase required to install it.



**Possible loss of data access** -- If all drives in the appliance are security enabled, the new controller will not be able to access the appliance until you unlock the secured drives using the Enterprise Management Window in SANtricity Storage Manager.

- Back up the configuration database.

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

- 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 in case the replacement does not resolve the problem.

- If the StorageGRID appliance is running in a StorageGRID system, place the E5600SG controller into maintenance mode.

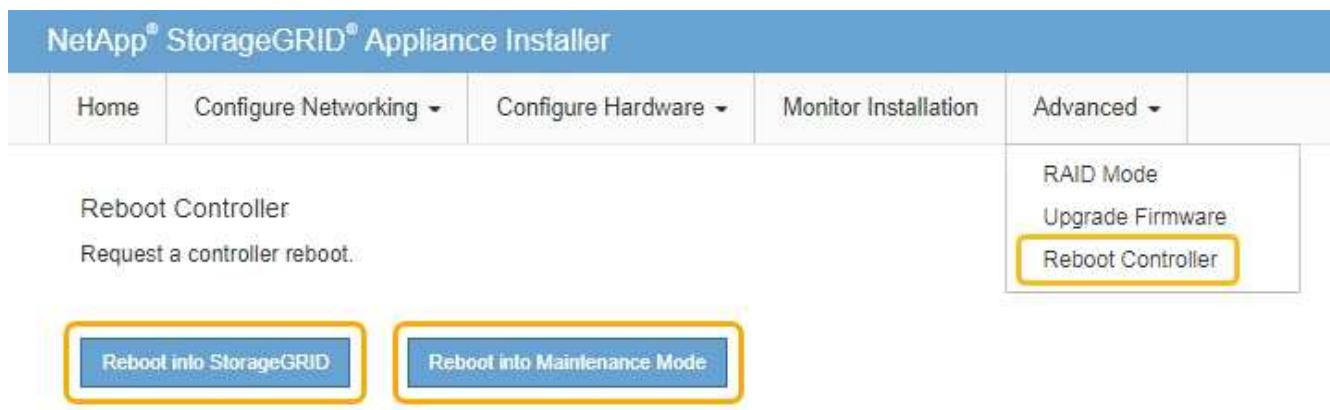
### Placing an appliance into maintenance mode

- If the E2700 controller is functioning sufficiently to allow for a controlled shutdown, confirm that all operations have completed.
  - From the title bar of the Array Management Window, select **Monitor > Reports > Operations in**

## Progress

- b. Confirm that all operations have completed.
4. Follow the instructions in the replacement procedure for a simplex E2700 controller to complete these steps:
  - a. Label the cables and then disconnect the cables.
-  To prevent degraded performance, do not twist, fold, pinch, or step on the cables.

  - b. Remove the failed controller from the appliance.
  - c. Remove the controller cover.
  - d. Unscrew the thumbscrew and remove the battery from the failed controller.
  - e. Install the battery in the replacement controller, and replace the controller cover.
  - f. Install the replacement controller into the appliance.
  - g. Replace the cables.
  - h. Wait for the E2700 controller to reboot. Verify that the seven-segment display shows a state of 99.
5. If the appliance uses secured drives, import the drive security key.
6. Return the appliance to normal operating mode. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select **Reboot into StorageGRID**.



During the reboot, the following screen appears:

## Reboot

Shuts down and restarts the node.

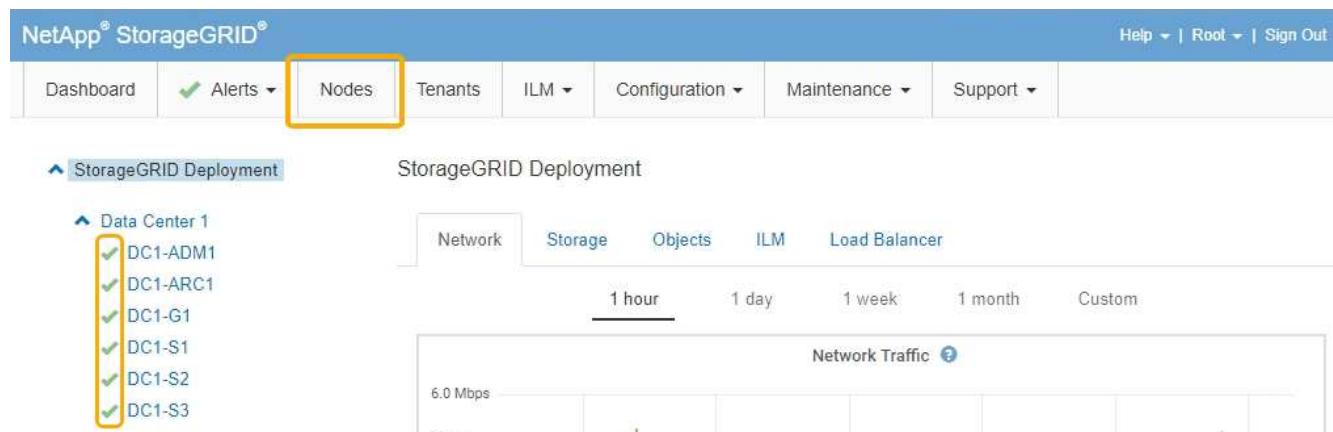
**Reboot**

## Maintenance Mode

This node is rebooting from maintenance mode to rejoin the grid. Monitor the node status to determine when the node has successfully rejoined the grid.

The appliance reboots and rejoins the grid. This process can take up to 20 minutes.

7. Confirm that the reboot is complete and that the node has rejoined the grid. In the Grid Manager, verify that the **Nodes** tab displays a normal status  for the appliance node, indicating that no alerts are active and the node is connected to the grid.



8. From SANtricity Storage Manager, confirm that the new controller is Optimal, and collect support data.

### Related information

[NetApp E-Series and EF-Series Hardware Replacement Procedures](#)

[NetApp Documentation: E2700 Series](#)

### Replacing the E5600SG controller

You might need to replace the E5600SG controller.

#### What you'll need

You must have access to the following resources:

- E-Series hardware replacement information on the NetApp Support Site at [mysupport.netapp.com](http://mysupport.netapp.com)
- E5600 documentation on the Support Site
- The appliance has been placed maintenance mode.

### About this task

If both controllers are functioning sufficiently to allow for a controlled shutdown, you can shut down the E5600SG controller first to interrupt the connectivity to the E2700 controller.

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 cannot 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. Use antistatic protection.
2. Label each cable that is attached to the E5600SG controller, so you can reconnect the cables correctly.



To prevent degraded performance, do not twist, fold, pinch, or step on the cables. Do not bend the cables tighter than a 5-cm (2-in) radius.

3. When the appliance has been placed maintenance mode, shut down the E5600SG controller.
  - a. Log in to the grid node:
    - 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.
  - b. Shut down the E5600SG controller:  
`shutdown -h now`
4. Turn off the power to the enclosure, and wait until all LED and seven-segment display activity on the rear of the controller has stopped.
5. Remove the cables.
6. Remove the controller, as described in the E5600SG controller documentation.
7. Insert the new controller, as described in the E5600SG controller documentation.
8. Replace all cables.
9. Turn the power back on to the enclosure.
10. Monitor the seven-segment codes.
  - E2700 controller:

The final LED state is 99.

- E5600SG controller:

The final LED state is HA.

## 11. Monitor the status of the appliance Storage Node in the Grid Manager.

Verify that the appliance Storage Nodes returns to the expected status.

### Related information

[NetApp E-Series and EF-Series Hardware Replacement Procedures](#)

[NetApp Documentation: E5600 Series](#)

### Replacing other hardware components

You might need to replace a drive, fan, power supply, or battery in the StorageGRID appliance.

#### What you'll need

- You have the E-Series hardware replacement procedure.
- The appliance has been placed maintenance mode if the component replacement procedure requires that you shut down the appliance.

[Placing an appliance into maintenance mode](#)

#### About this task

To replace a drive, power-fan canister, fan canister, power canister, battery, or drive drawer, refer to the standard procedures for the E2700 and E5600 storage arrays. Focus on the step-by-step instructions for removing and replacing the hardware itself; many of the SANtricity Storage Manager procedures do not apply to an appliance.

#### SG5612 component replacement instructions

FRU	See
Drive	Follow the steps in the E-Series instructions for replacing a drive in the E2600, E2700, E5400, E5500, E5600 or 12-drive or 24-drive trays.
Power-fan canister	Follow the steps in the E-Series instructions for replacing a failed power-fan canister in the E5612 or the E5624 controller-drive tray.
Battery in the E2700 controller (requires removing the controller)	Follow the steps in <a href="#">Replacing the E2700 controller</a> , but install the new battery in the existing controller.

#### SG5660 component replacement instructions

FRU	See
Drive	Follow the steps in the E-Series instructions for replacing a drive in the E2660, E2760, E5460, E5560, or E5660 trays.
Power canister	Follow the steps in the E-Series instructions for replacing a failed power canister in the E5660 controller-drive tray.
Fan canister	Follow the steps in the E-Series instructions for replacing a failed fan canister in the E5660 controller-drive tray.
Battery in the E2700 controller (requires removing the controller)	Follow the steps in <a href="#">Replacing the E2700 controller</a> , but install the new battery in the existing controller.

## Related information

[NetApp E-Series and EF-Series Hardware Replacement Procedures](#)

[NetApp Documentation: E2700 Series](#)

[NetApp Documentation: E5600 Series](#)

## Changing the link configuration of the E5600SG controller

You can change the Ethernet link configuration of the E5600SG controller. You can change the port bond mode, the network bond mode, and the link speed.

### What you'll need

- You must place the E5600SG controller into maintenance mode. Placing the controller into maintenance mode interrupts the connection to the E2700 controller. Putting a StorageGRID appliance into maintenance mode might make the appliance unavailable for remote access.

[Placing an appliance into maintenance mode](#)

### About this task

Options for changing the Ethernet link configuration of the E5600SG 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 from 10-GbE to 25-GbE, or from 25-GbE to 10-GbE

### Steps

1. Select **Configure Networking > Link Configuration** from the menu.

## NetApp® StorageGRID® Appliance Installer

Home Configure Networking ▾ Configure Hardware ▾ Monitor Installation Advanced ▾

Home

Link Configuration

IP Configuration

Remap Ports

Ping Test

Port Connectivity Test (nmap)

Review the settings below, and then click Start Installation.

### 2. Make the desired changes to the link configuration.

For more information on the options, see “Configuring 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 are not 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://E5600SG\\_Controller\\_IP:8443](https://E5600SG_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 instructions for configuring IP addresses.

#### Setting the IP configuration

4. From the StorageGRID Appliance Installer, select **Configure Networking > Ping Test**.
5. Use the Ping Test tool to check connectivity to IP addresses on any networks that may have been affected by the link configuration changes you made in the [Change link configuration](#) step.

In addition to any other tests you choose to perform, confirm that you can ping the grid IP address of the primary Admin Node, and the grid IP address of at least one other Storage Node. If necessary, correct any link configuration issues.

6. Once you are satisfied that your link configuration changes are working, reboot the node. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:
  - Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
  - Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.

NetApp® StorageGRID® Appliance Installer

Home	Configure Networking ▾	Configure Hardware ▾	Monitor Installation	Advanced ▾	
<p>Reboot Controller Request a controller reboot.</p>					<p>RAID Mode Upgrade Firmware Reboot Controller</p>
<p><b>Reboot into StorageGRID</b></p>		<p><b>Reboot into Maintenance Mode</b></p>			

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** tab should display a normal status  for the appliance node, indicating that no alerts are active and the node is connected to the grid.

NetApp® StorageGRID®

Dashboard	Alerts ▾	<b>Nodes</b>	Tenants	ILM ▾	Configuration ▾	Maintenance ▾	Support ▾	Help ▾   Root ▾   Sign Out
-----------	----------	--------------	---------	-------	-----------------	---------------	-----------	----------------------------

**StorageGRID Deployment**

**Nodes**

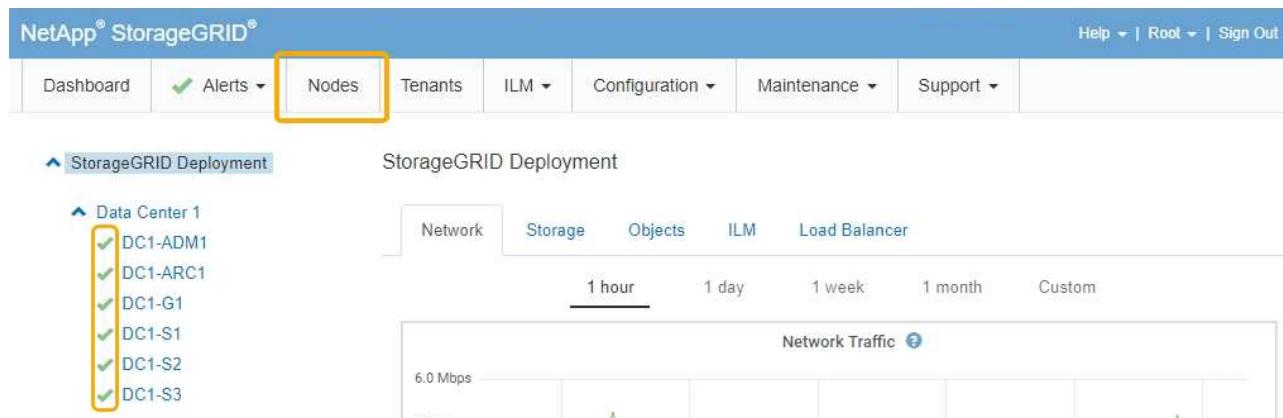
**StorageGRID Deployment**

**Network** **Storage** **Objects** **ILM** **Load Balancer**

1 hour 1 day 1 week 1 month Custom

Network Traffic 

6.0 Mbps



## Related information

[Configuring network links \(SG5600\)](#)

## Changing the MTU setting

You can change the MTU setting that you assigned when you configured IP addresses for the appliance node.

### What you'll need

The appliance has been placed maintenance mode.

### Placing an appliance into maintenance mode

#### Steps

1. From the StorageGRID Appliance Installer, select **Configure Networking > IP Configuration**.
2. Make the desired changes to the MTU settings for the Grid Network, Admin Network, and Client Network.

## Grid Network

The Grid Network is used for all internal StorageGRID traffic. The Grid Network provides connectivity between all nodes in the grid, across all sites and subnets. All hosts on the Grid Network must be able to talk to all other hosts. The Grid Network can consist of multiple subnets. Networks containing critical grid services, such as NTP, can also be added as Grid subnets.

IP  Static  DHCP

Assignment

IPv4 Address (CIDR)

Gateway

**⚠** All required Grid Network subnets must also be defined in the Grid Network Subnet List on the Primary Admin Node before starting installation.

Subnets (CIDR)	<input type="text" value="172.18.0.0/21"/> <span style="color: red;">×</span>
	<input type="text" value="172.18.0.0/21"/> <span style="color: red;">×</span>
	<input type="text" value="192.168.0.0/21"/> <span style="color: green;">+ ×</span>
MTU	<input type="text" value="1500"/> <span style="border: 1px solid black; padding: 2px;">▲</span>

Cancel Save



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.



For the best network performance, all nodes should be configured with similar MTU values on their Grid Network interfaces. The **Grid Network MTU mismatch** alert is triggered if there is a significant difference in MTU settings for the Grid Network on individual nodes. The MTU values do not have to be the same for all network types.

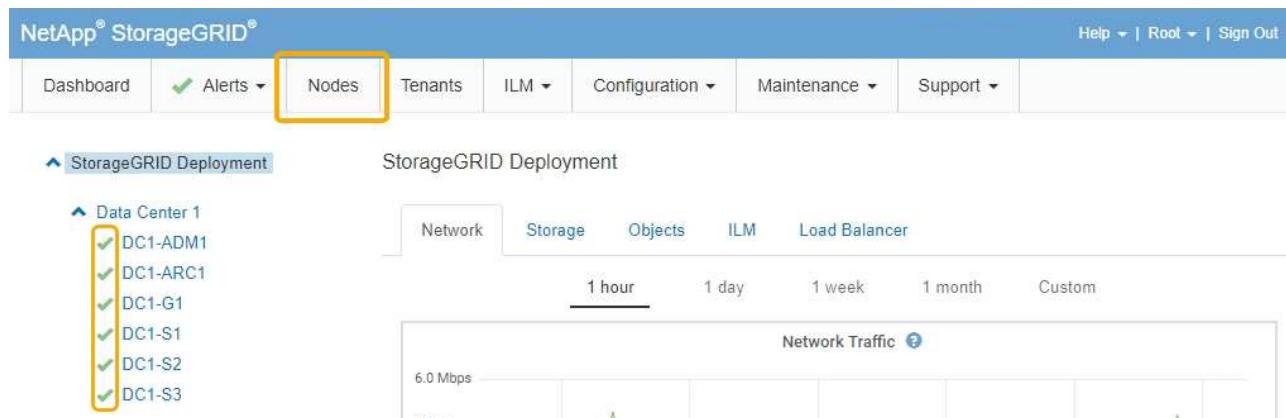
- When you are satisfied with the settings, select **Save**.
- Reboot the node. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:
  - Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this

option if you are done working in maintenance mode and are ready to return the node to normal operation.

- Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



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** tab should display a normal status for the appliance node, indicating that no alerts are active and the node is connected to the grid.



## Related information

[Administer StorageGRID](#)

### Checking the DNS server configuration

You can check and temporarily change the domain name system (DNS) servers that are currently in use by this appliance node.

### What you'll need

The appliance has been placed maintenance mode.

### Placing an appliance into maintenance mode

### About this task

You might need to change the DNS server settings if an encrypted appliance cannot connect to the key management server (KMS) or KMS cluster because the hostname for the KMS was specified as a domain name instead of an IP address. Any changes that you make to the DNS settings for the appliance are temporary and are lost when you exit maintenance mode. To make these changes permanent, specify the DNS servers in Grid Manager (**Maintenance > Network > DNS Servers**).

- Temporary changes to the DNS configuration are necessary only for node-encrypted appliances where the KMS server is defined using a fully qualified domain name, instead of an IP address, for the hostname.
- When a node-encrypted appliance connects to a KMS using a domain name, it must connect to one of the DNS servers defined for the grid. One of these DNS servers then translates the domain name into an IP address.
- If the node cannot reach a DNS server for the grid, or if you changed the grid-wide DNS settings when a node-encrypted appliance node was offline, the node is unable to connect to the KMS. Encrypted data on the appliance cannot be decrypted until the DNS issue is resolved.

To resolve a DNS issue preventing KMS connection, specify the IP address of one or more DNS servers in the StorageGRID Appliance Installer. These temporary DNS settings allow the appliance to connect to the KMS and decrypt data on the node.

For example, if the DNS server for the grid changes while an encrypted node was offline, the node will not be able to reach the KMS when it comes back online, since it is still using the previous DNS values. Entering the new DNS server IP address in the StorageGRID Appliance Installer allows a temporary KMS connection to decrypt the node data.

## Steps

1. From the StorageGRID Appliance Installer, select **Configure Networking > DNS Configuration**.
2. Verify that the DNS servers specified are correct.

### DNS Servers

 Configuration changes made on this page will not be passed to the StorageGRID software after appliance installation.

#### Servers

Server 1	<input type="text" value="10.224.223.135"/>	
Server 2	<input type="text" value="10.224.223.136"/>	 

3. If required, change the DNS servers.



Changes made to the DNS settings are temporary and are lost when you exit maintenance mode.

4. When you are satisfied with the temporary DNS settings, select **Save**.

The node uses the DNS server settings specified on this page to reconnect to the KMS, allowing data on the node to be decrypted.

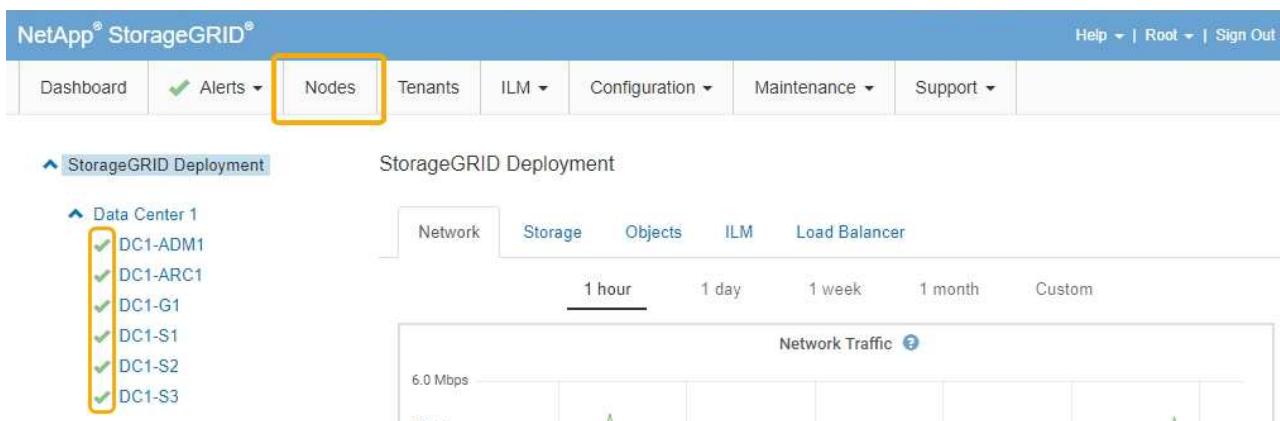
5. After node data is decrypted, reboot the node. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:

- Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
- Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



When the node reboots and rejoins the grid, it uses the system-wide DNS servers listed in the Grid Manager. After rejoining the grid, the appliance will no longer use the temporary DNS servers specified in the StorageGRID Appliance Installer while the appliance was in maintenance mode.

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** tab should display a normal status for the appliance node, indicating that no alerts are active and the node is connected to the grid.



### Monitoring node encryption in maintenance mode

If you enabled node encryption for the appliance during installation, you can monitor the node-encryption status of each appliance node, including the node-encryption state and key management server (KMS) details.

## What you'll need

- Node encryption must have been enabled for the appliance during installation. You cannot enable node encryption after the appliance is installed.
- The appliance has been placed into maintenance mode.

### Placing an appliance into maintenance mode

## Steps

1. From the StorageGRID Appliance Installer, select **Configure Hardware > Node Encryption**.

### Node Encryption

Node encryption allows you to use an external key management server (KMS) to encrypt all StorageGRID data on this appliance. If node encryption is enabled for the appliance and a KMS is configured for the site, you cannot access any data on the appliance unless the appliance can communicate with the KMS.

#### Encryption Status

**⚠** You can only enable node encryption for an appliance during installation. You cannot enable or disable the node encryption setting after the appliance is installed.

Enable node encryption

**Save**

#### Key Management Server Details

View the status and configuration details for the KMS that manages the encryption key for this appliance. You must use the Grid Manager to make configuration changes.

KMS display name thales

External key UID 41b0306abcce451facfce01b1b4870ae1c1ec6bd5e3849d790223766baf35c57

Hostnames 10.96.99.164  
10.96.99.165

Port 5696

#### Server certificate



#### Client certificate



#### Clear KMS Key

**⚠** Do not clear the KMS key if you need to access or preserve any data on this appliance.

If you want to reinstall this appliance node (for example, in another grid), you must clear the KMS key. When the KMS key is cleared, all data on this appliance is deleted.

**Clear KMS Key and Delete Data**

The Node Encryption page includes these three sections:

- Encryption Status shows whether node encryption is enabled or disabled for the appliance.
- Key Management Server Details shows information about the KMS being used to encrypt the appliance. You can expand the server and client certificate sections to view certificate details and status.

- To address issues with the certificates themselves, such as renewing expired certificates, see the information about KMS in the instructions for administering StorageGRID.
- If there are unexpected problems connecting to KMS hosts, verify that the domain name system (DNS) servers are correct and that appliance networking is correctly configured.

#### [Checking the DNS server configuration](#)

- If you are unable to resolve your certificate issues, contact technical support.
- Clear KMS Key disables node encryption for the appliance, removes the association between the appliance and the key management server that was configured for the StorageGRID site, and deletes all data from the appliance. You must clear the KMS key before you can install the appliance into another StorageGRID system.

#### [Clearing the key management server configuration](#)



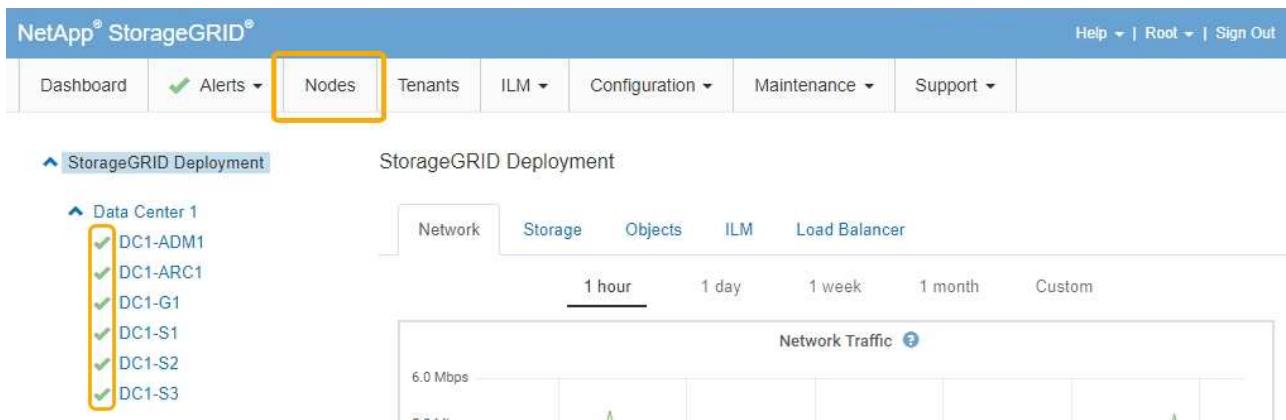
Clearing the KMS configuration deletes data from the appliance, rendering it permanently inaccessible. This data is not recoverable.

2. When you are done checking node-encryption status, reboot the node. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:

- Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
- Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



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** tab should display a normal status for the appliance node, indicating that no alerts are active and the node is connected to the grid.



## Related information

[Administer StorageGRID](#)

### Clearing the key management server configuration

Clearing the key management server (KMS) configuration disables node encryption on your appliance. After clearing the KMS configuration, the data on your appliance is permanently deleted and is no longer accessible. This data is not recoverable.

#### What you'll need

If you need to preserve data on the appliance, you must perform a node decommission procedure before you clear the KMS configuration.



When KMS is cleared, data on the appliance will be permanently deleted and no longer accessible. This data is not recoverable.

Decommission the node to move any data it contains to other nodes in StorageGRID. See the recovery and maintenance instructions for grid node decommissioning.

#### About this task

Clearing the appliance KMS configuration disables node encryption, removing the association between the appliance node and the KMS configuration for the StorageGRID site. Data on the appliance is then deleted and the appliance is left in a pre-install state. This process cannot be reversed.

You must clear the KMS configuration:

- Before you can install the appliance into another StorageGRID system, that does not use a KMS or that uses a different KMS.



Do not clear the KMS configuration if you plan to reinstall an appliance node in a StorageGRID system that uses the same KMS key.

- Before you can recover and reinstall a node where the KMS configuration was lost and the KMS key is not recoverable.
- Before returning any appliance that was previously in use at your site.
- After decommissioning a appliance that had node encryption enabled.



Decommission the appliance before clearing KMS to move its data to other nodes in your StorageGRID system. Clearing KMS before decommissioning the appliance will result in data loss and might render the appliance inoperable.

## Steps

1. Open a browser, and enter one of the IP addresses for the appliance's compute controller.

**[https://Controller\\_IP:8443](https://Controller_IP:8443)**

*Controller\_IP* is the IP address of the compute controller (not the storage controller) on any of the three StorageGRID networks.

The StorageGRID Appliance Installer Home page appears.

2. Select **Configure Hardware > Node Encryption**.

### Node Encryption

Node encryption allows you to use an external key management server (KMS) to encrypt all StorageGRID data on this appliance. If node encryption is enabled for the appliance and a KMS is configured for the site, you cannot access any data on the appliance unless the appliance can communicate with the KMS.

#### Encryption Status

**⚠** You can only enable node encryption for an appliance during installation. You cannot enable or disable the node encryption setting after the appliance is installed.

Enable node encryption

**Save**

#### Key Management Server Details

View the status and configuration details for the KMS that manages the encryption key for this appliance. You must use the Grid Manager to make configuration changes.

KMS display name thales

External key UID 41b0306abcce451facfce01b1b4870ae1c1ec6bd5e3849d790223766baf35c57

Hostnames 10.96.99.164  
10.96.99.165

Port 5696

**Server certificate**

**Client certificate**

#### Clear KMS Key

**⚠** Do not clear the KMS key if you need to access or preserve any data on this appliance.

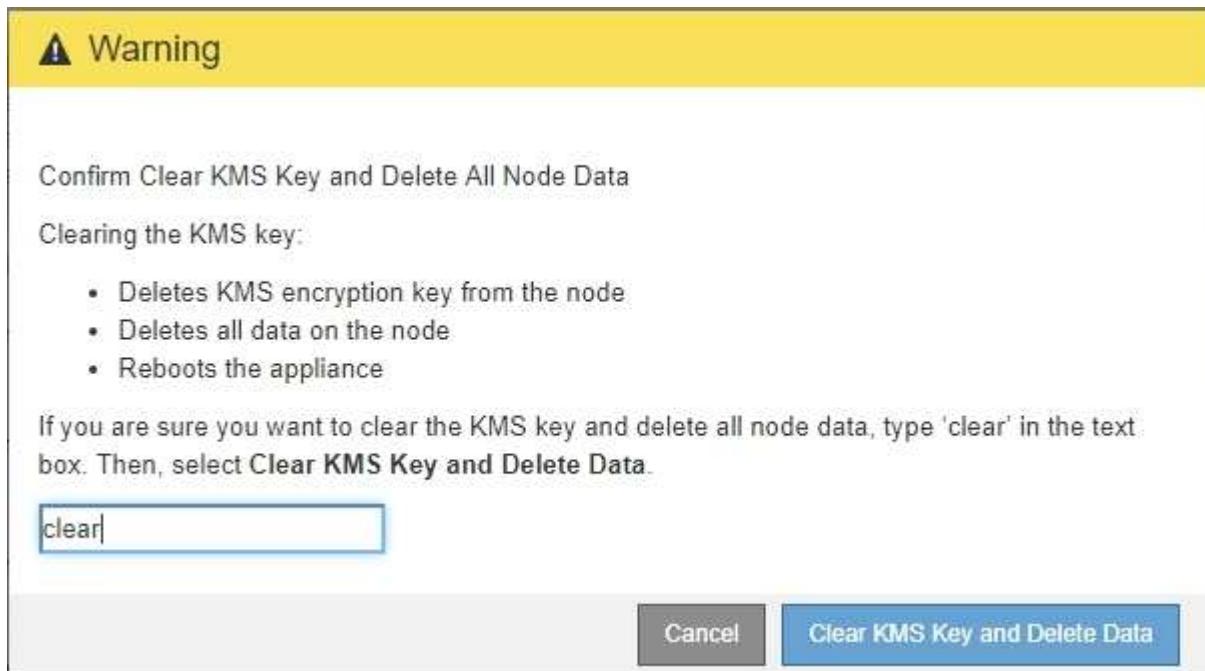
If you want to reinstall this appliance node (for example, in another grid), you must clear the KMS key. When the KMS key is cleared, all data on this appliance is deleted.

**Clear KMS Key and Delete Data**



If the KMS configuration is cleared, data on the appliance will be permanently deleted. This data is not recoverable.

3. At the bottom of the window, select **Clear KMS Key and Delete Data**.
4. If you are sure that you want to clear the KMS configuration, type **clear** and select **Clear KMS Key and Delete Data**.



The KMS encryption key and all data are deleted from the node, and the appliance reboots. This can take up to 20 minutes.

5. Open a browser, and enter one of the IP addresses for the appliance's compute controller.

**[https://Controller\\_IP:8443](https://Controller_IP:8443)**

*Controller\_IP* is the IP address of the compute controller (not the storage controller) on any of the three StorageGRID networks.

The StorageGRID Appliance Installer Home page appears.

6. Select **Configure Hardware > Node Encryption**.
7. Verify that node encryption is disabled and that the key and certificate information in **Key Management Server Details** and the **Clear KMS Key and Delete Data** control are removed from the window.

Node encryption cannot be reenabled on the appliance until it is reinstalled in a grid.

## After you finish

After the appliance reboots and you have verified that KMS has been cleared and that the appliance is in a pre-install state, you can physically remove the appliance from your StorageGRID system. See the recovery and maintenance instructions for information about preparing an appliance for reinstallation.

## Related information

[Administer StorageGRID](#)

## SG100 & SG1000 services appliances

Learn how to install and maintain the StorageGRID SG100 and SG1000 appliances.

- [SG100 and SG1000 appliances overview](#)
- [SG100 and SG1000 applications](#)
- [Installation and deployment overview](#)
- [Preparing for installation](#)
- [Installing the hardware](#)
- [Configuring StorageGRID connections](#)
- [Configuring the BMC interface](#)
- [Optional: Enabling node encryption](#)
- [Deploying a services appliance node](#)
- [Troubleshooting the hardware installation](#)
- [Maintaining the appliance](#)

### SG100 and SG1000 appliances overview

The StorageGRID SG100 services appliance and the SG1000 services appliance can operate as a Gateway Node and as an Admin Node to provide high availability load balancing services in a StorageGRID system. Both appliances can operate as Gateway Nodes and Admin Nodes (primary or non-primary) at the same time.

#### Appliance features

Both models of the services appliance provide the following features:

- Gateway Node or Admin Node functions for a StorageGRID system.
- The StorageGRID Appliance Installer to simplify node deployment and configuration.
- When deployed, can access StorageGRID software from an existing Admin Node or from software downloaded to a local drive. To further simplify the deployment process, a recent version of the software is preloaded onto the appliance during manufacturing.
- A baseboard management controller (BMC) for monitoring and diagnosing some of the appliance hardware.
- The ability to connect to all three StorageGRID networks, including the Grid Network, the Admin Network, and the Client Network:
  - The SG100 supports up to four 10- or 25-GbE connections to the Grid Network and Client Network.
  - The SG1000 supports up to four 10-, 25-, 40-, or 100-GbE connections to the Grid Network and Client Network.

#### SG100 and SG1000 diagrams

This figure shows the front of the SG100 and the SG1000 with the bezel removed.



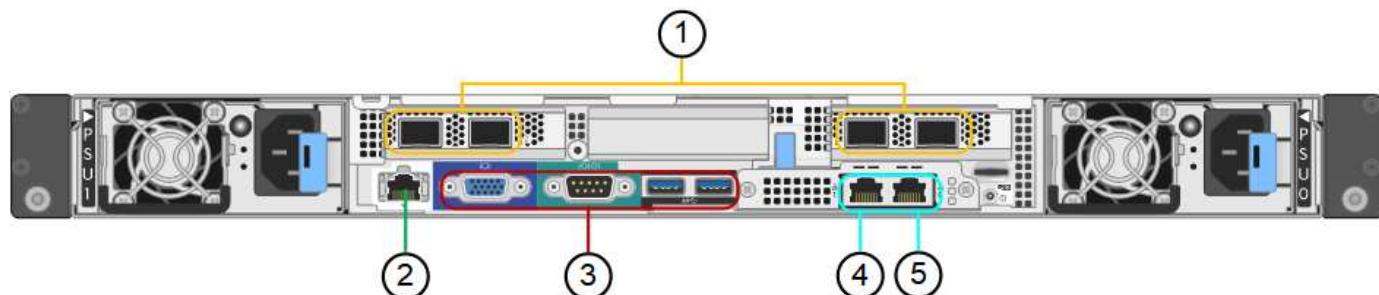
From the front, the two appliances are identical except for the product name on the bezel.

The two solid-state drives (SSDs), indicated by the orange outline, are used for storing the StorageGRID operating system and are mirrored using RAID1 for redundancy. When the SG100 or SG1000 services appliance is configured as an Admin Node, these drives are used to store audit logs, metrics, and database tables.

The remaining drive slots are blank.

### Connectors on the rear of the SG100

This figure shows the connectors on the back of the SG100.

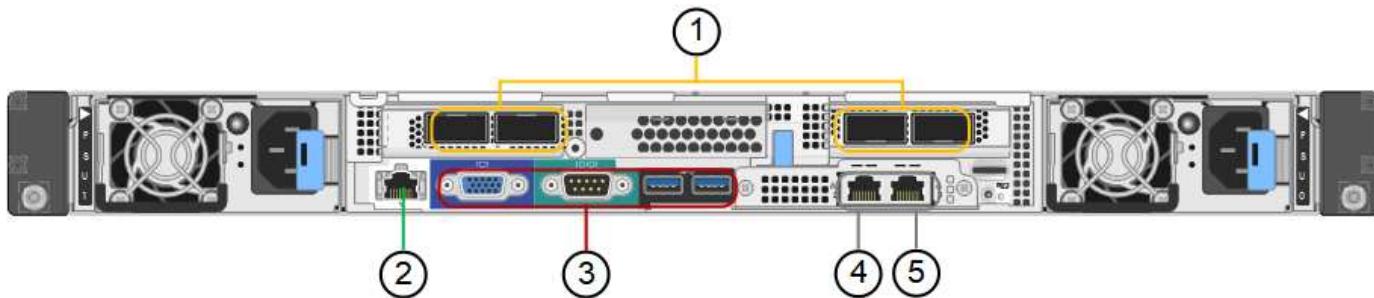


	Port	Type	Use
1	Network ports 1-4	10/25-GbE, based on cable or SFP transceiver type (SFP28 and SFP+ modules are supported), switch speed, and configured link speed	Connect to the Grid Network and the Client Network for StorageGRID.
2	BMC management port	1-GbE (RJ-45)	Connect to the appliance baseboard management controller.
3	Diagnostic and support ports	<ul style="list-style-type: none"><li>VGA</li><li>Serial, 115200 8-N-1</li><li>USB</li></ul>	Reserved for technical support use.
4	Admin Network port 1	1-GbE (RJ-45)	Connect the appliance to the Admin Network for StorageGRID.

	Port	Type	Use
5	Admin Network port 2	1-GbE (RJ-45)	<p>Options:</p> <ul style="list-style-type: none"> <li>Bond with management port 1 for a redundant connection to the Admin Network for StorageGRID.</li> <li>Leave disconnected and available for temporary local access (IP 169.254.0.1).</li> <li>During installation, use port 2 for IP configuration if DHCP-assigned IP addresses are not available.</li> </ul>

### Connectors on the rear of the SG1000

This figure shows the connectors on the back of the SG1000.



	Port	Type	Use
1	Network ports 1-4	10/25/40/100-GbE, based on cable or transceiver type, switch speed, and configured link speed. QSFP28 and QSFP+ (40/100GbE) are supported natively and SFP28/SFP+ transceivers can be used with a QSA (sold separately) to use 10/25GbE speeds.	Connect to the Grid Network and the Client Network for StorageGRID.
2	BMC management port	1-GbE (RJ-45)	Connect to the appliance baseboard management controller.
3	Diagnostic and support ports	<ul style="list-style-type: none"> <li>VGA</li> <li>Serial, 115200 8-N-1</li> <li>USB</li> </ul>	Reserved for technical support use.
4	Admin Network port 1	1-GbE (RJ-45)	Connect the appliance to the Admin Network for StorageGRID.

	Port	Type	Use
5	Admin Network port 2	1-GbE (RJ-45)	<p>Options:</p> <ul style="list-style-type: none"> <li>• Bond with management port 1 for a redundant connection to the Admin Network for StorageGRID.</li> <li>• Leave disconnected and available for temporary local access (IP 169.254.0.1).</li> <li>• During installation, use port 2 for IP configuration if DHCP-assigned IP addresses are not available.</li> </ul>

## SG100 and SG1000 applications

You can configure the StorageGRID services appliances in various ways to provide gateway services as well as redundancy of some grid administration services.

Appliances can be deployed in the following ways:

- Add to a new or existing grid as a Gateway Node
- Add to a new grid as a primary or non-primary Admin Node, or to an existing grid as a non-primary Admin Node
- Operate as a Gateway Node and Admin Node (primary or non-primary) at the same time

The appliance facilitates the use of high availability (HA) groups and intelligent load balancing for S3 or Swift data path connections.

The following examples describe how you can maximize the capabilities of the appliance:

- Use two SG100 or two SG1000 appliances to provide gateway services by configuring them as Gateway Nodes.



Do not deploy the SG100 and SG1000 service appliances in the same site. Unpredictable performance might result.

- Use two SG100 or two SG1000 appliances to provide redundancy of some grid administration services. Do this by configuring each appliance as Admin Nodes.
- Use two SG100 or two SG1000 appliances to provide highly available load balancing and traffic shaping services accessed through one or more virtual IP addresses. Do this by configuring the appliances as any combination of Admin Nodes or Gateway Nodes and adding both nodes to the same HA group.



If you use Admin Nodes and Gateway Nodes in the same HA group, CLB (Connection Load Balancer) ports and Admin Node-only ports will not fail over. For instructions for configuring HA groups, see the instructions for administering StorageGRID.



The CLB service is deprecated.

When used with StorageGRID storage appliances, both the SG100 and the SG1000 services appliances enable deployment of appliance-only grids with no dependencies on external hypervisors or compute hardware.

## Related information

[Administer StorageGRID](#)

## Installation and deployment overview

You can install one or more StorageGRID services appliances when you first deploy StorageGRID, or you can add services appliance nodes later as part of an expansion.

### What you'll need

Your StorageGRID system is using the required version of StorageGRID software.

Appliance	Required StorageGRID version
SG100	11.4 or later (latest hotfix recommended)
SG1000	11.3 or later (latest hotfix recommended)

## Installation and deployment tasks

Preparing and adding a StorageGRID appliance to the grid includes four primary steps:

1. Preparing for installation:
  - Preparing the installation site
  - Unpacking the boxes and checking the contents
  - Obtaining additional equipment and tools
  - Verifying network configuration
  - Optional: Configuring an external key management server (KMS) if you plan to encrypt all appliance data. See details about external key management in the instructions for administering StorageGRID.
2. Installing the hardware:
  - Registering the hardware
  - Installing the appliance into a cabinet or rack
  - Cabling the appliance
  - Connecting the power cord and applying power
  - Viewing boot-up status codes
3. Configuring the hardware:
  - Accessing StorageGRID Appliance Installer and configuring the link and network IP settings required to connect to StorageGRID networks
  - Accessing the baseboard management controller (BMC) interface on the appliance.
  - Optional: Enabling node encryption if you plan to use an external KMS to encrypt appliance data.
4. Deploying an appliance Gateway or Admin Node

After the appliance hardware has been installed and configured, you can deploy the appliance as a Gateway Node and an Admin Node in a StorageGRID system. Both the SG100 and the SG1000 appliances can operate as Gateway Nodes and Admin Nodes (primary and non-primary) at the same time.

Task	Instructions
Deploying an appliance Gateway or Admin Node in a new StorageGRID system	<a href="#">Deploying a services appliance node</a>
Adding an appliance Gateway or Admin Node to an existing StorageGRID system	<a href="#">Instructions for expanding a StorageGRID system</a>
Deploying an appliance Gateway or Admin Node as part of a node recovery operation	<a href="#">Instructions for recovery and maintenance</a>

## Related information

[Preparing for installation](#)

[Installing the hardware](#)

[Configuring StorageGRID connections](#)

[Expand your grid](#)

[Maintain & recover](#)

[Administer StorageGRID](#)

## Preparing for installation

Preparing to install a StorageGRID appliance entails preparing the site and obtaining all required hardware, cables, and tools. You should also gather IP addresses and network information.

### Steps

- [Preparing the site \(SG100 and SG1000\)](#)
- [Unpacking the boxes \(SG100 and SG1000\)](#)
- [Obtaining additional equipment and tools \(SG100 and SG1000\)](#)
- [Web browser requirements](#)
- [Reviewing appliance network connections](#)
- [Gathering installation information \(SG100 and SG1000\)](#)

### Preparing the site (SG100 and SG1000)

Before installing the appliance, you must make sure that the site and the cabinet or rack you plan to use meet the specifications for a StorageGRID appliance.

### Steps

1. Confirm that the site meets the requirements for temperature, humidity, altitude range, airflow, heat dissipation, wiring, power, and grounding. See the NetApp Hardware Universe for more information.
2. Confirm that your location provides the correct voltage of AC power (in the range of 120 to 240 volts AC).
3. Obtain a 19-inch (48.3-cm) cabinet or rack to fit shelves of this size (without cables):

Height	Width	Depth	Maximum weight
1.70 in. (4.32 cm)	17.32 in. (44.0 cm)	32.0 in. (81.3 cm)	39 lb. (17.7 kg)

4. Decide where you are going to install the appliance.

#### Related information

[NetApp Hardware Universe](#)

[NetApp Interoperability Matrix Tool](#)

#### Unpacking the boxes (SG100 and SG1000)

Before installing the StorageGRID appliance, unpack all boxes and compare the contents to the items on the packing slip.

#### Appliance hardware

- **SG100 or SG1000**



- **Rail kit with instructions**



#### Power cords

The shipment for the StorageGRID appliance includes the following power cords:

- **Two power cords for your country**



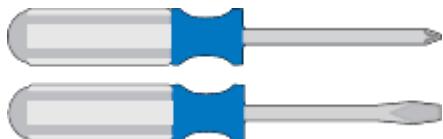
Your cabinet might have special power cords that you use instead of the power cords that ship with the appliance.

## Obtaining additional equipment and tools (SG100 and SG1000)

Before installing the StorageGRID appliance, confirm you have all of the additional equipment and tools that you need.

You need the following additional equipment to install and configure the hardware:

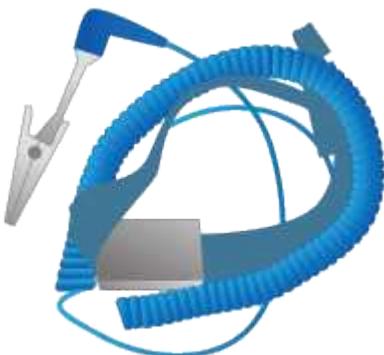
- **Screwdrivers**



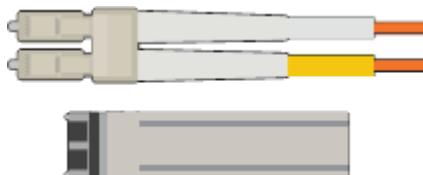
Phillips No. 2 screwdriver

Medium flat-blade screwdriver

- **ESD wrist strap**



- **Optical cables and transceivers**



- **Cable**

- TwinAx/Copper (1 to 4)

or

- Fibre/Optical (1 to 4)

- 1 to 4 of each of these transceivers/adapters based on link speed (mixed speeds are not supported)

- SG100:

Link speed (GbE)	Required equipment
10	SFP+ transceiver

Link speed (GbE)	Required equipment
25	SFP28 transceiver

- SG1000:

Link speed (GbE)	Required equipment
10	QSFP-to-SFP adapter (QSA) and SFP+ transceiver
25	QSFP-to-SFP adapter (QSA) and SFP28 transceiver
40	QSFP+ transceiver
100	QFSP28 transceiver

- RJ-45 (Cat5/Cat5e/Cat6/Cat6a) Ethernet cables



- Service laptop



Supported web browser

1-GbE (RJ-45) port



Some ports might not support 10/100 Ethernet speeds.

- Optional tools



Power drill with Phillips head bit

Flashlight

## Web browser requirements

You must use a supported web browser.

Web browser	Minimum supported version
Google Chrome	87
Microsoft Edge	87
Mozilla Firefox	84

You should set the browser window to a recommended width.

Browser width	Pixels
Minimum	1024
Optimum	1280

## Reviewing appliance network connections

Before installing the StorageGRID appliance, you should understand which networks can be connected to the appliance.

When you deploy a StorageGRID appliance as a node in a StorageGRID system, you can connect it to the following networks:

- **Grid Network for StorageGRID:** The Grid Network is used for all internal StorageGRID traffic. It provides connectivity between all nodes in the grid, across all sites and subnets. The Grid Network is required.
- **Admin Network for StorageGRID:** The Admin Network is a closed network used for system administration and maintenance. The Admin Network is typically a private network and does not need to be routable between sites. The Admin Network is optional.
- **Client Network for StorageGRID:** The Client Network is an open network used to provide access to client applications, including S3 and Swift. The Client Network provides client protocol access to the grid, so the Grid Network can be isolated and secured. You can configure the Client Network so that the appliance can be accessed over this network using only the ports you choose to open. The Client Network is optional.
- **BMC management network for the services appliance:** This network provides access to the baseboard management controller in the SG100 and SG1000, appliances allowing you to monitor and manage the hardware components in the appliance. This management network can be the same as the Admin Network for StorageGRID, or it can be an independent management network.

## Related information

[Gathering installation information \(SG100 and SG1000\)](#)

## Cabling the appliance SG100 and SG1000

### Network guidelines

### Grid primer

#### Port bond modes for the SG100 and SG1000 appliances

When configuring network links for the SG100 and SG1000 appliances, you can use port bonding for the ports that connect to the Grid Network and optional Client Network, and the 1-GbE management ports that connect to the optional Admin Network. Port bonding helps protect your data by providing redundant paths between StorageGRID networks and the appliance.

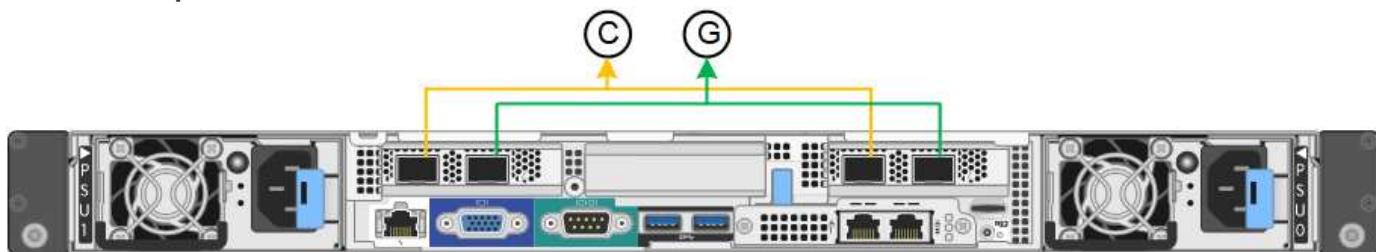
#### Network bond modes

The networking ports on the services appliance support Fixed port bond mode or Aggregate port bond mode for the Grid Network and Client Network connections.

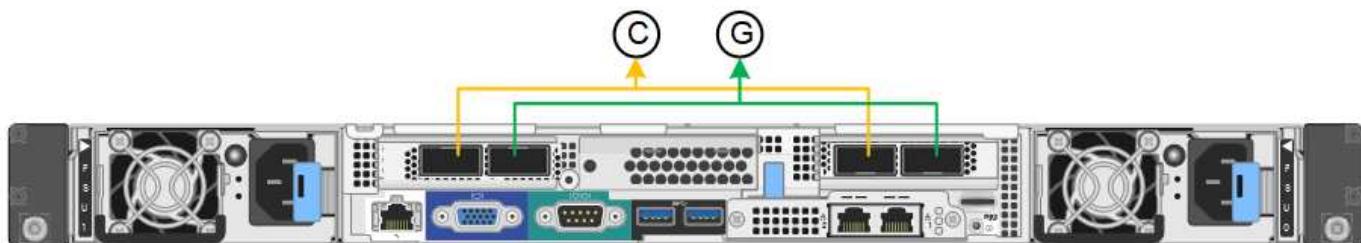
#### Fixed port bond mode

Fixed port bond mode is the default configuration for the networking ports.

##### SG100 fixed port bond mode



##### SG1000 fixed port bond mode



	Which ports are bonded
C	Ports 1 and 3 are bonded together for the Client Network, if this network is used.
G	Ports 2 and 4 are bonded together for the Grid Network.

When using Fixed port bond mode, the ports can be bonded using active-backup mode or Link Aggregation Control Protocol mode (LACP 802.3ad).

- In active-backup mode (default), only one port is active at a time. If the active port fails, its backup port

automatically provides a failover connection. Port 4 provides a backup path for port 2 (Grid Network), and port 3 provides a backup path for port 1 (Client Network).

- In LACP mode, each pair of ports forms a logical channel between the services appliance and the network, allowing for higher throughput. If one port fails, the other port continues to provide the channel. Throughput is reduced, but connectivity is not impacted.



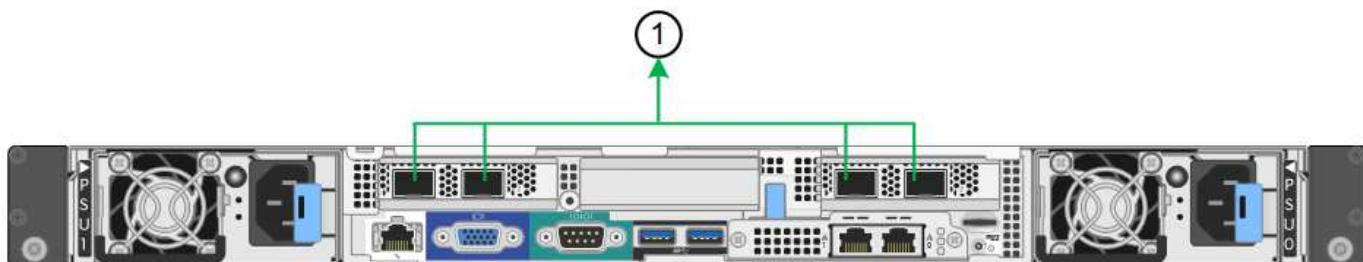
If you do not need redundant connections, you can use only one port for each network.

However, be aware that the **Services appliance link down** alert might be triggered in the Grid Manager after StorageGRID is installed, indicating that a cable is unplugged. You can safely disable this alert rule.

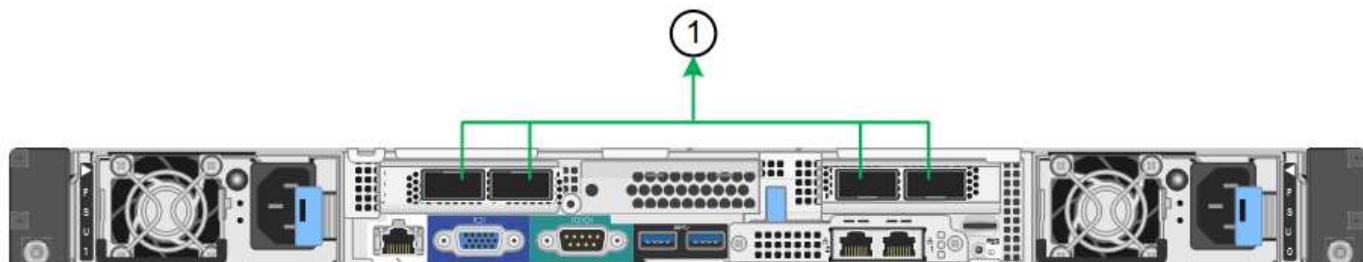
## Aggregate port bond mode

Aggregate port bond mode significantly increases the throughput for each StorageGRID network and provides additional failover paths.

### SG100 aggregate port bond mode



### SG1000 aggregate port bond mode



Which ports are bonded	
1	All connected ports are grouped in a single LACP bond, allowing all ports to be used for Grid Network and Client Network traffic.

If you plan to use aggregate port bond mode:

- You must use LACP network bond mode.
- You must specify a unique VLAN tag for each network. This VLAN tag will be added to each network packet to ensure that network traffic is routed to the correct network.
- The ports must be connected to switches that can support VLAN and LACP. If multiple switches are participating in the LACP bond, the switches must support multi-chassis link aggregation groups (MLAG), or equivalent.
- You must understand how to configure the switches to use VLAN, LACP, and MLAG, or equivalent.

If you do not want to use all four ports, you can use one, two, or three ports. Using more than one port maximizes the chance that some network connectivity will remain available if one of the ports fails.

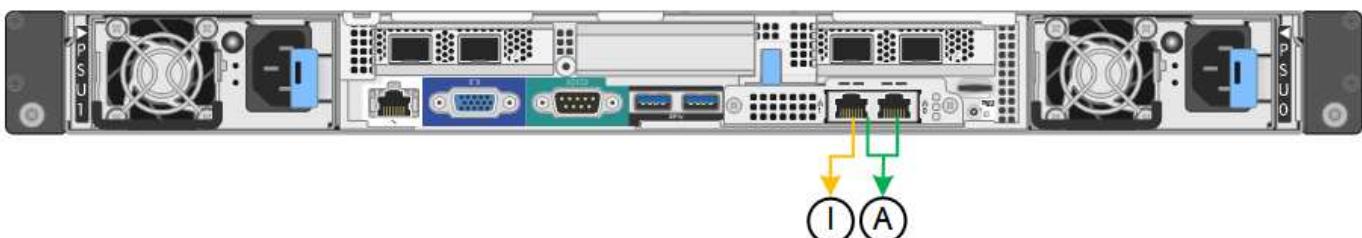


If you choose to use fewer than four network ports, be aware that a **Services appliance link down** alert might be triggered in the Grid Manager after the appliance node is installed, indicating that a cable is unplugged. You can safely disable this alert rule for the triggered alert.

### Network bond modes for the management ports

For the two 1-GbE management ports on the services appliance, you can choose Independent network bond mode or Active-Backup network bond mode to connect to the optional Admin Network.

#### SG100 network management ports



#### SG1000 network management ports



In Independent mode, only the management port on the left is connected to the Admin Network. This mode does not provide a redundant path. The management port on the right is unconnected and available for temporary local connections (uses IP address 169.254.0.1)

In Active-Backup mode, both management ports are connected to the Admin Network. Only one port is active at a time. If the active port fails, its backup port automatically provides a failover connection. Bonding these two physical ports into one logical management port provides a redundant path to the Admin Network.



If you need to make a temporary local connection to the services appliance when the 1-GbE management ports are configured for Active-Backup mode, remove the cables from both management ports, plug your temporary cable into the management port on the right, and access the appliance using IP address 169.254.0.1.

Network bond mode	
A	Active-Backup mode. Both management ports are bonded into one logical management port connected to the Admin Network.

<b>Network bond mode</b>	
I	Independent mode. The port on the left is connected to the Admin Network. The port on the right is available for temporary local connections (IP address 169.254.0.1).

### Gathering installation information (SG100 and SG1000)

As you install and configure the StorageGRID appliance, you must make decisions and gather information about Ethernet switch ports, IP addresses, and port and network bond modes. Record the required information for each network you connect to the appliance. These values are required to install and configure the hardware.

#### Administration and maintenance ports

The Admin Network for StorageGRID is an optional network, used for system administration and maintenance. The appliance connects to the Admin Network using the following 1-GbE management ports on the appliance.

#### SG100 RJ-45 ports



#### SG1000 RJ-45 ports



#### Administration and maintenance connections

Information needed	Your value
Admin Network enabled	Choose one: <ul style="list-style-type: none"> <li>• No</li> <li>• Yes (default)</li> </ul>
Network bond mode	Choose one: <ul style="list-style-type: none"> <li>• Independent (default)</li> <li>• Active-Backup</li> </ul>
Switch port for the left port circled in the diagram (default active port for Independent network bond mode)	
Switch port for the right port circled in the diagram (Active-Backup network bond mode only)	

Information needed	Your value
<p>MAC address for the Admin Network port</p> <p><b>Note:</b> The MAC address label on the front of the appliance lists the MAC address for the BMC management port. To determine the MAC address for the Admin Network port, you must add <b>2</b> to the hexadecimal number on the label. For example, if the MAC address on the label ends in <b>09</b>, the MAC address for the Admin Port would end in <b>0B</b>. If the MAC address on the label ends in <b>(y)FF</b>, the MAC address for the Admin Port would end in <b>(y+1)01</b>. You can easily make this calculation by opening Calculator in Windows, setting it to Programmer mode, selecting Hex, typing the MAC address, then typing <b>+ 2 =</b>.</p>	
<p>DHCP-assigned IP address for the Admin Network port, if available after power on</p> <p><b>Note:</b> You can determine the DHCP-assigned IP address by using the MAC address to look up the assigned IP.</p>	<ul style="list-style-type: none"> <li>IPv4 address (CIDR):</li> <li>Gateway:</li> </ul>
<p>Static IP address you plan to use for the appliance node on the Admin Network</p> <p><b>Note:</b> If your network does not have a gateway, specify the same static IPv4 address for the gateway.</p>	<ul style="list-style-type: none"> <li>IPv4 address (CIDR):</li> <li>Gateway:</li> </ul>
Admin Network subnets (CIDR)	

## Networking ports

The four networking ports on the appliance connect to the StorageGRID Grid Network and the optional Client Network.

## Networking connections

Information needed	Your value
Link speed	<p>For the SG100, choose one of the following:</p> <ul style="list-style-type: none"> <li>• Auto (default)</li> <li>• 10 GbE</li> <li>• 25 GbE</li> </ul> <p>For the SG1000, choose one of the following:</p> <ul style="list-style-type: none"> <li>• Auto (default)</li> <li>• 10 GbE</li> <li>• 25 GbE</li> <li>• 40 GbE</li> <li>• 100 GbE</li> </ul> <p><b>Note:</b> For the SG1000, 10- and 25-GbE speeds require the use of QSA adapters.</p>
Port bond mode	<p>Choose one:</p> <ul style="list-style-type: none"> <li>• Fixed (default)</li> <li>• Aggregate</li> </ul>
Switch port for port 1 (Client Network for Fixed mode)	
Switch port for port 2 (Grid Network for Fixed mode)	
Switch port for port 3 (Client Network for Fixed mode)	
Switch port for port 4 (Grid Network for Fixed mode)	

#### Grid Network ports

The Grid Network for StorageGRID is a required network, used for all internal StorageGRID traffic. The appliance connects to the Grid Network using the four network ports.

#### Grid Network connections

Information needed	Your value
Network bond mode	<p>Choose one:</p> <ul style="list-style-type: none"> <li>• Active-Backup (default)</li> <li>• LACP (802.3ad)</li> </ul>

Information needed	Your value
VLAN tagging enabled	Choose one: <ul style="list-style-type: none"> <li>• No (default)</li> <li>• Yes</li> </ul>
VLAN tag(if VLAN tagging is enabled)	Enter a value between 0 and 4095:
DHCP-assigned IP address for the Grid Network, if available after power on	<ul style="list-style-type: none"> <li>• IPv4 address (CIDR):</li> <li>• Gateway:</li> </ul>
Static IP address you plan to use for the appliance node on the Grid Network  <b>Note:</b> If your network does not have a gateway, specify the same static IPv4 address for the gateway.	<ul style="list-style-type: none"> <li>• IPv4 address (CIDR):</li> <li>• Gateway:</li> </ul>
Grid Network subnets (CIDRs)	
Maximum transmission unit (MTU) setting (optional)You can use the default value of 1500, or set the MTU to a value suitable for jumbo frames, such as 9000.	

#### Client Network ports

The Client Network for StorageGRID is an optional network, typically used to provide client protocol access to the grid. The appliance connects to the Client Network using the four network ports.

#### Client Network connections

Information needed	Your value
Client Network enabled	Choose one: <ul style="list-style-type: none"> <li>• No (default)</li> <li>• Yes</li> </ul>
Network bond mode	Choose one: <ul style="list-style-type: none"> <li>• Active-Backup (default)</li> <li>• LACP (802.3ad)</li> </ul>
VLAN tagging enabled	Choose one: <ul style="list-style-type: none"> <li>• No (default)</li> <li>• Yes</li> </ul>

Information needed	Your value
VLAN tag (If VLAN tagging is enabled)	Enter a value between 0 and 4095:
DHCP-assigned IP address for the Client Network, if available after power on	<ul style="list-style-type: none"> <li>IPv4 address (CIDR):</li> <li>Gateway:</li> </ul>
Static IP address you plan to use for the appliance node on the Client Network  <b>Note:</b> If the Client Network is enabled, the default route on the appliance will use the gateway specified here.	<ul style="list-style-type: none"> <li>IPv4 address (CIDR):</li> <li>Gateway:</li> </ul>

#### BMC management network ports

You can access the BMC interface on the services appliance using the 1-GbE management port circled in the diagram. This port supports remote management of the controller hardware over Ethernet using the Intelligent Platform Management Interface (IPMI) standard.

#### SG100 BMC management port



#### SG1000 BMC management port



#### BMC management network connections

Information needed	Your value
Ethernet switch port you will connect to the BMC management port (circled in the diagram)	
DHCP-assigned IP address for the BMC management network, if available after power on	<ul style="list-style-type: none"> <li>IPv4 address (CIDR):</li> <li>Gateway:</li> </ul>
Static IP address you plan to use for the BMC management port	<ul style="list-style-type: none"> <li>IPv4 address (CIDR):</li> <li>Gateway:</li> </ul>

#### Related information

[SG100 and SG1000 appliances overview](#)

[Cabling the appliance SG100 and SG1000](#)

## Installing the hardware

Hardware installation entails installing the appliance into a cabinet or rack, connecting the cables, and applying power.

### Steps

- [Registering the hardware](#)
- [Installing the appliance into a cabinet or rack \(SG100 and SG1000\)](#)
- [Cabling the appliance SG100 and SG1000](#)
- [Connecting power cords and applying power \(SG100 and SG1000\)](#)
- [Viewing status indicators on the SG100 and SG1000 appliances](#)

## Registering the hardware

Registering the appliance hardware provides support benefits.

### Steps

1. Locate the chassis serial number for the appliance.

You can find the number on the packing slip, in your confirmation email, or on the appliance after you unpack it.



2. Go to the NetApp Support Site at [mysupport.netapp.com](http://mysupport.netapp.com).
3. Determine whether you need to register the hardware:

If you are a...	Follow these steps...
Existing NetApp customer	<ol style="list-style-type: none"><li>Sign in with your username and password.</li><li>Select <b>Products &gt; My Products</b>.</li><li>Confirm that the new serial number is listed.</li><li>If it is not, follow the instructions for new NetApp customers.</li></ol>
New NetApp customer	<ol style="list-style-type: none"><li>Click <b>Register Now</b>, and create an account.</li><li>Select <b>Products &gt; Register Products</b>.</li><li>Enter the product serial number and requested details.</li></ol> <p>After your registration is approved, you can download any required software. The approval process might take up to 24 hours.</p>

## Installing the appliance into a cabinet or rack (SG100 and SG1000)

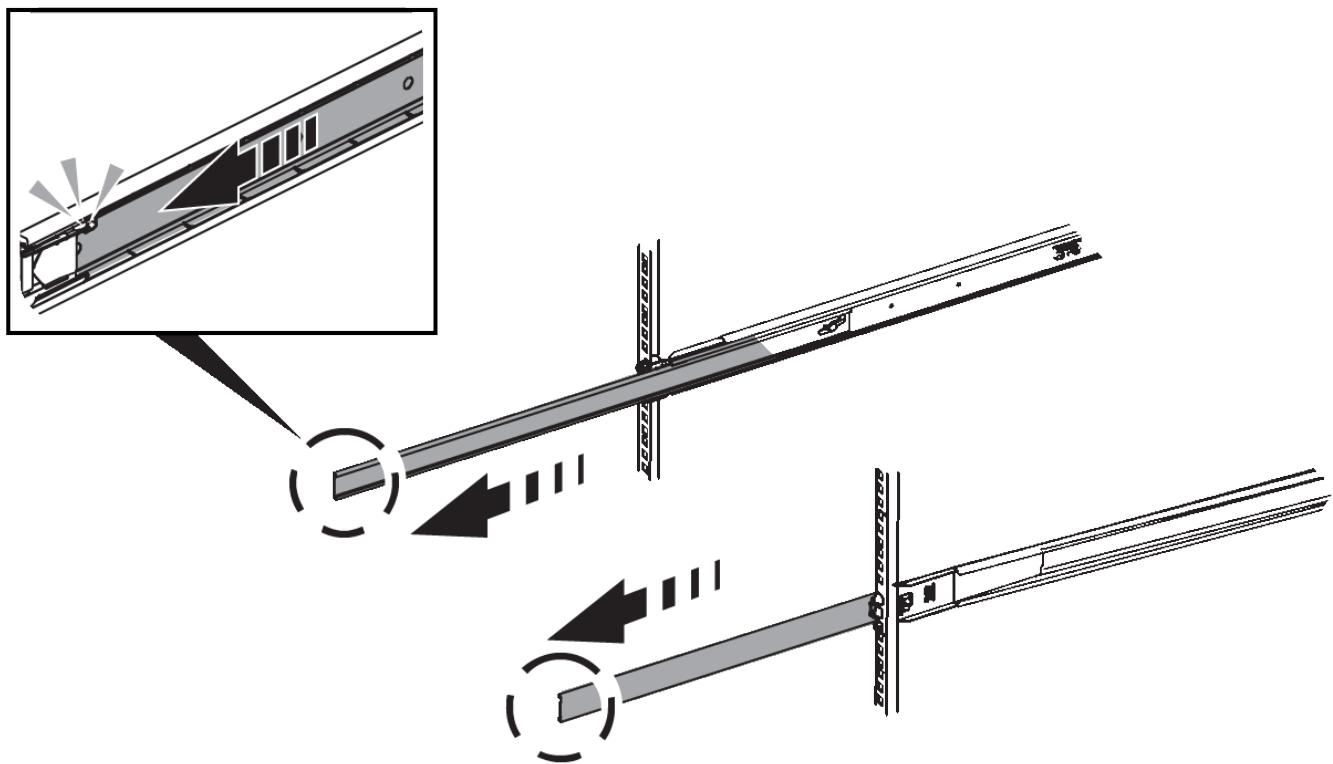
You must install a set of rails for the appliance in your cabinet or rack, and then slide the appliance onto the rails.

### What you'll need

- You have reviewed the Safety Notices document included in the box, and understand the precautions for moving and installing hardware.
- You have the instructions packaged with the rail kit.

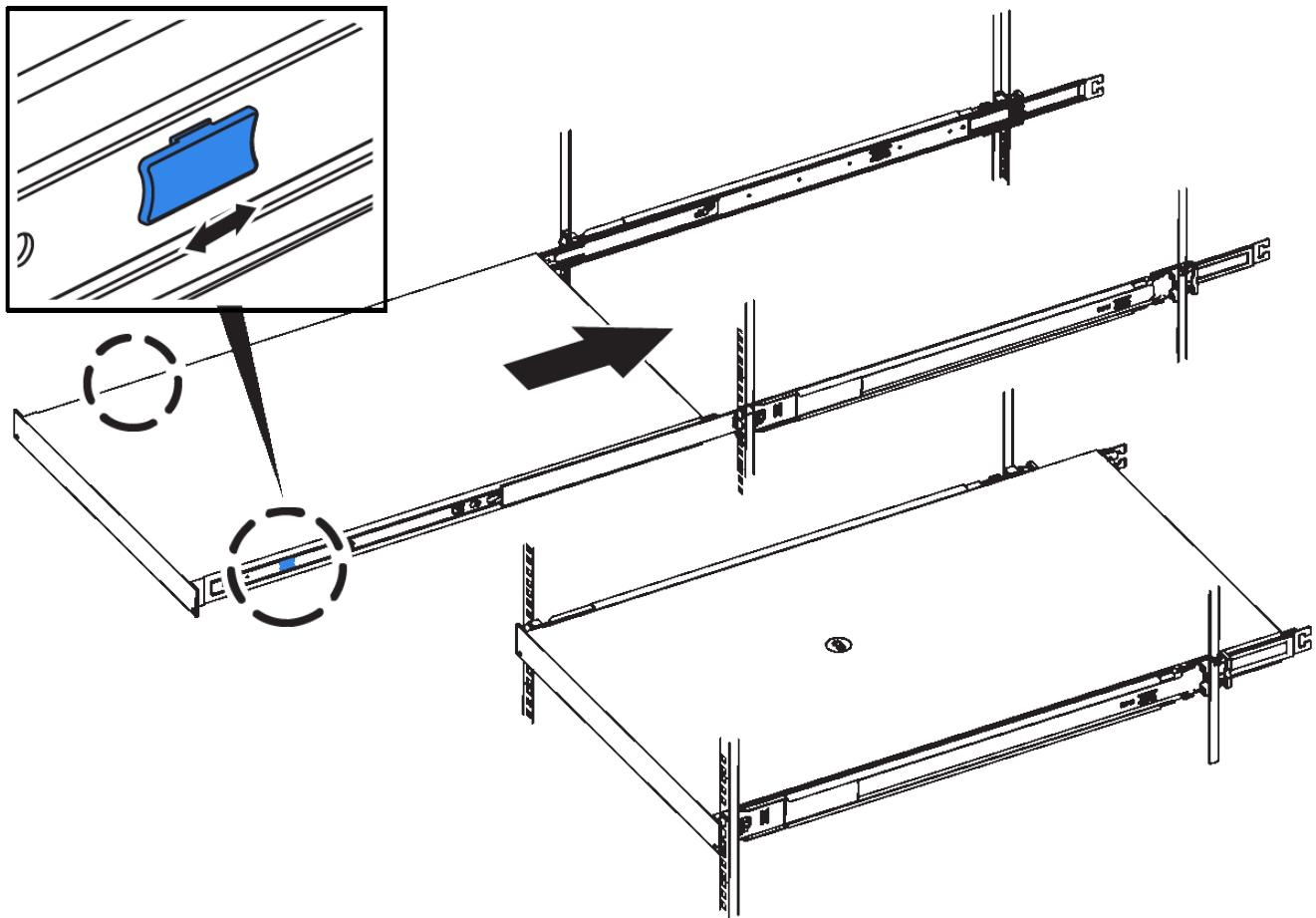
### Steps

1. Carefully follow the instructions for the rail kit to install the rails in your cabinet or rack.
2. On the two rails installed in the cabinet or rack, extend the movable parts of the rails until you hear a click.



3. Insert the appliance into the rails.
4. Slide the appliance into the cabinet or rack.

When you cannot move the appliance any further, pull the blue latches on both sides of the chassis to slide the appliance all the way in.



Do not attach the front bezel until after you power on the appliance.

## Cabling the appliance SG100 and SG1000

You must connect the management port on the appliance to the service laptop and connect the network ports on the appliance to the Grid Network and optional Client Network for StorageGRID.

### What you'll need

- You have an RJ-45 Ethernet cable for connecting the management port.
- You have one of the following options for the network ports. These items are not provided with the appliance.
  - One to four TwinAx cables for connecting the four network ports.
  - For the SG100, one to four SFP+ or SFP28 transceivers if you plan to use optical cables for the ports.
  - For the SG1000, one to four QSFP+ or QSFP28 transceivers if you plan to use optical cables for the ports.

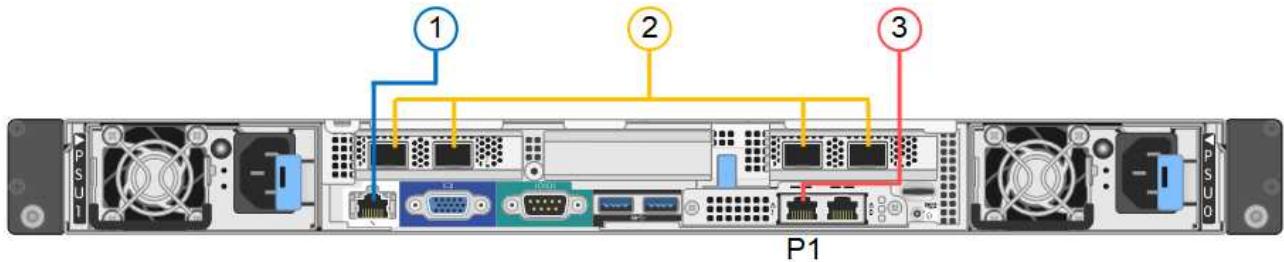


**Risk of exposure to laser radiation** — Do not disassemble or remove any part of a SFP or QSFP transceiver. You might be exposed to laser radiation.

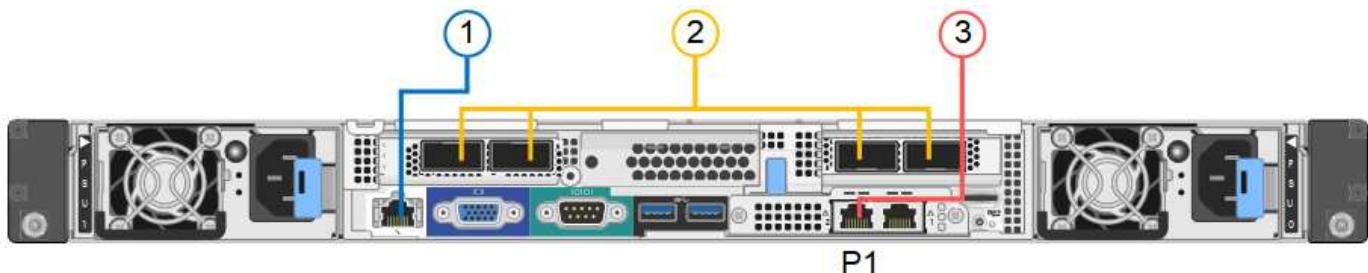
### About this task

The following figures show the ports on the back of the appliance.

## SG100 port connections



## SG1000 port connections



	Port	Type of port	Function
1	BMC management port on the appliance	1-GbE (RJ-45)	Connects to the network where you access the BMC interface.
2	Four network ports on the appliance	<ul style="list-style-type: none"> <li>For the SG100: 10/25-GbE</li> <li>For the SG1000: 10/25/40/100-GbE</li> </ul>	Connect to the Grid Network and the Client Network for StorageGRID.
3	Admin Network port on the appliance (labelled P1 in the figures)	<p>1-GbE (RJ-45)</p> <p><b>Important:</b> This port operates only at 1000 baseT/full and does not support 10- or 100-megabit speeds.</p>	Connects the appliance to the Admin Network for StorageGRID.
3	Rightmost RJ-45 port on the appliance	<p>1-GbE (RJ-45)</p> <p><b>Important:</b> This port operates only at 1000 baseT/full and does not support 10- or 100-megabit speeds.</p>	<ul style="list-style-type: none"> <li>Can be bonded with management port 1 if you want a redundant connection to the Admin Network.</li> <li>Can be left disconnected and available for temporary local access (IP 169.254.0.1).</li> <li>During installation, can be used to connect the appliance to a service laptop if DHCP-assigned IP addresses are not available.</li> </ul>

## Steps

1. Connect the BMC management port on the appliance to the management network, using an Ethernet cable.

Although this connection is optional, it is recommended to facilitate support.

2. Connect the network ports on the appliance to the appropriate network switches, using TwinAx cables or optical cables and transceivers.



The four network ports must use the same link speed. See the following tables for the equipment required based on your hardware and link speed.

<b>SG100 link speed (GbE)</b>	<b>Required equipment</b>
10	SFP+ transceiver
25	SFP28 transceiver
<b>SG1000 link speed (GbE)</b>	<b>Required equipment</b>
10	QSA and SFP+ transceiver
25	QSA and SFP28 transceiver
40	QSFP+ transceiver
100	QFSP28 transceiver

- If you plan to use Fixed port bond mode (default), connect the ports to the StorageGRID Grid and Client Networks, as shown in the table.

<b>Port</b>	<b>Connects to...</b>
Port 1	Client Network (optional)
Port 2	Grid Network
Port 3	Client Network (optional)
Port 4	Grid Network

- If you plan to use the Aggregate port bond mode, connect one or more of the network ports to one or more switches. You should connect at least two of the four ports to avoid having a single point of failure. If you use more than one switch for a single LACP bond, the switches must support MLAG or equivalent.

3. If you plan to use the Admin Network for StorageGRID, connect the Admin Network port on the appliance to the Admin Network, using an Ethernet cable.

## Connecting power cords and applying power (SG100 and SG1000)

After connecting the network cables, you are ready to apply power to the appliance.

### Steps

1. Connect a power cord to each of the two power supply units in the appliance.
2. Connect these two power cords to two different power distribution units (PDUs) in the cabinet or rack.
3. If the power button on the front of the appliance is not currently illuminated blue, press the button to turn on power to the appliance.  
Do not press the power button again during the power-on process.
4. If errors occur, correct any issues.
5. Attach the front bezel to the appliance.

### Related information

[Viewing status indicators on the SG100 and SG1000 appliances](#)

## Viewing status indicators on the SG100 and SG1000 appliances

The appliance includes indicators that help you determine the status of the appliance controller and the two SSDs.

### Appliance indicators and buttons



	Display	State
1	Power button	<ul style="list-style-type: none"><li>• Blue: the appliance is powered on.</li><li>• Off: the appliance is powered off.</li></ul>
2	Reset button	Use this button to perform a hard reset of the controller.
3	Identify button	<p>This button can be set to Blink, On (Solid), or Off.</p> <ul style="list-style-type: none"><li>• Blue, blinking: Identifies the appliance in the cabinet or rack.</li><li>• Blue, solid: Identifies the appliance in the cabinet or rack.</li><li>• Off: The appliance is not visually identifiable in the cabinet or rack.</li></ul>

	Display	State
4	Alarm LED	<ul style="list-style-type: none"> <li>Amber, solid: An error has occurred.</li> </ul> <p><b>Note:</b> To view the boot-up and error codes, you must access the BMC interface.</p> <ul style="list-style-type: none"> <li>Off: No errors are present.</li> </ul>

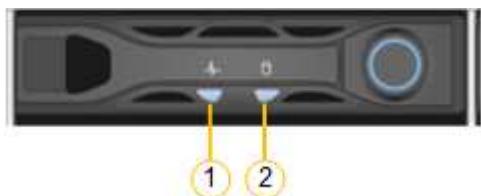
#### General boot-up codes

During boot-up or after a hard reset of the appliance, the following occurs:

1. The baseboard management controller (BMC) logs codes for the boot-up sequence, including any errors that occur.
2. The power button lights up.
3. If any errors occur during boot-up, the alarm LED lights up.

To view the boot-up and error codes, you must access the BMC interface.

#### SSD indicators



LED	Display	State
1	Drive status/fault	<ul style="list-style-type: none"> <li>Blue (solid): drive is online</li> <li>Amber (blinking): drive failure</li> <li>Off: slot is empty</li> </ul>
2	Drive active	Blue (blinking): drive is being accessed

#### Related information

[Troubleshooting the hardware installation](#)

[Configuring the BMC interface](#)

## Configuring StorageGRID connections

Before you can deploy the services appliance as a node in a StorageGRID system, you must configure the connections between the appliance and the networks you plan to use. You can configure networking by browsing to the StorageGRID Appliance Installer, which

is pre-installed on the services appliance.

## Steps

- [Accessing the StorageGRID Appliance Installer](#)
- [Verifying and upgrading the StorageGRID Appliance Installer version](#)
- [Configuring network links \(SG100 and SG1000\)](#)
- [Configuring StorageGRID IP addresses](#)
- [Verifying network connections](#)
- [Verifying port-level network connections](#)

## Accessing the StorageGRID Appliance Installer

You must access the StorageGRID Appliance Installer to configure the connections between the appliance and the three StorageGRID networks: the Grid Network, the Admin Network (optional), and the Client Network (optional).

### What you'll need

- You are using any management client that can connect to the StorageGRID Admin Network.
- The client has a supported web browser.
- The services appliance is connected to all of the StorageGRID networks you plan to use.
- You know the IP address, gateway, and subnet for the services appliance on these networks.
- You have configured the network switches you plan to use.

### About this task

To initially access the StorageGRID Appliance Installer, you can use the DHCP-assigned IP address for the Admin Network port on the services appliance (assuming it is connected to the Admin Network), or you can connect a service laptop directly to the services appliance.

## Steps

1. If possible, use the DHCP address for the Admin Network port on the services appliance to access the StorageGRID Appliance Installer.

### SG100 Admin Network port



### SG1000 Admin Network port



- a. Locate the MAC address label on the front of the services appliance, and determine the MAC address for the Admin Network port.

The MAC address label lists the MAC address for the BMC management port.

To determine the MAC address for the Admin Network port, you must add **2** to the hexadecimal number on the label. For example, if the MAC address on the label ends in **09**, the MAC address for the Admin Port would end in **0B**. If the MAC address on the label ends in **(y)FF**, the MAC address for the Admin Port would end in **(y+1)01**. You can easily make this calculation by opening Calculator in Windows, setting it to Programmer mode, selecting Hex, typing the MAC address, then typing **+ 2 =**.

- b. Provide the MAC address to your network administrator, so they can look up the DHCP address for the appliance on the Admin Network.
- c. From the client, enter this URL for the StorageGRID Appliance Installer:  
**[https://services-appliance\\_IP:8443](https://services-appliance_IP:8443)**

For *services-appliance\_IP*, use the DHCP address.

- d. If you are prompted with a security alert, view and install the certificate using the browser's installation wizard.

The alert will not appear the next time you access this URL.

The StorageGRID Appliance Installer Home page appears. The information and messages shown when you first access this page depend on how your appliance is currently connected to StorageGRID networks. Error messages might appear that will be resolved in later steps.

2. Alternatively, if you cannot obtain an IP address using DHCP, use a link-local connection to access the StorageGRID Appliance Installer.

- a. Connect a service laptop directly to the rightmost RJ-45 port on the services appliance, using an Ethernet cable.

#### SG100 link-local connection



#### SG1000 link-local connection



- b. Open a web browser.
- c. Enter this URL for the StorageGRID Appliance Installer:  
**<https://169.254.0.1:8443>**

The StorageGRID Appliance Installer Home page appears. The information and messages shown when you first access this page depend on how your appliance is currently connected to StorageGRID networks. Error messages might appear that will be resolved in later steps.



If you cannot access the Home page over a link-local connection, configure the service laptop IP address as **169.254.0.2**, and try again.

3. Review any messages displayed on the Home page and configure the link configuration and the IP configuration, as required.

[Home](#)**This Node**

Node type	<input type="text" value="Gateway"/> <input type="button" value="▼"/>
Node name	<input type="text" value="xlr8r-10"/>
	<input type="button" value="Cancel"/> <input type="button" value="Save"/>

**Primary Admin Node connection**

Enable Admin Node discovery	<input type="checkbox"/>
Primary Admin Node IP	<input type="text" value="192.168.7.44"/>
Connection state	Connection to 192.168.7.44 ready
	<input type="button" value="Cancel"/> <input type="button" value="Save"/>

**Installation**

Current state	Ready to start installation of xlr8r-10 into grid with Admin Node 192.168.7.44 running StorageGRID 11.4.0, using StorageGRID software downloaded from the Admin Node.
---------------	---

**Related information**[Web browser requirements](#)**Verifying and upgrading the StorageGRID Appliance Installer version**

The StorageGRID Appliance Installer version on the appliance must match the software version installed on your StorageGRID system to ensure that all StorageGRID features are supported.

**What you'll need**

You have accessed the StorageGRID Appliance Installer.

**About this task**

StorageGRID appliances come from the factory preinstalled with the StorageGRID Appliance Installer. If you are adding an appliance to a recently upgraded StorageGRID system, you might need to manually upgrade the StorageGRID Appliance Installer before installing the appliance as a new node.

The StorageGRID Appliance Installer automatically upgrades when you upgrade to a new StorageGRID version. You do not need to upgrade the StorageGRID Appliance Installer on installed appliance nodes. This procedure is only required when you are installing an appliance that contains an earlier version of the StorageGRID Appliance Installer.

## Steps

1. From the StorageGRID Appliance Installer, select **Advanced > Upgrade Firmware**.
2. Compare the Current Firmware version to the software version installed on your StorageGRID system (from the Grid Manager select **Help > About**).

The second digit in the two versions should match. For example, if your StorageGRID system is running version 11.5.x.y, the StorageGRID Appliance Installer version should be 3.5.z.

3. If the appliance has a down-level version of the StorageGRID Appliance Installer, go to the NetApp Downloads page for StorageGRID.

### [NetApp Downloads: StorageGRID](#)

Sign in with the username and password for your NetApp account.

4. Download the appropriate version of the **Support file for StorageGRID Appliances** and the corresponding checksum file.

The Support file for StorageGRID Appliances file is a .zip archive that contains the current and previous firmware versions for all StorageGRID appliance models, in subdirectories for each controller type.

After downloading the Support file for StorageGRID Appliances file, extract the .zip archive and see the README file for important information about installing the StorageGRID Appliance Installer.

5. Follow the instructions on the Upgrade Firmware page of the StorageGRID Appliance Installer to perform these steps:
  - a. Upload the appropriate support file (firmware image) for your controller type and the checksum file.
  - b. Upgrade the inactive partition.
  - c. Reboot and swap partitions.
  - d. Upgrade the second partition.

## Related information

### [Accessing the StorageGRID Appliance Installer](#)

### **Configuring network links (SG100 and SG1000)**

You can configure network links for the ports used to connect the appliance to the Grid Network, the Client Network, and the Admin Network. You can set the link speed as well as the port and network bond modes.

#### **What you'll need**

- You have obtained the additional equipment required for your cable type and link speed.
- You have connected the network ports to switches that support your chosen speed.

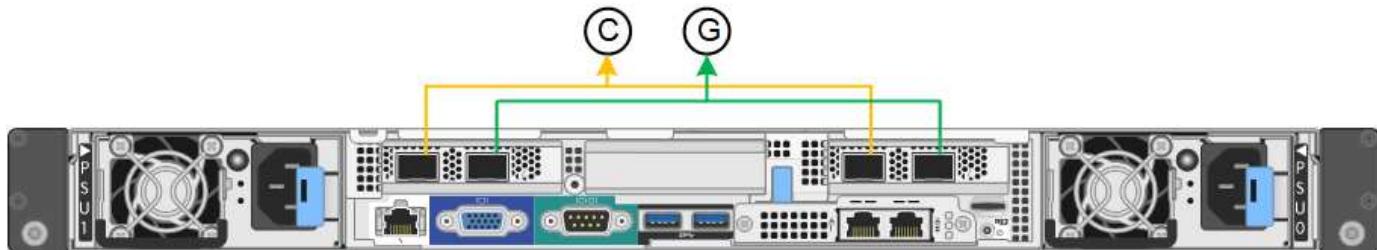
If you plan to use Aggregate port bond mode, LACP network bond mode, or VLAN tagging:

- You have connected the network ports on the appliance to switches that can support VLAN and LACP.
- If multiple switches are participating in the LACP bond, the switches support multi-chassis link aggregation groups (MLAG), or equivalent.
- You understand how to configure the switches to use VLAN, LACP, and MLAG or equivalent.
- You know the unique VLAN tag to use for each network. This VLAN tag will be added to each network packet to ensure that network traffic is routed to the correct network.

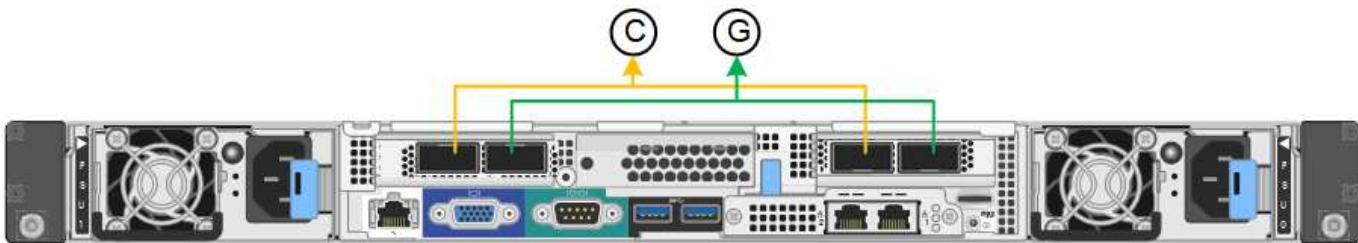
#### About this task

The figures show how the four network ports are bonded in fixed port bond mode (default configuration).

#### SG100 fixed port bond mode



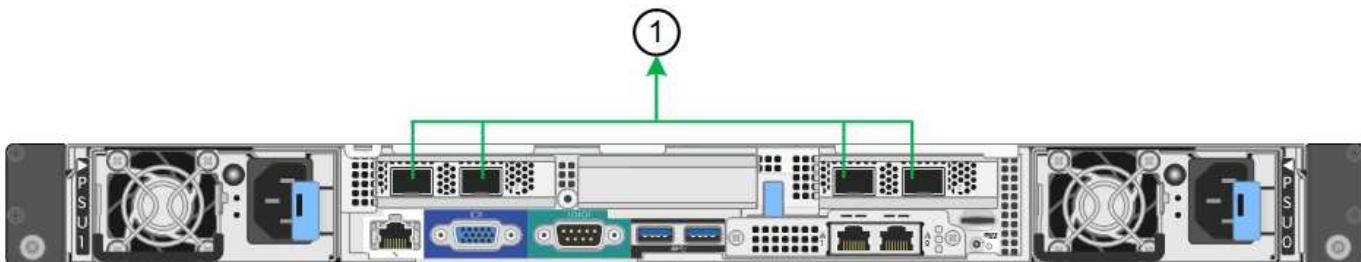
#### SG1000 fixed port bond mode



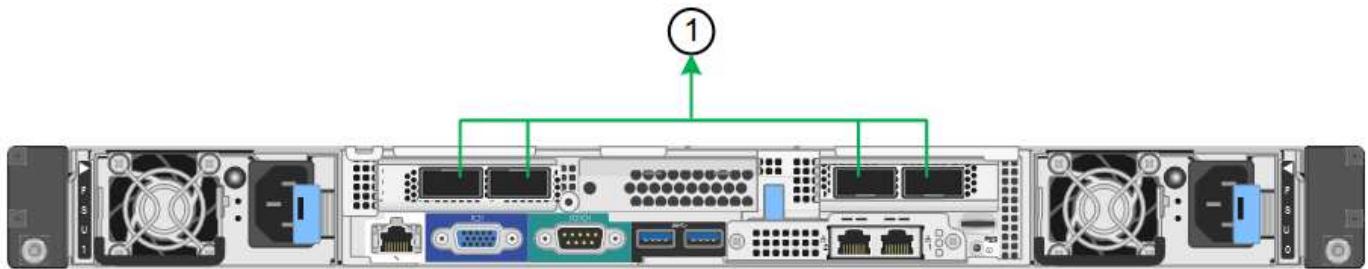
Which ports are bonded	
C	Ports 1 and 3 are bonded together for the Client Network, if this network is used.
G	Ports 2 and 4 are bonded together for the Grid Network.

This figure shows how the four network ports are bonded in aggregate port bond mode.

#### SG100 aggregate port bond mode



#### SG1000 aggregate port bond mode



Which ports are bonded	
1	All four ports are grouped in a single LACP bond, allowing all ports to be used for Grid Network and Client Network traffic.

The table summarizes the options for configuring the four network ports. The default settings are shown in bold. You only need to configure the settings on the Link Configuration page if you want to use a non-default setting.



The LACP transmit hash policy defaults to layer2+3 mode. If necessary, you can use the Grid Management API to change it to layer3+4 mode.

- **Fixed (default) port bond mode**

Network bond mode	Client Network disabled (default)	Client Network enabled
<b>Active-Backup (default)</b>	<ul style="list-style-type: none"> <li>• Ports 2 and 4 use an active-backup bond for the Grid Network.</li> <li>• Ports 1 and 3 are not used.</li> <li>• A VLAN tag is optional.</li> </ul>	<ul style="list-style-type: none"> <li>• Ports 2 and 4 use an active-backup bond for the Grid Network.</li> <li>• Ports 1 and 3 use an active-backup bond for the Client Network.</li> <li>• VLAN tags can be specified for both networks for the convenience of the network administrator.</li> </ul>
<b>LACP (802.3ad)</b>	<ul style="list-style-type: none"> <li>• Ports 2 and 4 use an LACP bond for the Grid Network.</li> <li>• Ports 1 and 3 are not used.</li> <li>• A VLAN tag is optional.</li> </ul>	<ul style="list-style-type: none"> <li>• Ports 2 and 4 use an LACP bond for the Grid Network.</li> <li>• Ports 1 and 3 use an LACP bond for the Client Network.</li> <li>• VLAN tags can be specified for both networks for the convenience of the network administrator.</li> </ul>

- **Aggregate port bond mode**

Network bond mode	Client Network disabled (default)	Client Network enabled
LACP (802.3ad) only	<ul style="list-style-type: none"> <li>Ports 1-4 use a single LACP bond for the Grid Network.</li> <li>A single VLAN tag identifies Grid Network packets.</li> </ul>	<ul style="list-style-type: none"> <li>Ports 1-4 use a single LACP bond for the Grid Network and the Client Network.</li> <li>Two VLAN tags allow Grid Network packets to be segregated from Client Network packets.</li> </ul>

For additional details, see the article about GbE port connections for the services appliance.

This figure shows how the two 1-GbE management ports on the SG100 are bonded in Active-Backup network bond mode for the Admin Network.

These figures shows how the two 1-GbE management ports on the appliance are bonded in Active-Backup network bond mode for the Admin Network.

#### SG100 Admin Network ports bonded



#### SG1000 Admin Network ports bonded



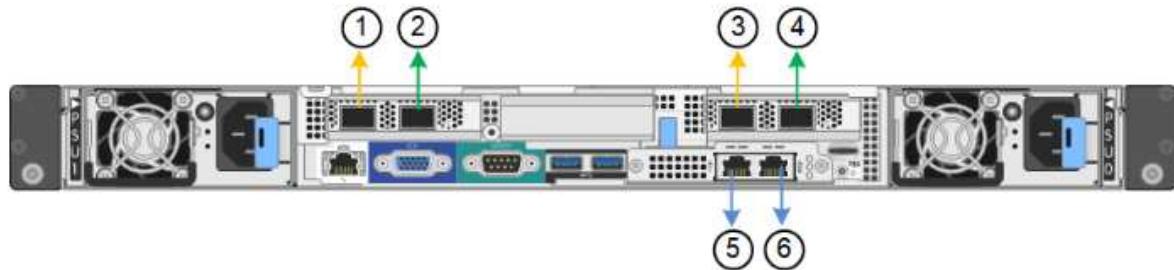
#### Steps

1. From the menu bar of the StorageGRID Appliance Installer, click **Configure Networking > Link Configuration**.

The Network Link Configuration page displays a diagram of your appliance with the network and management ports numbered.

#### SG100 ports

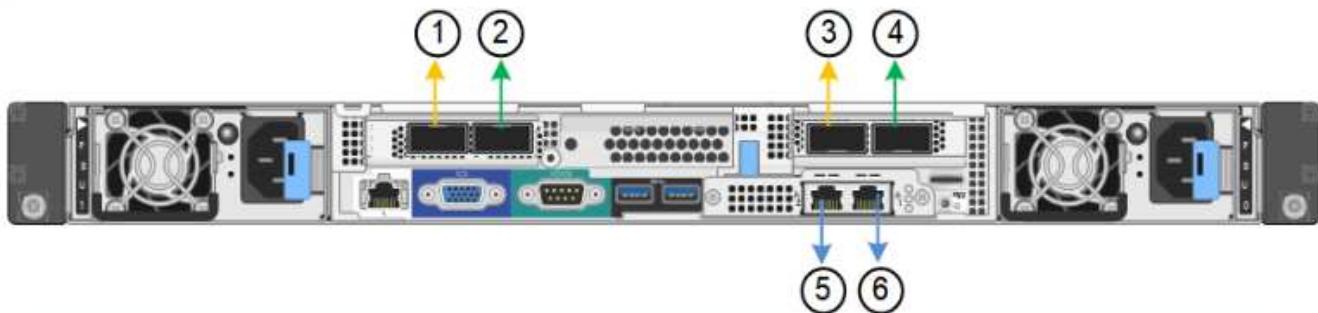
## Network Link Configuration



**⚠** You might lose your connection if you make changes to the network or link you are connected through. If you are not reconnected within 1 minute, re-enter the URL using one of the other IP addresses assigned to the appliance.

## SG1000 ports

### Network Link Configuration



**⚠** You might lose your connection if you make changes to the network or link you are connected through. If you are not reconnected within 1 minute, re-enter the URL using one of the other IP addresses assigned to the appliance.

The Link Status table lists the link state and speed of the numbered ports (SG1000 shown).

### Link Status

Link	State	Speed (Gbps)
1	Up	100
2	Down	N/A
3	Down	N/A
4	Down	N/A
5	Up	1
6	Up	1

The first time you access this page:

- **Link Speed** is set to **Auto**.
- **Port bond mode** is set to **Fixed**.

- **Network bond mode** is set to **Active-Backup** for the Grid Network.
- The **Admin Network** is enabled, and the network bond mode is set to **Independent**.
- The **Client Network** is disabled.

#### Link Settings

Link speed	<input type="button" value="Auto"/>
Port bond mode	<input checked="" type="radio"/> Fixed <input type="radio"/> Aggregate
Choose Fixed port bond mode if you want to use ports 2 and 4 for the Grid Network and ports 1 and 3 for the Client Network (if enabled). Choose Aggregate port bond mode if you want all connected ports to share a single LACP bond for both the Grid and Client Networks.	

#### Grid Network

Enable network	<input checked="" type="checkbox"/>
Network bond mode	<input checked="" type="radio"/> Active-Backup <input type="radio"/> LACP (802.3ad)
Enable VLAN (802.1q) tagging	<input type="checkbox"/>
MAC Addresses	50:6b:4b:42:d7:00 50:6b:4b:42:d7:01 50:6b:4b:42:d7:24 50:6b:4b:42:d7:25
If you are using DHCP, it is recommended that you configure a permanent DHCP reservation. Use all of these MAC addresses in the reservation to assign one IP address to this network interface.	

#### Admin Network

Enable network	<input checked="" type="checkbox"/>
Network bond mode	<input checked="" type="radio"/> Independent <input type="radio"/> Active-Backup
Connect the Admin Network to port 5. Leave port 6 unconnected. If necessary, you can make a temporary direct Ethernet connection to port 6 and use link-local IP address 169.254.0.1 for access.	
MAC Addresses	d8:c4:97:2a:e4:95
If you are using DHCP, it is recommended that you configure a permanent DHCP reservation. Use all of these MAC addresses in the reservation to assign one IP address to this network interface.	

#### Client Network

Enable network	<input type="checkbox"/>
Enabling the Client Network causes the default gateway for this node to move to the Client Network. Before enabling the Client Network, ensure that you've added all necessary subnets to the Grid Network Subnet List. Otherwise, the connection to the node might be lost.	

2. Select the link speed for the network ports from the **Link speed** drop-down list.

The network switches you are using for the Grid Network and the Client Network must also support and be

configured for this speed. You must use the appropriate adapters or transceivers for the configured link speed. Use Auto link speed when possible because this option negotiates both link speed and Forward Error Correction (FEC) mode with the link partner.

3. Enable or disable the StorageGRID networks you plan to use.

The Grid Network is required. You cannot disable this network.

- a. If the appliance is not connected to the Admin Network, unselect the **Enable network** check box for the Admin Network.

**Admin Network**

Enable network

- b. If the appliance is connected to the Client Network, select the **Enable network** check box for the Client Network.

The Client Network settings for the data NIC ports are now shown.

4. Refer to the table, and configure the port bond mode and the network bond mode.

This example shows:

- **Aggregate** and **LACP** selected for the Grid and the Client networks. You must specify a unique VLAN tag for each network. You can select values between 0 and 4095.
- **Active-Backup** selected for the Admin Network.

## Link Settings

Link speed

Port bond mode

Fixed  Aggregate

Choose Fixed port bond mode if you want to use ports 2 and 4 for the Grid Network and ports 1 and 3 for the Client Network (if enabled). Choose Aggregate port bond mode if you want all connected ports to share a single LACP bond for both the Grid and Client Networks.

## Grid Network

Enable network

Network bond mode

Active-Backup  LACP (802.3ad)

If the port bond mode is Aggregate, all bonds must be in LACP (802.3ad) mode.

Enable VLAN (802.1q) tagging

VLAN (802.1q) tag

MAC Addresses

50:6b:4b:42:d7:00 50:6b:4b:42:d7:01 50:6b:4b:42:d7:24 50:6b:4b:42:d7:25

If you are using DHCP, it is recommended that you configure a permanent DHCP reservation. Use all of these MAC addresses in the reservation to assign one IP address to this network interface.

## Admin Network

Enable network

Network bond mode

Independent  Active-Backup

Connect the Admin Network to ports 5 and 6. If necessary, you can make a temporary direct Ethernet connection by disconnecting ports 5 and 6, then connecting to port 6 and using link-local IP address 169.254.0.1 for access.

MAC Addresses

d8:c4:97:2a:e4:95

If you are using DHCP, it is recommended that you configure a permanent DHCP reservation. Use all of these MAC addresses in the reservation to assign one IP address to this network interface.

## Client Network

Enable network

Network bond mode

Active-Backup  LACP (802.3ad)

If the port bond mode is Aggregate, all bonds must be in LACP (802.3ad) mode.

Enable VLAN (802.1q) tagging

VLAN (802.1q) tag

MAC Addresses

50:6b:4b:42:d7:00 50:6b:4b:42:d7:01 50:6b:4b:42:d7:24 50:6b:4b:42:d7:25

If you are using DHCP, it is recommended that you configure a permanent DHCP reservation. Use all of these MAC addresses in the reservation to assign one IP address to this network interface.

5. 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 are not 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://services_appliance_IP:8443`**

## Related information

[Obtaining additional equipment and tools \(SG100 and SG1000\)](#)

## Configuring StorageGRID IP addresses

You use the StorageGRID Appliance Installer to configure the IP addresses and routing information used for the services appliance on the StorageGRID Grid, Admin, and Client Networks.

### About this task

You must either assign a static IP for the appliance on each connected network or assign a permanent lease for the address on the DHCP server.

If you want to change the link configuration, see the instructions for changing the link configuration of the services appliance.

### Steps

1. In the StorageGRID Appliance Installer, select **Configure Networking > IP Configuration**.  
The IP Configuration page appears.
2. To configure the Grid Network, select either **Static** or **DHCP** in the **Grid Network** section of the page.

## Grid Network

The Grid Network is used for all internal StorageGRID traffic. The Grid Network provides connectivity between all nodes in the grid, across all sites and subnets. All hosts on the Grid Network must be able to talk to all other hosts. The Grid Network can consist of multiple subnets. Networks containing critical grid services, such as NTP, can also be added as Grid subnets.

IP  Static  DHCP

Assignment

IPv4 Address (CIDR)

Gateway

**⚠ All required Grid Network subnets must also be defined in the Grid Network Subnet List on the Primary Admin Node before starting installation.**

Subnets (CIDR)	<input type="text" value="172.18.0.0/21"/> <span style="color: red;">×</span>
	<input type="text" value="172.18.0.0/21"/> <span style="color: red;">×</span>
	<input type="text" value="192.168.0.0/21"/> <span style="color: green;">+ ×</span>
MTU	<input type="text" value="1500"/> <span style="border: 1px solid black; padding: 2px;">▼</span>

Cancel Save

3. If you selected **Static**, follow these steps to configure the Grid Network:

- Enter the static IPv4 address, using CIDR notation.
- Enter the gateway.

If your network does not have a gateway, re-enter the same static IPv4 address.

- If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.



For the best network performance, all nodes should be configured with similar MTU values on their Grid Network interfaces. The **Grid Network MTU mismatch** alert is triggered if there is a significant difference in MTU settings for the Grid Network on individual nodes. The MTU values do not have to be the same for all network types.

d. Click **Save**.

When you change the IP address, the gateway and list of subnets might also change.

If you lose your connection to the StorageGRID Appliance Installer, re-enter the URL using the new static IP address you just assigned. For example,

**`https://services_appliance_IP:8443`**

e. Confirm that the list of Grid Network subnets is correct.

If you have grid subnets, the Grid Network gateway is required. All grid subnets specified must be reachable through this gateway. These Grid Network subnets must also be defined in the Grid Network Subnet List on the primary Admin Node when you start StorageGRID installation.



The default route is not listed. If the Client Network is not enabled, the default route will use the Grid Network gateway.

- To add a subnet, click the insert icon  to the right of the last entry.
- To remove an unused subnet, click the delete icon .

f. Click **Save**.

4. If you selected **DHCP**, follow these steps to configure the Grid Network:

a. After you select the **DHCP** radio button, click **Save**.

The **IPv4 Address**, **Gateway**, and **Subnets** fields are automatically populated. If the DHCP server is set up to assign an MTU value, the **MTU** field is populated with that value, and the field becomes read-only.

Your web browser is automatically redirected to the new IP address for the StorageGRID Appliance Installer.

b. Confirm that the list of Grid Network subnets is correct.

If you have grid subnets, the Grid Network gateway is required. All grid subnets specified must be reachable through this gateway. These Grid Network subnets must also be defined in the Grid Network Subnet List on the primary Admin Node when you start StorageGRID installation.



The default route is not listed. If the Client Network is not enabled, the default route will use the Grid Network gateway.

- To add a subnet, click the insert icon  to the right of the last entry.
- To remove an unused subnet, click the delete icon .

c. If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.



For the best network performance, all nodes should be configured with similar MTU values on their Grid Network interfaces. The **Grid Network MTU mismatch** alert is triggered if there is a significant difference in MTU settings for the Grid Network on individual nodes. The MTU values do not have to be the same for all network types.

d. Click **Save**.

5. To configure the Admin Network, select either **Static** or **DHCP** in the Admin Network section of the page.



To configure the Admin Network, you must enable the Admin Network on the Link Configuration page.

## Admin Network

The Admin Network is a closed network used for system administration and maintenance. The Admin Network is typically a private network and does not need to be routable between sites.

IP Assignment  Static  DHCP

IPv4 Address (CIDR)

Gateway

Subnets (CIDR)  +

MTU  ▼

Cancel Save

6. If you selected **Static**, follow these steps to configure the Admin Network:

a. Enter the static IPv4 address, using CIDR notation, for Management Port 1 on the appliance.

Management Port 1 is the left of the two 1-GbE RJ45 ports on the right end of the appliance.

b. Enter the gateway.

If your network does not have a gateway, re-enter the same static IPv4 address.

c. If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as

9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.

d. Click **Save**.

When you change the IP address, the gateway and list of subnets might also change.

If you lose your connection to the StorageGRID Appliance Installer, re-enter the URL using the new static IP address you just assigned. For example,

**`https://services_appliance:8443`**

e. Confirm that the list of Admin Network subnets is correct.

You must verify that all subnets can be reached using the gateway you provided.



The default route cannot be made to use the Admin Network gateway.

- To add a subnet, click the insert icon  to the right of the last entry.
- To remove an unused subnet, click the delete icon .

f. Click **Save**.

7. If you selected **DHCP**, follow these steps to configure the Admin Network:

a. After you select the **DHCP** radio button, click **Save**.

The **IPv4 Address**, **Gateway**, and **Subnets** fields are automatically populated. If the DHCP server is set up to assign an MTU value, the **MTU** field is populated with that value, and the field becomes read-only.

Your web browser is automatically redirected to the new IP address for the StorageGRID Appliance Installer.

b. Confirm that the list of Admin Network subnets is correct.

You must verify that all subnets can be reached using the gateway you provided.



The default route cannot be made to use the Admin Network gateway.

- To add a subnet, click the insert icon  to the right of the last entry.
- To remove an unused subnet, click the delete icon .

c. If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.

d. Click **Save**.

8. To configure the Client Network, select either **Static** or **DHCP** in the **Client Network** section of the page.



To configure the Client Network, you must enable the Client Network on the Link Configuration page.

## Client Network

The Client Network is an open network used to provide access to client applications, including S3 and Swift. The Client Network enables grid nodes to communicate with any subnet reachable through the Client Network gateway. The Client Network does not become operational until you complete the StorageGRID configuration steps.

IP Assignment

Static     DHCP

IPv4 Address (CIDR)

Gateway

MTU

9. If you selected **Static**, follow these steps to configure the Client Network:

- Enter the static IPv4 address, using CIDR notation.
- Click **Save**.
- Confirm that the IP address for the Client Network gateway is correct.



If the Client Network is enabled, the default route is displayed. The default route uses the Client Network gateway and cannot be moved to another interface while the Client Network is enabled.

- If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.

10. If you selected **DHCP**, follow these steps to configure the Client Network:

- After you select the **DHCP** radio button, click **Save**.

The **IPv4 Address** and **Gateway** fields are automatically populated. If the DHCP server is set up to assign an MTU value, the **MTU** field is populated with that value, and the field becomes read-only.

Your web browser is automatically redirected to the new IP address for the StorageGRID Appliance Installer.

b. Confirm that the gateway is correct.



If the Client Network is enabled, the default route is displayed. The default route uses the Client Network gateway and cannot be moved to another interface while the Client Network is enabled.

c. If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.

## Related information

[Changing the link configuration of the services appliance](#)

## Verifying network connections

You should confirm you can access the StorageGRID networks you are using from the appliance. To validate routing through network gateways, you should test connectivity between the StorageGRID Appliance Installer and IP addresses on different subnets. You can also verify the MTU setting.

### Steps

1. From the menu bar of the StorageGRID Appliance Installer, click **Configure Networking > Ping and MTU Test**.

The Ping and MTU Test page appears.

### Ping and MTU Test

Use a ping request to check the appliance's connectivity to a remote host. Select the network you want to check connectivity through, and enter the IP address of the host you want to reach. To verify the MTU setting for the entire path through the network to the destination, select Test MTU.

#### Ping and MTU Test

Network	<input type="text" value="Grid"/> <span>▼</span>
Destination IPv4 Address or FQDN	<input type="text"/>
Test MTU	<input type="checkbox"/>
<b>Test Connectivity</b>	

2. From the **Network** drop-down box, select the network you want to test: Grid, Admin, or Client.

3. Enter the IPv4 address or fully qualified domain name (FQDN) for a host on that network.

For example, you might want to ping the gateway on the network or the primary Admin Node.

4. Optionally, select the **Test MTU** check box to verify the MTU setting for the entire path through the network to the destination.

For example, you can test the path between the appliance node and a node at a different site.

5. Click **Test Connectivity**.

If the network connection is valid, the "Ping test passed" message appears, with the ping command output listed.

### Ping and MTU Test

Use a ping request to check the appliance's connectivity to a remote host. Select the network you want to check connectivity through, and enter the IP address of the host you want to reach. To verify the MTU setting for the entire path through the network to the destination, select Test MTU.

#### Ping and MTU Test

Network	<input type="text" value="Grid"/> <input type="button" value="▼"/>
Destination IPv4 Address or FQDN	<input type="text" value="10.96.104.223"/>
Test MTU	<input checked="" type="checkbox"/>
<input type="button" value="Test Connectivity"/>	
Ping test passed	
Ping command output	
<pre>PING 10.96.104.223 (10.96.104.223) 1472(1500) bytes of data. 1480 bytes from 10.96.104.223: icmp_seq=1 ttl=64 time=0.318 ms  --- 10.96.104.223 ping statistics --- 1 packets transmitted, 1 received, 0% packet loss, time 0ms rtt min/avg/max/mdev = 0.318/0.318/0.318/0.000 ms  Found MTU 1500 for 10.96.104.223 via br0</pre>	

### Related information

[Configuring network links \(SG100 and SG1000\)](#)

[Changing the MTU setting](#)

### Verifying port-level network connections

To ensure that access between the StorageGRID Appliance Installer and other nodes is

not obstructed by firewalls, confirm that the StorageGRID Appliance Installer can connect to a specific TCP port or set of ports at the specified IP address or range of addresses.

### About this task

Using the list of ports provided in the StorageGRID Appliance Installer, you can test the connectivity between the appliance and the other nodes in your Grid Network.

Additionally, you can test connectivity on the Admin and Client Networks and on UDP ports, such as those used for external NFS or DNS servers. For a list of these ports, see the port reference in the StorageGRID networking guidelines.



The Grid Network ports listed in the port connectivity table are valid only for StorageGRID version 11.5.0. To verify which ports are correct for each node type, you should always consult the networking guidelines for your version of StorageGRID.

### Steps

1. From the StorageGRID Appliance Installer, click **Configure Networking > Port Connectivity Test (nmap)**.

The Port Connectivity Test page appears.

The port connectivity table lists node types that require TCP connectivity on the Grid Network. For each node type, the table lists the Grid Network ports that should be accessible to your appliance.

The following node types require TCP connectivity on the Grid Network.

Node Type	Grid Network Ports
Admin Node	22,80,443,1504,1505,1506,1508,7443,9999
Storage Node without ADC	22,1139,1502,1506,1511,7001,9042,9999,18002,18017,18019,18082,18083,18200
Storage Node with ADC	22,1139,1501,1502,1506,1511,7001,9042,9999,18000,18001,18002,18003,18017,18019,18082,18083,18200,19000
API Gateway	22,1506,1507,9999
Archive Node	22,1506,1509,9999,11139

You can test the connectivity between the appliance ports listed in the table and the other nodes in your Grid Network.

2. From the **Network** drop-down, select the network you want to test: **Grid**, **Admin**, or **Client**.
3. Specify a range of IPv4 addresses for the hosts on that network.

For example, you might want to probe the gateway on the network or the primary Admin Node.

Specify a range using a hyphen, as shown in the example.

4. Enter a TCP port number, a list of ports separated by commas, or a range of ports.

The following node types require TCP connectivity on the Grid Network.

Node Type	Grid Network Ports
Admin Node	22,80,443,1504,1505,1506,1508,7443,9999
Storage Node without ADC	22,1139,1502,1506,1511,7001,9042,9999,18002,18017,18019,18082,18083,18200
Storage Node with ADC	22,1139,1501,1502,1506,1511,7001,9042,9999,18000,18001,18002,18003,18017,18019,18082,18083,18200,19000
API Gateway	22,1506,1507,9999
Archive Node	22,1506,1509,9999,11139

#### Port Connectivity Test

Network

IPv4 Address Ranges

Port Ranges

Protocol  TCP  UDP

#### 5. Click **Test Connectivity**.

- If the selected port-level network connections are valid, the “Port connectivity test passed” message appears in a green banner. The nmap command output is listed below the banner.

Port connectivity test passed

Nmap command output. Note: Unreachable hosts will not appear in the output.

```
# Nmap 7.70 scan initiated Fri Nov 13 18:32:03 2020 as: /usr/bin/nmap -n -oN - -e br0 -p 22,2022 10.224.6.160-161
Nmap scan report for 10.224.6.160
Host is up (0.00072s latency).

PORT      STATE SERVICE
22/tcp    open  ssh
2022/tcp  open  down

Nmap scan report for 10.224.6.161
Host is up (0.00060s latency).

PORT      STATE SERVICE
22/tcp    open  ssh
2022/tcp  open  down

# Nmap done at Fri Nov 13 18:32:04 2020 -- 2 IP addresses (2 hosts up) scanned in 0.55 seconds
```

- If a port-level network connection is made to the remote host, but the host is not listening on one or more of the selected ports, the “Port connectivity test failed” message appears in a yellow banner. The nmap command output is listed below the banner.

Any remote port the host is not listening to has a state of “closed.” For example, you might see this yellow banner when the node you are trying to connect to is in a pre-installed state and the StorageGRID NMS service is not yet running on that node.

 Port connectivity test failed  
Connection not established. Services might not be listening on target ports.

Nmap command output. Note: Unreachable hosts will not appear in the output.

```
# Nmap 7.70 scan initiated Sat May 16 17:07:02 2020 as: /usr/bin/nmap -n -oN - -e br0 -p 22,80,443,1504,1505,1506,1508,7443,9999
Nmap scan report for 172.16.4.71
Host is up (0.00020s latency).

PORT      STATE    SERVICE
22/tcp    open     ssh
80/tcp    open     http
443/tcp   open     https
1504/tcp  closed   evb-elm
1505/tcp  open     funkproxy
1506/tcp  open     utcd
1508/tcp  open     diagmond
7443/tcp  open     oracleas-https
9999/tcp  open     abyss
MAC Address: 00:50:56:87:39:AE (VMware)

# Nmap done at Sat May 16 17:07:03 2020 -- 1 IP address (1 host up) scanned in 0.59 seconds
```

- If a port-level network connection cannot be made for one or more selected ports, the “Port connectivity test failed” message appears in a red banner. The nmap command output is listed below the banner.

The red banner indicates that a TCP connection attempt to a port on the remote host was made, but nothing was returned to the sender. When no response is returned, the port has a state of “filtered” and is likely blocked by a firewall.



Ports with “closed” are also listed.

 Port connectivity test failed  
Connection failed to one or more ports.

Nmap command output. Note: Unreachable hosts will not appear in the output.

```
# Nmap 7.70 scan initiated Sat May 16 17:11:01 2020 as: /usr/bin/nmap -n -oN - -e br0 -p 22,79,80,443,1504,1505,1506,1508,7443,9999 172.16.4.71
Nmap scan report for 172.16.4.71
Host is up (0.00029s latency).

PORT      STATE    SERVICE
22/tcp    open     ssh
79/tcp    filtered finger
80/tcp    open     http
443/tcp   open     https
1504/tcp  closed   evb-elm
1505/tcp  open     funkproxy
1506/tcp  open     utcd
1508/tcp  open     diagmond
7443/tcp  open     oracleas-https
9999/tcp  open     abyss
MAC Address: 00:50:56:87:39:AE (VMware)

# Nmap done at Sat May 16 17:11:02 2020 -- 1 IP address (1 host up) scanned in 1.60 seconds
```

## Related information

[Network guidelines](#)

## Configuring the BMC interface

The user interface for the baseboard management controller (BMC) on the services appliance provides status information about the hardware and allows you to configure

SNMP settings and other options for the services appliance.

## Steps

- Changing the root password for the BMC interface
- Setting the IP address for the BMC management port
- Accessing the BMC interface
- Configuring SNMP settings for the services appliance
- Setting up email notifications for alerts

### Changing the root password for the BMC interface

For security, you must change the password for the BMC's root user.

#### What you'll need

The management client is using a supported web browser.

#### About this task

When you first install the appliance, the BMC uses a default password for the root user (root/calvin). You must change the password for the root user to secure your system.

## Steps

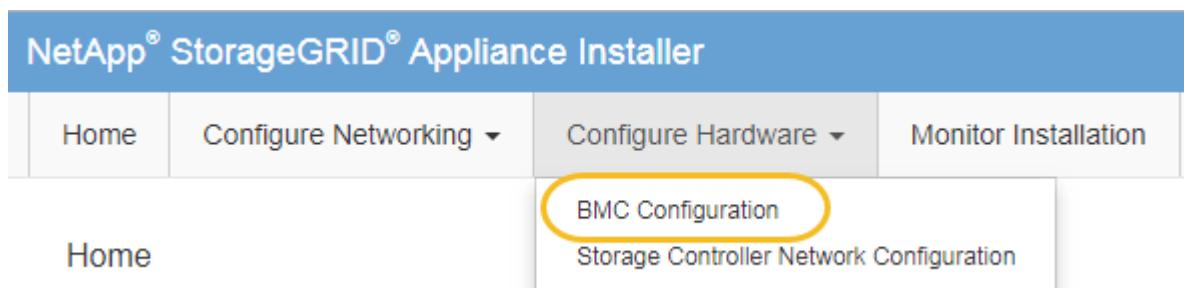
1. From the client, enter the URL for the StorageGRID Appliance Installer:

`https://services_appliance_IP:8443`

For services\_appliance\_IP, use the IP address for the appliance on any StorageGRID network.

The StorageGRID Appliance Installer Home page appears.

2. Select **Configure Hardware > BMC Configuration**.



The Baseboard Management Controller Configuration page appears.

3. Enter a new password for the root account in the two fields provided.

## Baseboard Management Controller Configuration

### User Settings

Root Password	.....
Confirm Root Password	.....

4. Click **Save**.

### Setting the IP address for the BMC management port

Before you can access the BMC interface, you must configure the IP address for the BMC management port on the services appliance.

#### What you'll need

- The management client is using a supported web browser.
- You are using any management client that can connect to a StorageGRID network.
- The BMC management port is connected to the management network you plan to use.

#### SG100 BMC management port



#### SG1000 BMC management port



#### About this task



For support purposes, the BMC management port allows low-level hardware access. You should only connect this port to a secure, trusted, internal management network. If no such network is available, leave the BMC port unconnected or blocked, unless a BMC connection is requested by technical support.

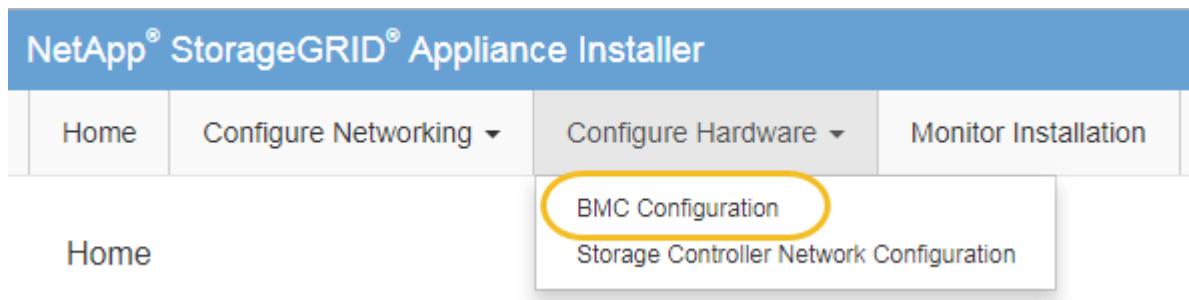
#### Steps

1. From the client, enter the URL for the StorageGRID Appliance Installer:  
**[https://services\\_appliance\\_IP:8443](https://services_appliance_IP:8443)**

For *services\_appliance\_IP*, use the IP address for the appliance on any StorageGRID network.

The StorageGRID Appliance Installer Home page appears.

2. Select **Configure Hardware > BMC Configuration**.



The Baseboard Management Controller Configuration page appears.

3. Make a note of the IPv4 address that is automatically displayed.

DHCP is the default method for assigning an IP address to this port.



It might take a few minutes for the DHCP values to appear.

#### Baseboard Management Controller Configuration

##### LAN IP Settings

IP Assignment	<input type="radio"/> Static <input checked="" type="radio"/> DHCP
MAC Address	d8:c4:97:28:50:62
IPv4 Address (CIDR)	10.224.3.225/21
Default gateway	10.224.0.1

**Cancel** **Save**

4. Optionally, set a static IP address for the BMC management port.



You should either assign a static IP for the BMC management port or assign a permanent lease for the address on the DHCP server.

- a. Select **Static**.
- b. Enter the IPv4 address, using CIDR notation.
- c. Enter the default gateway.

## Baseboard Management Controller Configuration

### LAN IP Settings

IP Assignment  Static  DHCP

MAC Address d8:c4:97:28:50:62

IPv4 Address (CIDR) 10.224.3.225/21

Default gateway 10.224.0.1

**Cancel** **Save**

d. Click **Save**.

It might take a few minutes for your changes to be applied.

## Accessing the BMC interface

You can access the BMC interface on the services appliance using the DHCP or static IP address for the BMC management port.

### What you'll need

- The management client is using a supported web browser.
- The BMC management port on the services appliance is connected to the management network you plan to use.

### SG100 BMC management port



### SG1000 BMC management port



## Steps

1. Enter the URL for the BMC interface:

**[https://BMC\\_Port\\_IP](https://BMC_Port_IP)**

For *BMC\_Port\_IP*, use the DHCP or static IP address for the BMC management port.

The BMC sign-in page appears.

2. Enter the root username and password, using the password you set when you changed the default root password:

root

password



root

\*\*\*\*\*

Remember Username

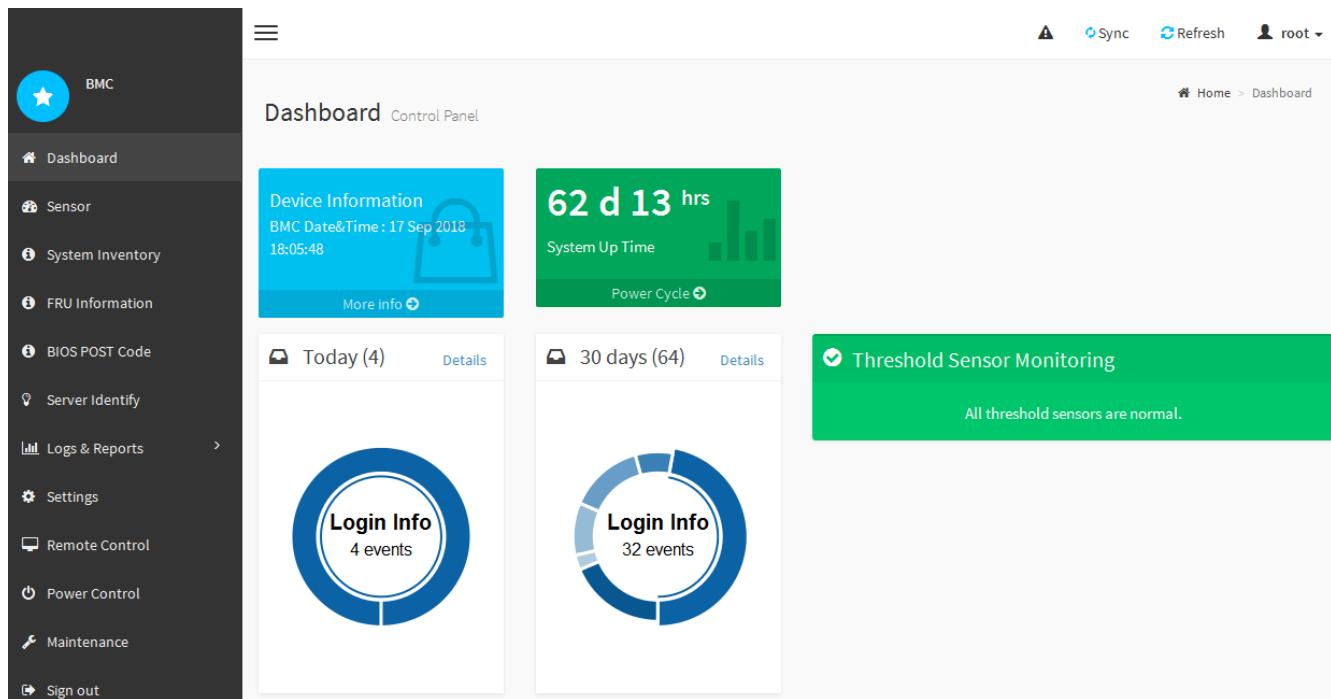
**Sign me in**

[I forgot my password](#)

# NetApp®

### 3. Click **Sign me in**

The BMC dashboard appears.



### 4. Optionally, create additional users by selecting **Settings > User Management** and clicking on any “disabled” user.



When users sign in for the first time, they might be prompted to change their password for increased security.

## Related information

[Changing the root password for the BMC interface](#)

### Configuring SNMP settings for the services appliance

If you are familiar with configuring SNMP for hardware, you can use the BMC interface to configure the SNMP settings for the services appliance. You can provide secure community strings, enable SNMP Trap, and specify up to five SNMP destinations.

#### What you'll need

- You know how to access the BMC dashboard.
- You have experience in configuring SNMP settings for SNMPv1-v2c equipment.

#### Steps

1. From the BMC dashboard, select **Settings > SNMP Settings**.
2. On the SNMP Settings page, select **Enable SNMP V1/V2**, and then provide a Read-Only Community String and a Read-Write Community String.

The Read-Only Community String is like a user ID or password. You should change this value to prevent intruders from getting information about your network setup. The Read-Write Community String protects the device against unauthorized changes.

3. Optionally, select **Enable Trap**, and enter the required information.



Enter the Destination IP for each SNMP trap using an IP address. Fully qualified domain names are not supported.

Enable traps if you want the services appliance to send immediate notifications to an SNMP console when it is in an unusual state. Traps might indicate link up/down conditions, temperatures exceeding certain thresholds, or high traffic.

4. Optionally, click **Send Test Trap** to test your settings.
5. If the settings are correct, click **Save**.

### Setting up email notifications for alerts

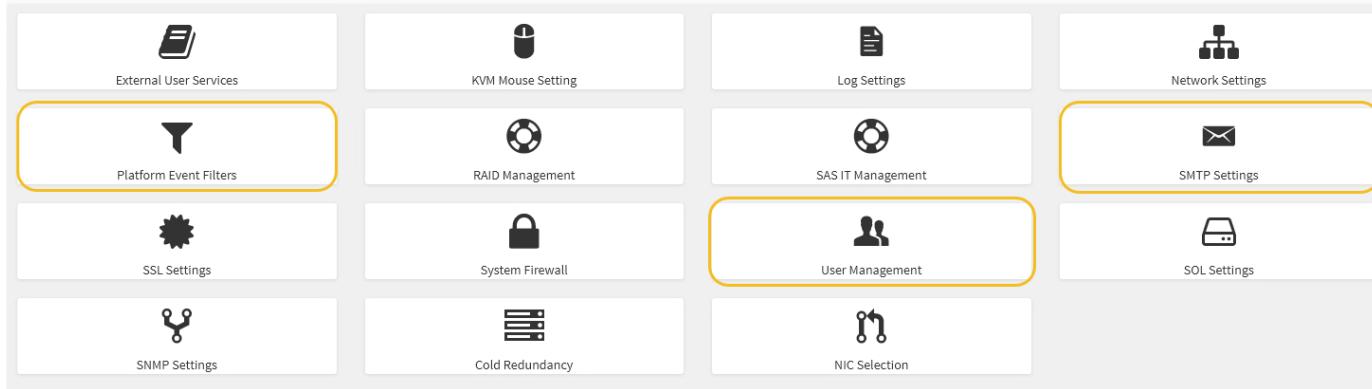
If you want email notifications to be sent when alerts occur, you must use the BMC interface to configure SMTP settings, users, LAN destinations, alert policies, and event filters.

#### What you'll need

You know how to access the BMC dashboard.

#### About this task

In the BMC interface, you use the **SMTP Settings**, **User Management**, and **Platform Event Filters** options on the Settings page to configure email notifications.



## Steps

1. Configure the SMTP settings.
  - a. Select **Settings > SMTP Settings**.
  - b. For Sender Email ID, enter a valid email address.

This email address is provided as the From address when the BMC sends email.

2. Set up users to receive alerts.
  - a. From the BMC dashboard, select **Settings > User Management**.
  - b. Add at least one user to receive alert notifications.

The email address you configure for a user is the address the BMC sends alert notifications to. For example, you could add a generic user, such as "notification-user," and use the email address of a technical support team email distribution list.

3. Configure the LAN destination for alerts.
  - a. Select **Settings > Platform Event Filters > LAN Destinations**.
  - b. Configure at least one LAN destination.
    - Select **Email** as the Destination Type.
    - For BMC Username, select a user name that you added earlier.
    - If you added multiple users and want all of them to receive notification emails, you must add a LAN Destination for each user.
  - c. Send a test alert.
4. Configure alert policies so you can define when and where the BMC sends alerts.
  - a. Select **Settings > Platform Event Filters > Alert Policies**.
  - b. Configure at least one alert policy for each LAN destination.
    - For Policy Group Number, select **1**.
    - For Policy Action, select **Always send alert to this destination**.
    - For LAN Channel, select **1**.
    - In the Destination Selector, select the LAN destination for the policy.
5. Configure event filters to direct alerts for different event types to the appropriate users.

- a. Select **Settings > Platform Event Filters > Event Filters**.
- b. For Alert Policy Group Number, enter 1.
- c. Create filters for every event you want the Alert Policy Group to be notified about.
  - You can create event filters for power actions, specific sensor events, or all events.
  - If you are uncertain which events to monitor, select **All Sensors** for Sensor Type and **All Events** for Event Options. If you receive unwanted notifications, you can change your selections later.

## Optional: Enabling node encryption

If you enable node encryption, the disks in your appliance can be protected by secure key management server (KMS) encryption against physical loss or removal from the site. You must select and enable node encryption during appliance installation and cannot unselect node encryption once the KMS encryption process starts.

### What you'll need

Review the information about KMS in the instructions for administering StorageGRID.

### About this task

An appliance that has node encryption enabled connects to the external key management server (KMS) that is configured for the StorageGRID site. Each KMS (or KMS cluster) manages the encryption keys for all appliance nodes at the site. These keys encrypt and decrypt the data on each disk in an appliance that has node encryption enabled.

A KMS can be set up in Grid Manager before or after the appliance is installed in StorageGRID. See the information about KMS and appliance configuration in the instructions for administering StorageGRID for additional details.

- If a KMS is set up before installing the appliance, KMS-controlled encryption begins when you enable node encryption on the appliance and add it to a StorageGRID site where KMS is configured.
- If a KMS is not set up before you install the appliance, KMS-controlled encryption is performed on each appliance that has node encryption enabled as soon as a KMS is configured and available for the site that contains the appliance node.

 Any data that exists before an appliance that has node encryption enabled connects to the configured KMS is encrypted with a temporary key that is not secure. The appliance is not protected from removal or theft until the key is set to a value provided by the KMS.

Without the KMS key needed to decrypt the disk, data on the appliance cannot be retrieved and is effectively lost. This is the case whenever the decryption key cannot be retrieved from the KMS. The key becomes inaccessible if a customer clears the KMS configuration, a KMS key expires, connection to the KMS is lost, or the appliance is removed from the StorageGRID system where its KMS keys are installed.

### Steps

1. Open a browser, and enter one of the IP addresses for the appliance's compute controller.  
**[https://Controller\\_IP:8443](https://Controller_IP:8443)**

*Controller\_IP* is the IP address of the compute controller (not the storage controller) on any of the three StorageGRID networks.

The StorageGRID Appliance Installer Home page appears.



After the appliance has been encrypted with a KMS key, the appliance disks cannot be decrypted without using the same KMS key.

## 2. Select **Configure Hardware > Node Encryption**.

The screenshot shows the 'Node Encryption' configuration page of the NetApp StorageGRID Appliance Installer. The top navigation bar includes 'Home', 'Configure Networking', 'Configure Hardware', 'Monitor Installation', and 'Advanced'. The 'Configure Hardware' tab is selected. The main content area is titled 'Node Encryption' and contains the following text: 'Node encryption allows you to use an external key management server (KMS) to encrypt all StorageGRID data on this appliance. If node encryption is enabled for the appliance and a KMS is configured for the site, you cannot access any data on the appliance unless the appliance can communicate with the KMS.' Below this is a section titled 'Encryption Status' with a note: '⚠ You can only enable node encryption for an appliance during installation. You cannot enable or disable the node encryption setting after the appliance is installed.' Under 'Encryption Status', there is a checkbox labeled 'Enable node encryption' which is checked, and a 'Save' button. At the bottom of the page, there is a section titled 'Key Management Server Details'.

## 3. Select **Enable node encryption**.

You can unselect **Enable node encryption** without risk of data loss until you select **Save** and the appliance node accesses the KMS encryption keys in your StorageGRID system and begins disk encryption. You are not able to disable node encryption after the appliance is installed.



After you add an appliance that has node encryption enabled to a StorageGRID site that has a KMS, you cannot stop using KMS encryption for the node.

## 4. Select **Save**.

## 5. Deploy the appliance as a node in your StorageGRID system.

KMS-controlled encryption begins when the appliance accesses the KMS keys configured for your StorageGRID site. The installer displays progress messages during the KMS encryption process, which might take a few minutes depending on the number of disk volumes in the appliance.



Appliances are initially configured with a random non-KMS encryption key assigned to each disk volume. The disks are encrypted using this temporary encryption key, that is not secure, until the appliance that has node encryption enabled accesses the KMS keys configured for your StorageGRID site.

## After you finish

You can view node-encryption status, KMS details, and the certificates in use when the appliance node is in maintenance mode.

## Related information

[Administer StorageGRID](#)

[Monitoring node encryption in maintenance mode](#)

## Deploying a services appliance node

You can deploy a services appliance as a primary Admin Node, a non-primary Admin Node, or a Gateway Node. Both the SG100 and the SG1000 appliances can operate as Gateway Nodes and Admin Nodes (primary or non-primary) at the same time.

### Deploying a services appliance as a primary Admin Node

When you deploy a services appliance as a primary Admin Node, you use the StorageGRID Appliance Installer included on the appliance to install the StorageGRID software, or you upload the software version you want to install. You must install and configure the primary Admin Node before you install any other appliance node types. A primary Admin Node can connect to the Grid Network, and to the optional Admin Network and Client Network, if one or both are configured.

#### What you'll need

- The appliance has been installed in a rack or cabinet, connected to your networks, and powered on.
- Network links, IP addresses, and port remapping (if necessary) have been configured for the appliance using the StorageGRID Appliance Installer.



If you have remapped any ports, you cannot use the same ports to configure load balancer endpoints. You can create endpoints using remapped ports, but those endpoints will be remapped to the original CLB ports and service, not the Load Balancer service. Follow the steps in the recovery and maintenance instructions for removing port remaps.



The CLB service is deprecated.

- You have a service laptop with a supported web browser.
- You know one of the IP addresses assigned to the appliance. You can use the IP address for any attached StorageGRID network.

#### About this task

To install StorageGRID on an appliance primary Admin Node:

- You use the StorageGRID Appliance Installer to install the StorageGRID software. If you want to install a different version of the software, you first upload it using the StorageGRID Appliance Installer.
- You wait as the software is installed.
- When the software has been installed, the appliance is rebooted automatically.

#### Steps

1. Open a browser, and enter the IP address for the appliance.

`https://services_appliance_IP:8443`

The StorageGRID Appliance Installer Home page appears.

2. In the **This Node** section, select **Primary Admin**.
3. In the **Node name** field, enter the name you want to use for this appliance node, and click **Save**.

The node name is assigned to this appliance node in the StorageGRID system. It is shown on the Grid Nodes page in the Grid Manager.

4. Optionally, to install a different version of the StorageGRID software, follow these steps:

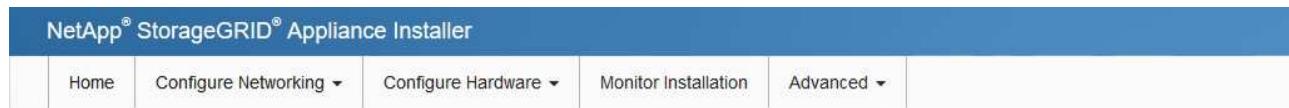
a. Download the installation archive from the NetApp Downloads page for StorageGRID.

#### NetApp Downloads: StorageGRID

b. Extract the archive.

c. From the StorageGRID Appliance Installer, select **Advanced > Upload StorageGRID Software**.

d. Click **Remove** to remove the current software package.



The screenshot shows the top navigation bar of the StorageGRID Appliance Installer. The 'Advanced' tab is highlighted in blue, indicating it is the active section. Other tabs visible include Home, Configure Networking, Configure Hardware, Monitor Installation, and another Advanced tab.

#### Upload StorageGRID Software

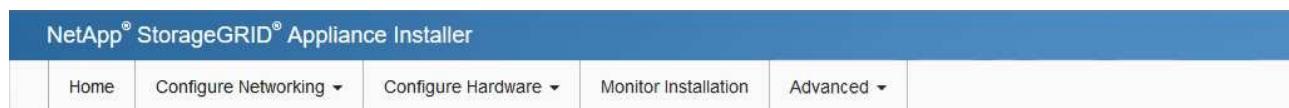
If this node is the primary Admin Node of a new deployment, you must use this page to upload the StorageGRID software installation package, unless the version of the software you want to install has already been uploaded. If you are adding this node to an existing deployment, you can avoid network traffic by uploading the installation package that matches the software version running on the existing grid. If you do not upload the correct package, the node obtains the software from the grid's primary Admin Node during installation.

#### Current StorageGRID Installation Software

Version 11.3.0

Package Name storagegrid-webscale-images-11-3-0\_11.3.0-20190806.1731.4064510\_amd64.deb

e. Click **Browse** for the software package you downloaded and extracted, and then click **Browse** for the checksum file.



The screenshot shows the top navigation bar of the StorageGRID Appliance Installer. The 'Advanced' tab is highlighted in blue, indicating it is the active section. Other tabs visible include Home, Configure Networking, Configure Hardware, Monitor Installation, and another Advanced tab.

#### Upload StorageGRID Software

If this node is the primary Admin Node of a new deployment, you must use this page to upload the StorageGRID software installation package, unless the version of the software you want to install has already been uploaded. If you are adding this node to an existing deployment, you can avoid network traffic by uploading the installation package that matches the software version running on the existing grid. If you do not upload the correct package, the node obtains the software from the grid's primary Admin Node during installation.

#### Current StorageGRID Installation Software

Version None

Package Name None

#### Upload StorageGRID Installation Software

Software Package

Checksum File

f. Select **Home** to return to the Home page.

5. Confirm that the current state is “Ready to start installation of primary Admin Node name with software version x.y” and that the **Start Installation** button is enabled.



If you are deploying the Admin Node appliance as a node cloning target, stop the deployment process here and continue the node cloning procedure in recovery and maintenance.

### Maintain & recover

6. From the StorageGRID Appliance Installer home page, click **Start Installation**.

Home

The screenshot shows the StorageGRID Appliance Installer interface. The 'This Node' section has a dropdown for 'Node type' set to 'Primary Admin (with Load Balancer)' and a text input for 'Node name' set to 'xlr8r-8'. Below these are 'Cancel' and 'Save' buttons. The 'Installation' section shows the 'Current state' as 'Ready to start installation of xlr8r-8 as primary Admin Node of a new grid running StorageGRID 11.3.0.' with a prominent 'Start Installation' button.

The Current state changes to “Installation is in progress,” and the Monitor Installation page is displayed.



If you need to access the Monitor Installation page manually, click **Monitor Installation** from the menu bar.

### Related information

[Deploying a services appliance as a Gateway or non-primary Admin Node](#)

### Deploying a services appliance as a Gateway or non-primary Admin Node

When you deploy a services appliance as a Gateway Node or non-primary Admin Node, you use the StorageGRID Appliance Installer included on the appliance.

#### What you'll need

- The appliance has been installed in a rack or cabinet, connected to your networks, and powered on.
- Network links, IP addresses, and port remapping (if necessary) have been configured for the appliance using the StorageGRID Appliance Installer.



If you have remapped any ports, you cannot use the same ports to configure load balancer endpoints. You can create endpoints using remapped ports, but those endpoints will be remapped to the original CLB ports and service, not the Load Balancer service. Follow the steps in the recovery and maintenance instructions for removing port remaps.



The CLB service is deprecated.

- The primary Admin Node for the StorageGRID system has been deployed.
- All Grid Network subnets listed on the IP Configuration page of the StorageGRID Appliance Installer have been defined in the Grid Network Subnet List on the primary Admin Node.
- You have a service laptop with a supported web browser.
- You know the IP address assigned to the appliance. You can use the IP address for any attached StorageGRID network.

## About this task

To install StorageGRID on a services appliance node:

- You specify or confirm the IP address of the primary Admin Node and the name of the appliance node.
- You start the installation and wait as the software is installed.

Partway through the appliance Gateway Node installation tasks, the installation pauses. To resume the installation, you sign into the Grid Manager, approve all grid nodes, and complete the StorageGRID installation process. The installation of a non-primary Admin Node does not require your approval.



Do not deploy the SG100 and SG1000 service appliances in the same site. Unpredictable performance might result.



If you need to deploy multiple appliance nodes at one time, you can automate the installation process by using the `configure-sga.py` Appliance Installation script. You can also use the Appliance Installer to upload a JSON file that contains configuration information. See [Automating appliance installation and configuration](#).

## Steps

1. Open a browser, and enter the IP address for the appliance.

**`https://Controller_IP:8443`**

The StorageGRID Appliance Installer Home page appears.

2. In the Primary Admin Node connection section, determine whether you need to specify the IP address for the primary Admin Node.

If you have previously installed other nodes in this data center, the StorageGRID Appliance Installer can discover this IP address automatically, assuming the primary Admin Node, or at least one other grid node with `ADMIN_IP` configured, is present on the same subnet.

3. If this IP address is not shown or you need to change it, specify the address:

Option	Description
Manual IP entry	<ol style="list-style-type: none"> <li>Unselect the <b>Enable Admin Node discovery</b> check box.</li> <li>Enter the IP address manually.</li> <li>Click <b>Save</b>.</li> <li>Wait for the connection state for the new IP address to become ready.</li> </ol>
Automatic discovery of all connected primary Admin Nodes	<ol style="list-style-type: none"> <li>Select the <b>Enable Admin Node discovery</b> check box.</li> <li>Wait for the list of discovered IP addresses to be displayed.</li> <li>Select the primary Admin Node for the grid where this appliance Storage Node will be deployed.</li> <li>Click <b>Save</b>.</li> <li>Wait for the connection state for the new IP address to become ready.</li> </ol>

4. In the **Node name** field, enter the name you want to use for this appliance node, and click **Save**.

The node name is assigned to this appliance node in the StorageGRID system. It is shown on the Nodes page (Overview tab) in the Grid Manager. If required, you can change the name when you approve the node.

5. Optionally, to install a different version of the StorageGRID software, follow these steps:

- Download the installation archive from the NetApp Downloads page for StorageGRID.

[NetApp Downloads: StorageGRID](#)

- Extract the archive.
- From the StorageGRID Appliance Installer, select **Advanced > Upload StorageGRID Software**.
- Click **Remove** to remove the current software package.

NetApp® StorageGRID® Appliance Installer

	Home	Configure Networking ▾	Configure Hardware ▾	Monitor Installation	Advanced ▾
--	------	------------------------	----------------------	----------------------	------------

#### Upload StorageGRID Software

If this node is the primary Admin Node of a new deployment, you must use this page to upload the StorageGRID software installation package, unless the version of the software you want to install has already been uploaded. If you are adding this node to an existing deployment, you can avoid network traffic by uploading the installation package that matches the software version running on the existing grid. If you do not upload the correct package, the node obtains the software from the grid's primary Admin Node during installation.

#### Current StorageGRID Installation Software

Version 11.3.0

Package Name storagegrid-webscale-images-11-3-0\_11.3.0-20190806.1731.4064510\_amd64.deb

[Remove](#)

- e. Click **Browse** for the software package you downloaded and extracted, and then click **Browse** for the checksum file.

NetApp® StorageGRID® Appliance Installer

	Home	Configure Networking ▾	Configure Hardware ▾	Monitor Installation	Advanced ▾
--	------	------------------------	----------------------	----------------------	------------

#### Upload StorageGRID Software

If this node is the primary Admin Node of a new deployment, you must use this page to upload the StorageGRID software installation package, unless the version of the software you want to install has already been uploaded. If you are adding this node to an existing deployment, you can avoid network traffic by uploading the installation package that matches the software version running on the existing grid. If you do not upload the correct package, the node obtains the software from the grid's primary Admin Node during installation.

#### Current StorageGRID Installation Software

Version None

Package Name None

#### Upload StorageGRID Installation Software

Software Package [Browse](#)

Checksum File [Browse](#)

- f. Select **Home** to return to the Home page.

6. In the Installation section, confirm that the current state is "Ready to start installation of `node_name` into grid with primary Admin Node `admin_ip`" and that the **Start Installation** button is enabled.

If the **Start Installation** button is not enabled, you might need to change the network configuration or port settings. For instructions, see the installation and maintenance instructions for your appliance.

7. From the StorageGRID Appliance Installer home page, click **Start Installation**.

 The installation is ready to be started. Review the settings below, and then click Start Installation.

### This Node

Node type	Non-primary Admin (with Load Balancer) 
Node name	GW-SG1000-003-074
 	

### Primary Admin Node connection

Enable Admin Node discovery	<input type="checkbox"/>
Primary Admin Node IP	172.16.6.32
Connection state	Connection to 172.16.6.32 ready
 	

### Installation

Current state	Ready to start installation of GW-SG1000-003-074 into grid with Admin Node 172.16.6.32 running StorageGRID 11.3.0, using StorageGRID software downloaded from the Admin Node.
	

The Current state changes to “Installation is in progress,” and the Monitor Installation page is displayed.



If you need to access the Monitor Installation page manually, click **Monitor Installation** from the menu bar.

8. If your grid includes multiple appliance nodes, repeat the previous steps for each appliance.

### Related information

[Deploying a services appliance as a primary Admin Node](#)

## Monitoring the services appliance installation

The StorageGRID Appliance Installer provides status until installation is complete. When the software installation is complete, the appliance is rebooted.

### Steps

1. To monitor the installation progress, click **Monitor Installation** from the menu bar.

The Monitor Installation page shows the installation progress.

#### Monitor Installation

1. Configure storage	Complete	
2. Install OS	Running	
Step	Progress	Status
Obtain installer binaries	<div style="width: 100%; background-color: #2e7131;"></div>	Complete
Configure installer	<div style="width: 100%; background-color: #2e7131;"></div>	Complete
Install OS	<div style="width: 50%; background-color: #4a90e2;"></div>	Installer VM running
3. Install StorageGRID		Pending
4. Finalize installation		Pending

The blue status bar indicates which task is currently in progress. Green status bars indicate tasks that have completed successfully.



The installer ensures that tasks completed in a previous install are not re-run. If you are re-running an installation, any tasks that do not need to be re-run are shown with a green status bar and a status of "Skipped."

2. Review the progress of first two installation stages.

- **1. Configure storage**

During this stage, the installer clears any existing configuration from the drives in the appliance, and configures host settings.

- **2. Install OS**

During this stage, the installer copies the base operating system image for StorageGRID to the appliance.

3. Continue monitoring the installation progress until one of the following processes occurs:

- For all appliance nodes except the primary Admin Node, the Install StorageGRID stage pauses and a message appears on the embedded console, prompting you to approve this node on the Admin Node using the Grid Manager. Go to the next step.

- For appliance primary Admin Node installation, you do not need to approve the node. The appliance is rebooted. You can skip the next step.



During installation of an appliance primary Admin Node, a fifth phase appears (see the example screen shot showing four phases). If the fifth phase is in progress for more than 10 minutes, refresh the web page manually.

Monitor Installation	
1. Configure storage	Complete
2. Install OS	Complete
3. Install StorageGRID	Running
4. Finalize installation	Pending

```
Connected (unencrypted) to: QEMU

platform.type: Device or resource busy
[2017-07-31T22:09:12.362566]    INFO -- [INSG] NOTICE: seeding /var/local with container data
[2017-07-31T22:09:12.366205]    INFO -- [INSG] Fixing permissions
[2017-07-31T22:09:12.369633]    INFO -- [INSG] Enabling syslog
[2017-07-31T22:09:12.511533]    INFO -- [INSG] Stopping system logging: syslog-ning.
[2017-07-31T22:09:12.570096]    INFO -- [INSG] Starting system logging: syslog-ning.
[2017-07-31T22:09:12.576360]    INFO -- [INSG] Beginning negotiation for download of node configuration
[2017-07-31T22:09:12.581363]    INFO -- [INSG]
[2017-07-31T22:09:12.585066]    INFO -- [INSG]
[2017-07-31T22:09:12.588314]    INFO -- [INSG]
[2017-07-31T22:09:12.591851]    INFO -- [INSG]
[2017-07-31T22:09:12.594886]    INFO -- [INSG]
[2017-07-31T22:09:12.598360]    INFO -- [INSG]
[2017-07-31T22:09:12.601324]    INFO -- [INSG]
[2017-07-31T22:09:12.604759]    INFO -- [INSG]
[2017-07-31T22:09:12.607800]    INFO -- [INSG]
[2017-07-31T22:09:12.610985]    INFO -- [INSG]
[2017-07-31T22:09:12.614597]    INFO -- [INSG]
[2017-07-31T22:09:12.618282]    INFO -- [INSG] Please approve this node on the Admin Node GMI to proceed...
```

- Go to the Grid Manager, approve the pending grid node, and complete the StorageGRID installation process.

When you click **Install** from the Grid Manager, Stage 3 completes and stage 4, **Finalize Installation**, begins. When stage 4 completes, the appliance is rebooted.

## Automating appliance installation and configuration

You can automate the installation and configuration of your appliances and configuration of the whole StorageGRID system.

### About this task

Automating installation and configuration can be useful for deploying multiple StorageGRID instances or one large, complex StorageGRID instance.

To automate installation and configuration, use one or more of the following options:

- Create a JSON file that specifies the configuration settings for your appliances. Upload the JSON file using the StorageGRID Appliance Installer.



You can use the same file to configure more than one appliance.

- Use the `StorageGRIDconfigure-sga.py` Python script to automate the configuration of your appliances.
- Use additional Python scripts to configure other components of the whole StorageGRID system (the "grid").



You can use StorageGRID automation Python scripts directly, or you can use them as examples of how to use the StorageGRID Installation REST API in grid deployment and configuration tools you develop yourself. See the information about downloading and extracting the StorageGRID installation files in the Recovery and Maintenance instructions.

### Related information

#### [Maintain & recover](#)

#### [Automating appliance configuration using the StorageGRID Appliance Installer](#)

You can automate the configuration of an appliance by using a JSON file that contains the configuration information. You upload the file using the StorageGRID Appliance Installer.

### What you'll need

- Your appliance must be on the latest firmware compatible with StorageGRID 11.5 or higher.
- You must be connected to the StorageGRID Appliance Installer on the appliance you are configuring using a supported browser.

### About this task

You can automate appliance configuration tasks such as configuring the following:

- Grid Network, Admin Network, and Client Network IP addresses
- BMC interface
- Network links
  - Port bond mode
  - Network bond mode
  - Link speed

Configuring your appliance using an uploaded JSON file is often more efficient than performing the

configuration manually using multiple pages in the StorageGRID Appliance Installer, especially if you have to configure many nodes. You must apply the configuration file for each node one at a time.



Experienced users who want to automate both the installation and configuration of their appliances can use the `configure-sga.py` script.  
[Automating installation and configuration of appliance nodes using the configure-sga.py script](#)

## Steps

1. Generate the JSON file using one of the following methods:

- The ConfigBuilder application

[ConfigBuilder.netapp.com](#)

- The `configure-sga.py` appliance configuration script. You can download the script from StorageGRID Appliance Installer (**Help > Appliance Configuration Script**). See the instructions on automating the configuration using the `configure-sga.py` script.

[Automating installation and configuration of appliance nodes using the configure-sga.py script](#)

The node names in the JSON file must follow these requirements:

- Must be a valid hostname containing at least 1 and no more than 32 characters
- Can use letters, numbers, and hyphens are allowed
- Cannot start or end with a hyphen or contain only numbers



Ensure that the node names (the top-level names) in the JSON file are unique, or you will not be able to configure more than one node using the JSON file.

2. Select **Advanced > Update Appliance Configuration**.

The Update Appliance Configuration page appears.

### Update Appliance Configuration

Use a JSON file to update this appliance's configuration. You can generate the JSON file from the [ConfigBuilder](#) application or from the [appliance configuration script](#).

**⚠** You might lose your connection if the applied configuration from the JSON file includes "link\_config" and/or "networks" sections. If you are not reconnected within 1 minute, re-enter the URL using one of the other IP addresses assigned to the appliance.

#### Upload JSON

JSON configuration	<input type="button" value="Browse"/>
Node name	-- Upload a file ▾
<input type="button" value="Apply JSON configuration"/>	

3. Select the JSON file with the configuration you want to upload.

a. Select **Browse**.

b. Locate and select the file.

c. Select **Open**.

The file is uploaded and validated. When the validation process is complete, the file name is shown next to a green check mark.



You might lose connection to the appliance if the configuration from the JSON file includes sections for "link\_config", "networks", or both. If you are not reconnected within 1 minute, re-enter the appliance URL using one of the other IP addresses assigned to the appliance.

#### Upload JSON

JSON configuration	<input type="button" value="Browse"/>	<input checked="" type="button" value="✓ appliances.orig.json"/>
Node name	<input type="button" value="-- Select a node ▾"/>	
<input type="button" value="Apply JSON configuration"/>		

The **Node name** drop down is populated with the top-level node names defined in the JSON file.



If the file is not valid, the file name is shown in red and an error message is displayed in a yellow banner. The invalid file is not applied to the appliance. You can use ConfigBuilder to ensure you have a valid JSON file.

4. Select a node from the list in the **Node name** drop down.

The **Apply JSON configuration** button is enabled.

#### Upload JSON

JSON configuration	<input type="button" value="Browse"/>	<input checked="" type="button" value="✓ appliances.orig.json"/>
Node name	<input type="button" value="Lab-80-1000 ▾"/>	
<input type="button" value="Apply JSON configuration"/>		

5. Select **Apply JSON configuration**.

The configuration is applied to the selected node.

You can use the `configure-sga.py` script to automate many of the installation and configuration tasks for StorageGRID appliance nodes, including installing and configuring a primary Admin Node. This script can be useful if you have a large number of appliances to configure. You can also use the script to generate a JSON file that contains appliance configuration information.

### What you'll need

- The appliance has been installed in a rack, connected to your networks, and powered on.
- Network links and IP addresses have been configured for the primary Admin Node using the StorageGRID Appliance Installer.
- If you are installing the primary Admin Node, you know its IP address.
- If you are installing and configuring other nodes, the primary Admin Node has been deployed, and you know its IP address.
- For all nodes other than the primary Admin Node, all Grid Network subnets listed on the IP Configuration page of the StorageGRID Appliance Installer have been defined in the Grid Network Subnet List on the primary Admin Node.
- You have downloaded the `configure-sga.py` file. The file is included in the installation archive, or you can access it by clicking **Help > Appliance Installation Script** in the StorageGRID Appliance Installer.

This procedure is for advanced users with some experience using command-line interfaces.

Alternatively, you can also use the StorageGRID Appliance Installer to automate the configuration.

[Automating appliance configuration using the StorageGRID Appliance Installer](#)

### Steps

1. Log in to the Linux machine you are using to run the Python script.
2. For general help with the script syntax and to see a list of the available parameters, enter the following:

```
configure-sga.py --help
```

The `configure-sga.py` script uses five subcommands:

- `advanced` for advanced StorageGRID appliance interactions, including BMC configuration and creating a JSON file containing the current configuration of the appliance
- `configure` for configuring the RAID mode, node name, and networking parameters
- `install` for starting a StorageGRID installation
- `monitor` for monitoring a StorageGRID installation
- `reboot` for rebooting the appliance

If you enter a subcommand (advanced, configure, install, monitor, or reboot) argument followed by the `--help` option you will get a different help text providing more detail on the options available within that subcommand:

```
configure-sga.py subcommand --help
```

3. To confirm the current configuration of the appliance node, enter the following where *SGA-install-ip* is any one of the IP addresses for the appliance node:

```
configure-sga.py configure SGA-INSTALL-IP
```

The results show current IP information for the appliance, including the IP address of the primary Admin Node and information about the Admin, Grid, and Client Networks.

```
Connecting to +https://10.224.2.30:8443+ (Checking version and
connectivity.)
2021/02/25 16:25:11: Performing GET on /api/versions... Received 200
2021/02/25 16:25:11: Performing GET on /api/v2/system-info... Received
200
2021/02/25 16:25:11: Performing GET on /api/v2/admin-connection...
Received 200
2021/02/25 16:25:11: Performing GET on /api/v2/link-config... Received
200
2021/02/25 16:25:11: Performing GET on /api/v2/networks... Received 200
2021/02/25 16:25:11: Performing GET on /api/v2/system-config... Received
200
```

#### StorageGRID Appliance

```
Name: LAB-SGA-2-30
Node type: storage
```

#### StorageGRID primary Admin Node

```
IP: 172.16.1.170
State: unknown
Message: Initializing...
Version: Unknown
```

#### Network Link Configuration

##### Link Status

Link	State	Speed (Gbps)
---	-----	-----
1	Up	10
2	Up	10
3	Up	10
4	Up	10
5	Up	1
6	Down	N/A

##### Link Settings

```
Port bond mode: FIXED
Link speed: 10GBE
```

```
Grid Network: ENABLED
```

```
Bonding mode: active-backup
```

```

VLAN:           novlan
MAC Addresses: 00:a0:98:59:8e:8a 00:a0:98:59:8e:82

Admin Network:  ENABLED
Bonding mode:  no-bond
MAC Addresses: 00:80:e5:29:70:f4

Client Network:  ENABLED
Bonding mode:  active-backup
VLAN:           novlan
MAC Addresses: 00:a0:98:59:8e:89 00:a0:98:59:8e:81

Grid Network
CIDR:          172.16.2.30/21 (Static)
MAC:            00:A0:98:59:8E:8A
Gateway:        172.16.0.1
Subnets:        172.17.0.0/21
                172.18.0.0/21
                192.168.0.0/21
MTU:            1500

Admin Network
CIDR:          10.224.2.30/21 (Static)
MAC:            00:80:E5:29:70:F4
Gateway:        10.224.0.1
Subnets:        10.0.0.0/8
                172.19.0.0/16
                172.21.0.0/16
MTU:            1500

Client Network
CIDR:          47.47.2.30/21 (Static)
MAC:            00:A0:98:59:8E:89
Gateway:        47.47.0.1
MTU:            2000

#####
##### If you are satisfied with this configuration, #####
##### execute the script with the "install" sub-command. #####
#####

```

4. If you need to change any of the values in the current configuration, use the `configure` subcommand to update them. For example, if you want to change the IP address that the appliance uses for connection to the primary Admin Node to 172.16.2.99, enter the following:  
`configure-sga.py configure --admin-ip 172.16.2.99 SGA-INSTALL-IP`
5. If you want to back up the appliance configuration to a JSON file, use the `advanced` and `backup-file`

subcommands. For example, if you want to back up the configuration of an appliance with IP address *SGA-INSTALL-IP* to a file named `appliance-SG1000.json`, enter the following:

```
configure-sga.py advanced --backup-file appliance-SG1000.json SGA-INSTALL-IP
```

The JSON file containing the configuration information is written to the same directory you executed the script from.



Check that the top-level node name in the generated JSON file matches the appliance name. Do not make any changes to this file unless you are an experienced user and have a thorough understanding of StorageGRID APIs.

6. When you are satisfied with the appliance configuration, use the `install` and `monitor` subcommands to install the appliance:

```
configure-sga.py install --monitor SGA-INSTALL-IP
```

7. If you want to reboot the appliance, enter the following:

```
configure-sga.py reboot SGA-INSTALL-IP
```

### Automating the configuration of StorageGRID

After deploying the grid nodes, you can automate the configuration of the StorageGRID system.

#### What you'll need

- You know the location of the following files from the installation archive.

Filename	Description
<code>configure-storagegrid.py</code>	Python script used to automate the configuration
<code>configure-storagegrid.sample.json</code>	Sample configuration file for use with the script
<code>configure-storagegrid.blank.json</code>	Blank configuration file for use with the script

- You have created a `configure-storagegrid.json` configuration file. To create this file, you can modify the sample configuration file (`configure-storagegrid.sample.json`) or the blank configuration file (`configure-storagegrid.blank.json`).

#### About this task

You can use the `configure-storagegrid.py` Python script and the `configure-storagegrid.json` configuration file to automate the configuration of your StorageGRID system.



You can also configure the system using the Grid Manager or the Installation API.

#### Steps

1. Log in to the Linux machine you are using to run the Python script.
2. Change to the directory where you extracted the installation archive.

For example:

```
cd StorageGRID-Webscale-version/platform
```

where *platform* is `debs`, `rpms`, or `vsphere`.

3. Run the Python script and use the configuration file you created.

For example:

```
./configure-storagegrid.py ./configure-storagegrid.json --start-install
```

### After you finish

A Recovery Package `.zip` file is generated during the configuration process, and it is downloaded to the directory where you are running the installation and configuration process. You must back up the Recovery Package file so that you can recover the StorageGRID system if one or more grid nodes fails. For example, copy it to a secure, backed up network location and to a secure cloud storage location.



The Recovery Package file must be secured because it contains encryption keys and passwords that can be used to obtain data from the StorageGRID system.

If you specified that random passwords should be generated, you need to extract the `Passwords.txt` file and look for the passwords required to access your StorageGRID system.

```
#####
##### The StorageGRID "recovery package" has been downloaded as: #####
#####           ./sgws-recovery-package-994078-rev1.zip           #####
#####           Safeguard this file as it will be needed in case of a   #####
#####           StorageGRID node recovery.                         #####
#####
```

Your StorageGRID system is installed and configured when a confirmation message is displayed.

```
StorageGRID has been configured and installed.
```

### Overview of installation REST APIs

StorageGRID provides two REST APIs for performing installation tasks: the StorageGRID Installation API and the StorageGRID Appliance Installer API.

Both APIs use the Swagger open source API platform to provide the API documentation. Swagger allows both developers and non-developers to interact with the API in a user interface that illustrates how the API responds to parameters and options. This documentation assumes that you are familiar with standard web technologies and the JSON (JavaScript Object Notation) data format.



Any API operations you perform using the API Docs webpage are live operations. Be careful not to create, update, or delete configuration data or other data by mistake.

Each REST API command includes the API's URL, an HTTP action, any required or optional URL parameters, and an expected API response.

## StorageGRID Installation API

The StorageGRID Installation API is only available when you are initially configuring your StorageGRID system, and in the event that you need to perform a primary Admin Node recovery. The Installation API can be accessed over HTTPS from the Grid Manager.

To access the API documentation, go to the installation web page on the primary Admin Node and select **Help > API Documentation** from the menu bar.

The StorageGRID Installation API includes the following sections:

- **config** — Operations related to the product release and versions of the API. You can list the product release version and the major versions of the API supported by that release.
- **grid** — Grid-level configuration operations. You can get and update grid settings, including grid details, Grid Network subnets, grid passwords, and NTP and DNS server IP addresses.
- **nodes** — Node-level configuration operations. You can retrieve a list of grid nodes, delete a grid node, configure a grid node, view a grid node, and reset a grid node's configuration.
- **provision** — Provisioning operations. You can start the provisioning operation and view the status of the provisioning operation.
- **recovery** — Primary Admin Node recovery operations. You can reset information, upload the Recover Package, start the recovery, and view the status of the recovery operation.
- **recovery-package** — Operations to download the Recovery Package.
- **sites** — Site-level configuration operations. You can create, view, delete, and modify a site.

## StorageGRID Appliance Installer API

The StorageGRID Appliance Installer API can be accessed over HTTPS from *Controller\_IP*:8443.

To access the API documentation, go to the StorageGRID Appliance Installer on the appliance and select **Help > API Docs** from the menu bar.

The StorageGRID Appliance Installer API includes the following sections:

- **clone** — Operations to configure and control node cloning.
- **encryption** — Operations to manage encryption and view encryption status.
- **hardware configuration** — Operations to configure system settings on attached hardware.
- **installation** — Operations for starting the appliance installation and for monitoring installation status.
- **networking** — Operations related to the Grid, Admin, and Client Network configuration for a StorageGRID appliance and appliance port settings.
- **setup** — Operations to help with initial appliance installation setup including requests to get information about the system and update the primary Admin Node IP.
- **support** — Operations for rebooting the controller and getting logs.
- **upgrade** — Operations related to upgrading appliance firmware.
- **uploadsg** — Operations for uploading StorageGRID installation files.

## Troubleshooting the hardware installation

If you encounter issues during the installation, you might find it helpful to review

troubleshooting information related to hardware setup and connectivity issues.

## Related information

[Hardware setup appears to hang](#)

[Troubleshooting connection issues](#)

## Viewing boot-up codes for the appliance

When you apply power to the appliance, the BMC logs a series of boot-up codes. You can view these codes on a graphical console that is connected to the BMC management port.

### What you'll need

- You know how to access the BMC dashboard.
- If you want to use a kernel-based virtual machine (KVM), you have experience deploying and using KVM applications.
- If you want to use serial-over-LAN (SOL), you have experience using IPMI SOL console applications.

### Steps

1. Select one of the following methods for viewing the boot-up codes for the appliance controller, and gather the required equipment.

Method	Required equipment
VGA console	<ul style="list-style-type: none"><li>• VGA-capable monitor</li><li>• VGA cable</li></ul>
KVM	<ul style="list-style-type: none"><li>• KVM application</li><li>• RJ-45 cable</li></ul>
Serial port	<ul style="list-style-type: none"><li>• DB-9 serial cable</li><li>• Virtual serial terminal</li></ul>
SOL	<ul style="list-style-type: none"><li>• Virtual serial terminal</li></ul>

2. If you are using a VGA console, perform these steps:
  - a. Connect a VGA-capable monitor to the VGA port on the back of the appliance.
  - b. View the codes displayed on the monitor.
3. If you are using BMC KVM, perform these steps:
  - a. Connect to the BMC management port and log into the BMC web interface.
  - b. Select **Remote Control**.
  - c. Launch the KVM.
  - d. View the codes on the virtual monitor.
4. If you are using a serial port and terminal, perform these steps:

- a. Connect to the DB-9 serial port on the back of the appliance.
- b. Use settings 115200 8-N-1.
- c. View the codes printed over the serial terminal.

5. If you are using SOL, perform these steps:

- a. Connect to the IPMI SOL using the BMC IP address and login credentials.

```
ipmitool -I lanplus -H 10.224.3.91 -U root -P calvin sol activate
```

- b. View the codes on the virtual serial terminal.

6. Use the table to look up the codes for your appliance.

Code	Indicates
HI	The master boot script has started.
HP	The system is checking to see if the network interface card (NIC) firmware needs to be updated.
RB	The system is rebooting after applying firmware updates.
FP	The hardware subsystem firmware update checks have been completed. Inter-controller communication services are starting.
HC	The system is checking for existing StorageGRID installation data.
HO	The StorageGRID appliance is running.
HA	StorageGRID is running.

## Related information

[Accessing the BMC interface](#)

## Viewing error codes for the appliance

If a hardware error occurs when the appliance is booting up, the BMC logs an error code. As required, you can view these error codes using the BMC interface, and then work with technical support to resolve the issue.

### What you'll need

- You know how to access the BMC dashboard.

### Steps

1. From the BMC dashboard, select **BIOS POST Code**.

2. Review the information displayed for Current Code and the Previous Code.

If any of the following error codes are shown, work with technical support to resolve the issue.

Code	Indicates
0x0E	Microcode not found
0x0F	Microcode not loaded
0x50	Memory initialization error. Invalid memory type or incompatible memory speed.
0x51	Memory initialization error. SPD reading has failed.
0x52	Memory initialization error. Invalid memory size or memory modules do not match.
0x53	Memory initialization error. No usable memory detected.
0x54	Unspecified memory initialization error
0x55	Memory not installed
0x56	Invalid CPU type or speed
0x57	CPU mismatch
0x58	CPU self-test failed, or possible CPU cache error
0x59	CPU micro-code is not found, or micro-code update failed
0x5A	Internal CPU error
0x5B	Reset PPI is not available
0x5C	PEI phase BMC self-test failure
0xD0	CPU initialization error
0xD1	North bridge initialization error
0xD2	South bridge initialization error

Code	Indicates
0xD3	Some architectural protocols are not available
0xD4	PCI resource allocation error. Out of resources.
0xD5	No space for legacy option ROM
0xD6	No console output devices are found
0xD7	No console input devices are found
0xD8	Invalid password
0xD9	Error loading boot option (LoadImage returned error)
0xDA	Boot option failed (StartImage returned error)
0xDB	Flash update failed
0xDC	Reset protocol is not available
0xDD	DXE phase BMC self-test failure
0xE8	MRC: ERR_NO_MEMORY
0xE9	MRC: ERR_LT_LOCK
0xEA	MRC: ERR_DDR_INIT
0xEB	MRC: ERR_MEM_TEST
0xEC	MRC: ERR_VENDOR_SPECIFIC
0xED	MRC: ERR_DIMM_COMPAT
0xEE	MRC: ERR_MRC_COMPATIBILITY
0xEF	MRC: ERR_MRC_STRUCT
0xF0	MRC: ERR_SET_VDD
0xF1	MRC: ERR_IOT_MEM_BUFFER

Code	Indicates
0xF2	MRC: ERR_RC_INTERNAL
0xF3	MRC: ERR_INVALID_REG_ACCESS
0xF4	MRC: ERR_SET_MC_FREQ
0xF5	MRC: ERR_READ_MC_FREQ
0x70	MRC: ERR_DIMM_CHANNEL
0x74	MRC: ERR_BIST_CHECK
0xF6	MRC: ERR_SMBUS
0xF7	MRC: ERR_PCU
0xF8	MRC: ERR_NGN
0xF9	MRC: ERR_INTERLEAVE_FAILURE

### **Hardware setup appears to hang**

The StorageGRID Appliance Installer might not be available if hardware faults or cabling errors prevent the appliance from completing its boot-up processing.

#### **Steps**

1. Review the LEDs on the appliance and the boot-up and error codes displayed in the BMC.
2. If you need help resolving an issue, contact technical support.

#### **Related information**

[Viewing boot-up codes for the appliance](#)

[Viewing error codes for the appliance](#)

### **Troubleshooting connection issues**

If you encounter connection issues during the StorageGRID appliance installation, you should perform the corrective action steps listed.

#### **Unable to connect to the appliance**

If you cannot connect to the services appliance, there might be a network issue, or the hardware installation might not have been completed successfully.

#### **Steps**

1. Try to ping the appliance using the IP address for the appliance :  
`ping services_appliance_IP`
2. If you receive no response from the ping, confirm you are using the correct IP address.

You can use the IP address of the appliance on the Grid Network, the Admin Network, or the Client Network.

3. If the IP address is correct, check appliance cabling, QSFP or SFP transceivers, and the network setup.

If that does not resolve the issue, contact technical support.

4. If the ping was successful, open a web browser.
5. Enter the URL for the StorageGRID Appliance Installer:

`https://appliances\_controller\_IP:8443`

The Home page appears.

### **Rebooting the services appliance while the StorageGRID Appliance Installer is running**

You might need to reboot the services appliance while the StorageGRID Appliance Installer is running. For example, you might need to reboot the services appliance if the installation fails.

#### **About this task**

This procedure only applies when the services appliance is running the StorageGRID Appliance Installer. Once the installation is completed, this step no longer works because the StorageGRID Appliance Installer is no longer available.

#### **Steps**

1. From the menu bar of the StorageGRID Appliance Installer, click **Advanced > Reboot Controller**.

The Reboot Controller page appears.

2. From the StorageGRID Appliance Installer, click **Advanced > Reboot Controller**, and then select one of these options:
  - Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
  - Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.

Reboot Controller

Request a controller reboot.

RAID Mode  
Upgrade Firmware  
Reboot Controller

Reboot into StorageGRID

Reboot into Maintenance Mode

The services appliance is rebooted.

## Maintaining the appliance

You might need to perform maintenance procedures on the appliance. The procedures in this section assume that the appliance has already been deployed as a Gateway Node or an Admin Node in a StorageGRID system.

### Steps

- Placing an appliance into maintenance mode
- Turning the controller identify LED on and off
- Locating the controller in a data center
- Replacing the services appliance
- Replacing a power supply in the services appliance
- Replacing a fan in the services appliance
- Replacing a drive in the services appliance
- Changing the link configuration of the services appliance
- Changing the MTU setting
- Checking the DNS server configuration
- Monitoring node encryption in maintenance mode

### Placing an appliance into maintenance mode

You must place the appliance into maintenance mode before performing specific maintenance procedures.

#### What you'll need

- You must be signed in to the Grid Manager using a supported browser.
- You must have the Maintenance or Root Access permission. For details, see the instructions for administering StorageGRID.

#### About this task

Placing a StorageGRID appliance into maintenance mode might make the appliance unavailable for remote access.



The password and host key for a StorageGRID appliance in maintenance mode remain the same as they were when the appliance was in service.

## Steps

1. From the Grid Manager, select **Nodes**.
2. From the tree view of the Nodes page, select the appliance Storage Node.
3. Select **Tasks**.



### Reboot

Shuts down and restarts the node.

**Reboot**

### Maintenance Mode

Places the appliance's compute controller into maintenance mode.

**Maintenance Mode**

4. Select **Maintenance Mode**.

A confirmation dialog box appears.

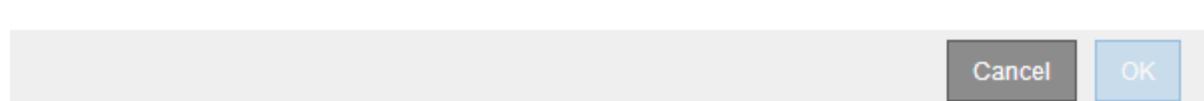


You must place the appliance's compute controller into maintenance mode to perform certain maintenance procedures on the appliance.

Attention: All StorageGRID services on this node will be shut down. Wait a few minutes for the node to reboot into maintenance mode.

If you are ready to start, enter the provisioning passphrase and click OK.

Provisioning Passphrase



5. Enter the provisioning passphrase, and select **OK**.

A progress bar and a series of messages, including "Request Sent," "Stopping StorageGRID," and "Rebooting," indicate that the appliance is completing the steps for entering maintenance mode.

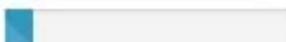
## Reboot

Shuts down and restarts the node.

Reboot

## Maintenance Mode

**Attention:** Your request has been sent, but the appliance might take 10-15 minutes to enter maintenance mode. Do not perform maintenance procedures until this tab indicates maintenance mode is ready, or data could become corrupted.



Request Sent

When the appliance is in maintenance mode, a confirmation message lists the URLs you can use to access the StorageGRID Appliance Installer.

## Reboot

Shuts down and restarts the node.

Reboot

## Maintenance Mode

This node is currently in maintenance mode. Navigate to one of the URLs listed below and perform any necessary maintenance procedures.

- <https://172.16.2.106:8443>
- <https://10.224.2.106:8443>
- <https://47.47.2.106:8443>
- <https://169.254.0.1:8443>

When you are done with any required maintenance procedures, you must exit maintenance mode by clicking Reboot Controller from the StorageGRID Appliance Installer.

6. To access the StorageGRID Appliance Installer, browse to any of the URLs displayed.

If possible, use the URL containing the IP address of the appliance's Admin Network port.

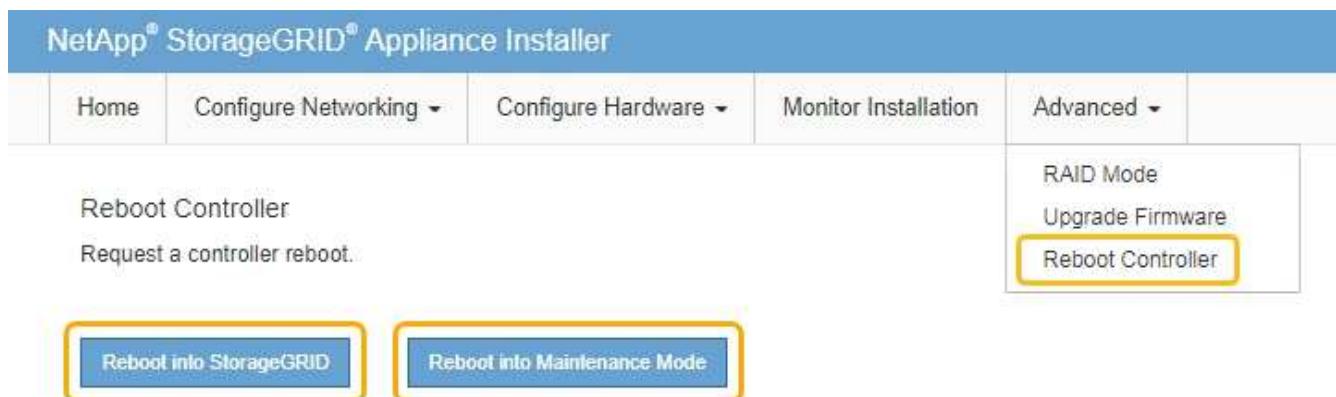


Accessing <https://169.254.0.1:8443> requires a direct connection to the local management port.

7. From the StorageGRID Appliance Installer, confirm that the appliance is in maintenance mode.

**⚠** This node is in maintenance mode. Perform any required maintenance procedures. If you want to exit maintenance mode manually to resume normal operation, go to Advanced > Reboot Controller to **reboot** the controller.

8. Perform any required maintenance tasks.
9. After completing maintenance tasks, exit maintenance mode and resume normal node operation. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select **Reboot into StorageGRID**.



NetApp® StorageGRID® Appliance Installer

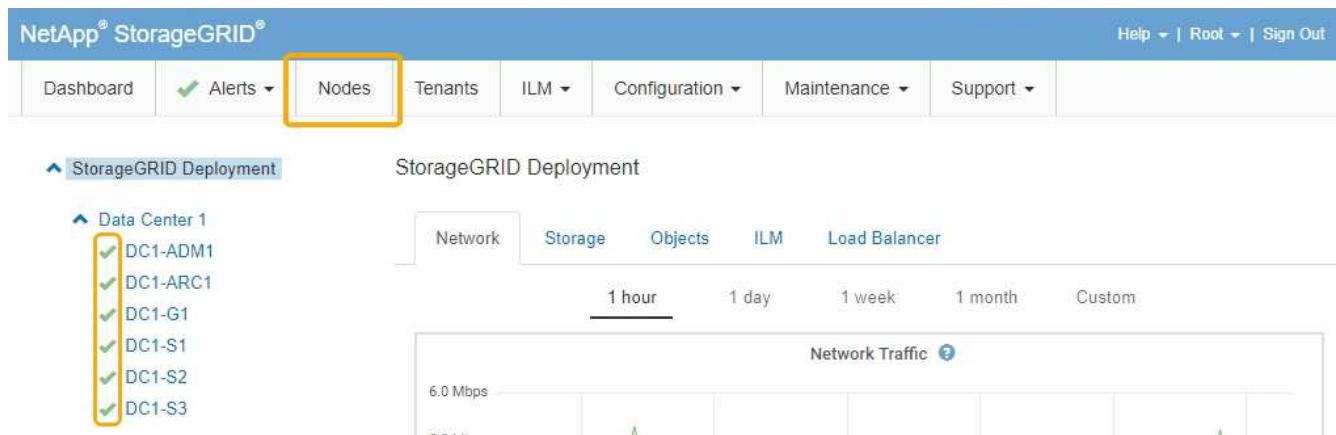
Home Configure Networking ▾ Configure Hardware ▾ Monitor Installation Advanced ▾

Reboot Controller Request a controller reboot.

RAID Mode Upgrade Firmware **Reboot Controller**

**Reboot into StorageGRID** **Reboot into Maintenance Mode**

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** tab should display a normal status **✓** for the appliance node, indicating that no alerts are active and the node is connected to the grid.



NetApp® StorageGRID®

Help ▾ | Root ▾ | Sign Out

Dashboard Alerts ▾ **Nodes** Tenants ILM ▾ Configuration ▾ Maintenance ▾ Support ▾

**StorageGRID Deployment**

**StorageGRID Deployment**

**Data Center 1**

- ✓ DC1-ADM1
- ✓ DC1-ARC1
- ✓ DC1-G1
- ✓ DC1-S1
- ✓ DC1-S2
- ✓ DC1-S3

Network Storage Objects ILM Load Balancer

1 hour 1 day 1 week 1 month Custom

6.0 Mbps

Network Traffic

### Turning the 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.

#### What you'll need

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

#### Steps

1. Access the controller BMC interface.
2. Select **Server Identify**.
3. Select **ON** and then select **Perform Action**.

The screenshot shows the BMC interface with the 'Server Identify' page selected. The 'Identify Status' is currently off. The 'ON' radio button is selected and highlighted with a yellow box. A 'Perform Action' button is at the bottom right, also highlighted with a yellow box and a circled number 2.

## Result

The blue identify LEDs light on the front (shown) and rear of the controller.



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

## After you finish

To turn off the controller identify LED:

- Press the identify LED switch on the controller front panel.
- From the controller BMC interface, select **Server Identify**, select **OFF** and then select **Perform Action**.

The blue identify LEDs on the front and rear of the controller go off.



## Related information

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

[Accessing the BMC interface](#)

### Locating the controller in a data center

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

#### What you'll need

- You have determined which controller requires maintenance.

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

[Turning the controller identify LED on and off](#)

#### 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.

#### Turning the controller identify LED on and off

## Replacing the services appliance

You might need to replace the appliance if it is not functioning optimally or if it has failed.

### What you'll need

- You have a replacement appliance with the same part number as the appliance you are replacing.
- You have labels to identify each cable that is connected to the appliance.
- You have physically located the appliance that you are replacing in the data center. See [Locating the controller in a data center](#).
- The appliance has been placed maintenance mode. See [Placing an appliance into maintenance mode](#).

### About this task

The StorageGRID node will not be accessible while you replace the appliance. If the appliance is functioning sufficiently, you can perform a controlled shutdown at the start of this procedure.

If you are replacing the appliance 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 cannot access it from hosts on other subnets. This condition should resolve itself within 15 minutes (when any ARP cache entries for the original appliance 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. When the appliance has been placed maintenance mode, shut down the appliance.

a. Log in to the grid node:

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

`shutdown -h now`

2. Use one of two methods to verify that the power for the appliance is off:

- The power indicator LED on the front of the appliance is off.
- The Power Control page of the BMC interface indicates that the appliance is off.

3. If the StorageGRID networks attached to the appliance use DHCP servers, update DNS/network and IP

address settings.

- a. Locate the MAC address label on the front of the appliance, and determine the MAC address for the Admin Network port.



The MAC address label lists the MAC address for the BMC management port.

To determine the MAC address for the Admin Network port, you must add **2** to the hexadecimal number on the label. For example, if the MAC address on the label ends in **09**, the MAC address for the Admin Port would end in **0B**. If the MAC address on the label ends in **(y)FF**, the MAC address for the Admin Port would end in **(y+1)01**. You can easily make this calculation by opening Calculator in Windows, setting it to Programmer mode, selecting Hex, typing the MAC address, then typing **+ 2 =**.

- b. Ask your network administrator to associate the DNS/network and IP address for the appliance you removed with the MAC address for the replacement appliance.



You must ensure that all IP addresses for the original appliance have been updated before you apply power to the replacement appliance. Otherwise, the appliance will obtain new DHCP IP addresses when it boots up and might not be able to reconnect to StorageGRID. This step applies to all StorageGRID networks that are attached to the appliance.



If the original appliance used static IP address, the new appliance will automatically adopt the IP addresses of the appliance you removed.

#### 4. Remove and replace the appliance:

- a. Label the cables and then disconnect the cables and any network transceivers.



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

- b. Remove the failed appliance from the cabinet or rack.

- c. Transfer the two power supplies, eight cooling fans, and two SSDs from the failed appliance to the replacement appliance.

Follow the instructions provided for replacing these components.

- d. Install the replacement appliance into the cabinet or rack.

- e. Replace the cables and any optical transceivers.

- f. Power on the appliance and monitor the appliance LEDs and boot-up codes.

Use the BMC interface to monitor boot-up status.

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

#### Related information

[Installing the appliance into a cabinet or rack \(SG100 and SG1000\)](#)

[Viewing status indicators on the SG100 and SG1000 appliances](#)

[Viewing boot-up codes for the appliance](#)

## Replacing a power supply in the services appliance

The services appliance 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 appliance has redundant power.

### What you'll need

- You have unpacked the replacement power supply unit.
- You have physically located the appliance where you are replacing the power supply in the data center.

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

- You can confirmed that the other power supply is installed and running.

### About this task

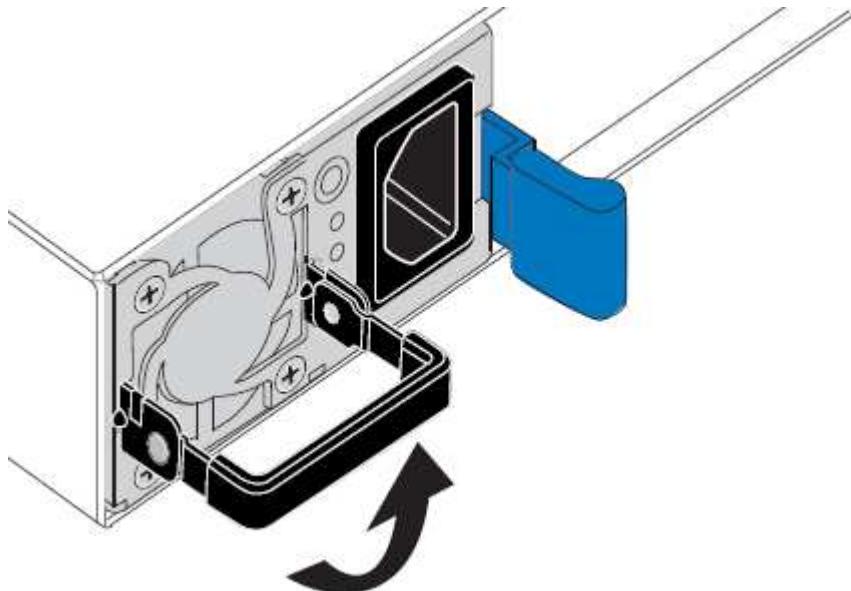
The figure shows the two power supply units for the SG100, which are accessible from the back of the appliance.



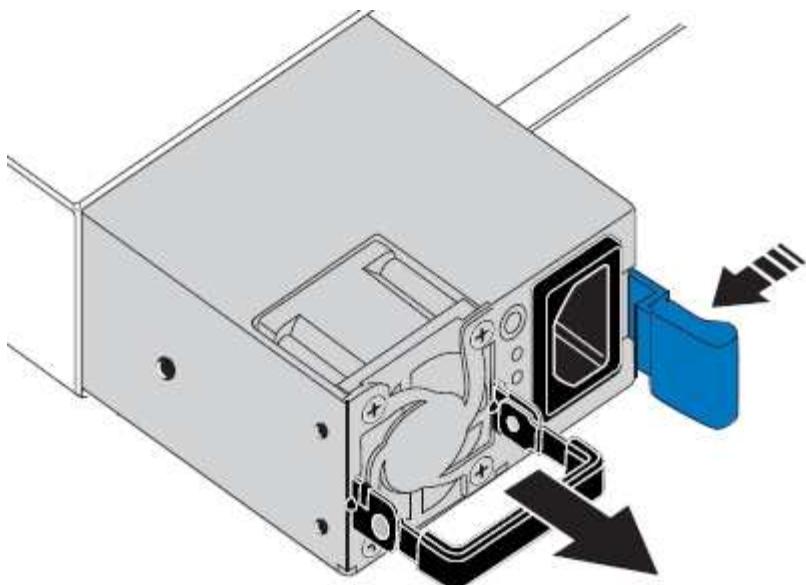
The power supplies for the SG1000 are identical.

### Steps

1. Unplug the power cord from the power supply.
2. Lift the cam handle.

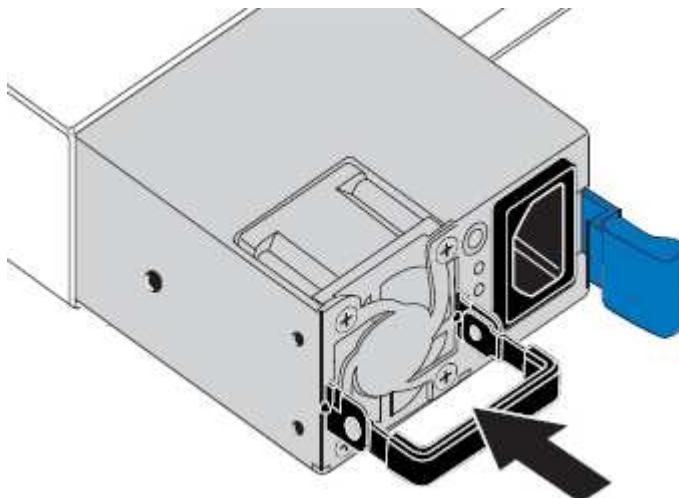


3. Press the blue latch and pull the power supply out.



4. Slide the replacement power supply into the chassis.

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



5. Push the cam handle down to secure the power supply.
6. Attach the power cord to the power supply, and ensure that the green LED comes on.

### Replacing a fan in the services appliance

The services appliance has eight cooling fans. If one of the fans fails, you must replace it as soon as possible to ensure that the appliance has proper cooling.

#### What you'll need

- You have unpacked the replacement fan.
- You have physically located the appliance where you are replacing the fan in the data center.

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

- You have confirmed that the other fans are installed and running.

- The appliance has been placed maintenance mode.

### [Placing an appliance into maintenance mode](#)

#### **About this task**

The appliance node will not be accessible while you replace the fan.

The photograph shows a fan for the services appliance. The cooling fans are accessible after you take the top cover off of the appliance.



Each of the two power supply units also contain a fan. Those fans are not included in this procedure.

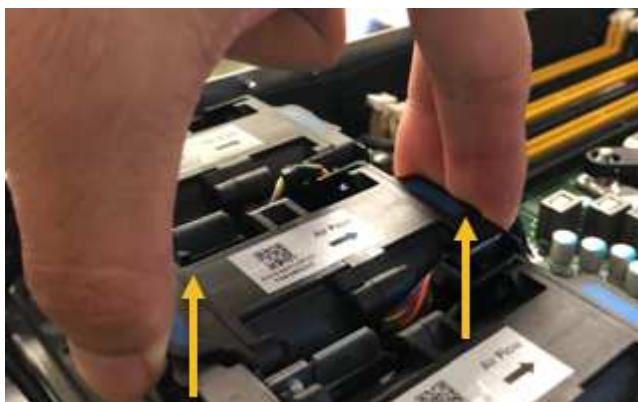


#### **Steps**

1. When the appliance has been placed maintenance mode, shut down the appliance.
  - a. Log in to the grid node:
    - 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 services appliance:  
`shutdown -h now`
2. Use one of two methods to verify that the power for the services appliance is off:
  - The power indicator LED on the front of the appliance is off.
  - The Power Control page of the BMC interface indicates that the appliance is off.
3. Lift the latch on the top cover and remove the cover from the appliance.
4. Locate the fan that failed.

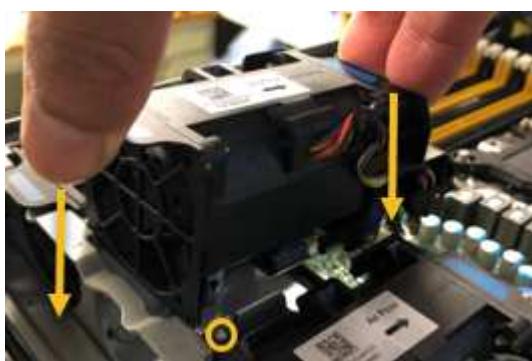


5. Lift the failed fan out of the chassis.

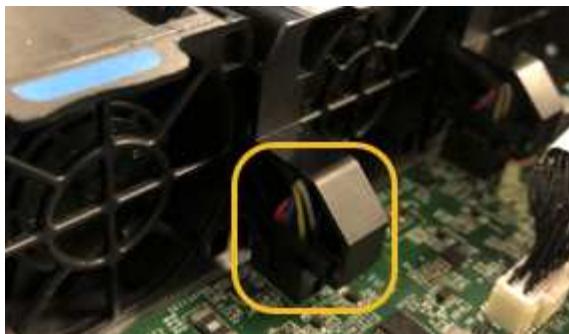


6. Slide the replacement fan into the open slot in the chassis.

Line up the edge of the fan with the guide pin. The pin is circled in the photograph.



7. Press the fan's connector firmly into the circuit board.



8. Put the top cover back on the appliance, and press the latch down to secure the cover in place.
9. Power on the appliance and monitor the controller LEDs and boot-up codes.

Use the BMC interface to monitor boot-up status.

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

### Replacing a drive in the services appliance

The SSDs in the services appliance contain the StorageGRID operating system. Additionally, when the appliance is configured as an Admin Node, the SSDs also contain audit logs, metrics, and database tables. The drives are mirrored using RAID1 for redundancy. If one of the drives fails, you must replace it as soon as possible to ensure redundancy.

#### What you'll need

- You have physically located the appliance where you are replacing the drive in the data center.

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

- You have verified which drive has failed by noting that its left LED is blinking amber.



If you remove the working drive, you will bring down the appliance node. See the information about viewing status indicators to verify the failure.

- You have obtained the replacement drive.
- You have obtained proper ESD protection.

#### Steps

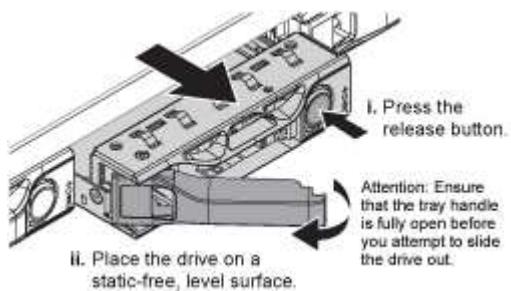
1. Verify that the drive's left LED is blinking amber.

You can also use the Grid Manager to monitor the status of the SSDs. Select **Nodes**. Then select **Appliance Node > Hardware**. If a drive has failed, the Storage RAID Mode field contains a message about which drive has failed.

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. Unpack the replacement drive, and set it on a static-free, level surface near the appliance.

Save all packing materials.

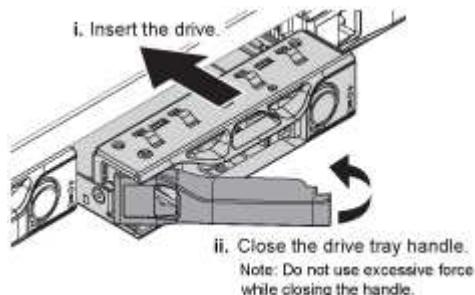
4. Press the release button on the failed drive.



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

5. Open the handle, slide the drive out, and place it on a static-free, level surface.
6. Press the release button on the replacement drive before you insert it into the drive slot.

The latch springs open.



7. Insert the replacement drive in the slot, and then close the drive handle.



Do not use excessive force while closing the handle.

When the drive is fully inserted, you hear a click.

The drive is automatically rebuilt with mirrored data from the working drive. You can check the status of the rebuild by using the Grid Manager. Select **Nodes**. Then select **Appliance Node > Hardware**. The Storage RAID Mode field contains a “rebuilding” message until the drive is completely rebuilt.

8. Contact technical support about the drive replacement.

Technical support will provide instructions for returning the failed drive.

## Changing the link configuration of the services appliance

You can change the Ethernet link configuration of the services appliance. You can change the port bond mode, the network bond mode, and the link speed.

### What you'll need

- You must place the appliance in maintenance mode. Putting a StorageGRID appliance into maintenance mode might make the appliance unavailable for remote access.

#### [Placing an appliance into maintenance mode](#)

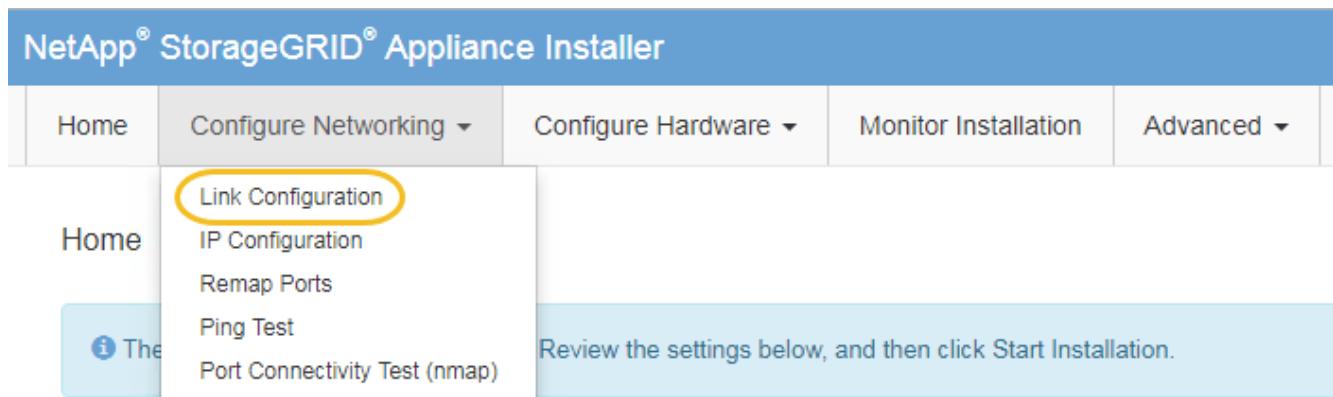
## About this task

Options for changing the Ethernet link configuration of the services appliance 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 on the options, see “Configuring 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 are not 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://services\\_appliance\\_IP:8443](https://services_appliance_IP:8443)**

4. Make any necessary changes to the IP addresses for the appliance.

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 instructions for configuring IP addresses.

### [Configuring StorageGRID IP addresses](#)

5. Select **Configure Networking > Ping Test** from the menu.
6. 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 when configuring the appliance.

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 node. If necessary, return to the instructions for configuring network links, and correct any issues.

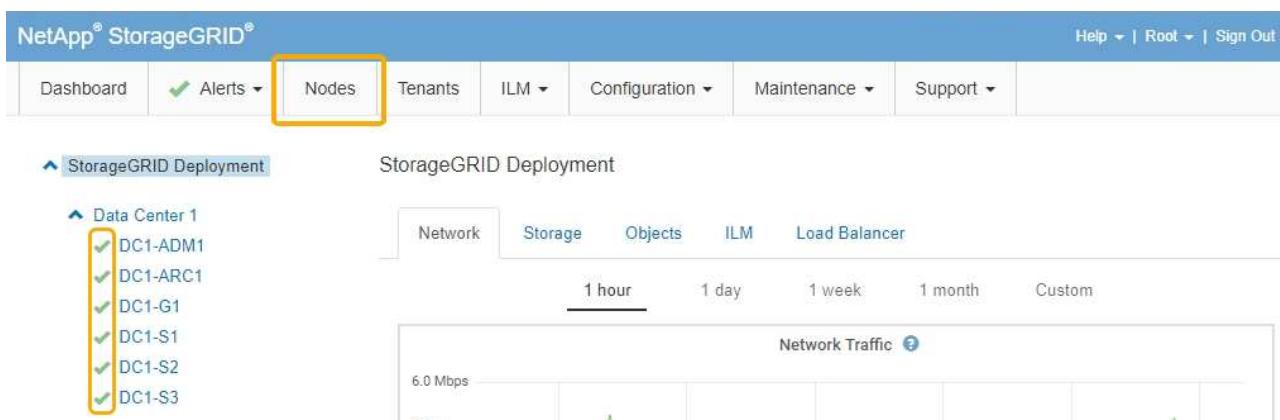
7. Once you are satisfied that your link configuration changes are working, reboot the node. From the

StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:

- Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
- Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



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** tab should display a normal status  for the appliance node, indicating that no alerts are active and the node is connected to the grid.



## Changing the MTU setting

You can change the MTU setting that you assigned when you configured IP addresses for the appliance node.

### What you'll need

The appliance has been placed maintenance mode.

### Placing an appliance into maintenance mode

### Steps

1. From the StorageGRID Appliance Installer, select **Configure Networking > IP Configuration**.
2. Make the desired changes to the MTU settings for the Grid Network, Admin Network, and Client Network.

## Grid Network

The Grid Network is used for all internal StorageGRID traffic. The Grid Network provides connectivity between all nodes in the grid, across all sites and subnets. All hosts on the Grid Network must be able to talk to all other hosts. The Grid Network can consist of multiple subnets. Networks containing critical grid services, such as NTP, can also be added as Grid subnets.

IP  Static  DHCP

Assignment

IPv4 Address (CIDR)

Gateway

**⚠** All required Grid Network subnets must also be defined in the Grid Network Subnet List on the Primary Admin Node before starting installation.

Subnets (CIDR)	<input type="text" value="172.18.0.0/21"/> <span style="color: red;">×</span>
	<input type="text" value="172.18.0.0/21"/> <span style="color: red;">×</span>
	<input type="text" value="192.168.0.0/21"/> <span style="color: green;">+ ×</span>
MTU	<input type="text" value="1500"/> <span style="color: green;">↑ ↓</span>

Cancel Save



The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.

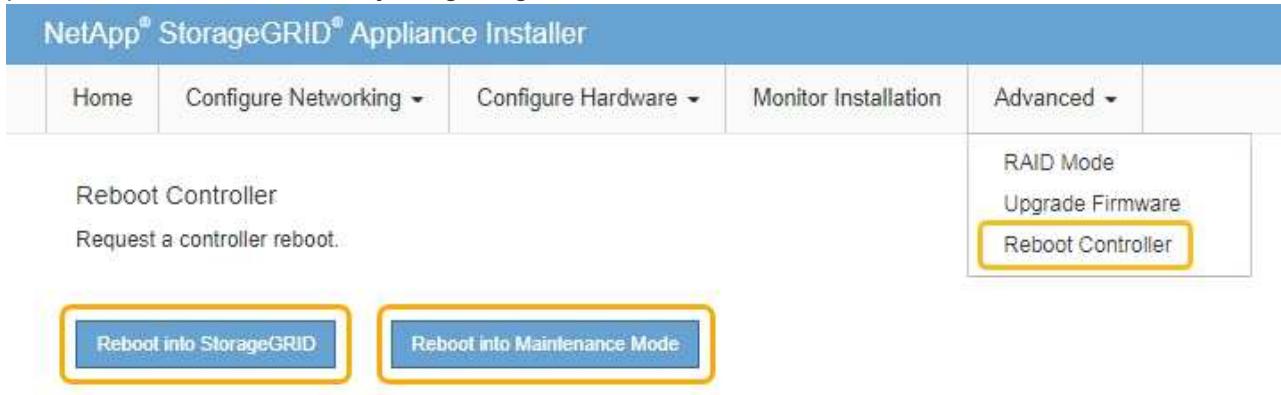


For the best network performance, all nodes should be configured with similar MTU values on their Grid Network interfaces. The **Grid Network MTU mismatch** alert is triggered if there is a significant difference in MTU settings for the Grid Network on individual nodes. The MTU values do not have to be the same for all network types.

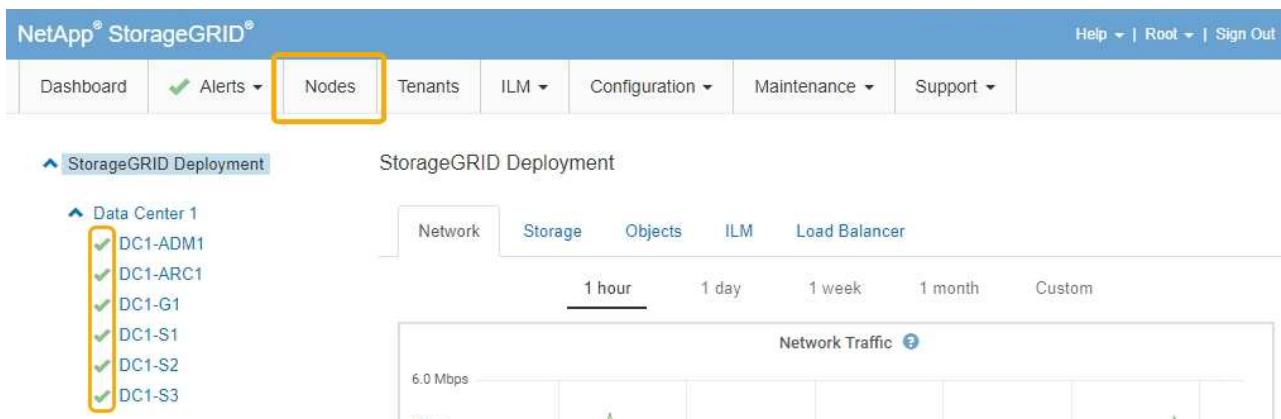
3. When you are satisfied with the settings, select **Save**.

4. Reboot the node. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:

- Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
- Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



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** tab should display a normal status  for the appliance node, indicating that no alerts are active and the node is connected to the grid.



## Related information

[Administer StorageGRID](#)

## Checking the DNS server configuration

You can check and temporarily change the domain name system (DNS) servers that are currently in use by this appliance node.

## What you'll need

The appliance has been placed maintenance mode.

## Placing an appliance into maintenance mode

### About this task

You might need to change the DNS server settings if an encrypted appliance cannot connect to the key management server (KMS) or KMS cluster because the hostname for the KMS was specified as a domain name instead of an IP address. Any changes that you make to the DNS settings for the appliance are temporary and are lost when you exit maintenance mode. To make these changes permanent, specify the DNS servers in Grid Manager (**Maintenance > Network > DNS Servers**).

- Temporary changes to the DNS configuration are necessary only for node-encrypted appliances where the KMS server is defined using a fully qualified domain name, instead of an IP address, for the hostname.
- When a node-encrypted appliance connects to a KMS using a domain name, it must connect to one of the DNS servers defined for the grid. One of these DNS servers then translates the domain name into an IP address.
- If the node cannot reach a DNS server for the grid, or if you changed the grid-wide DNS settings when a node-encrypted appliance node was offline, the node is unable to connect to the KMS. Encrypted data on the appliance cannot be decrypted until the DNS issue is resolved.

To resolve a DNS issue preventing KMS connection, specify the IP address of one or more DNS servers in the StorageGRID Appliance Installer. These temporary DNS settings allow the appliance to connect to the KMS and decrypt data on the node.

For example, if the DNS server for the grid changes while an encrypted node was offline, the node will not be able to reach the KMS when it comes back online, since it is still using the previous DNS values. Entering the new DNS server IP address in the StorageGRID Appliance Installer allows a temporary KMS connection to decrypt the node data.

### Steps

1. From the StorageGRID Appliance Installer, select **Configure Networking > DNS Configuration**.
2. Verify that the DNS servers specified are correct.

#### DNS Servers

**⚠ Configuration changes made on this page will not be passed to the StorageGRID software after appliance installation.**

##### Servers

Server 1	<input type="text" value="10.224.223.135"/>	
Server 2	<input type="text" value="10.224.223.136"/>	 
<input type="button" value="Cancel"/> <input type="button" value="Save"/>		

3. If required, change the DNS servers.



Changes made to the DNS settings are temporary and are lost when you exit maintenance mode.

4. When you are satisfied with the temporary DNS settings, select **Save**.

The node uses the DNS server settings specified on this page to reconnect to the KMS, allowing data on the node to be decrypted.

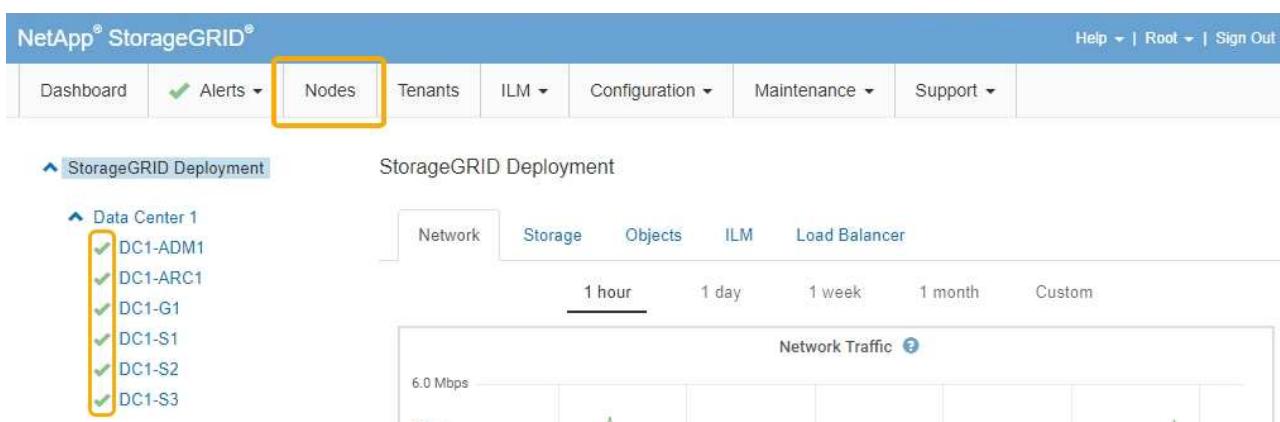
5. After node data is decrypted, reboot the node. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:

- Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
- Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



When the node reboots and rejoins the grid, it uses the system-wide DNS servers listed in the Grid Manager. After rejoining the grid, the appliance will no longer use the temporary DNS servers specified in the StorageGRID Appliance Installer while the appliance was in maintenance mode.

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** tab should display a normal status for the appliance node, indicating that no alerts are active and the node is connected to the grid.



#### Monitoring node encryption in maintenance mode

If you enabled node encryption for the appliance during installation, you can monitor the

node-encryption status of each appliance node, including the node-encryption state and key management server (KMS) details.

## What you'll need

- Node encryption must have been enabled for the appliance during installation. You cannot enable node encryption after the appliance is installed.
- The appliance has been placed into maintenance mode.

### Placing an appliance into maintenance mode

## Steps

1. From the StorageGRID Appliance Installer, select **Configure Hardware > Node Encryption**.

### Node Encryption

Node encryption allows you to use an external key management server (KMS) to encrypt all StorageGRID data on this appliance. If node encryption is enabled for the appliance and a KMS is configured for the site, you cannot access any data on the appliance unless the appliance can communicate with the KMS.

#### Encryption Status

**⚠** You can only enable node encryption for an appliance during installation. You cannot enable or disable the node encryption setting after the appliance is installed.

Enable node encryption

**Save**

#### Key Management Server Details

View the status and configuration details for the KMS that manages the encryption key for this appliance. You must use the Grid Manager to make configuration changes.

KMS display name thales

External key UID 41b0306abcce451facfce01b1b4870ae1c1ec6bd5e3849d790223766baf35c57

Hostnames 10.96.99.164  
10.96.99.165

Port 5696

**Server certificate** **>**

**Client certificate** **>**

#### Clear KMS Key

**⚠** Do not clear the KMS key if you need to access or preserve any data on this appliance.

If you want to reinstall this appliance node (for example, in another grid), you must clear the KMS key. When the KMS key is cleared, all data on this appliance is deleted.

**Clear KMS Key and Delete Data**

The Node Encryption page includes these three sections:

- Encryption Status shows whether node encryption is enabled or disabled for the appliance.

- Key Management Server Details shows information about the KMS being used to encrypt the appliance. You can expand the server and client certificate sections to view certificate details and status.
  - To address issues with the certificates themselves, such as renewing expired certificates, see the information about KMS in the instructions for administering StorageGRID.
  - If there are unexpected problems connecting to KMS hosts, verify that the domain name system (DNS) servers are correct and that appliance networking is correctly configured.

#### Checking the DNS server configuration

- If you are unable to resolve your certificate issues, contact technical support.
- Clear KMS Key disables node encryption for the appliance, removes the association between the appliance and the key management server that was configured for the StorageGRID site, and deletes all data from the appliance. You must clear the KMS key before you can install the appliance into another StorageGRID system.

#### Clearing the key management server configuration



Clearing the KMS configuration deletes data from the appliance, rendering it permanently inaccessible. This data is not recoverable.

2. When you are done checking node-encryption status, reboot the node. From the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select one of these options:

- Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
- Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



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** tab should display a normal status for the appliance node, indicating that no alerts are active and the node is connected to the grid.

## Related information

[Administer StorageGRID](#)

### Clearing the key management server configuration

Clearing the key management server (KMS) configuration disables node encryption on your appliance. After clearing the KMS configuration, the data on your appliance is permanently deleted and is no longer accessible. This data is not recoverable.

#### What you'll need

If you need to preserve data on the appliance, you must perform a node decommission procedure before you clear the KMS configuration.



When KMS is cleared, data on the appliance will be permanently deleted and no longer accessible. This data is not recoverable.

Decommission the node to move any data it contains to other nodes in StorageGRID. See the recovery and maintenance instructions for grid node decommissioning.

#### About this task

Clearing the appliance KMS configuration disables node encryption, removing the association between the appliance node and the KMS configuration for the StorageGRID site. Data on the appliance is then deleted and the appliance is left in a pre-install state. This process cannot be reversed.

You must clear the KMS configuration:

- Before you can install the appliance into another StorageGRID system, that does not use a KMS or that uses a different KMS.



Do not clear the KMS configuration if you plan to reinstall an appliance node in a StorageGRID system that uses the same KMS key.

- Before you can recover and reinstall a node where the KMS configuration was lost and the KMS key is not recoverable.
- Before returning any appliance that was previously in use at your site.
- After decommissioning a appliance that had node encryption enabled.



Decommission the appliance before clearing KMS to move its data to other nodes in your StorageGRID system. Clearing KMS before decommissioning the appliance will result in data loss and might render the appliance inoperable.

## Steps

1. Open a browser, and enter one of the IP addresses for the appliance's compute controller.

**[https://Controller\\_IP:8443](https://Controller_IP:8443)**

*Controller\_IP* is the IP address of the compute controller (not the storage controller) on any of the three StorageGRID networks.

The StorageGRID Appliance Installer Home page appears.

2. Select **Configure Hardware > Node Encryption**.

### Node Encryption

Node encryption allows you to use an external key management server (KMS) to encrypt all StorageGRID data on this appliance. If node encryption is enabled for the appliance and a KMS is configured for the site, you cannot access any data on the appliance unless the appliance can communicate with the KMS.

#### Encryption Status

**⚠** You can only enable node encryption for an appliance during installation. You cannot enable or disable the node encryption setting after the appliance is installed.

Enable node encryption

**Save**

#### Key Management Server Details

View the status and configuration details for the KMS that manages the encryption key for this appliance. You must use the Grid Manager to make configuration changes.

KMS display name thales

External key UID 41b0306abcce451facfce01b1b4870ae1c1ec6bd5e3849d790223766baf35c57

Hostnames 10.96.99.164  
10.96.99.165

Port 5696

**Server certificate**

**Client certificate**

#### Clear KMS Key

**⚠** Do not clear the KMS key if you need to access or preserve any data on this appliance.

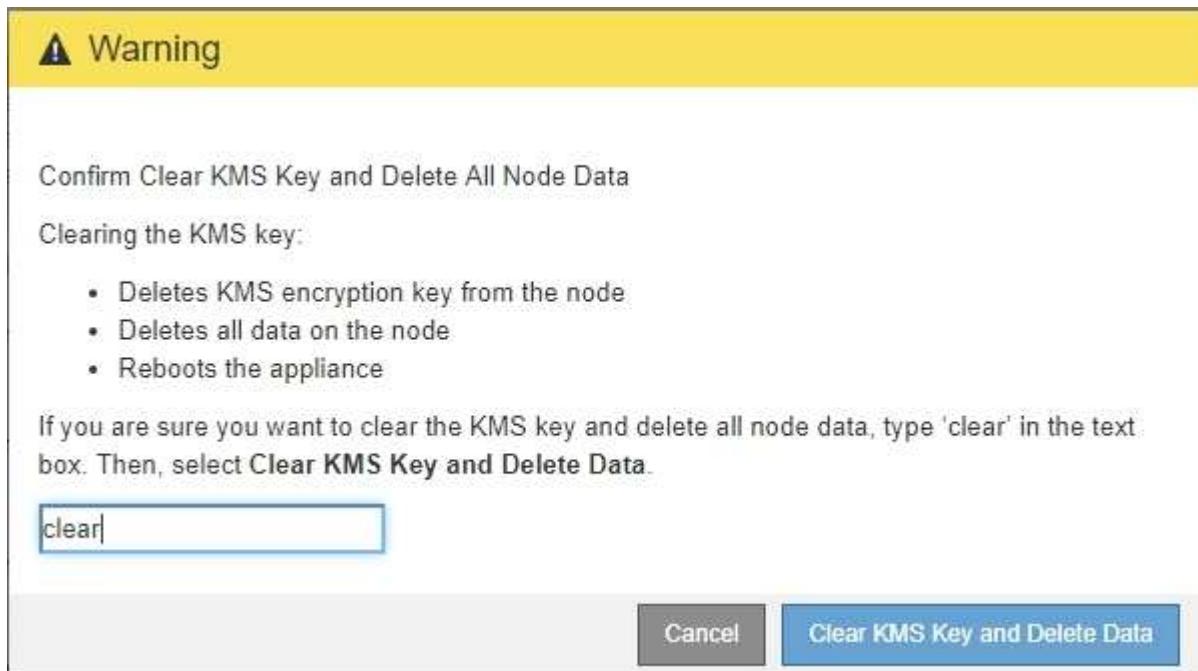
If you want to reinstall this appliance node (for example, in another grid), you must clear the KMS key. When the KMS key is cleared, all data on this appliance is deleted.

**Clear KMS Key and Delete Data**



If the KMS configuration is cleared, data on the appliance will be permanently deleted. This data is not recoverable.

3. At the bottom of the window, select **Clear KMS Key and Delete Data**.
4. If you are sure that you want to clear the KMS configuration, type **clear** and select **Clear KMS Key and Delete Data**.



The KMS encryption key and all data are deleted from the node, and the appliance reboots. This can take up to 20 minutes.

5. Open a browser, and enter one of the IP addresses for the appliance's compute controller.

**[https://Controller\\_IP:8443](https://Controller_IP:8443)**

*Controller\_IP* is the IP address of the compute controller (not the storage controller) on any of the three StorageGRID networks.

The StorageGRID Appliance Installer Home page appears.

6. Select **Configure Hardware > Node Encryption**.
7. Verify that node encryption is disabled and that the key and certificate information in **Key Management Server Details** and the **Clear KMS Key and Delete Data** control are removed from the window.

Node encryption cannot be reenabled on the appliance until it is reinstalled in a grid.

## After you finish

After the appliance reboots and you have verified that KMS has been cleared and that the appliance is in a pre-install state, you can physically remove the appliance from your StorageGRID system. See the recovery and maintenance instructions for information about preparing an appliance for reinstallation.

## Related information

[Administer StorageGRID](#)



## Copyright information

Copyright © 2025 NetApp, Inc. All Rights Reserved. Printed in the U.S. No part of this document covered by copyright may be reproduced in any form or by any means—graphic, electronic, or mechanical, including photocopying, recording, taping, or storage in an electronic retrieval system—without prior written permission of the copyright owner.

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

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

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

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

**LIMITED RIGHTS LEGEND:** Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (b)(3) of the Rights in Technical Data -Noncommercial Items at DFARS 252.227-7013 (FEB 2014) and FAR 52.227-19 (DEC 2007).

Data contained herein pertains to a commercial product and/or commercial service (as defined in FAR 2.101) and is proprietary to NetApp, Inc. All NetApp technical data and computer software provided under this Agreement is commercial in nature and developed solely at private expense. The U.S. Government has a non-exclusive, non-transferrable, nonsublicensable, worldwide, limited irrevocable license to use the Data only in connection with and in support of the U.S. Government contract under which the Data was delivered. Except as provided herein, the Data may not be used, disclosed, reproduced, modified, performed, or displayed without the prior written approval of NetApp, Inc. United States Government license rights for the Department of Defense are limited to those rights identified in DFARS clause 252.227-7015(b) (FEB 2014).

## Trademark information

NETAPP, the NETAPP logo, and the marks listed at <http://www.netapp.com/TM> are trademarks of NetApp, Inc. Other company and product names may be trademarks of their respective owners.