Install appliance

StorageGRID appliances

NetApp
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Install StorageGRID appliance hardware

Quick start for appliance installation

Follow these high-level steps to install and set up a StorageGRID appliance and deploy it as a node in your StorageGRID system.

1 Prepare for installation

1. Work with your NetApp Professional Services consultant to automate installation and configuration. See Automate appliance installation and configuration.

   This step is optional. However, streamlining and automating configuration steps can save time and provide consistency in the configuration of multiple appliances.

2. Prepare site
3. Unpack boxes
4. Obtain additional equipment and tools
5. Review web browser requirements
6. Gather network information

2 Install hardware

1. Register hardware
2. Install into cabinet or rack
   - SG100 and SG1000
   - SG110 and SG1100
   - SG5700
   - SG5800
   - SG6000
   - SG6100
3. Cable appliance
4. Connect power cords and apply power
5. View status indicators and codes

3 Set up hardware

If you are configuring and deploying more than one appliance, use the NetApp ConfigBuilder tool to automate the following configuration and deployment steps. For guidance, contact your NetApp Professional Services consultant. See Automate appliance installation and configuration.

1. Configure StorageGRID connections
   - Access StorageGRID Appliance Installer and verify you are running most recent version

    - Configure network links
    - Configure StorageGRID IP addresses
    - Verify network connections
    - Verify port-level network connections
2. Access and configure SANtricity System Manager (SG6160, SG5700, SG5800, and SG6000)
3. Configure the BMC interface (SG6100, SG6000, and services appliances)
4. Perform optional setup steps
    - Enable node or drive encryption
    - Change RAID mode (SG6160, SG6000, SG5860, and SG5760)
    - Remap network ports

Deploy appliance node

Deploy the appliance as a new node in your StorageGRID system.

- Deploy appliance Storage Node
- Deploy services appliance node

Prepare for StorageGRID installation

Prepare site

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:

Model	Requirement
SG100 and SG1000	120 to 240-volts AC
SG110 and SG1100	100 to 240 volts AC
SG5712	120 to 240 volts AC
SG5760	240-volts AC
SG5812	120 to 240-volts AC
SG5860	240-volts AC

Model	Requirement
SGF6024	120-volts AC
SG6060	240-volts AC
SGF6112	240-volts AC
SG6160	240-volts AC

3. Confirm that your location meets the power requirements for your appliance:

> The power supplies in StorageGRID appliances are rated for significantly higher wattages than the StorageGRID appliance hardware uses, even during periods of maximum power consumption. NetApp recommends using the numbers in the following table to determine whether a proposed rack layout that includes StorageGRID appliances is compatible with your rack power budget.

Model	Average power required (W)	Maximum power required (W)
SG100	273	400
SG1000	337	600
SG110	352	500
SG1100	422	700
SG5712	578	700
SG5760	1394	1800
SG5812	449	600
SG5860	1048	1300
SGF6024	1027	1900
SG6060	1484	2300
SGF6112	446	700
SG6160	1312	1800

4. Obtain a 19-inch (48.3-cm) cabinet or rack to fit shelves of the following size (without cables).

SG100 and SG1000

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)

SG110 and SG1100

Height	Width	Depth	Maximum weight
1.70 in. (4.31 cm)	18.98 in. (48.2 cm)	33.11 in. (84.1 cm)	43.83 lb. (19.88 kg)

SG5700

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)

SG5800

Appliance model	Height	Width	Depth	Maximum weight
SG5812 (12 drives)	3.4 in. (8.6 cm)	17.6 in. (44.8 cm)	21.1 in. (53.6 cm)	64.92 lb (29.45 kg)
SG5860 (60 drives)	7.0 in. (17.8 cm)	17.6 in. (44.8 cm)	37.8 in. (92.2 cm)	253.0 lb. (114.76 kg)

SG6000

Type of shelf	Height	Width	Depth	Maximum weight
E2860 controller shelf (SG6060)	6.87 in. (17.46 cm)	17.66 in. (44.86 cm)	38.25 in. (97.16 cm)	250 lb. (113 kg)
Expansion shelf (SG6060) - Optional	6.87 in. (17.46 cm)	17.66 in. (44.86 cm)	38.25 in. (97.16 cm)	250 lb. (113 kg)

Type of shelf	Height	Width	Depth	Maximum weight
EF570 controller shelf (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)
SG6000-CN compute controller	1.70 in. (4.32 cm)	17.32 in. (44.0 cm)	32.0 in. (81.3 cm)	39 lb. (17.7 kg)

SG6100

Appliance model/type of shelf	Height	Width	Depth	Maximum weight
SGF6112 appliance	1.70 in. (4.31 cm)	17.32 in. (44.0 cm)	33.11 in. (84.1 cm)	43.83 lb. (19.88 kg)
SG6100-CN compute controller (SG6160)	1.70 in. (4.32 cm)	17.32 in. (44.0 cm)	33.11 in. (84.1 cm)	40.98 lb. (18.59 kg)
E4060 controller shelf (SG6160)	6.87 in. (17.45 cm)	17.64 in. (44.8 cm)	36.3 in. (97.16 cm)	223.58 lb. (101.42 kg)
Expansion shelf (SG6160) - Optional	6.87 in. (17.45 cm)	17.64 in. (44.8 cm)	36.3 in. (97.16 cm)	223.58 lb. (101.42 kg)

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

When installing the E2860 or E4000 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 or SG6100-CN controller above the E2860 or E4000 controller shelf and expansion shelves.

Before committing to the installation, verify that the cables shipped with an SG6000 or SG6100 appliance, or cables that you supply, are long enough for the planned layout.

6. Install any required network switches. See the NetApp Interoperability Matrix Tool for compatibility information.

Unpack boxes

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

SG100 and SG1000

- **Hardware**

  SG100 or SG1000

  Rail kit with instructions

- **Power cords**

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

  Two power cords for your country

SG110 and SG1100

- **Hardware**

  SG110 or SG1100

  Rail kit with instructions

  Front bezel

- **Power cords**

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

Two power cords for your country

SG5700

- **Hardware**

  SG5712 appliance with 12 drives installed

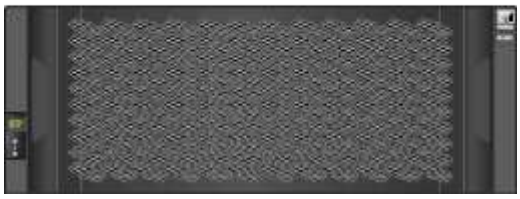
  

  SG5760 appliance with no drives installed

  Front bezel for the appliance

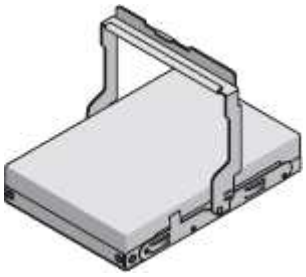
  

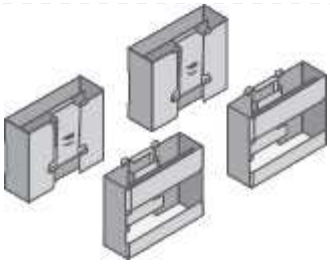
  Rail kit with instructions

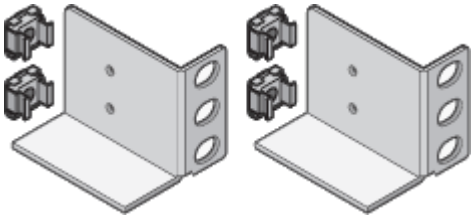
  SG5760: Sixty drives

  SG5760: Handles



SG5760: Back brackets and cage nuts for square-hole rack installation

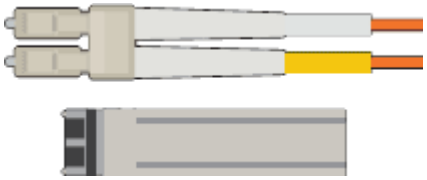


- **Cables and connectors**

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

Two power cords for your country

Optical cables and SFP transceivers



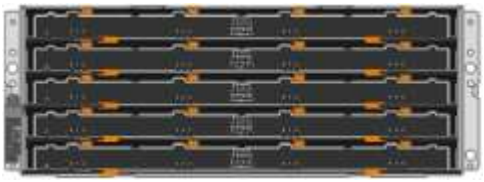
  - Two optical cables for the FC interconnect ports
  - Eight SFP+ transceivers, compatible with both the four 16Gb/s FC interconnect ports and the four 10-GbE network ports

SG5800

- **Hardware**

SG5812 appliance with 12 drives installed

SG5860 appliance with no drives installed

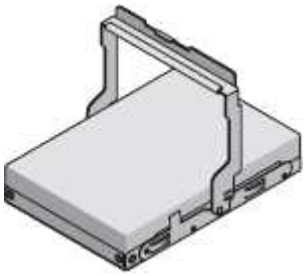


Front bezel for the appliance

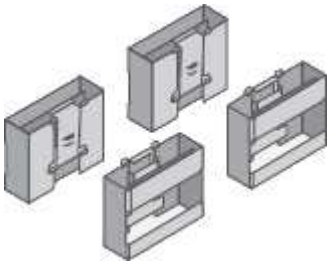
Your bezels might look different.

Rail kit with instructions

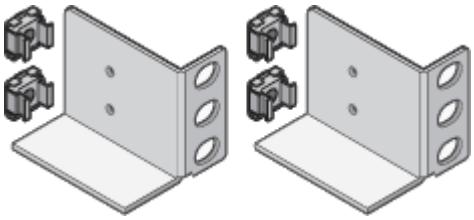
SG5860: Sixty NL-SAS drives



SG5860: Handles



SG5860: Back brackets and cage nuts for square-hole rack installation



- **Cables and connectors**

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

Two power cords for your country

Two 25GbE SFP28 cables for controller interconnect (iSCSI)

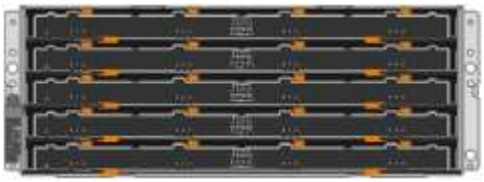
SG6000

- **SG6060 hardware**

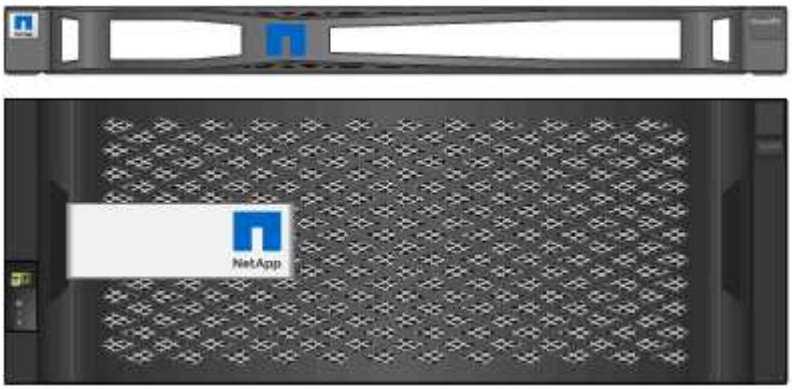
  SG6000-CN controller

  E2860 controller shelf with no drives installed

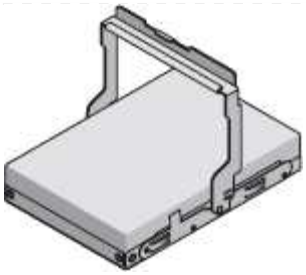
  Two front bezels

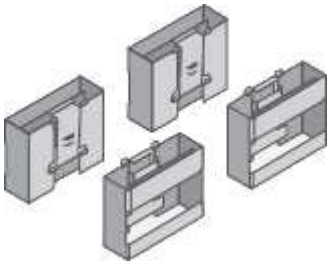
  Two rail kits with instructions

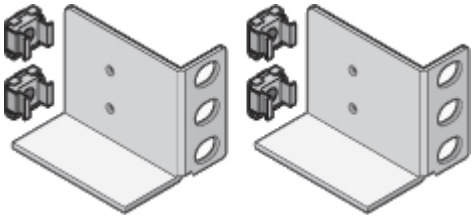
  60 drives (2 SSD and 58 NL-SAS)



Four handles



Back brackets and cage nuts for square-hole rack installation

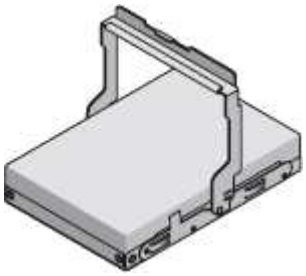


- **SG6060 expansion shelf**

  Expansion shelf with no drives installed

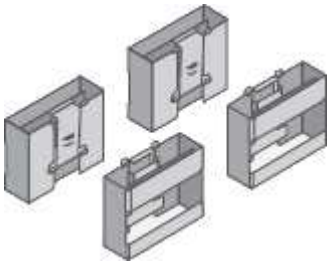
  Front bezel

  60 NL-SAS drives

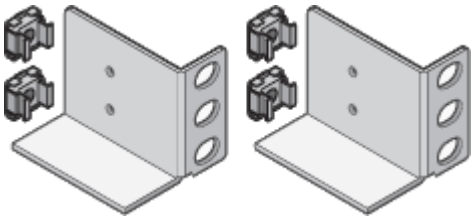


One rail kit with instructions

Four handles



Back brackets and cage nuts for square-hole rack installation



- **SGF6024 hardware**

  SG6000-CN controller

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

  Two front bezels

  Two rail kits with instructions

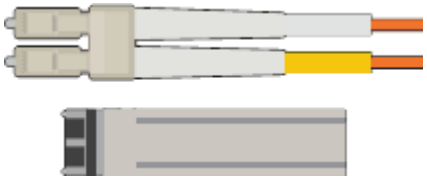
Shelf endcaps

- **Cables and connectors**

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

Four power cords for your country

Optical cables and SFP transceivers



  - Four optical cables for the FC interconnect ports
  - Four SFP+ transceivers, which support 16-Gb/s FC

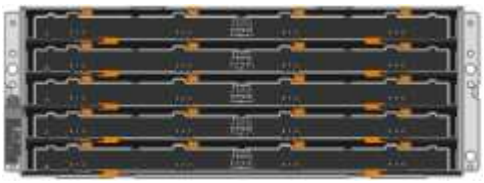
Optional: Two SAS cables for connecting each SG6060 expansion shelf

SG6100

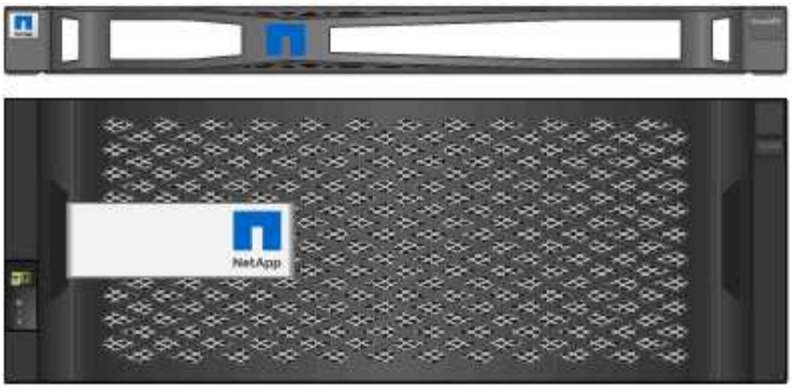
- **SG6160 hardware**

SG6100-CN controller

E4000 controller shelf with no drives installed



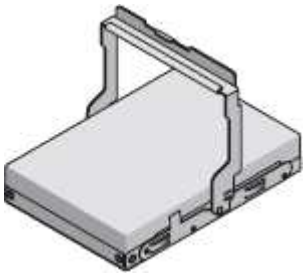
Two front bezels



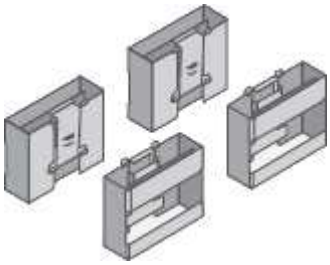
Your bezels might look different.

Two rail kits with instructions

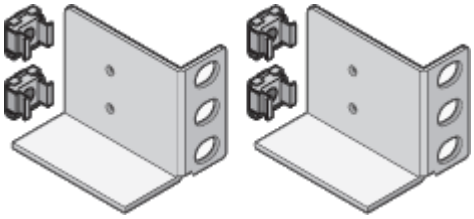
60 NL-SAS drives



Four handles



Back brackets and cage nuts for square-hole rack installation

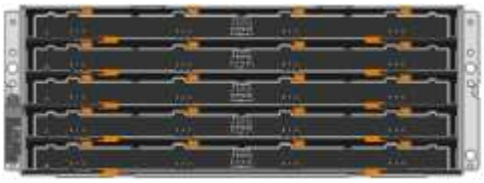


One 100 GbE to 4x25GbE breakout interconnect cable

Four power cords for your country

- **SG6160 expansion shelf**

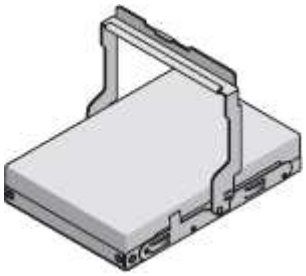
  Expansion shelf with no drives installed

  Front bezel

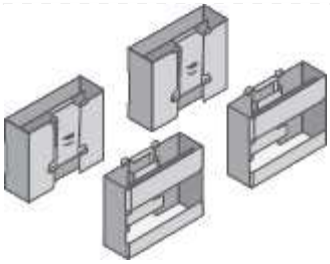
  60 NL-SAS drives

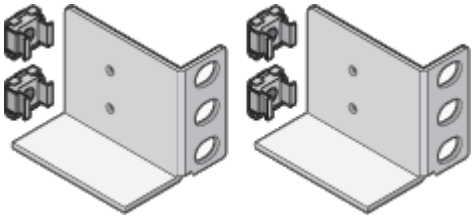
  One rail kit with instructions

  Four handles



Back brackets and cage nuts for square-hole rack installation



- **SGF6112 Hardware**

  SGF6112

  Rail kit with instructions

  Front bezel

- **Power cords**

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

  Two power cords for your country

Obtain additional equipment and tools

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

All appliances

You need the following equipment to install and configure all appliances.

Screwdrivers

- Phillips No. 2 screwdriver
- Medium flat-blade screwdriver

ESD wrist strap

Service laptop

- Supported web browser
- SSH client, such as PuTTY
- 1-GbE (RJ-45) port

> Some ports might not support 10/100 Ethernet speeds.

Optional tools

- Power drill with Phillips head bit
- Flashlight

Appliance-specific equipment and tools

SG100 and SG1000

You need the following additional equipment to install and configure the SG100 and SG1000 hardware.

Optical cables and transceivers

- Cables, 1 to 4 of either:
  - TwinAx/Copper
  - Fibre/Optical
- Transceivers/adapters, 1 to 4 of each, based on link speed (mixed speeds aren’t supported):
  - SG100:
    - 10-GbE SFP+
    - 25-GbE SFP28
  - SG1000:
    - 10-GbE QSFP-to-SFP adapter (QSA) and SFP+
    - 25-GbE QSFP-to-SFP adapter (QSA) and SFP28
    - 40-GbE QSFP+
    - 100-GbE QFSP28

Ethernet cables

RJ-45 (Cat5/Cat5e/Cat6/Cat6a)

SG110 and SG1100

You need the following additional equipment to install and configure the SG110 and SG1100 hardware.

Optical cables and transceivers

- Cables, 1 to 4 of either:
  - TwinAx/Copper
  - Fibre/Optical
- Transceivers/adapters, 1 to 4 of each, based on link speed (mixed speeds aren’t supported):
  - SG110:
    - 10-GbE SFP+
    - 25-GbE SFP28
  - SG1100:
    - 10-GbE QSFP-to-SFP adapter (QSA) and SFP+
    - 25-GbE QSFP-to-SFP adapter (QSA) and SFP28
    - 40-GbE QSFP+
    - 100-GbE QFSP28

Ethernet cables

RJ-45 (Cat5/Cat5e/Cat6/Cat6a)

SG5700

You need the following additional equipment to install and configure the SG5700 hardware.

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

Optional tools

Mechanized lift for SG5760

SG5800

You need the following additional equipment to install and configure the SG5800 hardware.

Cables and SFP transceivers

- Cables for the 10/25-GbE ports you plan to use
- Optional: SFP28 transceivers if you want to use 25-GbE link speed and have optical cables
- Optional: SFP+ transceivers if you want to use 10-GbE link speed and have optical cables

Ethernet cables

Optional tools

Mechanized lift for SG5860

SG6000

You need the following additional equipment to install and configure the SG6000 hardware.

Optical cables and SFP transceivers

- Cables, 1 to 4 of either:
  - TwinAx/Copper
  - Fibre/Optical
- Transceivers/adapters, 1 to 4 of each, based on link speed (mixed speeds aren’t supported):
  - 10-GbE SFP+
  - 25-GbE SFP28

Ethernet cables

RJ-45 (Cat5/Cat5e/Cat6)

Optional tools

Mechanized lift for 60-drive shelves

SG6100

You need the following additional equipment to install and configure the SG6100 hardware.

Cables and transceivers

- Cables, 1 to 4 of either:
  - TwinAx/Copper
  - Fibre/Optical
- Transceivers/adapters, 1 to 8 of each, based on link speed (mixed speeds aren’t supported):
  - 10-GbE SFP+

- 25-GbE SFP28
- 100-GbE QSFP28

Ethernet cables

RJ-45 (Cat5/Cat5e/Cat6/Cat6a)

Optional tools

Mechanized lift for 60-drive shelves

Gather network information

StorageGRID network types

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 network requirements are fully explained in the Networking guidelines.

Refer to the instructions for your appliance to determine what information you need:

- SG100 and SG1000
- SG110 and SG1100
- SG5700
- SG5800
- SG6000
- SG6100

Alternatively, you can work with your NetApp Professional Services consultant to use the NetApp ConfigBuilder tool to streamline and automate the configuration steps. See Automate appliance installation and configuration.

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.
- **Management network for SANtricity** (optional for storage appliances, not needed for the SGF6112): This network provides access to SANtricity System Manager, allowing you to monitor and manage the hardware components in the appliance and 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** (optional for SG100, SG110, SG1000, SG1100, SG6000, and SG6100): This network provides access to the baseboard management controller in the SG100, SG1000, SG6000, and SG6100 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.

If the optional BMC management network is not connected, some support and maintenance procedures will be more difficult to perform. You can leave the BMC management network unconnected except when needed for support purposes.

For detailed information about StorageGRID networks, see the StorageGRID network types.

Gather network information (SG100 and SG1000)

Using the tables, record the required information for each network you connect to the appliance. These values are required to install and configure the hardware.

Instead of using the tables, use the workbook provided with ConfigBuilder. Using the ConfigBuilder workbook allows you to upload your system information and generate a JSON file to automatically complete some configuration steps in the StorageGRID Appliance Installer. See Automate appliance installation and configuration.

Check StorageGRID version

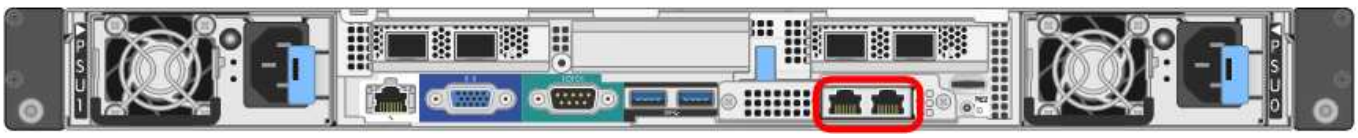
Before installing an SG100 or SG1000 services appliance, confirm your StorageGRID system is using a required version of StorageGRID software.

Appliance	Required StorageGRID version
SG1000	11.3 or later (latest hotfix recommended)
SG100	11.4 or later (latest hotfix recommended)

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:

Information needed	Your value
Admin Network enabled	Choose one: • No • Yes (default)
Network bond mode	Choose one: • Independent (default) • Active-Backup
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)	
MAC address for the Admin Network port **Note:** 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, 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 =**.	
DHCP-assigned IP address for the Admin Network port, if available after power on **Note:** You can determine the DHCP-assigned IP address by using the MAC address to look up the assigned IP.	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the appliance node on the Admin Network **Note:** If your network does not have a gateway, specify the same static IPv4 address for the gateway.	• IPv4 address (CIDR): • Gateway:
Admin Network subnets (CIDR)	

Networking ports

The four networking ports on the appliance connect to the StorageGRID Grid Network and the optional Client Network.

Information needed	Your value
Link speed	For the SG100, choose one of the following: • Auto (default) • 10 GbE • 25 GbE For the SG1000, choose one of the following: • Auto (default) • 10 GbE • 25 GbE • 40 GbE • 100 GbE **Note:** For the SG1000, 10- and 25-GbE speeds require the use of QSA adapters.
Port bond mode	Choose one: • Fixed (default) • Aggregate
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.

Information needed	Your value
Network bond mode	Choose one: • Active-Backup (default) • LACP (802.3ad)

Information needed	Your value
VLAN tagging enabled	Choose one: • No (default) • Yes
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	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the appliance node on the Grid Network **Note:** If your network does not have a gateway, specify the same static IPv4 address for the gateway.	• IPv4 address (CIDR): • Gateway:
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.

Information needed	Your value
Client Network enabled	Choose one: • No (default) • Yes
Network bond mode	Choose one: • Active-Backup (default) • LACP (802.3ad)
VLAN tagging enabled	Choose one: • No (default) • Yes
VLAN tag (If VLAN tagging is enabled)	Enter a value between 0 and 4095:

Information needed	Your value
DHCP-assigned IP address for the Client Network, if available after power on	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the appliance node on the Client Network **Note:** If the Client Network is enabled, the default route on the appliance will use the gateway specified here.	• IPv4 address (CIDR): • Gateway:

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.

> You can enable or disable remote IPMI access for all appliances containing a BMC. The remote IPMI interface allows low-level hardware access to your StorageGRID appliances by anyone with a BMC account and password. If you do not need remote IPMI access to the BMC, disable this option using one of the following methods:
> In Grid Manager, go to **CONFIGURATION** > **Security** > **Security settings** > **Appliances** and clear the **Enable remote IPMI access** checkbox.
> In the Grid management API, use the private endpoint: `PUT /private/bmc`.

SG100 BMC management port:

SG1000 BMC management port:

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	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the BMC management port	• IPv4 address (CIDR): • Gateway:

Port bond modes

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.

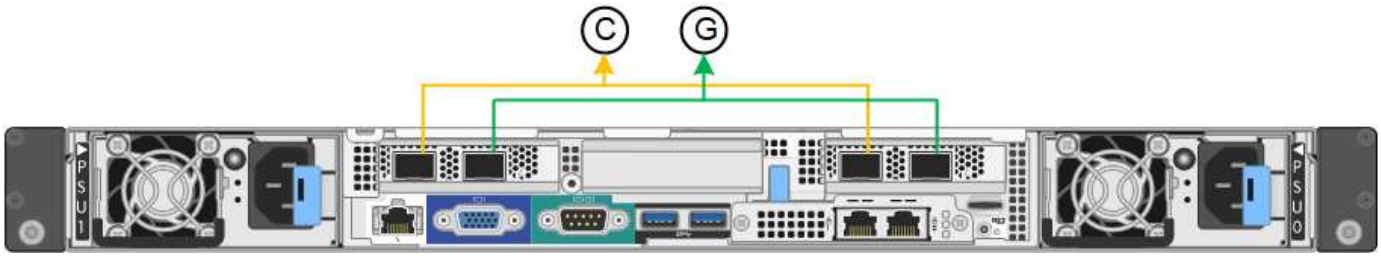
Network bond modes

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.

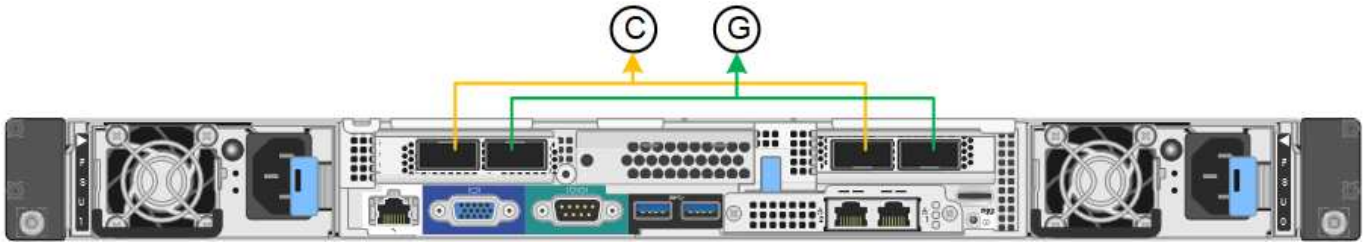
Fixed port bond mode

Fixed port bond mode is the default configuration for the networking ports. The figures show how the network ports on the SG1000 or SG100 are bonded in fixed port bond mode.

SG100:



SG1000:



Callout	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).

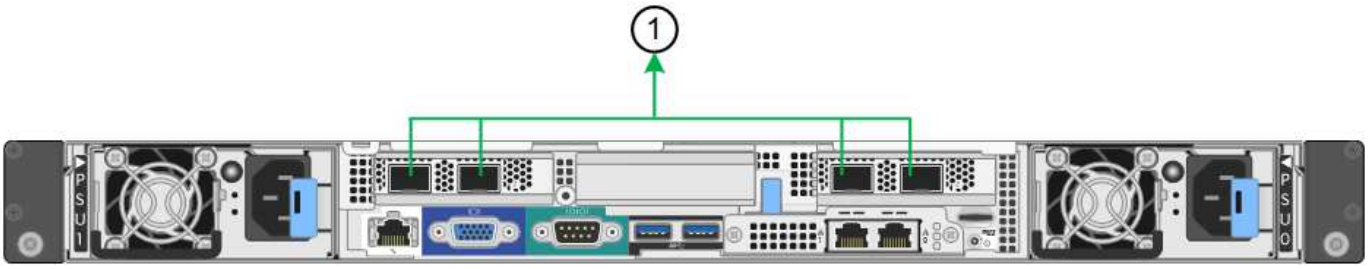
- In active-backup mode (default), only one port is active at a time. If the active port fails, its backup port automatically provides a failover connection. Port 4 provides a backup path for port 2 (Grid Network), and port 3 provides a backup path for port 1 (Client Network).
- In LACP mode, each pair 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 don’t 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.

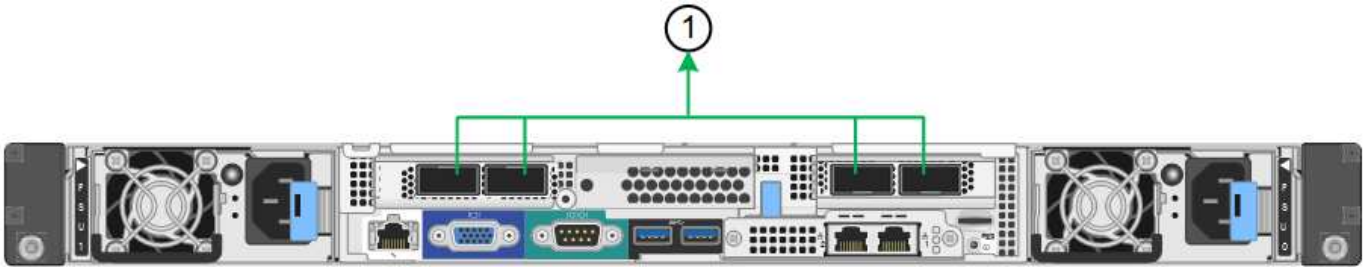
Aggregate port bond mode

Aggregate port bond mode significantly increases the throughput for each StorageGRID network and provides additional failover paths. These figures show how the network ports are bonded in aggregate port bond mode.

SG100:



SG1000:



Callout	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 understand how to configure the switches to use VLAN, LACP, and MLAG, or equivalent.

If you don’t 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.

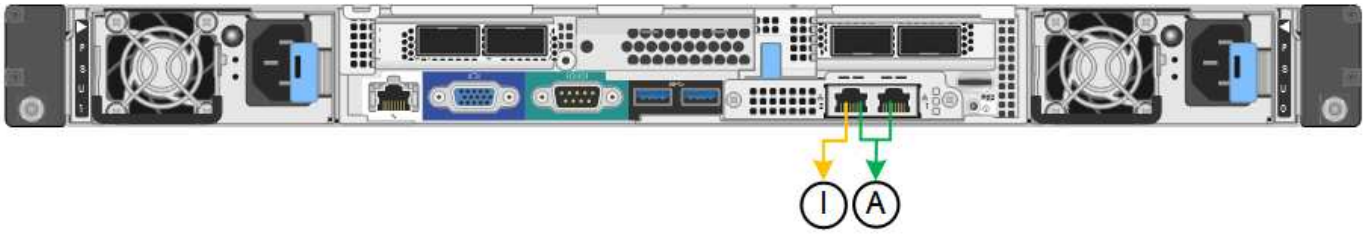
If you choose to use fewer than four network ports, be aware that a **Services appliance link down** alert might be triggered in the Grid Manager after the appliance node is installed, indicating that a cable is unplugged. You can safely disable this alert rule for the triggered alert.

Network bond modes for 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. These figures show how the management ports on the appliances are bonded in network bond mode for the Admin Network.

SG100:

SG1000:



Callout	Network bond mode
A	Active-Backup mode. Both management ports are bonded into one logical management port connected to the Admin Network.
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).

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.

Related information

- Cable appliance
- Configure StorageGRID IP addresses

Gather network information (SG110 and SG1100)

Using the tables, record the required information for each network you connect to the appliance. These values are required to install and configure the hardware.

> Instead of using the tables, use the workbook provided with ConfigBuilder. Using the ConfigBuilder workbook allows you to upload your system information and generate a JSON file to automatically complete some configuration steps in the StorageGRID Appliance Installer. See Automate appliance installation and configuration.

Check StorageGRID version

Before installing an SG110 or SG1100 services appliance, confirm your StorageGRID system is using a required version of StorageGRID software.

Appliance	Required StorageGRID version
SG1100	11.8 or later (latest hotfix recommended)
SG110	11.8 or later (latest hotfix recommended)

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 1/10-GbE management ports on the appliance.

SG110 RJ-45 ports:

SG1100 RJ-45 ports:

Information needed	Your value
Admin Network enabled	Choose one: • No • Yes (default)

Information needed	Your value
Network bond mode	Choose one: • Independent (default) • Active-Backup
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)	
DHCP-assigned IP address for the Admin Network port, if available after power on **Note:** Contact your network administrator for the Admin Network port DHCP-assigned IP address.	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the appliance node on the Admin Network **Note:** If your network does not have a gateway, specify the same static IPv4 address for the gateway.	• IPv4 address (CIDR): • Gateway:
Admin Network subnets (CIDR)	

Networking ports

The four networking ports on the appliance connect to the StorageGRID Grid Network and the optional Client Network.

Information needed	Your value
Link speed	For the SG110, choose one of the following: • Auto (default) • 10 GbE • 25 GbE For the SG1100, choose one of the following: • Auto (default) • 10 GbE • 25 GbE • 40 GbE • 100 GbE **Note:** For the SG1100, 10- and 25-GbE speeds require the use of QSA adapters.
Port bond mode	Choose one: • Fixed (default) • Aggregate
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.

Information needed	Your value
Network bond mode	Choose one: • Active-Backup (default) • LACP (802.3ad)

Information needed	Your value
VLAN tagging enabled	Choose one: • No (default) • Yes
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	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the appliance node on the Grid Network **Note:** If your network does not have a gateway, specify the same static IPv4 address for the gateway.	• IPv4 address (CIDR): • Gateway:
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.

Information needed	Your value
Client Network enabled	Choose one: • No (default) • Yes
Network bond mode	Choose one: • Active-Backup (default) • LACP (802.3ad)
VLAN tagging enabled	Choose one: • No (default) • Yes
VLAN tag (If VLAN tagging is enabled)	Enter a value between 0 and 4095:

Information needed	Your value
DHCP-assigned IP address for the Client Network, if available after power on	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the appliance node on the Client Network **Note:** If the Client Network is enabled, the default route on the appliance will use the gateway specified here.	• IPv4 address (CIDR): • Gateway:

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.

> You can enable or disable remote IPMI access for all appliances containing a BMC. The remote IPMI interface allows low-level hardware access to your StorageGRID appliances by anyone with a BMC account and password. If you do not need remote IPMI access to the BMC, disable this option using one of the following methods:
> In Grid Manager, go to **CONFIGURATION** > **Security** > **Security settings** > **Appliances** and clear the **Enable remote IPMI access** checkbox.
> In the Grid management API, use the private endpoint: `PUT /private/bmc`.

SG110 BMC management port:

SG1100 BMC management port:

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	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the BMC management port	• IPv4 address (CIDR): • Gateway:

Port bond modes

When configuring network links for the SG110 and SG1100 appliances, you can use port bonding for the ports that connect to the Grid Network and optional Client Network, and the 1-GbE1/10-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.

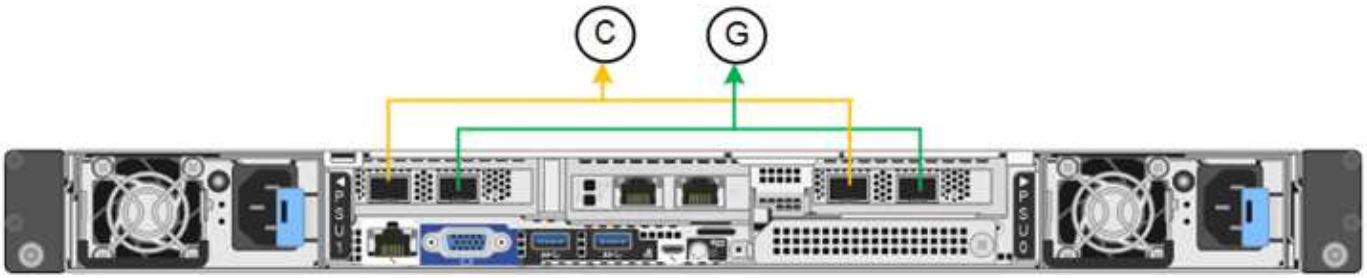
Network bond modes

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.

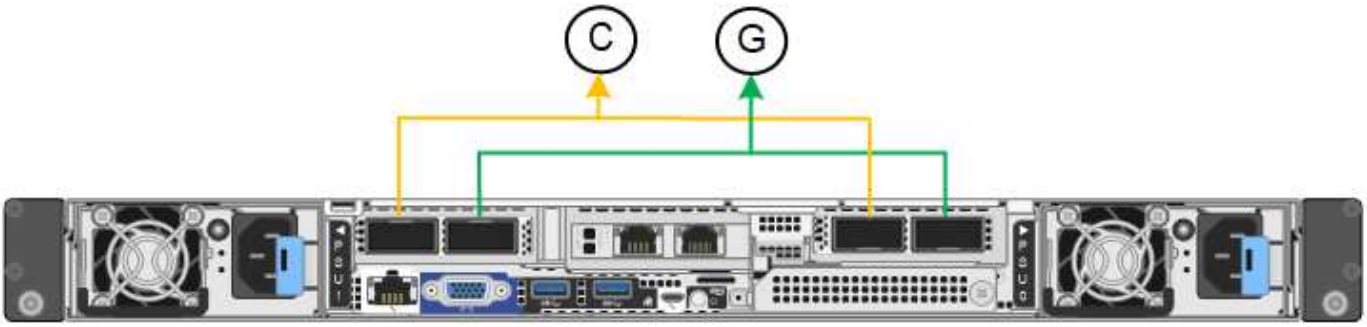
Fixed port bond mode

Fixed port bond mode is the default configuration for the networking ports. The figures show how the network ports on the SG1100 or SG110 are bonded in fixed port bond mode.

SG110:



SG1100:



Callout	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,

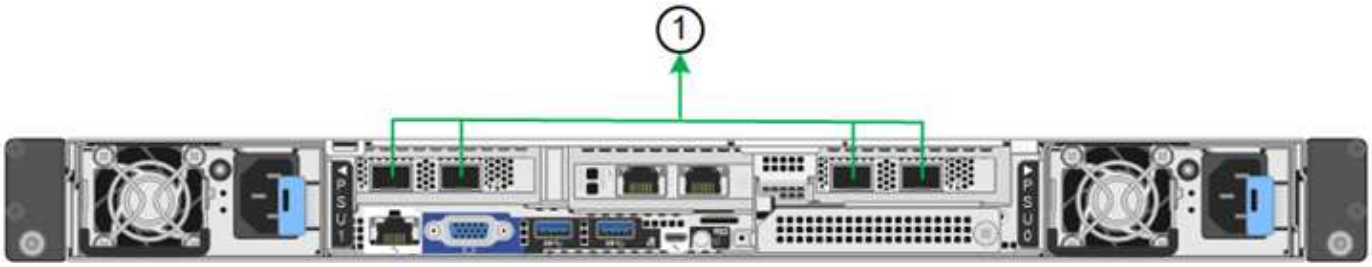
allowing for higher throughput. If one port fails, the other port continues to provide the channel. Throughput is reduced, but connectivity is not impacted.

> If you don't 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.

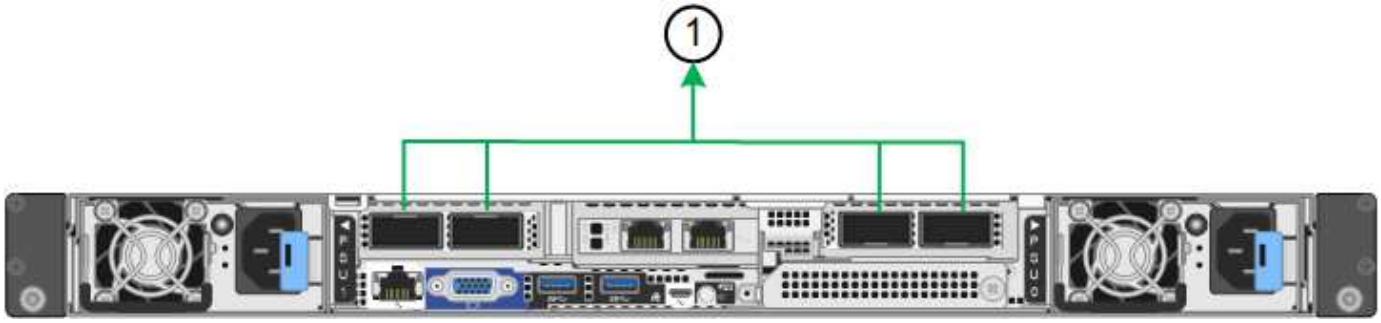
Aggregate port bond mode

Aggregate port bond mode significantly increases the throughput for each StorageGRID network and provides additional failover paths. These figures show how the network ports are bonded in aggregate port bond mode.

SG110:



SG1100:



Callout	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 understand how to configure the switches to use VLAN, LACP, and MLAG, or equivalent.

If you don't want to use all four ports, you can use one, two, or three ports. Using more than one port

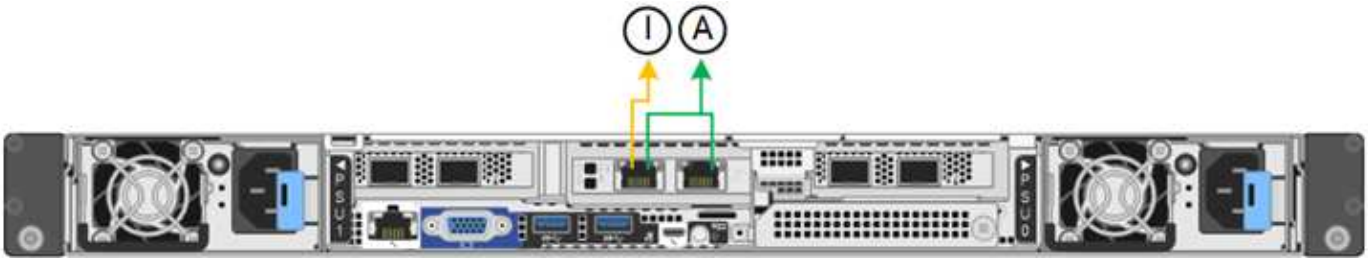
maximizes the chance that some network connectivity will remain available if one of the ports fails.

> 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.

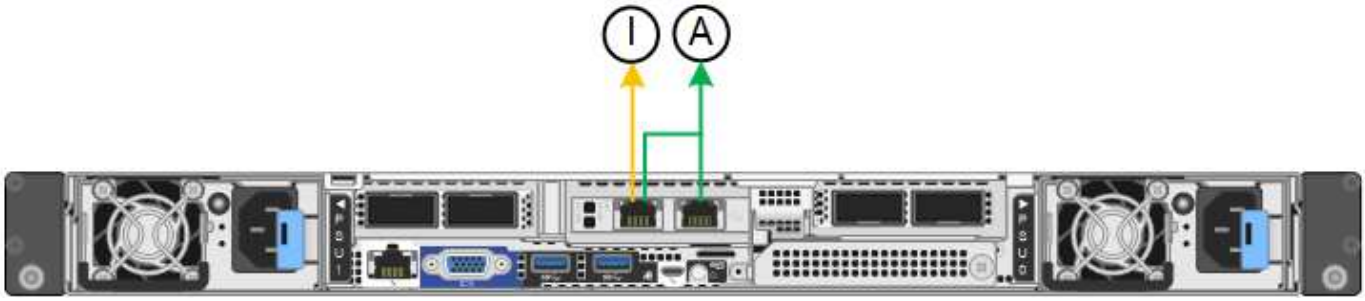
Network bond modes for management ports

For the two 1/10-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. These figures show how the management ports on the appliances are bonded in network bond mode for the Admin Network.

SG110:



SG1100:



Callout	Network bond mode
A	Active-Backup mode. Both management ports are bonded into one logical management port connected to the Admin Network.
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).

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 1/10-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.

Related information

- Cable appliance
- Configure StorageGRID IP addresses

Gather network information (SG5700)

Using the tables, record the required information for each network you connect to the appliance. These values are required to install and configure the hardware.

Instead of using the tables, use the workbook provided with ConfigBuilder. Using the ConfigBuilder workbook allows you to upload your system information and generate a JSON file to automatically complete some configuration steps in the StorageGRID Appliance Installer. See Automate appliance installation and configuration.

Information needed to connect to SANtricity System Manager on E2800 controller

You connect the E2800 series 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 **Note:** 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 **Note:** You must make sure the Ethernet switch for the SANtricity System Manager management network is set to autonegotiate.	Must be: • Autonegotiate (default)
IP address format	Choose one: • IPv4 • IPv6

Information needed	Your value
Static IP address you plan to use for the appliance on the management network	For IPv4: • IPv4 address: • Subnet mask: • Gateway: For IPv6: • IPv6 address: • Routable IP address: • E2800 controller router IP address:

Information needed to connect E5700SG controller to 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: • No • Yes (default)
Network bond mode	Choose one: • Independent • Active-Backup
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 **Note:** 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.	• IPv4 address (CIDR): • Gateway:

Information needed	Your value
Static IP address you plan to use for the appliance Storage Node on the Admin Network **Note:** If your network does not have a gateway, specify the same static IPv4 address for the gateway.	• IPv4 address (CIDR): • Gateway:
Admin Network subnets (CIDR)	

Information needed to connect and configure 10/25-GbE ports on E5700SG controller

The four 10/25-GbE ports on the E5700SG controller connect to the StorageGRID Grid Network and Client Network.

See Port bond modes (E5700SG controller).

Information needed	Your value
Link speed **Note:** If you select 25 GbE, install SPF28 transceivers. Autonegotiation is not supported, so you must also configure the ports and the connected switches for 25GbE.	Choose one: • 10 GbE (default) • 25 GbE
Port bond mode	Choose one: • Fixed (default) • Aggregate
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 E5700SG controller to 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 Port bond modes (E5700SG controller).

Information needed	Your value
Network bond mode	Choose one: • Active-Backup (default) • LACP (802.3ad)
VLAN tagging enabled	Choose one: • No (default) • Yes
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 **Note:** 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.	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the appliance Storage Node on the Grid Network **Note:** If your network does not have a gateway, specify the same static IPv4 address for the gateway.	• IPv4 address (CIDR): • Gateway:
Grid Network subnets (CIDR) **Note:** If the Client Network is not enabled, the default route on the controller will use the gateway specified here.	

Information needed to connect E5700SG controller to 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 Port bond modes (E5700SG controller).

Information needed	Your value
Client Network enabled	Choose one: • No (default) • Yes

Information needed	Your value
Network bond mode	Choose one: • Active-Backup (default) • LACP (802.3ad)
VLAN tagging enabled	Choose one: • No (default) • Yes
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	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the appliance Storage Node on the Client Network **Note:** If the Client Network is enabled, the default route on the controller will use the gateway specified here.	• IPv4 address (CIDR): • Gateway:

Port bond modes

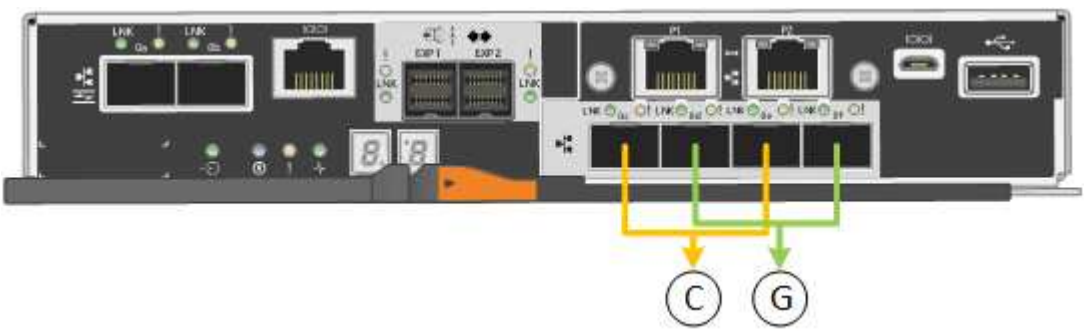
When configuring network links for the E5700SG controller, you can use port bonding for the 10/25-GbE ports that connect to the Grid Network and optional Client Network, and the 1-GbE management ports that connect to the optional Admin Network. Port bonding helps protect your data by providing redundant paths between StorageGRID networks and the appliance.

Network bond modes for 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.



Callout	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.

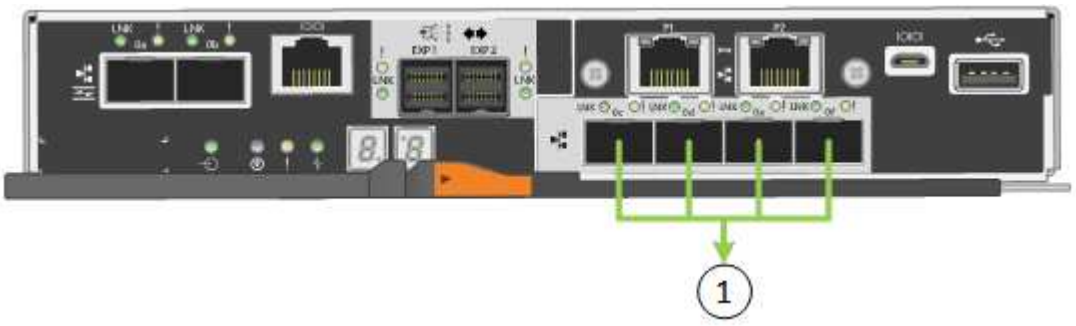
When using Fixed port bond mode, you can use one of two network bond modes: Active-Backup or Link Aggregation Control Protocol (LACP).

- 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 don't 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 throughout for each StorageGRID network and provides additional failover paths.



Callout	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 understand how to configure the switches to use VLAN, LACP, and MLAG, or equivalent.

If you don’t 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.

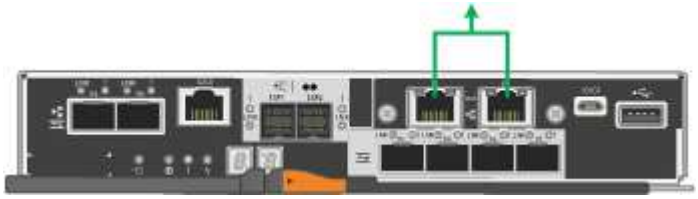
Network bond modes for 1-GbE management ports

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.



Related information

- Cable appliance (SG5700)
- Configure hardware (SG5700)

Gather network information (SG5800)

Using the tables, record the required information for each network you connect to the appliance. These values are required to install and configure the hardware.

> Instead of using the tables, use the workbook provided with ConfigBuilder. Using the ConfigBuilder workbook allows you to upload your system information and generate a JSON file to automatically complete some configuration steps in the StorageGRID Appliance Installer. See Automate appliance installation and configuration.

Information needed to connect to SANtricity System Manager on E4000 controller

You will use the SANtricity System Manager to connect the E4000 series controller to the management network.

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 **Note:** If the network you will connect to the E4000 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 **Note:** You must make sure the Ethernet switch for the SANtricity System Manager management network is set to autonegotiate.	Must be: • Autonegotiate (default)
IP address format	Choose one: • IPv4 • IPv6
Static IP address you plan to use for the appliance on the management network	For IPv4: • IPv4 address: • Subnet mask: • Gateway: For IPv6: • IPv6 address: • Routable IP address: • E4000 controller router IP address:

Information needed to connect SG5800 controller to 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 port on the SG5800 controller.

Information needed	Your value
Admin Network enabled	Choose one: • No • Yes (default)

Information needed	Your value
Switch port for port 1	
DHCP-assigned IP address for management port 1, if available after power on **Note:** If the Admin Network includes a DHCP server, you can determine the DHCP-assigned IP address by using the MAC address to look up the assigned IP.	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the appliance Storage Node on the Admin Network **Note:** If your network does not have a gateway, specify the same static IPv4 address for the gateway.	• IPv4 address (CIDR): • Gateway:
Admin Network subnets (CIDR)	

Information needed to connect and configure 10/25-GbE ports on SG5800 controller

The four 10/25-GbE ports on the SG5800 controller connect to the StorageGRID Grid Network and Client Network.

See Port bond modes (SG5800 controller).

Information needed	Your value
Link speed	Choose one: • Auto (default) • 10 GbE • 25 GbE
Port bond mode	Choose one: • Fixed (default) • Aggregate
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 SG5800 controller to 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 SG5800 controller.

See Port bond modes (SG5800 controller).

Information needed	Your value
Network bond mode	Choose one: • Active-Backup (default) • LACP (802.3ad)
VLAN tagging enabled	Choose one: • No (default) • Yes
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	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the appliance Storage Node on the Grid Network **Note:** If your network does not have a gateway, specify the same static IPv4 address for the gateway.	• IPv4 address (CIDR): • Gateway:
Grid Network subnets (CIDR) **Note:** If the Client Network is not enabled, the default route on the controller will use the gateway specified here.	

Information needed to connect SG5800 controller to 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 SG5800 controller.

See Port bond modes (SG5800 controller).

Information needed	Your value
Client Network enabled	Choose one: • No (default) • Yes

Information needed	Your value
Network bond mode	Choose one: • Active-Backup (default) • LACP (802.3ad)
VLAN tagging enabled	Choose one: • No (default) • Yes
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	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the appliance Storage Node on the Client Network **Note:** If the Client Network is enabled, the default route on the controller will use the gateway specified here.	• IPv4 address (CIDR): • Gateway:

Port bond modes

When configuring network links for the SG5800 controller, you can use port bonding for the 10/25-GbE ports that connect to the Grid Network and optional Client Network. Port bonding helps protect your data by providing redundant paths between StorageGRID networks and the appliance. The 10/25-GbE networking ports on the SG5800 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.

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

Callout	Which ports are bonded
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 don’t 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 throughout for each StorageGRID network and provides additional failover paths.

Callout	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 understand how to configure the switches to use VLAN, LACP, and MLAG, or equivalent.

If you don’t 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.

Related information

- Cable appliance (SG5800)
- Configure hardware (SG5800)

Gather network information (SG6000)

Using the tables, record the required information for each network you connect to the appliance. These values are required to install and configure the hardware.

Instead of using the tables, use the workbook provided with ConfigBuilder. Using the ConfigBuilder workbook allows you to upload your system information and generate a JSON file to automatically complete some configuration steps in the StorageGRID Appliance Installer. See Automate appliance installation and configuration.

Information needed to connect to SANtricity System Manager on storage controllers

You connect both of the storage controllers in the appliance (either the E2800 series 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 and SG6060X: 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 **Note:** 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.		

Information needed	Your value for controller A	Your value for controller B
Static IP address you plan to use for the appliance on the management network	For IPv4: • IPv4 address: • Subnet mask: • Gateway: For IPv6: • IPv6 address: • Routable IP address: • storage controller router IP address:	For IPv4: • IPv4 address: • Subnet mask: • Gateway: For IPv6: • IPv6 address: • Routable IP address: • storage controller router IP address:
IP address format	Choose one: • IPv4 • IPv6	Choose one: • IPv4 • IPv6
Speed and duplex mode **Note:** You must make sure the Ethernet switch for the SANtricity System Manager management network is set to autonegotiate.	Must be: • Autonegotiate (default)	Must be: • Autonegotiate (default)

Information needed to connect SG6000-CN controller to 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: • No • Yes (default)
Network bond mode	Choose one: • Independent (default) • Active-Backup

Information needed	Your value
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)	
MAC address for the Admin Network port **Note:** 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 **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 =**.	
DHCP-assigned IP address for the Admin Network port, if available after power on **Note:** You can determine the DHCP-assigned IP address by using the MAC address to look up the assigned IP.	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the appliance Storage Node on the Admin Network **Note:** If your network does not have a gateway, specify the same static IPv4 address for the gateway.	• IPv4 address (CIDR): • Gateway:
Admin Network subnets (CIDR)	

Information needed to connect and configure 10/25-GbE ports on 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	Choose one: • Auto (default) • 10 GbE • 25 GbE

Information needed	Your value
Port bond mode	Choose one: • Fixed (default) • Aggregate
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 SG6000-CN controller to 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	Choose one: • Active-Backup (default) • LACP (802.3ad)
VLAN tagging enabled	Choose one: • No (default) • Yes
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	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the appliance Storage Node on the Grid Network **Note:** If your network does not have a gateway, specify the same static IPv4 address for the gateway.	• IPv4 address (CIDR): • Gateway:
Grid Network subnets (CIDRs)	

Information needed to connect SG6000-CN controller to 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: • No (default) • Yes
Network bond mode	Choose one: • Active-Backup (default) • LACP (802.3ad)
VLAN tagging enabled	Choose one: • No (default) • Yes
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	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the appliance Storage Node on the Client Network **Note:** If the Client Network is enabled, the default route on the controller will use the gateway specified here.	• IPv4 address (CIDR): • Gateway:

Information needed to connect SG6000-CN controller to 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.

You can enable or disable remote IPMI access for all appliances containing a BMC. The remote IPMI interface allows low-level hardware access to your StorageGRID appliances by anyone with a BMC account and password. If you do not need remote IPMI access to the BMC, disable this option using one of the following methods:
In Grid Manager, go to **CONFIGURATION** > **Security** > **Security settings** > **Appliances** and clear the **Enable remote IPMI access** checkbox.
In the Grid management API, use the private endpoint: `PUT /private/bmc`.

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	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the BMC management port	• IPv4 address (CIDR): • Gateway:

Port bond modes

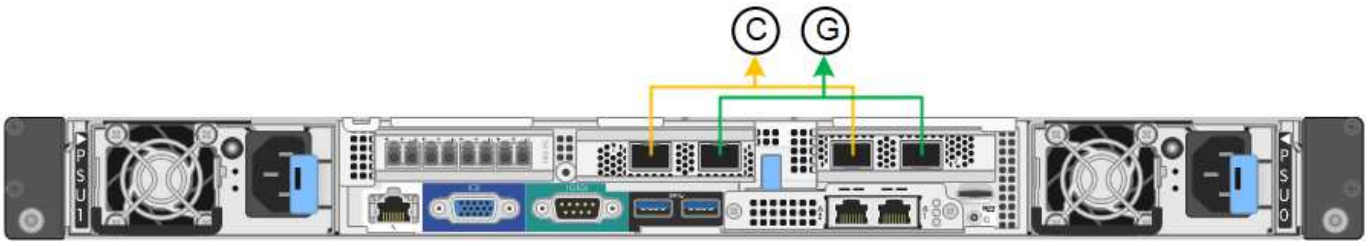
When configuring network links for the SG6000-CN controller, you can use port bonding for the 10/25-GbE ports that connect to the Grid Network and optional Client Network, and the 1-GbE management ports that connect to the optional Admin Network. Port bonding helps protect your data by providing redundant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

Network bond modes for 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.



Callout	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).

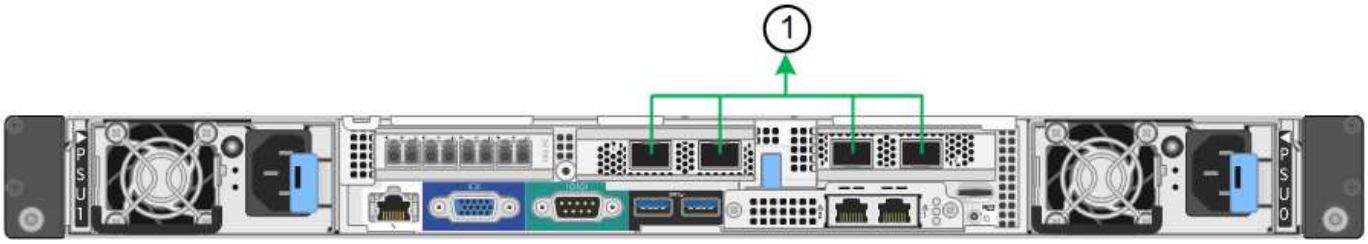
- In active-backup mode (default), only one port is active at a time. If the active port fails, its backup port automatically provides a failover connection. Port 4 provides a backup path for port 2 (Grid Network), and port 3 provides a backup path for port 1 (Client Network).
- In LACP mode, each pair 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 don't 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** checkbox.

Aggregate port bond mode

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



Callout	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 understand how to configure the switches to use VLAN, LACP, and MLAG, or equivalent.

If you don't 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 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.

Callout	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).

Related information

- SG6000 controllers
- Determine appliance network connections
- Cable appliance
- Configure StorageGRID IP addresses

Gather network information (SG6100)

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

Instead of using the tables, use the workbook provided with ConfigBuilder. Using the ConfigBuilder workbook allows you to upload your system information and generate a JSON file to automatically complete some configuration steps in the StorageGRID Appliance Installer. See Automate appliance installation and configuration.

Check StorageGRID version

Before installing an SGF6112 or SG6160 appliance, confirm your StorageGRID system is using a required version of StorageGRID software.

Appliance	Required StorageGRID version
SGF6112	11.7 or later (latest hotfix recommended)
SG6160	11.8 or later (latest hotfix recommended)

Connect to SANtricity System Manager

You connect both of the storage controllers in the SG6160 appliance to the management network you will use for SANtricity System Manager. Controller A is on the top and controller B is on the bottom.

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 **Note:** 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.		

Information needed	Your value for controller A	Your value for controller B
Static IP address you plan to use for the appliance on the management network	For IPv4: • IPv4 address: • Subnet mask: • Gateway: For IPv6: • IPv6 address: • Routable IP address: • storage controller router IP address:	For IPv4: • IPv4 address: • Subnet mask: • Gateway: For IPv6: • IPv6 address: • Routable IP address: • storage controller router IP address:
IP address format	Choose one: • IPv4 • IPv6	Choose one: • IPv4 • IPv6
Speed and duplex mode **Note:** You must make sure the Ethernet switch for the SANtricity System Manager management network is set to autonegotiate.	Must be: • Autonegotiate (default)	Must be: • Autonegotiate (default)

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 1/10-GbE ports on the appliance.

RJ-45 ports on the SGF6112 appliance:

RJ-45 ports on the SG6100-CN controller:

Information needed	Your value
Admin Network enabled	Choose one: • No • Yes (default)
Network bond mode	Choose one: • Independent (default) • Active-Backup
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)	
DHCP-assigned IP address for the Admin Network port, if available after power on **Note:** Contact your network administrator for the Admin Network port DHCP-assigned IP address.	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the appliance node on the Admin Network **Note:** If your network does not have a gateway, specify the same static IPv4 address for the gateway.	• IPv4 address (CIDR): • Gateway:
Admin Network subnets (CIDR)	

Networking ports

The four networking ports on the appliance connect to the StorageGRID Grid Network and the optional Client Network.

Information needed	Your value
Link speed	Choose one: • Auto (default) • 10 GbE • 25 GbE • 40GbE with the optional 100G NIC SKU (SG6160 only) • 100 GbE (SG6160 only)

Information needed	Your value
Port bond mode	Choose one: • Fixed (default) • Aggregate
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.

Information needed	Your value
Network bond mode	Choose one: • Active-Backup (default) • LACP (802.3ad)
VLAN tagging enabled	Choose one: • No (default) • Yes
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	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the appliance node on the Grid Network **Note:** If your network does not have a gateway, specify the same static IPv4 address for the gateway.	• IPv4 address (CIDR): • Gateway:
Grid Network subnets (CIDRs)	

Information needed	Your value
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.

Information needed	Your value
Client Network enabled	Choose one: • No (default) • Yes
Network bond mode	Choose one: • Active-Backup (default) • LACP (802.3ad)
VLAN tagging enabled	Choose one: • No (default) • Yes
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	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the appliance node on the Client Network **Note:** If the Client Network is enabled, the default route on the appliance will use the gateway specified here.	• IPv4 address (CIDR): • Gateway:

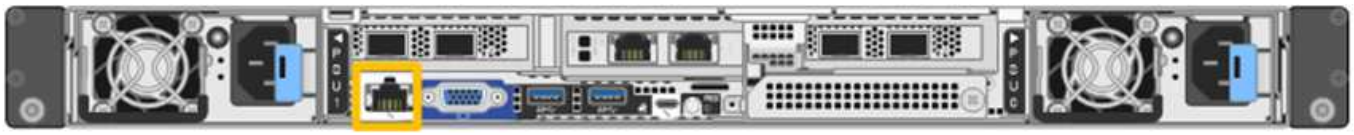
BMC management network ports

You can access the BMC interface on the 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.

You can enable or disable remote IPMI access for all appliances containing a BMC. The remote IPMI interface allows low-level hardware access to your StorageGRID appliances by anyone with a BMC account and password. If you do not need remote IPMI access to the BMC, disable this option using one of the following methods:
In Grid Manager, go to **CONFIGURATION** > **Security** > **Security settings** > **Appliances** and clear the **Enable remote IPMI access** checkbox.
In the Grid management API, use the private endpoint: `PUT /private/bmc`.

The following figures show the BMC management port on the SGF6112 and SG6100-CN.

SGF6112



SG6100-CN

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	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the BMC management port	• IPv4 address (CIDR): • Gateway:

Port bond modes

When configuring network links for the SGF6112 appliance, you can use port bonding for the ports that connect to the Grid Network and optional Client Network, and the 1/10-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.

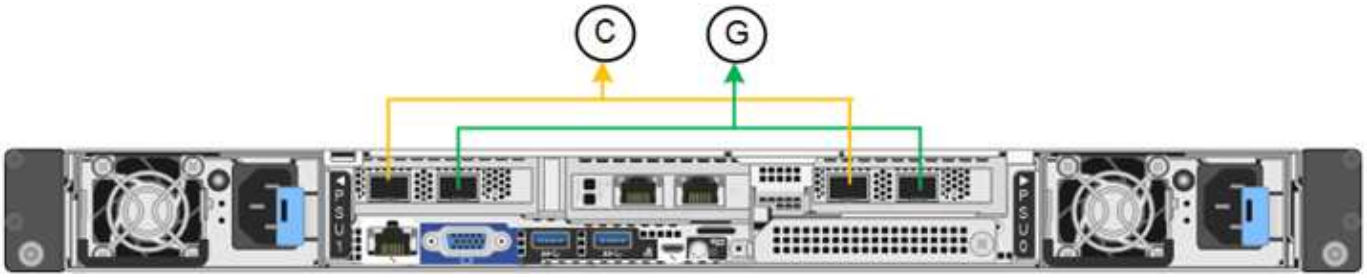
Network bond modes

The networking ports on the appliance support Fixed port bond mode or Aggregate port bond mode for the Grid Network and Client Network connections.

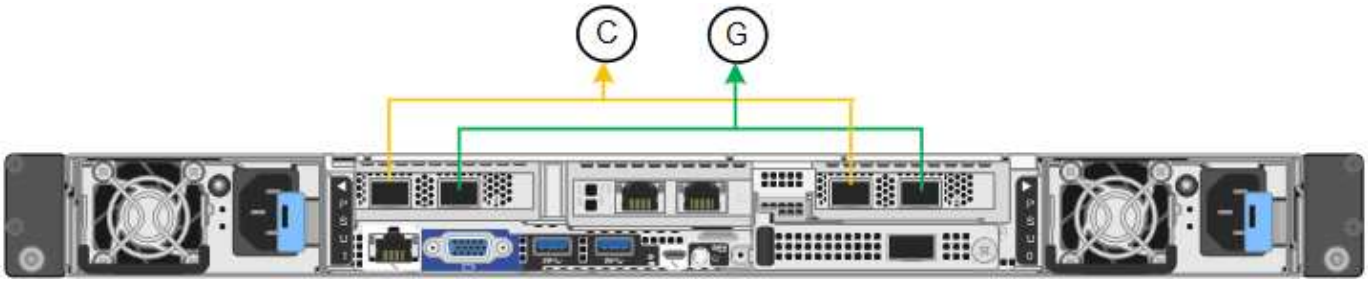
Fixed port bond mode

Fixed port bond mode is the default configuration for the networking ports.

SGF6112:



SG6100-CN:



Callout	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).

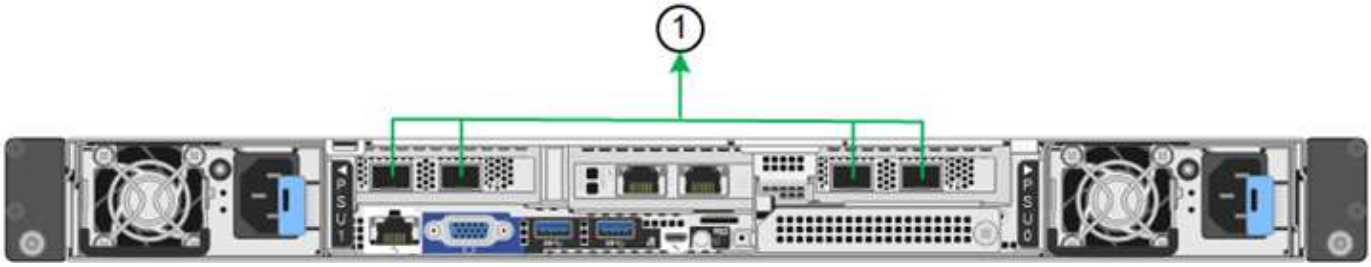
- In active-backup mode (default), only one port is active at a time. If the active port fails, its backup port automatically provides a failover connection. Port 4 provides a backup path for port 2 (Grid Network), and port 3 provides a backup path for port 1 (Client Network).
- In LACP mode, each pair of ports forms a logical channel between the 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 don't need redundant connections, you can use only one port for each network. However, be aware that the **Storage 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.

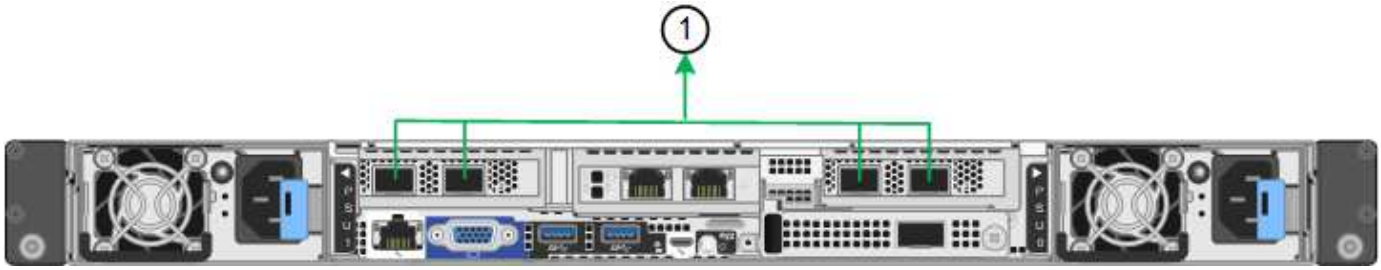
Aggregate port bond mode

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

SGF6112:



SG6100-CN:



Callout	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 understand how to configure the switches to use VLAN, LACP, and MLAG, or equivalent.

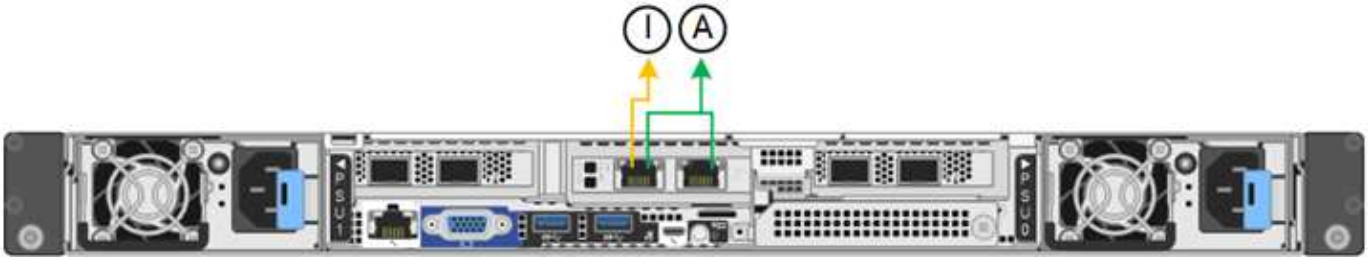
If you don't want to use all four ports, you can use one, two, or three ports. Using more than one port maximizes the chance that some network connectivity will remain available if one of the ports fails.

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.

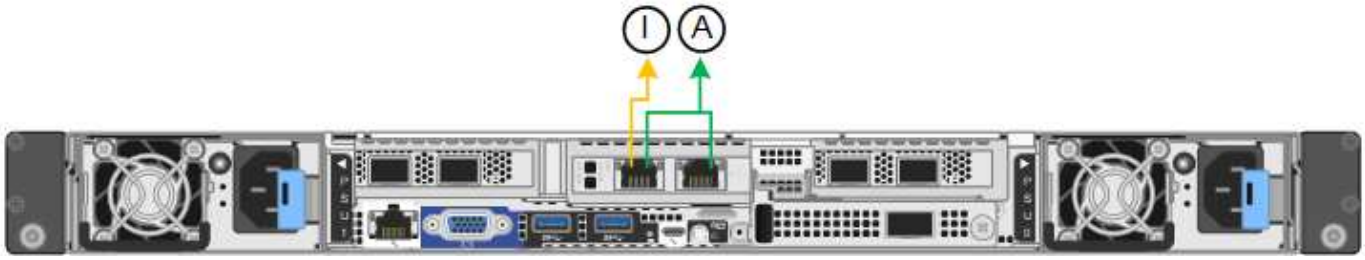
Network bond modes for management ports

For the two 1/10-GbE management ports, you can choose Independent network bond mode or Active-Backup network bond mode to connect to the optional Admin Network.

SGF6112:



SG6100-CN:



Callout	Network bond mode
A	Active-Backup mode. Both management ports are bonded into one logical management port connected to the Admin Network.
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).

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 appliance when the 1/10-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.

Related information

- Cable appliance
- Configure StorageGRID IP addresses

Automate appliance installation and configuration

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

Using NetApp StorageGRID tools, you can automate the installation and configuration of your StorageGRID

appliances. After you install and configure the appliances, you can automate the configuration of the entire StorageGRID system.

You can automate the configuration of the following:

- Grid Network, Admin Network, and Client Network IP addresses
- BMC interface
- Network links
  - Port bond mode
  - Network bond mode
  - Link speed
  - LACP transmit hash policy and PDU rate

Automation options

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

- Generate a JSON file that contains configuration details. Work with your NetApp Professional Services consultant to use the NetApp ConfigBuilder tool to complete these steps:

  1. Consult with NetApp Professional Services to get a sales order number.
  2. Get the workbook from ConfigBuilder.
  3. Consult with Professional Services to complete the workbook.
  4. Use ConfigBuilder to upload the workbook.
  5. Use ConfigBuilder to generate a JSON file.
  6. Consult with Professional Services to upload the JSON file to the appliance.

     See Automate using Appliance Installer.

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

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

- If you are an advanced user, you can use the following StorageGRID Python scripts to install and configure your system:

  - `configure-sga.py`: Automate the installation and configuration of your appliances. See Automate appliance installation and configuration using configure-sga.py script.
  - `configure-storagegrid.py`: Configure other components of the entire StorageGRID system (the "grid"). See Automate StorageGRID configuration.

  > ⓘ 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 instructions for downloading and extracting the StorageGRID installation files.

Automate appliance configuration using StorageGRID Appliance Installer

After you have generated a JSON file, you can automate the configuration of one or more appliances by using the StorageGRID Appliance Installer to upload the JSON file.

Before you begin

- The appliance has been installed in a rack, connected to your networks, and powered on.
- You have generated the JSON file with the guidance of your NetApp Professional Services consultant.
- Your appliance contains the latest firmware compatible with StorageGRID 11.5 or higher.
- You are connected to the StorageGRID Appliance Installer on the appliance you are configuring using a supported web browser.

Steps

1. In the StorageGRID Appliance Installer, select **Advanced** > **Update Appliance Configuration**. The Update Appliance Configuration page appears.
2. In the Upload JSON section, browse for and select the JSON configuration file you want to upload.

   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 aren't reconnected within 1 minute, re-enter the appliance URL using one of the other IP addresses assigned to the appliance.

   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. ConfigBuilder verifies that you have a valid JSON file.

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

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

4. Select **Apply JSON configuration**.

   The configuration is applied to the selected node.

Automate appliance installation and configuration using configure-sga.py script

If you are an advanced user, 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. You can upload the JSON file to the StorageGRID Appliance Installer to configure all appliance nodes at the same time. You can also edit the JSON file, then upload it to apply a new configuration to one or more appliances.

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

Before you begin

- The appliance has been installed in a rack, connected to your networks, and powered on.
- You have generated the JSON file with the guidance of your NetApp Professional Services consultant.
- Your appliance contains the latest firmware compatible with StorageGRID 11.5 or higher.
- You have configured the IP address of the Admin Network for the appliance.
- 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.

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`

     If you will back up the appliance configuration to a JSON file, ensure the node names follow these requirements:

     - Each node name is unique if you want to automatically configure all appliance nodes using a JSON file.
     - Must be a valid hostname containing at least 1 and no more than 32 characters.
     - Can use letters, numbers, and hyphens.
     - Can’t start or end with a hyphen.
     - Can’t contain only numbers.
3. To apply the configuration from the JSON file to the appliance, enter the following, where *`SGA-INSTALL-IP`* is the Admin Network IP address for the appliance, *`json-file-name`* is the name of the JSON file, and *`node-name-inside-json-file`* is the name of the node with the configuration being applied:
   `./configure-sga.py advanced --restore-file` *`json-file-name`* `--restore-node` *`node-name-inside-json-file SGA-INSTALL-IP`*
4. To confirm the current configuration of the appliance node, enter the following where *`SGA-INSTALL-IP`* is the Admin Network IP address for the appliance:

`./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. #####
#################################################################
```

5. 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
   ```

Do not use subnets that contain the following IPv4 addresses for the Grid Network, Admin Network, or Client Network of any node:

- 192.168.130.101
- 192.168.131.101
- 192.168.130.102
- 192.168.131.102
- 198.51.100.2
- 198.51.100.4

For example, do not use the following subnet ranges for the Grid Network, Admin Network, or Client Network of any node:

- 192.168.130.0/24 because this subnet range contains the IP addresses 192.168.130.101 and 192.168.130.102
- 192.168.131.0/24 because this subnet range contains the IP addresses 192.168.131.101 and 192.168.131.102
- 198.51.100.0/24 because this subnet range contains the IP addresses 198.51.100.2 and 198.51.100.4

6. 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 path of the output file specified, in this case the relative path for the file `appliance-SG1000.json`.

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

7. 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`
   `./configure-sga.py monitor --monitor-storagegrid-install SGA-INSTALL-IP`

8. If you want to reboot the appliance, enter the following:
   `./configure-sga.py reboot SGA-INSTALL-IP`

Automate StorageGRID configuration

After you have installed and configured the grid nodes, you can automate the configuration of the StorageGRID system.

Before you begin

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

Filename	Description
`configure-storagegrid.py`	Python script used to automate the configuration
`configure-storagegrid.sample.json`	Example configuration file for use with the script
`configure-storagegrid.blank.json`	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 example configuration file (`configure-storagegrid.sample.json`) or the blank configuration file (`configure-storagegrid.blank.json`).

> Store the management password and provisioning passphrase from the passwords section of the modified `configure-storagegrid.json` configuration file in a secure location. These passwords are required for installation, expansion, and maintenance procedures. You should also back up the modified `configure-storagegrid.json` configuration file and store it in a secure location.

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 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 if 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.
- **drive-encryption** (StorageGRID 11.8 and later): Operations to manage drive encryption and view drive encryption status.
- **encryption**: Operations to manage node encryption and view node encryption status.
- **hardware config**: 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.
- **update-config**: Operations to update StorageGRID appliance configuration.
- **upgrade**: Operations related to upgrading appliance firmware.
- **uploadsg**: Operations for uploading StorageGRID installation files.

Install appliance hardware

Register hardware

Registering the appliance hardware provides support benefits.

Steps

1. Locate the chassis serial number for the appliance. For SG6000 appliances the chassis serial number is on 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 SG6000 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 SG6000 appliance.

2. Go to the NetApp Support Site.
3. Determine whether you need to register the hardware:

If you are a…	Follow these steps…
Existing NetApp customer	a. Sign in with your username and password. b. Select **Products** > **My Products**. c. Confirm that the new serial number is listed. d. If it is not, follow the instructions for new NetApp customers.
New NetApp customer	a. Click **Register Now**, and create an account. b. Select **Products** > **Register Products**. c. Enter the product serial number and requested details. After your registration is approved, you can download any required software. The approval process might take up to 24 hours.

Install into cabinet or rack

Install into cabinet or rack (SG100 and SG1000)

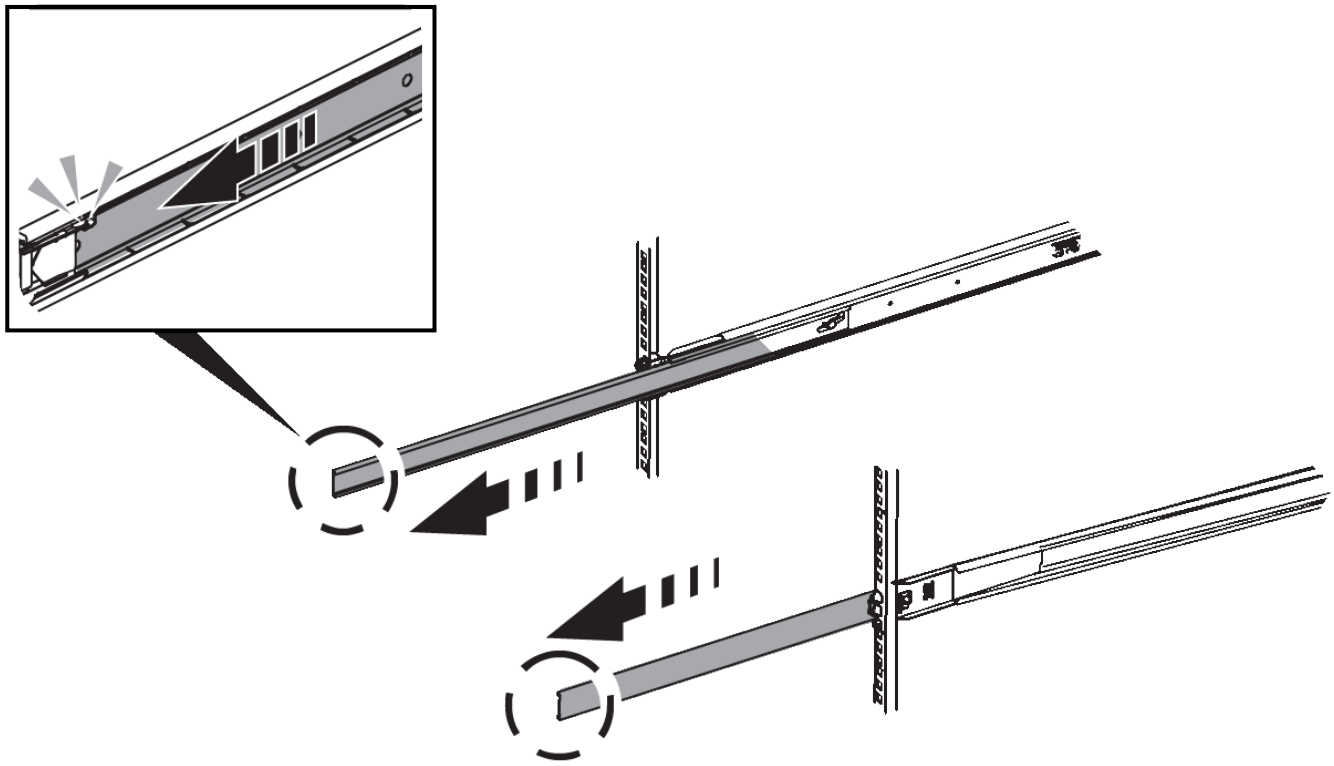
You install a set of rails for the appliance in your cabinet or rack, and then slide the appliance onto the rails.

Before you begin

- 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.

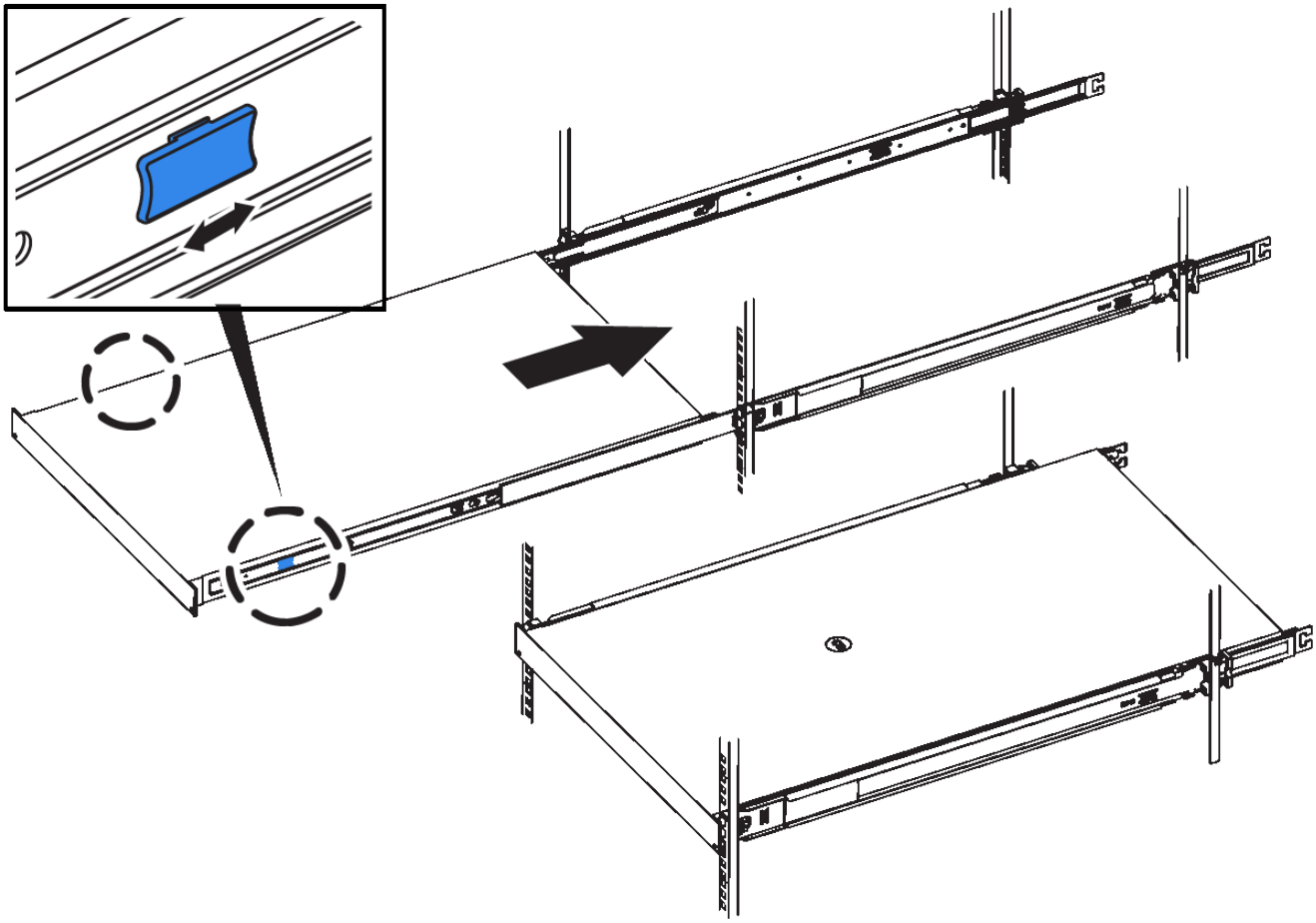
Steps

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 can’t move the appliance any further, pull the blue latches on both sides of the chassis to slide the appliance all the way in.



Don’t attach the front bezel until after you power on the appliance.

Install into cabinet or rack (SG110 or SG1100)

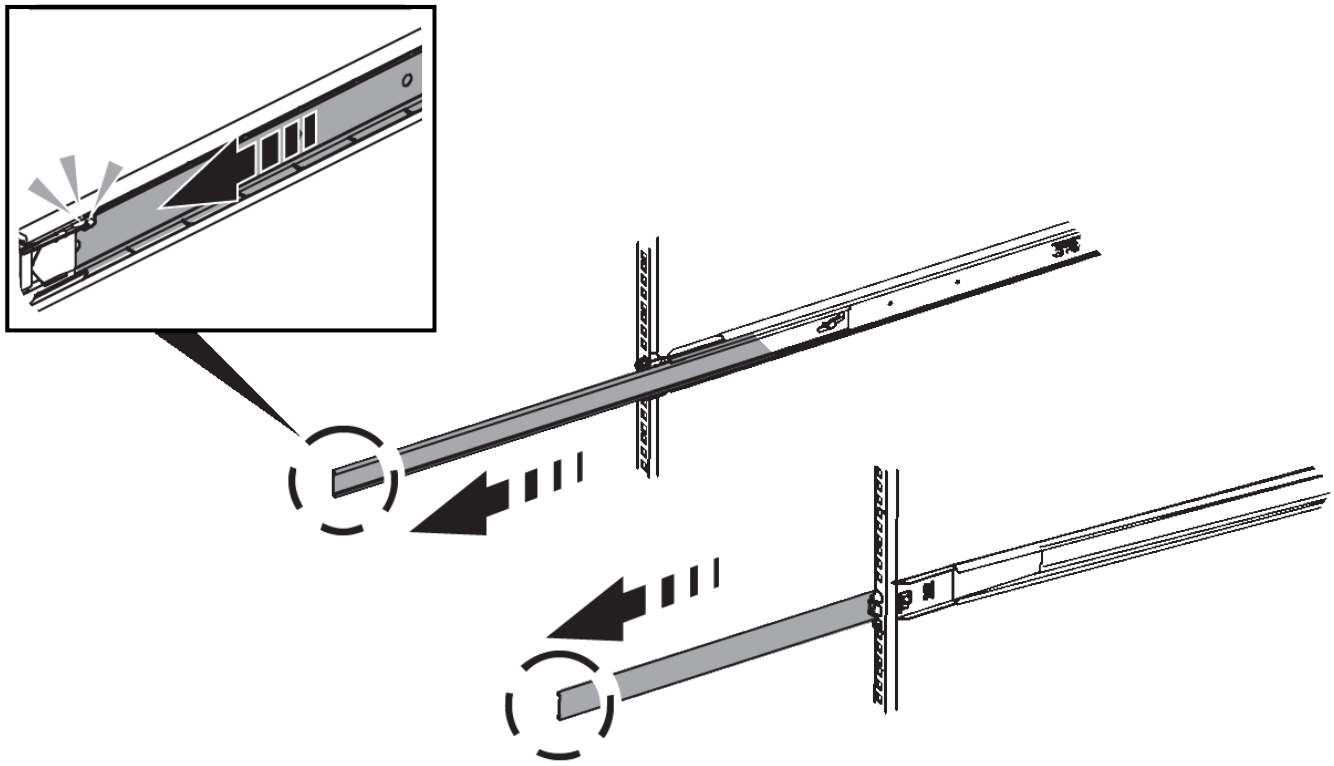
You install a set of rails for the appliance in your cabinet or rack, and then slide the appliance onto the rails.

Before you begin

- 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.

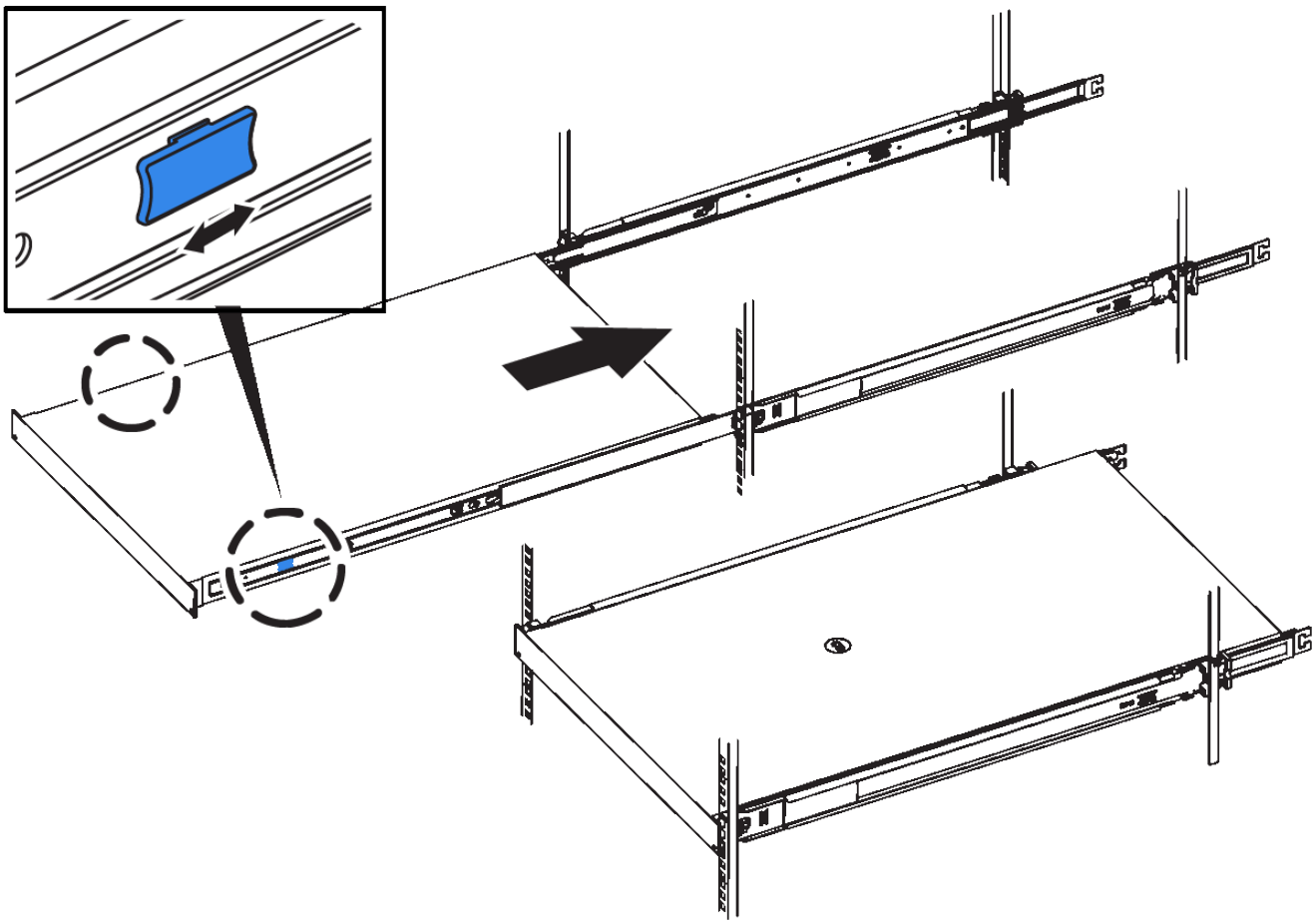
Steps

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 can’t move the appliance any further, pull the blue latches on both sides of the chassis to slide the appliance all the way in.



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

Don’t attach the front bezel until after you power on the appliance.

Install into cabinet or rack (SG5700)

You install a set of rails in your cabinet or rack and then slide the appliance onto the rails. If you have an SG5760, install the drives after installing the appliance.

Before you begin

- 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.

Install SG5712

Follow these steps to install an SG5712 appliance into a rack or cabinet.

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.

Install hardware from the bottom of the rack or cabinet or rack up to prevent the equipment from tipping over.

Steps

1. Follow the instructions for the rail kit to install the rails.
2. Place the back of the appliance (the end with the connectors) on the rails.
3. Carefully slide the appliance all the way back into the cabinet or rack.
4. Secure the appliance to the cabinet or rack as directed in the rail kit instructions.
5. Attach the bezel to the front.

Install SG5760

Follow these steps to install an SG5760 appliance and any expansion shelves into a rack or cabinet.

Install hardware from the bottom of the rack or cabinet or rack up to prevent the equipment from tipping over.

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. Follow the instructions for the rail kit to install the rails in your cabinet or rack.
2. Prepare to move the appliance:
   a. Remove the outer packing box.
   b. Fold down the flaps on the inner box.
   c. 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. If your cabinet has square hole, install the cage nuts so that you can secure the front and rear of the shelf with screws.
4. Place the back of the appliance (the end with the connectors) on the rails.
5. Supporting the appliance from the bottom, slide it into the rack or cabinet.

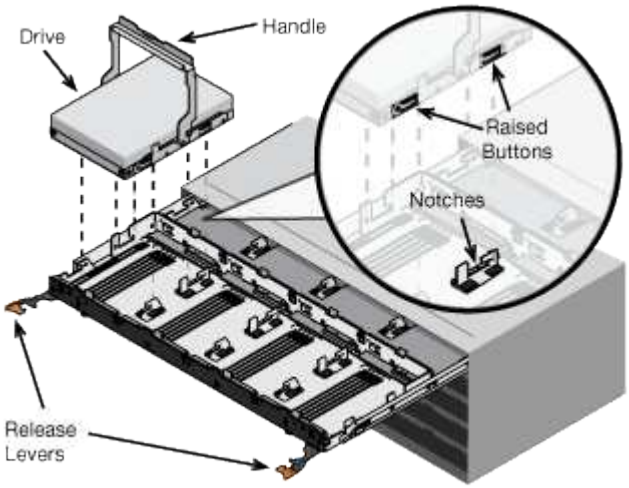
   Use the thumb latches to detach the handles as you slide the appliance in.
6. Secure the appliance to the front of the rack by inserting two screws in the first and third holes (counting down from the top) on each side.
7. Secure the appliance to the rear of the rack or cabinet with the brackets.
8. Install 12 drives in each of the five 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.

9. Attach the front bezel.

Install into cabinet or rack (SG5800)

You install a set of rails in your cabinet or rack and then slide the appliance onto the rails. If you have an SG5860, install the drives after installing the appliance.

Before you begin

- 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.

Install SG5812

Follow these steps to install an SG5812 appliance into a rack or cabinet.

Two people or a mechanized lift are required to safely move the SG5812.

Install hardware from the bottom of the rack or cabinet or rack up to prevent the equipment from tipping over.

Steps

1. Follow the instructions for the rail kit to install the rails.
2. Place the back of the appliance (the end with the connectors) on the rails.

3. Carefully slide the appliance all the way back into the cabinet or rack.
4. Secure the appliance to the cabinet or rack as directed in the rail kit instructions.
5. Attach the bezel to the front.

Install SG5860

Follow these steps to install an SG5860 appliance and any expansion shelves into a rack or cabinet.

> Install hardware from the bottom of the rack or cabinet or rack up to prevent the equipment from tipping over.

> Four people or a mechanized lift are required to safely move an empty SG5860.

> To avoid damaging the hardware, never move an SG5860 if drives are installed. You must remove all drives before moving the shelf.

Steps

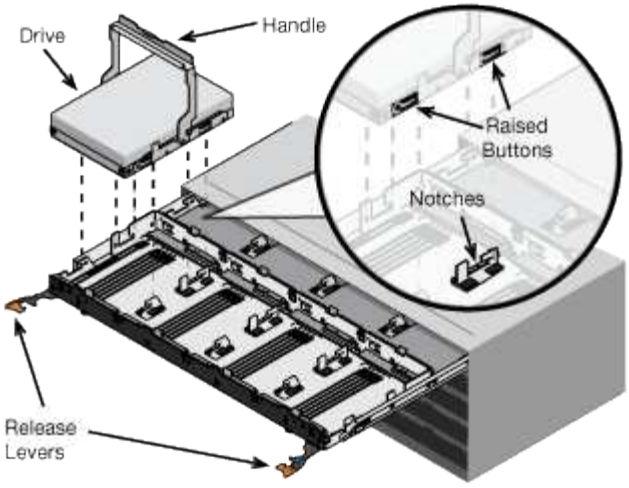
1. Follow the instructions for the rail kit to install the rails in your cabinet or rack.
2. Prepare to move the appliance:
   a. Remove the outer packing box.
   b. Fold down the flaps on the inner box.
   c. If you are lifting the SG5860 by hand, attach the four handles to the sides of the chassis.

      You remove these handles as you slide the appliance onto the rails.
3. If your cabinet has square holes, install the cage nuts so that you can secure the front and rear of the shelf with screws.
4. Place the back of the appliance (the end with the connectors) on the rails.
5. Supporting the appliance from the bottom, slide it into the rack or cabinet.

   Use the thumb latches to detach the handles as you slide the appliance in.
6. Secure the appliance to the front of the rack by inserting two screws in the first and third holes (counting down from the top) on each side.
7. Secure the appliance to the rear of the rack or cabinet with the brackets.
8. Install 12 drives in each of the five 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.

9. Attach the front bezel, if one was provided.

SG6000

Install into cabinet or rack (SG6000)

For the SG6060 and SGF6024, you install rails in your cabinet or rack and slide the controller shelf, any expansion shelves, and the compute controller onto the rails. For the SG6060, don't install the drives in each shelf until the shelves are installed.

Model	Install	For information
SG6060	60-drive controller shelf and any 60-drive expansion shelves	Install 60-drive shelves
SG6060	60 drives into each shelf	Install drives
SGF6024	24-drive controller shelf	Install 24-drive shelves
SG6060 and SGF6024	SG6000-CN compute controller	Install SG6000-CN controller

Install 60-drive shelves (SG6060)

You 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.

Before you begin

- 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.

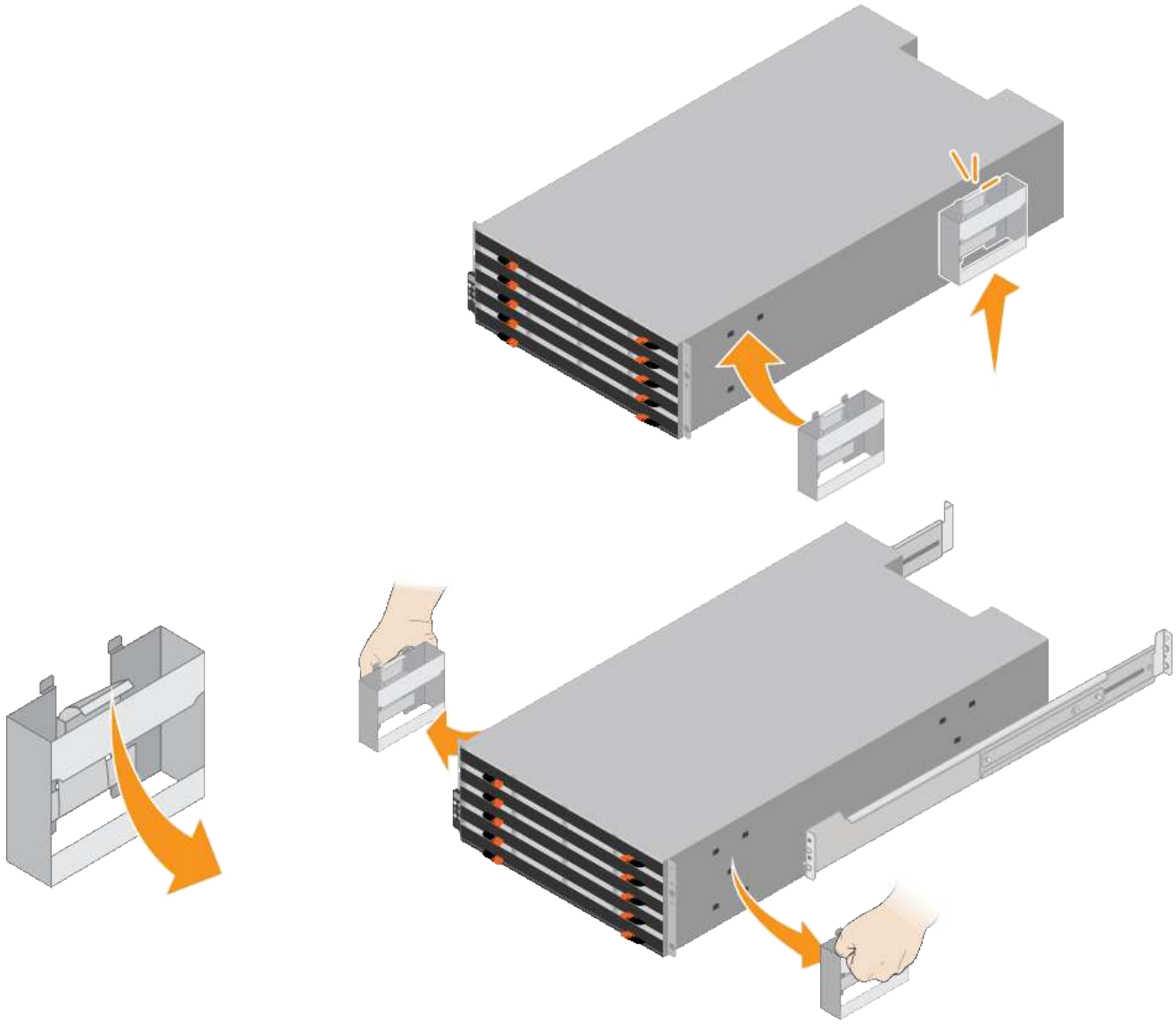
Steps

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

   For square hole cabinets, 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.

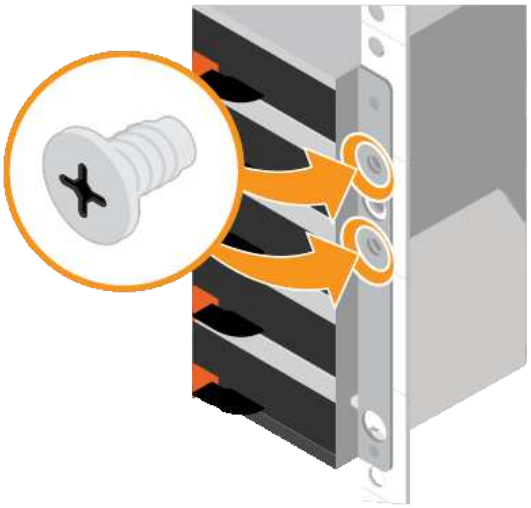
   To remove the handles, pull back on the release latch, push down, then pull away from the shelf.

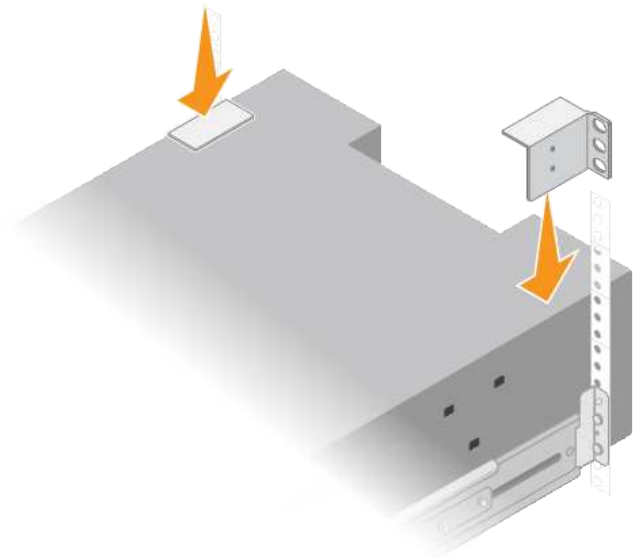
6. Secure the shelf to the front of the cabinet.

   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.

Install drives (SG6060)

After installing the 60-drive shelf into a cabinet or rack, 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.

Before you begin

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

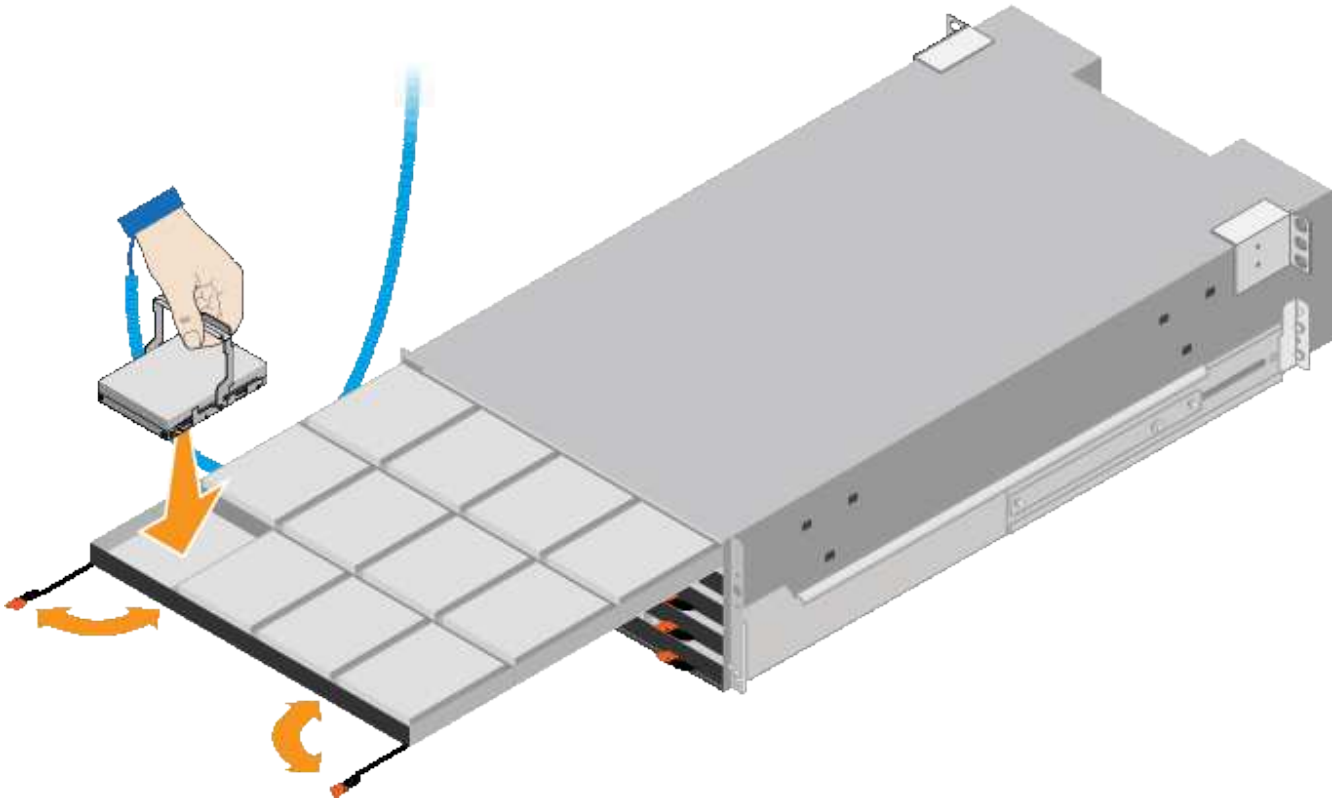
> To avoid damaging the hardware, never move the shelf if drives are installed. You must remove all drives before moving the shelf.

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 don’t 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.

Install 24-drive shelves (SGF6024)

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

Before you begin

- 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, 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 people are required to safely move the enclosure.

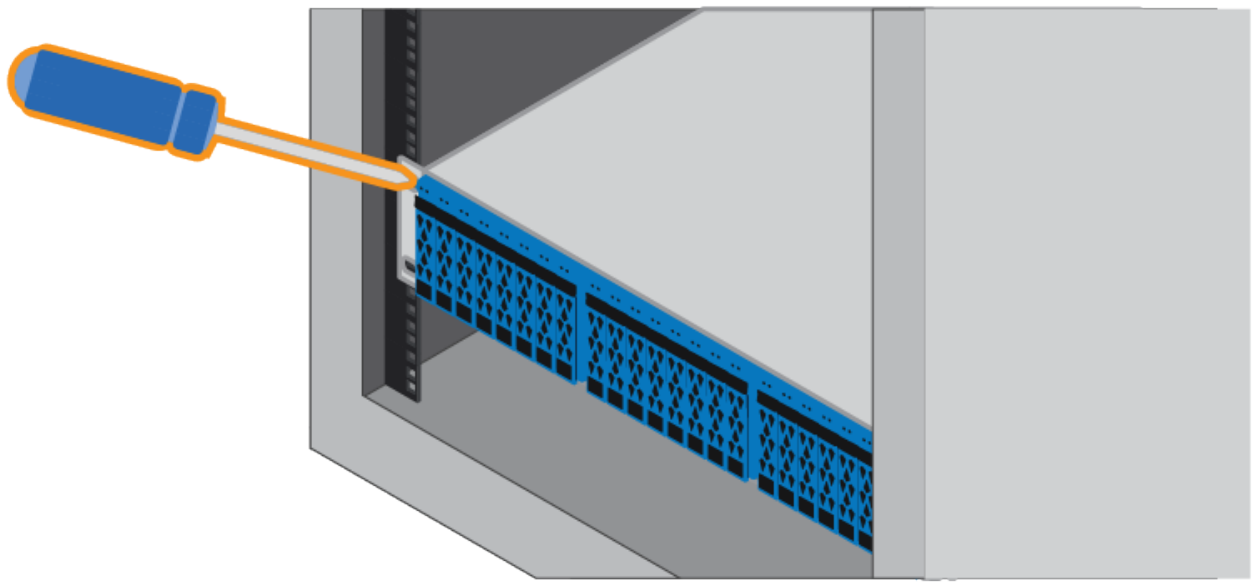
4. Carefully slide the enclosure all the way onto the rails.

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

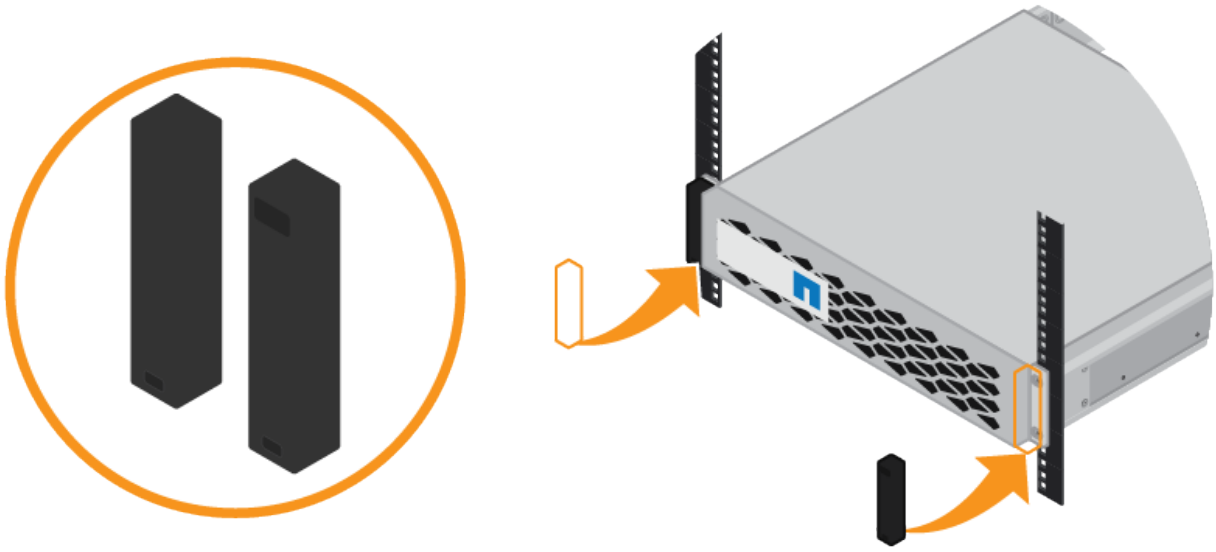
   Don’t place additional equipment on the rails after you finish installing the enclosure. The rails aren’t designed to bear additional weight.

   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.



Install SG6000-CN controller (SG6060 and SG6024)

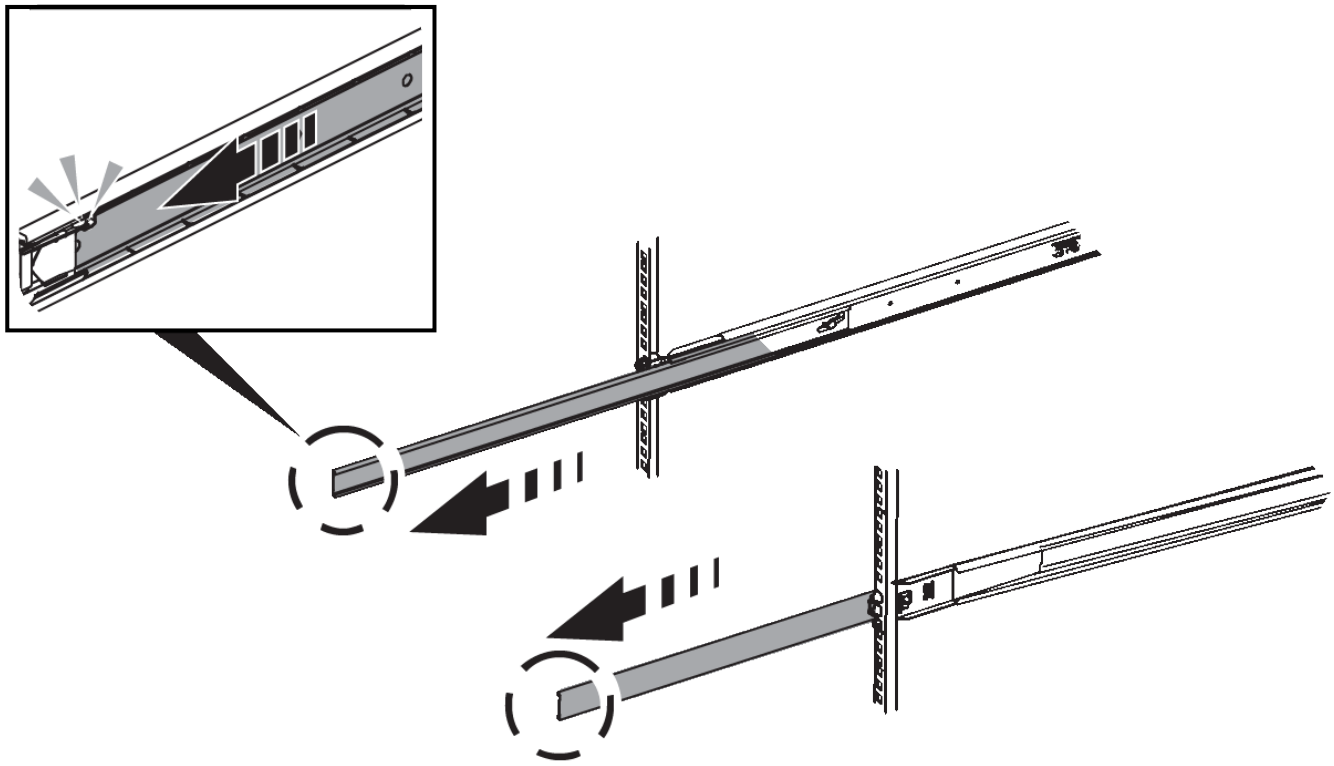
You install a set of rails for the SG6000-CN controller in your cabinet or rack, and then slide the controller onto the rails.

Before you begin

- 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.

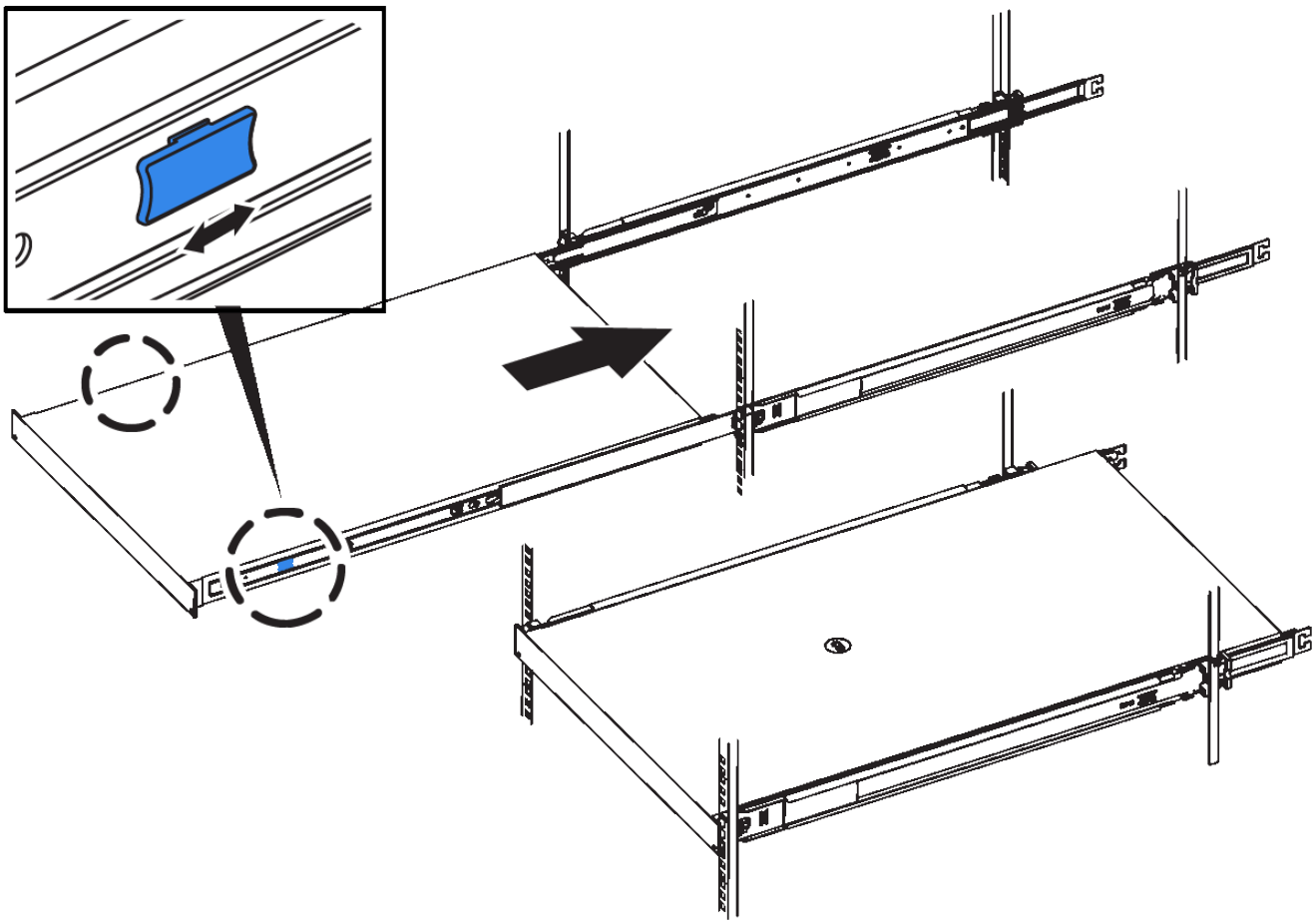
Steps

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



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

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

SG6100

Install into cabinet or rack (SG6100)

For the SG6160 and SGF6112, you install rails in your cabinet or rack and slide the controller shelf, any expansion shelves, and the compute controller onto the rails.

Model	Install	For information
SG6160	60-drive controller shelf and any 60-drive expansion shelves	Install 60-drive shelves
SG6112	12-drive appliance shelf	Install 12-drive shelves

Model	Install	For information
SG6160	SG6100-CN compute controller	Install SG6100-CN controller

Install 60-drive shelves (SG6160)

You install a set of rails for the E4000 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.

Before you begin

- 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.

> 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 E4000 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 SG6100-CN controller above the E4000 controller shelf and expansion shelves.

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

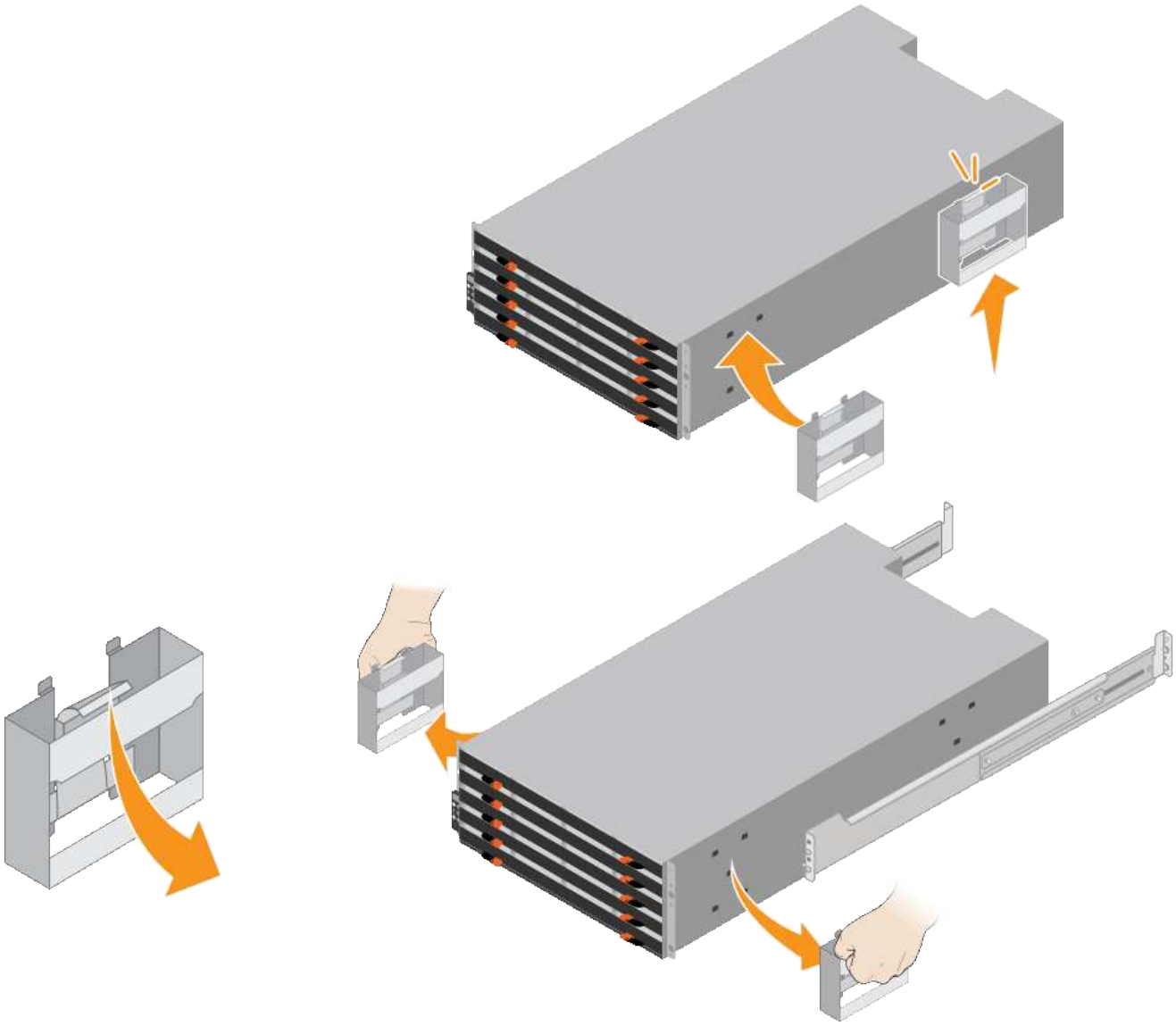
Steps

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

   For square hole cabinets, 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.

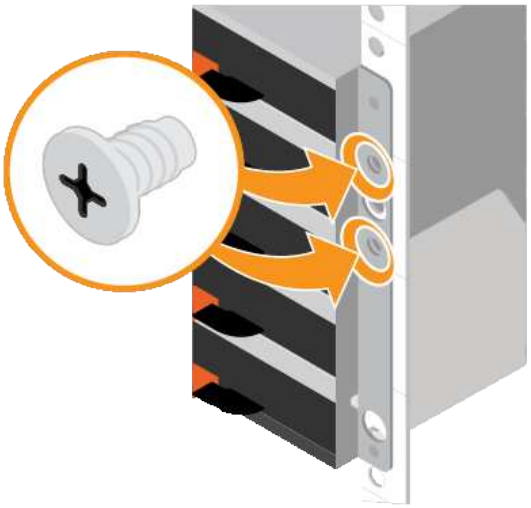
   To remove the handles, pull back on the release latch, push down, then pull away from the shelf.

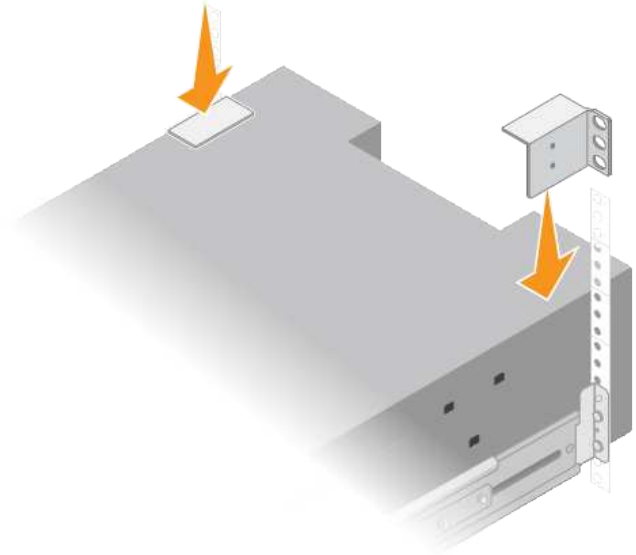
6. Secure the shelf to the front of the cabinet.

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

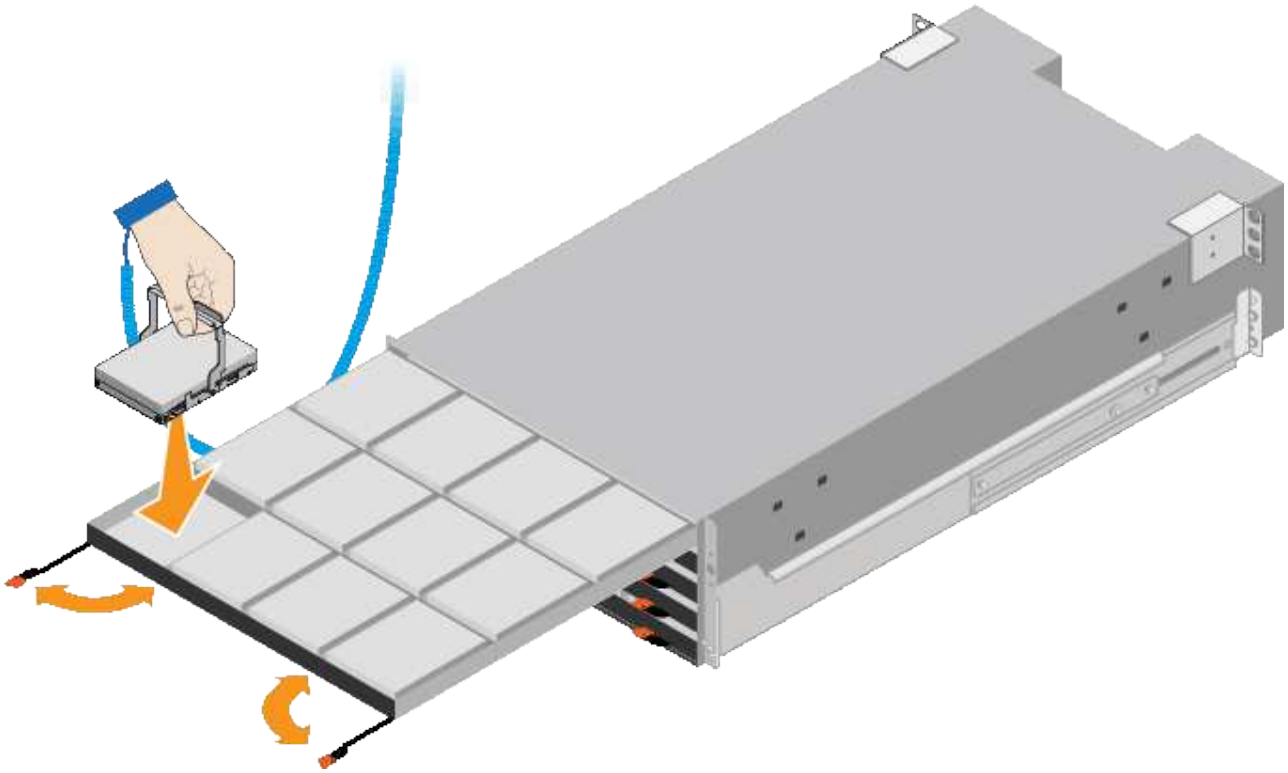
7. Secure the shelf to the rear of the cabinet.

   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.
9. Install 12 NL-SAS drives in each of of the five drive drawers.
    a. Wrap the strap end of the ESD wristband around your wrist, and secure the clip end to a metal ground to prevent static discharge.
    b. Release the levers on the top drive drawer, and slide the drawer out using the levers.
    c. Raise each drive handle to a vertical position.
    d. Gently position each drive into its slot, and lower the raised drive handle until it clicks into place.



    e. Install 12 NL-SAS drives into the top drawer.
    f. 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.

g. Repeat these steps to install NL-SAS drives into the other four drawers.

You must install all 60 drives to ensure correct operation.

h. Attach the front bezel to the shelf, if one was provided.

10. If you have expansion shelves, repeat these steps to install 12 NL-SAS drives into each drawer of each expansion shelf.
11. Proceed to the instructions for installing the SG6100-CN into a cabinet or rack.

Install into cabinet or rack (SGF6112)

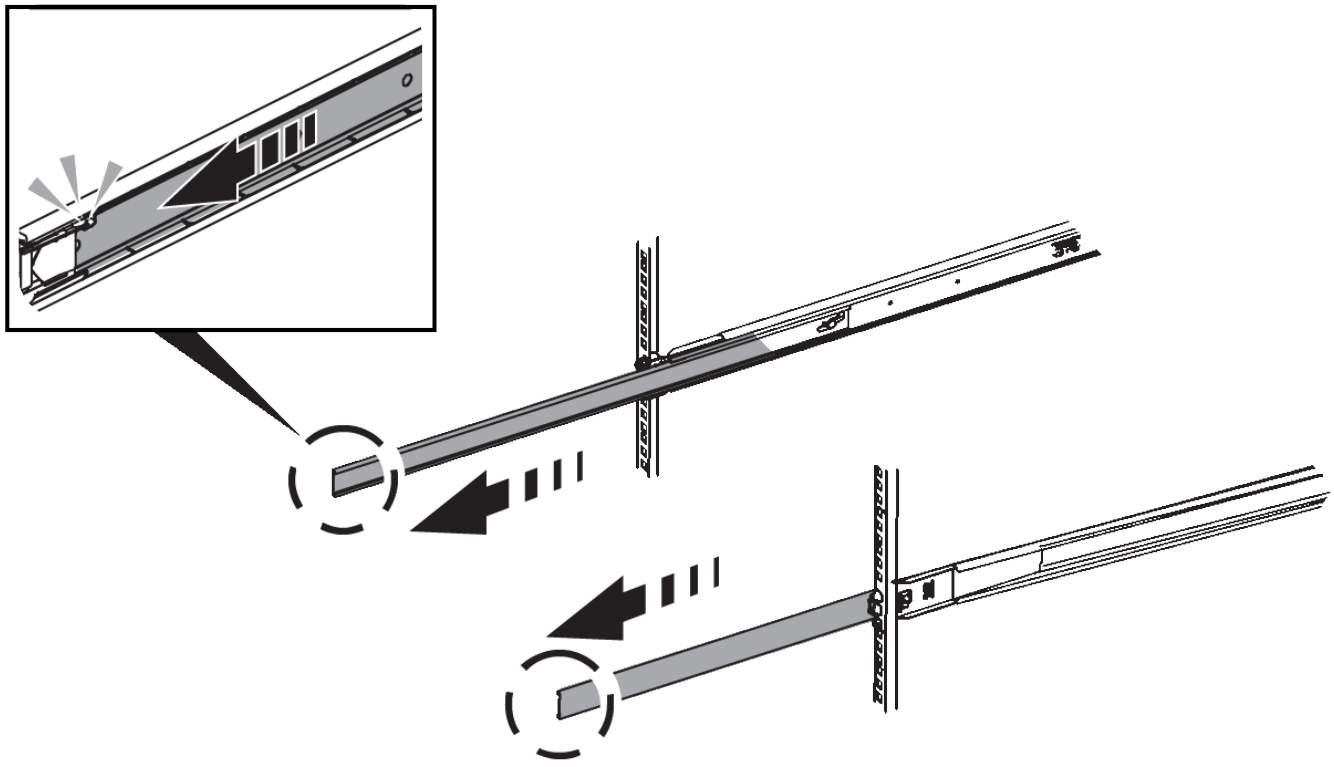
You install a set of rails for the appliance in your cabinet or rack, and then slide the appliance onto the rails.

Before you begin

- 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

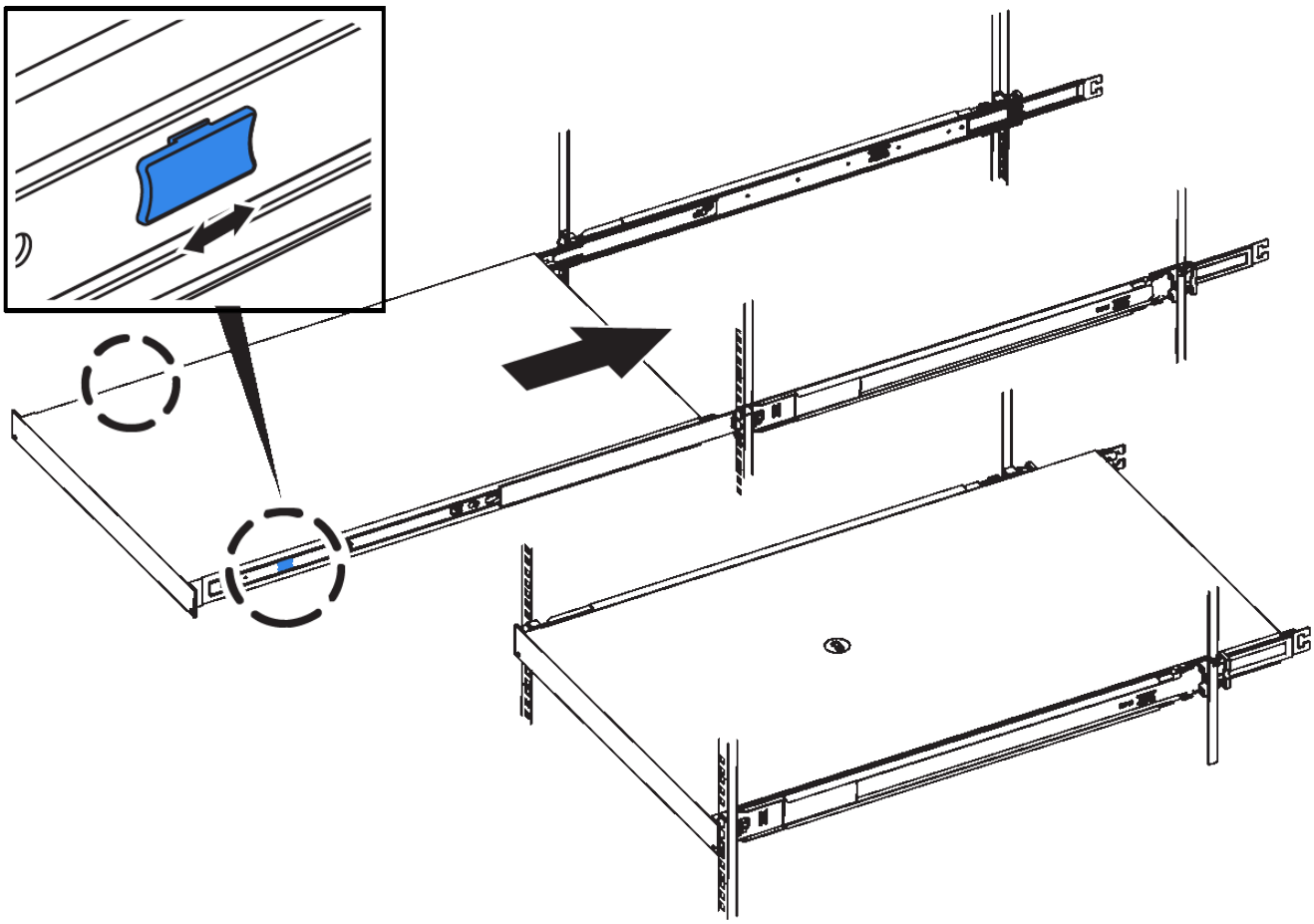
1. Carefully follow the instructions for the rail kit to install the rails in your cabinet or rack.
2. On the two rails installed in the cabinet or rack, extend the movable parts of the rails until you hear a click.



3. Insert the appliance into the rails.

4. Slide the appliance into the cabinet or rack.

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



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

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

Install SG6100-CN controller (SG6160)

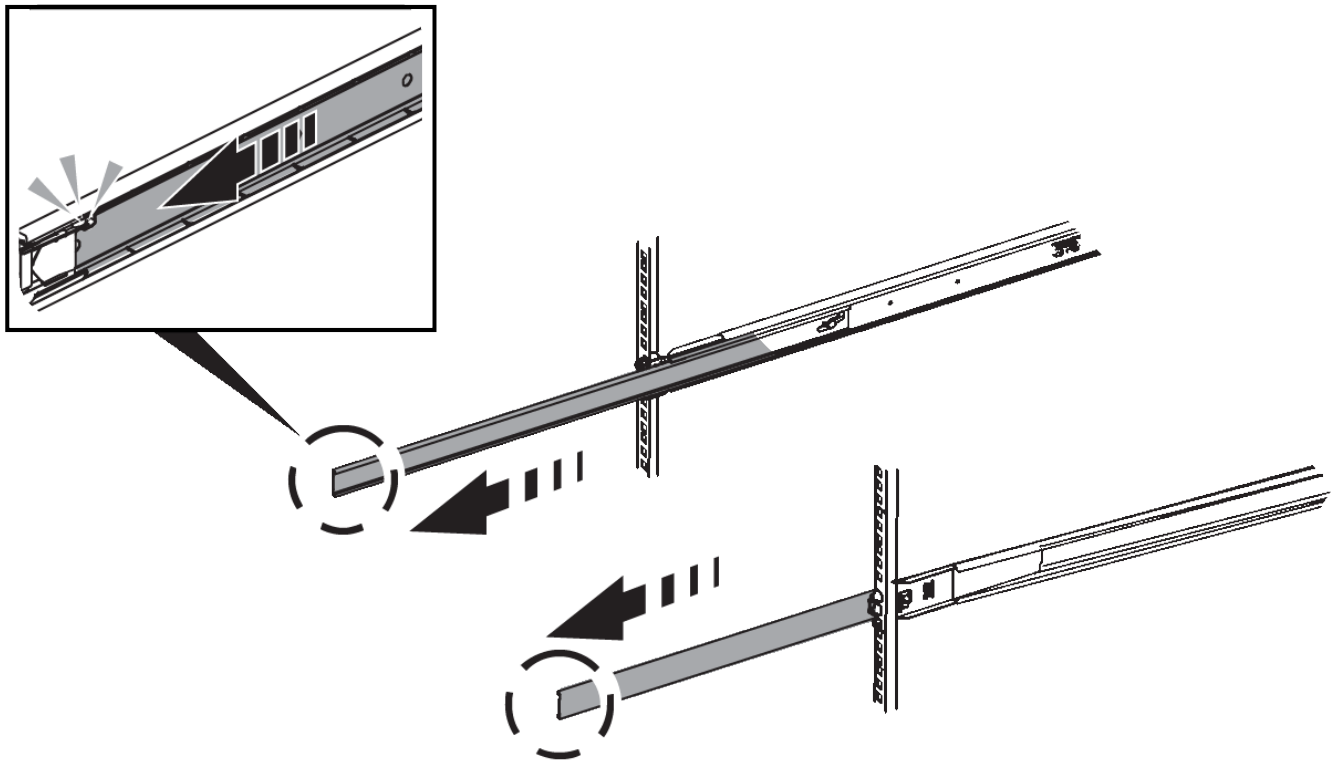
You install a set of rails for the SG6100-CN controller in your cabinet or rack, and then slide the controller onto the rails.

Before you begin

- 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 E4000 controller shelf and drives.

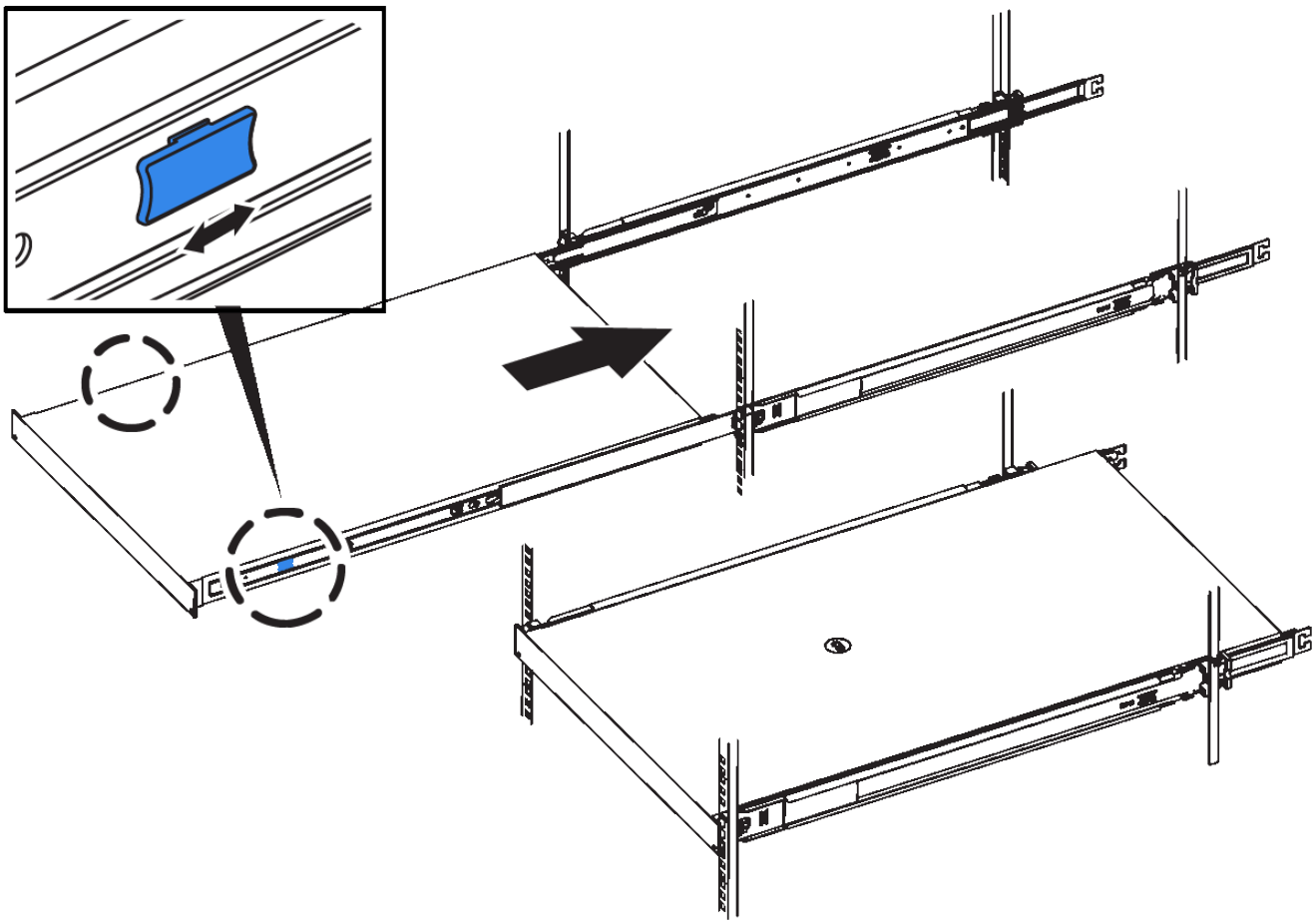
Steps

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 SG6100-CN controller into the rails.
4. Slide the controller into the cabinet or rack.

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



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

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

Cable appliance

Connect the network ports on the appliance or controller to the Grid Network and optional Client Network for StorageGRID. For some appliances, you also connect the management port on the appliance to the service laptop or make connections between the controller management ports.

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.

Before you begin

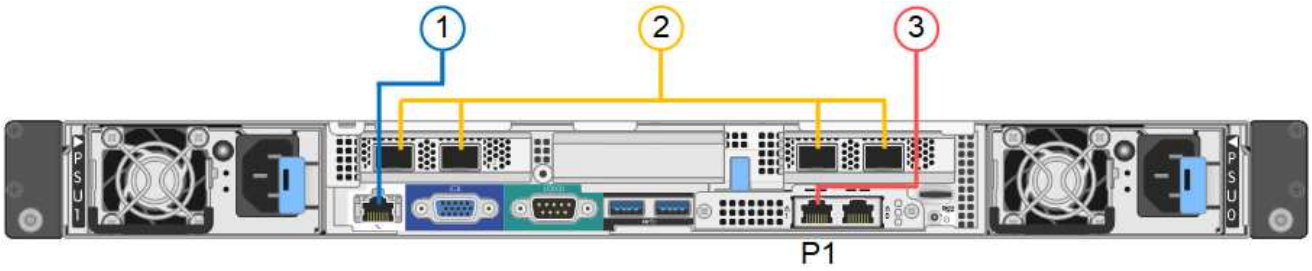
- You have an RJ-45 Ethernet cable for connecting the management port.
- You have one of the following options for the network ports. These items aren't provided with the appliance.
  - One to four TwinAx cables for connecting the four network ports.
  - For the SG100, one to four SFP+ or SFP28 transceivers 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** — Don't disassemble or remove any part of an SFP or QSFP transceiver. You might be exposed to laser radiation.

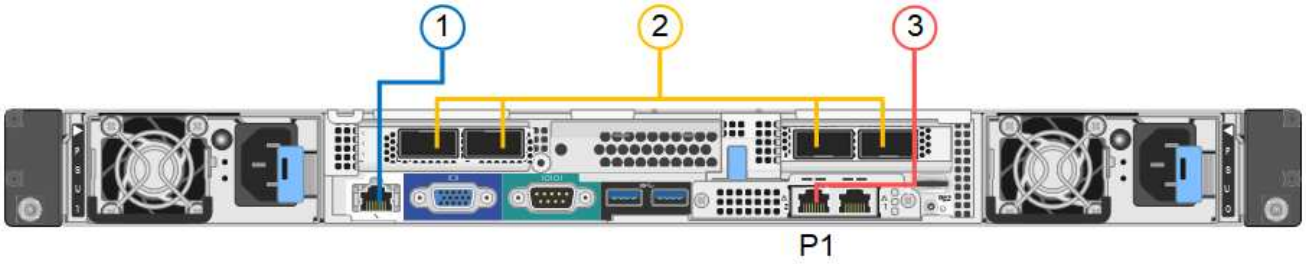
About this task

The following figures show the ports on the back of the appliance.

SG100 port connections:



SG1000 port connections:



Callout	Port	Type of port	Use
1	BMC management port on the appliance	1-GbE (RJ-45)	Connects to the network where you access the BMC interface.

Callout	Port	Type of port	Use
2	Four network ports on the appliance	• For the SG100: 10/25-GbE • For the SG1000: 10/25/40/100-GbE	Connect to the Grid Network and the Client Network for StorageGRID. See Port bond modes (Port bond modes (SG100 and SG1000).
3	Admin Network port on the appliance (labeled P1 in the figures)	1-GbE (RJ-45) **Caution:** This port operates only at 1000 baseT/full and does not support 10- or 100-megabit speeds.	Connects the appliance to the Admin Network for StorageGRID.
	Rightmost RJ-45 port on the appliance	1-GbE (RJ-45) **Caution:** This port operates only at 1000 baseT/full and does not support 10- or 100-megabit speeds.	• Can be bonded with management port 1 if you want a redundant connection to the Admin Network. • Can be left disconnected and available for temporary local access (IP 169.254.0.1). • During installation, can be used to connect the appliance to a service laptop if DHCP-assigned IP addresses aren't available.

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.

   See the following table for the equipment required for your hardware and link speed.

SG100 link speed (GbE)	Required equipment
10	SFP+ transceiver
25	SFP28 transceiver
SG1000 link speed (GbE)	**Required equipment**
10	QSA and SFP+ transceiver
25	QSA and SFP28 transceiver

SG100 link speed (GbE)	Required equipment
40	QSFP+ transceiver
100	QFSP28 transceiver

- On models that support Autonegotiate as a port speed option, if Fixed port bonding mode is selected you can run the ports dedicated to the StorageGRID Grid network at a different speed than the ports dedicated to the Client network.
- On models that do not support Autonegotiate as a port speed option, all four network ports must use the same link speed.
- 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.

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.

SG110 and SG1100

You 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.

Before you begin

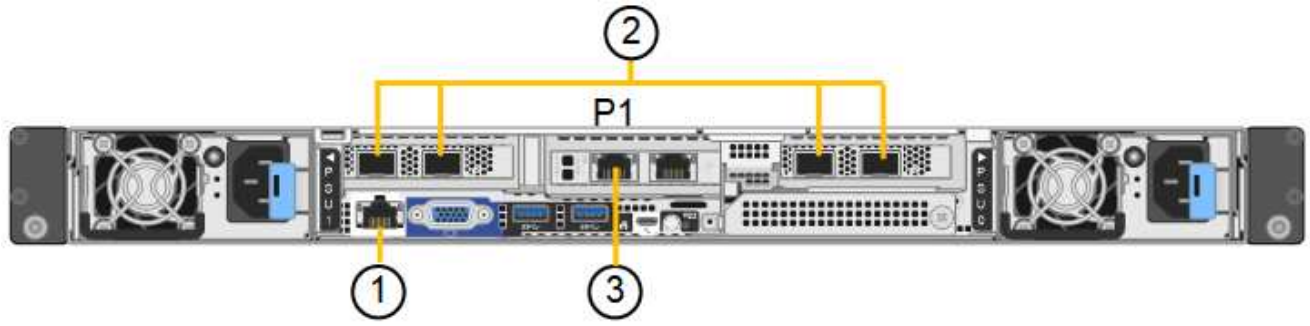
- You have an RJ-45 Ethernet cable for connecting the management port.
- You have one of the following options for the network ports. These items aren’t provided with the appliance.
  - One to four TwinAx cables for connecting the four network ports.
  - For the SG110, one to four SFP+ or SFP28 transceivers if you plan to use optical cables for the ports.
  - For the SG1100, one to four QSFP+ or QSFP28 transceivers if you plan to use optical cables for the ports.

Risk of exposure to laser radiation — Don’t disassemble or remove any part of an SFP or QSFP transceiver. You might be exposed to laser radiation.

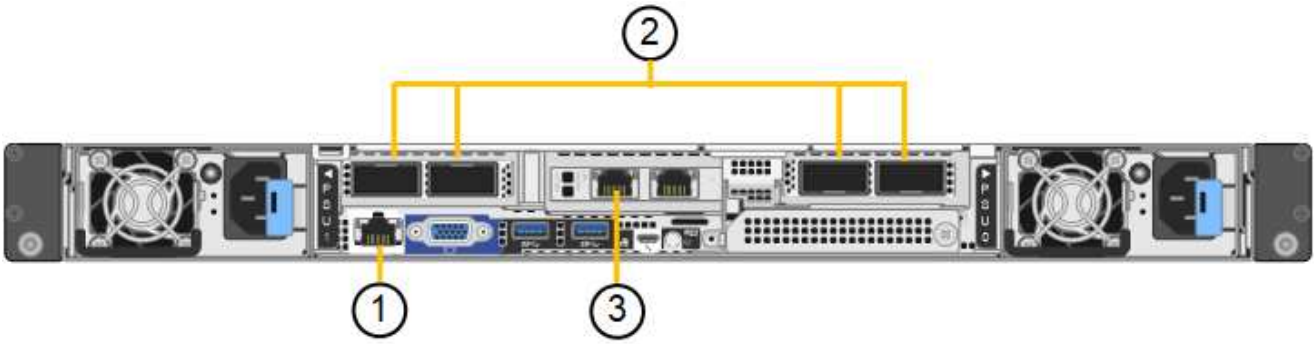
About this task

The following figures show the ports on the back of the appliance.

SG110 port connections:



SG1100 port connections:



Callout	Port	Type of port	Use
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	• For the SG110: 10/25-GbE • For the SG1100: 10/25/40/100-GbE	Connect to the Grid Network and the Client Network for StorageGRID. See Port bond modes (SG110 and SG1100)
3	Admin Network port on the appliance	1-GbE (RJ-45) **Important:** This port operates only at 1/10-GbE (RJ-45) and does not support 100-megabit speeds.	Connects the appliance to the Admin Network for StorageGRID.

Callout	Port	Type of port	Use
	Rightmost RJ-45 port on the appliance	1-GbE (RJ-45) **Important:** This port operates only at 1/10-GbE (RJ-45) and does not support 100-megabit speeds.	• Can be bonded with management port 1 if you want a redundant connection to the Admin Network. • Can be left disconnected and available for temporary local access (IP 169.254.0.1). • During installation, can be used to connect the appliance to a service laptop if DHCP-assigned IP addresses aren't available.

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.

   See the following table for the equipment required for your hardware and link speed.

SG110 link speed (GbE)	**Required equipment**
10	SFP+ transceiver
25	SFP28 transceiver
SG1100 link speed (GbE)	**Required equipment**
10	QSA and SFP+ transceiver
25	QSA and SFP28 transceiver
40	QSFP+ transceiver
100	QFSP28 transceiver

   - On models that support Autonegotiate as a port speed option, if Fixed port bonding mode is selected you can run the ports dedicated to the StorageGRID Grid network at a different speed than the ports dedicated to the Client network.
   - On models that do not support Autonegotiate as a port speed option, all four network ports must use the same link speed.
   - 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.

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.

SG5700

You 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.

Before you begin

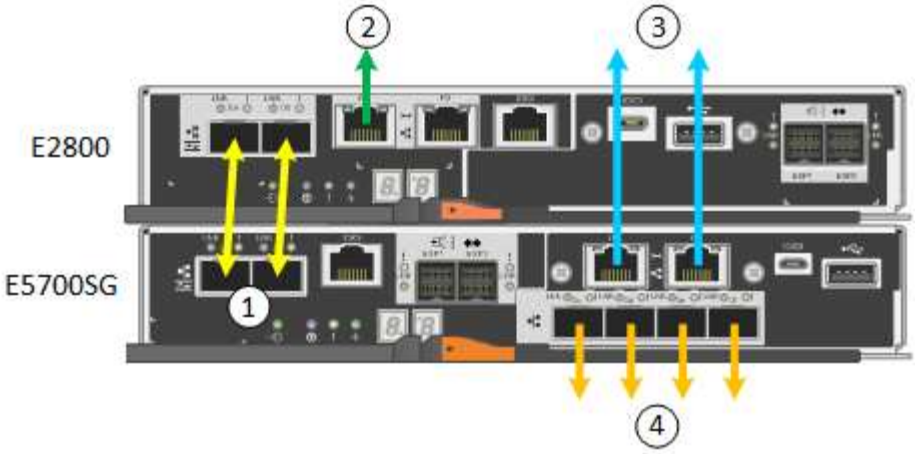
- You have unpacked the following items, which are included with the appliance:
    - Two power cords.
    - Two optical cables for the FC interconnect ports on the controllers.
    - Eight SFP+ transceivers, which support either 10-GbE or 16-Gbps FC. The transceivers can be used with the two interconnect 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 aren't 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 — Don't disassemble or remove any part of an SFP transceiver. You might be exposed to laser radiation.

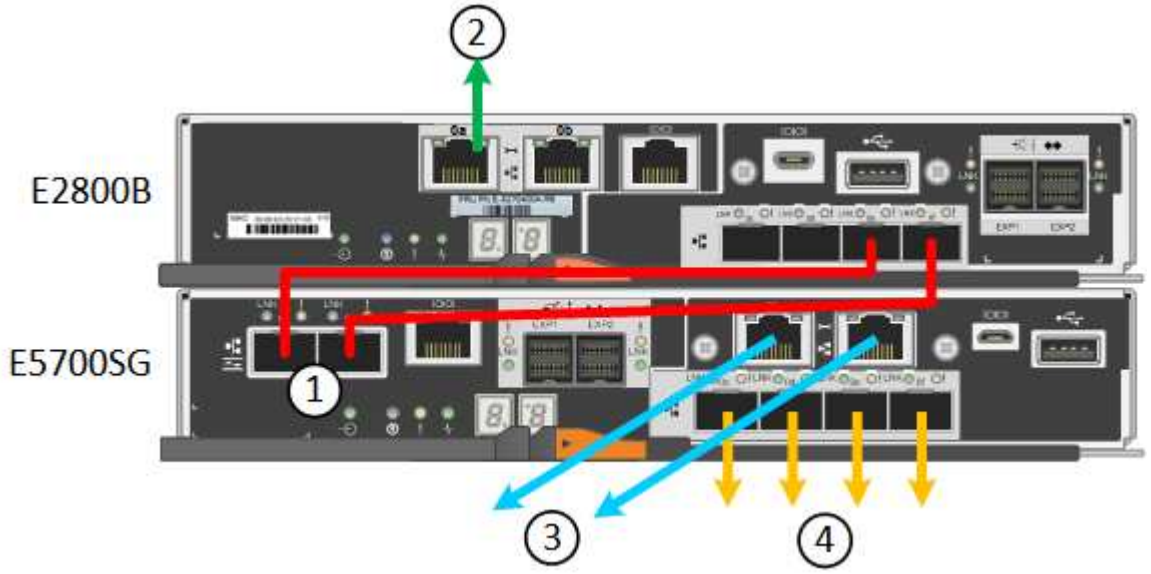
About this task

The figures show the two controllers in the SG5760 and SG5760X, with the E2800 series storage controller on the top and the E5700SG controller on the bottom. In the SG5712 and SG5712X, the E2800 series storage controller is to the left of the E5700SG controller when viewed from the back.

SG5760 connections:



SG5760X connections:



Callout	Port	Type of port	Use
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 series 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 series controller	1-GbE (RJ-45)	Reserved for technical support.

Callout	Port	Type of port	Use
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)	• Can be bonded with management port 1 if you want a redundant connection to the Admin Network. • Can be left unwired and available for temporary local access (IP 169.254.0.1). • During installation, can be used to connect the E5700SG controller to a service laptop if DHCP-assigned IP addresses aren't available.
4	10/25-GbE ports 1-4 on the E5700SG controller	10-GbE or 25-GbE **Note:** 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 Port bond modes (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. If you plan to use SANtricity System Manager, 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.

   Don't 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.

   > Install SFP+ transceivers if you plan to use 10-GbE link speeds. Install SFP28 transceivers if you plan to use 25-GbE link speeds.

   - On models that support Autonegotiate as a port speed option, if Fixed port bonding mode is selected you can run the ports dedicated to the StorageGRID Grid network at a different speed than the ports dedicated to the Client network.
   - On models that do not support Autonegotiate as a port speed option, all four network ports must use the same link speed.
   - 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.

SG5800

You connect the two controllers to each other, connect the management ports on each controller, and connect the 10/25-GbE ports on the SG5800 controller to the Grid Network and optional Client Network for StorageGRID.

Before you begin

- You have unpacked the following items, which are included with the appliance:
  - Two power cords.
  - Two cables for the iSCSI interconnect ports on the controllers.
- You have obtained the following items, which aren’t included with the appliance:
  - One to four optical or copper cables for the 10/25-GbE ports you plan to use.
  - One to eight SFP+ transceivers, if you plan to use optical cables and 10-GbE link speed.

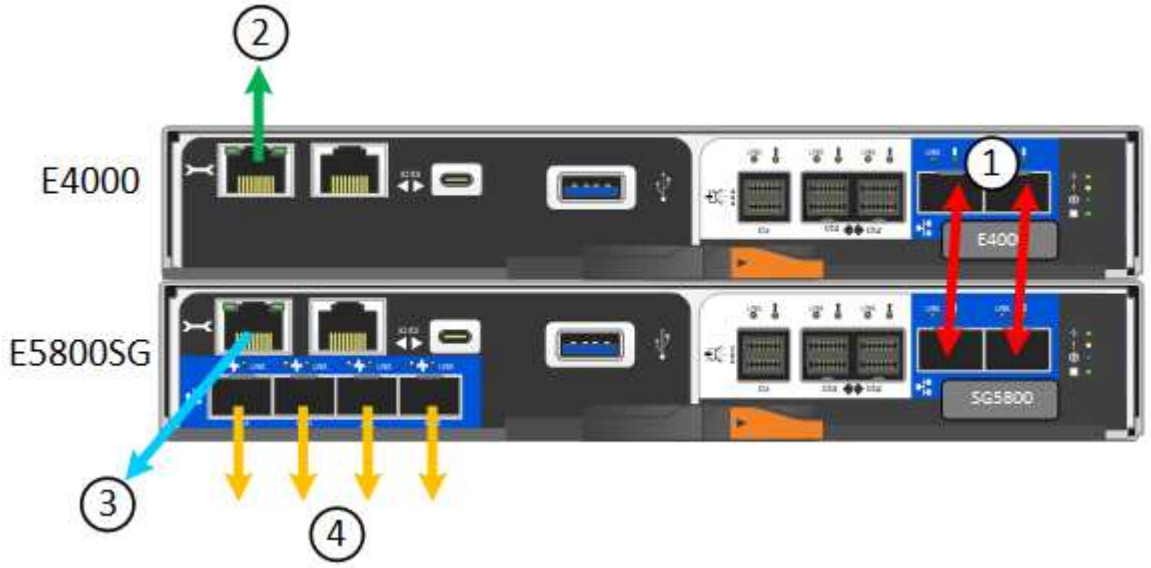
- One to eight SFP28 transceivers, if you plan to use optical cables and 25-GbE link speed.
- Ethernet cables for connecting the management ports.

Risk of exposure to laser radiation — Don't disassemble or remove any part of an SFP transceiver. You might be exposed to laser radiation.

About this task

The figures show the two controllers in the SG5860, with the E4000 series storage controller on the top and the SG5800 controller on the bottom. In the SG5812, the E4000 series storage controller is to the left of the SG5800 controller when viewed from the back.

SG5860 connections:



Callout	Port	Type of port	Use
1	Two interconnect ports on each controller	25GbE iSCSI (SFP28)	Connect the two controllers to each other.
2	Management port 1 on the E4000 series 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.
3	Management port 1 on the SG5800 controller	1-GbE (RJ-45)	Connects the SG5800 controller to the Admin Network for StorageGRID.

Callout	Port	Type of port	Use
4	10/25-GbE ports 1-4 on the SG5800 controller	10-GbE or 25-GbE	Connect to the Grid Network and the Client Network for StorageGRID. See Port bond modes (SG5800 controller).

Steps

1. Connect the E4000 controller to the SG5800 controller, using the two provided cables.

Connect this port…	To this port…
Interconnect port 1 on the E4000 controller	Interconnect port 1 on the SG5800 controller
Interconnect port 2 on the E4000 controller	Interconnect port 2 on the SG5800 controller

2. Optionally, connect management port 1 (P1) on the E4000 controller (the RJ-45 port on the left) to the management network for SANtricity System Manager using an Ethernet cable.
3. If you plan to use the Admin Network for StorageGRID, connect management port 1 on the SG5800 controller (the RJ-45 port on the left) to the Admin Network, using an Ethernet cable.

   The physical link state for port 1 is unavailable in software and must be verified at this time using the status LED on the SG5800 controller.

4. Connect the 10/25-GbE ports on the SG5800 controller to the appropriate network switches, using copper cables or optical cables and SFP+ or SFP28 transceivers.

   Install SFP+ transceivers if you plan to use 10-GbE link speeds. Install SFP28 transceivers if you plan to use 25-GbE link speeds.

   - On models that support Autonegotiate as a port speed option, if Fixed port bonding mode is selected you can run the ports dedicated to the StorageGRID Grid network at a different speed than the ports dedicated to the Client network.
   - On models that do not support Autonegotiate as a port speed option, all four network ports must use the same link speed.
   - 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	Connects to…
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.

SG6000

You 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.

Before you begin

- 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 aren't 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 — Don't disassemble or remove any part of an SFP transceiver. You might be exposed to laser radiation.

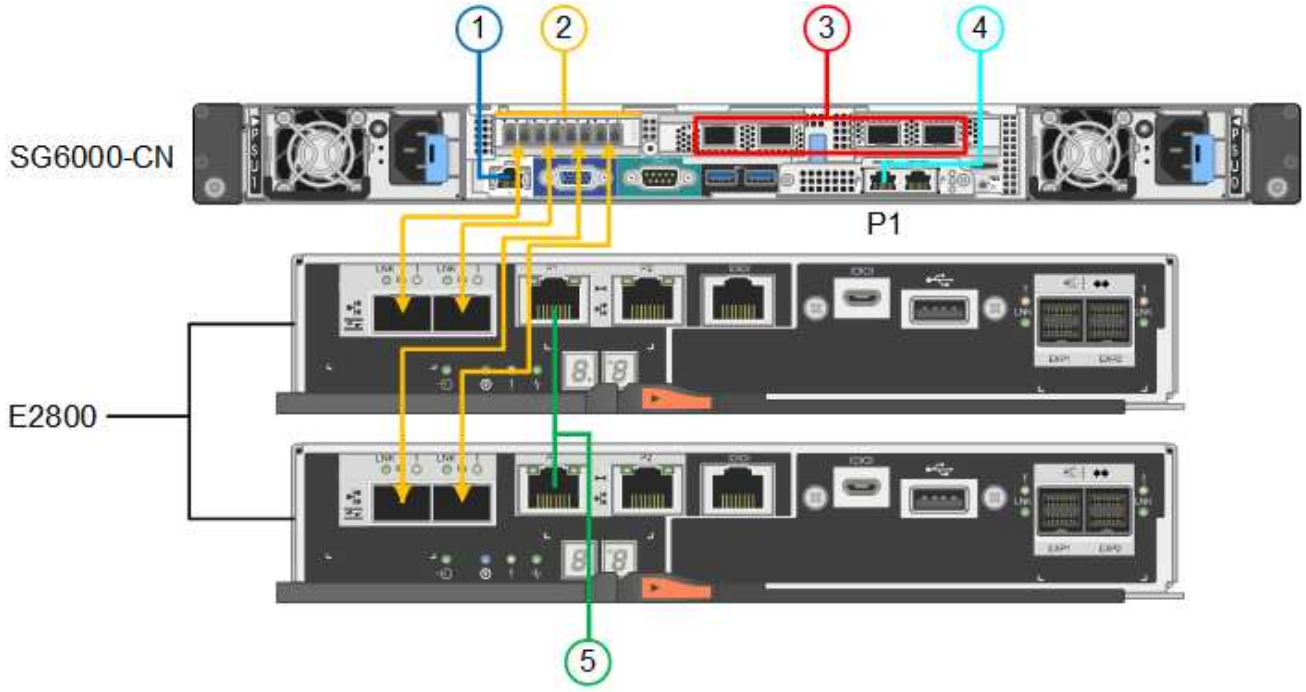
About this task

The following figures show the three controllers in the SG6060 and SG6060X appliances, with the SG6000-CN compute controller on the top and the two E2800 storage controllers on the bottom. The SG6060 uses E2800A controllers, and the SG6060X uses one of two E2800B controller versions.

Both versions of the E2800 controller have identical specifications and function except for the location of the interconnect ports.

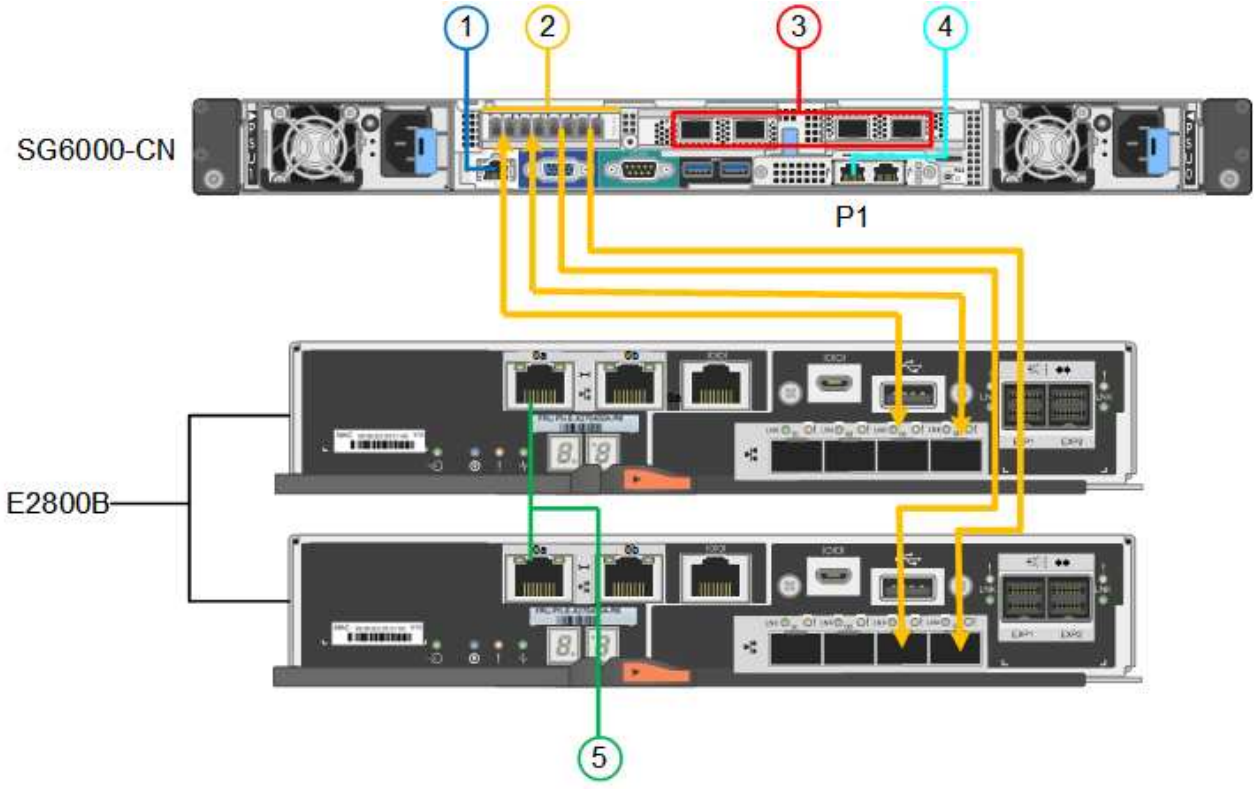
Don't use an E2800A and E2800B controller in the same appliance.

SG6060 connections:



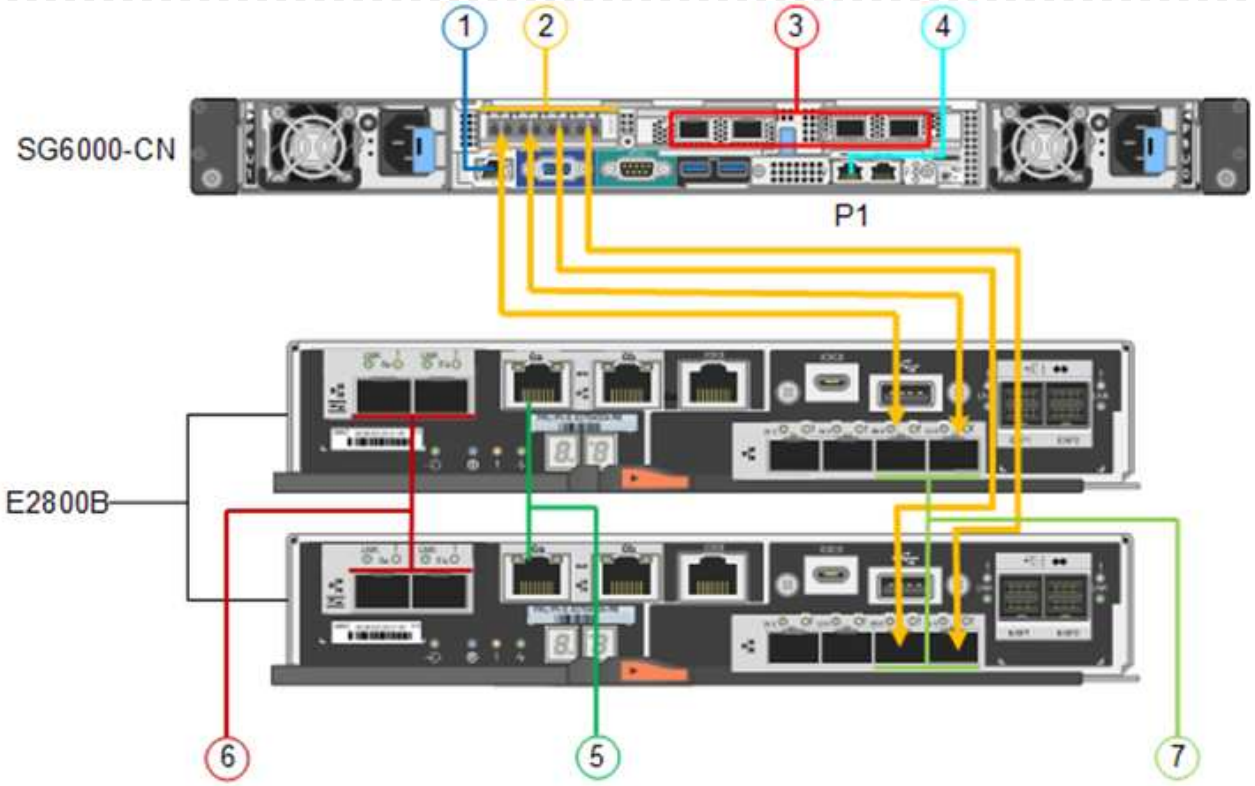
SG6060X connections:

- Version 1



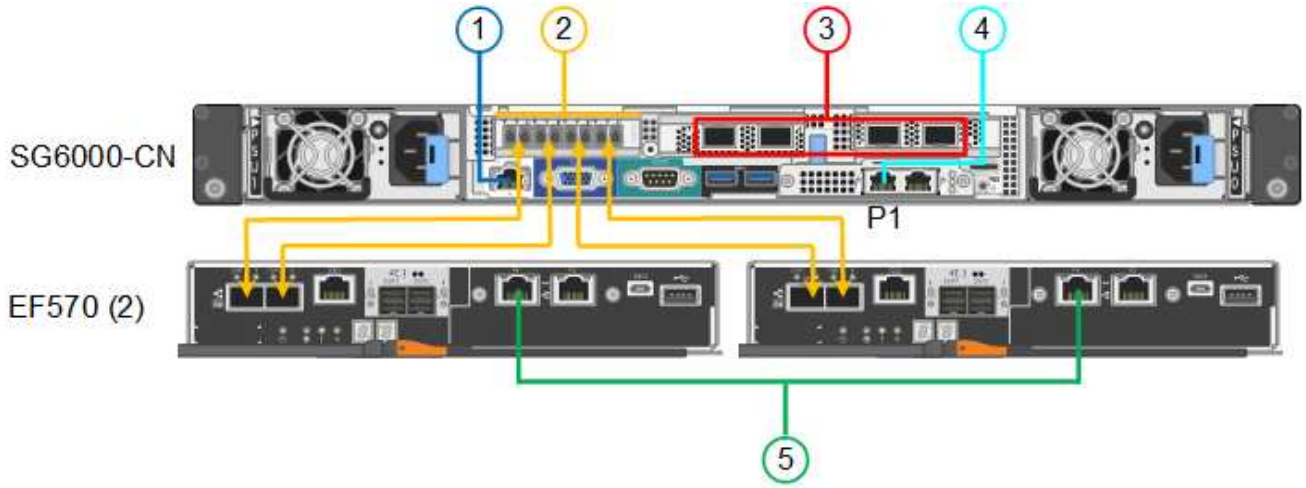
- Version 2

If the FC transceivers in the E2800B controller are installed in the upper FC connection ports (6), move them to the lower-right FC connection ports (7).



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.

SGF6024 connections:



Callout	Port	Type of port	Use
1	BMC management port on the SG6000-CN controller	1-GbE (RJ-45)	Connects to the network where you access the BMC interface.

Callout	Port	Type of port	Use
2	FC connection ports: • 4 on the SG6000-CN controller • 2 on each storage controller	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. See Port bond modes (SG6000-CN controller).
4	Admin Network port on the SG6000-CN controller (labeled P1 in the figure)	1-GbE (RJ-45) **Caution:** 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.
	Rightmost RJ-45 port on the SG6000-CN controller	1-GbE (RJ-45) **Caution:** This port operates only at 1000 baseT/full and does not support 10- or 100-megabit speeds.	• Can be bonded with management port 1 if you want a redundant connection to the Admin Network. • Can be left unwired and available for temporary local access (IP 169.254.0.1). • During installation, can be used to connect the SG6000-CN controller to a service laptop if DHCP-assigned IP addresses aren't available.
5	Management port 1 on each storage controller	1-GbE (RJ-45)	Connects to the network where you access SANtricity System Manager.
	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.

   Although this connection is optional, it is recommended to facilitate support.

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.

Install SFP+ transceivers if you plan to use 10-GbE link speeds. Install SFP28 transceivers if you plan to use 25-GbE link speeds.

- On models that support Autonegotiate as a port speed option, if Fixed port bonding mode is selected you can run the ports dedicated to the StorageGRID Grid network at a different speed than the ports dedicated to the Client network.
- On models that do not support Autonegotiate as a port speed option, all four network ports must use the same link speed.
- 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. If you plan to use the management network for SANtricity System Manager, 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.

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

SG6100

You 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.

Before you begin

- SG6160 only: You have the 100GbE to 4x25GbE breakout cable provided with the appliance for connecting the two storage controllers to the SG6100-CN controller.
- You have RJ-45 Ethernet cables:
  - One RJ-45 cable for connecting the management port.
  - SG6160 only: Up to four additional RJ-45 Ethernet cables for the optional ports you plan to use, including the second Admin port and the BMC port on the SG6100-CN, and the maintenance ports on each of the two E4000 controllers.
- You have one of the following options for the network ports. These items aren’t provided with the

appliance.

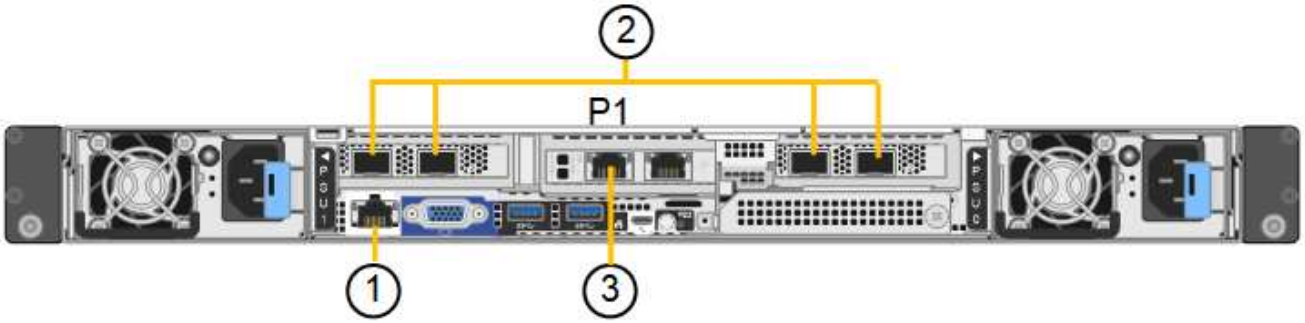
- One to four TwinAx cables for connecting the four network ports.
- One to eight SFP+ or SFP28 transceivers if you plan to use optical cables for the ports.

Risk of exposure to laser radiation — Don't disassemble or remove any part of an SFP transceiver. You might be exposed to laser radiation.

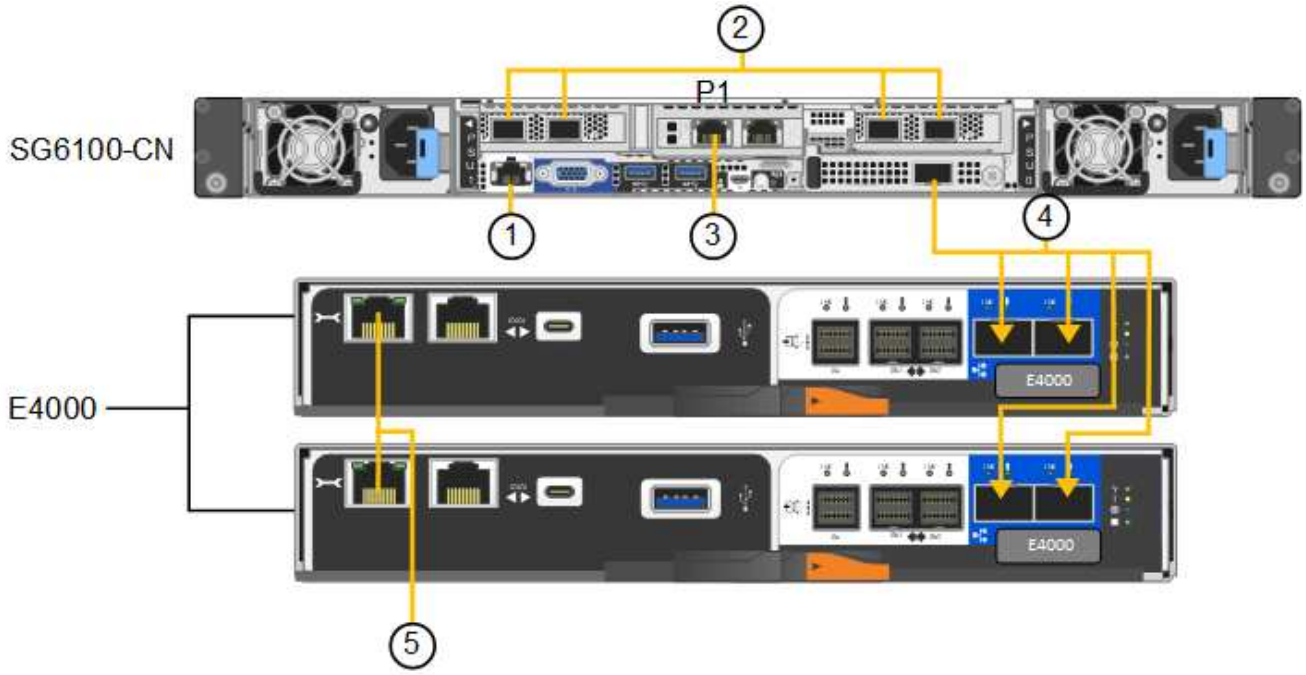
About this task

The following figures show the ports on the back of the SGF6112 and the three controllers in the SG6160 appliance. The SG6160 appliance includes a SG6100-CN compute controller on top and two E4000 storage controllers on the bottom.

SGF6112 connections:



SG6160 connections:



Callout	Port	Type of port	Use
1	BMC management port on the appliance	1-GbE (RJ-45)	Connects to the network where you access the BMC interface.

Callout	Port	Type of port	Use
2	Four network ports on the SG6100-CN controller	• Four 10/25-GbE network ports on the appliance • Four 10/25/40/100-GbE network ports with optional 100G NIC SKU (SG6160 only)	Connect to the Grid Network and the Client Network for StorageGRID. See Port bond modes (SG6100)
3	Admin Network port on the appliance (labeled P1 in the figure)	1/10-GbE (RJ-45) **Important:** This port operates only at 1/10-GbE (RJ-45) and does not support 100-megabit speeds.	Connects the appliance to the Admin Network for StorageGRID.
	Rightmost RJ-45 port on the appliance	1/10-GbE (RJ-45) **Caution:** This port operates only at 1/10-GbE (RJ-45) and does not support 100-megabit speeds.	• Can be bonded with management port 1 if you want a redundant connection to the Admin Network. • Can be left disconnected and available for temporary local access (IP 169.254.0.1). • During installation, can be used to connect the appliance to a service laptop if DHCP-assigned IP addresses aren't available.
4 (SG6160 only)	Five total connection ports	• One 100GbE port on the SG6100-CN • Two 10/25GbE ports on each of the storage controllers	Connect each storage controller to the SG6100-CN controller.
5 (SG6160 only)	Management port 1 on each storage controller	1-GbE (RJ-45)	Connects to the network where you access SANtricity System Manager.
	Management port 2 on each storage controller	1-GbE (RJ-45)	Connects to the network where you access SANtricity System Manager.

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 two interconnect ports on each storage controller to the 100GbE port on the SG6100-CN controller, using one 100-GbE QSFP28 to 4x25-GbE SFP28 cable.

3. Connect the network ports on the appliance to the appropriate network switches, using TwinAx cables or optical cables and transceivers.

Link speed (GbE)	Required equipment
10	SFP+ transceiver
25	SFP28 transceiver

   - Grid and Client network ports can be run at different speeds only if Autonegotiate is selected as the link speed, and Fixed is selected as the port bond mode. Otherwise, all four ports will run at the same speed.
   - 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 appliance to the Admin Network, using an Ethernet cable.
5. If your appliance includes an expansion shelf, see the instructions for adding an expansion shelf to a deployed SG6160 for cabling information.

Connect power cords and apply power

After connecting the network cables, you are ready to apply power to an appliance, controller, or expansion shelf.

SG100 and SG1000

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.

   Don’t 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 if removed.

SG110 and SG1100

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.

   Don’t press the power button again during the power-on process.

   The LED on the power supply should be illuminated green without blinking.

4. If errors occur, correct any issues.
5. Attach the front bezel to the appliance if removed.

SG5700

Before you begin

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.
   - Don’t 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.

SG5800

Before you begin

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.
   - Don’t 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.

SG6000

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.

   Don’t 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.
   - Don’t 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 if removed.

SG6100

SGF6112:

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.
4. Don’t press the power button again during the power-on process.
5. The LED on the power supply should be illuminated green without blinking.
6. If errors occur, correct any issues.
7. Attach the front bezel to the appliance if removed.

SG6160:

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 SG6100-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 SG6100-CN controller is not currently illuminated blue, press the button to turn on power to the controller.

   Don’t 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.
   - Don’t 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, verify that the power button on the front of the SG6100-CN controller is lit.

11. If errors occur, correct any issues.
12. Attach the front bezel to the SG6100-CN controller if removed.

Related information

View status indicators

View status indicators and codes

The appliances and controllers include indicators that help you determine the status of the appliance components.

SG100 and SG1000

The appliance includes indicators that help you determine the status of the appliance controller and the two SSDs:

- Appliance indicators and buttons
- General boot-up codes
- SSD indicators

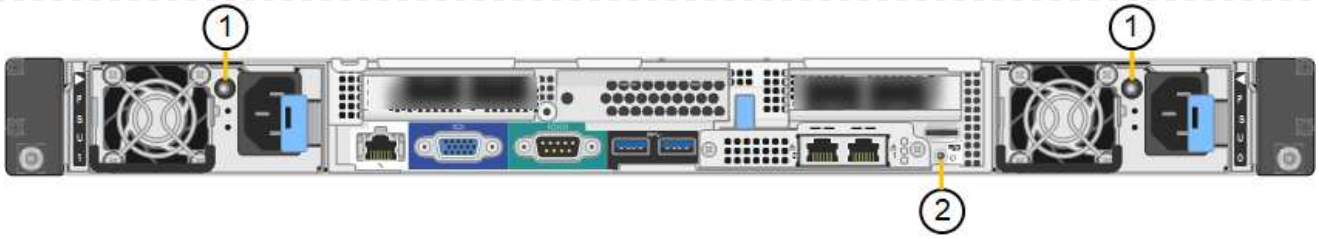
Use this information to help troubleshoot SG100 and SG1000 hardware installation.

Appliance indicators and buttons

The following figure shows status indicators and buttons on the front of the SG100 and SG1000.

Callout	Display	State
1	Power button	• Blue: the appliance is powered on. • Off: the appliance is powered off.
2	Reset button	Use this button to perform a hard reset of the controller.
3	Identify button	This button can be set to Blink, On (Solid), or Off. • Blue, blinking: Identifies the appliance in the cabinet or rack. • Blue, solid: Identifies the appliance in the cabinet or rack. • Off: The appliance is not visually identifiable in the cabinet or rack.
4	Alarm LED	• Amber, solid: An error has occurred. **Note:** To view the boot-up and error codes, access the BMC interface. • Off: No errors are present.

The following figure shows the location of the power supply and identify LEDs on the rear of the SG100 and the SG1000. Additional status and activity LEDs are on the appliance ports. These LEDs might vary by appliance model.



Callout	LED	State
1	Power supply LED	• Green, solid: power applied to appliance, power button is on. • Green, blinking: power applied to appliance, power button is off. • Off: no power applied to appliance. • Amber: power supply fault.
2	Identify LED	• Blue, blinking: Identifies the appliance in the cabinet or rack. • Blue, solid: Identifies the appliance in the cabinet or rack. • Off: The appliance is not visually identifiable in the cabinet or rack.

General boot-up codes

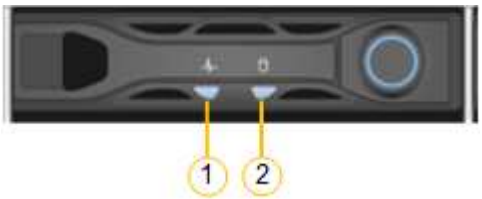
During boot-up or after a hard reset of the appliance, the following occurs:

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, access the BMC interface.

SSD indicators

The following figure shows SSD indicators on the SG100 and SG1000.



LED	Display	State
1	Drive status/fault	• Blue (solid): drive is online • Amber (solid): drive failure • Amber (blinking): drive locator light on • Off: slot is empty
2	Drive active	Blue (blinking): drive is being accessed

SG110 and SG1100

The appliance includes indicators that help you determine the status of the appliance controller and the SSDs:

- Appliance indicators and buttons
- General boot-up codes
- SSD indicators

Use this information to help troubleshoot SG110 and SG1100 hardware installation.

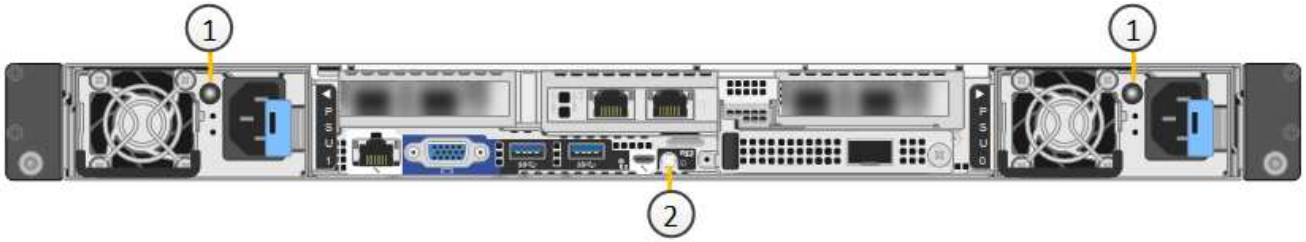
Appliance indicators and buttons

The following figure shows indicators and buttons on the front of the SG110 and SG1100 appliances.

Callout	Display	State
1	Power button	• Blue: the appliance is powered on. • Off: the appliance is powered off.
2	Reset button	Use this button to perform a hard reset of the controller.
3	Identify button	Using the BMC, this button can be set to blink, On (Solid), or Off. • Blue, blinking: Identifies the appliance in the cabinet or rack. • Blue, solid: Identifies the appliance in the cabinet or rack. • Off: The appliance is not visually identifiable in the cabinet or rack.

Callout	Display	State
4	Status LED	• Amber, solid: An error has occurred. **Note:** To view the boot-up and error codes, access the BMC interface. • Off: No errors are present.
5	PFR	This light is not used by the SG110 and SG1100 appliances and remains off.

The following figure shows the location of the power supply and identify LEDs on the rear of the SG110 and the SG1100. Additional status and activity LEDs are on the appliance ports. These LEDs might vary by appliance model.



Callout	LED	State
1	Power supply LED	• Green, solid: power applied to appliance, power button is on. • Green, blinking: power applied to appliance, power button is off. • Off: no power applied to appliance. • Amber: power supply fault.
2	Identify LED	• Blue, blinking: Identifies the appliance in the cabinet or rack. • Blue, solid: Identifies the appliance in the cabinet or rack. • Off: The appliance is not visually identifiable in the cabinet or rack.

General boot-up codes

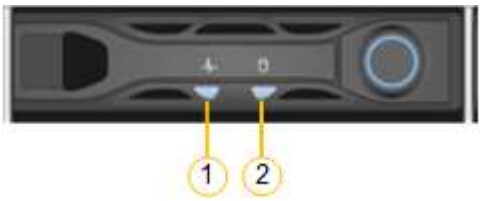
During boot-up or after a hard reset of the appliance, the following occurs:

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, access the BMC interface.

SSD indicators

The following figure shows SSD indicators on the SG110 and SG1100 appliances.



LED	Display	State
1	Drive status/fault	• Blue (solid): drive is online • Amber (solid): drive failure • Off: slot is empty
2	Drive active	Blue (blinking): drive is being accessed

SG5700

The appliance controllers include indicators that help you determine the status of the appliance controller:

- SG5700 boot-up status codes
- Status indicators on E5700SG controller
- General boot-up codes
- E5700SG controller boot-up codes
- E5700SG controller error codes

Use this information to help troubleshoot SG5700 hardware installation.

SG5700 boot-up status codes

The seven-segment displays on each controller show status and error codes as the appliance powers up.

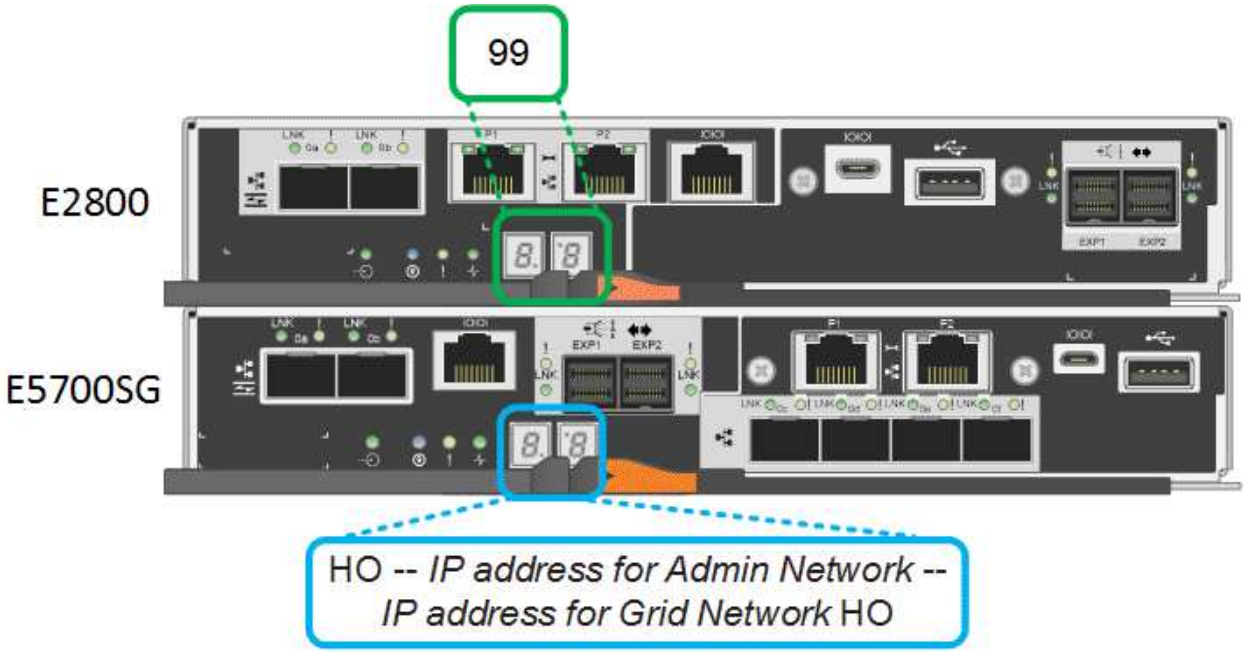
The E2800 controller and the E5700SG controller display different statuses and error codes.

To understand what these codes mean, see the following resources:

Controller	Reference
E2800 controller	*E5700 and E2800 System Monitoring Guide* **Note:** The codes listed for the E-Series E5700 controller don't apply to the E5700SG controller in the appliance.
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	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-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. **Note:** If an IP address could not be assigned using DHCP, 0.0.0.0 is displayed.

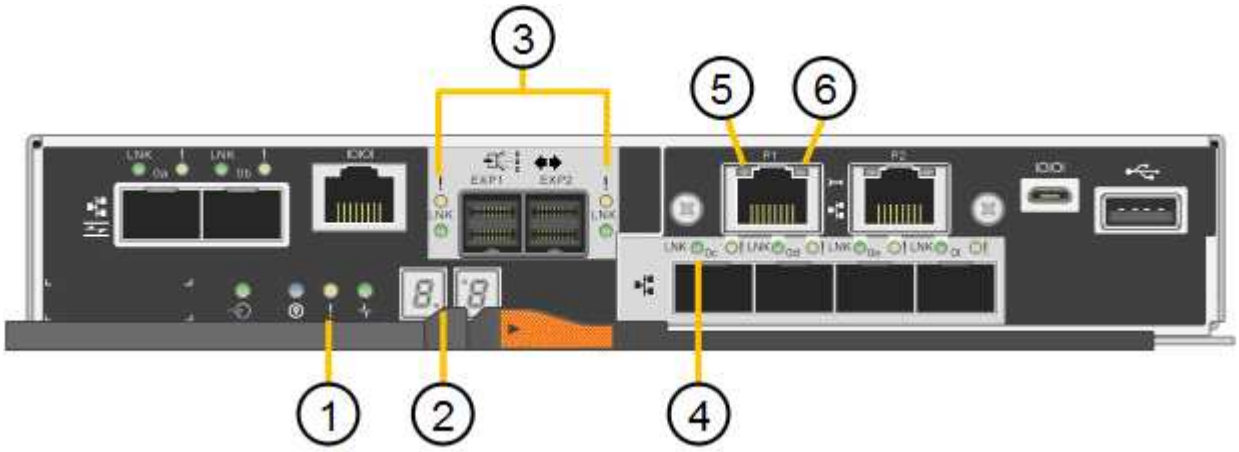
3. If the seven-segment displays show other values, see Troubleshoot hardware installation (SG6000 or SG5700) and confirm you completed the installation steps correctly. If you are unable to resolve the problem, contact technical support.

Status indicators on 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.

The following figure shows status indicators on the E5700SG controller.



Callout	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.

Callout	Display	Description
6	Ethernet Activity LEDs	Green: The link between the management port and the device to which it is connected (such as an Ethernet switch) is up. Off: There is no link between the controller and the connected device. Blinking Green: There is Ethernet activity.

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
HT	The master boot script is waiting for OS boot to complete.
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	The system is awaiting connectivity with the E2800 controller and synchronizing with the SANtricity operating system. **Note:** If this boot procedure does not progress past this stage, check the connections between the two controllers.
HC	The system is checking for existing StorageGRID installation data.
HO	The StorageGRID Appliance Installer is running.

Code	Indicates
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

- NetApp Support
- E5700 and E2800 System Monitoring Guide

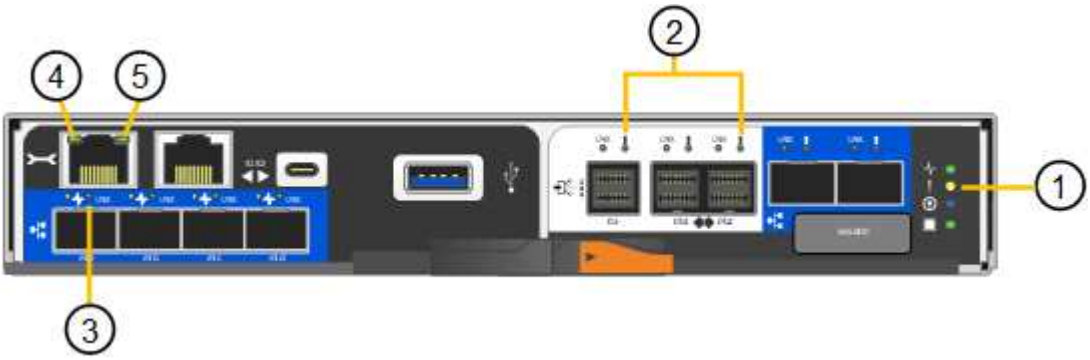
SG5800

The appliance controllers include indicators that help you determine the status of the appliance controller. Use this information to help troubleshoot SG5800 hardware installation.

Status indicators on SG5800 controller

After the StorageGRID Appliance Installer has started, you should periodically review the status indicators on the SG5800 controller.

The following figure shows status indicators on the SG5800 controller.



Callout	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	Expansion Port Attention LEDs	Amber: These LEDs are always amber (no link established) because the appliance does not use the expansion ports.
3	Host Port Link Status LEDs	Green: The link is up. Off: The link is down.
4	Ethernet Link State LEDs	Green: A link is established. Off: No link is established.

Callout	Display	Description
5	Ethernet Activity LEDs	Green: The link between the management port and the device to which it is connected (such as an Ethernet switch) is up. Off: There is no link between the controller and the connected device. Blinking Green: There is Ethernet activity.

Related information

NetApp Support

SG6000

The SG6000 appliance controllers include indicators that help you determine the status of the appliance controller:

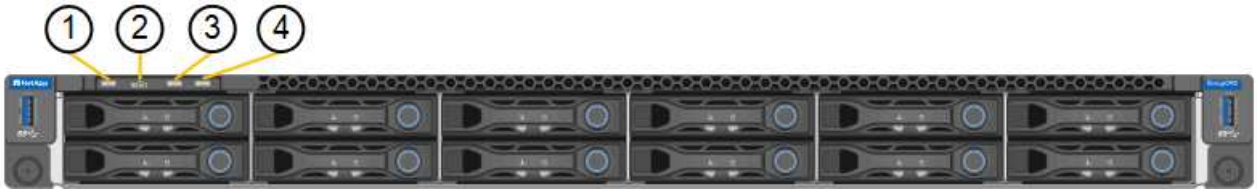
- Status indicators and buttons on SG6000-CN controller
- General boot-up codes
- Boot-up status codes for SG6000 storage controllers

Use this information to help troubleshoot SG6000 installation.

Status indicators and buttons on SG6000-CN controller

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

The following figure shows status indicators and buttons on the front of the SG6000-CN controller.



Callout	Display	Description
1	Power button	• Blue: The controller is powered on. • Off: The controller is powered off.
2	Reset button	*No indicator* Use this button to perform a hard reset of the controller.

Callout	Display	Description
3	Identify button	• Blinking or solid blue: Identifies the controller in the cabinet or rack. • Off: The controller is not visually identifiable in the cabinet or rack. This button can be set to Blink, On (Solid), or Off.
4	Alarm LED	• Amber: An error has occurred. **Note:** To view the boot-up and error codes, access the BMC interface. • Off: No errors are present.

The following figure shows the location of the power supply and identify LEDs on the rear of the SG6000-CN controller. Additional status and activity LEDs are on the appliance ports. These LEDs might vary by appliance model.

Callout	LED	State
1	Power supply LED	• Green, solid: power applied to appliance, power button is on. • Green, blinking: power applied to appliance, power button is off. • Off: no power applied to appliance. • Amber: power supply fault.
2	Identify LED	• Blue, blinking: Identifies the appliance in the cabinet or rack. • Blue, solid: Identifies the appliance in the cabinet or rack. • Off: The appliance is not visually identifiable in the cabinet or rack.

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, access the BMC interface.

Boot-up status codes for 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.

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

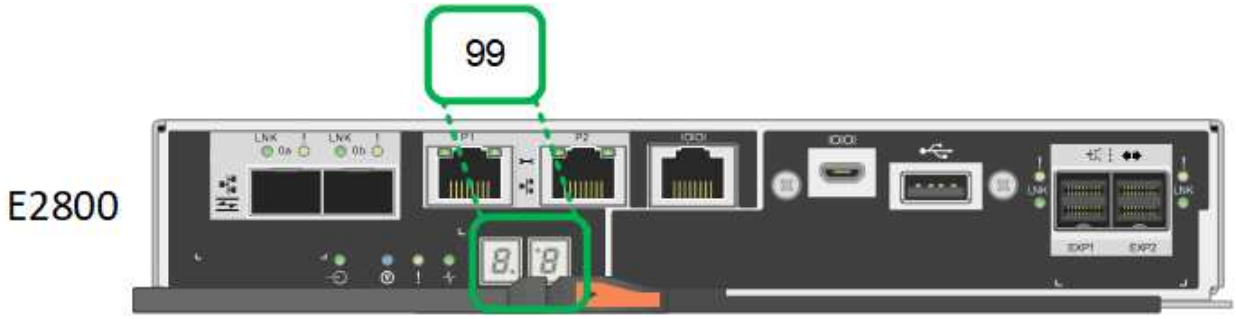
Steps

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 Troubleshoot hardware installation (SG6000 or SG5700) and confirm you completed the installation steps correctly. If you are unable to resolve the problem, contact technical support.

Related information

- NetApp Support
- Power on SG6000-CN controller and verify operation

SG6100

The appliance includes indicators that help you determine the status of the appliance controller and the SSDs:

- Appliance indicators and buttons
- General boot-up codes
- SSD indicators

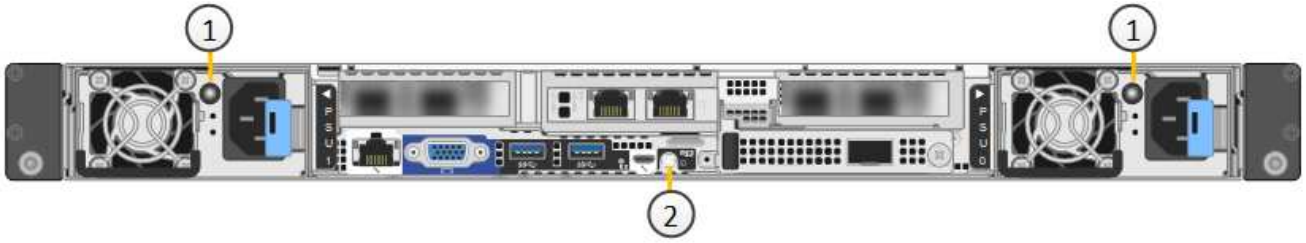
Use this information to help troubleshoot SG6100 hardware installation.

Appliance indicators and buttons

The following figure shows indicators and buttons on the front of the SG6100 appliances.

Callout	Display	State
1	Power button	• Blue: the appliance is powered on. • Off: the appliance is powered off.
2	Reset button	Use this button to perform a hard reset of the controller.
3	Identify button	Using the BMC, this button can be set to blink, On (Solid), or Off. • Blue, blinking: Identifies the appliance in the cabinet or rack. • Blue, solid: Identifies the appliance in the cabinet or rack. • Off: The appliance is not visually identifiable in the cabinet or rack.
4	Status LED	• Amber, solid: An error has occurred. **Note:** To view the boot-up and error codes, access the BMC interface. • Off: No errors are present.
5	PFR	This light is not used by SG6100 appliances and remains off.

The following figure shows the location of the power supply and identify LEDs on the rear of the SGF6112 and SG6100-CN. Additional status and activity LEDs are on the appliance ports. These LEDs might vary by appliance model.



Callout	LED	State
1	Power supply LED	• Green, solid: power applied to appliance, power button is on. • Green, blinking: power applied to appliance, power button is off. • Off: no power applied to appliance. • Amber: power supply fault.
2	Identify LED	• Blue, blinking: Identifies the appliance in the cabinet or rack. • Blue, solid: Identifies the appliance in the cabinet or rack. • Off: The appliance is not visually identifiable in the cabinet or rack.

General boot-up codes

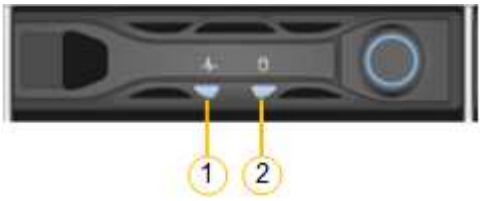
During boot-up or after a hard reset of the appliance, the following occurs:

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, access the BMC interface.

SSD indicators

The following figure shows SSD indicators on the SGF6112 or SG6160 appliance.



LED	Display	State
1	Drive status/fault	• Blue (solid): drive is online • Amber (solid): drive failure • Off: slot is empty **Note:** If a new working SSD is inserted into a working SGF6112 or SG6160 StorageGRID node, the LEDs on the SSD should blink initially, but stop blinking as soon as the system determines that the drive has enough capacity and is functional.
2	Drive active	Blue (blinking): drive is being accessed

Related information

NetApp Support

Set up hardware

Set up hardware: Overview

After applying power to the appliance, you configure the network connections that will be used by StorageGRID.

Configure required network connections

For all appliances, you perform several tasks to configure required network connections such as:

- Access the Appliance Installer
- Configure network links
- Verify port-level network connections

Additional configuration that might be required

Depending upon which appliance types you are configuring, additional hardware configuration might be required.

SANtricity System Manager

For SG6160, SG6000, SG5800, and SG5700, you configure SANtricity System Manager. The SANtricity software is used to monitor the hardware for these appliances.

BMC interface

The following appliances have a BMC interface that must be configured:

- SG100

- SG110
- SG1000
- SG1100
- SG6000
- SG6100

Optional configuration

- Storage appliances
  - Configure SANtricity System Manager (SG5700, SG5800, SG6000, and SG6100) the software you will use to monitor the hardware
  - Change the RAID mode
  - Access the BMC interface for the SG6000-CN or SG6100-CN controller
- Services appliances
  - Access the BMC interface for the SG100, SG110, SG1000, and SG1100

Configure StorageGRID connections

Access 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).

Before you begin

- 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 services appliance or storage appliance controller is connected to all of the StorageGRID networks you plan to use.
- You know the IP address, gateway, and subnet for the services appliance or storage appliance controller on these networks.
- You have configured the network switches you plan to use.

About this task

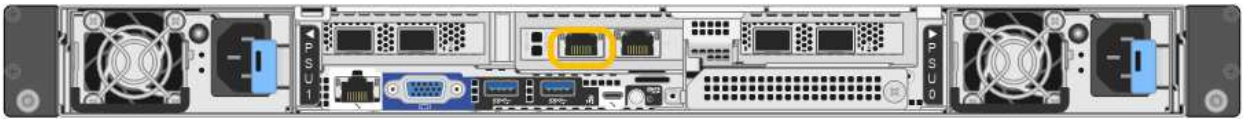
To initially access the StorageGRID Appliance Installer, you can use the DHCP-assigned IP address for the Admin Network port on the services appliance or storage appliance controller (assuming it is connected to the Admin Network), or you can connect a service laptop directly to the services appliance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

Steps

1. If possible, use the DHCP address for the Admin Network port on the services appliance or storage appliance controller. The Admin Network port is highlighted in the following figure. (Use the IP address on the Grid Network if the Admin Network is not connected.)

SG100

SG110



SG1000

SG1100

E5700SG

For the E5700SG, 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:

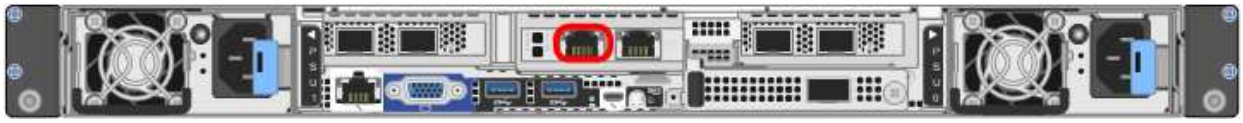
  - The first set of numbers is the DHCP address for the appliance Storage Node on the Admin Network, if it is connected. This IP address is assigned to management port 1 on the E5700SG controller.
  - The second set of numbers is the DHCP address for the appliance Storage Node on the Grid Network. This 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.

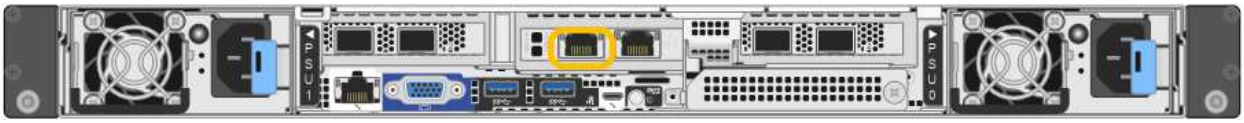
SG5800

SG6000-CN

SG6100-CN



SGF6112



a. Obtain the DHCP address for the appliance on the Admin Network from your network administrator.

b. From the client, enter this URL for the StorageGRID Appliance Installer:
`https://Appliance_IP:8443`

   For *`Appliance_IP`*, use the DHCP address (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.

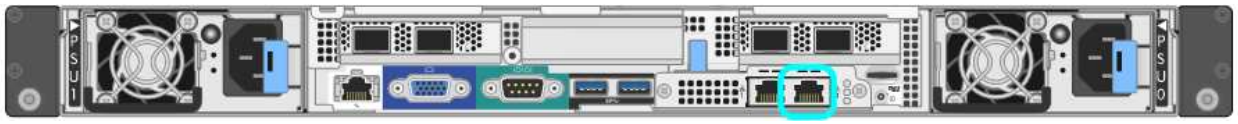
   The alert will not appear the next time you access this URL.

   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.

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

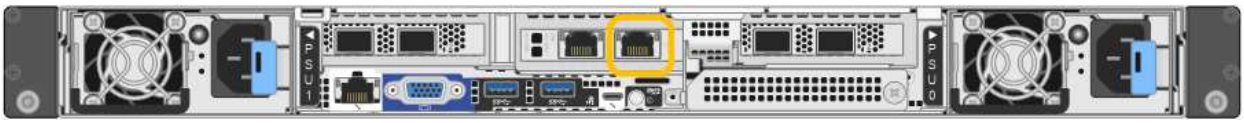
SG100

Connect a service laptop directly to the rightmost RJ-45 port on the services appliance, using an Ethernet cable.



SG110

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



SG1000

Connect a service laptop directly to the rightmost RJ-45 port on the services appliance, using an Ethernet cable.

SG1100

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

E5700SG

Connect the service laptop to management port 2 on the E5700SG controller, using an Ethernet cable.

SG5800

Connect the service laptop to management port 1 on the SG5800 controller, using an Ethernet cable.

SG6000-CN

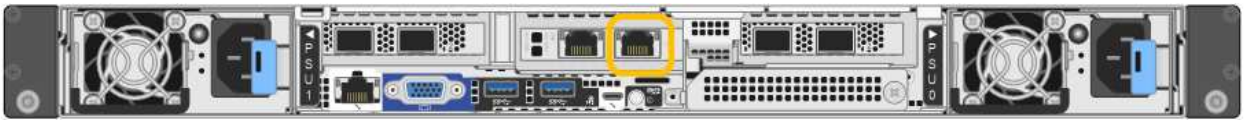
Connect a service laptop directly to the rightmost RJ-45 port on the SG6000-CN controller, using an Ethernet cable.

SG6100-CN

Connect a service laptop directly to the rightmost RJ-45 port on the SG6100-CN controller, using an Ethernet cable.

SGF6112

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



a. Open a web browser on the service laptop.

b. 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 can't 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.

  Verify and upgrade 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.

Verify and upgrade 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.

Before you begin

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 don't 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. Make sure that the Current Firmware version matches the software version installed on your StorageGRID system. (From the top of the Grid Manager, select the help icon and select **About**.)
3. If the appliance has a down-level version of the StorageGRID Appliance Installer, go to NetApp Downloads: StorageGRID Appliance.

   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 is a `.zip` archive that contains the current and previous firmware versions for all StorageGRID appliance models.

   After downloading the Support file for StorageGRID appliances, 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 your StorageGRID Appliance Installer to perform these steps:
   a. Upload the appropriate support file (firmware image) for your controller type. Some firmware versions also require uploading a checksum file. If you are prompted for a checksum file, it can also be found in the Support file for StorageGRID Appliances.
   b. Upgrade the inactive partition.
   c. Reboot and swap partitions.
   d. Upload the appropriate support file (firmware image) again for your controller type. Some firmware versions also require uploading a checksum file. If you are prompted for a checksum file, it can also be found in the Support file for StorageGRID Appliances.
   e. Upgrade the second (inactive) partition.

Related information

Accessing StorageGRID Appliance Installer

Configure network links

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.

If you are using ConfigBuilder to generate a JSON file, you can configure the network links automatically. See Automate appliance installation and configuration.

Before you begin

- You have obtained the additional equipment required for your cable type and link speed.
- You have installed the correct transceivers in the ports, based on the link speed you plan to use.
- 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

You only need to configure the settings on the Link Configuration page if you want to use values other than the default settings.

LACP PDU rate changes that are made following these instructions remain persistent in the StorageGRID environment. To make temporary changes to the LACP PDU rate when performing maintenance operations on network components installed in your appliance, see Temporarily changing the LACP PDU rate.

The figures and tables summarize the options for the port bond mode and network bond mode for each appliance. See the following for more information:

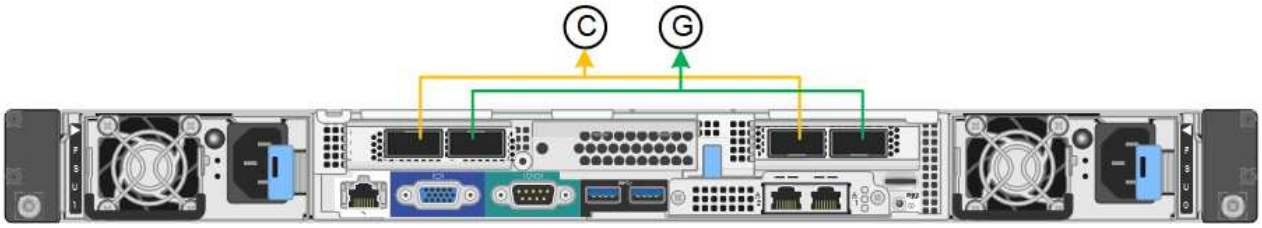
- Port bond modes (SG1000 and SG100)
- Port bond modes (SG1100 and SG110)
- Port bond modes (E5700SG)
- Port bond modes (SG5800)
- Port bond modes (SG6000-CN)
- Port bond modes (SGF6112 and SG6100-CN)

SG100 and SG1000

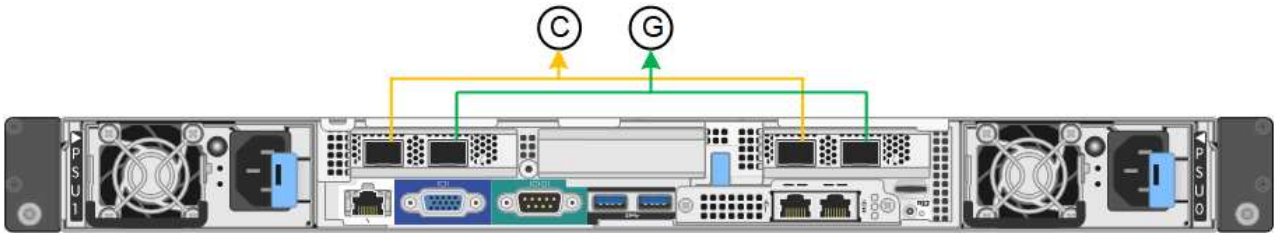
Fixed port bond mode (default)

The figures show how the four network ports on the SG1000 or SG100 are bonded in fixed port bond mode (default configuration).

SG1000:



SG100:



Callout	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.

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

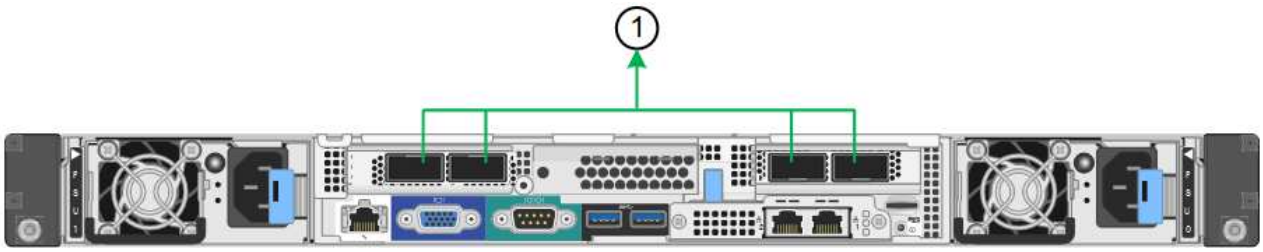
Network bond mode	Client Network disabled	Client Network enabled (default)
Active-Backup (default)	• Ports 2 and 4 use an active-backup bond for the Grid Network. • Ports 1 and 3 aren't used. • A VLAN tag is optional.	• Ports 2 and 4 use an active-backup bond for the Grid Network. • Ports 1 and 3 use an active-backup bond for the Client Network. • VLAN tags can be specified for both networks for the convenience of the network administrator.

Network bond mode	Client Network disabled	Client Network enabled (default)
LACP (802.3ad)	• Ports 2 and 4 use an LACP bond for the Grid Network. • Ports 1 and 3 aren't used. • A VLAN tag is optional. • LACP PDU rate and LACP transmit hash policy values can be specified in the Grid Network section.	• Ports 2 and 4 use an LACP bond for the Grid Network. • Ports 1 and 3 use an LACP bond for the Client Network. • VLAN tags can be specified for both networks for the convenience of the network administrator. • LACP PDU rate and LACP transmit hash policy values can be specified in the Grid Network and Client Network sections.

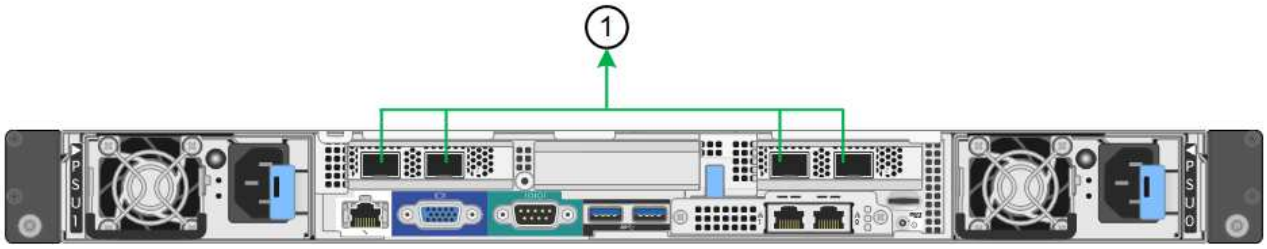
Aggregate port bond mode

These figures show how the four network ports are bonded in aggregate port bond mode.

SG1000:



SG100:



Callout	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. You only need to configure the settings on the Link Configuration page if you want to use a non-default setting.

Network bond mode	Client Network disabled	Client Network enabled (default)
LACP (802.3ad) only	• Ports 1-4 use a single LACP bond for the Grid Network. • A single VLAN tag identifies Grid Network packets. • LACP PDU rate and LACP transmit hash policy values can be specified in the Link settings section.	• Ports 1-4 use a single LACP bond for the Grid Network and the Client Network. • Two VLAN tags allow Grid Network packets to be segregated from Client Network packets. • LACP PDU rate and LACP transmit hash policy values can be specified in the Link settings section.

Active-Backup network bond mode for management ports

These figures show how the two 1-GbE management ports on the appliances are bonded in Active-Backup network bond mode for the Admin Network.

SG1000:

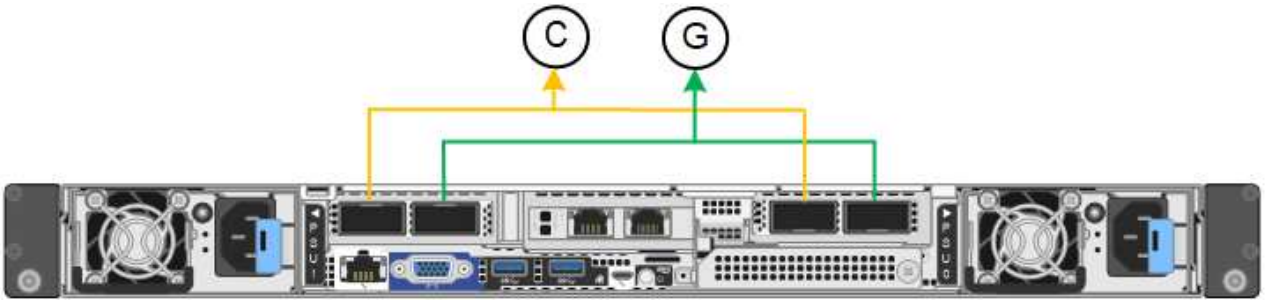
SG100:

SG110 and SG1100

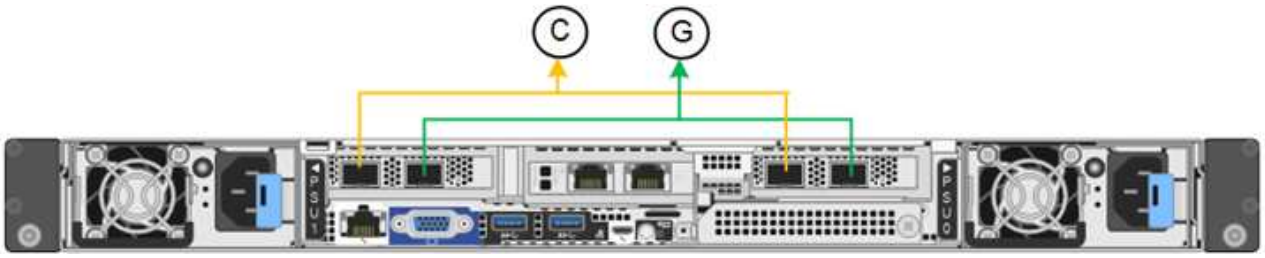
Fixed port bond mode (default)

The figures show how the four network ports on the SG1100 or SG110 are bonded in fixed port bond mode (default configuration).

SG1100:



SG110:



Callout	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.

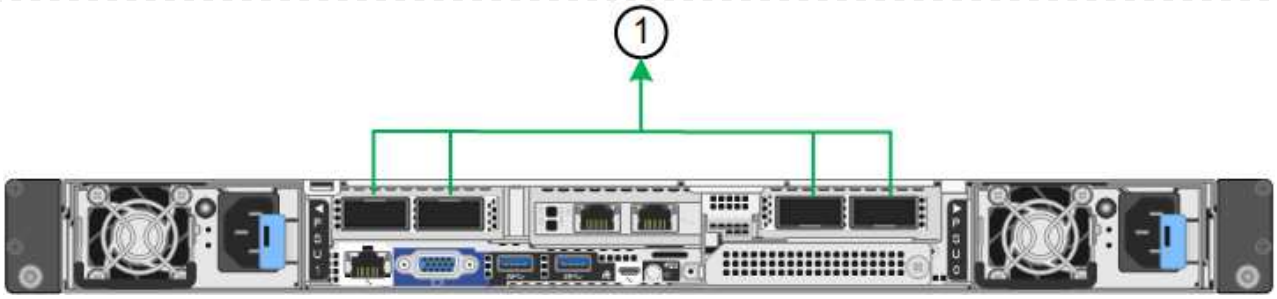
The table summarizes the options for configuring the four network ports. You only need to configure the settings on the Link Configuration page if you want to use a non-default setting.

Network bond mode	Client Network disabled	Client Network enabled (default)
Active-Backup (default)	• Ports 2 and 4 use an active-backup bond for the Grid Network. • Ports 1 and 3 aren't used. • A VLAN tag is optional.	• Ports 2 and 4 use an active-backup bond for the Grid Network. • Ports 1 and 3 use an active-backup bond for the Client Network. • VLAN tags can be specified for both networks for the convenience of the network administrator.
LACP (802.3ad)	• Ports 2 and 4 use an LACP bond for the Grid Network. • Ports 1 and 3 aren't used. • A VLAN tag is optional. • LACP PDU rate and LACP transmit hash policy values can be specified in the Grid Network section.	• Ports 2 and 4 use an LACP bond for the Grid Network. • Ports 1 and 3 use an LACP bond for the Client Network. • VLAN tags can be specified for both networks for the convenience of the network administrator. • LACP PDU rate and LACP transmit hash policy values can be specified in the Grid Network and Client Network sections.

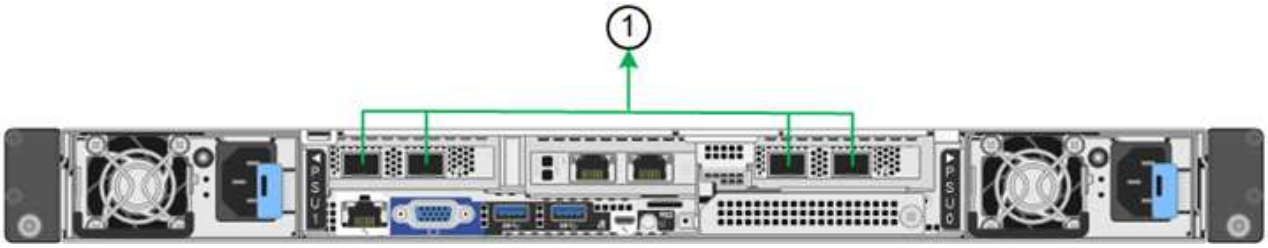
Aggregate port bond mode

These figures show how the four network ports are bonded in aggregate port bond mode.

SG1100:



SG110:



Callout	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.

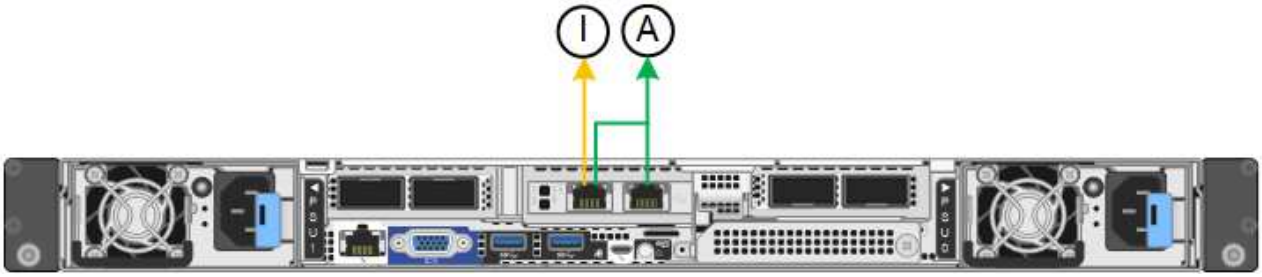
The table summarizes the options for configuring the network ports. You only need to configure the settings on the Link Configuration page if you want to use a non-default setting.

Network bond mode	Client Network disabled	Client Network enabled (default)
LACP (802.3ad) only	• Ports 1-4 use a single LACP bond for the Grid Network. • A single VLAN tag identifies Grid Network packets. • LACP PDU rate and LACP transmit hash policy values can be specified in the Link settings section.	• Ports 1-4 use a single LACP bond for the Grid Network and the Client Network. • Two VLAN tags allow Grid Network packets to be segregated from Client Network packets. • LACP PDU rate and LACP transmit hash policy values can be specified in the Link settings section.

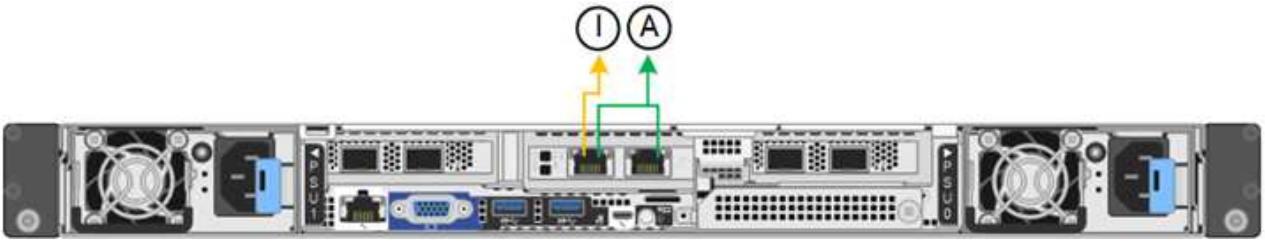
Active-Backup network bond mode for management ports

These figures show how the two 1-GbE management ports on the appliances are bonded in Active-Backup network bond mode for the Admin Network.

SG1100:



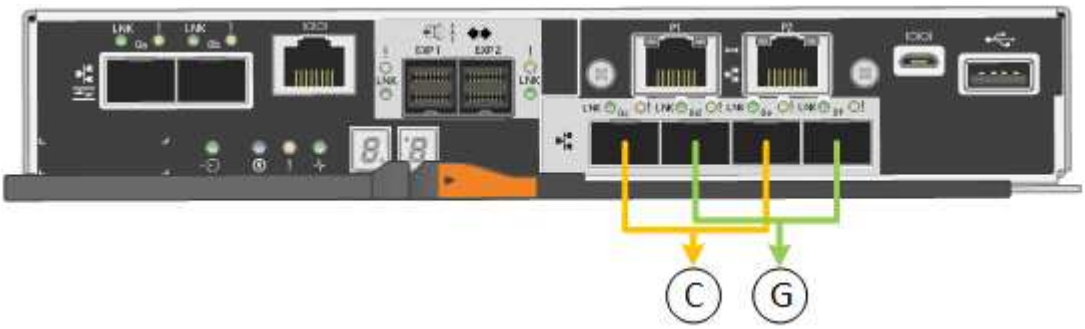
SG110:



SG5700

Fixed port bond mode (default)

This figure shows how the four 10/25-GbE ports are bonded in Fixed port bond mode (default configuration).



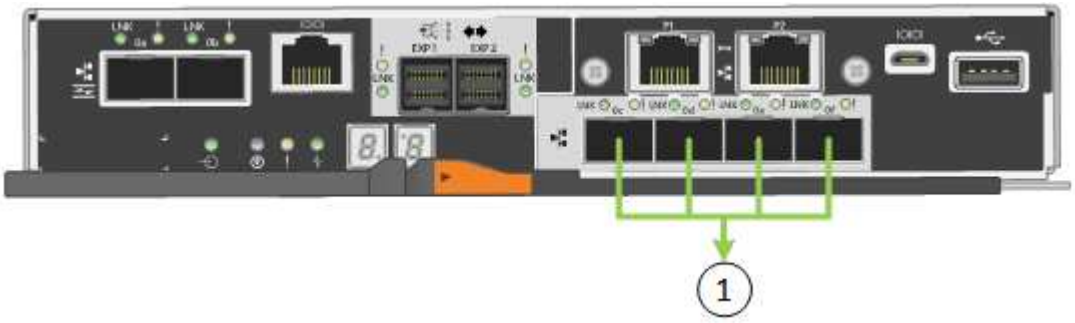
Callout	Which ports are bonded
C	Ports 1 and 3 are bonded together for the Client Network, if this network is used.
G	Ports 2 and 4 are bonded together for the Grid Network.

The table summarizes the options for configuring the four 10/25-GbE ports. You only need to configure the settings on the Link Configuration page if you want to use a non-default setting.

Network bond mode	Client Network disabled	Client Network enabled (default)
Active-Backup (default)	• Ports 2 and 4 use an active-backup bond for the Grid Network. • Ports 1 and 3 aren't used. • A VLAN tag is optional.	• Ports 2 and 4 use an active-backup bond for the Grid Network. • Ports 1 and 3 use an active-backup bond for the Client Network. • VLAN tags can be specified for both networks for the convenience of the network administrator.
LACP (802.3ad)	• Ports 2 and 4 use an LACP bond for the Grid Network. • Ports 1 and 3 aren't used. • A VLAN tag is optional. • LACP PDU rate and LACP transmit hash policy values can be specified in the Grid Network section.	• Ports 2 and 4 use an LACP bond for the Grid Network. • Ports 1 and 3 use an LACP bond for the Client Network. • VLAN tags can be specified for both networks for the convenience of the network administrator. • LACP PDU rate and LACP transmit hash policy values can be specified in the Grid Network and Client Network sections.

Aggregate port bond mode

This figure shows how the four 10/25-GbE ports are bonded in Aggregate port bond mode.



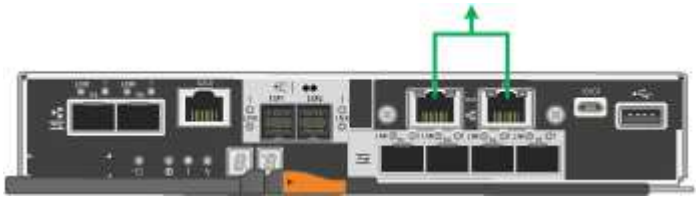
Callout	Which ports are bonded
1	All four ports are grouped in a single LACP bond, allowing all ports to be used for Grid Network and Client Network traffic.

The table summarizes the options for configuring the four 10/25-GbE ports. You only need to configure the settings on the Link Configuration page if you want to use a non-default setting.

Network bond mode	Client Network disabled	Client Network enabled (default)
LACP (802.3ad) only	• Ports 1-4 use a single LACP bond for the Grid Network. • A single VLAN tag identifies Grid Network packets. • LACP PDU rate and LACP transmit hash policy values can be specified in the Link settings section.	• Ports 1-4 use a single LACP bond for the Grid Network and the Client Network. • Two VLAN tags allow Grid Network packets to be segregated from Client Network packets. • LACP PDU rate and LACP transmit hash policy values can be specified in the Link settings section.

Active-Backup network bond mode for management ports

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.



SG5800

Fixed port bond mode (default)

This figure shows how the four 10/25-GbE ports are bonded in Fixed port bond mode (default configuration).

Callout	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.

The table summarizes the options for configuring the four 10/25-GbE ports. You only need to configure the settings on the Link Configuration page if you want to use a non-default setting.

Network bond mode	Client Network disabled	Client Network enabled (default)
Active-Backup (default)	• Ports 2 and 4 use an active-backup bond for the Grid Network. • Ports 1 and 3 aren't used. • A VLAN tag is optional.	• Ports 2 and 4 use an active-backup bond for the Grid Network. • Ports 1 and 3 use an active-backup bond for the Client Network. • VLAN tags can be specified for both networks for the convenience of the network administrator.
LACP (802.3ad)	• Ports 2 and 4 use an LACP bond for the Grid Network. • Ports 1 and 3 aren't used. • A VLAN tag is optional. • LACP PDU rate and LACP transmit hash policy values can be specified in the Grid Network section.	• Ports 2 and 4 use an LACP bond for the Grid Network. • Ports 1 and 3 use an LACP bond for the Client Network. • VLAN tags can be specified for both networks for the convenience of the network administrator. • LACP PDU rate and LACP transmit hash policy values can be specified in the Grid Network and Client Network sections.

Aggregate port bond mode

This figure shows how the four 10/25-GbE ports are bonded in Aggregate port bond mode.

Callout	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.

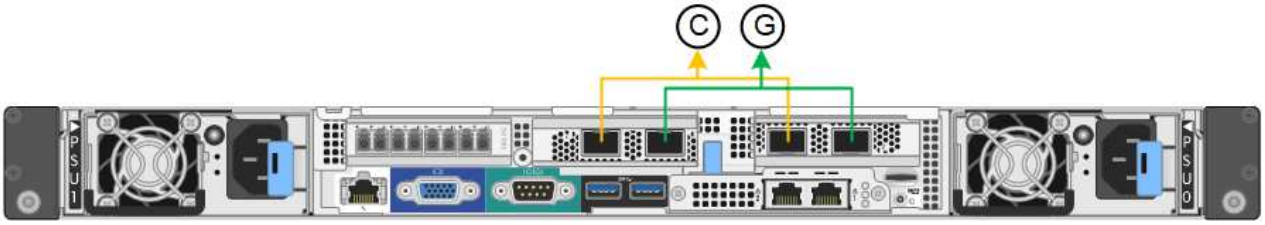
The table summarizes the options for configuring the four 10/25-GbE ports. You only need to configure the settings on the Link Configuration page if you want to use a non-default setting.

Network bond mode	Client Network disabled	Client Network enabled (default)
LACP (802.3ad) only	• Ports 1-4 use a single LACP bond for the Grid Network. • A single VLAN tag identifies Grid Network packets. • LACP PDU rate and LACP transmit hash policy values can be specified in the Link settings section.	• Ports 1-4 use a single LACP bond for the Grid Network and the Client Network. • Two VLAN tags allow Grid Network packets to be segregated from Client Network packets. • LACP PDU rate and LACP transmit hash policy values can be specified in the Link settings section.

SG6000

Fixed port bond mode (default)

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



Callout	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.

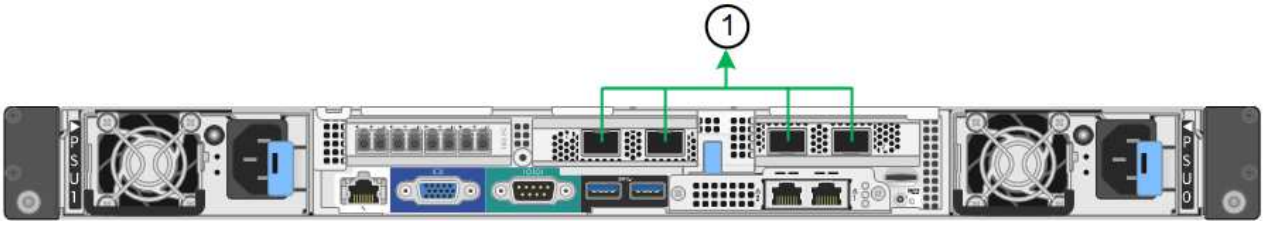
The table summarizes the options for configuring the network ports. You only need to configure the settings on the Link Configuration page if you want to use a non-default setting.

Network bond mode	Client Network disabled	Client Network enabled (default)
Active-Backup (default)	• Ports 2 and 4 use an active-backup bond for the Grid Network. • Ports 1 and 3 aren't used. • A VLAN tag is optional.	• Ports 2 and 4 use an active-backup bond for the Grid Network. • Ports 1 and 3 use an active-backup bond for the Client Network. • VLAN tags can be specified for both networks for the convenience of the network administrator.

Network bond mode	Client Network disabled	Client Network enabled (default)
LACP (802.3ad)	• Ports 2 and 4 use an LACP bond for the Grid Network. • Ports 1 and 3 aren't used. • A VLAN tag is optional. • LACP PDU rate and LACP transmit hash policy values can be specified in the Grid Network section.	• Ports 2 and 4 use an LACP bond for the Grid Network. • Ports 1 and 3 use an LACP bond for the Client Network. • VLAN tags can be specified for both networks for the convenience of the network administrator. • LACP PDU rate and LACP transmit hash policy values can be specified in the Grid Network and Client Network sections.

Aggregate port bond mode

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



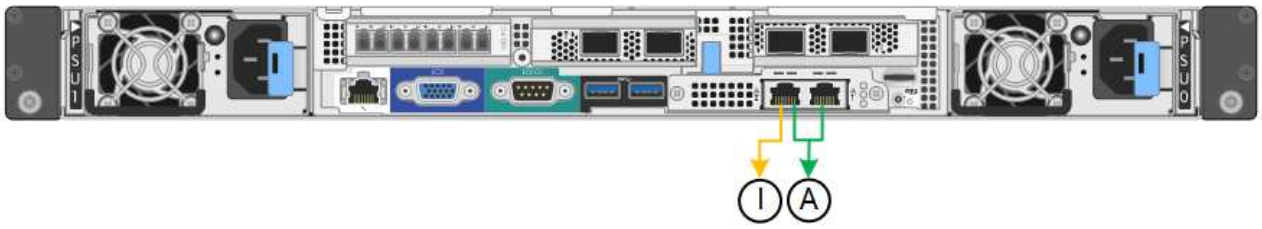
Callout	Which ports are bonded
1	All four ports are grouped in a single LACP bond, allowing all ports to be used for Grid Network and Client Network traffic.

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

Network bond mode	Client Network disabled	Client Network enabled (default)
LACP (802.3ad) only	• Ports 1-4 use a single LACP bond for the Grid Network. • A single VLAN tag identifies Grid Network packets. • LACP PDU rate and LACP transmit hash policy values can be specified in the Link settings section.	• Ports 1-4 use a single LACP bond for the Grid Network and the Client Network. • Two VLAN tags allow Grid Network packets to be segregated from Client Network packets. • LACP PDU rate and LACP transmit hash policy values can be specified in the Link settings section.

Active-Backup network bond mode for management ports

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.

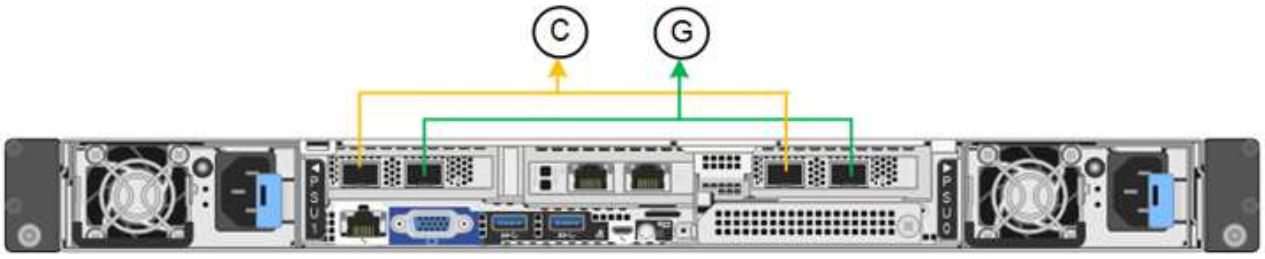


SG6100

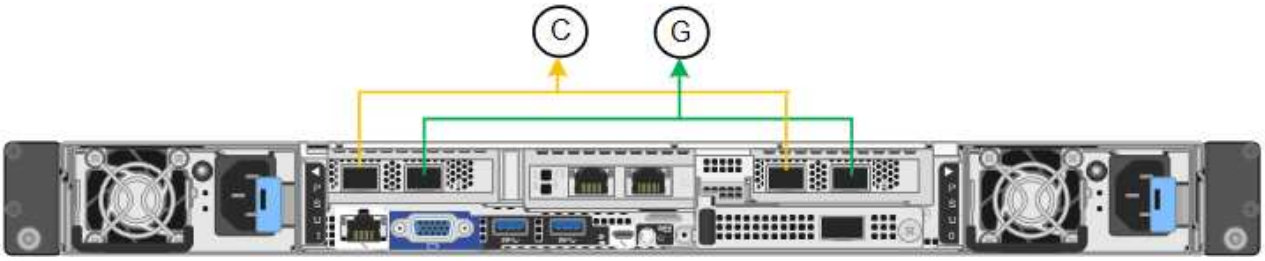
Fixed port bond mode (default)

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

SGF6112:



SG6100:



Callout	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.

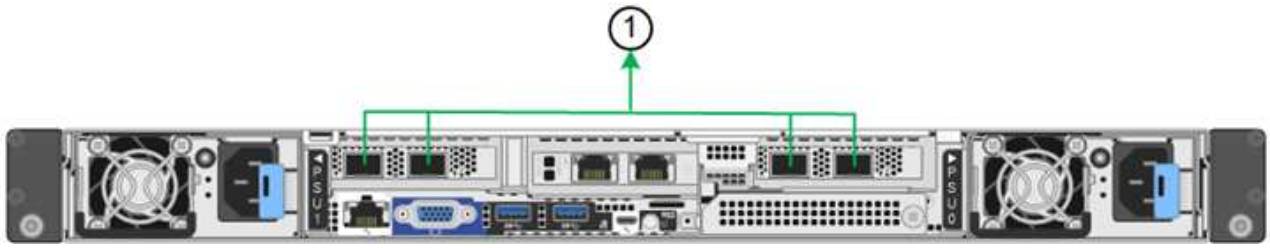
The table summarizes the options for configuring the network ports. You only need to configure the settings on the Link Configuration page if you want to use a non-default setting.

Network bond mode	Client Network disabled	Client Network enabled (default)
Active-Backup (default)	• Ports 2 and 4 use an active-backup bond for the Grid Network. • Ports 1 and 3 aren't used. • A VLAN tag is optional.	• Ports 2 and 4 use an active-backup bond for the Grid Network. • Ports 1 and 3 use an active-backup bond for the Client Network. • VLAN tags can be specified for both networks for the convenience of the network administrator.
LACP (802.3ad)	• Ports 2 and 4 use an LACP bond for the Grid Network. • Ports 1 and 3 aren't used. • A VLAN tag is optional. • LACP PDU rate and LACP transmit hash policy values can be specified in the Grid Network section.	• Ports 2 and 4 use an LACP bond for the Grid Network. • Ports 1 and 3 use an LACP bond for the Client Network. • VLAN tags can be specified for both networks for the convenience of the network administrator. • LACP PDU rate and LACP transmit hash policy values can be specified in the Grid Network and Client Network sections.

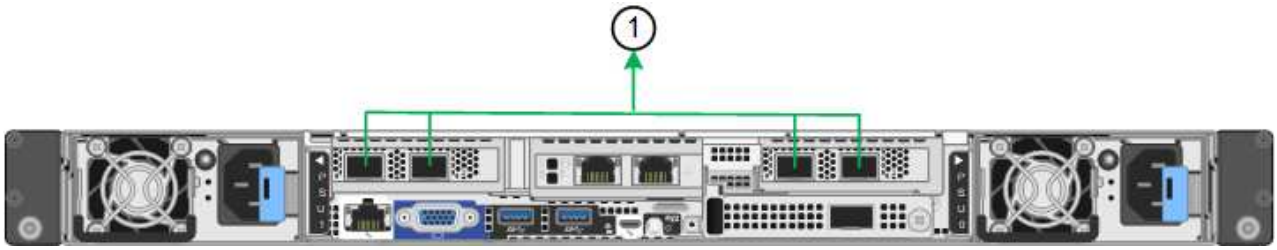
Aggregate port bond mode

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

SGF6112:



SG6100:



Callout	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.

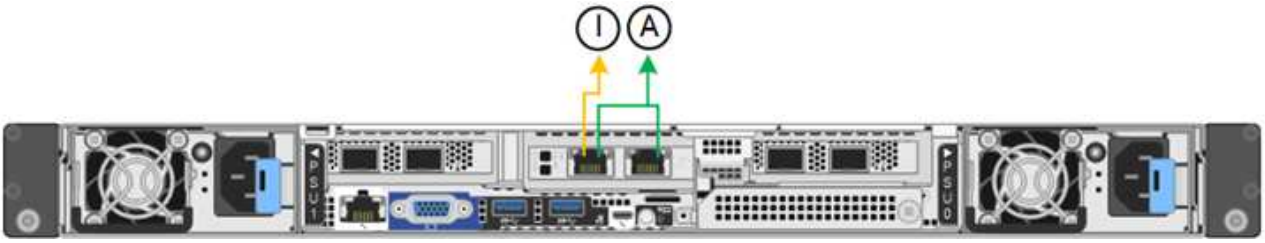
The table summarizes the options for configuring the network ports. You only need to configure the settings on the Link Configuration page if you want to use a non-default setting.

Network bond mode	Client Network disabled	Client Network enabled (default)
LACP (802.3ad) only	• Ports 1-4 use a single LACP bond for the Grid Network. • A single VLAN tag identifies Grid Network packets. • LACP PDU rate and LACP transmit hash policy values can be specified in the Link settings section.	• Ports 1-4 use a single LACP bond for the Grid Network and the Client Network. • Two VLAN tags allow Grid Network packets to be segregated from Client Network packets. • LACP PDU rate and LACP transmit hash policy values can be specified in the Link settings section.

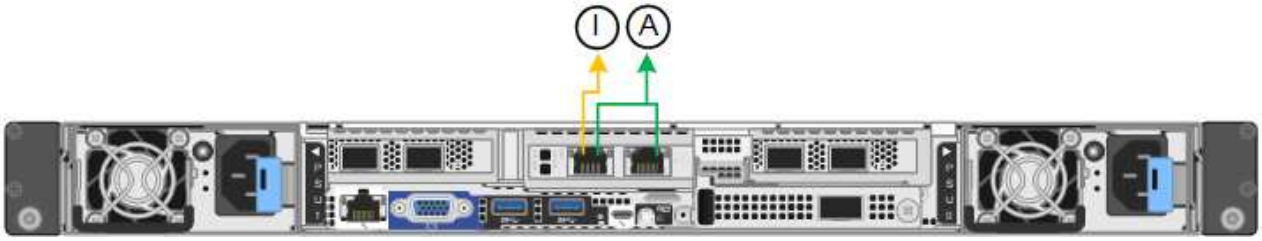
Active-Backup network bond mode for management ports

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

SGF6112:



SG6100:



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.

   The Link Status table lists the link state, link speed, and other statistics of the numbered ports.

   For the SG5800, the link state for port 1 is unavailable in software and must be physically verified using the status LED on the SG5800 controller.

The first time you access this page, the default values are:

- **Link Speed** is set to **Auto**.
- **Port bond mode** is set to **Fixed**.
- **LACP transmit hash policy** is set to **Layer2+3**.
- **LACP PDU rate** is set to **Fast**.
- **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 enabled.

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.

   If you plan to use the 25-GbE link speed for the SG6100, SG6000, SG5800, or SG5700 network ports:

   - Use SFP28 transceivers and SFP28 TwinAx cables or optical cables.
   - For the SG5700, select **25GbE** from the **Link speed** drop-down list.
   - For the SG5800, SG6000, or SG6100, select **Auto** from the **Link speed** drop-down list.

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

   The Grid Network is required. You can't disable this network.

   a. If the appliance is not connected to the Admin Network, clear the **Enable network** checkbox for the Admin Network.
   b. If the appliance is connected to the Client Network, select the **Enable network** checkbox for the Client Network.

      The Client Network settings for the data NIC ports are now shown.

4. Refer to the fixed and aggregate port bond mode configuration table for each appliance type, and configure the port bond mode and the network bond mode to match your network configuration.

   You must specify a unique VLAN tags for the Grid and the Client Networks. You can select values between 0 and 4095.

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 aren't reconnected within 1 minute, re-enter the URL for the StorageGRID Appliance Installer using one of the other IP addresses assigned to the appliance:
> **`https://appliance_IP:8443`**

Configure StorageGRID IP addresses

Use the StorageGRID Appliance Installer to configure IP addresses and routing for the services appliance or Storage Node on the Grid, Admin, and Client Networks.

If you are using ConfigBuilder to generate a JSON file, you can configure IP addresses automatically. See Automate appliance installation and configuration.

About this task

You must either assign a static IP address for the appliance on each connected Grid or Admin Network or assign a permanent lease for the address on the DHCP server. Static IP address or DHCP configuration is optional for a connected Client Network.

To enable or disable a link or change the link configuration, see the following instructions:

- Change link configuration of the SG100 or SG1000 services appliance
- Change link configuration of the SG110 or SG1100 services appliance
- Change link configuration of the E5700SG controller
- Change link configuration of the SG5800 controller
- Change link configuration of the SG6000-CN controller
- Change link configuration of the SG6100 appliance

> Do not use subnets that contain the following IPv4 addresses for the Grid Network, Admin Network, or Client Network of any node:
>
> - 192.168.130.101
> - 192.168.131.101
> - 192.168.130.102
> - 192.168.131.102
> - 198.51.100.2
> - 198.51.100.4
>
> For example, do not use the following subnet ranges for the Grid Network, Admin Network, or Client Network of any node:
>
> - 192.168.130.0/24 because this subnet range contains the IP addresses 192.168.130.101 and 192.168.130.102
> - 192.168.131.0/24 because this subnet range contains the IP addresses 192.168.131.101 and 192.168.131.102
> - 198.51.100.0/24 because this subnet range contains the IP addresses 198.51.100.2 and 198.51.100.4

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 and

then enter your network settings.

Static

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

a. Enter the static IPv4 address, using CIDR notation.

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.

   > 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 don't 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://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.

   > 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 ✖.

DHCP

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.

   > 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 don't have to be the same for all network types.

d. Click **Save**.

3. To configure the Admin Network, select either **Static** or **DHCP** in the **Admin Network** section of the page and then enter your network settings.

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

Static

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.

   See Cable appliance for the Management Port 1 location on your 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://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 can't 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 ✖.

DHCP

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 can't 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**.

4. To configure the Client Network, select either **Static**, **DHCP**, or **None** in the **Client Network** section of the page and then enter your network settings.

> To configure the Client Network, make sure that the Client Network is enabled on the Link Configuration page.

Static

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

a. Enter the static IPv4 address, using CIDR notation.

b. Click **Save**.

c. 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 can't be moved to another interface while the Client Network is enabled.

d. 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.

e. Click **Save**.

DHCP

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

a. 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 can't 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.

None

Select **None** to enable the Client Network without specifying an IP address. The Client Network only needs an IP address for direct access. Enabling the Client Network without an IP address lets you to configure the Client Network VLAN interfaces in StorageGRID.

Verify 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.

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** checkbox 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.

Related information

- Configure network links
- Change MTU setting

Verify 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 network port reference.

> The Grid Network ports listed in the port connectivity table are valid only for StorageGRID version 11.7 or later. 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.

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 space-separated list or a range of IPv4 addresses for the hosts on that network.
4. Enter a TCP port number, a list of ports separated by commas, or a range of ports.
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. Unreachable hosts will not appear in the nmap command output.
   - 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. Unreachable hosts will not appear in the nmap command output.

     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.

   - If a port-level network connection can’t 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. Unreachable hosts will not appear in the nmap command output.

     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.

Configure SANtricity System Manager (SG6160, SG6000, SG5700, and SG5800)

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.

Set up and access 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.

Before you begin

- You are using a supported web browser.

- To access SANtricity System Manager through Grid Manager, you have installed StorageGRID, and you have the Storage appliance administrator permission or Root access permission.
- To access SANtricity System Manager using the StorageGRID Appliance Installer, you have the SANtricity System Manager administrator username and password.
- To access SANtricity System Manager directly using a web browser, you 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 don't 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 can't 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 NetApp E-Series documentation.

- 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

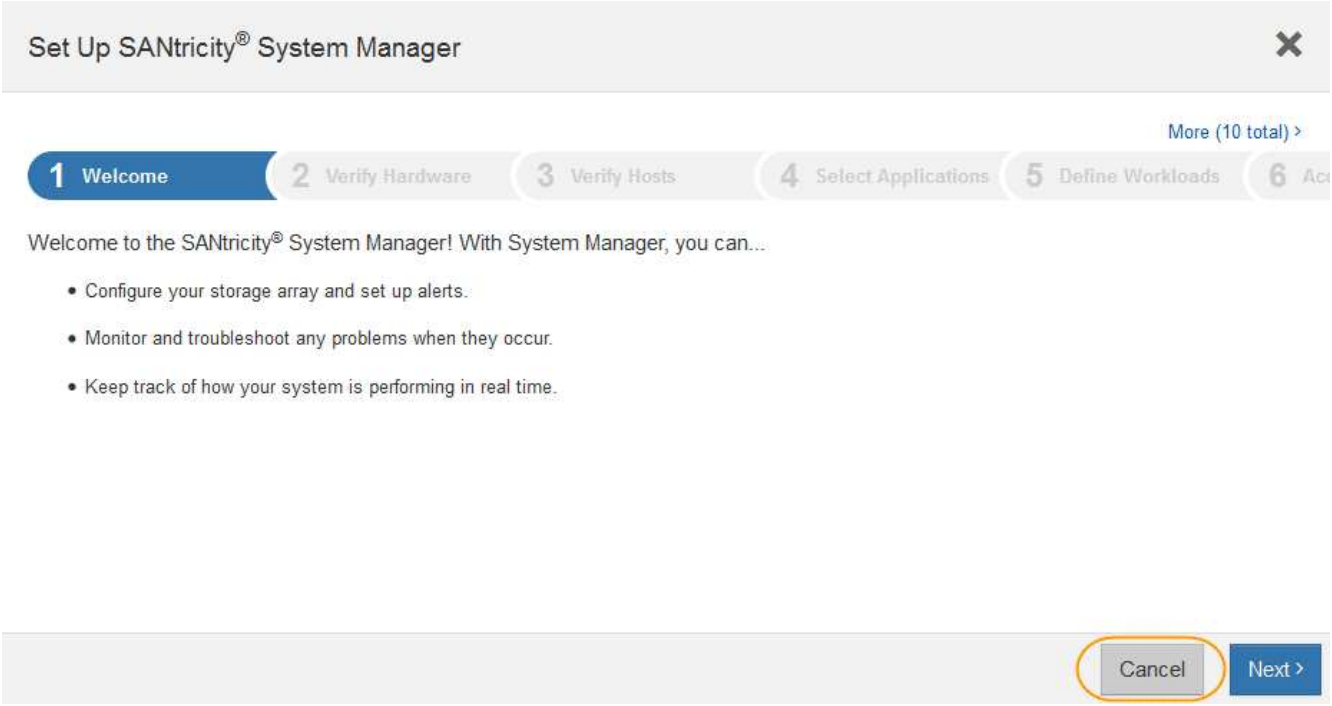
Steps

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 aren't available or the login page does not appear, use the IP addresses for the storage controllers. Access SANtricity System Manager by browsing to the storage controller IP.

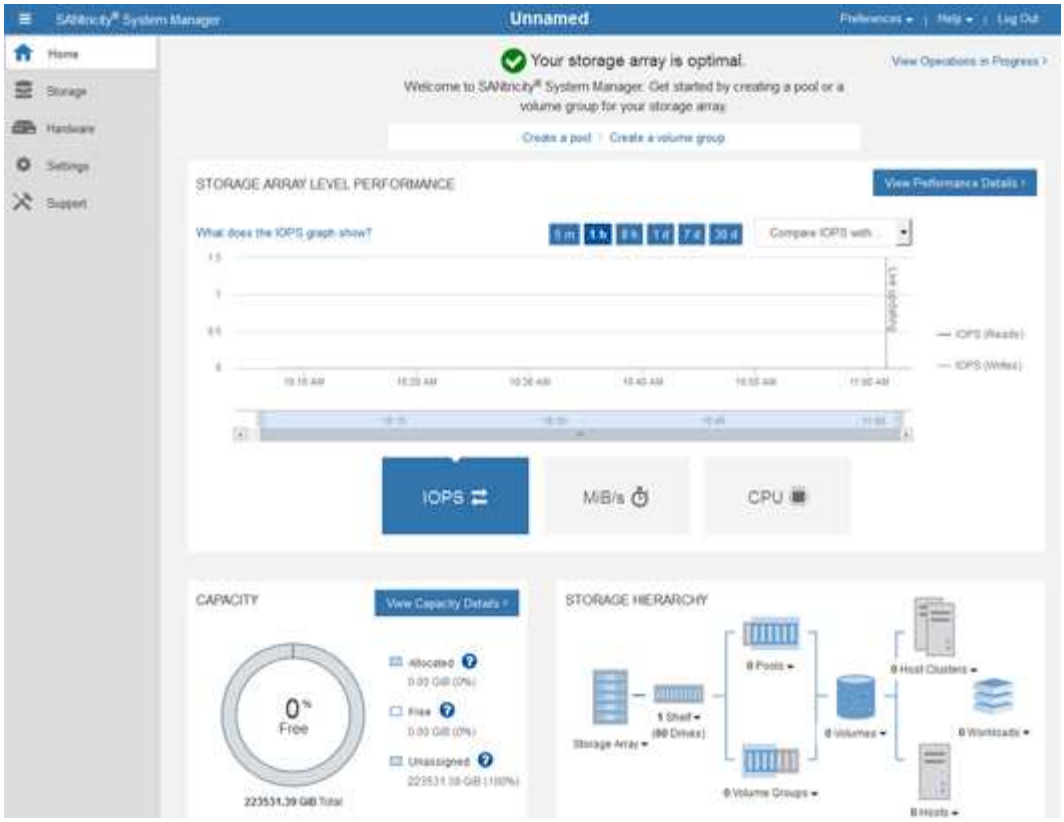
2. Set or enter the administrator password.

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



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

   > Don't complete the Set Up wizard for a StorageGRID appliance.



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 configuring storage proxy settings.

6. If Drive Security is enabled for the appliance, create and manage the security key.

SG5700 and SG5800

For the SG5700 and SG5800 storage appliances follow the high-level steps to implement drive security in SANtricity System Manager.

SG6060

For the SG6060 storage appliance, drive security can be automatically enabled on the SSD drives only if key management was configured before installing the Storage Appliance.

a. Equip your storage array with secure-capable drives (FDE drives or FIPS drives).
   - For volumes that require FIPS support, use only FIPS drives.
   - Mixing FIPS and FDE drives in a volume group or pool results in all drives being treated as FDE drives.
   - An FDE drive cannot be added to or used as a spare in an all-FIPS volume group or pool.

b. For the E2800 controller shelf, create a security key (a string of characters that is shared by the controller and drives for read and write access).
   - You can create an internal key from the controller's persistent memory or use an external key provided by a key management server.
   - To use an external key provided by a key management server, you must first establish authentication with a key management server in SANtricity System Manager.

c. Start installation of the appliance.

d. After appliance installation is complete, confirm that drive security was enabled for the StorageGRID flash cache and enable drive security for all remaining disk pools or volume groups (See Enable security for a pool or volume group in SANtricity System Manager).

SG6160

The SG6160 storage appliance can be equipped with FIPS-compliant drives in both the SG6100-CN compute controller and the E4000 controller shelf. Drive encryption is configured separately for the SG6100-CN drives and E4000 drives.

a. Enable Drive Encryption for SED SSDs installed in the SG6100-CN compute node.

b. Create a security key (a string of characters shared by the controller and drives for read/write access).
   - You can create an internal key from the controller's persistent memory or use an external key provided by a key management server.
   - To use an external key provided by a key management server, you must first establish authentication with a key management server in SANtricity System Manager.

c. Start installation of the appliance.

d. After install is complete, enable drive security in SANtricity System Manager for all disk pools or volume groups.

Review 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.

Before you begin

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

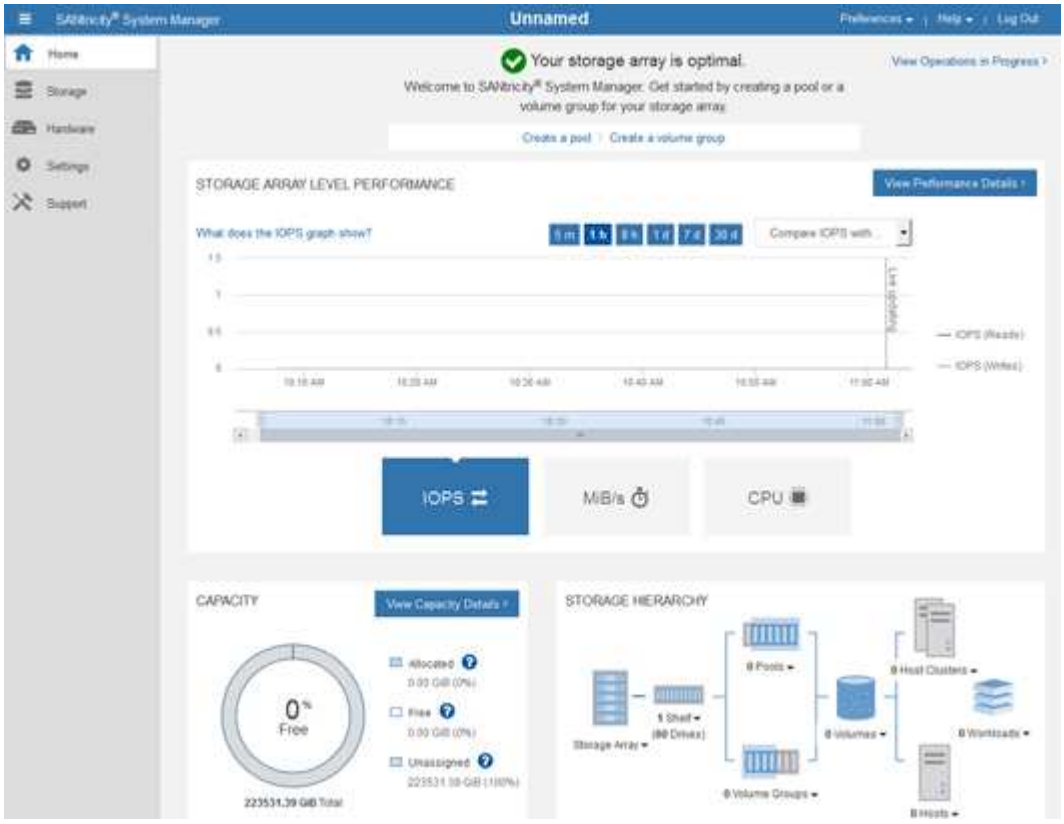
> ⓘ You must have SANtricity firmware 8.70 or higher to access SANtricity System Manager using the Grid Manager or the StorageGRID Appliance Installer.

> ⓘ 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 don't apply to monitoring your StorageGRID appliance. To avoid issues, always follow the hardware installation and maintenance instructions for your appliance.

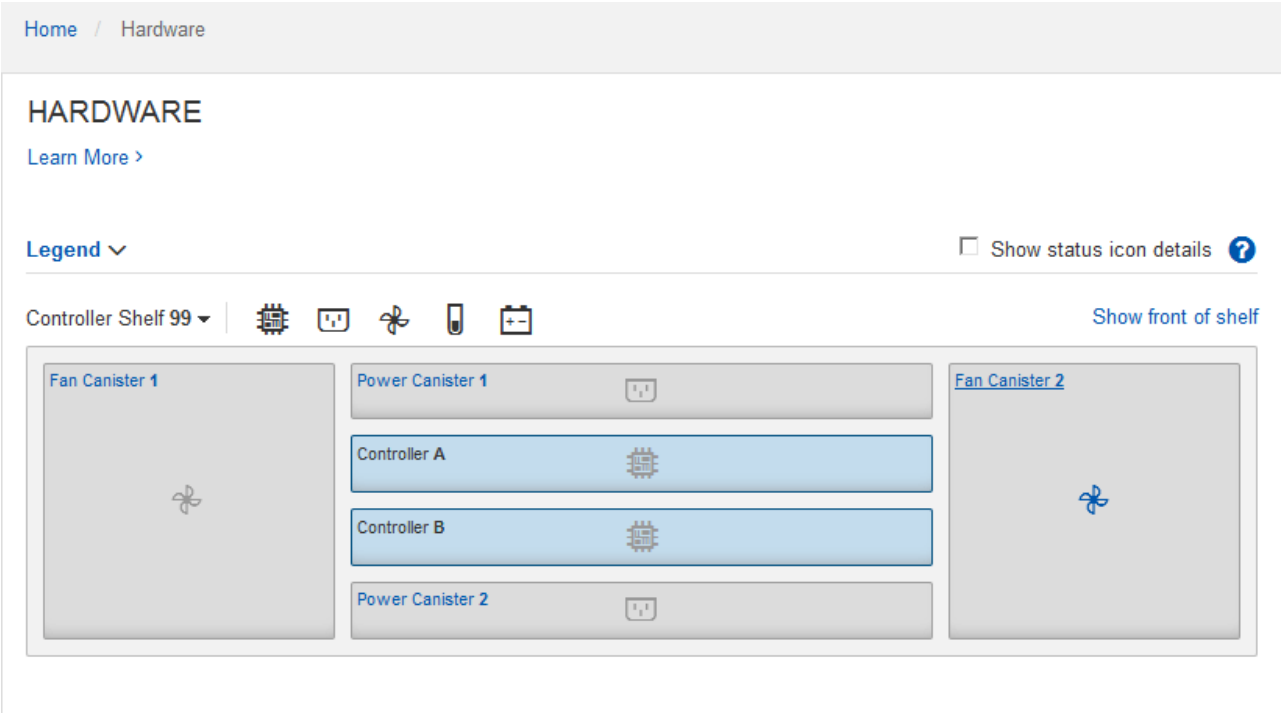
Steps

1. Access SANtricity System Manager.
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**.



   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.

Set IP addresses for storage controllers using StorageGRID Appliance Installer

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

Before you begin

- 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 don't 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.

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.
   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`

Configure BMC interface (SG100, SG110, SG1000, SG1100, SG6000, and SG6100)

BMC interface: Overview (SG100, SG110, SG1000, SG1100, SG6000, and SG6100)

The user interface for the baseboard management controller (BMC) on the SG6100,

SG6000, or services appliance provides status information about the hardware and allows you to configure SNMP settings and other options for the appliances.

Use the following procedures in this section to configure the BMC when you install the appliance:

- Change admin or root password for BMC interface
- Set IP address for BMC management port
- Access BMC interface
- Configure SNMP settings
- Set up email notifications for BMC alerts

> If the appliance has already been installed into a grid and is running StorageGRID software, use the following procedures:
>
> - Place the appliance into maintenance mode to access the StorageGRID appliance installer.
> - See Set IP address for BMC management port for information about accessing the BMC interface using the StorageGRID Appliance Installer.

Change admin or root password for BMC interface

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

Before you begin

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 admin or root user. You must change the password for the admin or root user to secure your system.

The default user depends on when you installed your StorageGRID appliance. The default user is **admin** for new installations and **root** for older installations.

Steps

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

   `https://Appliance_IP:8443`

   For *`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 admin or root account in the two fields provided.
4. Select **Save**.

Set IP address for BMC management port

Before you can access the BMC interface, configure the IP address for the BMC management port on the SGF6112, SG6000-CN controller, SG6100-CN controller or services appliances.

If you are using ConfigBuilder to generate a JSON file, you can configure IP addresses automatically. See Automate appliance installation and configuration.

Before you begin

- 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

SG110

SG1000

SG1100

SG6000

SG6100

SGF6112:

SG6100-CN:

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://Appliance_IP:8443`

For `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. In the LAN IP Settings, 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.

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.
   d. Click **Save**.

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

Access BMC interface

You can access the BMC interface using the DHCP or static IP address for the BMC management port on the following appliance models:

- SG100
- SG110
- SG1000
- SG1100
- SG6000
- SG6100

Before you begin

- The management client is using a supported web browser.
- The BMC management port on the appliance is connected to the management network you plan to use.

SG100

SG110

SG1000

SG1100

SG6000

SG6100

SGF6112:

SG6100-CN:

Steps

1. 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.

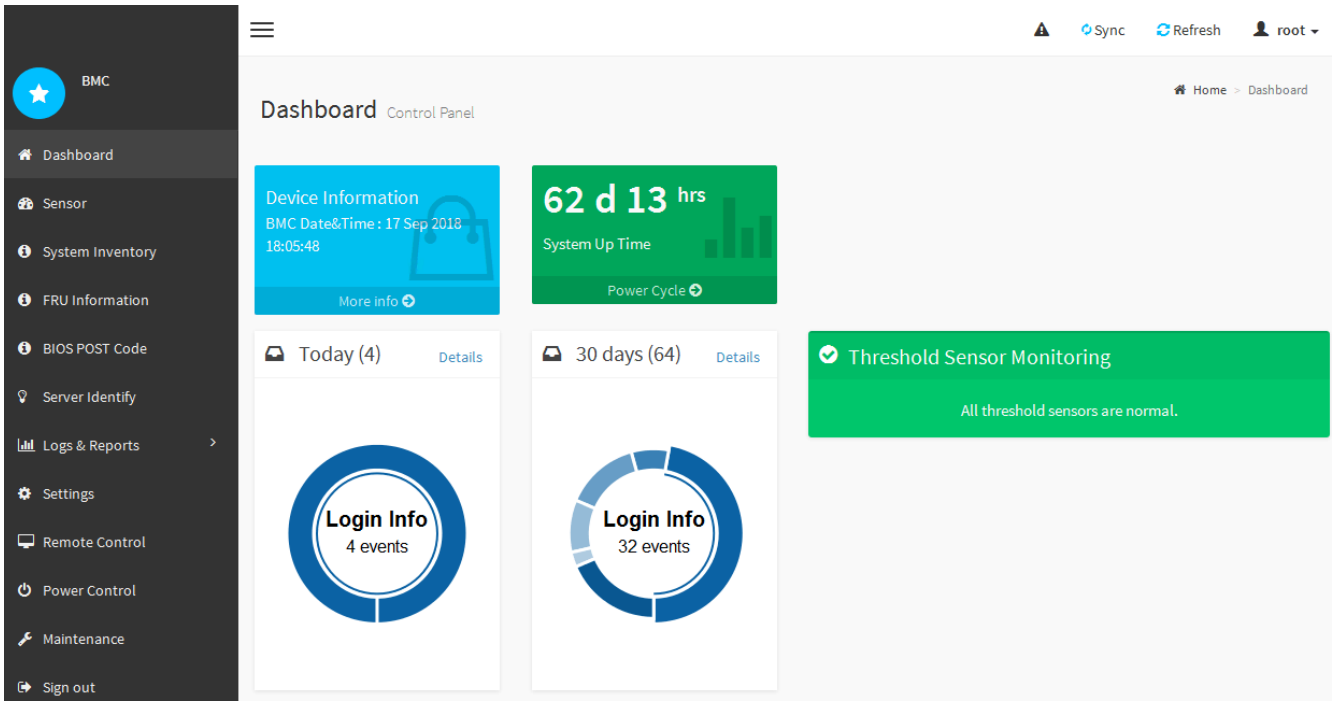
   The BMC sign-in page appears.

If you haven't yet configured `BMC_Port_IP`, follow the instructions in Configure BMC interface. If you are unable to follow that procedure due to a hardware problem, and have not yet configured a BMC IP address, you might still be able to access the BMC. By default, the BMC obtains an IP address using DHCP. If DHCP is enabled on the BMC network, your network administrator can provide the IP address assigned to the BMC MAC, which is printed on the label on the front of the appliance. If DHCP is not enabled on the BMC network, the BMC will not respond after a few minutes and assign itself the default static IP `192.168.0.120`. You might need to connect your laptop directly to the BMC port, and change the networking setting to assign your laptop an IP such as `192.168.0.200/24`, in order to browse to `192.168.0.120`.

2. Enter the admin or root username and password, using the password you set when you changed the default password:

The default user depends on when you installed your StorageGRID appliance. The default user is **admin** for new installations and **root** for older installations.

3. Select **Sign me in**.



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.

Configure SNMP settings for BMC

If you are familiar with configuring SNMP for hardware, you can use the BMC interface to configure the SNMP settings for the SG6100, SG6000, and services appliances. You can provide secure community strings, enable SNMP Trap, and specify up to five SNMP

destinations.

SG110, SG1100, SG6100-CN, SGF6112

Before you begin

- You know how to access the BMC dashboard.
- You have experience in configuring SNMP settings for SNMPv3 equipment.

> BMC settings made by this procedure might not be preserved if the appliance fails and has to be replaced. Make sure you have a record of all settings you have applied, so they can be easily reapplied after a hardware replacement if necessary.

These instructions show the latest version of BMC firmware available for some StorageGRID appliances. Your StorageGRID appliance might have a BMC firmware version that is slightly different.

- The latest version of BMC firmware supports only SNMPv3.
- The BMC firmware updates during StorageGRID software upgrades. If you are not running the latest version of StorageGRID software, you can update your appliance to the latest StorageGRID version to install the latest BMC firmware version available for your appliance.
- If your BMC appears different before or after a StorageGRID update:
  - See instructions on the SG100, SG1000, SG6000-CN tab.
  - Use the StorageGRID BMC might also have information to help you adapt these instructions for your BMC version.

Steps

1. Configure SNMP traps as one or more LAN destinations.
   a. From the BMC dashboard, select **Settings** > **Platform Event Filters** > **LAN Destinations**.
   b. For Destination Type, select **SNMP Trap**.
   c. For SNMP Destination Address, enter the target IP address.

      > Use an IP address for the SNMP Destination Address. DNS names aren't supported.

   d. Select **Save**.
2. If you are using SNMP traps to deliver alert notifications, see the Platform Event Filters section of the BMC User Guide for information about using the BMC to configure Alert Policies and Event Filters.
3. (Optional) Enable and configure SNMP for a BMC user.
   a. From the BMC dashboard, select **Settings** > **User Management**; then, select a BMC User.
   b. See the User Management section of the BMC User Guide for information about configuring SNMP settings for a BMC user.

SG100, SG1000, SG6000-CN

Before you begin

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

BMC settings made by this procedure might not be preserved if the appliance fails and has to be replaced. Make sure you have a record of all settings you have applied, so they can be easily reapplied after a hardware replacement if necessary.

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. DNS names aren't supported.

   Enable traps if you want the appliance to send immediate notifications to an SNMP console when it is in an unusual state. Depending on the device, traps might indicate hardware failures of various components, link up/down conditions, temperature thresholds being exceeded, or high traffic.

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

Set up email notifications for BMC alerts

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

BMC settings made by this procedure might not be preserved if a controller or appliance fails and has to be replaced. Make sure you have a record of all settings you have applied, so they can be easily reapplied after a hardware replacement if necessary.

StorageGRID 11.9 and later

Before you begin

You know how to access the BMC dashboard.

About this task

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

These instructions show the latest version of BMC firmware available for some StorageGRID appliances. Your StorageGRID appliance might have a BMC firmware version that is slightly different.

- The BMC firmware updates during StorageGRID software upgrades. If you are not running the latest version of StorageGRID software, you can update your appliance to the latest StorageGRID version to install the latest BMC firmware version available for your appliance.
- If your BMC appears different before or after a StorageGRID update:
  - See instructions on the StorageGRID 11.8 tab.
  - Use the StorageGRID BMC might also have information to help you adapt these instructions for your BMC version.

Steps

1. Configure email notifications as one or more LAN destinations.
   a. From the BMC dashboard, select **Settings** > **Platform Event Filters** > **LAN Destinations**.
   b. For Destination Type, select **E-Mail**.
   c. Select a BMC Username to receive the email alert from the list of BMC users. Alert email will be sent to the email address configured for this user.
   NOTE: To configure BMC users, select **Settings** > **User Management**. See the User Management section of the BMC User Guide for more information.
   d. Enter an Email Subject and Email Message for the email alert.

   ⓘ An Email Subject and Email Message are not used for AMI-Format email users.

   e. Select **Save**.
2. See the Platform Event Filters section of the BMC User Guide for information about using the BMC to configure Alert Policies and Event Filters.

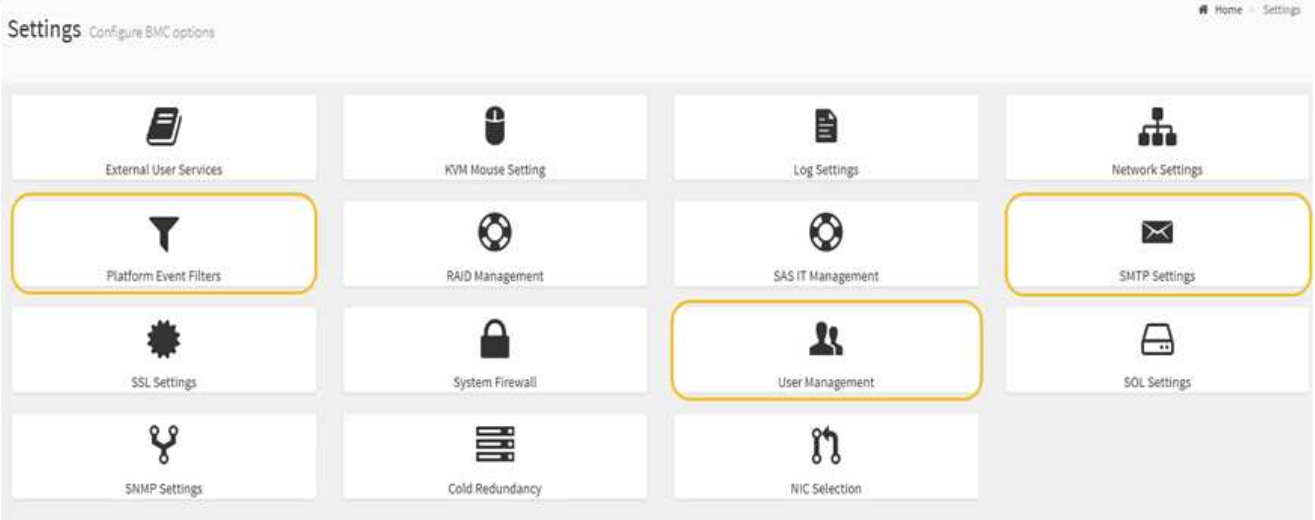
StorageGRID 11.8

Before you begin

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 SMTP settings for BMC.
   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, 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: Enable node or drive encryption

You can enable encryption at the node and disk levels to protect the disks in your appliance against physical loss or removal from the site.

- Node encryption uses software encryption to protect all disks in the appliance. It does not require special drive hardware. Node encryption is performed by appliance software using keys managed by an external key management server (KMS).
- Drive encryption uses hardware encryption to protect self-encrypting drives (SEDs), also known as full-disk encryption (FED) drives, including those drives that meet the Federal Information Processing Standards (FIPS). Drive encryption is performed within each drive using encryption keys managed by a StorageGRID key manager.

You can perform both encryption levels on supported drives for additional security.

See StorageGRID encryption methods for information about all encryption methods available for StorageGRID appliances.

Enable 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. You can't disable node encryption after the KMS encryption process starts.

If you are using ConfigBuilder to generate a JSON file, you can enable node encryption automatically. See Automate appliance installation and configuration.

Additionally, when you enable FIPS mode after enabling node encryption, the NetApp StorageGRID Kernel Crypto API 6.1.129-1-ntap1-amd64 module is used for encryption of data at rest. Refer to Select a security policy for more information.

Before you begin

Review the information about configuring KMS.

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.

> When an appliance is installed with node encryption enabled, a temporary key is assigned. The data on the appliance is not protected until the appliance is connected to the Key Management System (KMS) and a KMS security key is set. Refer to the KMS appliance configuration overview for additional information.

Without the KMS key needed to decrypt the disk, data on the appliance can't be retrieved and is effectively lost. This is the case whenever the decryption key can't 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 can't be decrypted without using the same KMS key.

2. Select **Configure Hardware** > **Node Encryption**.
3. Select **Enable node encryption**.

   Before appliance installation, you can clear **Enable node encryption** without risk of data loss. When the installation begins, the appliance node accesses the KMS encryption keys in your StorageGRID system and begins disk encryption. You can't 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 can't 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. See Monitor node encryption in maintenance mode for information.

Drive encryption

Drive encryption is managed on self-encrypting drive (SED) hardware during the write and read processes. Access to data on these drives is controlled by a user-defined passphrase.

Drive encryption can be used for any SED SSD installed in an SG100, SG1000, SG110, SG1100, SGF6112, or SG6100-CN compute node or controller.

- For services appliances, the SSDs are the node root disks.
- In an SG6100-CN controller, the SSDs are used for caching.
- In an SGF6112, the SSDs are the node root disks and are used for the primary storage of object data.

Encrypted SEDs automatically lock when the appliance is powered down or when the drive is removed from the appliance. An encrypted SED remains locked after power is restored to it until the correct passphrase is entered. To allow drives to be accessed without manually reentering the passphrase, the passphrase is stored on the StorageGRID appliance to unlock encrypted drives that remain in the appliance when the appliance restarts. Drives encrypted with an SED passphrase can be accessed by anyone who knows the passphrase.

Drive encryption doesn't apply to SANtricity-managed drives. If you have a StorageGRID appliance with SEDs and SANtricity controllers, you can enable drive security in SANtricity System Manager.

When you enable Drive Encryption for a StorageGRID appliance with FIPS drives, the FIPS encryption provided by the FIPS drives is used for encryption of data at rest.

You can enable drive encryption during initial appliance installation before loading Grid Manager. You can also enable drive encryption or change your passphrase by placing the appliance in maintenance mode.

Before you begin

Review the information about StorageGRID encryption methods.

About this task

A passphrase is set when drive encryption is initially enabled. If a compute node is replaced or if an encrypted SED is moved to a new compute node, you must manually reenter the passphrase.

Make sure that you store the drive-encryption passphrase in a secure location. Encrypted SEDs can't be accessed without manually entering the same passphrase if the SED is installed in another StorageGRID appliance.

Enable drive encryption

1. Access the StorageGRID Appliance Installer.
   - Place the appliance into maintenance mode.

- 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.

2. From the StorageGRID Appliance Installer Home page, select **Configure Hardware** > **Drive Encryption**.
3. Select **Enable drive encryption**.

   After enabling drive encryption and setting the passphrase the SED drives are hardware encrypted. The content of the drive can't be accessed without using the same passphrase.

4. Select **Save**.

   After the drive is encrypted, drive passphrase information displays.

   When a drive is initially encrypted, the passphrase is set to a default blank value and the current passphrase text indicates "default (not secure)." While the data on this drive is encrypted, it can be accessed without entering a passphrase until a unique passphrase is set.

5. Enter a unique passphrase for encrypted drive access and then enter the passphrase again to confirm it. The passphrase must be at least 8 and no more than 32 characters in length.
6. Enter passphrase display text that will help you recall the passphrase.

   Save the passphrase and passphrase display text in a secure location, such as a password management application.

7. Select **Save**.

View drive-encryption status

1. Place the appliance into maintenance mode.
2. From the StorageGRID Appliance Installer, select **Configure Hardware** > **Drive Encryption**.

Access an encrypted drive

You must enter the passphrase to access an encrypted drive after compute node replacement or after a drive is moved to a new compute node.

1. Access the StorageGRID Appliance Installer.
   - Place the appliance into maintenance mode.
   - 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.

2. From the StorageGRID Appliance Installer, select the **Drive Encryption** link in the warning banner.

3. Enter the drive encryption passphrase you set previously in **New passphrase** and **Retype new passphrase**.

   If you enter values for the passphrase and passphrase display text that do not match the values previously entered, drive authentication will fail. You will need to restart the appliance and enter the correct passphrase and passphrase display text.

4. Enter the passphrase display text you set previously in **New passphrase display text**.
5. Select **Save**.

   The warning banners will no longer display when the drives are unlocked.

6. Return to the StorageGRID Appliance Installer Home page and select **Reboot** in the Installation section banner to restart the compute node and access the encrypted drives.

Change the drive-encryption passphrase

1. Access the StorageGRID Appliance Installer.
   - Place the appliance into maintenance mode.
   - 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.

2. From the StorageGRID Appliance Installer, select **Configure Hardware** > **Drive Encryption**.
3. Enter a new unique passphrase for drive access and then enter the passphrase again to confirm it. The passphrase must be at least 8 and no more than 32 characters in length.

   You must have already authenticated with access to the drive before you can change the drive-encryption passphrase.

4. Enter passphrase display text that will help you recall the passphrase.
5. Select **Save**.

   After setting a new passphrase the encrypted drives can't be decrypted without using the new passphrase and passphrase display text.

6. Save the new passphrase and passphrase display text in a secure location, such as a password management application.

Disable drive encryption

1. Access the StorageGRID Appliance Installer.
   - Place the appliance into maintenance mode.
   - 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.

2. From the StorageGRID Appliance Installer, select **Configure Hardware** > **Drive Encryption**.
3. Clear **Enable drive encryption**.
4. To erase all drive data when drive encryption is disabled, select **Erase all data on drives.**

> The data erasure option is only avaliable from the StorageGRID Appliance Installer before the appliance is added to the grid. You cannot access this option when accessing the StorageGRID Appliance Installer from maintenance mode.

5. Select **Save**.

The drive contents are unencrypted or cryptographically erased, the encryption passphrase is erased, and the SEDs are now accessible without a passphrase.

Optional: Change RAID mode (SG5760, SG5860, SG6000, and SG6160)

On some appliance models, 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.

If you are using ConfigBuilder to generate a JSON file, you can change the RAID mode automatically. See Automate appliance installation and configuration.

About this task

If supported by your appliance, you can choose one of the following volume configuration options:

> Volume sizes aren't consistent across all DDP and RAID types. Variations in how DDP and RAID6 operate cause different volume sizes.

- **Dynamic Disk Pools (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 RAID 6, DDP delivers better system performance, reduced rebuild times after drive failures, and ease of management.
  - One disk pool is created per storage appliance or expansion shelf.
  - DDP provides drawer-loss protection in SG5760, SG5860, and SG6160 appliances.

> DDP doesn't provide drawer loss protection in SG6060 appliances because of the two SSDs. Drawer loss protection is effective in any expansion shelves that are added to an SG6060.

- **DDP16**: This mode uses two parity drives for every 16 data drives, which results in higher storage efficiency compared to DDP.
  - Compared to RAID 6, DDP16 delivers better system performance, reduced rebuild times after drive failures, ease of management, and comparable storage efficiency.
  - To use DDP16 mode, your storage appliance must contain at least 20 drives.
  - One disk pool is created per storage appliance or expansion shelf.

    - DDP16 doesn’t provide drawer loss protection.
- **RAID6**: This mode uses two parity drives for every 16 or more data drives. It 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. To use RAID 6 mode, your configuration must contain at least 20 drives. Although RAID 6 can increase storage efficiency of the appliance when compared to DDP, it is not recommended for most StorageGRID environments.
    - RAID 6 provides one global hot spare per expansion shelf. For example, an SG6160 with two expansion shelves has three hot spares.
    - On a 60-drive storage appliance StorageGRID creates three volume groups, each with a minimum of 18 drives (16+2) and a maximum size of 21 drives (19+2).
    - On the SGF6024 a RAID 6 volume group is 23 drives with one hot spare.
    - RAID 6 volumes are slightly larger, allowing node cloning from DDP16 in many cases. Volume sizes can vary between volume groups in a RAID 6 configuration.

> 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.

SG5760

Before you begin

- You have an SG5760 with 60 drives. If you have an SG5712, you must use the default DDP mode.
- You are using any client that can connect to StorageGRID.
- The client has a supported web browser.

Steps

1. Using the service laptop, open a web browser and access the StorageGRID Appliance Installer:
   `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**.

SG5860

Before you begin

- You have an SG5860 with 60 drives. If you have an SG5812, you must use the default DDP mode.
- You are using any client that can connect to StorageGRID.
- The client has a supported web browser.

Steps

1. Using the service laptop, open a web browser and access the StorageGRID Appliance Installer:
   `https://SG5800_Controller_IP:8443`

   Where *`SG5800_Controller_IP`* is any of the IP addresses for the SG5800 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**.

SG6000

Before you begin

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

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**.

SG6160

Before you begin

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

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**.

Optional: Remap network ports for appliance

You can optionally remap the internal ports on an appliance node to different external ports. For example, you might need to remap ports because of a firewall issue.

Before you begin

You have previously accessed the StorageGRID Appliance Installer.

About this task

You can't use remapped ports for load balancer endpoints. If you need to remove a remapped port, follow the steps in Remove port remaps.

Steps

1. From the StorageGRID Appliance Installer, select **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. Select **Add Rule**.

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

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

Deploy an appliance node

Deploy 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.

Before you begin

- If you are cloning an appliance node, continue following the appliance node cloning process.
- 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.

> Support for port remapping is deprecated and will be removed in a future release. To remove remapped ports, refer to Remove port remaps on StorageGRID appliances.

- 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 adding grid nodes.
- To deploy an appliance Storage Node as part of a recovery operation, see instructions recovering an appliance Storage Node.

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.

2. Select the **Node type**. For more information, see Types of Storage Nodes.

   Metadata-only can only be selected during appliance deployment. If Metadata-only is selected as the Storage Node type, it can't be changed after the appliance is deployed.

3. In the **Node name** field, provide the system name you want to use for this appliance node, and click **Save**.

   The name that appears here will be the appliance node's system name. System names are required for internal StorageGRID operations and can't be changed. To change an appliance node's display name, see How to rename grid, sites, or nodes
   .

4. 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.

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

Option	Description
Manual IP entry	a. Clear the **Enable Admin Node discovery** checkbox. b. Enter the IP address manually. c. Click **Save**. d. Wait for the connection state for the new IP address to become ready.
Automatic discovery of all connected primary Admin Nodes	a. Select the **Enable Admin Node discovery** checkbox. b. Wait for the list of discovered IP addresses to be displayed. c. Select the primary Admin Node for the grid where this appliance Storage Node will be deployed. d. Click **Save**. e. Wait for the connection state for the new IP address to become ready.

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 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.

7. 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**.

8. 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.

Deploy services appliance node

You can deploy a services appliance as a primary Admin Node, a non-primary Admin Node, or a Gateway Node. All services appliances can operate as Gateway Nodes and Admin Nodes (primary or non-primary) at the same time.

Deploy services appliance as 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.

Before you begin

- 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.

  > Support for port remapping is deprecated and will be removed in a future release. To remove remapped ports, refer to Remove port remaps on StorageGRID appliances.

- 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:

      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.
   e. Click **Browse** for the software package you downloaded and extracted. Select the `storagegrid-webscale-images-version.deb` package.
   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.

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** from the menu bar.

Deploy services appliance as 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.

Before you begin

- 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.

  > Support for port remapping is deprecated and will be removed in a future release. To remove remapped ports, refer to Remove port remaps on StorageGRID appliances.

- 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.

> Mixing services appliances with different levels of performance in the same site, such as an SG100 or SG110 with an SG1000 or SG1100, can cause unpredictable and inconsistent results when using multiple nodes in a high-availability group or when balancing client load across multiple services appliances.

> If you need to deploy multiple appliance nodes at one time, you can automate the installation process. See Automate 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	a. Clear the **Enable Admin Node discovery** checkbox. b. Enter the IP address manually. c. Click **Save**. d. Wait for the connection state for the new IP address to become ready.
Automatic discovery of all connected primary Admin Nodes	a. Select the **Enable Admin Node discovery** checkbox. b. Wait for the list of discovered IP addresses to be displayed. c. Select the primary Admin Node for the grid where this appliance Gateway or non-primary Admin Node will be deployed. d. Click **Save**. e. Wait for the connection state for the new IP address to become ready.

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

   The name that appears here will be the appliance node's system name. System names are required for internal StorageGRID operations and can't be changed. To change an appliance node's display name, see How to rename grid, sites, or nodes
   .

5. Optionally, to install a different version of the StorageGRID software, follow these steps:
   a. Download the installation archive:

      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.
   e. Click **Browse** for the software package you downloaded and extracted. Select the `storagegrid-webscale-images-version.deb` package.
   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 maintenance instructions for your appliance.

7. 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** from the menu bar.

8. If your grid includes multiple appliance nodes, repeat the previous steps for each appliance.

Monitor appliance installation

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

Example 1. Steps

Storage appliance

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

   The Monitor Installation page shows the installation progress.

   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 aren't re-run. If you are re-running an installation, any tasks that don't 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, creates RAIDs according to the configured RAID Mode, allocates volumes for StorageGRID software and object data storage, 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; then, go to the next step.
4. Go to the Grid Manager of the Primary Admin node, 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.

Close the window after all installation stages are complete.

Services appliance

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

   The Monitor Installation page shows the installation progress.

   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 aren't re-run. If you are re-running an installation, any tasks that don't 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 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; then, go to the next step.
   - For appliance primary Admin Node installation, you don't 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 to load the StorageGRID Installer (the example screen shot shows only the first four phases). If loading the StorageGRID Installer (fifth phase) is in progress for more than 10 minutes, refresh the web page manually.

4. Go to the Grid Manager of the Primary Admin node, 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.

Close the window after all installation stages are complete.

Reboot appliance while StorageGRID Appliance Installer is running

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

About this task

This procedure only applies when the 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 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. (This option is available only when the controller is in maintenance mode.) Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.

Troubleshoot hardware installation (SG100 and SG1000)

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

View boot-up codes

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.

Before you begin

- You know how to access the BMC dashboard.
- 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	• VGA-capable monitor • VGA cable
KVM	• RJ-45 cable
Serial port	• DB-9 serial cable • Virtual serial terminal
SOL	• Virtual serial terminal

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 in to 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 BMC_Port_IP -U admin -P Password sol activate
```

> In some cases the default username might be `root` instead of `admin`.

b. View the codes on the virtual serial terminal.

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

Code	Indicates
HT	The master boot script is waiting for OS boot to complete.
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 network interface card (NIC) firmware needs to be updated.
HB	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.
HC	The system is checking for existing StorageGRID installation data.
HO	The StorageGRID appliance is running.
HA	StorageGRID is running.

View error codes

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 or the appliance serial port, and then work with technical support to resolve the issue.

> **Before you begin**
>
> If your BMC does not have a BIOS POST Code menu item, access the error codes using the appliance serial port.

- If you are using the BMC, you know how to access the BMC dashboard.
- If you are using a serial port and terminal, gather the required equipment:
  - DB-9 serial cable
  - Virtual serial terminal

Steps

1. Access the error codes using one of the following methods.

BMC

If you are using the BMC, perform these steps:

a. Access the BMC dashboard.

b. From the BMC dashboard, select **BIOS POST Code**.

c. Review the information displayed for Current Code and the Previous Code.

Serial port

If you are using a serial port and terminal, perform these steps to view the error codes. BIOS POST codes display on the serial console when the appliance reboots.

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.

2. 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 don’t 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

Code	Indicates
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
0xD3	Some architectural protocols aren’t 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

Code	Indicates
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
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.

Connection issues

If you can’t 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.
4. If physical access to the appliance is available, you can use a direct connection to the permanent link-local IP `169.254.0.1` to check controller networking configuration and update if necessary. For detailed instructions, see step 2 in Access StorageGRID Appliance Installer.

   If that does not resolve the issue, contact technical support.
5. If the ping was successful, open a web browser.
6. Enter the URL for the StorageGRID Appliance Installer:
   `https://appliances_controller_IP:8443`

   The Home page appears.

Troubleshoot hardware installation (SG110 and SG1100)

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

View boot-up codes

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.

Before you begin

- You know how to access the BMC dashboard.
- 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	• VGA-capable monitor • VGA cable
KVM	• RJ-45 cable

Method	Required equipment
Serial port	• USB cable • Virtual serial terminal
SOL	• Virtual serial terminal

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 in to 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 serial USB 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 BMC_Port_IP -U admin -P Password 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
HT	The master boot script is waiting for OS boot to complete.
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 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.

Code	Indicates
HC	The system is checking for existing StorageGRID installation data.
HO	The StorageGRID appliance is running.
HA	StorageGRID is running.

View error codes

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 appliance serial port, and then work with technical support to resolve the issue.

Before you begin

- Gather the required equipment:
  - USB cable
  - Virtual serial terminal

Steps

1. Connect to the serial USB port on the back of the appliance.
2. Use settings `115200 8-N-1`.
3. Review the information printed over the serial terminal 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 don’t match.
0x53	Memory initialization error. No usable memory detected.
0x54	Unspecified memory initialization error
0x55	Memory not installed

Code	Indicates
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
0xD3	Some architectural protocols aren’t 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

Code	Indicates
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
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.

Connection issues

If you can't 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 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.
4. If physical access to the appliance is available, you can use a direct connection to the permanent link-local IP `169.254.0.1` to check controller networking configuration and update if necessary. For detailed instructions, see step 2 in Access StorageGRID Appliance Installer.

   If that does not resolve the issue, contact technical support.
5. If the ping was successful, open a web browser.
6. Enter the URL for the StorageGRID Appliance Installer:
   `https://appliances_controller_IP:8443`

   The Home page appears.

Troubleshoot hardware installation (SG5700 or SG6000)

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

View boot-up codes (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.

Before you begin

- You know how to access the BMC dashboard.
- 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	• VGA-capable monitor • VGA cable
KVM	• RJ-45 cable
Serial port	• DB-9 serial cable • Virtual serial terminal
SOL	• Virtual serial terminal

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 in to 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 BMC_Port_IP -U admin -P Password sol activate
      ```

      > In some cases the default username for an SG6000 appliance might be `root` instead of `admin`.

   b. View the codes on the virtual serial terminal.
6. Use the table to look up the codes for your appliance.

Code	Indicates
HT	The master boot script is waiting for OS boot to complete.
HI	The master boot script has started.
PP	The system is checking to see if the FPGA needs to be updated.

Code	Indicates
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	For an appliance Storage Node only: The system is awaiting connectivity with the storage controllers and synchronizing with the SANtricity operating system. **Note:** If the boot-up procedure does not progress past this stage, perform these steps: a. Confirm that the four interconnect cables between the SG6000-CN controller and the two storage controllers are securely connected. b. As required, replace one or more of the cables, and try again. c. If this does not resolve the issue, contact technical support.
HC	The system is checking for existing StorageGRID installation data.
HO	The StorageGRID Appliance Installer is running.
HA	StorageGRID is running.

View error codes (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 or the appliance serial port, and then work with technical support to resolve the issue.

Before you begin

If your BMC does not have a BIOS POST Code menu item, access the error codes using the appliance serial port.

- If you are using the BMC, you know how to access the BMC dashboard.
- If you are using a serial port and terminal, gather the required equipment:
  - DB-9 serial cable
  - Virtual serial terminal

Steps

1. Access the error codes using one of the following methods.

BMC

If you are using the BMC, perform these steps:

a. Access the BMC dashboard.

b. From the BMC dashboard, select **BIOS POST Code**.

c. Review the information displayed for Current Code and the Previous Code.

Serial port

If you are using a serial port and terminal, perform these steps to view the error codes. BIOS POST codes display on the serial console when the appliance reboots.

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.

2. 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 don’t 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

Code	Indicates
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
0xD3	Some architectural protocols aren’t 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

Code	Indicates
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
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 (SG6000 or SG5700)

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

Example 2. Steps

SG5700

1. Watch the codes on the SG5700 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 don't 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	• "Status indicators on the E5700SG controller" • "HE error: Error synchronizing with SANtricity OS Software"
E2800 controller	*E5700 and E2800 System Monitoring Guide* **Note:** The codes described for the E-Series E5700 controller don't apply to the E5700SG controller in the appliance.

4. If this does not resolve the issue, contact technical support.

SG6000

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.

Connection issues (SG5700 or SG6000)

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

Unable to connect to SG6000 appliance

If you can't 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.
   d. If physical access to the SG6000-CN is available, you can use a direct connection to the permanent link-local IP `169.254.0.1` to check controller networking configuration and update if necessary. For detailed instructions, see step 2 in Accessing StorageGRID Appliance Installer.

      If that does not resolve the issue, contact technical support.
   e. If the ping was successful, open a web browser.
   f. Enter the URL for the StorageGRID Appliance Installer:
      https://*SG6000-CN_Controller_IP*:8443

      The Home page appears.

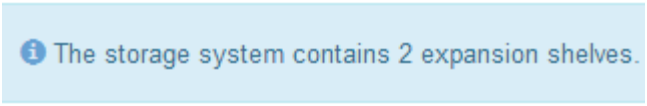
SG6060 expansion shelves don’t appear in Appliance Installer

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

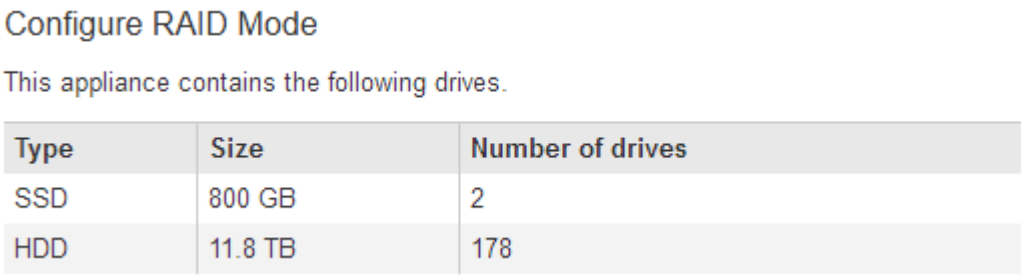
About this task

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 **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.



If the StorageGRID Appliance Installer pages don't indicate that expansion shelves are present, follow this procedure.

Steps

1. Verify that all required cables have been firmly connected. See Cable appliance.
2. Verify that you have powered on the expansion shelves. See Connect power cords and apply power (SG6000).
3. If you need help resolving an issue, contact technical support.

Unable to connect to SG5700 appliance

If you can't 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

The Home page appears.

HE error: Error synchronizing with SANtricity OS Software (SG5700)

The seven-segment display on the compute controller shows an HE error code if the StorageGRID Appliance Installer can't 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.

Troubleshoot hardware installation (SG5800 or SG6100)

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

View boot-up codes (SGF6112 and SG6160 only)

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.

Before you begin

- You know how to access the BMC dashboard.
- 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	• VGA-capable monitor • VGA cable
KVM	• RJ-45 cable
Serial port	• USB cable • Virtual serial terminal
SOL	• Virtual serial terminal

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 in to 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 serial USB 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 BMC_Port_IP -U admin -P Password sol activate
      ```

      In some cases the default username might be 'root' instead of 'admin'.

   b. View the codes on the virtual serial terminal.
6. Use the table to look up the codes for your appliance.

Code	Indicates
HT	The master boot script is waiting for OS boot to complete.
HI	The master boot script has started.
PP	The system is checking to see if the FPGA needs to be updated.

Code	Indicates
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	For the SG6160 only: The system is awaiting connectivity with the storage controllers and synchronizing with the SANtricity operating system. **Note**: If the boot-up procedure does not progress past this stage, perform these steps: a. Confirm that the four interconnect cables between the SG6100-CN controller and the two storage controllers are securely connected. b. As required, replace one or more of the cables, and try again. c. If this does not resolve the issue, contact technical support.
HC	The system is checking for existing StorageGRID installation data.
HO	The StorageGRID appliance is running.
HA	StorageGRID is running.

View error codes (SGF6112 and SG6160 only)

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 appliance serial port, and then work with technical support to resolve the issue.

Before you begin

- Gather the required equipment:
  - USB cable
  - Virtual serial terminal

Steps

1. Connect to the serial USB port on the back of the appliance.
2. Use settings `115200 8-N-1`.
3. Review the information printed over the serial terminal 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 don’t 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
0xD3	Some architectural protocols aren’t available
0xD4	PCI resource allocation error. Out of resources.
0xD5	No space for legacy option ROM

Code	Indicates
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
0xF2	MRC: ERR_RC_INTERNAL
0xF3	MRC: ERR_INVALID_REG_ACCESS
0xF4	MRC: ERR_SET_MC_FREQ
0xF5	MRC: ERR_READ_MC_FREQ

Code	Indicates
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/or the boot-up and error codes displayed in the BMC (if equipped).
2. If you need help resolving an issue, contact technical support.

Connection issues

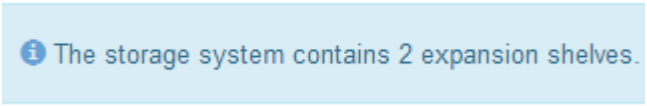
Expansion shelves don't appear in Appliance Installer (SG6160)

If you have installed expansion shelves and they don't 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 **Advanced** > **RAID Mode** page indicates by number of drives whether or not the appliance includes expansion shelves.

If the StorageGRID Appliance Installer pages don't indicate that expansion shelves are present, follow this procedure.

Steps

1. Verify that all required cables have been firmly connected. See Cable appliance.
2. Verify that you have powered on the expansion shelves. See Connect power cords and apply power (SG6100).

3. If you need help resolving an issue, contact technical support.

Unable to connect to appliance

If you can't connect to the storage 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 appliance/controller_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.
4. If physical access to the appliance is available, you can use a direct connection to the permanent link-local IP `169.254.0.1` to check controller networking configuration and update if necessary. For detailed instructions, see step 2 in Access StorageGRID Appliance Installer.

   If that does not resolve the issue, contact technical support.

5. If the ping was successful, open a web browser.
6. Enter the URL for the StorageGRID Appliance Installer or SANtricity System Manager:
   `https://appliances_controller_IP:8443`

   The Home page appears.