SG100 & SG1000 services appliances

StorageGRID 11.5

NetApp
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SG100 & SG1000 services appliances

Learn how to install and maintain the StorageGRID SG100 and SG1000 appliances.

SG100 and SG1000 appliances overview

The StorageGRID SG100 services appliance and the SG1000 services appliance can operate as a Gateway Node and as an Admin Node to provide high availability load balancing services in a StorageGRID system. Both appliances can operate as Gateway Nodes and Admin Nodes (primary or non-primary) at the same time.

Appliance features

Both models of the services appliance provide the following features:

- Gateway Node or Admin Node functions for a StorageGRID system.
- The StorageGRID Appliance Installer to simplify node deployment and configuration.
- When deployed, can access StorageGRID software from an existing Admin Node or from software downloaded to a local drive. To further simplify the deployment process, a recent version of the software is preloaded onto the appliance during manufacturing.
- A baseboard management controller (BMC) for monitoring and diagnosing some of the appliance hardware.
- The ability to connect to all three StorageGRID networks, including the Grid Network, the Admin Network, and the Client Network:
  - The SG100 supports up to four 10- or 25-GbE connections to the Grid Network and Client Network.
  - The SG1000 supports up to four 10-, 25-, 40-, or 100-GbE connections to the Grid Network and Client Network.

SG100 and SG1000 diagrams

This figure shows the front of the SG100 and the SG1000 with the bezel removed.

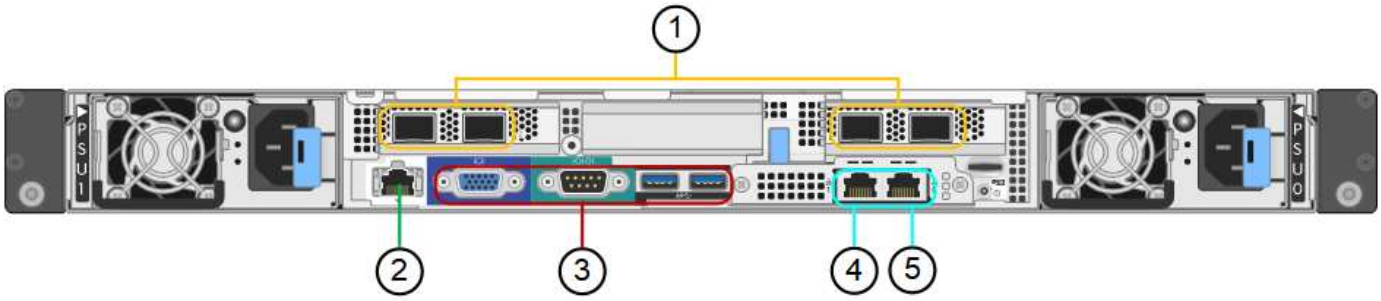
From the front, the two appliances are identical except for the product name on the bezel.

The two solid-state drives (SSDs), indicated by the orange outline, are used for storing the StorageGRID operating system and are mirrored using RAID1 for redundancy. When the SG100 or SG1000 services appliance is configured as an Admin Node, these drives are used to store audit logs, metrics, and database tables.

The remaining drive slots are blank.

Connectors on the rear of the SG100

This figure shows the connectors on the back of the SG100.

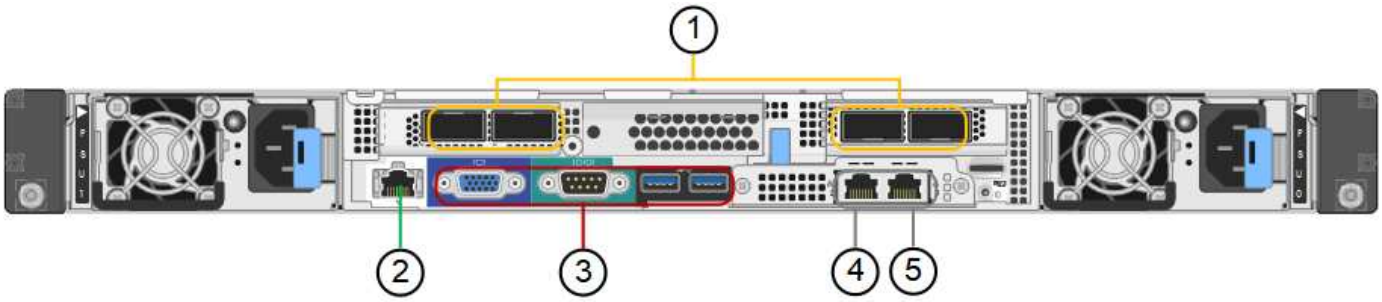


	Port	Type	Use
1	Network ports 1-4	10/25-GbE, based on cable or SFP transceiver type (SFP28 and SFP+ modules are supported), switch speed, and configured link speed	Connect to the Grid Network and the Client Network for StorageGRID.
2	BMC management port	1-GbE (RJ-45)	Connect to the appliance baseboard management controller.
3	Diagnostic and support ports	• VGA • Serial, 115200 8-N-1 • USB	Reserved for technical support use.
4	Admin Network port 1	1-GbE (RJ-45)	Connect the appliance to the Admin Network for StorageGRID.

	Port	Type	Use
5	Admin Network port 2	1-GbE (RJ-45)	Options: • Bond with management port 1 for a redundant connection to the Admin Network for StorageGRID. • Leave disconnected and available for temporary local access (IP 169.254.0.1). • During installation, use port 2 for IP configuration if DHCP-assigned IP addresses are not available.

Connectors on the rear of the SG1000

This figure shows the connectors on the back of the SG1000.



	Port	Type	Use
1	Network ports 1-4	10/25/40/100-GbE, based on cable or transceiver type, switch speed, and configured link speed. QSFP28 and QSFP+ (40/100GbE) are supported natively and SFP28/SFP+ transceivers can be used with a QSA (sold separately) to use 10/25GbE speeds.	Connect to the Grid Network and the Client Network for StorageGRID.
2	BMC management port	1-GbE (RJ-45)	Connect to the appliance baseboard management controller.
3	Diagnostic and support ports	• VGA • Serial, 115200 8-N-1 • USB	Reserved for technical support use.
4	Admin Network port 1	1-GbE (RJ-45)	Connect the appliance to the Admin Network for StorageGRID.

	Port	Type	Use
5	Admin Network port 2	1-GbE (RJ-45)	Options: • Bond with management port 1 for a redundant connection to the Admin Network for StorageGRID. • Leave disconnected and available for temporary local access (IP 169.254.0.1). • During installation, use port 2 for IP configuration if DHCP-assigned IP addresses are not available.

SG100 and SG1000 applications

You can configure the StorageGRID services appliances in various ways to provide gateway services as well as redundancy of some grid administration services.

Appliances can be deployed in the following ways:

- Add to a new or existing grid as a Gateway Node
- Add to a new grid as a primary or non-primary Admin Node, or to an existing grid as a non-primary Admin Node
- Operate as a Gateway Node and Admin Node (primary or non-primary) at the same time

The appliance facilitates the use of high availability (HA) groups and intelligent load balancing for S3 or Swift data path connections.

The following examples describe how you can maximize the capabilities of the appliance:

- Use two SG100 or two SG1000 appliances to provide gateway services by configuring them as Gateway Nodes.

  Do not deploy the SG100 and SG1000 service appliances in the same site. Unpredictable performance might result.

- Use two SG100 or two SG1000 appliances to provide redundancy of some grid administration services. Do this by configuring each appliance as Admin Nodes.
- Use two SG100 or two SG1000 appliances to provide highly available load balancing and traffic shaping services accessed through one or more virtual IP addresses. Do this by configuring the appliances as any combination of Admin Nodes or Gateway Nodes and adding both nodes to the same HA group.

  If you use Admin Nodes and Gateway Nodes in the same HA group, CLB (Connection Load Balancer) ports and Admin Node-only ports will not fail over. For instructions for configuring HA groups, see the instructions for administering StorageGRID.

  The CLB service is deprecated.

When used with StorageGRID storage appliances, both the SG100 and the SG1000 services appliances enable deployment of appliance-only grids with no dependencies on external hypervisors or compute hardware.

Related information

Administer StorageGRID

Installation and deployment overview

You can install one or more StorageGRID services appliances when you first deploy StorageGRID, or you can add services appliance nodes later as part of an expansion.

What you'll need

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

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

Installation and deployment tasks

Preparing and adding a StorageGRID appliance to the grid includes four primary steps:

1. Preparing for installation:
   - Preparing the installation site
   - Unpacking the boxes and checking the contents
   - Obtaining additional equipment and tools
   - Verifying network configuration
   - Optional: Configuring an external key management server (KMS) if you plan to encrypt all appliance data. See details about external key management in the instructions for administering StorageGRID.
2. Installing the hardware:
   - Registering the hardware
   - Installing the appliance into a cabinet or rack
   - Cabling the appliance
   - Connecting the power cord and applying power
   - Viewing boot-up status codes
3. Configuring the hardware:
   - Accessing StorageGRID Appliance Installer and configuring the link and network IP settings required to connect to StorageGRID networks
   - Accessing the baseboard management controller (BMC) interface on the appliance.
   - Optional: Enabling node encryption if you plan to use an external KMS to encrypt appliance data.
4. Deploying an appliance Gateway or Admin Node

After the appliance hardware has been installed and configured, you can deploy the appliance as a Gateway Node and an Admin Node in a StorageGRID system. Both the SG100 and the SG1000 appliances can operate as Gateway Nodes and Admin Nodes (primary and non-primary) at the same time.

Task	Instructions
Deploying an appliance Gateway or Admin Node in a new StorageGRID system	Deploying a services appliance node
Adding an appliance Gateway or Admin Node to an existing StorageGRID system	Instructions for expanding a StorageGRID system
Deploying an appliance Gateway or Admin Node as part of a node recovery operation	Instructions for recovery and maintenance

Related information

Preparing for installation

Installing the hardware

Configuring StorageGRID connections

Expand your grid

Maintain & recover

Administer StorageGRID

Preparing for installation

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

Steps

- Preparing the site (SG100 and SG1000)
- Unpacking the boxes (SG100 and SG1000)
- Obtaining additional equipment and tools (SG100 and SG1000)
- Web browser requirements
- Reviewing appliance network connections
- Gathering installation information (SG100 and SG1000)

Preparing the site (SG100 and SG1000)

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

Steps

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

Height	Width	Depth	Maximum weight
1.70 in. (4.32 cm)	17.32 in. (44.0 cm)	32.0 in. (81.3 cm)	39 lb. (17.7 kg)

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

Related information

NetApp Hardware Universe

NetApp Interoperability Matrix Tool

Unpacking the boxes (SG100 and SG1000)

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

Appliance hardware

- **SG100 or SG1000**

- **Rail kit with instructions**

Power cords

The shipment for the StorageGRID appliance includes the following power cords:

- **Two power cords for your country**

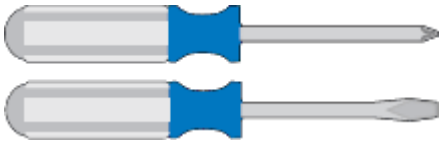
  Your cabinet might have special power cords that you use instead of the power cords that ship with the appliance.

Obtaining additional equipment and tools (SG100 and SG1000)

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

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

- **Screwdrivers**

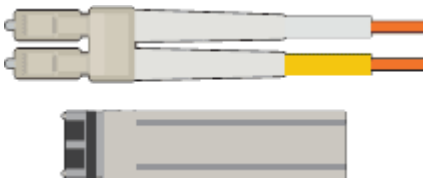


Phillips No. 2 screwdriver

Medium flat-blade screwdriver

- **ESD wrist strap**

- **Optical cables and transceivers**



  - Cable
    - TwinAx/Copper (1 to 4)

      or

    - Fibre/Optical (1 to 4)
  - 1 to 4 of each of these transceivers/adapters based on link speed (mixed speeds are not supported)
    - SG100:

Link speed (GbE)	Required equipment
10	SFP+ transceiver

Link speed (GbE)	Required equipment
25	SFP28 transceiver

- SG1000:

Link speed (GbE)	Required equipment
10	QSFP-to-SFP adapter (QSA) and SFP+ transceiver
25	QSFP-to-SFP adapter (QSA) and SFP28 transceiver
40	QSFP+ transceiver
100	QFSP28 transceiver

- **RJ-45 (Cat5/Cat5e/Cat6/Cat6a) Ethernet cables**

- **Service laptop**

Supported web browser

1-GbE (RJ-45) port

Some ports might not support 10/100 Ethernet speeds.

- **Optional tools**

Power drill with Phillips head bit

Flashlight

Web browser requirements

You must use a supported web browser.

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

You should set the browser window to a recommended width.

Browser width	Pixels
Minimum	1024
Optimum	1280

Reviewing appliance network connections

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

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

- **Grid Network for StorageGRID**: The Grid Network is used for all internal StorageGRID traffic. It provides connectivity between all nodes in the grid, across all sites and subnets. The Grid Network is required.
- **Admin Network for StorageGRID**: The Admin Network is a closed network used for system administration and maintenance. The Admin Network is typically a private network and does not need to be routable between sites. The Admin Network is optional.
- **Client Network for StorageGRID:** The Client Network is an open network used to provide access to client applications, including S3 and Swift. The Client Network provides client protocol access to the grid, so the Grid Network can be isolated and secured. You can configure the Client Network so that the appliance can be accessed over this network using only the ports you choose to open. The Client Network is optional.
- **BMC management network for the services appliance:** This network provides access to the baseboard management controller in the SG100 and SG1000, appliances allowing you to monitor and manage the hardware components in the appliance. This management network can be the same as the Admin Network for StorageGRID, or it can be an independent management network.

Related information

Gathering installation information (SG100 and SG1000)

Cabling the appliance SG100 and SG1000)

Network guidelines

Grid primer

Port bond modes for the SG100 and SG1000 appliances

When configuring network links for the SG100 and SG1000 appliances, you can use port bonding for the ports that connect to the Grid Network and optional Client Network, and the 1-GbE management ports that connect to the optional Admin Network. Port bonding helps protect your data by providing redundant paths between StorageGRID networks and the appliance.

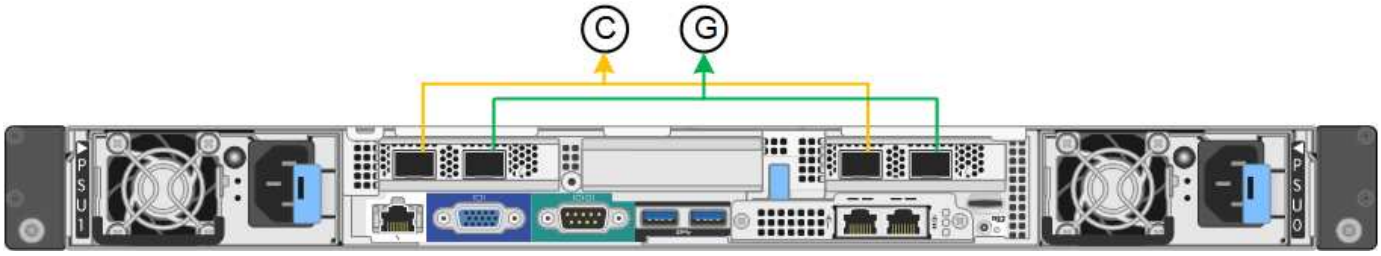
Network bond modes

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

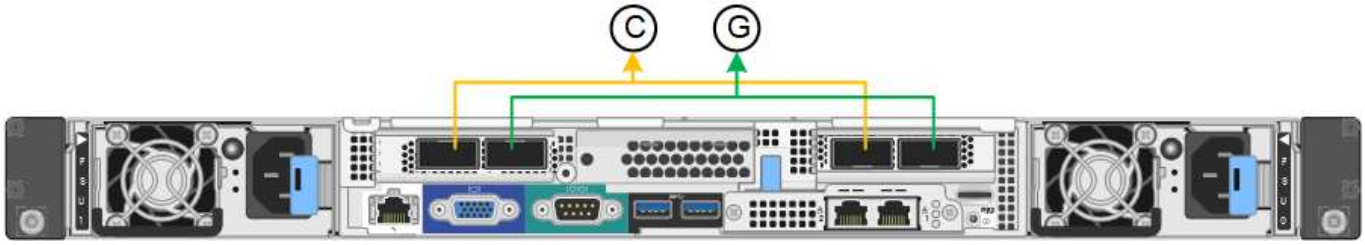
Fixed port bond mode

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

SG100 fixed port bond mode



SG1000 fixed port bond mode



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

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

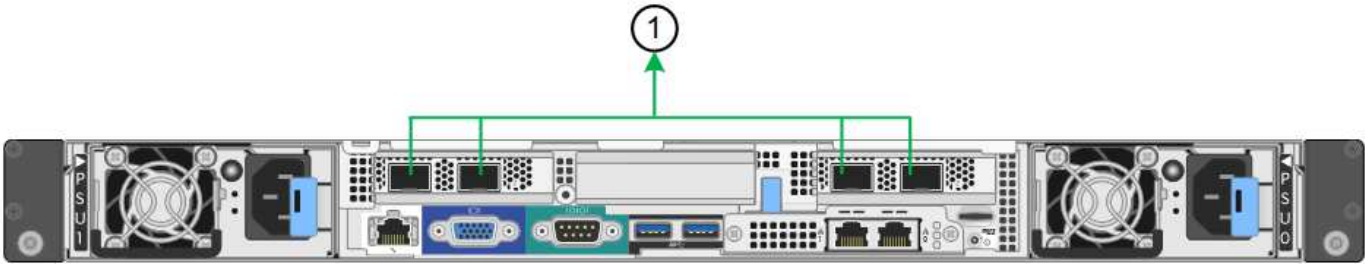
- In active-backup mode (default), only one port is active at a time. If the active port fails, its backup port automatically provides a failover connection. Port 4 provides a backup path for port 2 (Grid Network), and port 3 provides a backup path for port 1 (Client Network).
- In LACP mode, each pair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

> If you do not need redundant connections, you can use only one port for each network. However, be aware that the **Services appliance link down** alert might be triggered in the Grid Manager after StorageGRID is installed, indicating that a cable is unplugged. You can safely disable this alert rule.

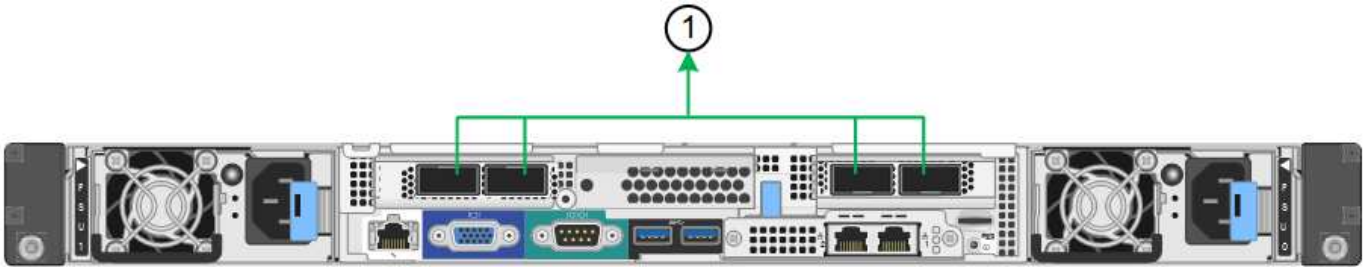
Aggregate port bond mode

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

SG100 aggregate port bond mode



SG1000 aggregate port bond mode



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

If you plan to use aggregate port bond mode:

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

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

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

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

Network bond modes for the management ports

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

SG100 network management ports

SG1000 network management ports

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

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

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

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

	Network bond mode
I	Independent mode. The port on the left is connected to the Admin Network. The port on the right is available for temporary local connections (IP address 169.254.0.1).

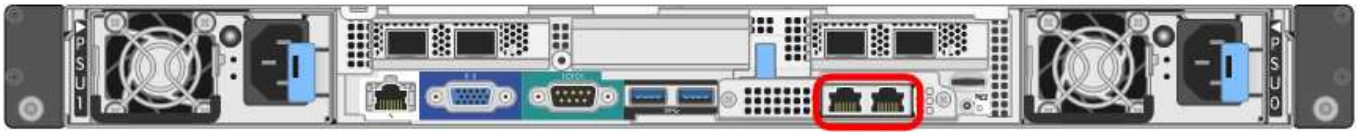
Gathering installation information (SG100 and SG1000)

As you install and configure the StorageGRID appliance, you must make decisions and gather information about Ethernet switch ports, IP addresses, and port and network bond modes. Record the required information for each network you connect to the appliance. These values are required to install and configure the hardware.

Administration and maintenance ports

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

SG100 RJ-45 ports



SG1000 RJ-45 ports

Administration and maintenance connections

Information needed	Your value
Admin Network enabled	Choose one: • 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)	

Information needed	Your value
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, 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 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.

Networking connections

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.

Grid Network connections

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.

Client Network connections

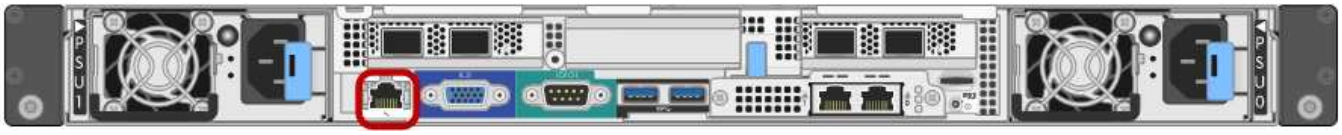
Information needed	Your value
Client Network enabled	Choose one: • No (default) • Yes
Network bond mode	Choose one: • Active-Backup (default) • LACP (802.3ad)
VLAN tagging enabled	Choose one: • No (default) • Yes

Information needed	Your value
VLAN tag(If VLAN tagging is enabled)	Enter a value between 0 and 4095:
DHCP-assigned IP address for the Client Network, if available after power on	• 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.

SG100 BMC management port



SG1000 BMC management port

BMC management network connections

Information needed	Your value
Ethernet switch port you will connect to the BMC management port (circled in the diagram)	
DHCP-assigned IP address for the BMC management network, if available after power on	• IPv4 address (CIDR): • Gateway:
Static IP address you plan to use for the BMC management port	• IPv4 address (CIDR): • Gateway:

Related information

SG100 and SG1000 appliances overview

Cabling the appliance SG100 and SG1000)

Configuring StorageGRID IP addresses

Installing the hardware

Hardware installation entails installing the appliance into a cabinet or rack, connecting the cables, and applying power.

Steps

- Registering the hardware
- Installing the appliance into a cabinet or rack (SG100 and SG1000)
- Cabling the appliance SG100 and SG1000)
- Connecting power cords and applying power (SG100 and SG1000)
- Viewing status indicators on the SG100 and SG1000 appliances

Registering the hardware

Registering the appliance hardware provides support benefits.

Steps

1. Locate the chassis serial number for the appliance.

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

2. Go to the NetApp Support Site at mysupport.netapp.com.
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.

If you are a…	Follow these steps…
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.

Installing the appliance into a cabinet or rack (SG100 and SG1000)

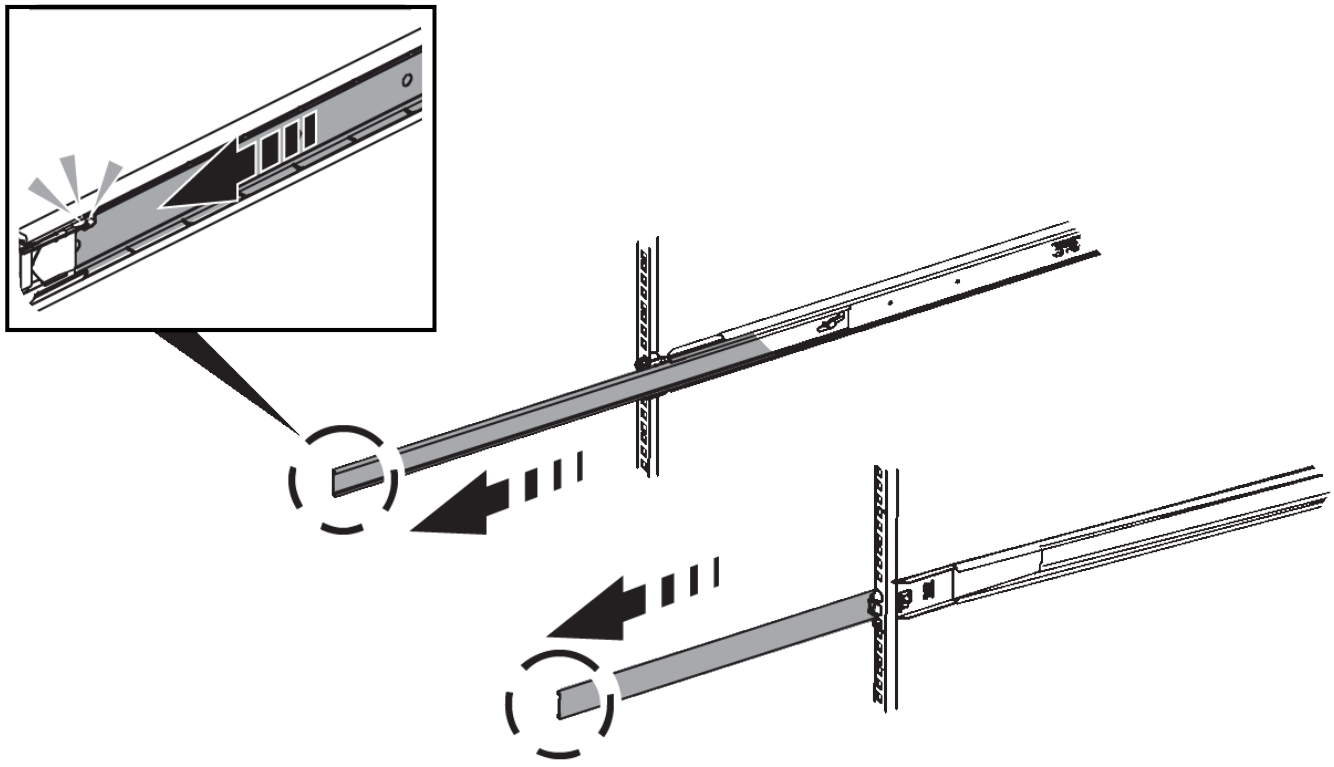
You must install a set of rails for the appliance in your cabinet or rack, and then slide the appliance onto the rails.

What you'll need

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

Steps

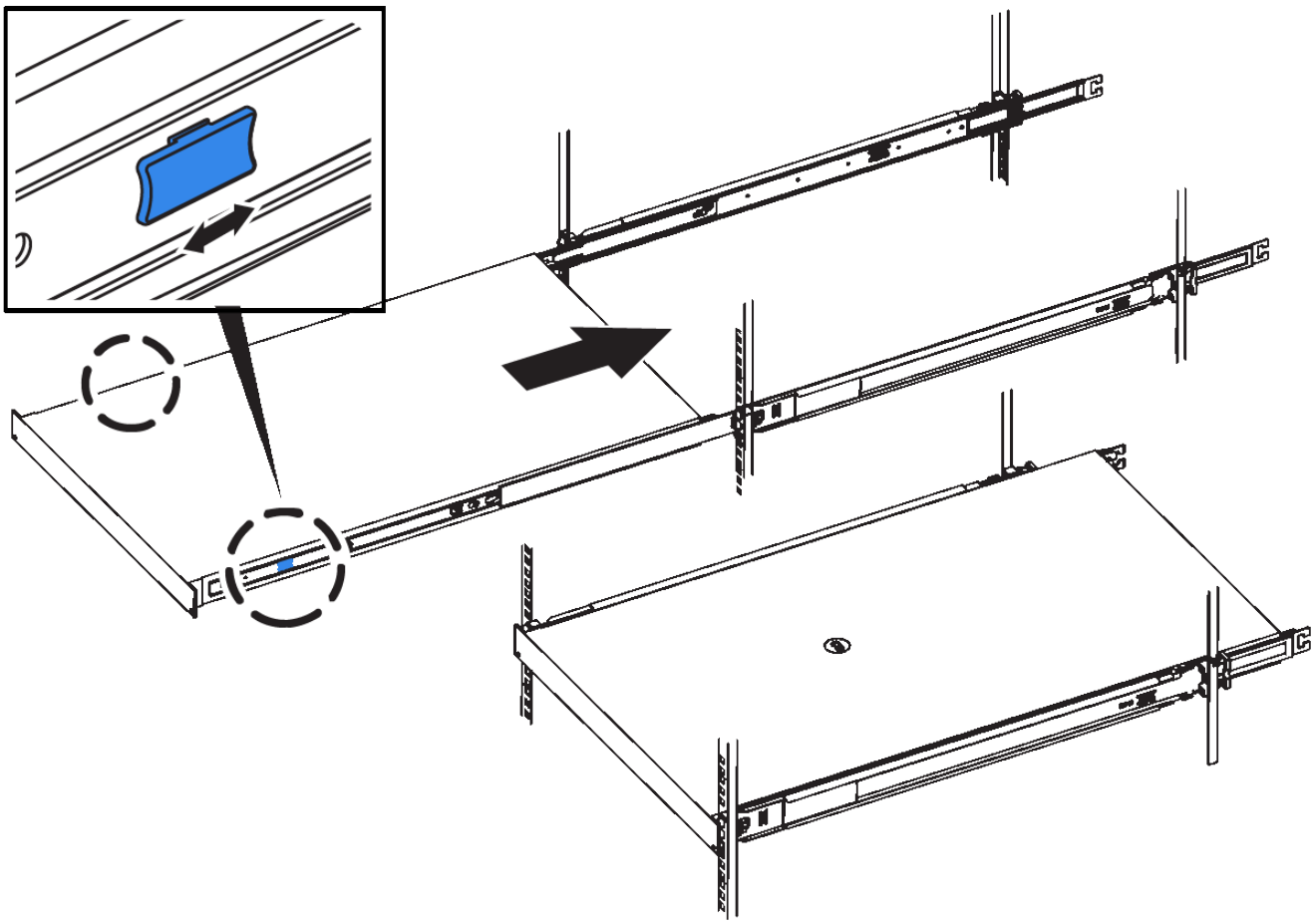
1. Carefully follow the instructions for the rail kit to install the rails in your cabinet or rack.
2. On the two rails installed in the cabinet or rack, extend the movable parts of the rails until you hear a click.



3. Insert the appliance into the rails.

4. Slide the appliance into the cabinet or rack.

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



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

Cabling the appliance SG100 and SG1000

You must connect the management port on the appliance to the service laptop and connect the network ports on the appliance to the Grid Network and optional Client Network for StorageGRID.

What you'll need

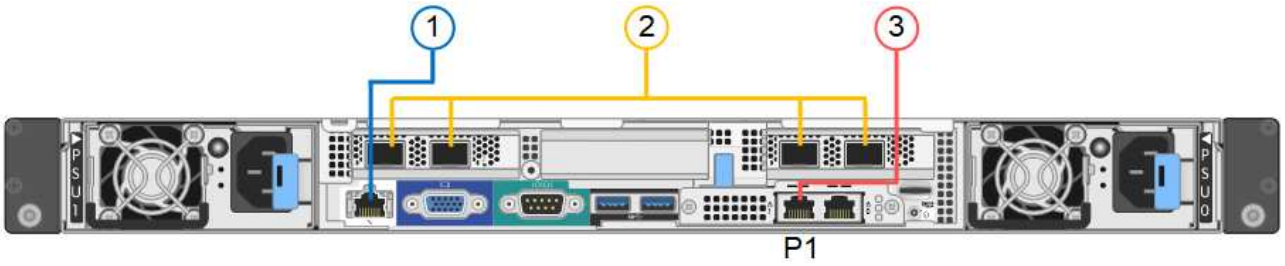
- You have an RJ-45 Ethernet cable for connecting the management port.
- You have one of the following options for the network ports. These items are not provided with the appliance.
  - One to four TwinAx cables for connecting the four network ports.
  - For the SG100, one to four SFP+ or SFP28 transceivers if you plan to use optical cables for the ports.
  - For the SG1000, one to four QSFP+ or QSFP28 transceivers if you plan to use optical cables for the ports.

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

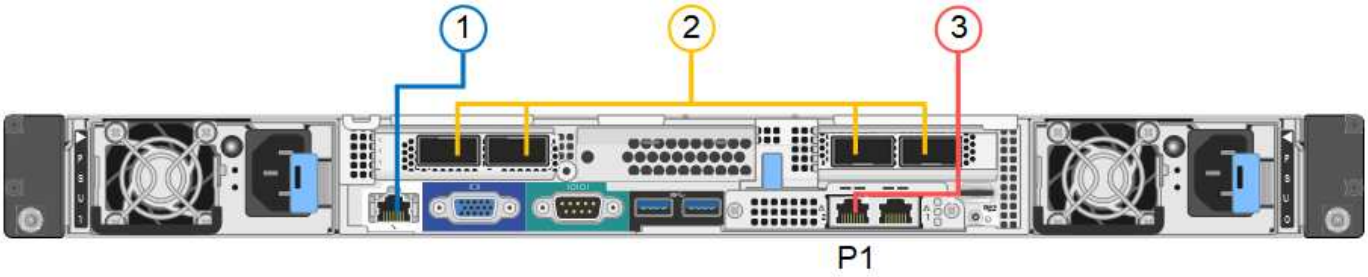
About this task

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

SG100 port connections



SG1000 port connections



	Port	Type of port	Function
1	BMC management port on the appliance	1-GbE (RJ-45)	Connects to the network where you access the BMC interface.
2	Four network ports on the appliance	• 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.
3	Admin Network port on the appliance (labelled P1 in the figures)	1-GbE (RJ-45) **Important:** 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.

	Port	Type of port	Function
3	Rightmost RJ-45 port on the appliance	1-GbE (RJ-45) **Important:** 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 are not 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.

   The four network ports must use the same link speed. See the following tables for the equipment required based on your hardware and link speed.

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
40	QSFP+ transceiver
100	QFSP28 transceiver

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

Port	Connects to…
Port 1	Client Network (optional)

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

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

3. If you plan to use the Admin Network for StorageGRID, connect the Admin Network port on the appliance to the Admin Network, using an Ethernet cable.

Connecting power cords and applying power (SG100 and SG1000)

After connecting the network cables, you are ready to apply power to the appliance.

Steps

1. Connect a power cord to each of the two power supply units in the appliance.
2. Connect these two power cords to two different power distribution units (PDUs) in the cabinet or rack.
3. If the power button on the front of the appliance is not currently illuminated blue, press the button to turn on power to the appliance.

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

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

Related information

Viewing status indicators on the SG100 and SG1000 appliances

Viewing status indicators on the SG100 and SG1000 appliances

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

Appliance indicators and buttons

	Display	State
1	Power button	• 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, you must access the BMC interface. • Off: No errors are present.

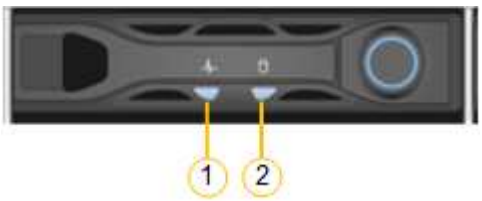
General boot-up codes

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

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

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

SSD indicators



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

Related information

Troubleshooting the hardware installation

Configuring the BMC interface

Configuring StorageGRID connections

Before you can deploy the services appliance as a node in a StorageGRID system, you must configure the connections between the appliance and the networks you plan to use. You can configure networking by browsing to the StorageGRID Appliance Installer, which is pre-installed on the services appliance.

Steps

- Accessing the StorageGRID Appliance Installer
- Verifying and upgrading the StorageGRID Appliance Installer version
- Configuring network links (SG100 and SG1000)
- Configuring StorageGRID IP addresses
- Verifying network connections
- Verifying port-level network connections

Accessing the StorageGRID Appliance Installer

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

What you'll need

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

About this task

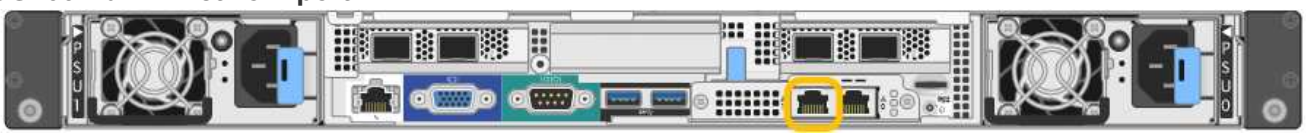
To initially access the StorageGRID Appliance Installer, you can use the DHCP-assigned IP address for the Admin Network port on the services appliance (assuming it is connected to the Admin Network), or you can

connect a service laptop directly to the services appliance.

Steps

1. If possible, use the DHCP address for the Admin Network port on the services appliance to access the StorageGRID Appliance Installer.

   SG100 Admin Network port

   SG1000 Admin Network port

   a. Locate the MAC address label on the front of the serrvices appliance, and determine the MAC address for the Admin Network port.

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

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

   b. Provide the MAC address to your network administrator, so they can look up the DHCP address for the appliance on the Admin Network.

   c. From the client, enter this URL for the StorageGRID Appliance Installer:
      `https://services-appliance_IP:8443`

      For *`services-appliance_IP`*, use the DHCP address.

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

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

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

2. Alternatively, if you cannot obtain an IP address using DHCP, use a link-local connection to access the StorageGRID Appliance Installer.

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

      SG100 link-local connection

SG1000 link-local connection

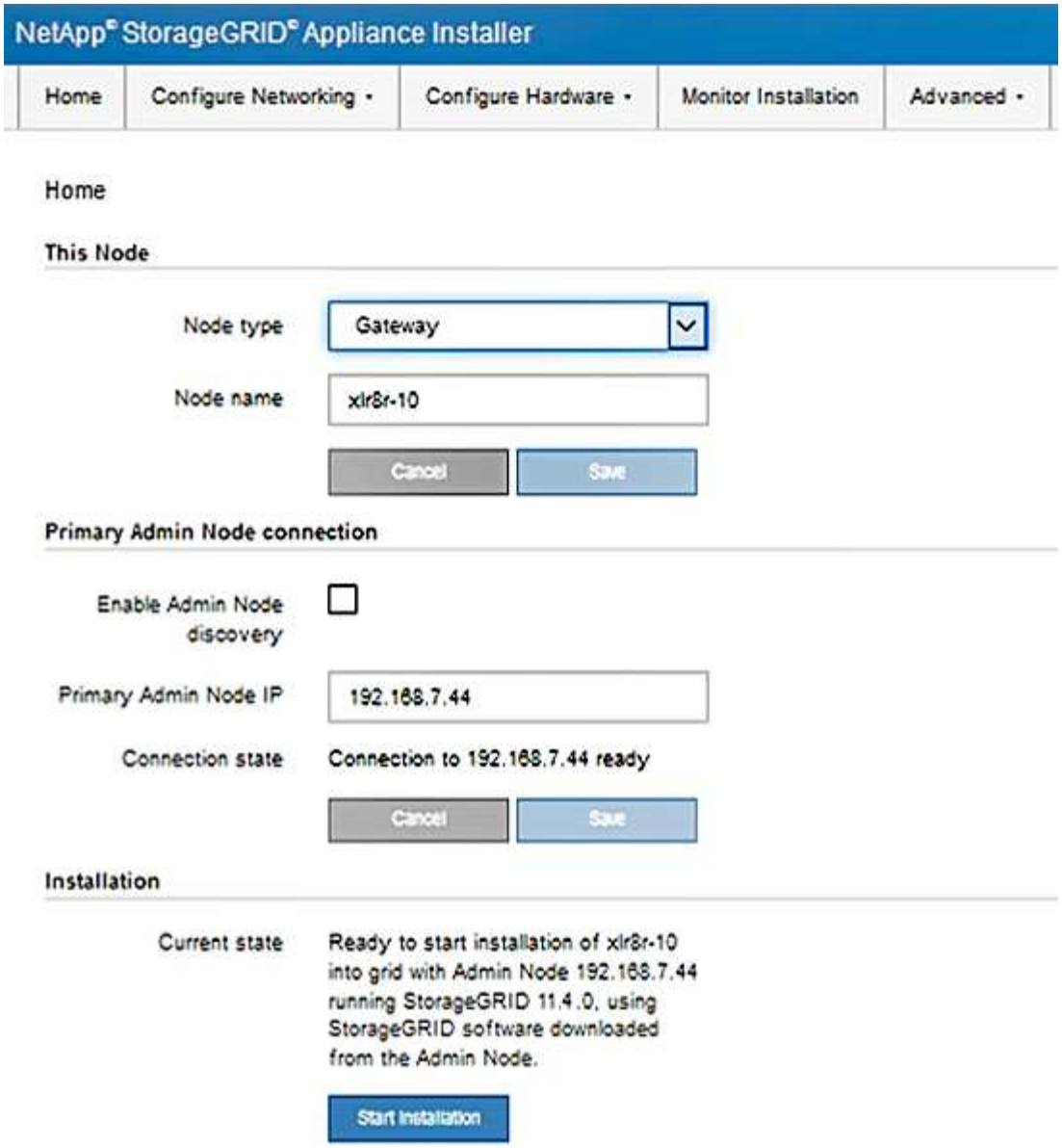
b. Open a web browser.

c. Enter this URL for the StorageGRID Appliance Installer:
`https://169.254.0.1:8443`

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

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

3. Review any messages displayed on the Home page and configure the link configuration and the IP configuration, as required.



Related information

Web browser requirements

Verifying and upgrading the StorageGRID Appliance Installer version

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

What you'll need

You have accessed the StorageGRID Appliance Installer.

About this task

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

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

Steps

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

   The second digit in the two versions should match. For example, if your StorageGRID system is running version 11.**5**.*x*.*y*, the StorageGRID Appliance Installer version should be 3.**5**.*z*.

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

   NetApp Downloads: StorageGRID

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

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

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

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

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

Related information

Accessing the StorageGRID Appliance Installer

Configuring network links (SG100 and SG1000)

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

What you'll need

- You have obtained the additional equipment required for your cable type and link speed.
- You have connected the network ports to switches that support your chosen speed.

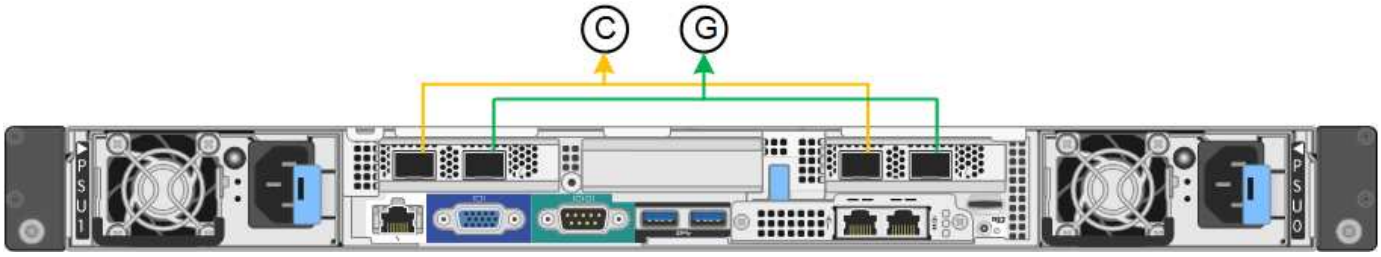
If you plan to use Aggregate port bond mode, LACP network bond mode, or VLAN tagging:

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

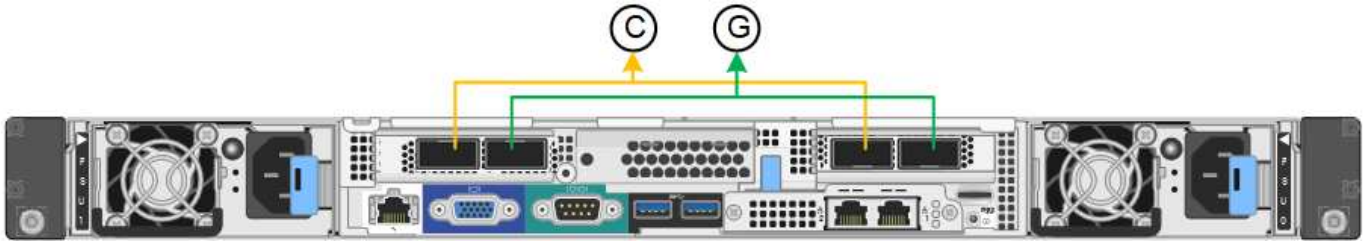
About this task

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

SG100 fixed port bond mode



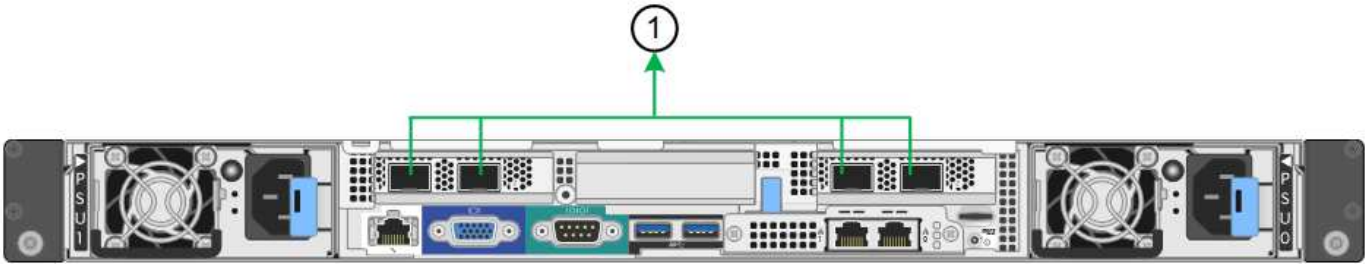
SG1000 fixed port bond mode



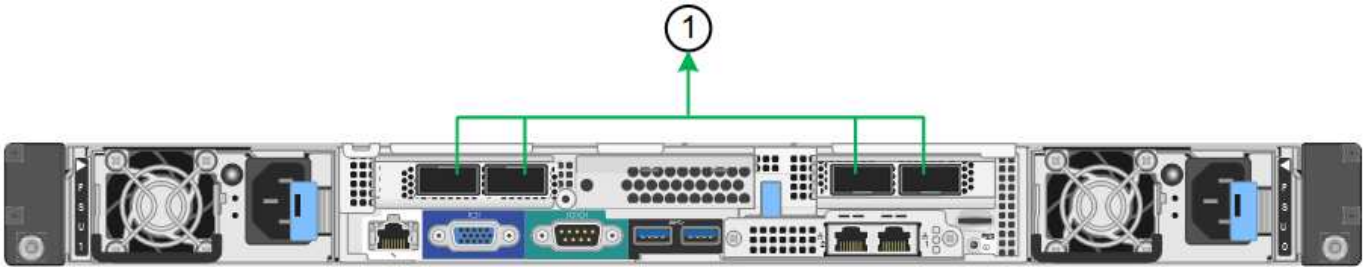
	Which ports are bonded
C	Ports 1 and 3 are bonded together for the Client Network, if this network is used.
G	Ports 2 and 4 are bonded together for the Grid Network.

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

SG100 aggregate port bond mode



SG1000 aggregate port bond mode



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

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

> The LACP transmit hash policy defaults to layer2+3 mode. If necessary, you can use the Grid Management API to change it to layer3+4 mode.

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

Network bond mode	Client Network disabled (default)	Client Network enabled
Active-Backup (default)	• Ports 2 and 4 use an active-backup bond for the Grid Network. • Ports 1 and 3 are not 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 are not used. • A VLAN tag is optional.	• 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.

- **Aggregate port bond mode**

Network bond mode	Client Network disabled (default)	Client Network enabled
LACP (802.3ad) only	• Ports 1-4 use a single LACP bond for the Grid Network. • A single VLAN tag identifies Grid Network packets.	• 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.

For additional details, see the article about GbE port connections for the services appliance.

This figure shows how the two 1-GbE management ports on the SG100 are bonded in Active-Backup network bond mode for the Admin Network.

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

SG100 Admin Network ports bonded

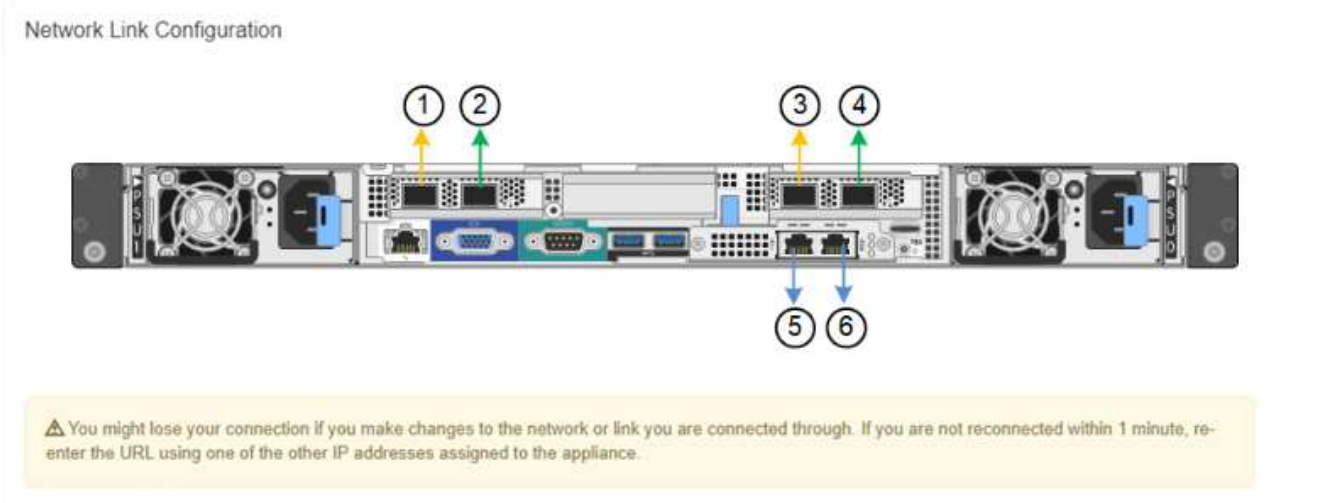
SG1000 Admin Network ports bonded

Steps

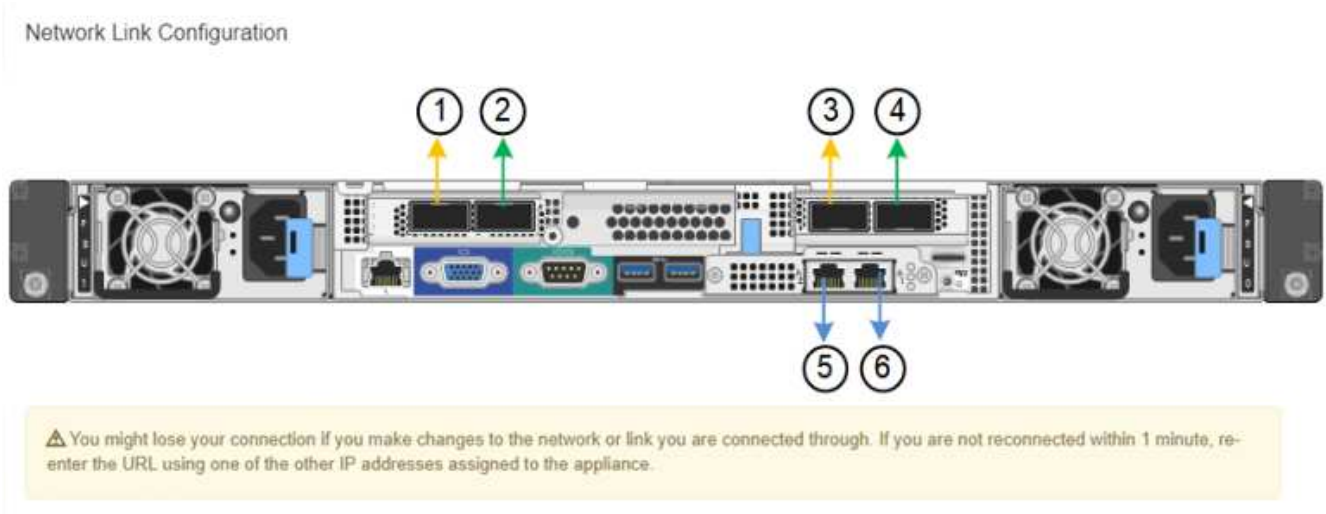
1. From the menu bar of the StorageGRID Appliance Installer, click **Configure Networking** > **Link Configuration**.

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

   SG100 ports



SG1000 ports



The Link Status table lists the link state and speed of the numbered ports (SG1000 shown).

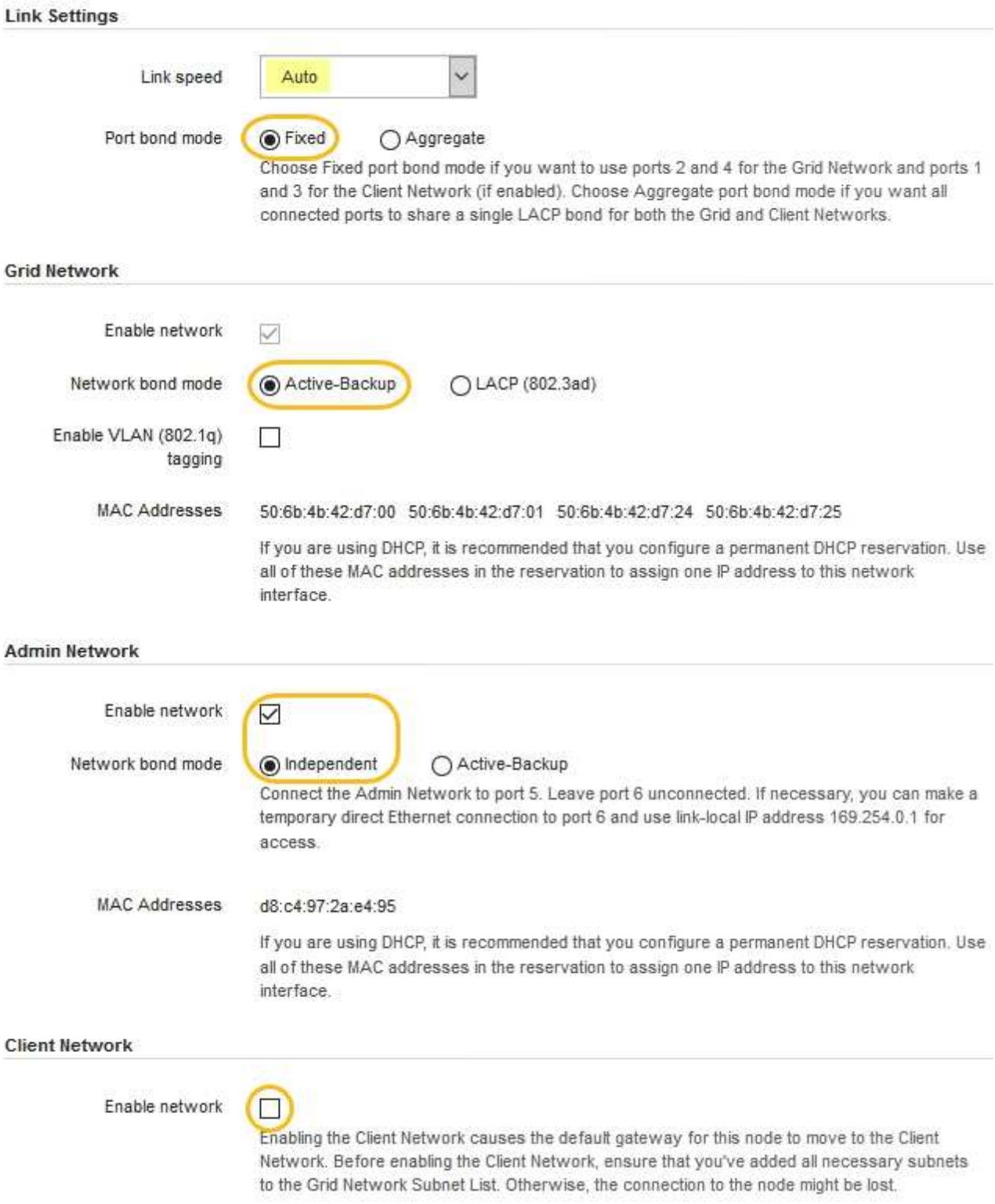
Link Status

Link	State	Speed (Gbps)
1	Up	100
2	Down	N/A
3	Down	N/A
4	Down	N/A
5	Up	1
6	Up	1

The first time you access this page:

- **Link Speed** is set to **Auto**.
- **Port bond mode** is set to **Fixed**.

- **Network bond mode** is set to **Active-Backup** for the Grid Network.
- The **Admin Network** is enabled, and the network bond mode is set to **Independent**.
- The **Client Network** is disabled.



2. Select the link speed for the network ports from the **Link speed** drop-down list.

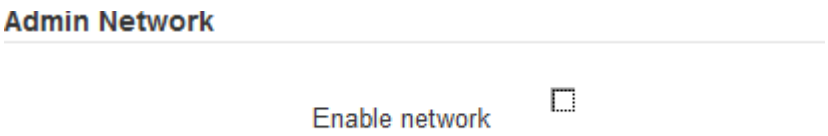
   The network switches you are using for the Grid Network and the Client Network must also support and be

configured for this speed. You must use the appropriate adapters or transceivers for the configured link speed. Use Auto link speed when possible because this option negotiates both link speed and Forward Error Correction (FEC) mode with the link partner.

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

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

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

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

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

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

   This example shows:

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

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

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

`https://services_appliance_IP:8443`

Related information

Obtaining additional equipment and tools (SG100 and SG1000)

Configuring StorageGRID IP addresses

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

About this task

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

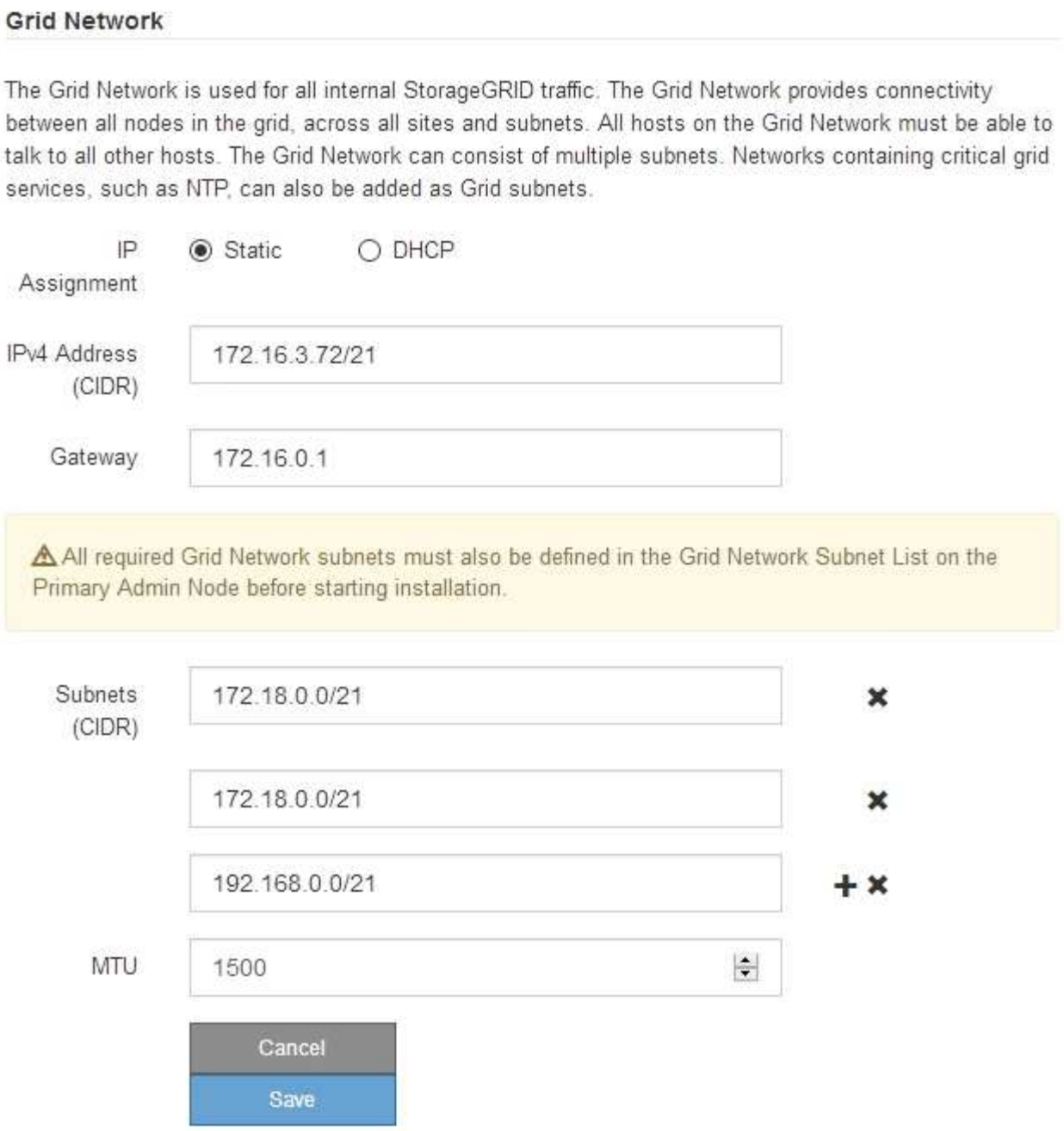
If you want to change the link configuration, see the instructions for changing the link configuration of the services appliance.

Steps

1. In the StorageGRID Appliance Installer, select **Configure Networking** > **IP Configuration**.

   The IP Configuration page appears.

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



3. 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 do not have to be the same for all network types.

d. Click **Save**.

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

If you lose your connection to the StorageGRID Appliance Installer, re-enter the URL using the new static IP address you just assigned. For example,
`https://services_appliance_IP:8443`

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

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

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

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

f. Click **Save**.

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

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

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

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

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

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

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

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

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

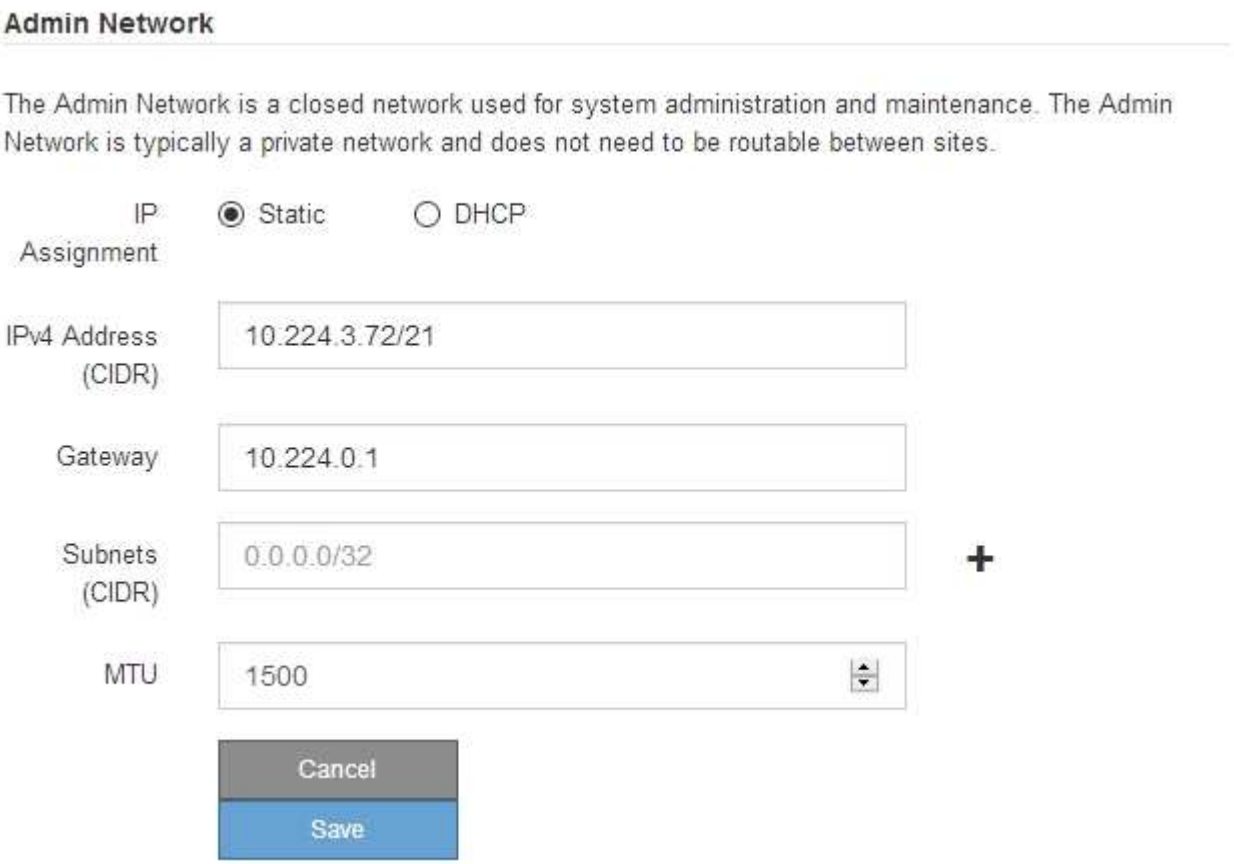
The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.

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

d. Click **Save**.

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

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



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

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

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

b. Enter the gateway.

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

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

9000. Otherwise, keep the default value of 1500.

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

d. Click **Save**.

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

If you lose your connection to the StorageGRID Appliance Installer, re-enter the URL using the new static IP address you just assigned. For example,
`https://services_appliance:8443`

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

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

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

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

f. Click **Save**.

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

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

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

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

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

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

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

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

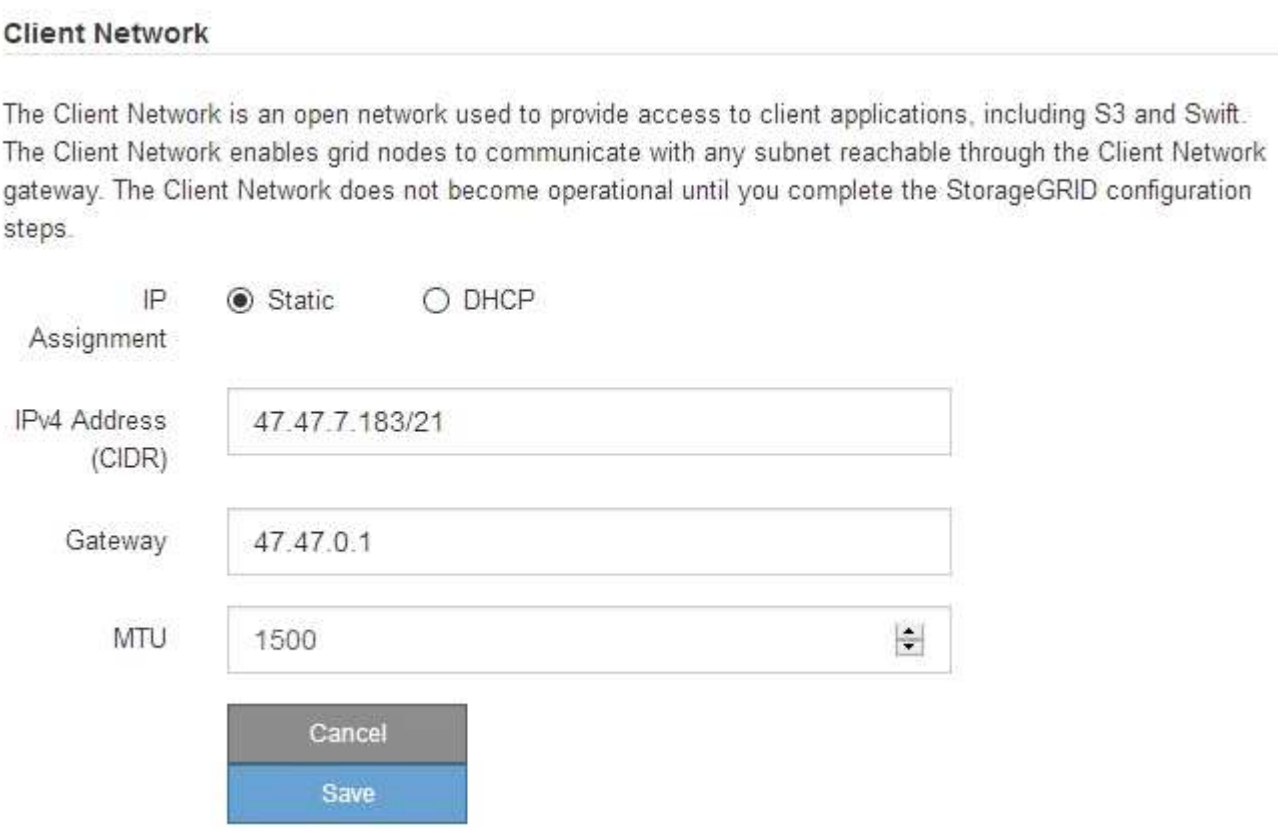
c. If you want to use jumbo frames, change the MTU field to a value suitable for jumbo frames, such as 9000. Otherwise, keep the default value of 1500.

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

d. Click **Save**.

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

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



9. 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 cannot 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**.
10. 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 cannot be moved to another interface while the Client Network is enabled.

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

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

Related information

Changing the link configuration of the services appliance

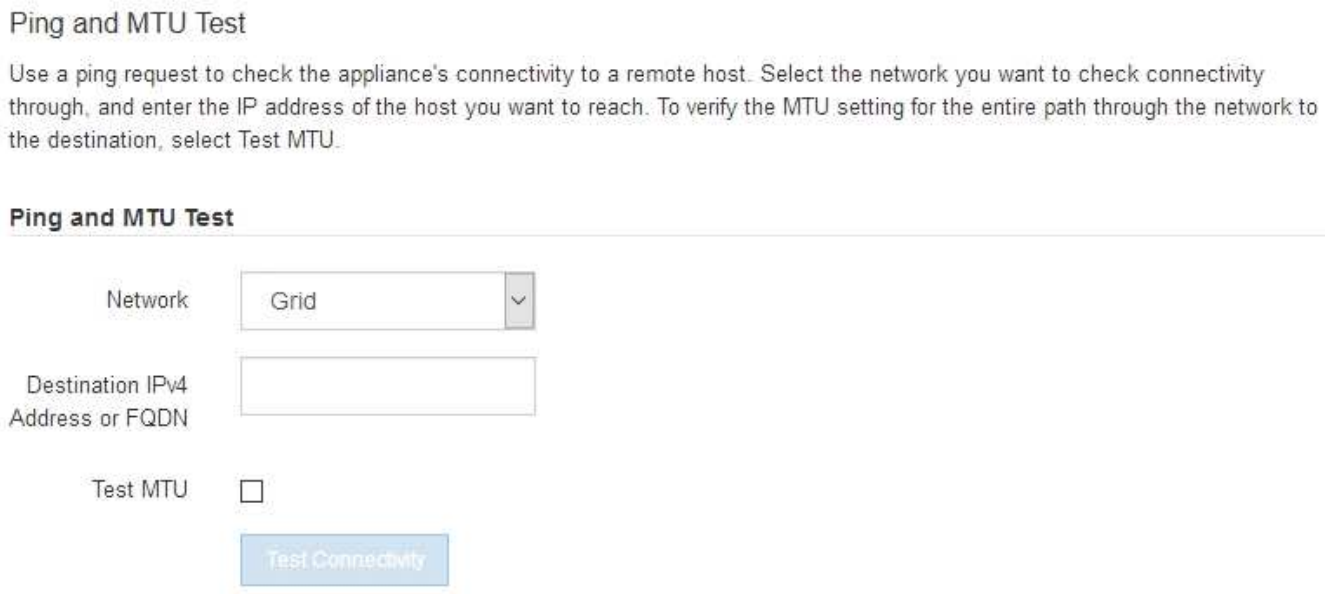
Verifying network connections

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

Steps

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

   The Ping and MTU Test page appears.



2. From the **Network** drop-down box, select the network you want to test: Grid, Admin, or Client.
3. Enter the IPv4 address or fully qualified domain name (FQDN) for a host on that network.

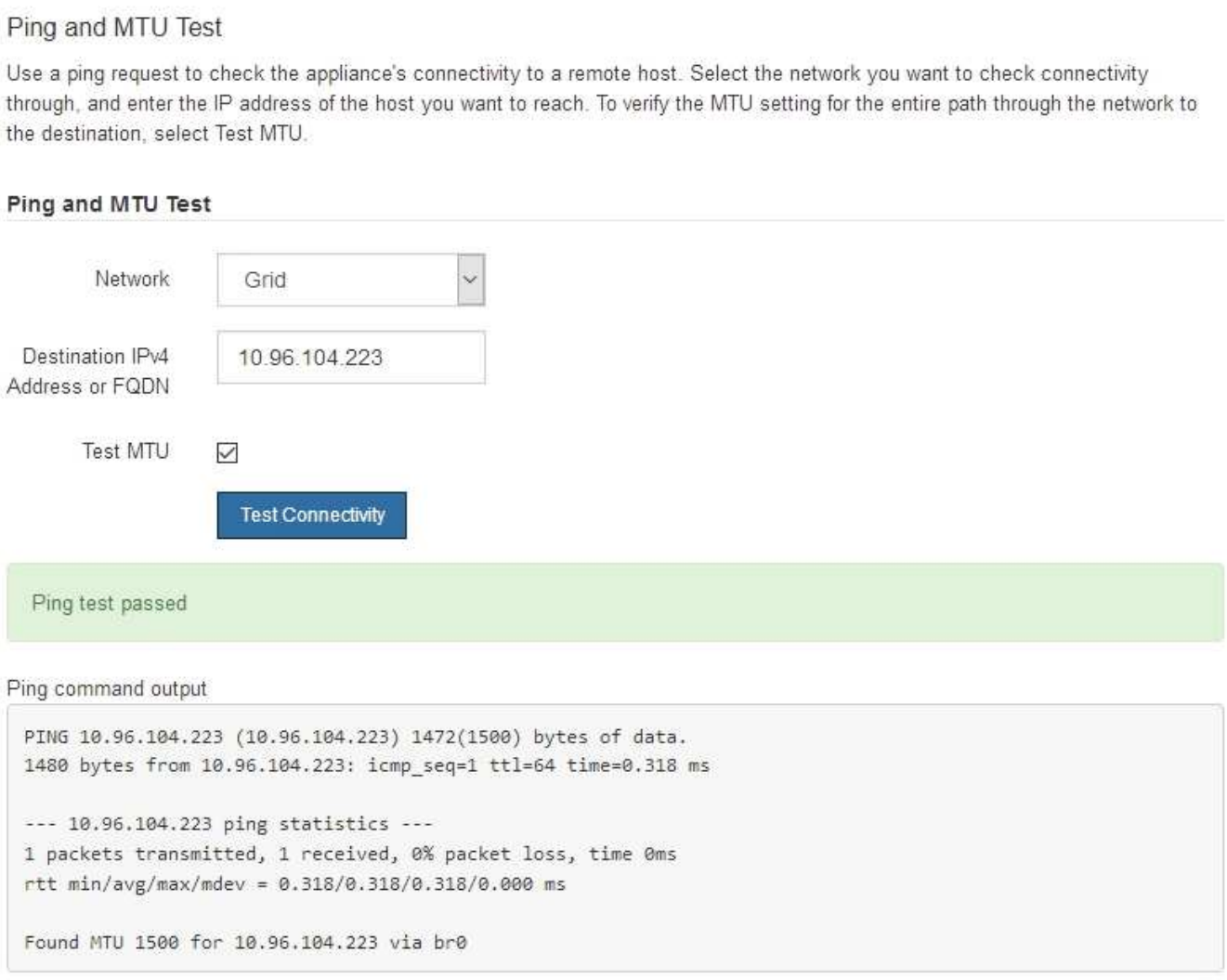
   For example, you might want to ping the gateway on the network or the primary Admin Node.

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

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

5. Click **Test Connectivity**.

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



Related information

Configuring network links (SG100 and SG1000)

Changing the MTU setting

Verifying port-level network connections

To ensure that access between the StorageGRID Appliance Installer and other nodes is not obstructed by firewalls, confirm that the StorageGRID Appliance Installer can connect to a specific TCP port or set of ports at the specified IP address or range of addresses.

About this task

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

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

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

Steps

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

   The Port Connectivity Test page appears.

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

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

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

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

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

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

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

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

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

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

Port Connectivity Test

Network: Grid

IPv4 Address Ranges: 10.224.6.160-161

Port Ranges: 22,2022

Protocol: TCP UDP

Test Connectivity

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

Port connectivity test passed

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

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

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

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

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

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

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

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

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

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

  Ports with “closed” are also listed.

Related information

Network guidelines

Configuring the BMC interface

The user interface for the baseboard management controller (BMC) on the services appliance provides status information about the hardware and allows you to configure

SNMP settings and other options for the services appliance.

Steps

- Changing the root password for the BMC interface
- Setting the IP address for the BMC management port
- Accessing the BMC interface
- Configuring SNMP settings for the services appliance
- Setting up email notifications for alerts

Changing the root password for the BMC interface

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

What you'll need

The management client is using a supported web browser.

About this task

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

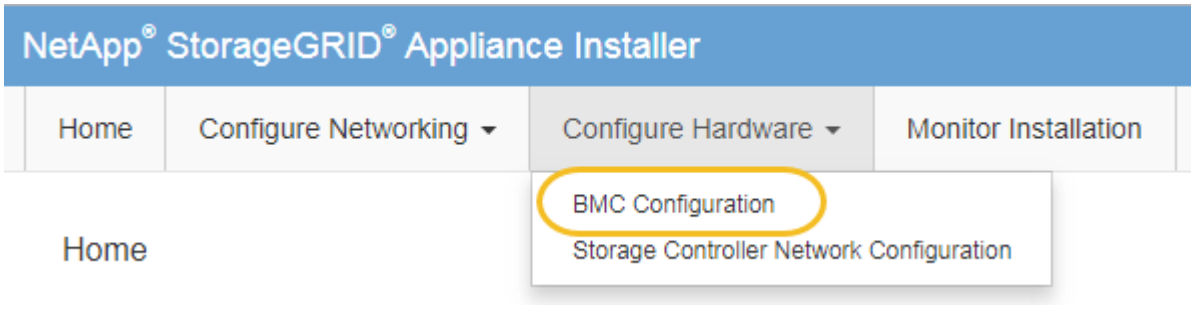
Steps

1. From the client, enter the URL for the StorageGRID Appliance Installer:
   `https://services_appliance_IP:8443`

   For `services_appliance_IP`, use the IP address for the appliance on any StorageGRID network.

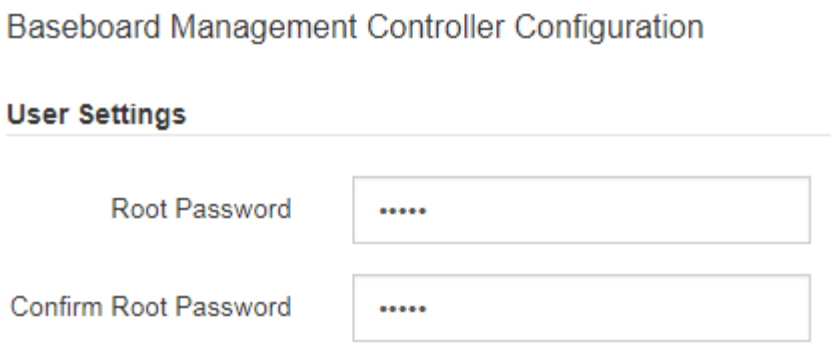
   The StorageGRID Appliance Installer Home page appears.

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



   The Baseboard Management Controller Configuration page appears.

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



4. Click **Save**.

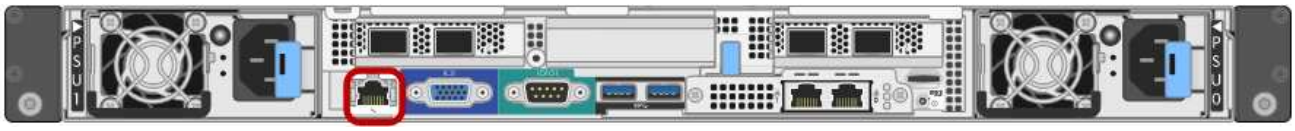
Setting the IP address for the BMC management port

Before you can access the BMC interface, you must configure the IP address for the BMC management port on the services appliance.

What you'll need

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

SG100 BMC management port



SG1000 BMC management port

About this task

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

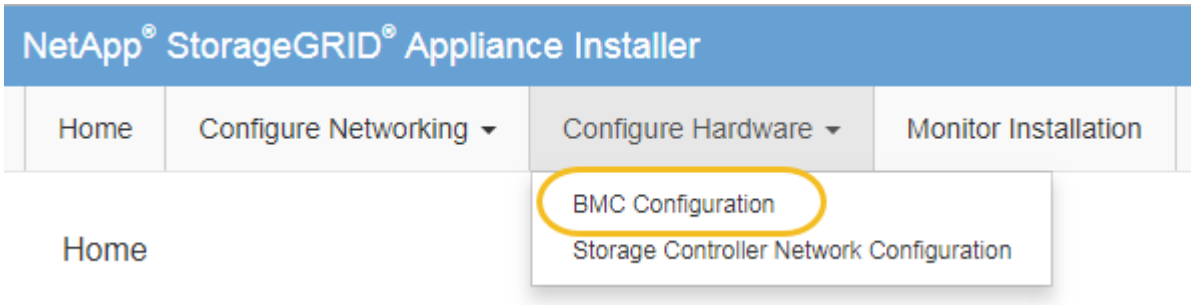
Steps

1. From the client, enter the URL for the StorageGRID Appliance Installer:
   `https://services_appliance_IP:8443`

   For *`services_appliance_IP`*, use the IP address for the appliance on any StorageGRID network.

   The StorageGRID Appliance Installer Home page appears.

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

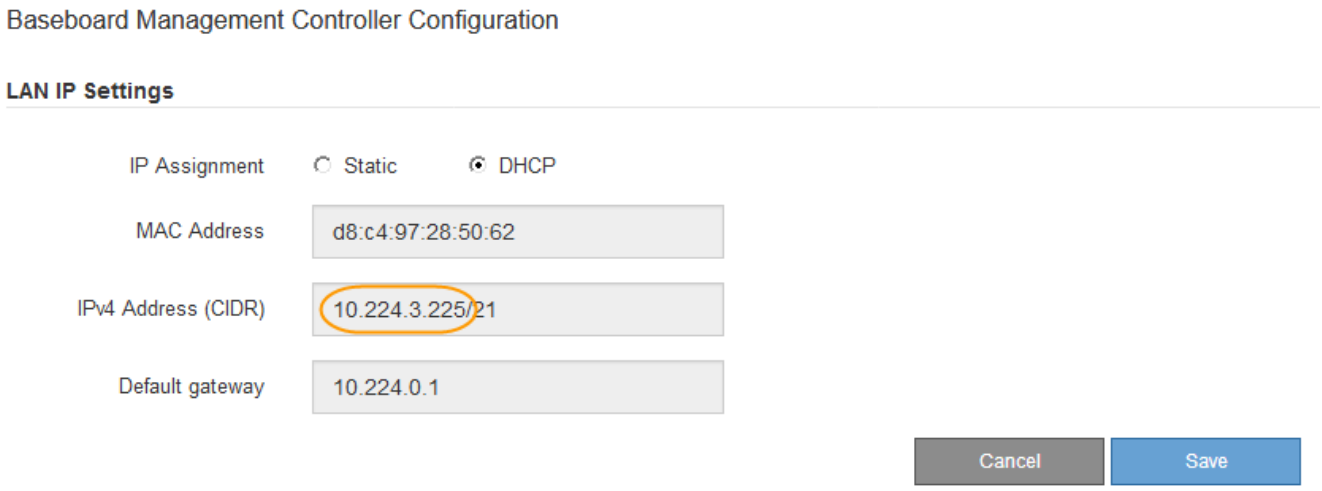


The Baseboard Management Controller Configuration page appears.

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

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

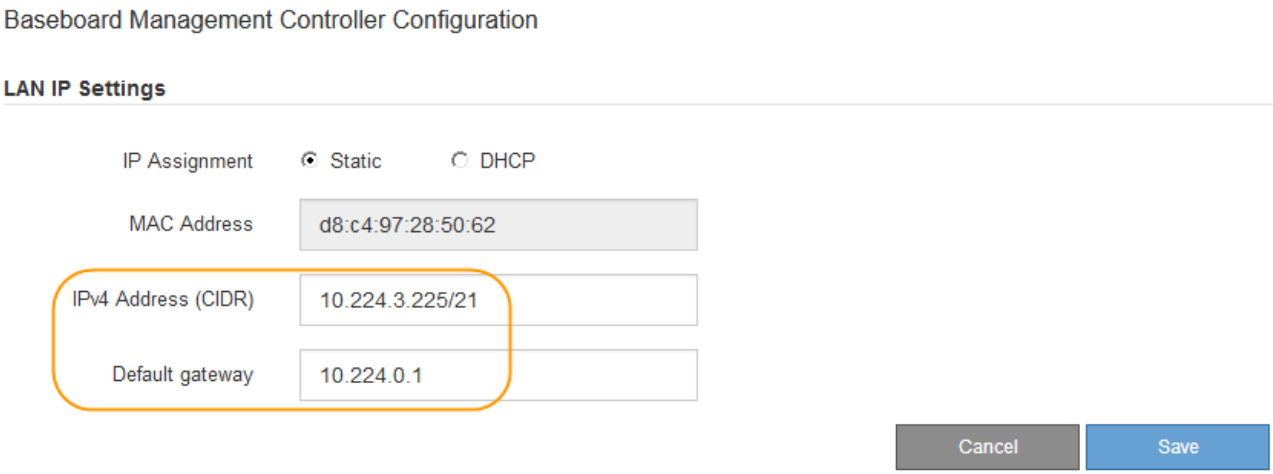
> It might take a few minutes for the DHCP values to appear.



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.

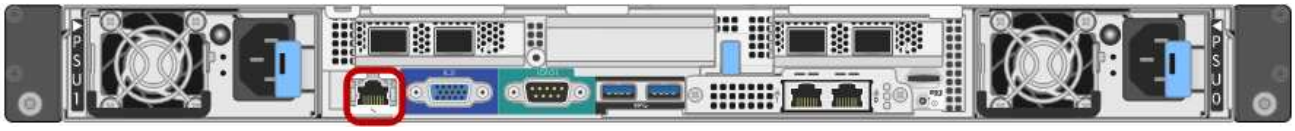
Accessing the BMC interface

You can access the BMC interface on the services appliance using the DHCP or static IP address for the BMC management port.

What you'll need

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

SG100 BMC management port



SG1000 BMC management port

Steps

1. Enter the URL for the BMC interface:
   `https://BMC_Port_IP`

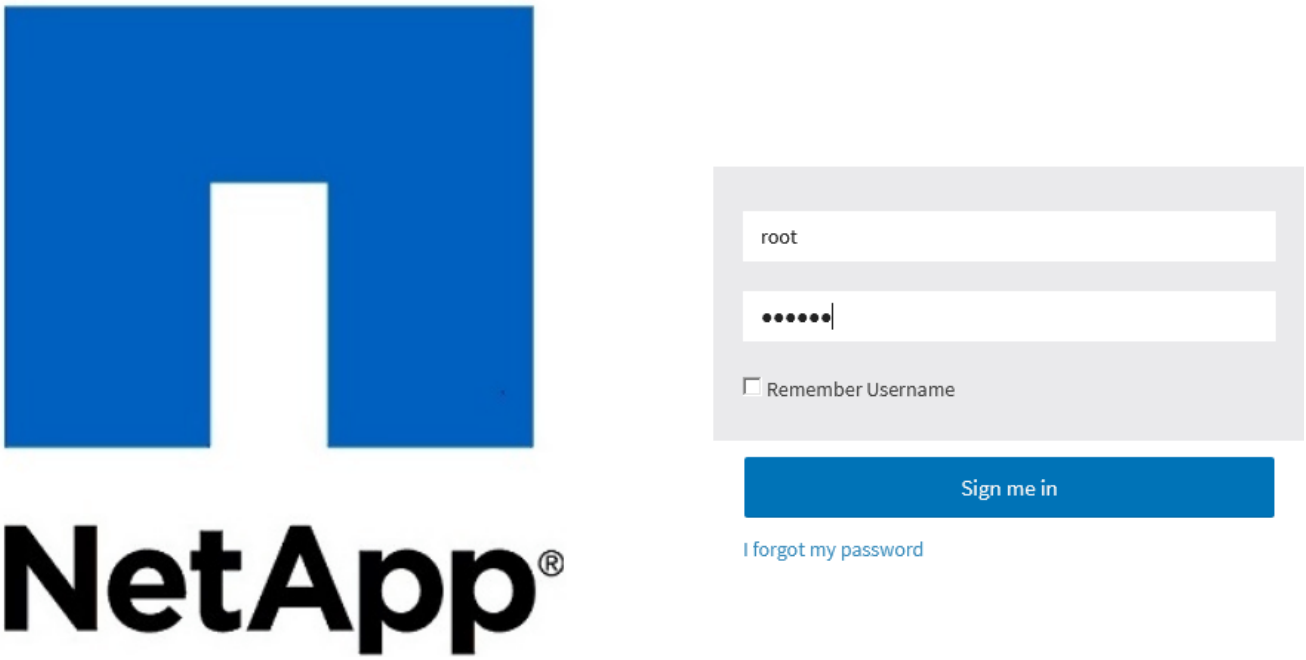
   For *`BMC_Port_IP`*, use the DHCP or static IP address for the BMC management port.

   The BMC sign-in page appears.

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

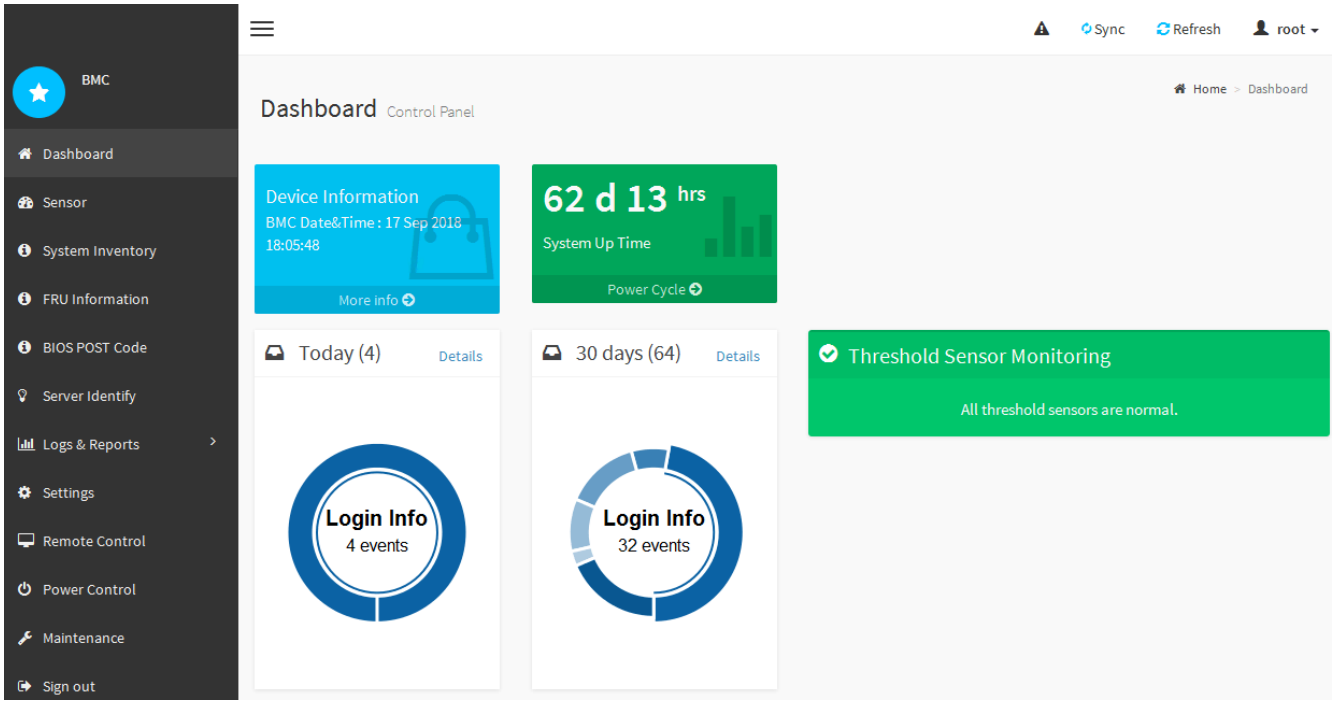
`root`

`password`



3. Click **Sign me in**

   The BMC dashboard appears.



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

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

Related information

Changing the root password for the BMC interface

Configuring SNMP settings for the services appliance

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

What you'll need

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

Steps

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

   The Read-Only Community String is like a user ID or password. You should change this value to prevent intruders from getting information about your network setup. The Read-Write Community String protects the device against unauthorized changes.

3. Optionally, select **Enable Trap**, and enter the required information.

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

   Enable traps if you want the services appliance to send immediate notifications to an SNMP console when it is in an unusual state. Traps might indicate link up/down conditions, temperatures exceeding certain thresholds, or high traffic.

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

Setting up email notifications for alerts

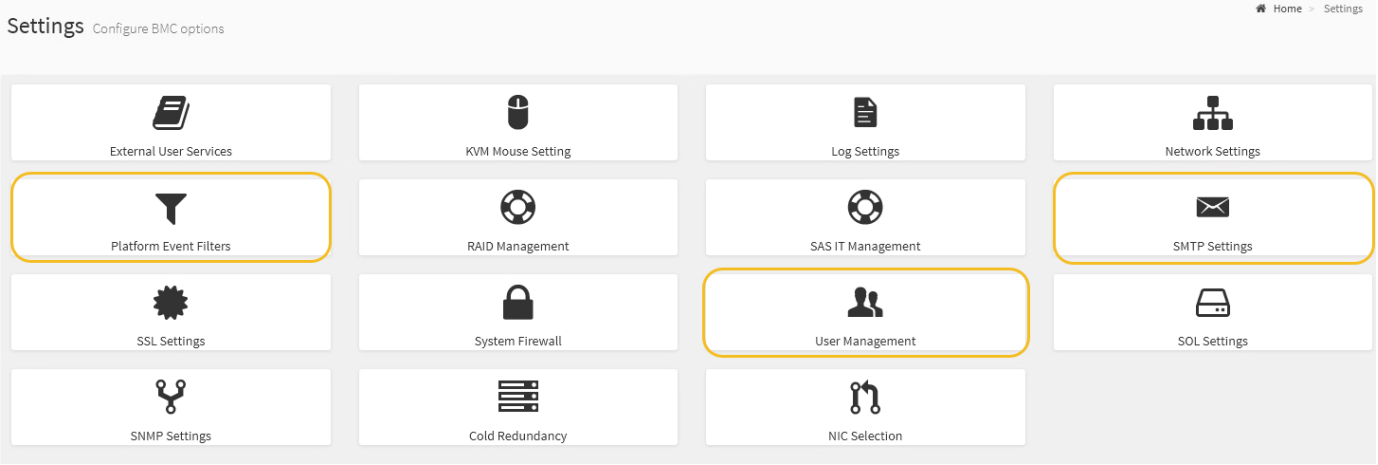
If you want email notifications to be sent when alerts occur, you must use the BMC interface to configure SMTP settings, users, LAN destinations, alert policies, and event filters.

What you'll need

You know how to access the BMC dashboard.

About this task

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



Steps

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

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

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

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

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

a. Select **Settings** > **Platform Event Filters** > **Event Filters**.

b. For Alert Policy Group Number, enter **1**.

c. Create filters for every event you want the Alert Policy Group to be notified about.

- You can create event filters for power actions, specific sensor events, or all events.
- If you are uncertain which events to monitor, select **All Sensors** for Sensor Type and **All Events** for Event Options. If you receive unwanted notifications, you can change your selections later.

Optional: Enabling node encryption

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

What you'll need

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

About this task

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

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

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

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

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

Steps

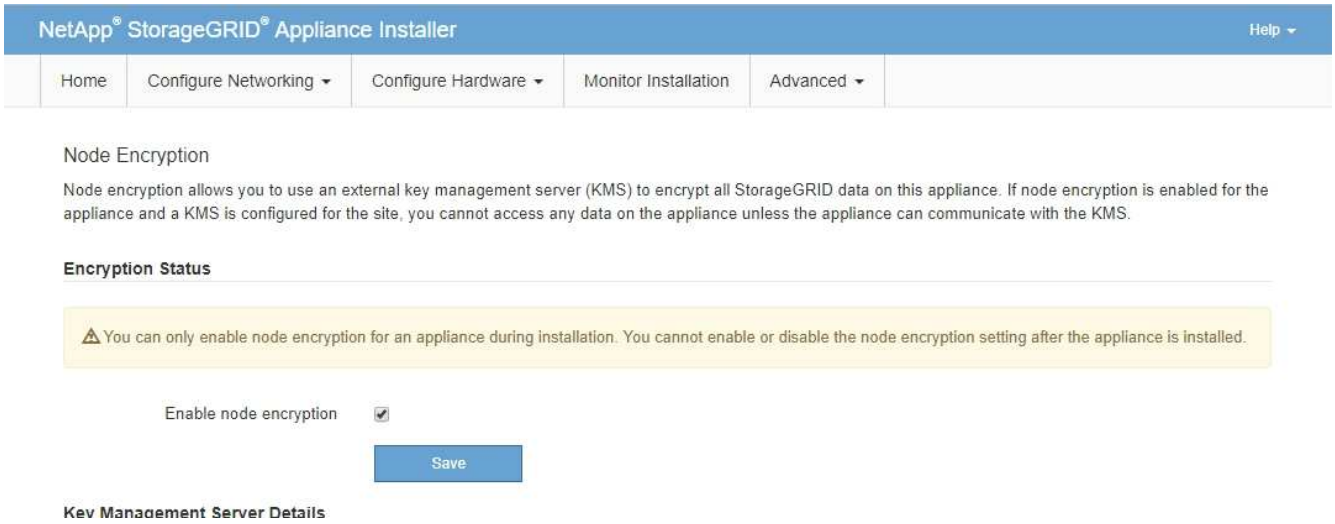
1. Open a browser, and enter one of the IP addresses for the appliance's compute controller.
   `https://Controller_IP:8443`

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

The StorageGRID Appliance Installer Home page appears.

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

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



3. Select **Enable node encryption**.

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

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

4. Select **Save**.
5. Deploy the appliance as a node in your StorageGRID system.

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

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

After you finish

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

Related information

Administer StorageGRID

Monitoring node encryption in maintenance mode

Deploying a services appliance node

You can deploy a services appliance as a primary Admin Node, a non-primary Admin Node, or a Gateway Node. Both the SG100 and the SG1000 appliances can operate as Gateway Nodes and Admin Nodes (primary or non-primary) at the same time.

Deploying a services appliance as a primary Admin Node

When you deploy a services appliance as a primary Admin Node, you use the StorageGRID Appliance Installer included on the appliance to install the StorageGRID software, or you upload the software version you want to install. You must install and configure the primary Admin Node before you install any other appliance node types. A primary Admin Node can connect to the Grid Network, and to the optional Admin Network and Client Network, if one or both are configured.

What you'll need

- The appliance has been installed in a rack or cabinet, connected to your networks, and powered on.
- Network links, IP addresses, and port remapping (if necessary) have been configured for the appliance using the StorageGRID Appliance Installer.

  If you have remapped any ports, you cannot use the same ports to configure load balancer endpoints. You can create endpoints using remapped ports, but those endpoints will be remapped to the original CLB ports and service, not the Load Balancer service. Follow the steps in the recovery and maintenance instructions for removing port remaps.

  The CLB service is deprecated.

- You have a service laptop with a supported web browser.
- You know one of the IP addresses assigned to the appliance. You can use the IP address for any attached StorageGRID network.

About this task

To install StorageGRID on an appliance primary Admin Node:

- You use the StorageGRID Appliance Installer to install the StorageGRID software. If you want to install a different version of the software, you first upload it using the StorageGRID Appliance Installer.
- You wait as the software is installed.
- When the software has been installed, the appliance is rebooted automatically.

Steps

1. Open a browser, and enter the IP address for the appliance.
   `https://services_appliance_IP:8443`

   The StorageGRID Appliance Installer Home page appears.

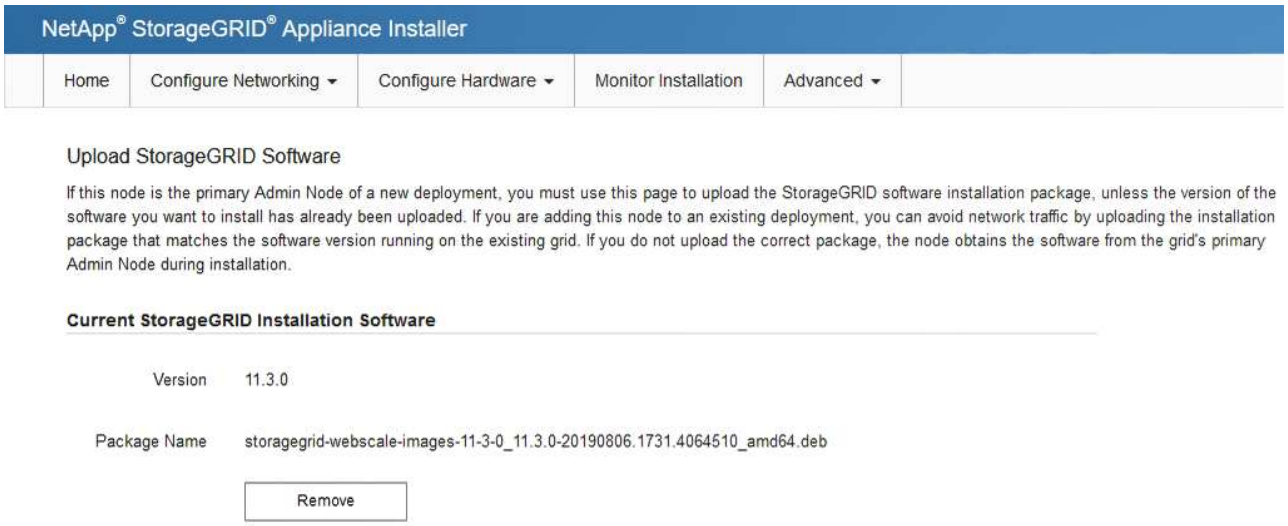
2. In the **This Node** section, select **Primary Admin**.
3. In the **Node name** field, enter the name you want to use for this appliance node, and click **Save**.

The node name is assigned to this appliance node in the StorageGRID system. It is shown on the Grid Nodes page in the Grid Manager.

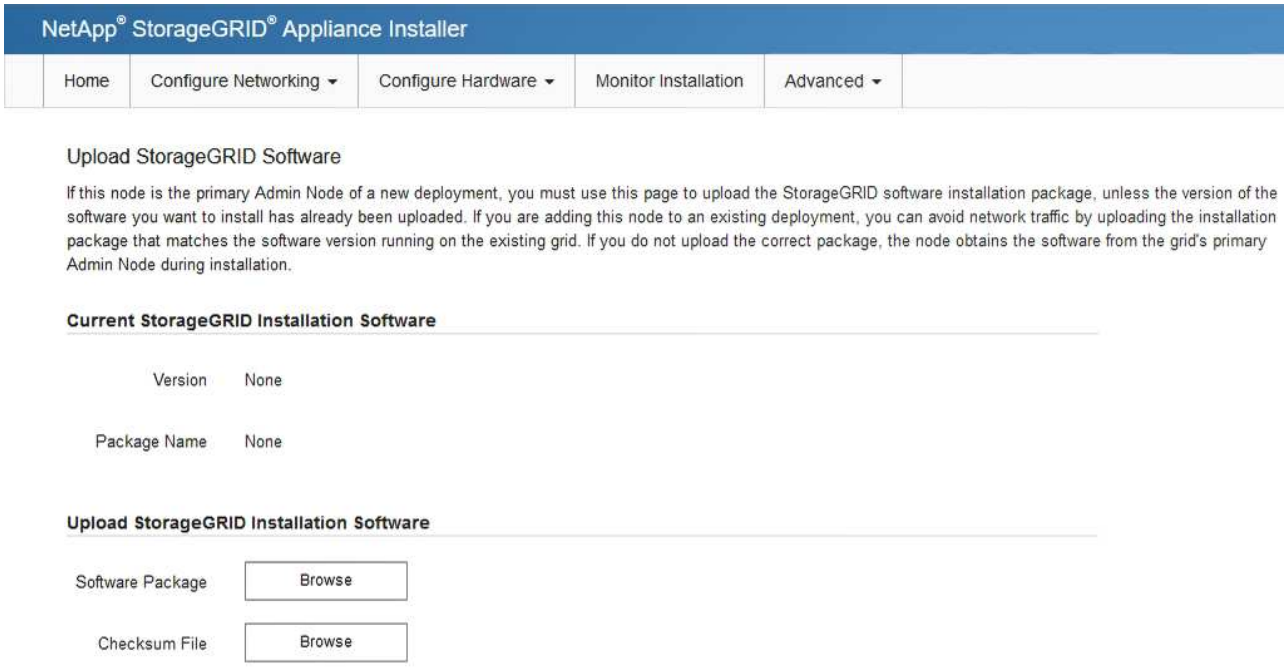
4. Optionally, to install a different version of the StorageGRID software, follow these steps:
   a. Download the installation archive from the NetApp Downloads page for StorageGRID.

      NetApp Downloads: StorageGRID

   b. Extract the archive.
   c. From the StorageGRID Appliance Installer, select **Advanced** > **Upload StorageGRID Software**.
   d. Click **Remove** to remove the current software package.



   e. Click **Browse** for the software package you downloaded and extracted, and then click **Browse** for the checksum file.



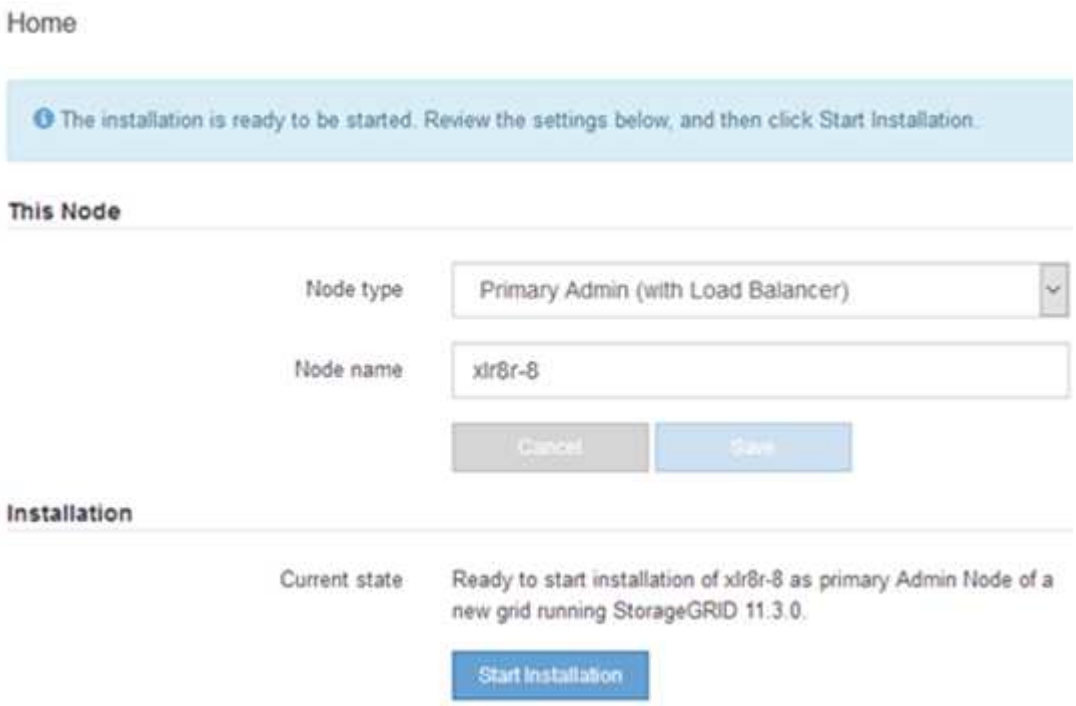
   f. Select **Home** to return to the Home page.

5. Confirm that the current state is “Ready to start installation of primary Admin Node name with software version x.y” and that the **Start Installation** button is enabled.

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

   Maintain & recover

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



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

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

Related information

Deploying a services appliance as a Gateway or non-primary Admin Node

Deploying a services appliance as a Gateway or non-primary Admin Node

When you deploy a services appliance as a Gateway Node or non-primary Admin Node, you use the StorageGRID Appliance Installer included on the appliance.

What you’ll need

- The appliance has been installed in a rack or cabinet, connected to your networks, and powered on.
- Network links, IP addresses, and port remapping (if necessary) have been configured for the appliance using the StorageGRID Appliance Installer.

If you have remapped any ports, you cannot use the same ports to configure load balancer endpoints. You can create endpoints using remapped ports, but those endpoints will be remapped to the original CLB ports and service, not the Load Balancer service. Follow the steps in the recovery and maintenance instructions for removing port remaps.

The CLB service is deprecated.

- The primary Admin Node for the StorageGRID system has been deployed.
- All Grid Network subnets listed on the IP Configuration page of the StorageGRID Appliance Installer have been defined in the Grid Network Subnet List on the primary Admin Node.
- You have a service laptop with a supported web browser.
- You know the IP address assigned to the appliance. You can use the IP address for any attached StorageGRID network.

About this task

To install StorageGRID on a services appliance node:

- You specify or confirm the IP address of the primary Admin Node and the name of the appliance node.
- You start the installation and wait as the software is installed.

  Partway through the appliance Gateway Node installation tasks, the installation pauses. To resume the installation, you sign into the Grid Manager, approve all grid nodes, and complete the StorageGRID installation process. The installation of a non-primary Admin Node does not require your approval.

Do not deploy the SG100 and SG1000 service appliances in the same site. Unpredictable performance might result.

If you need to deploy multiple appliance nodes at one time, you can automate the installation process by using the `configure-sga.py` Appliance Installation script. You can also use the Appliance Installer to upload a JSON file that contains configuration information. See Automating appliance installation and configuration.

Steps

1. Open a browser, and enter the IP address for the appliance.

   `https://Controller_IP:8443`

   The StorageGRID Appliance Installer Home page appears.

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

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

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

Option	Description
Manual IP entry	a. Unselect the **Enable Admin Node discovery** check box. 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** check box. 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.

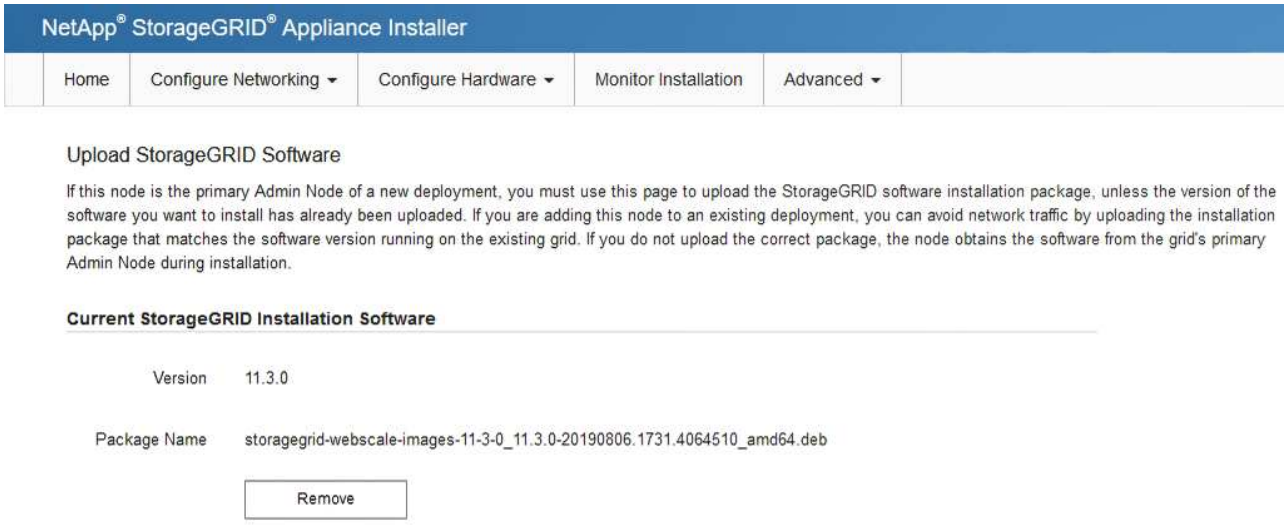
4. In the **Node name** field, enter the name you want to use for this appliance node, and click **Save**.

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

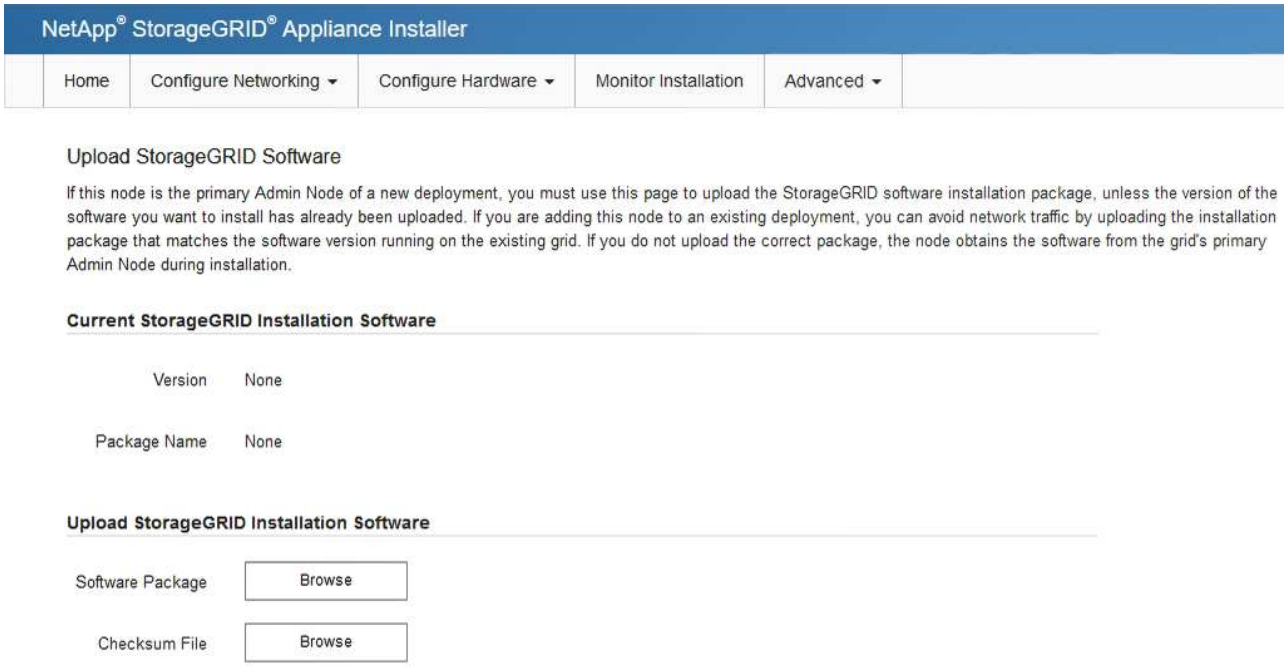
5. Optionally, to install a different version of the StorageGRID software, follow these steps:
   a. Download the installation archive from the NetApp Downloads page for StorageGRID.

      NetApp Downloads: StorageGRID

   b. Extract the archive.
   c. From the StorageGRID Appliance Installer, select **Advanced** > **Upload StorageGRID Software**.
   d. Click **Remove** to remove the current software package.



e. Click **Browse** for the software package you downloaded and extracted, and then click **Browse** for the checksum file.

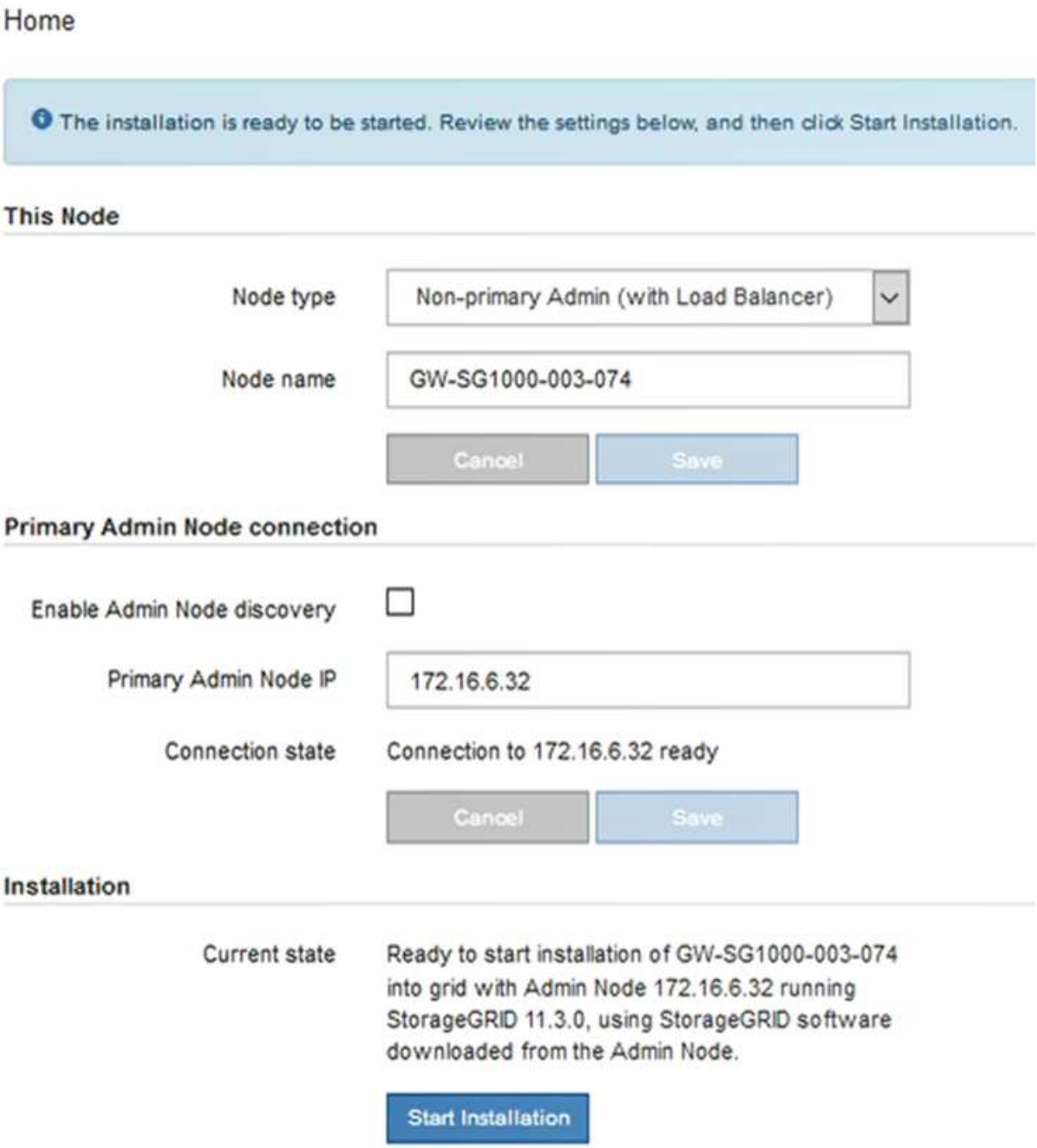


f. Select **Home** to return to the Home page.

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

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

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



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

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

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

Related information

Deploying a services appliance as a primary Admin Node

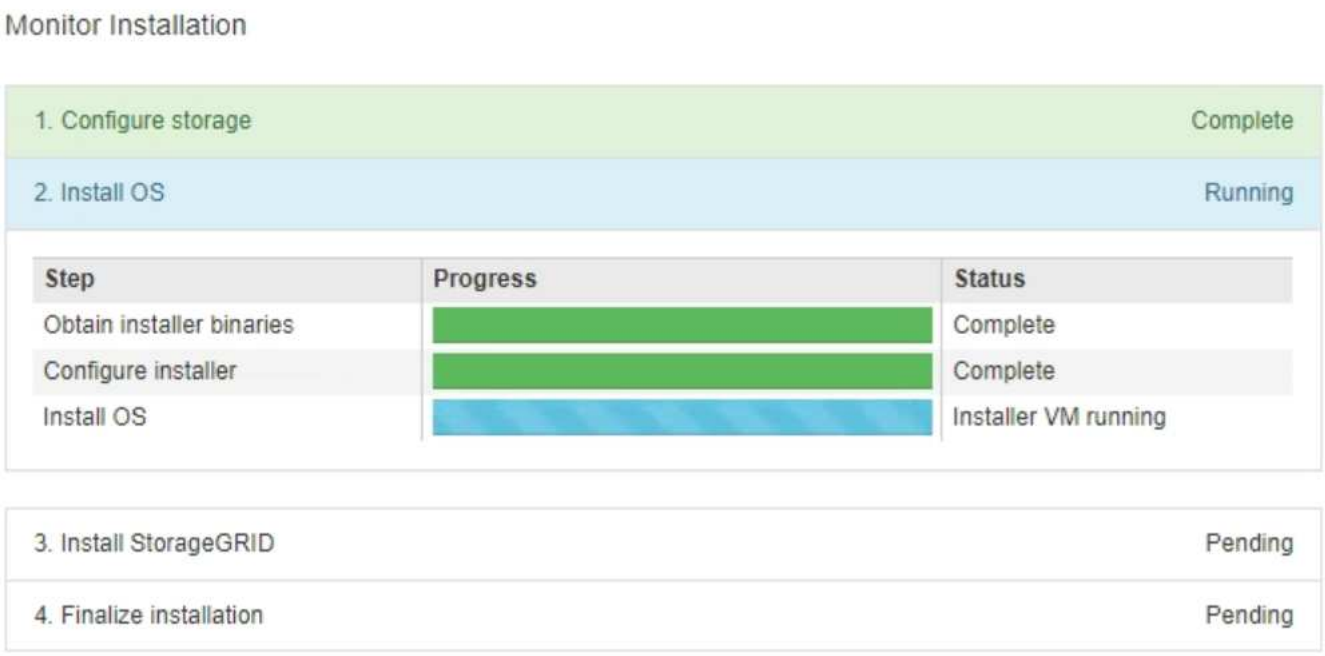
Monitoring the services appliance installation

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

Steps

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

   The Monitor Installation page shows the installation progress.



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

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

2. Review the progress of first two installation stages.
   - **1. Configure storage**

     During this stage, the installer clears any existing configuration from the drives in the appliance, and configures host settings.

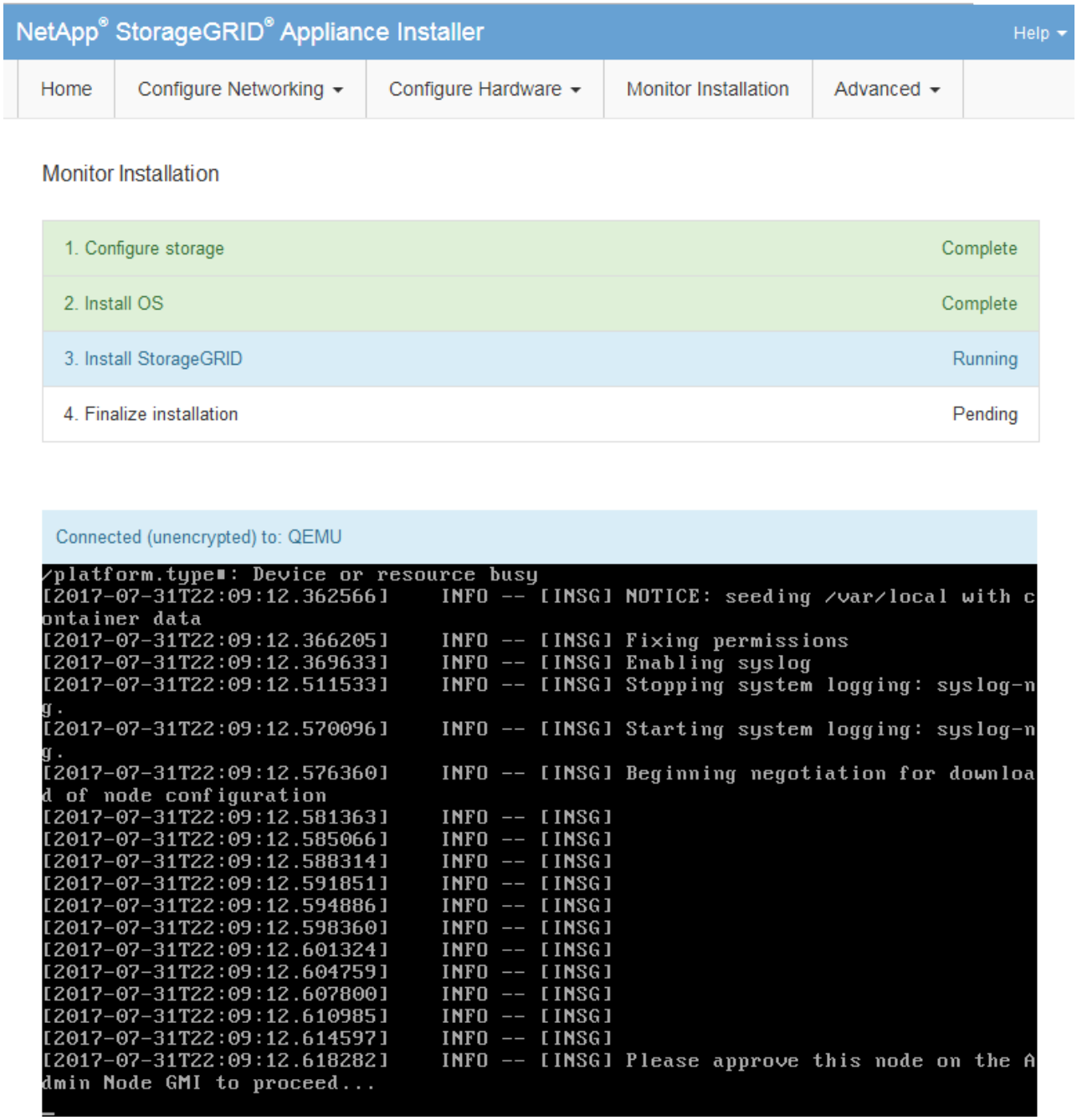
   - **2. Install OS**

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

3. Continue monitoring the installation progress until one of the following processes occurs:
   - For all appliance nodes except the primary Admin Node, the Install StorageGRID stage pauses and a message appears on the embedded console, prompting you to approve this node on the Admin Node using the Grid Manager. Go to the next step.

- For appliance primary Admin Node installation, you do not need to approve the node. The appliance is rebooted. You can skip the next step.

> During installation of an appliance primary Admin Node, a fifth phase appears (see the example screen shot showing four phases). If the fifth phase is in progress for more than 10 minutes, refresh the web page manually.



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

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

Automating appliance installation and configuration

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

About this task

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

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

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

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

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

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

Related information

Maintain & recover

Automating appliance configuration using the StorageGRID Appliance Installer

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

What you'll need

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

About this task

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

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

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

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

Steps

1. Generate the JSON file using one of the following methods:
   - The ConfigBuilder application

     ConfigBuilder.netapp.com

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

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

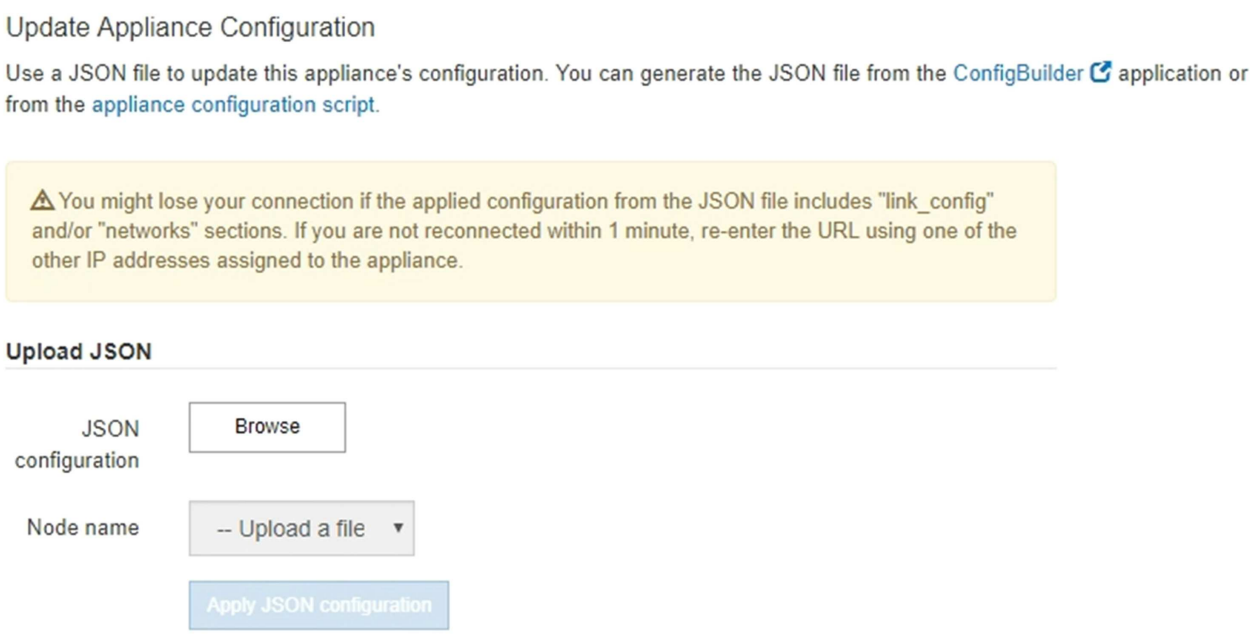
     The node names in the JSON file must follow these requirements:

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

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

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

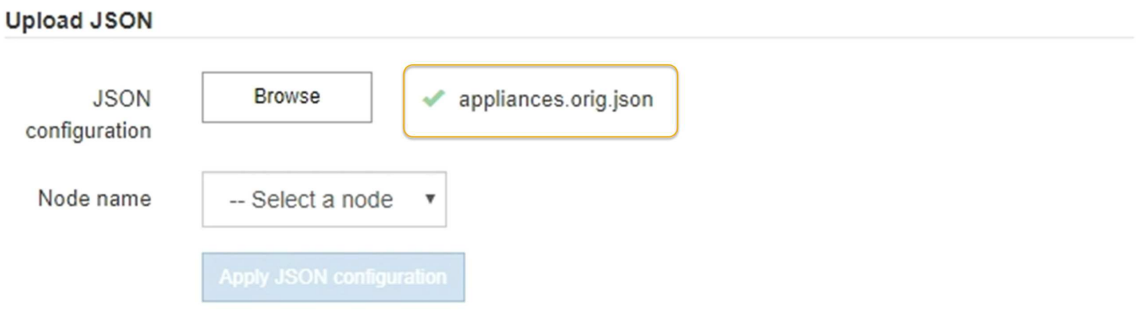
   The Update Appliance Configuration page appears.



3. Select the JSON file with the configuration you want to upload.
   a. Select **Browse**.
   b. Locate and select the file.
   c. Select **Open**.

   The file is uploaded and validated. When the validation process is complete, the file name is shown next to a green check mark.

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

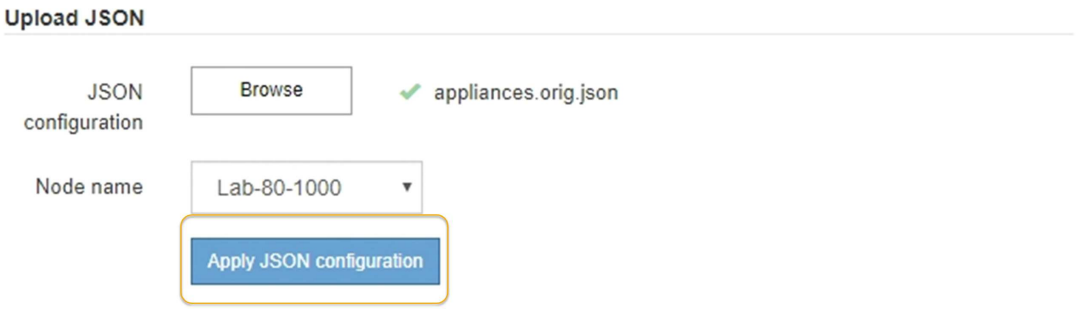


   The **Node name** drop down is populated with the top-level node names defined in the JSON file.

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

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

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



5. Select **Apply JSON configuration**.

   The configuration is applied to the selected node.

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

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

What you'll need

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

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

Steps

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

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

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

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

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

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

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

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

  StorageGRID Appliance
    Name:        LAB-SGA-2-30
    Node type:   storage

  StorageGRID primary Admin Node
    IP:        172.16.1.170
    State:     unknown
    Message:   Initializing...
    Version:   Unknown
```

```
Network Link Configuration
  Link Status
        Link      State      Speed (Gbps)
        ----      -----      -----
        1         Up         10
        2         Up         10
        3         Up         10
        4         Up         10
        5         Up         1
        6         Down       N/A

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

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

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

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

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

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

```
    MTU:       1500

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

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

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

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

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

6. When you are satisfied with the appliance configuration, use the `install` and `monitor` subcommands to install the appliance:
`configure-sga.py install --monitor SGA-INSTALL-IP`
7. If you want to reboot the appliance, enter the following:
`configure-sga.py reboot SGA-INSTALL-IP`

Automating the configuration of StorageGRID

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

What you'll need

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

Filename	Description
`configure-storagegrid.py`	Python script used to automate the configuration

Filename	Description
`configure-storagegrid.sample.json`	Sample 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 sample configuration file (`configure-storagegrid.sample.json`) or the blank configuration file (`configure-storagegrid.blank.json`).

About this task

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

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

Steps

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

   For example:
   `cd StorageGRID-Webscale-version/platform`

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

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

   For example:

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

After you finish

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

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

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

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

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

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

Overview of installation REST APIs

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

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

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

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

StorageGRID Installation API

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

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

The StorageGRID Installation API includes the following sections:

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

Package, start the recovery, and view the status of the recovery operation.

- **recovery-package** — Operations to download the Recovery Package.
- **sites** — Site-level configuration operations. You can create, view, delete, and modify a site.

StorageGRID Appliance Installer API

The StorageGRID Appliance Installer API can be accessed over HTTPS from `Controller_IP:8443`.

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

The StorageGRID Appliance Installer API includes the following sections:

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

Troubleshooting the hardware installation

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

Related information

Hardware setup appears to hang

Troubleshooting connection issues

Viewing boot-up codes for the appliance

When you apply power to the appliance, the BMC logs a series of boot-up codes. You can view these codes on a graphical console that is connected to the BMC management port.

What you'll need

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

Steps

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

Method	Required equipment
VGA console	• VGA-capable monitor • VGA cable
KVM	• KVM application • 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 into the BMC web interface.
   b. Select **Remote Control**.
   c. Launch the KVM.
   d. View the codes on the virtual monitor.
4. If you are using a serial port and terminal, perform these steps:
   a. Connect to the DB-9 serial port on the back of the appliance.
   b. Use settings `115200 8-N-1`.
   c. View the codes printed over the serial terminal.
5. If you are using SOL, perform these steps:
   a. Connect to the IPMI SOL using the BMC IP address and login credentials.

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

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

Code	Indicates
HI	The master boot script has started.
HP	The system is checking to see if the network interface card (NIC) firmware needs to be updated.

Code	Indicates
RB	The system is rebooting after applying firmware updates.
FP	The hardware subsystem firmware update checks have been completed. Inter-controller communication services are starting.
HC	The system is checking for existing StorageGRID installation data.
HO	The StorageGRID appliance is running.
HA	StorageGRID is running.

Related information

Accessing the BMC interface

Viewing error codes for the appliance

If a hardware error occurs when the appliance is booting up, the BMC logs an error code. As required, you can view these error codes using the BMC interface, and then work with technical support to resolve the issue.

What you'll need

- You know how to access the BMC dashboard.

Steps

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

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

Code	Indicates
0x0E	Microcode not found
0x0F	Microcode not loaded
0x50	Memory initialization error. Invalid memory type or incompatible memory speed.
0x51	Memory initialization error. SPD reading has failed.
0x52	Memory initialization error. Invalid memory size or memory modules do not match.

Code	Indicates
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 are not available
0xD4	PCI resource allocation error. Out of resources.
0xD5	No space for legacy option ROM
0xD6	No console output devices are found
0xD7	No console input devices are found
0xD8	Invalid password
0xD9	Error loading boot option (LoadImage returned error)

Code	Indicates
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
0x70	MRC: ERR_DIMM_CHANNEL
0x74	MRC: ERR_BIST_CHECK
0xF6	MRC: ERR_SMBUS
0xF7	MRC: ERR_PCU

Code	Indicates
0xF8	MRC: ERR_NGN
0xF9	MRC: ERR_INTERLEAVE_FAILURE

Hardware setup appears to hang

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

Steps

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

Related information

Viewing boot-up codes for the appliance

Viewing error codes for the appliance

Troubleshooting connection issues

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

Unable to connect to the appliance

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

Steps

1. Try to ping the appliance using the IP address for the appliance :
   `ping services_appliance_IP`
2. If you receive no response from the ping, confirm you are using the correct IP address.

   You can use the IP address of the appliance on the Grid Network, the Admin Network, or the Client Network.
3. If the IP address is correct, check appliance cabling, QSFP or SFP transceivers, and the network setup.

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

   The Home page appears.

Rebooting the services appliance while the StorageGRID Appliance Installer is running

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

About this task

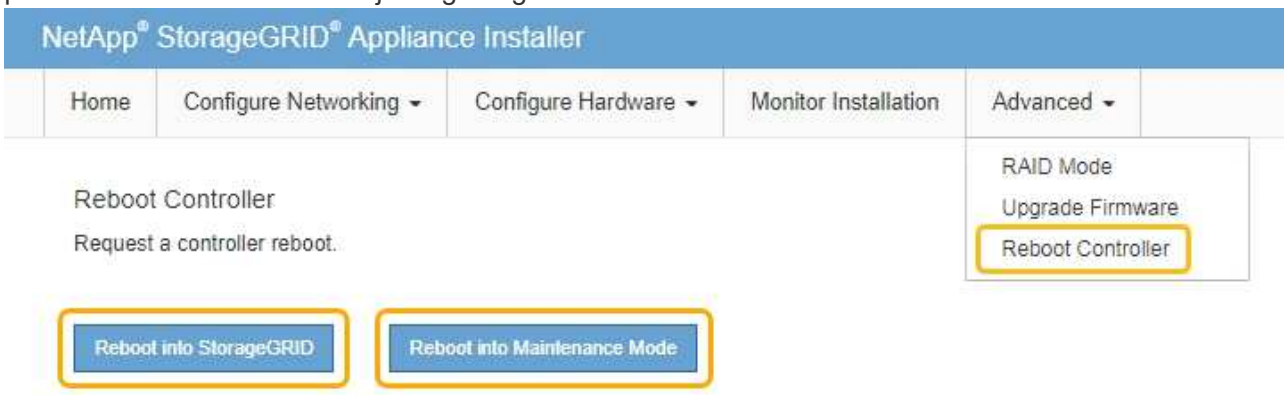
This procedure only applies when the services appliance is running the StorageGRID Appliance Installer. Once the installation is completed, this step no longer works because the StorageGRID Appliance Installer is no longer available.

Steps

1. From the menu bar of the StorageGRID Appliance Installer, click **Advanced** > **Reboot Controller**.

   The Reboot Controller page appears.

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



   The services appliance is rebooted.

Maintaining the appliance

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

Steps

- Placing an appliance into maintenance mode

- Turning the controller identify LED on and off
- Locating the controller in a data center
- Replacing the services appliance
- Replacing a power supply in the services appliance
- Replacing a fan in the services appliance
- Replacing a drive in the services appliance
- Changing the link configuration of the services appliance
- Changing the MTU setting
- Checking the DNS server configuration
- Monitoring node encryption in maintenance mode

Placing an appliance into maintenance mode

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

What you'll need

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

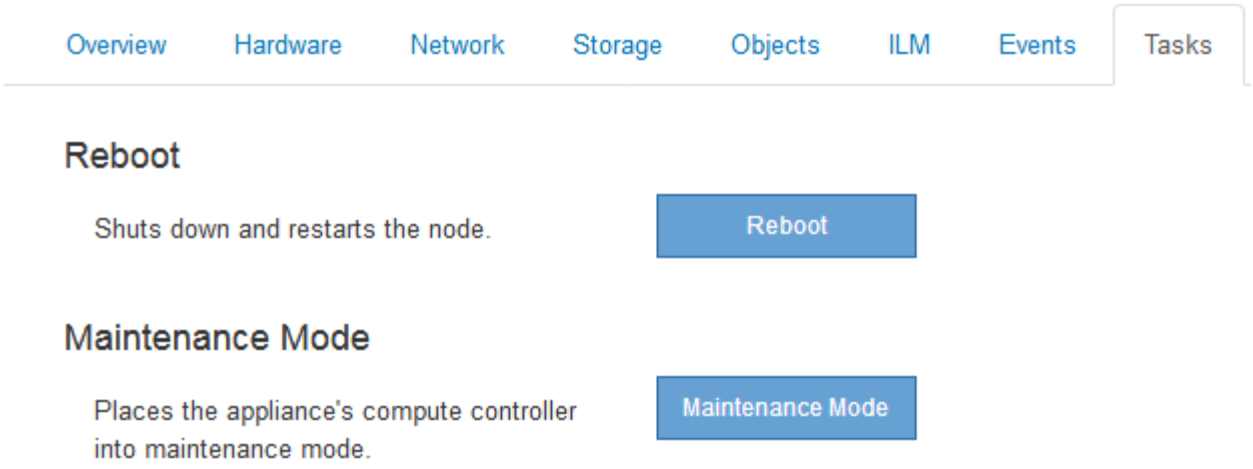
About this task

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

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

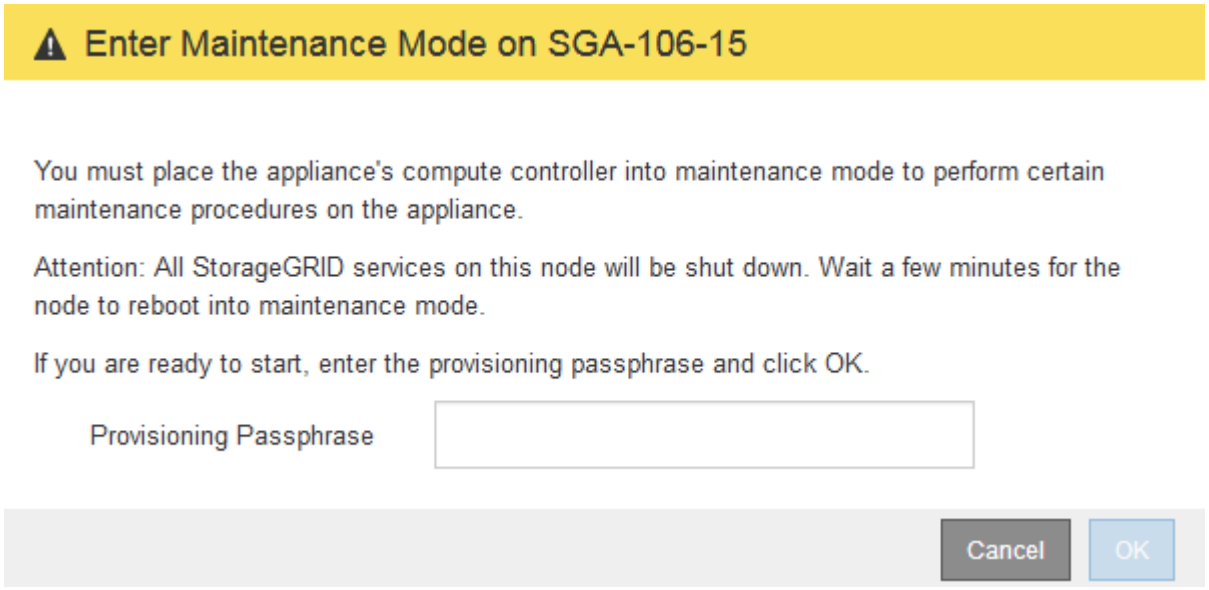
Steps

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



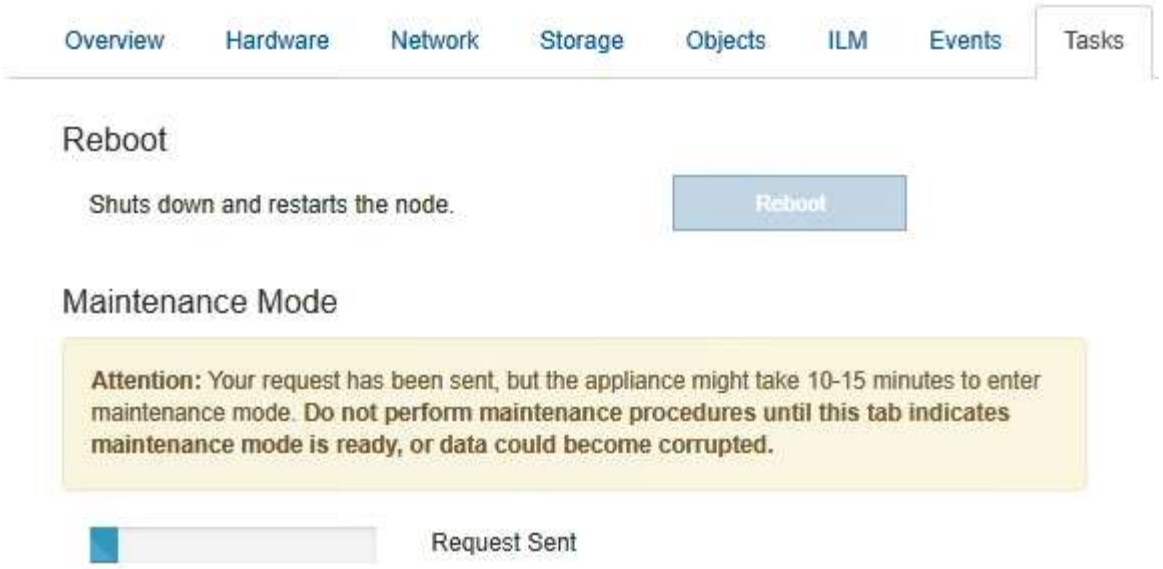
4. Select **Maintenance Mode**.

   A confirmation dialog box appears.

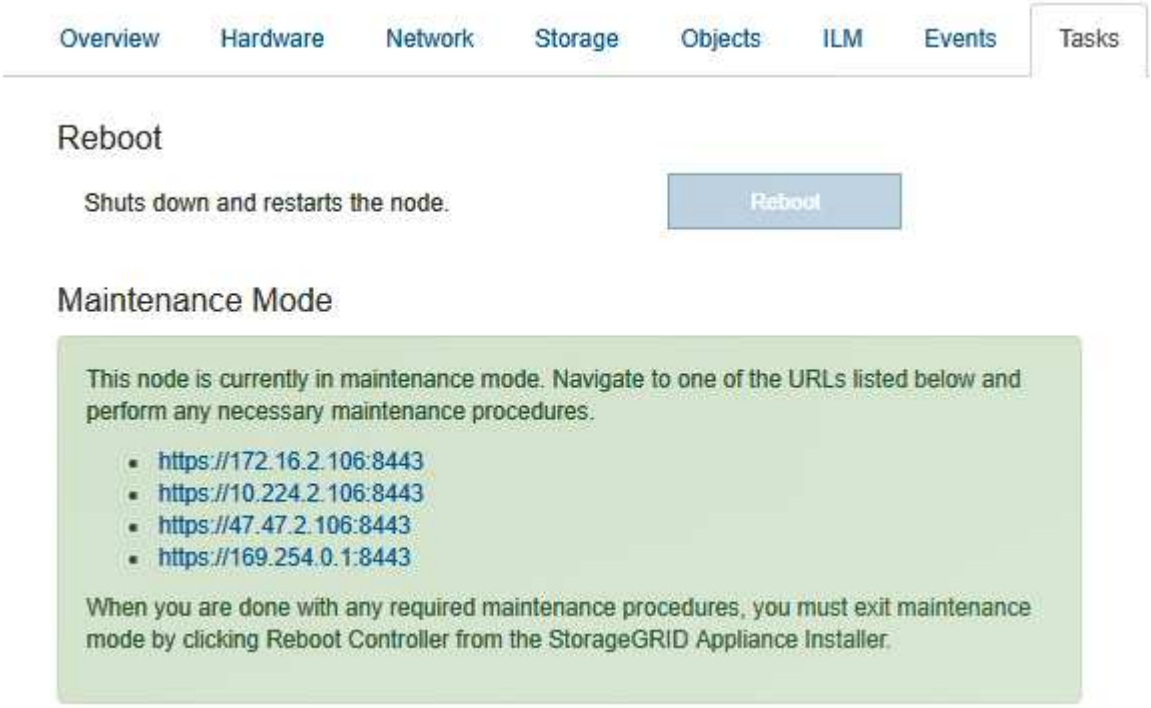


5. Enter the provisioning passphrase, and select **OK**.

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



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



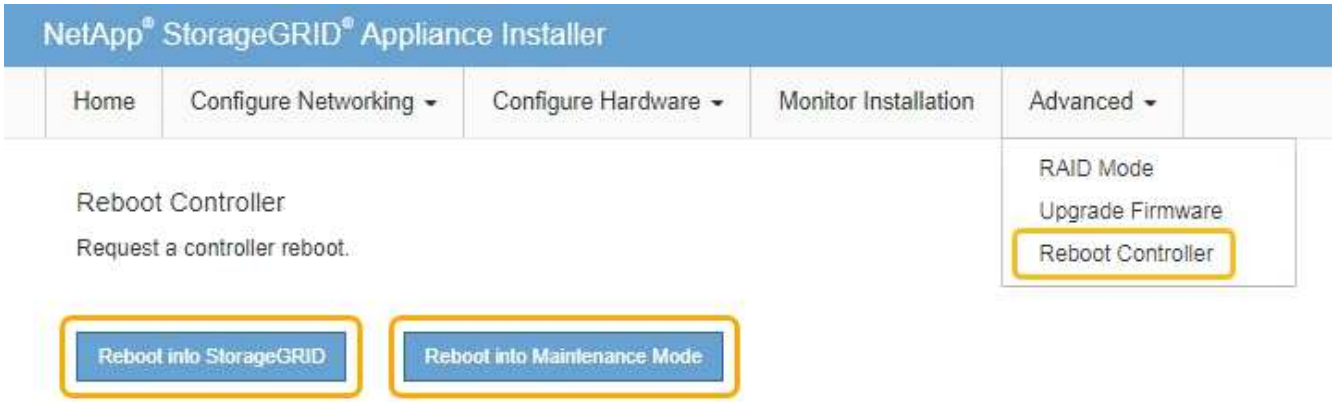
6. To access the StorageGRID Appliance Installer, browse to any of the URLs displayed.

   If possible, use the URL containing the IP address of the appliance's Admin Network port.

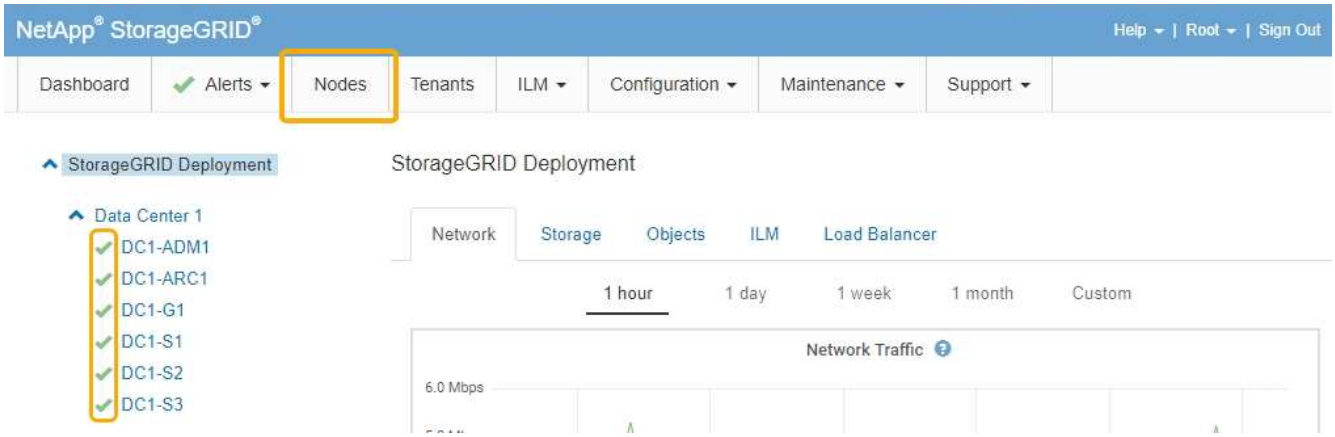
   > Accessing `https://169.254.0.1:8443` requires a direct connection to the local management port.

7. From the StorageGRID Appliance Installer, confirm that the appliance is in maintenance mode.

8. Perform any required maintenance tasks.
9. After completing maintenance tasks, exit maintenance mode and resume normal node operation. From the StorageGRID Appliance Installer, select **Advanced** > **Reboot Controller**, and then select **Reboot into StorageGRID**.



It can take up to 20 minutes for the appliance to reboot and rejoin the grid. To confirm that the reboot is complete and that the node has rejoined the grid, go back to the Grid Manager. The **Nodes** tab should display a normal status ✔ for the appliance node, indicating that no alerts are active and the node is connected to the grid.



Turning the controller identify LED on and off

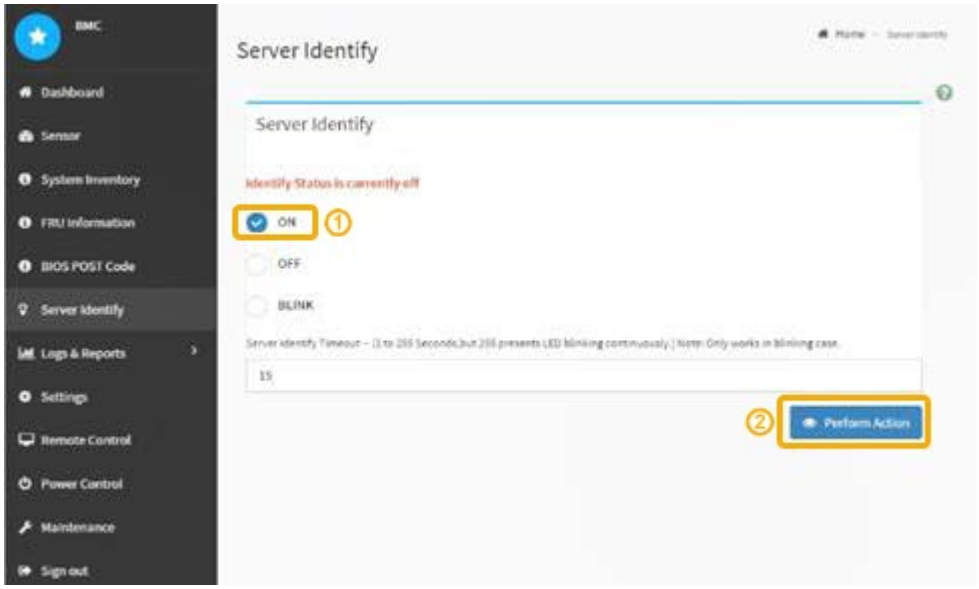
The blue identify LED on the front and back of the controller can be turned on to help locate the appliance in a data center.

What you'll need

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

Steps

1. Access the controller BMC interface.
2. Select **Server Identify**.
3. Select **ON** and then select **Perform Action**.



Result

The blue identify LEDs light on the front (shown) and rear of the controller.

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

After you finish

To turn off the controller identify LED:

- Press the identify LED switch on the controller front panel.
- From the controller BMC interface, select **Server Identify**, select **OFF** and then select **Perform Action**.

The blue identify LEDs on the front and rear of the controller go off.

Related information

Locating the controller in a data center

Accessing the BMC interface

Locating the controller in a data center

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

What you'll need

- You have determined which controller requires maintenance.

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

  Turning the controller identify LED on and off

Steps

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

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

   - Check the tags attached to the front of each controller for a matching part number.
2. Remove the controller front bezel, if one is installed, to access the front panel controls and indicators.

3. Optional: Turn off the blue identify LED if you used it to locate the controller.
   - Press the identify LED switch on the controller front panel.
   - Use the controller BMC interface.

     Turning the controller identify LED on and off

Replacing the services appliance

You might need to replace the appliance if it is not functioning optimally or if it has failed.

What you'll need

- You have a replacement appliance with the same part number as the appliance you are replacing.
- You have labels to identify each cable that is connected to the appliance.
- You have physically located the appliance that you are replacing in the data center. See Locating the controller in a data center.
- The appliance has been placed maintenance mode. See Placing an appliance into maintenance mode.

About this task

The StorageGRID node will not be accessible while you replace the appliance. If the appliance is functioning sufficiently, you can perform a controlled shutdown at the start of this procedure.

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

Steps

1. When the appliance has been placed maintenance mode, shut down the appliance.
   a. Log in to the grid node:
      i. Enter the following command: `ssh admin@grid_node_IP`
      ii. Enter the password listed in the `Passwords.txt` file.
      iii. Enter the following command to switch to root: `su -`
      iv. Enter the password listed in the `Passwords.txt` file.

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

   b. Shut down the appliance:
      `shutdown -h now`
2. Use one of two methods to verify that the power for the appliance is off:
   - The power indicator LED on the front of the appliance is off.
   - The Power Control page of the BMC interface indicates that the appliance is off.
3. If the StorageGRID networks attached to the appliance use DHCP servers, update DNS/network and IP

address settings.

a. Locate the MAC address label on the front of the appliance, and determine the MAC address for the Admin Network port.

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

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

b. Ask your network administrator to associate the DNS/network and IP address for the appliance you removed with the MAC address for the replacement appliance.

   You must ensure that all IP addresses for the original appliance have been updated before you apply power to the replacement appliance. Otherwise, the appliance will obtain new DHCP IP addresses when it boots up and might not be able to reconnect to StorageGRID. This step applies to all StorageGRID networks that are attached to the appliance.

   If the original appliance used static IP address, the new appliance will automatically adopt the IP addresses of the appliance you removed.

4. Remove and replace the appliance:

   a. Label the cables and then disconnect the cables and any network transceivers.

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

   b. Remove the failed appliance from the cabinet or rack.

   c. Transfer the two power supplies, eight cooling fans, and two SSDs from the failed appliance to the replacement appliance.

      Follow the instructions provided for replacing these components.

   d. Install the replacement appliance into the cabinet or rack.

   e. Replace the cables and any optical transceivers.

   f. Power on the appliance and monitor the appliance LEDs and boot-up codes.

      Use the BMC interface to monitor boot-up status.

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

Related information

Installing the appliance into a cabinet or rack (SG100 and SG1000)

Viewing status indicators on the SG100 and SG1000 appliances

Viewing boot-up codes for the appliance

Replacing a power supply in the services appliance

The services appliance has two power supplies for redundancy. If one of the power supplies fails, you must replace it as soon as possible to ensure that the appliance has redundant power.

What you'll need

- You have unpacked the replacement power supply unit.
- You have physically located the appliance where you are replacing the power supply in the data center.

  Locating the controller in a data center

- You can confirmed that the other power supply is installed and running.

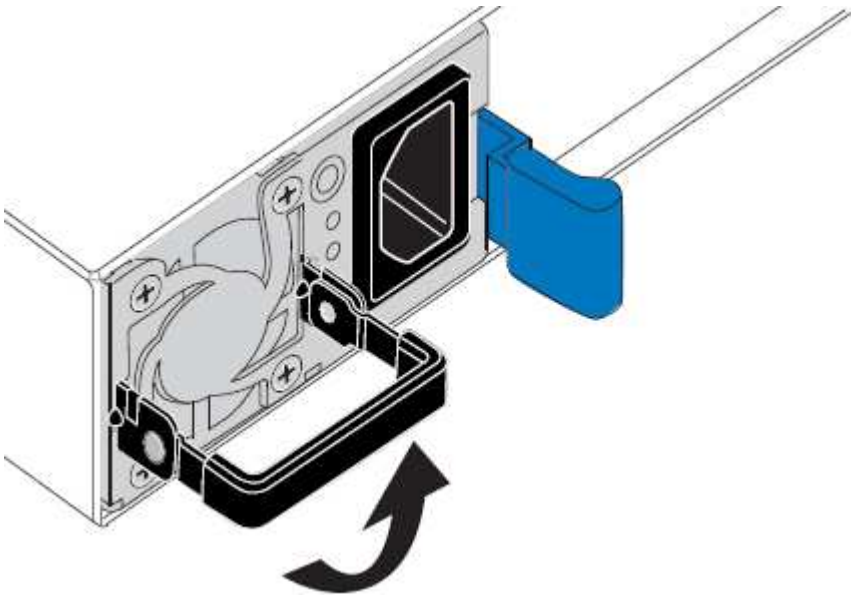
About this task

The figure shows the two power supply units for the SG100, which are accessible from the back of the appliance.

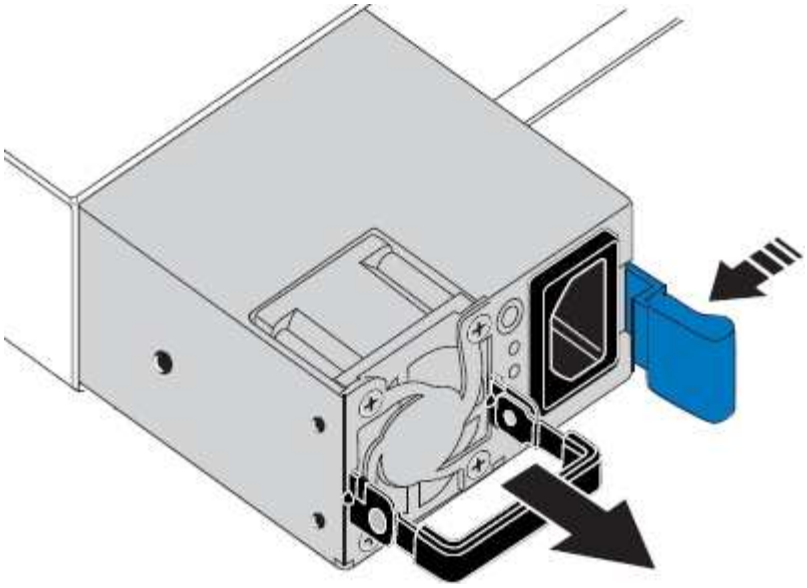
The power supplies for the SG1000 are identical.

Steps

1. Unplug the power cord from the power supply.
2. Lift the cam handle.

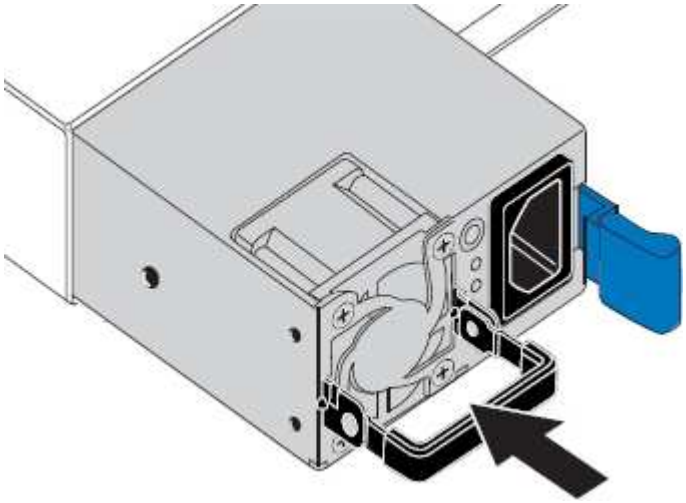


3. Press the blue latch and pull the power supply out.



4. Slide the replacement power supply into the chassis.

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



5. Push the cam handle down to secure the power supply.
6. Attach the power cord to the power supply, and ensure that the green LED comes on.

Replacing a fan in the services appliance

The services appliance has eight cooling fans. If one of the fans fails, you must replace it as soon as possible to ensure that the appliance has proper cooling.

What you'll need

- You have unpacked the replacement fan.
- You have physically located the appliance where you are replacing the fan in the data center.

  Locating the controller in a data center

- You have confirmed that the other fans are installed and running.

- The appliance has been placed maintenance mode.

  Placing an appliance into maintenance mode

About this task

The appliance node will not be accessible while you replace the fan.

The photograph shows a fan for the services appliance. The cooling fans are accessible after you take the top cover off of the appliance.

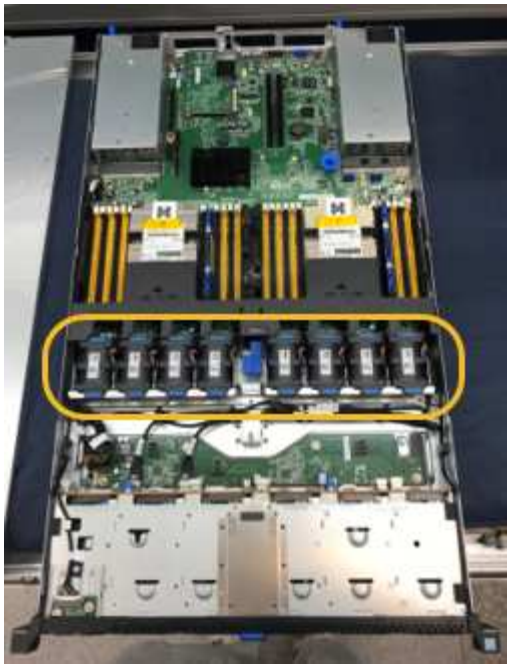
> Each of the two power supply units also contain a fan. Those fans are not included in this procedure.

Steps

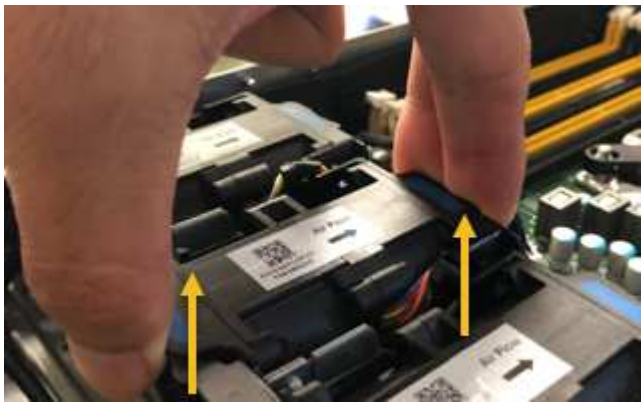
1. When the appliance has been placed maintenance mode, shut down the appliance.
   a. Log in to the grid node:
      i. Enter the following command: `ssh admin@grid_node_IP`
      ii. Enter the password listed in the `Passwords.txt` file.
      iii. Enter the following command to switch to root: `su -`
      iv. Enter the password listed in the `Passwords.txt` file.

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

   b. Shut down the services appliance:
      `shutdown -h now`
2. Use one of two methods to verify that the power for the services appliance is off:
   - The power indicator LED on the front of the appliance is off.
   - The Power Control page of the BMC interface indicates that the appliance is off.
3. Lift the latch on the top cover and remove the cover from the appliance.
4. Locate the fan that failed.

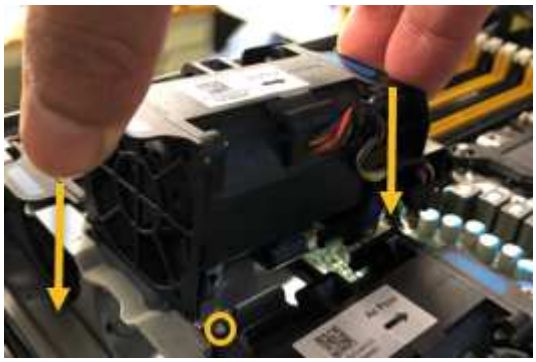


5. Lift the failed fan out of the chassis.

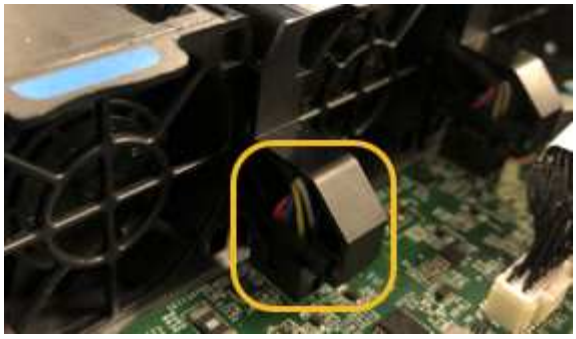


6. Slide the replacement fan into the open slot in the chassis.

   Line up the edge of the fan with the guide pin. The pin is circled in the photograph.



7. Press the fan's connector firmly into the circuit board.



8. Put the top cover back on the appliance, and press the latch down to secure the cover in place.
9. Power on the appliance and monitor the controller LEDs and boot-up codes.

   Use the BMC interface to monitor boot-up status.

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

Replacing a drive in the services appliance

The SSDs in the services appliance contain the StorageGRID operating system. Additionally, when the appliance is configured as an Admin Node, the SSDs also contain audit logs, metrics, and database tables. The drives are mirrored using RAID1 for redundancy. If one of the drives fails, you must replace it as soon as possible to ensure redundancy.

What you'll need

- You have physically located the appliance where you are replacing the drive in the data center.

  Locating the controller in a data center

- You have verified which drive has failed by noting that its left LED is blinking amber.

  If you remove the working drive, you will bring down the appliance node. See the information about viewing status indicators to verify the failure.

- You have obtained the replacement drive.
- You have obtained proper ESD protection.

Steps

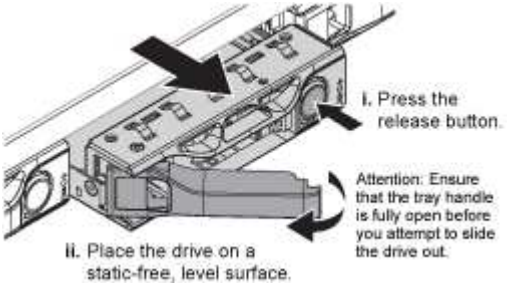
1. Verify that the drive's left LED is blinking amber.

   You can also use the Grid Manager to monitor the status of the SSDs. Select **Nodes**. Then select **`Appliance Node`** > **Hardware**. If a drive has failed, the Storage RAID Mode field contains a message about which drive has failed.

2. Wrap the strap end of the ESD wristband around your wrist, and secure the clip end to a metal ground to prevent static discharge.
3. Unpack the replacement drive, and set it on a static-free, level surface near the appliance.

   Save all packing materials.

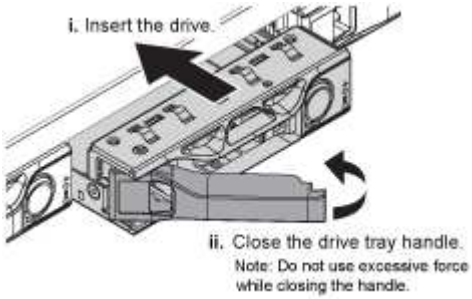
4. Press the release button on the failed drive.



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

5. Open the handle, slide the drive out, and place it on a static-free, level surface.
6. Press the release button on the replacement drive before you insert it into the drive slot.

   The latch springs open.



7. Insert the replacement drive in the slot, and then close the drive handle.

   > Do not use excessive force while closing the handle.

   When the drive is fully inserted, you hear a click.

   The drive is automatically rebuilt with mirrored data from the working drive. You can check the status of the rebuild by using the Grid Manager. Select **Nodes**. Then select **`Appliance Node`** > **Hardware**. The Storage RAID Mode field contains a “rebuilding” message until the drive is completely rebuilt.

8. Contact technical support about the drive replacement.

   Technical support will provide instructions for returning the failed drive.

Changing the link configuration of the services appliance

You can change the Ethernet link configuration of the services appliance. You can change the port bond mode, the network bond mode, and the link speed.

What you’ll need

- You must place the appliance in maintenance mode. Putting a StorageGRID appliance into maintenance mode might make the appliance unavailable for remote access.

  Placing an appliance into maintenance mode

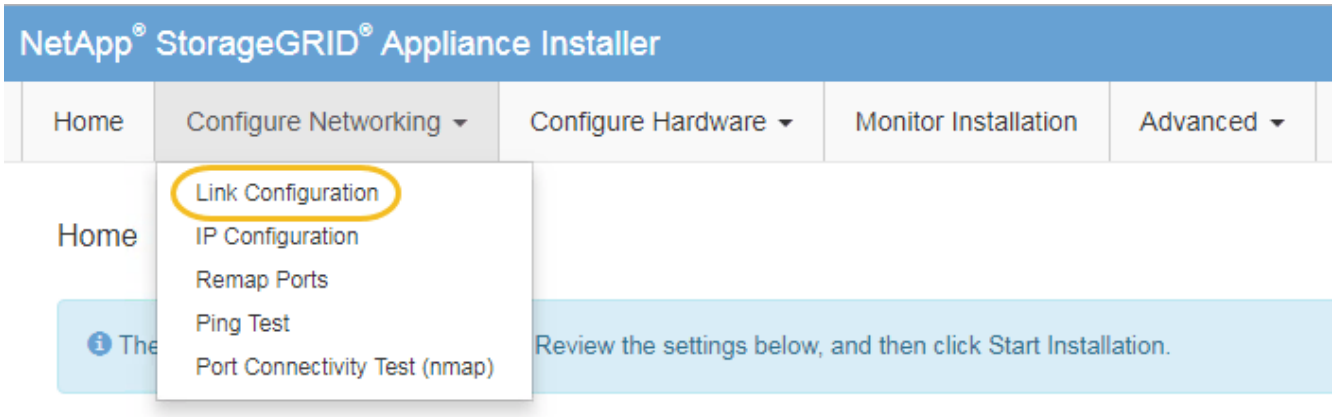
About this task

Options for changing the Ethernet link configuration of the services appliance include:

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

Steps

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



2. Make the desired changes to the link configuration.

   For more information on the options, see “Configuring network links.”

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

   > You might lose your connection if you made changes to the network or link you are connected through. If you are not reconnected within 1 minute, re-enter the URL for the StorageGRID Appliance Installer using one of the other IP addresses assigned to the appliance:
   > **`https://services_appliance_IP:8443`**

4. Make any necessary changes to the IP addresses for the appliance.

   If you made changes to the VLAN settings, the subnet for the appliance might have changed. If you need to change the IP addresses for the appliance, follow the instructions for configuring IP addresses.

   Configuring StorageGRID IP addresses

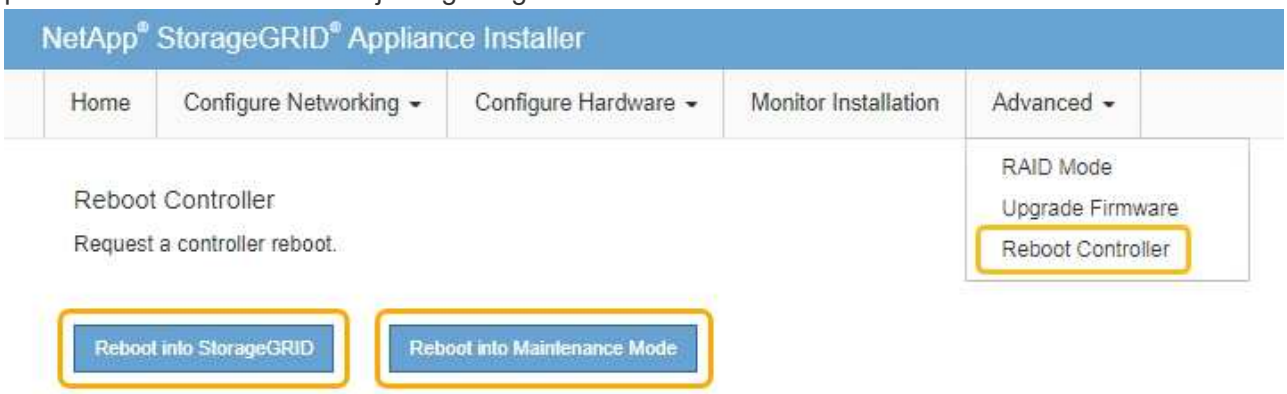
5. Select **Configure Networking** > **Ping Test** from the menu.
6. Use the Ping Test tool to check connectivity to IP addresses on any networks that might have been affected by the link configuration changes you made when configuring the appliance.

   In addition to any other tests you choose to perform, confirm that you can ping the Grid Network IP address of the primary Admin Node, and the Grid Network IP address of at least one other node. If necessary, return to the instructions for configuring network links, and correct any issues.

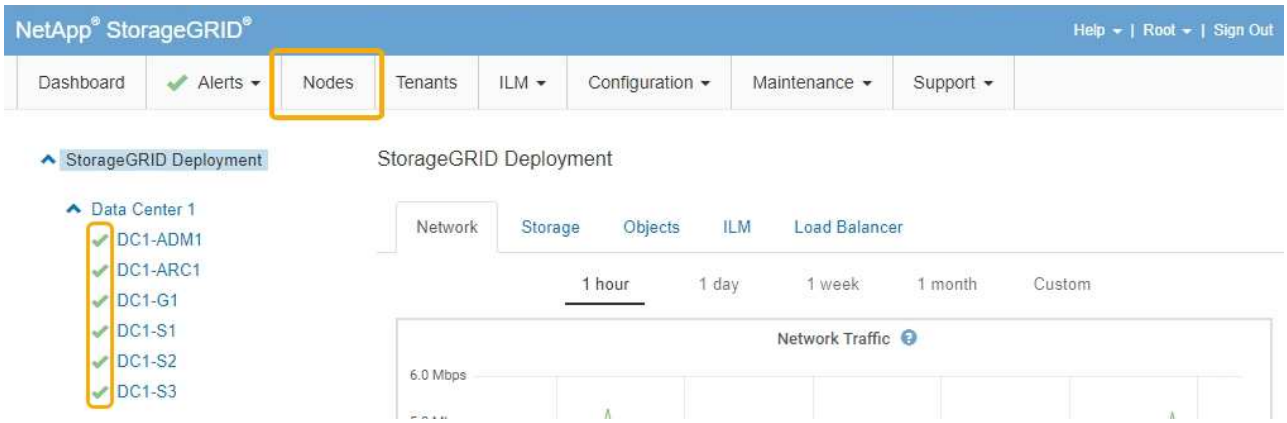
7. Once you are satisfied that your link configuration changes are working, reboot the node. From the

StorageGRID Appliance Installer, select **Advanced** > **Reboot Controller**, and then select one of these options:

- Select **Reboot into StorageGRID** to reboot the controller with the node rejoining the grid. Select this option if you are done working in maintenance mode and are ready to return the node to normal operation.
- Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if there are additional maintenance operations you need to perform on the node before rejoining the grid.



It can take up to 20 minutes for the appliance to reboot and rejoin the grid. To confirm that the reboot is complete and that the node has rejoined the grid, go back to the Grid Manager. The **Nodes** tab should display a normal status ✔ for the appliance node, indicating that no alerts are active and the node is connected to the grid.



Changing the MTU setting

You can change the MTU setting that you assigned when you configured IP addresses for the appliance node.

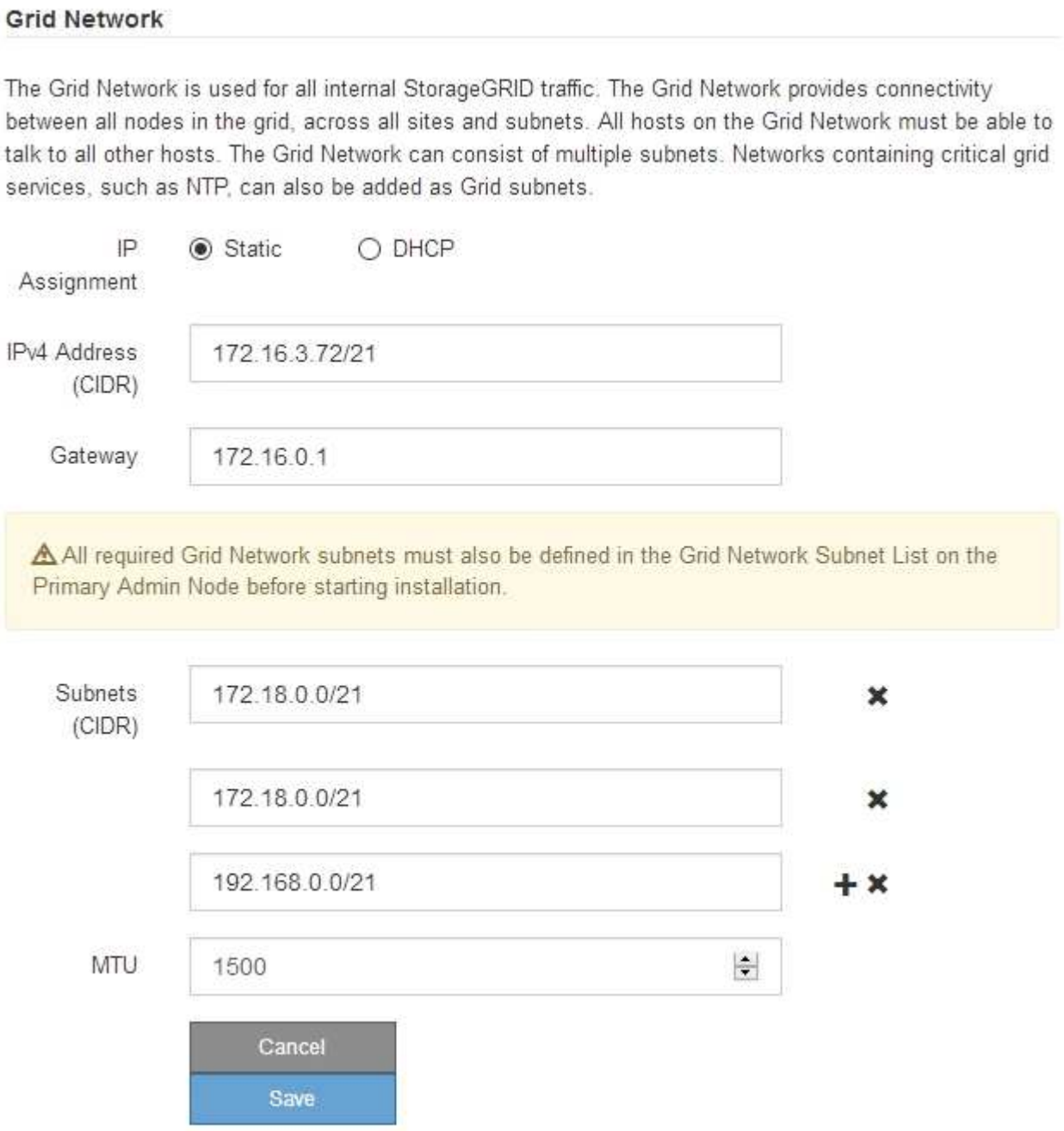
What you'll need

The appliance has been placed maintenance mode.

Placing an appliance into maintenance mode

Steps

1. From the StorageGRID Appliance Installer, select **Configure Networking** > **IP Configuration**.
2. Make the desired changes to the MTU settings for the Grid Network, Admin Network, and Client Network.

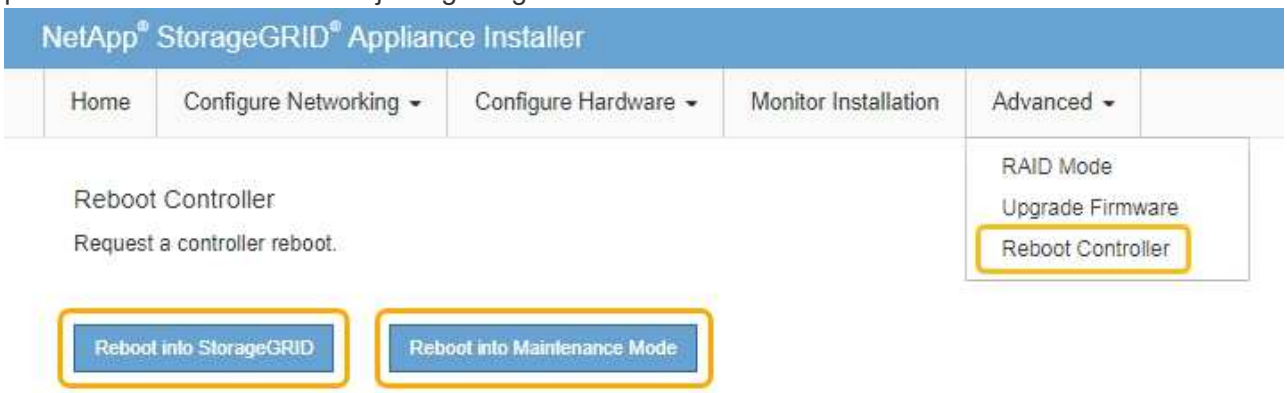


> The MTU value of the network must match the value configured on the switch port the node is connected to. Otherwise, network performance issues or packet loss might occur.

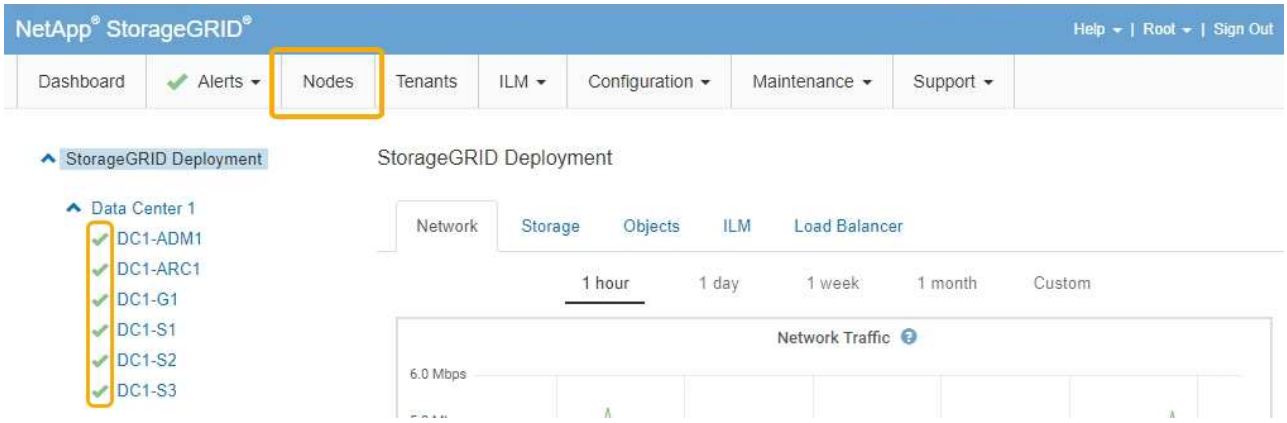
> For the best network performance, all nodes should be configured with similar MTU values on their Grid Network interfaces. The **Grid Network MTU mismatch** alert is triggered if there is a significant difference in MTU settings for the Grid Network on individual nodes. The MTU values do not have to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

3. When you are satisfied with the settings, select **Save**.

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



   It can take up to 20 minutes for the appliance to reboot and rejoin the grid. To confirm that the reboot is complete and that the node has rejoined the grid, go back to the Grid Manager. The **Nodes** tab should display a normal status ✔ for the appliance node, indicating that no alerts are active and the node is connected to the grid.



Related information

Administer StorageGRID

Checking the DNS server configuration

You can check and temporarily change the domain name system (DNS) servers that are currently in use by this appliance node.

What you'll need

The appliance has been placed maintenance mode.

Placing an appliance into maintenance mode

About this task

You might need to change the DNS server settings if an encrypted appliance cannot connect to the key management server (KMS) or KMS cluster because the hostname for the KMS was specified as a domain name instead of an IP address. Any changes that you make to the DNS settings for the appliance are temporary and are lost when you exit maintenance mode. To make these changes permanent, specify the DNS servers in Grid Manager (**Maintenance** > **Network** > **DNS Servers**).

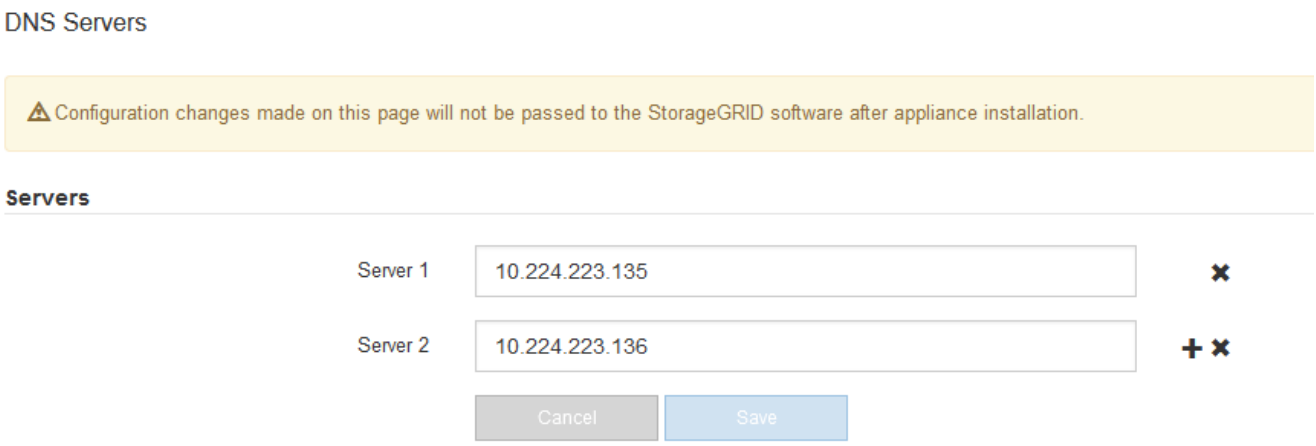
- Temporary changes to the DNS configuration are necessary only for node-encrypted appliances where the KMS server is defined using a fully qualified domain name, instead of an IP address, for the hostname.
- When a node-encrypted appliance connects to a KMS using a domain name, it must connect to one of the DNS servers defined for the grid. One of these DNS servers then translates the domain name into an IP address.
- If the node cannot reach a DNS server for the grid, or if you changed the grid-wide DNS settings when a node-encrypted appliance node was offline, the node is unable to connect to the KMS. Encrypted data on the appliance cannot be decrypted until the DNS issue is resolved.

To resolve a DNS issue preventing KMS connection, specify the IP address of one or more DNS servers in the StorageGRID Appliance Installer. These temporary DNS settings allow the appliance to connect to the KMS and decrypt data on the node.

For example, if the DNS server for the grid changes while an encrypted node was offline, the node will not be able to reach the KMS when it comes back online, since it is still using the previous DNS values. Entering the new DNS server IP address in the StorageGRID Appliance Installer allows a temporary KMS connection to decrypt the node data.

Steps

1. From the StorageGRID Appliance Installer, select **Configure Networking** > **DNS Configuration**.
2. Verify that the DNS servers specified are correct.



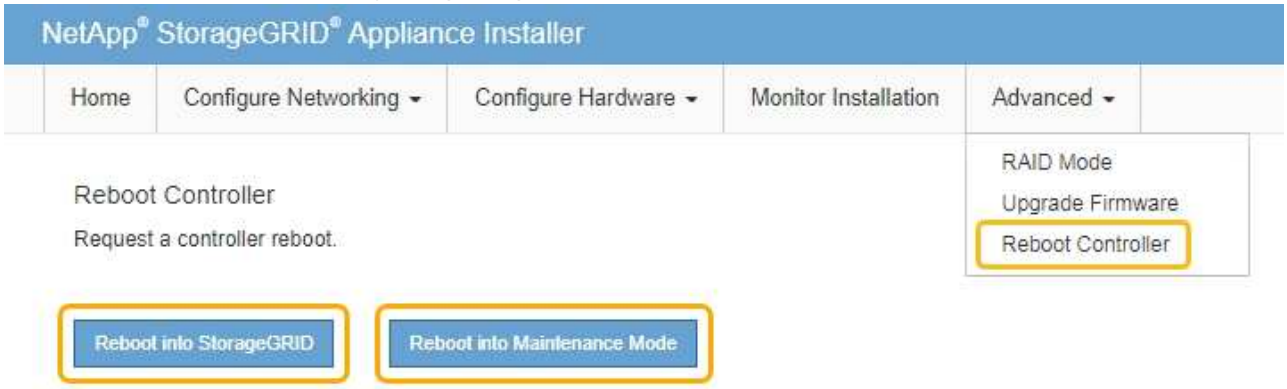
3. If required, change the DNS servers.

> Changes made to the DNS settings are temporary and are lost when you exit maintenance mode.

4. When you are satisfied with the temporary DNS settings, select **Save**.

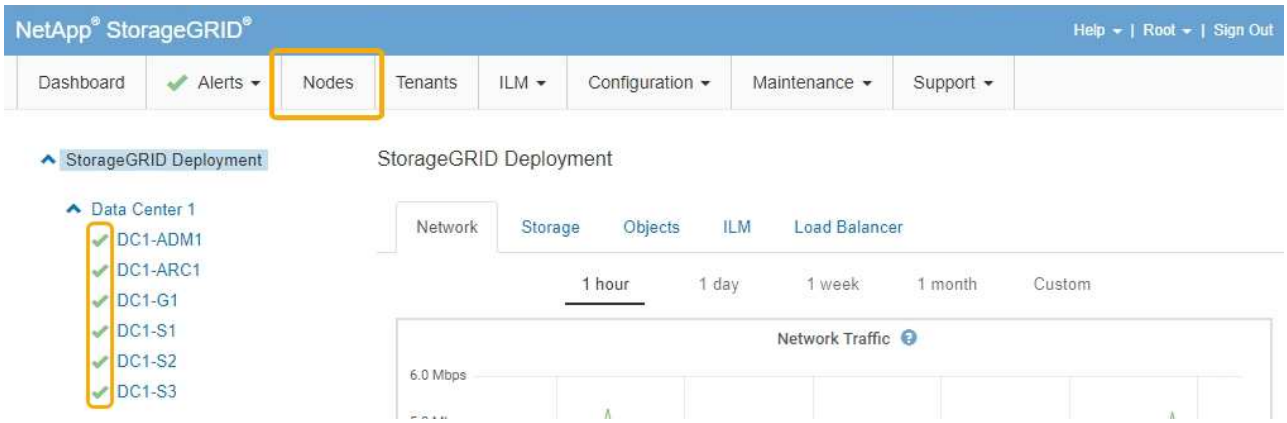
The node uses the DNS server settings specified on this page to reconnect to the KMS, allowing data on the node to be decrypted.

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



When the node reboots and rejoins the grid, it uses the system-wide DNS servers listed in the Grid Manager. After rejoining the grid, the appliance will no longer use the temporary DNS servers specified in the StorageGRID Appliance Installer while the appliance was in maintenance mode.

It can take up to 20 minutes for the appliance to reboot and rejoin the grid. To confirm that the reboot is complete and that the node has rejoined the grid, go back to the Grid Manager. The **Nodes** tab should display a normal status ✔ for the appliance node, indicating that no alerts are active and the node is connected to the grid.



Monitoring node encryption in maintenance mode

If you enabled node encryption for the appliance during installation, you can monitor the

node-encryption status of each appliance node, including the node-encryption state and key management server (KMS) details.

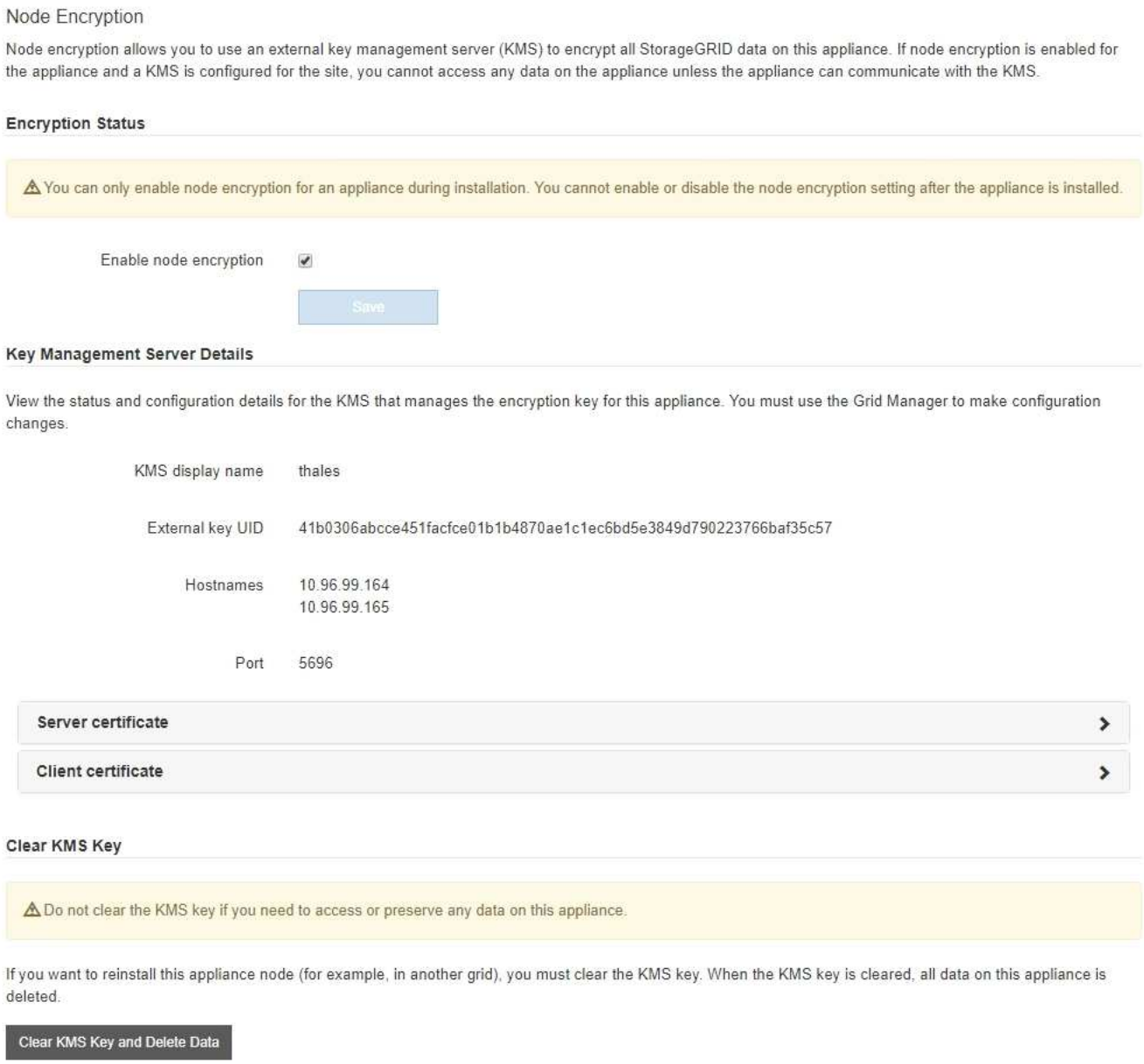
What you'll need

- Node encryption must have been enabled for the appliance during installation. You cannot enable node encryption after the appliance is installed.
- The appliance has been placed into maintenance mode.

  Placing an appliance into maintenance mode

Steps

1. From the StorageGRID Appliance Installer, select **Configure Hardware** > **Node Encryption**.



   The Node Encryption page includes these three sections:

   - Encryption Status shows whether node encryption is enabled or disabled for the appliance.

- Key Management Server Details shows information about the KMS being used to encrypt the appliance. You can expand the server and client certificate sections to view certificate details and status.
  - To address issues with the certificates themselves, such as renewing expired certificates, see the information about KMS in the instructions for administering StorageGRID.
  - If there are unexpected problems connecting to KMS hosts, verify that the domain name system (DNS) servers are correct and that appliance networking is correctly configured.

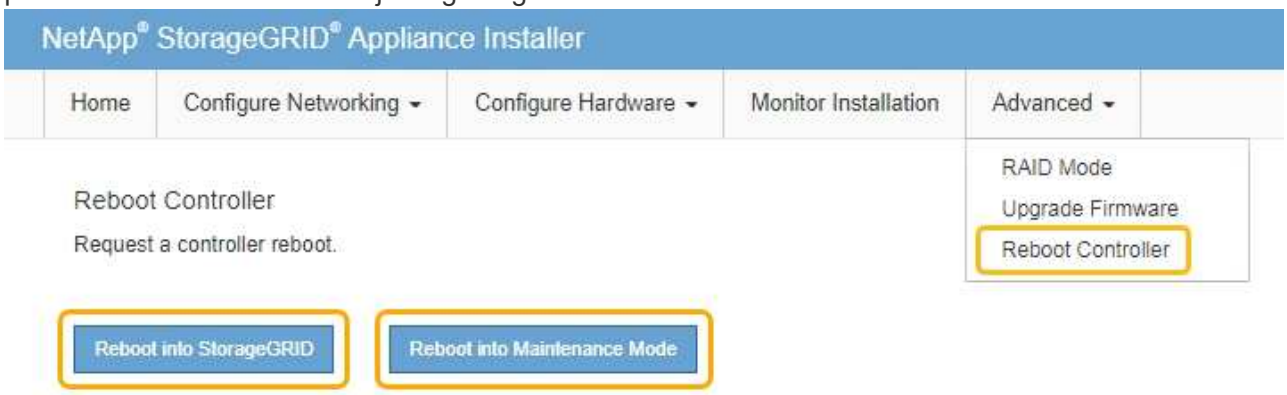
    Checking the DNS server configuration

  - If you are unable to resolve your certificate issues, contact technical support.
- Clear KMS Key disables node encryption for the appliance, removes the association between the appliance and the key management server that was configured for the StorageGRID site, and deletes all data from the appliance. You must clear the KMS key before you can install the appliance into another StorageGRID system.

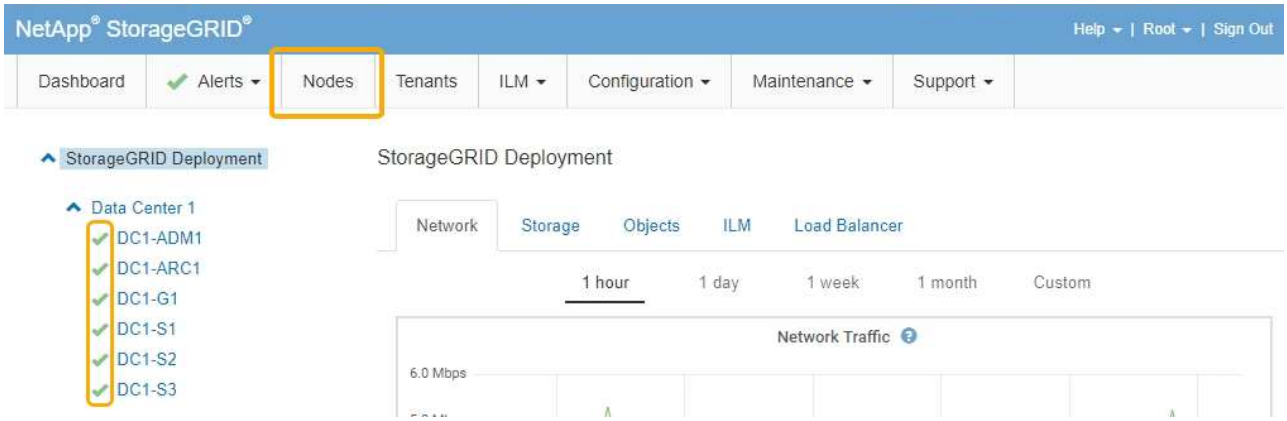
  Clearing the key management server configuration

  > Clearing the KMS configuration deletes data from the appliance, rendering it permanently inaccessible. This data is not recoverable.

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



It can take up to 20 minutes for the appliance to reboot and rejoin the grid. To confirm that the reboot is complete and that the node has rejoined the grid, go back to the Grid Manager. The **Nodes** tab should display a normal status ✔ for the appliance node, indicating that no alerts are active and the node is connected to the grid.



Related information

Administer StorageGRID

Clearing the key management server configuration

Clearing the key management server (KMS) configuration disables node encryption on your appliance. After clearing the KMS configuration, the data on your appliance is permanently deleted and is no longer accessible. This data is not recoverable.

What you'll need

If you need to preserve data on the appliance, you must perform a node decommission procedure before you clear the KMS configuration.

> When KMS is cleared, data on the appliance will be permanently deleted and no longer accessible. This data is not recoverable.

Decommission the node to move any data it contains to other nodes in StorageGRID. See the recovery and maintenance instructions for grid node decommissioning.

About this task

Clearing the appliance KMS configuration disables node encryption, removing the association between the appliance node and the KMS configuration for the StorageGRID site. Data on the appliance is then deleted and the appliance is left in a pre-install state. This process cannot be reversed.

You must clear the KMS configuration:

- Before you can install the appliance into another StorageGRID system, that does not use a KMS or that uses a different KMS.

  > Do not clear the KMS configuration if you plan to reinstall an appliance node in a StorageGRID system that uses the same KMS key.

- Before you can recover and reinstall a node where the KMS configuration was lost and the KMS key is not recoverable.
- Before returning any appliance that was previously in use at your site.
- After decommissioning a appliance that had node encryption enabled.

Decommission the appliance before clearing KMS to move its data to other nodes in your StorageGRID system. Clearing KMS before decommissioning the appliance will result in data loss and might render the appliance inoperable.

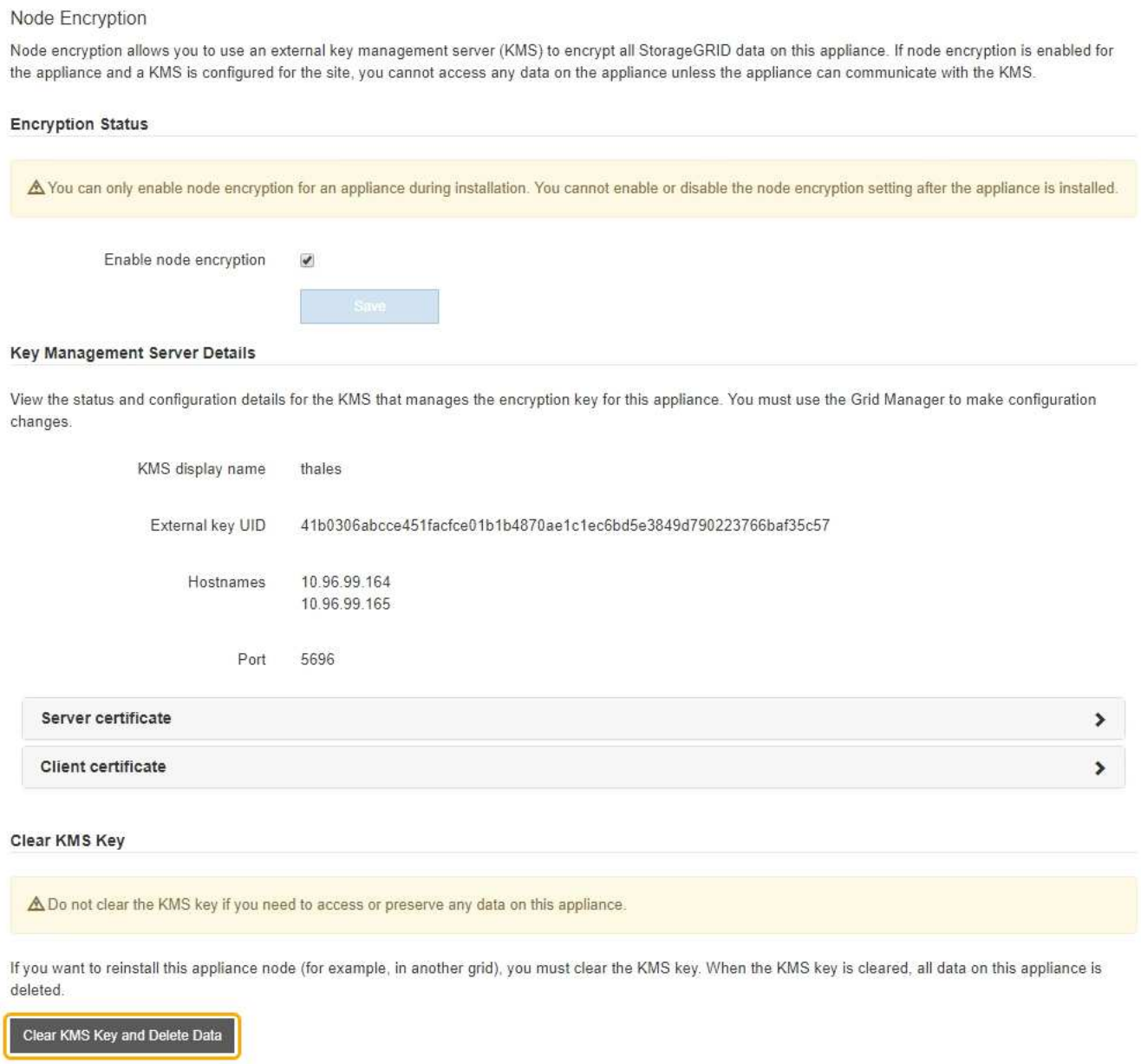
Steps

1. Open a browser, and enter one of the IP addresses for the appliance's compute controller.
   `https://Controller_IP:8443`

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

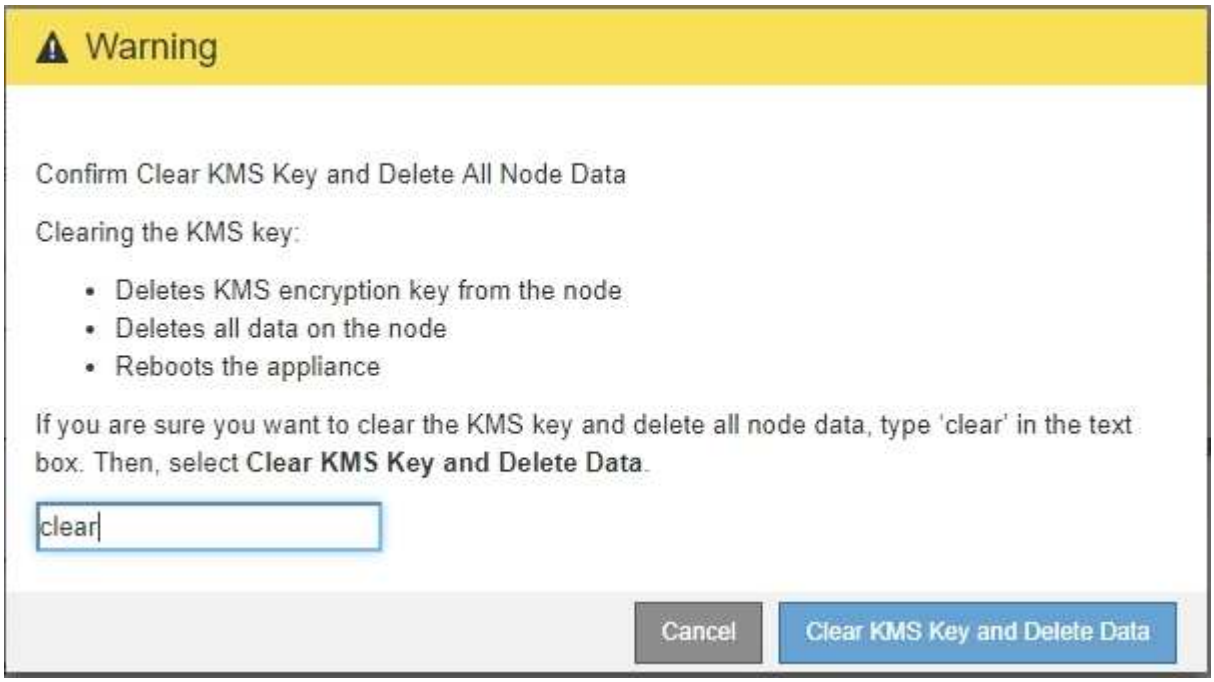
   The StorageGRID Appliance Installer Home page appears.

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



If the KMS configuration is cleared, data on the appliance will be permanently deleted. This data is not recoverable.

3. At the bottom of the window, select **Clear KMS Key and Delete Data**.
4. If you are sure that you want to clear the KMS configuration, type **`clear`** and select **Clear KMS Key and Delete Data**.



The KMS encryption key and all data are deleted from the node, and the appliance reboots. This can take up to 20 minutes.

5. Open a browser, and enter one of the IP addresses for the appliance's compute controller.
`https://Controller_IP:8443`

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

The StorageGRID Appliance Installer Home page appears.

6. Select **Configure Hardware** > **Node Encryption**.
7. Verify that node encryption is disabled and that the key and certificate information in **Key Management Server Details** and the **Clear KMS Key and Delete Data** control are removed from the window.

Node encryption cannot be reenabled on the appliance until it is reinstalled in a grid.

After you finish

After the appliance reboots and you have verified that KMS has been cleared and that the appliance in a pre-install state, you can physically remove the appliance from your StorageGRID system. See the recovery and maintenance instructions for information about preparing an appliance for reinstallation.

Related information

Administer StorageGRID

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