



Adding grid nodes to an existing site or adding a new site

StorageGRID 11.5

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Table of Contents

- Adding grid nodes to an existing site or adding a new site 1
 - Updating subnets for the Grid Network 1
 - Deploying new grid nodes 2
 - Performing the expansion 9

Adding grid nodes to an existing site or adding a new site

You can follow this procedure to add grid nodes to existing sites or to add a new site, but you cannot perform both types of expansion at the same time.

What you'll need

- You must have root or maintenance permissions. For details, see information about controlling system access with administration user accounts and groups.
- All existing nodes in the grid must be up and running across all sites.
- Any previous expansion, upgrade, decommissioning, or recovery procedures must be complete.



You are prevented from starting an expansion while another expansion, upgrade, recovery, or active decommission procedure is in progress. However, if necessary, you can pause a decommission procedure to start an expansion.

Steps

1. [Updating subnets for the Grid Network](#)
2. [Deploying new grid nodes](#)
3. [Performing the expansion](#)

Updating subnets for the Grid Network

When you add grid nodes or a new site in an expansion, you might need to update or add subnets to the Grid Network.

StorageGRID maintains a list of the network subnets used to communicate between grid nodes on the Grid Network (eth0). These entries include the subnets used for the Grid Network by each site in your StorageGRID system as well as any subnets used for NTP, DNS, LDAP, or other external servers accessed through the Grid Network gateway.

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.
- You must have the provisioning passphrase.
- You must have the network addresses, in CIDR notation, of the subnets you want to configure.

About this task

If you are performing an expansion activity that includes adding a new subnet, you must add the new Grid subnet before you start the expansion procedure.

Steps

1. Select **Maintenance > Network > Grid Network**.

Grid Network

Configure the subnets that are used on the Grid Network. These entries typically include the subnets for the Grid Network (eth0) for each site in your StorageGRID system as well as any subnets for NTP, DNS, LDAP, or other external servers accessed through the Grid Network gateway.

Subnets

Subnet 1



Passphrase

Provisioning
Passphrase

Save

2. In the Subnets list, click the plus sign to add a new subnet in CIDR notation.

For example, enter 10.96.104.0/22.

3. Enter the provisioning passphrase, and click **Save**.

The subnets you have specified are configured automatically for your StorageGRID system.

Deploying new grid nodes

The steps for deploying new grid nodes in an expansion are the same as the steps used when the grid was first installed. You must deploy all new grid nodes before you can perform the expansion.

When you expand the grid, the nodes you add do not have to match the existing node types. You can add VMware nodes, Linux container-based nodes, or appliance nodes.

VMware: Deploying grid nodes

You must deploy a virtual machine in VMware vSphere for each VMware node you want to add in the expansion.

Steps

1. Deploy the new grid node as a virtual machine and connect it to one or more StorageGRID networks.

When you deploy the node, you can optionally remap node ports or increase CPU or memory settings.

[Deploying a StorageGRID node as a virtual machine](#)

2. After you have deployed all new VMware nodes, return to these instructions to perform the expansion procedure.

[Performing the expansion](#)

Linux: Deploying grid nodes

You can deploy grid nodes on new Linux hosts or on existing Linux hosts. If you need additional Linux hosts to support the CPU, RAM, and storage requirements of the StorageGRID nodes you want to add to your grid, you prepare them in the same way you prepared the hosts when you first installed them. Then, you deploy the expansion nodes in the same way you deployed grid nodes during installation.

What you'll need

- You have the instructions for installing StorageGRID for your version of Linux, and you have reviewed the hardware and storage requirements.
- If you plan to deploy new grid nodes on existing hosts, you have confirmed the existing hosts have enough CPU, RAM, and storage capacity for the additional nodes.
- You have a plan to minimize failure domains. For example, you should not deploy all Gateway Nodes on a single physical host.



In a production deployment, do not run more than one Storage Node on a single physical or virtual host. Using a dedicated host for each Storage Node provides an isolated failure domain.

- If the StorageGRID node uses storage assigned from a NetApp AFF system, confirm that the volume does not have a FabricPool tiering policy enabled. Disabling FabricPool tiering for volumes used with StorageGRID nodes simplifies troubleshooting and storage operations.



Never use FabricPool to tier any data related to StorageGRID back to StorageGRID itself. Tiering StorageGRID data back to StorageGRID increases troubleshooting and operational complexity.

Steps

1. If you are adding new hosts, access the installation instructions for deploying StorageGRID nodes.
2. To deploy the new hosts, follow the instructions for preparing the hosts.
3. To create node configuration files and to validate the StorageGRID configuration, follow the instructions for deploying grid nodes.
4. If you are adding nodes to a new Linux host, start the StorageGRID host service.
5. If you are adding nodes to an existing Linux host, start the new nodes using the storagegrid host service
`CLI:sudo storagegrid node start [<node name>]`

After you finish

After deploying all new grid nodes, you can perform the expansion.

Related information

[Install Red Hat Enterprise Linux or CentOS](#)

[Install Ubuntu or Debian](#)

[Performing the expansion](#)

Appliances: Deploying Storage, Gateway, or non-primary Admin Nodes

To install the StorageGRID software on an appliance node, you use the StorageGRID Appliance Installer, which is included on the appliance. In an expansion, each storage appliance functions as a single Storage Node, and each services appliance functions as a single Gateway Node or non-primary Admin Node. Any appliance can connect to the Grid Network, the Admin Network, and the Client Network.

What you'll need

- The appliance has been installed in a rack or cabinet, connected to your networks, and powered on.
- You have used the StorageGRID Appliance Installer to complete all of the “configuring the hardware” steps in the appliance installation and maintenance instructions.

Configuring appliance hardware includes the required steps for configuring StorageGRID connections (network links and IP addresses) as well as the optional steps for enabling node encryption, changing the RAID mode, and remapping network ports.

- 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.
- The StorageGRID Appliance Installer version on the replacement appliance matches the software version of your StorageGRID system. (If the versions do not match, you must upgrade the StorageGRID Appliance Installer firmware.)

For instructions, see the appliance installation and maintenance instructions.

- [SG100 & SG1000 services appliances](#)
- [SG5600 storage appliances](#)
- [SG5700 storage appliances](#)
- [SG6000 storage appliances](#)
- You have a service laptop with a supported web browser.
- You know one of the IP addresses assigned to the appliance's compute controller. You can use the IP address for any attached StorageGRID network.

About this task

The process of installing StorageGRID on an appliance node has the following phases:

- 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 volumes are configured and the software is installed.

Partway through appliance 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.



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.

Steps

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

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

The StorageGRID Appliance Installer Home page appears.

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

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

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

Option	Description
Manual IP entry	<ol style="list-style-type: none">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	<ol style="list-style-type: none">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. 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.

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

NetApp® StorageGRID® Appliance Installer

Home
Configure Networking ▼
Configure Hardware ▼
Monitor Installation
Advanced ▼

Home

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

Primary Admin Node connection

Enable Admin Node discovery
☐

Primary Admin Node IP

Connection state
Connection to 172.16.4.210 ready

Cancel

Save

Node name

Node name

Cancel

Save

Installation

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

Start Installation

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

- If your expansion includes multiple appliance nodes, repeat the previous steps for each appliance.



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

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

The Monitor Installation page shows the installation progress.

1. Configure storage			Running
Step	Progress	Status	
Connect to storage controller	<div></div>	Complete	
Clear existing configuration	<div></div>	Complete	
Configure volumes	<div></div>	Creating volume StorageGRID-obj-00	
Configure host settings		Pending	

2. Install OS	Pending
3. Install StorageGRID	Pending
4. Finalize installation	Pending

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



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

9. Review the progress of first two installation stages.

1. Configure appliance

During this stage, one of the following processes occurs:

- For a storage appliance, the installer connects to the storage controller, clears any existing configuration, communicates with SANtricity software to configure volumes, and configures host settings.
- For a services appliance, the installer clears any existing configuration from the drives in the compute controller, and configures host settings.

2. Install OS

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

10. Continue monitoring the installation progress until a message appears in the console window, prompting you to use the Grid Manager to approve the node.



Wait until all nodes you added in this expansion are ready for approval before going to the Grid Manager to approve the nodes.

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

Monitor Installation

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

Connected (unencrypted) to: QEMU

```

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

```

Related information

[SG5700 storage appliances](#)[SG5600 storage appliances](#)[SG6000 storage appliances](#)[SG100 & SG1000 services appliances](#)

Performing the expansion

When you perform the expansion, the new grid nodes are added to your existing StorageGRID deployment.

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.
- You must have the provisioning passphrase.
- You must have deployed all of the grid nodes that are being added in this expansion.
- If you are adding Storage Nodes, you must have confirmed that all data-repair operations performed as part of a recovery are complete. See the steps for checking data repair jobs in the recovery and maintenance instructions.
- If you are adding a new site, you must review and update ILM rules before starting the expansion procedure to ensure that object copies are not stored to the new site until after the expansion is complete. For example, if a rule uses the default storage pool (All Storage Nodes), you must create a new storage pool that contains only the existing Storage Nodes and update the ILM rule to use the new storage pool. Otherwise, objects will be copied to the new site as soon as the first node at that site becomes active. See the instructions for managing objects with information lifecycle management.

About this task

Performing the expansion includes these phases:

1. You configure the expansion by specifying whether you are adding new grid nodes or a new site and approving the grid nodes you want to add.
2. You start the expansion.
3. While the expansion process is running, you download a new Recovery Package file.
4. You monitor the status of the grid configuration tasks, which run automatically. The set of tasks depends on what types of grid nodes are being added and on whether a new site is being added.



Some tasks might take a significant amount of time to run on a large grid. For example, streaming Cassandra to a new Storage Node might take only a few minutes if the Cassandra database is relatively empty. However, if the Cassandra database includes a large amount of object metadata, this stage might take several hours or longer. You can look at the “streamed” percentage shown during the “Starting Cassandra and streaming data” stage to determine how complete the Cassandra streaming operation is.

Steps

1. Select **Maintenance > Maintenance Tasks > Expansion**.

The Grid Expansion page appears. The Pending Nodes section lists all nodes that are ready to be added.

+ Approve

✖ Remove

Grid Network MAC

☐ 00:50:56:87:68:1a
 ☐ 00:50:56:87:54:1e
 ☒ 00:50:56:87:6f:0c
 ☐ 00:50:56:87:b6:83
 ☐ 00:50:56:87:b3:7d

DC2-S3-187

Storage Node

	Address	IP	Name
Network			
Grid Network	172.17.3.187/21	172.17.0.1	lwm1ers-DC2-ADM1-184
Admin Network			lwm1ers-DC2-ADM1-184
Client Network	10.224.3.187/21	10.224.0.1	lwm1ers-DC2-ADM1-184
Hardware			
VMware VM	8 CPUs	8 GB RAM	lwm1ers-DC2-ADM1-184
Disks			
107 GB	107 GB	107 GB	107 GB 107 GB



If a grid node is missing, confirm that it was deployed successfully.

6. From the list of pending nodes, approve the grid nodes for this expansion.
 - a. Select the radio button next to the first pending grid node you want to approve.
 - b. Click **Approve**.

The grid node configuration form appears.

Storage Node Configuration

General Settings

Site	<input type="text" value="Site A"/>
Name	<input type="text" value="DC2-S3-187"/>
NTP Role	<input type="text" value="Automatic"/>
ADC Service	<input type="text" value="Automatic"/>

Select "Yes" if this node will replace another node at this site that has the ADC service.

Grid Network

Configuration	STATIC
IPv4 Address (CIDR)	<input type="text" value="172.17.3.187/21"/>
Gateway	<input type="text" value="172.17.0.1"/>

Admin Network

Configuration	STATIC
IPv4 Address (CIDR)	<input type="text"/>
Gateway	<input type="text"/>
Subnets (CIDR)	<input type="text"/> +

Client Network

Configuration	STATIC
IPv4 Address (CIDR)	<input type="text"/>
Gateway	<input type="text"/>

Cancel

Save

c. As required, modify the general settings:

- **Site:** The name of the site the grid node will be associated with. If you are adding multiple nodes, be sure to select the correct site for each node. If you are adding a new site, all nodes are added to the new site.

- **Name:** The hostname that will be assigned to the node, and the name that will be displayed in the Grid Manager.
- **NTP Role:** The Network Time Protocol (NTP) role of the grid node. The options are **Automatic**, **Primary**, and **Client**. Selecting **Automatic** assigns the Primary role to Admin Nodes, Storage Nodes with ADC services, Gateway Nodes, and any grid nodes that have non-static IP addresses. All other grid nodes are assigned the Client role.



Assign the Primary NTP role to at least two nodes at each site. This provides redundant system access to external timing sources.

- **ADC Service** (Storage Nodes only): Whether this Storage Node will run the Administrative Domain Controller (ADC) service. The ADC service keeps track of the location and availability of grid services. At least three Storage Nodes at each site must include the ADC service. You cannot add the ADC service to a node after it is deployed.
 - If you are adding this node to replace a Storage Node, select **Yes** if the node you are replacing includes the ADC service. Because you cannot decommission a Storage Node if too few ADC services would remain, this ensures that a new ADC service is available before the old service is removed.
 - Otherwise, select **Automatic** to let the system determine whether this node requires the ADC service. Learn about the ADC quorum in the recovery and maintenance instructions.
- d. As required, modify the settings for the Grid Network, Admin Network, and Client Network.
- **IPv4 Address (CIDR):** The CIDR network address for the network interface. For example: 172.16.10.100/24
 - **Gateway:** The default gateway of the grid node. For example: 172.16.10.1
 - **Subnets (CIDR):** One or more subnetworks for the Admin Network.
- e. Click **Save**.

The approved grid node moves to the Approved Nodes list.

Approved Nodes

Grid nodes that have been approved and have been configured for installation. An approved grid node's configuration can be edited if errors are identified.

Edit

Reset

Remove

Search

	Grid Network MAC Address	Name	Site	Type	Platform	Grid Network IPv4 Address
	00:50:56:87:f1:fc	DC2-S1-185	Site A	Storage Node	VMware VM	172.17.3.185/21
	00:50:56:87:6f:0c	DC2-S3-187	Site A	Storage Node	VMware VM	172.17.3.187/21

Passphrase

Enter the provisioning passphrase to change the grid topology of your StorageGRID system.

Provisioning Passphrase

- To modify the properties of an approved grid node, select its radio button, and click **Edit**.
- To move an approved grid node back to the Pending Nodes list, select its radio button, and click **Reset**.

- To permanently remove an approved grid node, power the node off. Then, select its radio button, and click **Remove**.
- f. Repeat these steps for each pending grid node you want to approve.



If possible, you should approve all pending grid notes and perform a single expansion. More time will be required if you perform multiple small expansions.

7. When you have approved all grid nodes, enter the **Provisioning Passphrase**, and click **Expand**.

After a few minutes, this page updates to display the status of the expansion procedure. When tasks that affect individual grid node are in progress, the Grid Node Status section lists the current status for each grid node.



During this process, for appliances the StorageGRID Appliance Installer shows installation moving from Stage 3 to Stage 4, Finalize Installation. When Stage 4 completes, the controller is rebooted.

Grid Expansion

A new Recovery Package has been generated as a result of the configuration change. Go to the [Recovery Package](#) page to download it.

Expansion Progress

Lists the status of grid configuration tasks required to change the grid topology. These grid configuration tasks are run automatically by the StorageGRID system.

1. Installing Grid NodesIn Progress

Grid Node Status

Lists the installation and configuration status of each grid node included in the expansion.

Search

Q

Name	Site	Grid Network IPv4 Address	Progress	Stage
DC2-ADM1-184	Site A	172.17.3.184/21	<div></div>	Waiting for NTP to synchronize
DC2-S1-185	Site A	172.17.3.185/21	<div></div>	Waiting for Dynamic IP Service peers
DC2-S2-186	Site A	172.17.3.186/21	<div></div>	Waiting for NTP to synchronize
DC2-S3-187	Site A	172.17.3.187/21	<div></div>	Waiting for NTP to synchronize
DC2-S4-188	Site A	172.17.3.188/21	<div></div>	Waiting for Dynamic IP Service peers
DC2-ARC1-189	Site A	172.17.3.189/21	<div></div>	Waiting for NTP to synchronize

2. Initial Configuration

Pending

3. Distributing the new grid node's certificates to the StorageGRID system.

Pending

4. Starting services on the new grid nodes

Pending

5. Cleaning up unused Cassandra keys

Pending



A site expansion includes an additional task to configure Cassandra for the new site.

8. As soon as the **Download Recovery Package** link appears, download the Recovery Package file.

You must download an updated copy of the Recovery Package file as soon as possible after making grid topology changes to the StorageGRID system. The Recovery Package file allows you to restore the system if a failure occurs.

- a. Click the download link.
- b. Enter the provisioning passphrase, and click **Start Download**.
- c. When the download completes, open the .zip file and confirm it includes a `gpt-backup` directory and a `_SAID.zip` file. Then, extract the `_SAID.zip` file, go to the `/GID*_REV*` directory, and confirm you can open the `passwords.txt` file.
- d. Copy the downloaded Recovery Package file (.zip) to two safe, secure, and separate locations.



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.

9. If you are adding one or more Storage Nodes, monitor the progress of the “Starting Cassandra and streaming data” stage by reviewing the percentage shown in the status message.

4. Starting services on the new grid nodes

In Progress

Grid Node Status

Lists the installation and configuration status of each grid node included in the expansion.

⚠ Do not reboot any Storage Nodes during Step 4. The “Starting Cassandra and streaming data” stage might take hours, especially if existing Storage Nodes contain a large amount of object metadata.

Search

Q

Name	Site	Grid Network IPv4 Address	Progress	Stage
DC1-S4	Data Center 1	10.96.99.55/23	<div></div>	Starting Cassandra and streaming data (90.0% streamed)
DC1-S5	Data Center 1	10.96.99.56/23	<div></div>	Complete
DC1-S6	Data Center 1	10.96.99.57/23	<div></div>	Complete

This percentage estimates how complete the Cassandra streaming operation is, based on the total amount of Cassandra data available and the amount that has already been written to the new node.



Do not reboot any Storage Nodes during Step 4 (Starting services on the new grid nodes). The “Starting Cassandra and streaming data” stage might take hours to complete for each new Storage Node, especially if existing Storage Nodes contain a large amount of object metadata.

10. Continue monitoring the expansion until all tasks are complete and the **Configure Expansion** button reappears.

After you finish

Depending on which types of grid nodes you added, you must perform additional integration and configuration steps.

Related information

[Manage objects with ILM](#)

Maintain & recover

Configuring your expanded StorageGRID system

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