



Appliance node cloning

StorageGRID Appliances

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Appliance node cloning

Appliance node cloning: Overview

You can clone an appliance node in StorageGRID to use an appliance of newer design or increased capabilities. Cloning transfers all information about the existing node to the new appliance, provides a hardware-upgrade process that is easy to perform, and provides an alternative to decommissioning and expansion for replacing appliances.

Appliance node cloning lets you easily replace an existing appliance node (source) in your grid with a compatible appliance (target) that is part of the same logical StorageGRID site. The process transfers all data to the new appliance, placing it in service to replace the old appliance node and leaving the old appliance in a pre-install state.

Why clone an appliance node?

You can clone an appliance node if you need to:

- Replace appliances that are reaching end-of-life.
- Upgrade existing nodes to take advantage of improved appliance technology.
- Increase grid storage capacity without changing the number of Storage Nodes in your StorageGRID system.
- Improve storage efficiency, such as by changing the RAID mode from DDP-8 to DDP-16, or to RAID-6.
- Efficiently implement node encryption to allow the use of external key management servers (KMS).

Which StorageGRID network is used?

Cloning transfers data from the source node directly to the target appliance over any of the three StorageGRID networks. The Grid Network is typically used, but you can also use the Admin Network or the Client Network if the source appliance is connected to these networks. Choose the network to use for cloning traffic that provides the best data-transfer performance without degrading StorageGRID network performance or data availability.

When you install the replacement appliance, you must specify temporary IP addresses for StorageGRID connection and data transfer. Because the replacement appliance will be part of the same networks as the appliance node it replaces, you must specify temporary IP addresses for each of these networks on the replacement appliance.

Target appliance compatibility

Replacement appliances must be the same type as the source node they are replacing and both must be part of the same logical StorageGRID site.

- A replacement services appliance can be different than the Admin Node or Gateway Node it is replacing.
 - You can clone an SG100 source node appliance to an SG1000 services target appliance to give the Admin Node or Gateway Node greater capability.
 - You can clone an SG1000 source node appliance to an SG100 services target appliance to redeploy the SG1000 for a more demanding application.

For example, if an SG1000 source node appliance is being used as an Admin Node and you want to use it as a dedicated load-balancing node.

- Replacing an SG1000 source node appliance with an SG100 services target appliance reduces the maximum speed of the network ports from 100-GbE to 25-GbE.
- The services appliances have different network connectors. Changing the appliance type might require replacing the cables or SFP modules.
- A replacement storage appliance must have greater capacity than the Storage Node it is replacing.
 - If the target storage appliance has the same number of drives as the source node, the drives in the target appliance must have greater capacity (in TB).
 - If you plan to use the same RAID mode on the target node as was used on the source node, or a less storage efficient RAID mode (for example, switching from RAID 6 to DDP), the drives in the target appliance must be larger (in TB) than the drives in the source appliance.
 - If the number of standard drives installed in a target storage appliance is less than the number of drives in the source node, due to installation of solid-state drives (SSDs), the overall storage capacity of the standard drives in the target appliance (in TB) must exceed the total functional drive capacity of all drives in the source Storage Node.

For example, when cloning an SG5760 source Storage Node appliance with 60 drives to an SG6060 target appliance with 58 standard drives, larger drives should be installed in the SG6060 target appliance before cloning to maintain storage capacity. (The two drive slots containing SSDs in the target appliance aren't included in the total appliance-storage capacity.)

However, if a 60-drive SG5760 source node appliance is configured with SANtricity Dynamic Disk Pools DDP-8, configuring a 58-drive same-size-drive SG6060 target appliance with DDP-16 might make the SG6060 appliance a valid clone target due to its improved storage efficiency.

You can view information about the current RAID mode of the source appliance node on the **NODES** page in Grid Manager. Select the **Storage** tab for the appliance.

- The number of volumes in a target storage appliance must be greater than or equal to the number of volumes in the source node. You cannot clone a source node with 16 object store volumes (rangedb) to a target storage appliance with 12 object store volumes even if the target appliance has larger capacity than the source node. Most storage appliances have 16 object store volumes, except the SGF6112 storage appliance that has only 12 object store volumes.

What information is not cloned?

The following appliance configurations don't transfer to the replacement appliance during cloning. You must configure them during initial set up of the replacement appliance.

- BMC interface
- Network links
- Node encryption status
- SANtricity System Manager (for Storage Nodes)
- RAID mode (for Storage Nodes)

What issues prevent cloning?

If any of the following issues are encountered while cloning, the cloning process halts and an error message is

generated:

- Wrong network configuration
- Lack of connectivity between the source and target appliances
- Source and target appliance incompatibility
- For Storage Nodes, a replacement appliance of insufficient capacity

You must resolve each issue for cloning to continue.

Considerations and requirements for appliance node cloning

Before cloning an appliance node, you must understand the considerations and requirements.

Hardware requirements for the replacement appliance

Ensure that the replacement appliance meets the following criteria:

- The source node (appliance being replaced) and the target (new) appliance must be the same type of appliance:
 - You can only clone an Admin Node appliance or a Gateway Node appliance to a new services appliance.
 - You can only clone a Storage Node appliance to a new storage appliance.
- For Admin Node or Gateway Node appliances, the source node appliance and the target appliance don't need to be the same appliance model; however, changing the appliance model might require replacing the cables or SFP modules.

For example, you can replace a SG1000 node appliance with a SG100 or replace a SG100 appliance with a SG1000 appliance.

- For Storage Node appliances, the source node appliance and the target appliance don't need to be the same type of appliance; however:
 - The target appliance must have greater storage capacity than the source appliance.

For example, you can replace a SG5700 node appliance with a SG6000 appliance.

- The target appliance must have an equal or greater number of object storage volumes than the source appliance.

For example, you cannot replace a SG6000 node appliance (16 object store volumes) with a SGF6112 appliance (12 object store volumes).

Contact your StorageGRID sales representative for help choosing compatible replacement appliances to clone specific appliance nodes in your StorageGRID installation.

Prepare to clone an appliance node

You must have the following information before you clone an appliance node:

- Obtain a temporary IP address for the Grid Network from your network administrator for use with the target appliance during initial installation. If the source node belongs to an Admin Network or Client Network, obtain temporary IP addresses for these networks.

Temporary IP addresses are normally on the same subnet as the source node appliance being cloned and aren't needed after cloning completes. The source and target appliances must both connect to the primary Admin Node of your StorageGRID to establish a cloning connection.

- Determine which network to use for cloning data-transfer traffic that provides the best data-transfer performance without degrading StorageGRID network performance or data availability.



Using the 1-GbE Admin Network for clone data transfer results in slower cloning.

- Determine if node encryption using a key management server (KMS) will be used on the target appliance, so that you can enable node encryption during initial target appliance installation before cloning. You can check if node encryption is enabled on the source appliance node as described in the [enabling node encryption](#).

The source node and target appliance can have different node-encryption settings. Data decryption and encryption is performed automatically during data transfer and when the target node restarts and joins the grid.

- Determine if the RAID mode on the target appliance should be changed from its default setting, so you can specify this information during initial target appliance installation before cloning. You can view information about the current RAID mode of the source appliance node on the **NODES** page in Grid Manager. Select the **Hardware** tab for the appliance.

The source node and target appliance can have different RAID settings.

- Plan for sufficient time to complete the node cloning process. Several days might be required to transfer data from an operational Storage Node to a target appliance. Schedule cloning at a time that minimizes the impact to your business.
- You should only clone one appliance node at a time. Cloning can prevent you from performing other StorageGRID maintenance functions at the same time.
- After you have cloned an appliance node, you can use the source appliance that was returned to a pre-install state as the target to clone another compatible node appliance.

Clone appliance node

The cloning process might take several days to transfer data between the source node (appliance being replaced) and the target (new) appliance.

Before you begin

- You have installed the compatible target appliance into a cabinet or rack, connected all cables, and applied power.
- You have verified that the StorageGRID Appliance Installer version on the replacement appliance matches the software version of your StorageGRID system, upgrading and downgrading the StorageGRID Appliance Installer firmware, if necessary.
- You have configured the target appliance, including configuring StorageGRID connections, SANtricity System Manager (storage appliances only), and the BMC interface.

- When configuring StorageGRID connections, use the temporary IP addresses.
- When configuring network links, use the final link configuration.



Leave the StorageGRID Appliance Installer open after you complete initial target appliance configuration. You will return to the target appliance's installer page after you start the node cloning process.

- You have optionally enabled node encryption for the target appliance.
- You have optionally set the RAID mode for the target appliance (storage appliances only).
- You have reviewed the [considerations and requirements for appliance node cloning](#).

You should clone only one appliance node at a time to maintain StorageGRID network performance and data availability.

Steps

1. [Place the source node you are cloning into maintenance mode](#).
2. From the StorageGRID Appliance Installer on the source node, in the Installation section of the Home page, select **Enable Cloning**.

The Primary Admin Node connection section is replaced with the Clone target node connection section.

The screenshot shows the NetApp StorageGRID Appliance Installer interface. At the top, there is a blue header with the title "NetApp® StorageGRID® Appliance Installer" and a "Help" link. Below the header is a navigation bar with tabs: "Home", "Configure Networking", "Configure Hardware", "Monitor Installation", and "Advanced". The "Home" tab is selected.

Below the navigation bar, there is a yellow warning box with a triangle icon and the text: "This node is in maintenance mode. Perform any required maintenance procedures. If you want to exit maintenance mode manually to resume normal operation, go to Advanced > Reboot Controller to **reboot** the controller."

The main content area is titled "This Node" and contains the following fields:

- Node type: Storage (dropdown menu)
- Node name: hrmny2-1-254-sn (text input)
- Buttons: Cancel, Save

Below this section is a yellow-bordered box titled "Clone target node connection" which is highlighted in yellow in the original image. It contains the following fields:

- Clone target node IP: 0.0.0.0 (text input)
- Connection state: No connection information available.
- Buttons: Cancel, Save

At the bottom of the interface is the "Installation" section, which shows the current state as "Waiting for configuration and validation of clone target." and includes buttons for "Start Cloning" and "Disable Cloning".

3. For **Clone target node IP**, enter the temporary IP address assigned to the target node for the network to use for clone data-transfer traffic, and then select **Save**.

Typically, you enter the IP address for the Grid Network, but if you need to use a different network for clone data-transfer traffic, enter the IP address of the target node on that network.



Using the 1-GbE Admin Network for clone data transfer results in slower cloning.

After the target appliance is configured and validated, in the Installation section, **Start Cloning** is enabled on the source node.

If issues exist that prevent cloning, **Start Cloning** is not enabled and issues that you must resolve are listed as the **Connection state**. These issues are listed on the StorageGRID Appliance Installer Home page of both the source node and the target appliance. Only one issue displays at a time and the state automatically updates as conditions change. Resolve all cloning issues to enable **Start Cloning**.

When **Start Cloning** is enabled, the **Current state** indicates the StorageGRID network that was selected for cloning traffic, along with information about using that network connection. See [Considerations and requirements for appliance node cloning](#).

4. Select **Start Cloning** on the source node.
5. Monitor the cloning progress using the StorageGRID Appliance Installer on either the source or target node.

The StorageGRID Appliance Installer on both the source and target nodes indicate similar status.

Step	Progress	Status
1. Establish clone peering relationship		Complete
2. Clone another node from this node		Running
Send data to clone target node	<div style="width: 0%;"></div>	Sending data, 0% complete, 8.99 GB transferred
3. Activate cloned node and leave this one offline		Pending

The Monitor Cloning page provides detailed progress for each stage of the cloning process:

- **Establish clone peering relationship** shows the progress of cloning set up and configuration.
 - **Clone another node from this node** shows the progress of data transfer. (This part of the cloning process can take several days to complete.)
 - **Activate cloned node and leave this one offline** shows the progress of transferring control to the target node and placing the source node in a pre-install state, after data transfer is complete.
6. If you need to terminate the cloning process and return the source node to service before cloning is complete, on the source node go to the StorageGRID Appliance Installer Home page and select **Advanced > Reboot Controller**, and then select **Reboot into StorageGRID**.

If the cloning process is terminated:

- The source node exits maintenance mode and rejoins StorageGRID.
- The target node remains in the pre-install state. To restart cloning the source node, start the cloning process again from step 1.

When cloning successfully completes:

- The source and target nodes swap IP addresses:
 - The target node now uses the IP addresses originally assigned to the source node for the Grid, Admin, and Client Networks.
 - The source node now uses the temporary IP address initially assigned to the target node.
- The target node exits maintenance mode and joins StorageGRID, replacing the source node.
- The source appliance is in a pre-installed state, as if you had [prepared it for reinstallation](#).



If the target appliance does not join the grid, go to the StorageGRID Appliance Installer Home page for the source node, select **Advanced > Reboot Controller**, and then select **Reboot into Maintenance Mode**. After the source node reboots in maintenance mode, repeat the node cloning procedure.

- User data remains on the source appliance as a recovery option if an unexpected issue occurs with the target node. After the target node has successfully joined StorageGRID, user data on the source appliance is outdated and is no longer needed.

Outdated user data is overwritten when you install or expand the source appliance as a new node in another grid.

You can also reset the controller configuration on the source appliance to make this data inaccessible:

1. Open the [StorageGRID Appliance Installer](#) for the source appliance using the temporary IP address initially assigned to the target node.
2. Select **Help > Support and Debug Tools**.
3. Select **Reset Storage Controller Configuration**.



If needed, contact technical support for assistance resetting the storage controller configuration.



Overwriting the data or resetting the controller configuration makes the outdated data difficult or impossible to retrieve; however, neither method securely removes the data from the source appliance. If a secure erase is required, use a data-wiping tool or service to permanently and securely remove data from the source appliance.

You can:

- Use the source appliance as a target for additional cloning operations: no additional configuration is required. This appliance already has the temporary IP address assigned that were originally specified for the first clone target.
- Install and set up the source appliance as a new appliance node.
- Discard the source appliance if it is no longer of use with StorageGRID.

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