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## Simplex-to-Duplex Conversion

You can upgrade a controller-drive tray that has a simplex configuration to a duplex configuration.

### Before you begin

- You have a new controller canister with the same part number as the currently installed controller canister.
- If the currently installed controller canister includes a host interface card (HIC), you have a new HIC that is identical to the HIC in the currently installed controller canister.
- You have all cables, transceivers, switches, and host bus adapters (HBAs) needed to connect the new controller ports.  
**Note:** For information about compatible hardware, refer to the *NetApp Interoperability Matrix Tool* or the *NetApp Hardware Universe*.
- You have installed a multipath driver on the host so that you can use both controllers. Refer to the *SANtricity Storage Manager Express Guide* or the *SANtricity Power Guide for Advanced Users* for your operating system for instructions.
- You have an ESD wristband, or you have taken other antistatic precautions.
- You have labels to identify the new cables.
- You have the removal and replacement instruction for your model of controller.

### About this task

Because the instructions in this procedure apply to different models of controllers, this procedure does not describe in detail how to install any one controller. For more information, go to the *E-Series Documentation Center* and download the removal and replacement instruction for your controller. For information about cabling, refer to the *E-Series Hardware Cabling Guide*.

**Attention:** Before you begin, be aware that this is not a reversible procedure. Duplex-to-simplex conversions are never supported.

### Steps

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### Related information

[E-Series Hardware Cabling Guide](#)

[NetApp E-Series and EF-Series Systems Documentation Center](#)

[NetApp Hardware Universe](#)

[NetApp Interoperability Matrix Tool](#)

[SANtricity Storage Manager 11.30 Installing and Configuring for VMware Express Guide](#)

[SANtricity Storage Manager 11.30 Installing and Configuring for AIX Express Guide](#)

[SANtricity Storage Manager 11.30 Installing and Configuring for Linux Express Guide](#)

[SANtricity Storage Manager 11.30 Installing and Configuring for Solaris Express Guide](#)

*SANtricity Storage Manager 11.30 Installing and Configuring for Windows Express Guide*  
*SANtricity 11.30 Installing and Configuring for VMware Power Guide for Advanced Users*  
*SANtricity 11.30 Installing and Configuring for AIX Power Guide for Advanced Users*  
*SANtricity 11.30 Installing and Configuring for Linux Power Guide for Advanced Users*  
*SANtricity 11.30 Installing and Configuring for Solaris Power Guide for Advanced Users*  
*SANtricity 11.30 Installing and Configuring for Windows Power Guide for Advanced Users*

## Setting the configuration to duplex

You must set the controller to duplex mode. You cannot undo the change to duplex once it is completed.

### Steps

1. Ensure that no I/O operations are occurring between the storage array and all connected hosts. For example, you can perform these steps:
  - Stop all processes that involve the LUNs mapped from the storage to the hosts.
  - Ensure that no applications are writing data to any LUNs mapped from the storage to the hosts.
  - Unmount all file systems associated with volumes on the array.

**Note:** The exact steps to stop host I/O operations depend on the host operating system and the configuration, which are beyond the scope of these instructions. If you are not sure how to stop host I/O operations in your environment, consider shutting down the host.

**Attention: Possible data loss** – If you continue this procedure while I/O operations are occurring, you might lose data.

2. Wait five minutes to allow any data in cache memory to be flushed to disk.
3. From the title bar of the **Array Management Window**, select **Monitor > Reports > Operations in Progress**.
4. Wait for all operations shown on the **Operations in Progress** window to complete before continuing with the next step.
5. Open the Enterprise Management Window (EMW).
6. Select the storage array.
7. Select **Tools > Execute Script**.
8. Type the following command in the text box.

```
set storageArray redundancyMode=duplex;
```

9. Select **Tools > Verify and Execute**.
10. Type the following command in the text box.

```
reset controller [a];
```

11. Select **Tools > Verify and Execute**.

After the controller reboots, an “alternate controller missing” error message is displayed. This message indicates that controller A has been successfully converted to duplex mode. This message persists until you install the second controller and connect the host cables.

## Installing duplex NVSRAM

NVSRAM files specify the default settings for the controllers. You can download the NVSRAM by using either the command line interface (CLI) or the graphical user interface (GUI) of the storage management software.

### Before you begin

Before trying to download NVSRAM, you must contact your technical support representative to make sure that you are downloading the NVSRAM that is appropriate for the controller in your storage array.

Make sure that the controller-drive tray has an Optimal status. If one or more managed devices has a Needs Attention status, determine and correct the condition that created the Needs Attention status before proceeding with this conversion instruction.

### Steps

1. Download the latest SANtricity OS software files from the NetApp Support Site to your management client.

- a. Go to [NetApp Downloads: Software](#).
- b. Locate **E-Series SANtricity OS Controller Software**.
- c. For the platform, select **E2600** or **E2700**, and click **Go!**
- d. Select the version of SANtricity OS (Controller Firmware) you want to install, and click **View & Download**.
- e. Follow the online instructions to complete the file download.

SANtricity OS software files have filenames similar to E26xx\_0820 or E27XX\_0830 with a .zip or .tar.gz extension.

- f. Extract the files from the .zip or .tar.gz file.

You will use the duplex version of the NVSRAM file, which includes DXX or DOX in the filename.

Controller	Controller NVSRAM -- duplex
E2600	N26X0-820834-DBA.dlp
E2700	N2701-830834-D01.dlp

2. Upgrade the files.

**Attention: Risk of data loss or risk of damage to the storage array** — Do not make changes to the storage array while the upgrade is occurring. Maintain power to the storage array.

You can cancel the operation during the pre-upgrade health check, but not during transferring or activating.

Option	Description
CLI	<p>a. Make a copy of your storage array profile, and save it in the event that you might need to restore the storage array.</p> <p>b. Start the command line interface.</p> <p>c. On the command line, type this command, and press <b>Enter</b>.</p> <pre>smcli ctrl-A_IP_address -c "download storageArray NVSRAM file="filename";</pre> <p><b>Note:</b> In this command, <i>ctrl-A_IP_address</i> is the IP address of the original simplex controller, and <i>filename</i> is the complete file path and name of the file that contains the new NVSRAM. Valid file names must end with a <code>.d1p</code> extension. Enclose the file name in double quotation marks (" ").</p>
GUI	<p>a. Make a copy of your storage array profile, and save it in the event that you might need to restore the storage array.</p> <p>b. At the storage management station, start the SMclient software.</p> <p>c. In the Array Management Window, select <b>Upgrade &gt; Controller NVSRAM</b>.</p> <p>d. Click <b>Browse</b>, and navigate to the duplex version of the NVSRAM file you downloaded.</p>

#### Related information

[SANtricity 11.30 Command Line Interface and Script Commands Programming Guide](#)

## Installing the second controller

The new controller must have a part number identical to the existing controller or must be a certified substitute. The part number is on a label on the controller.

#### About this task

To provide full functionality in dual-controller configurations, make sure that both controllers in the controller-drive tray have the same memory capacity.

**Attention: Possible hardware damage** – To prevent electrostatic discharge damage to the tray, use proper antistatic protection when handling tray components.

#### Steps

1. Put on antistatic protection.

**Attention: Possible damage to the controller** – Do not remove the electrostatic protection until you have finished installing the controller and you have connected the host cables and the drive tray cables.

2. Unpack the new controller.

**Attention: Possible damage to the controller** – Bumping the controller against another surface might damage the data connectors on the rear of the controller. Use caution when handling the controller.

3. Remove the blank controller canister from the tray by releasing the levers, and pulling the blank controller canister out of the tray.

4. Slide the new controller canister all of the way into the empty slot in the tray. Rotate the release levers on the controller canister into the closed position to lock the controller canister in place.

## Connecting the host cables

When you connect host cables, make sure you include appropriate labeling.

### About this task

The steps in this procedure describe how to attach Fibre Channel host cables. The steps for connecting other types of host cables are similar, but they do not require the installation of Small Form-factor Pluggable (SFP) transceivers. For information about host cabling, refer to the *E-Series Hardware Cabling Guide*.

### Steps

1. If there is a black plastic plug in the host port, remove it.
2. Install an SFP transceiver into the controller by pushing the SFP transceiver into the host port until it snaps into place.  
**Attention: Possible degraded performance** – To prevent degraded performance, do not twist, fold, pinch, or step on fiber-optic cables. Do not bend fiber-optic cables tighter than a 5-cm (2-in.) radius.
3. Plug one end of the fiber-optic cable into the SFP transceiver in the host port.
4. Plug the other end of the fiber-optic cable into one of the HBAs in the host (direct topology) or into a switch (switch topology).
5. Label both ends of the cable in case you ever need to disconnect and reconnect it.
6. Repeat Step 1 through Step 5 for each host channel that you intend to use.

### Related information

[E-Series Hardware Cabling Guide](#)

## Connecting the controller to a drive tray

If your storage array uses expansion drive trays, you must connect the SAS ports on the new controller to the SAS ports on the drive tray.

### About this task

For information about connecting the controller to the drive tray, refer to the *Hardware Cabling Guide*.

### Steps

1. Plug one end of the cable in the SAS expansion port on the controller-drive tray.
2. Plug the other end of the cable into the appropriate in port or out port on the environmental services module (ESM) in the drive tray as applicable for your cabling configuration.
3. Label both ends of the cable in case you ever need to disconnect and reconnect it.
4. Repeat Step 1 through Step 3 for each cable you need.

### Related information

[E-Series Hardware Cabling Guide](#)

## Bringing the controller online

After you connect the controller to the drive tray, you can bring the controller online.

### Steps

1. Bring the controller online.

Option	Instructions
CLI	Run the following command: <pre>smCLI &lt;DNS-network-name-or-IP-address&gt; -c "set controller [b] availability=online";</pre>
GUI	From the Hardware pane in the Array Management Window, right-click the picture of the controller, and select <b>Advanced &gt; Place &gt; Online</b> .

2. Using the LEDs on the storage array and information provided by the storage management software, check the status of all trays in the storage array.
3. Does any component have a Needs Attention status?
  - Yes – Click the Recovery Guru toolbar button in the Array Management Window, and complete the recovery procedure. If a problem is still indicated, contact technical support.
  - No – Go to the next step.
4. Reinstall the duplex version of the NVSRAM file to ensure that both controllers have the same version of NVSRAM.
  - Run the following command:

```
smCLI <DNS-network-name-or-IP-address> download storageArray NVSRAM file="filename";
```

5. Distribute the volumes between the controllers.

Option	Instructions
CLI	Run the following command: <pre>smCLI &lt;DNS-network-name-or-IP-address&gt; -c "set volumes [ "volumeName1" ... "volumeNameN" ] owner=[ (a   b) ]";</pre>
GUI	In the Array Management Window, select <b>Storage &gt; Volume &gt; Advanced &gt; Redistribute Volumes</b>

6. Create, save, and print a new storage array profile.

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- NetApp, Inc., 495 East Java Drive, Sunnyvale, CA 94089 U.S.

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- Fax: +1 (408) 822-4501
- Support telephone: +1 (888) 463-8277