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Deciding whether to use this guide

This guide describes how to upgrade storage management software, controller firmware and NVSRAM, and ESM firmware in your storage array. It has information about preparing to upgrade and about compatibility and system requirements for various upgrade options. For each supported operating system, this guide has procedures for installing or uninstalling SANtricity Storage Manager. It also includes procedures for upgrading hardware by replacing controllers in controller-drive trays.

This guide assumes that you are upgrading an existing storage array that has previously been installed and is functioning normally.

Where to Find the Latest Information About the Product

This guide references the *Multipath Drivers Guide for SANtricity Storage Manager 11.20*. To access the latest information about this product and other documentation for E-series and EF-series storage arrays, go to the NetApp® support site at [mysupport.netapp.com/series](http://mysupport.netapp.com/series).
How to send your comments

You can help us to improve the quality of our documentation by sending us your feedback. Your feedback is important in helping us to provide the most accurate and high-quality information. If you have suggestions for improving this document, send us your comments by email to doccomments@netapp.com. To help us direct your comments to the correct division, include in the subject line the product name, version, and operating system.

You can also contact us in the following ways:

• NetApp, Inc., 495 East Java Drive, Sunnyvale, CA 94089 U.S.
• Telephone: +1 (408) 822-6000
• Fax: +1 (408) 822-4501
• Support telephone: +1 (888) 463-8277
Preparing to upgrade your software or firmware

The following table shows the supported upgrade paths for controller-drive trays for storage management software version 11.20 and controller firmware (CFW) version 8.20.

<table>
<thead>
<tr>
<th>Controller-Drive Tray</th>
<th>Installed Storage Management Software Version</th>
<th>Supported Upgrades CFW</th>
</tr>
</thead>
<tbody>
<tr>
<td>E2612 E2624 E2660</td>
<td>10.70 or later to 11.20</td>
<td>7.70 to 8.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.75.27.xx or lower to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.75.28.xx</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.75.28.xx or higher to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.20.xx.xx</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.77.21.xx or lower to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.77.22.xx</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.77.22.xx or higher to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.20.xx.xx</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.80.xx.xx to 8.20.xx.xx</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.83.xx.xx to 8.20.xx.xx</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.84.xx.xx to 8.20.xx.xx</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.86.xx.xx to 8.20.xx.xx</td>
</tr>
<tr>
<td>E2712 E2724 E2760</td>
<td>11.10 to 11.20</td>
<td>8.10 to 8.20.xx.xx</td>
</tr>
<tr>
<td>E5412 E5424 E5460</td>
<td>10.80 or later to 11.20</td>
<td>7.70.xx.xx to 8.20.xx.xx</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.83.xx.xx to 8.20.xx.xx</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.84.xx.xx to 8.20.xx.xx</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.86.xx.xx to 8.20.xx.xx</td>
</tr>
<tr>
<td>E5512 E5524 E5560</td>
<td>10.86 or later to 11.20</td>
<td>7.86.xx.xx to 8.20.xx.xx</td>
</tr>
</tbody>
</table>

**Note:** On an E2600 controller-drive tray, if you are upgrading from controller firmware version 7.75.xx where xx is less than 28, you must first upgrade to 7.75.28, and then upgrade to 8.20. If you are upgrading from controller firmware version 7.77.xx where xx is less than 22, you must first upgrade to 7.77.22, and then upgrade to 8.20. All other supported upgrades are performed directly without an intermediate step.

**Note:** To make sure that your failover driver is compatible with the new hardware, firmware, and software, refer to the Multipath Drivers Guide. For the RHEL and SLES operating systems using the DM-MP multipath driver, if you are upgrading the storage array controller firmware from version 7.8 (or an earlier version), you might need to change the host type in the storage partition mapping. Refer to the Failover Drivers Guide for information about which host type to select.
Upgrading controller firmware and NVSRAM

About this task

Obtain a copy of the installation files to upgrade controller firmware and NVSRAM from the NetApp support site at mysupport.netapp.com. Save the files on the management station where you will perform the upgrade. Check the information in the "readme" file that is included in the .zip archive with the controller firmware and NVSRAM to make sure whether you need to upgrade.

Steps

1. In the SANtricity Enterprise Management window, double-click the icon for the storage array to upgrade.

   The Array Management window for the storage array appears.

2. Check that the storage array has Optimal status.

3. Save a support bundle for the storage array.

   a. In the Array Management window, select Monitor > Health > Collect Support Data Manually.

   b. Enter a file path for the archive file in the Specify filename text box.

   c. Click Start.

      There might be some delay while the data is saved and storage array performance might be slowed during that interval.

   d. Click OK.

4. Select Upgrade > Controller Firmware > Upgrade.

5. In the Pre-Upgrade Check dialog, click OK.

6. Does an Event Log Error Verification dialog appear?

   • If yes, select Monitor > Reports > Log, resolve any listed events, clear the log, and then go to step 7 on page 8.

   • If no, continue with step 7 on page 8.

7. In the Download Controller Firmware dialog, click Select File for the controller firmware, locate and select the controller firmware upgrade file that you want to download, and then click OK in the Select File dialog.

8. Do you choose to upgrade the NVSRAM while you upgrade the controller firmware?

   The recommend option is to upgrade NVSRAM while you upgrade controller firmware.

   • If yes, select the check box labeled Transfer NVSRAM file with controller firmware and then go to step 9 on page 8.

   • If no, continue with step 10 on page 8.

9. Click Select File for the NVSRAM, locate and select the NVSRAM upgrade file that want to download, and then click OK in the Select File dialog.

10. Click Transfer.

    The Confirm Download dialog appears.
11. In the **Confirm Download** dialog, click **Yes**.

   The **Downloading** dialog appears. This dialog tracks progress while the installation proceeds.

12. In the **Downloading** dialog, when check marks appear beside each step of the update process, click **Close**.
Upgrading the ESM firmware

About this task

Obtain a copy of the installation files to upgrade ESM firmware from the NetApp support site at mysupport.netapp.com. Save the files on the management station where you will perform the upgrade. Check the information in the "readme" file that is included in the .zip archive with the ESM firmware to make sure whether you need to upgrade. The following steps describe how to upgrade the firmware one drive tray at a time. At step 3, you might, as an alternative, choose to upgrade all or some subset of the drive trays at once.

Steps

1. In the SANtricity Enterprise Management window, double-click the icon for the storage array to upgrade.
   
The Array Management window for the storage array appears.

2. Select Upgrade Firmware > ESM Firmware.
   
The Download Environmental (ESM) Card Firmware dialog appears.

3. In the Download Environmental (ESM) Card Firmware dialog, select the first drive tray on the list that you have not yet upgraded.

4. In the Download Environmental (ESM) Card Firmware dialog, click Select File, locate and select the file that you want to download, and then click OK.
   
   If you change the default selection for File of type to All Files or All Firmware Files, the ESM Firmware Compatibility Warning dialog might appears. If this occurs, review any warning messages before you proceed.

5. In the Download Environmental (ESM) Card Firmware dialog, click Start.
   
The Confirm Download dialog appears.

6. In the Confirm Download dialog, type "yes" in the text box and then click OK.

7. When the Transfer complete message appears, click Close in the Download Environmental (ESM) Card Firmware dialog.

8. Do one of the following:
   
   • If there are additional drive trays in the storage array that require an ESM firmware upgrade, go to step 2 on page 10.
   
   • If you have upgraded the ESM firmware for all of the drive trays in the storage array, you have completed this task.
Upgrading drive firmware

Drive firmware controls the low-level operating characteristics of a disk drive. Periodically, the drive manufacturers release updates to drive firmware to add new features, improve performance, and fix defects.

Types of Drive Firmware Downloads

Each firmware image file contains information about the drive type on which the firmware image runs. The specified firmware image can be downloaded only to a compatible drive. Different firmware download methods are available depending on the type and state of the volume group or disk pool to which that drive belongs as described in the following list.

- **Online**: If the volume group or disk pool supports redundancy and is Optimal, you can use the Online method to download the drive firmware. The Online method downloads firmware while the storage array is processing I/O. You do not have to stop I/O to the associated volumes using these drives. These drives are upgraded one at a time. If the drive is not assigned to a volume group or disk pool (or is a standby Hot Spared), then its firmware may be updated by the Online or the Parallel method.

  **Note**: During an online drive firmware download, if a volume transfer takes place during the rapid reconstruction process, the system initiates a full reconstruction on the volume that was transferred. This operation might take a considerable amount of time. Generally, a full reconstruction operation requires approximately 15 to 20 seconds per gigabyte for RAID 5 or RAID 6. Actual full reconstruction time depends on several factors, including the amount of I/O activity occurring during the reconstruction operation, the number of drives in the volume group, the rebuild priority setting, and the drive performance.

- **Parallel**: If the volume group or disk pool does not support redundancy (RAID 0), or is degraded, you must use the Parallel method to download the drive firmware. The Parallel method downloads firmware only while all I/O activity is stopped. You must stop all I/O to any associated volumes using these drives. If the drive is not assigned to a volume group or disk pool (or is a standby Hot Spared), then its firmware may be updated by the Online or the Parallel method.

- **All**: You can choose All to download firmware to all the drives included in the selection list, regardless of the state of the volume group or disk pool. The selection list can contain a mixture of redundant and non-redundant volume group or disk pool drives or SSD cache drives. Therefore, the system downloads firmware to all these drives using the Parallel method. All I/O to the volumes using these drives must be stopped before the firmware download begins.

Guidelines

Keep these important guidelines in mind when you update the drive firmware to avoid the risk of application errors:

- Downloading firmware incorrectly could result in damage to the drives or loss of data. Perform downloads only under the guidance of technical support.

- If using the Parallel download method, stop all I/O to the volume group containing the drives before starting the download.

- Make sure that the firmware that you download to the drives is compatible with the drives that you select.

- Do not make any configuration changes to the storage array while downloading the firmware.

- Firmware on RAID 0 volume group drives can only be updated using the Parallel method.
Steps to upgrade the drive firmware

About this task
Use the Upgrade Drive Firmware option to upgrade compatible drives in the storage array with the latest firmware version.

Steps
1. From the Array Management window, select Upgrade > Drive Firmware.
   The Download Drive Firmware - Add Packages dialog appears. This dialog shows a list of firmware files that are currently in use by the drives on the storage array.
2. Select View Associated Drives to view the drives that are currently using the firmware files listed.
3. To select the latest firmware, click Add, and do the following:
   a. Navigate to the directory that contains the firmware files that you want to download and select up to four firmware files.
   b. Click OK. The system updates the Packages to Be Transferred information area with the firmware files you selected.
   Note: Selecting more than one firmware file to update the firmware of the same drive might result in a file conflict error. If a file conflict error occurs, an error dialog appears. To resolve this error, click OK and remove all other firmware files except the one that you want to use for updating the firmware of the drive. To remove a firmware file, select the firmware file in the Packages to Be Transferred information area, and click Remove. In addition, you can only select up to four (4) drive firmware packages at one time.
4. Click Next to view the Download Drive Firmware - Select Drives dialog. The following actions occur:
   - All drives are scanned for configuration information and upgrade eligibility.
   - You are presented with a selection (depending on what variety of drives you have in the storage array) of compatible drives that can be upgraded with the firmware you selected. The drives capable of being updated as an online operation are displayed by default.
   - The selected firmware for the drive appears in the Proposed Firmware information area. If you must change the firmware, click Back to return to the previous dialog.
5. From the Drive upgrade capability drop-down, filter the drives based on whether they can support an online or parallel download operation or both (all):
   - Online (default) - Shows the drives that can support a firmware download while the storage array is processing I/O. You do not have to stop I/O to the associated volumes using these drives when you select this download method. These drives are upgraded one at a time while the storage array is processing I/O to those drives.
   - Parallel - Shows the drives that can support a firmware download only while all I/O activity is stopped. You must stop all I/O to any associated volumes using these drives when you select this download method. Drives that do not have redundancy must be processed as a parallel operation. This requirement includes any drive associated with SSD cache, a RAID 0 volume group, or any disk pool or volume group that is degraded.
All - Shows a combination of drives that can support both an online firmware download operation and a parallel firmware download operation. This option includes any drive associated with SSD cache, a RAID 0 volume group, or any disk pool or volume group that is degraded. If you select “All” as the download type, the firmware files are downloaded as a parallel operation. All I/O to the volumes using these drives must be stopped before the firmware download begins.

6. In the Compatible Drives table, select the drives for which you want to download the selected firmware files. Choose one of the following actions:
   • For one or more drives – In the Compatible Drives table, select each drive you want to update.
   • For all compatible drives listed in the table – Click Select all.

7. Click Finish.
   The Confirm Download dialog appears.

8. To start the firmware download, type yes in the text box.

9. Click OK.
   The drive firmware download begins, and the following actions occur:
   • Download Drive Firmware - Progress dialog opens, indicating the status of the firmware transfer for all drives.
   • The status of each drive participating in the download appears in the Transfer Progress column of the Devices updated area.

10. During the firmware download process, you can do the following:
    • Click Stop to stop the firmware download in progress. Any firmware downloads currently in progress are completed. Any drives that have attempted firmware downloads show their individual status. Any remaining drives are listed with a status of Not attempted.
    • Click Save As to save a text report of the progress summary. The report saves with a default .log file extension. If you want to change the file extension or directory, change the parameters in the Save Drive Download Log dialog.

11. After the drive firmware download operation completes, perform one of these actions:
    • To close the Drive Firmware Download Wizard – Click Close.
    • To start the wizard again – Click Transfer More.

Viewing the progress of the drive firmware download

About this task
Use the Download Drive Firmware - Progress dialog to monitor the progress of the drive firmware download. The Drives Updated area contains a list of drives that are scheduled for firmware downloads and the transfer status of each drive’s download.

Timing of the drive firmware download operation
• The Parallel drive firmware download operation can take as much as 90 seconds to complete if all drives are updated on a 24-drive system. On a larger system, the execution time is slightly longer.
• The **Online** drive firmware download operation can range between two minutes per drive to complete to over an hour per drive to complete. Actual time depends on several factors, including the following:
  ◦ I/O load on the storage array and the amount of I/O activity occurring during an online firmware download operation (write-heavy workloads will cause the online firmware download time to increase)
  ◦ Number of drives that are participating in the download
  ◦ Drive performance
  ◦ Number of volumes and size of volumes that reside on the drives that are participating in the download
  ◦ RAID level of the associated disk pool or volume group

**Status of the drive firmware download**

The progress and status of each drive that is participating in the download appears in the Transfer Progress column of the Drives Updated area. When monitoring the progress of the firmware download, keep in mind the following:

- When an online drive firmware download operation is in-progress, a progress bar appears indicating both the status of the firmware file transfer and the rapid reconstruction process.
- During an online drive firmware download, if a volume transfer takes place during the rapid reconstruction process, the system initiates a full reconstruction. The progress bar shows “Reconstruction in progress” as the download status. This operation might take a considerable amount of time.

<table>
<thead>
<tr>
<th>Transfer Progress Status</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pending</td>
<td>This status is shown for an online firmware download operation that has been scheduled but has not yet started.</td>
</tr>
<tr>
<td>In progress</td>
<td>The firmware is being transferred to the drive.</td>
</tr>
<tr>
<td>Reconstruction in progress</td>
<td>This status is shown if a volume transfer takes place during the rapid reconstruction of a drive. This is typically due to a controller reset or failure and the controller owner transfers the volume. The system will initiate a full reconstruction of the drive.</td>
</tr>
<tr>
<td>Failed - partial</td>
<td>The firmware was only partially transferred to the drive before a problem prevented the rest of the file from being transferred.</td>
</tr>
<tr>
<td>Failed - invalid state</td>
<td>The firmware is not valid.</td>
</tr>
<tr>
<td>Failed - other</td>
<td>The firmware could not be downloaded, possibly because of a physical problem with the drive.</td>
</tr>
<tr>
<td>Not attempted</td>
<td>The firmware was not downloaded, which may be due to a number of different reasons such as the download was stopped before it could occur, or the drive did not qualify for the update, or the download could not occur due to an error.</td>
</tr>
<tr>
<td>Successful</td>
<td>The firmware was downloaded successfully.</td>
</tr>
</tbody>
</table>
Upgrading storage management software

Before you upgrade SANtricity Storage Manager, check which version of SANtricity Storage Manager is currently installed on your storage array, and understand the upgrade path from that version to version 11.20. Decide which SANtricity Storage Manager options you need to install.

Installation options

Install only the packages that are required for the type of installation you are performing. The Java Access Bridge is installed automatically with all options.

<table>
<thead>
<tr>
<th>Software Package</th>
<th>Description and Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMclient</td>
<td>This package contains the graphical user interface for managing the storage array. This package also contains an optional monitor service that sends alerts when a critical problem exists with the storage array.</td>
</tr>
<tr>
<td>SMagent</td>
<td>The storage management software that is installed only on a host machine to enable in-band management.</td>
</tr>
<tr>
<td>SMruntime</td>
<td>The operating system (OS)-specific storage management software that installs the appropriate Java runtime environment (JRE), which allows Java files to be displayed.</td>
</tr>
<tr>
<td>Redundant Dual Active Controller (RDAC)/Multi-Path Proxy (MPP)</td>
<td>A multi-path failover driver, proprietary to NetApp, that is installed on Linux hosts. This software package manages the I/O paths into the controllers in the storage array. If a problem exists on the path or a failure occurs on one of the controllers, the driver automatically reroutes the request from the hosts to the other controller in the storage array. For information about other supported failover drivers for your operating system, refer to the Multipath Drivers Guide. <strong>Note:</strong> RDAC is not supported for Red Hat Enterprise Linux versions 7.x or Suse Linux Enterprise Server versions 12.x.</td>
</tr>
<tr>
<td>MPIO DSM</td>
<td>The device specific module (DSM) for Microsoft MPIO.</td>
</tr>
<tr>
<td>SMutil</td>
<td>This package contains utilities that let the operating system recognize the volumes that you create in the storage array and to view the OS-specific device names for each volume.</td>
</tr>
<tr>
<td>SMprovider</td>
<td>The storage management software interface to the Volume Shadow Copy Service (VSS) and Virtual Disk Service (VDS) technologies (these technologies are included with Microsoft’s .NET framework).</td>
</tr>
<tr>
<td>SMinstaller</td>
<td>A package that manages the installation of SANtricity Storage Manager.</td>
</tr>
</tbody>
</table>

1 In-band management is a method for managing a storage array in which the controllers are managed from a storage management station attached to a host that is running host-agent software. The host-agent software receives communication from the storage management client software and passes it to the storage array controllers along the input/output (I/O) path. The controllers also use the I/O connections to send event information back to the storage management station through the host.
<table>
<thead>
<tr>
<th>Installation Option</th>
<th>Runtime</th>
<th>SMclient</th>
<th>SMutil</th>
<th>SMagent</th>
<th>Failover Driver¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical (Full Installation)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Depends on the operating system</td>
</tr>
<tr>
<td>Management Station²</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Host</td>
<td>X</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
</tr>
<tr>
<td>Custom</td>
<td>X</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
</tr>
</tbody>
</table>

¹ If you select the Typical or Host Installation options, a failover driver provided by NetApp might be installed, depending on your operating system. The RDAC/MPP driver is proprietary to NetApp and is included with the Linux version of the SMInstaller. The MPIO DSM driver is included with the Windows version of SMInstaller.

² A management station is a computer that runs storage management software to monitor and manage the storage arrays on a network.

Note: The Microsoft Virtual Disk Service (VDS) and Volume Shadow Copy Service (VSS) providers are a part of the SANtricity Storage Manager package for the Windows Server 2008 OS and the Windows Server 2012 OS.

Checking the current version of the storage management software

About this task

You can check the version of your storage management software from SANtricity by selecting EMW > Help > About. To check the version of the current storage management software from the command line, type the command that corresponds to your operating system, and press Enter. The <package name> placeholder refers to the name of the software package (SMclient, SMruntime, SMutil, etc.) that is installed.

- In the AIX operating system, type the command lslpp -L <package name >, and press Enter.
- In the HP-UX operating system, type the command swlist | grep SM*, and press Enter.
- In the Linux operating system, type the command rpm -qi <package name >, and press Enter.
- In the Solaris operating system, type the command pkginfo -l <package name >, and press Enter.

In the Windows operating system, perform these steps.

Steps

1. Select Start > Run.
2. Type regedit, and press Enter.
3. Select HKEY_LOCAL_MACHINE > SOFTWARE > Wow6432Node > storage > SMInstaller.

   The host software versions are listed under the storage directory.
Steps to upgrade storage management software

About this task

**Important:** If you are upgrading the storage management software on an I/O-attached Windows host for a storage array that has controller firmware version 7.80 (or a release prior to version 7.80), change the order of the following steps. Before you perform step 6 on page 17 to install the storage management software, perform step 8 on page 17 to upgrade the controller firmware and NVSRAM on the storage array to version 8.20.

These steps are required for a successful upgrade to storage management software version 11.20 and controller firmware version 8.20. Perform the steps in order.

**Steps**

1. Make sure that the controller-drive trays in your storage array are compatible with the software level and the firmware level to which you are upgrading and that the current version of the storage management software can be upgraded directly to SANtricity Storage Manager Version 11.20.

   See the NetApp® support site at [mysupport.netapp.com/matrix](https://mysupport.netapp.com/matrix) for the supported controller-drive trays and upgrade paths.

2. Check that the host bus adapters (HBAs), switches, driver versions, and firmware levels are supported.

   Refer to your storage vendor for compatibility information and for specific hardware restrictions.

3. Start the existing storage management software with the procedure for your operating system.

4. Make sure that the hardware and operating systems on all attached hosts and managements stations meet the minimum system requirements to work with your upgraded storage array.

   Refer to the System Requirements topics for each operating system in this document.

5. Make sure that your failover driver is compatible with the new hardware, firmware, and software.

   Refer to the topics in *Multipath Drivers Guide*.

   If you select the **Host** option when you run the SANtricity installer, the Windows DSM is installed.

6. Install storage management software version 11.20 using the instructions for your operating system (OS). OS-specific instructions are given in subsequent chapters of this document.

7. Make sure that the installation was successful. Use the procedure in this document for your operating system to start the storage management software.

8. Update the controller firmware and NVSRAM.

   See the steps in *Upgrading controller firmware and NVSRAM* on page 8.

9. Update the ESM firmware.

   See the steps in *Upgrading the ESM Firmware* on page 10.

   **Note:** Starting with SANtricity Storage Manager Version 10.83, a storage array can use asymmetric logical unit access (ALUA). ALUA enables a controller-drive tray to service I/O requests through either controller in a duplex configuration. Additional steps are required for VMware configurations. See *Upgrade instructions for asymmetric logical unit access (ALUA) with the VMware OS* on page 43 for instructions.

10. Confirm that the Default Operating System or Defined Host Operating Systems are set correctly in Storage Partition Mapping.
11. To verify that the storage array has an Optimal status, select **Monitor > Health > View Health (Recovery Guru)**. If one or more managed devices has a Needs Attention status, follow the instruction in the Recovery Guru. If Optimal status is not restored, contact technical support.

### Upgrade instructions for the Solaris OS

Use the procedures in this chapter to upgrade the storage management software on the Solaris operating system.

### System requirements for Solaris

Review these specifications to make sure that your system meets the minimum general requirements.

**Note:** Solaris supports only Fibre Channel host connections.

| Operating system version for I/O attached hosts | • Solaris 10 u11  
| • Solaris 11.1  
| • Solaris 11.2  |
| Processor support | Oracle Sparc, Intel Xeon 32 bit, Intel Xeon 64 bit, AMD Opteron 32 bit, AMD Opteron 64 bit |
| Controller-drive trays | • E2600  
| • E2700  
| • E5400  
| • EF540  
| • E5500  
| • EF550  
| • E5600  
| • EF560  |
| iSCSI Host Adapters | NICs, CNAs, LoM (only with Solaris 11.x) |
| Fibre Channel Host adapters | Emulex  
| • 8 Gb/s: LPE12000, LPE12002, LPE12004  |
| Qlogic | • 8 Gb/s: QLE2560, QLE2562, QLE2564  |
| Oracle | • 8 Gb/s: SG-XPCIE1FC-EM8-Z, SG-XPCIE2FC-EM8-Z, SG-XPCIE1FC-QF8-N, SG-XPCIE2FC-QF8-N  |
| Host Connection Configurations | • Direct connect  
| • Fabric  |
| Rootboot supported? | Yes, where supported by the HBA |
Local File systems supported
Oracle provides the list of supported file systems. NetApp will test a sampling of the supported file systems but will not limit support to those file systems only. Refer to Oracle's list of file systems for official support.

<table>
<thead>
<tr>
<th>SCSI driver</th>
<th>sd/ssd/Leadville</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>I/O path failover and mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solaris 10 u11MPxIO (TPGS/ALUA or non-TPGS)</td>
</tr>
<tr>
<td>Solaris 11.1 MPxIO (TPGS/ALUA)</td>
</tr>
<tr>
<td>Solaris 11.2 MPxIO (TPGS/ALUA)</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Node failover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Solaris Cluster 4.2 (Sol 11.2)</td>
</tr>
<tr>
<td>Oracle Solaris Cluster 4.1 (Sol 11.1)</td>
</tr>
<tr>
<td>Oracle Solaris Cluster 3.3 U2 (Sol 10 u11)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Providers</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMI-S</td>
</tr>
</tbody>
</table>

**Additional information for SANtricity Storage Manager on Solaris**

**About this task**

Use this procedure to install the storage management software packages on the Solaris OS. When you install the new software, earlier versions of the software are automatically removed as part of that process.

For this procedure, you must first obtain an installation file that is specific to your operating system and to the release level of the storage management software from NetApp Support. In the following steps, the installation file is identified as SMIA-SOLX86-11.20.00nn.nnnn.bin (for the Intel x86 platform) or SMIA-SOL-11.20.06nn.nnnn.bin (for the SPARC platform). The characters nn.nnnn are, in practice, alpha-numerical characters: for example, SMIA-SOLX86-11.20.0000.0178.bin.

**Steps**

1. Make sure that you have root privileges, which are required to install the software.

2. Download or copy the installation file, SMIA-SOLX86-11.20.nn.nn.bin or SMIA-SOL-11.20.nn.nn.bin, to a directory on your host. To download the installation file, navigate to NetApp Support and download the E-Series/EF-Series SANtricity Storage Manager 11.20.06.nn.nn and related software package for your Solaris platform.

3. Change your current directory to the installation directory by typing `cd <install>` on the command line and then pressing Enter.  
   `<install>` is the name of the directory on your server to which you downloaded the installation file.

4. Change the file permissions for the installer using the `chmod 777 SMIA-SOL*.bin` command.  
   This action allows you to run the installer.

5. Execute the installer using the `. /SMIA-SOL*.bin` command.

The following messages appear in the console window:

Preparging to install...  
Extracting the JRE from the installer archive...  
Unpacking the JRE...  
Extracting the installation resources from the installer archive...  
Upgrading storage management software | 19
Configuring the installer for this system's environment...
Launching installer...

After the software is loaded, the Introduction window appears.

6. Click **Next**.
   The License Agreement window appears.
7. Select the option that accepts the terms of the License Agreement.
8. Click **Next**.
   The Select Installation Type window appears.
9. Based on the type of installation you are performing, select one of these options.
   The steps in this procedure describe a typical (full) installation.
   • **Typical (Full Installation)** – This selection, which is the default, installs all of the packages on the system. Choose this option if you do not know which installation type to select.
   • **Management Station** – This selection installs the software that is needed to configure, manage, and monitor a storage array. This option is for your workstation or management computer.
   • **Host** – This selection installs the storage array server software. Use this type of installation for the host (server) that is connected to the storage array.
   • **Custom** – This selection lets you customize the features to be installed.
   The installation type that you select is highlighted in blue text.
10. Click **Next**.
    A Software Incompatibility Detected screen may appear if there is a previous version of the SANtricity software installed on your system. If this is the case, click **OK** to override the pre-existing version.
    The Pre-Installation Summary window appears.
11. Click **Install**.
    The Installing window appears while the software is loading. When the software is loaded, the Install Complete window appears.
    **Important:**
    If you cancel an installation before the installation completes or while the progress bar is still visible, the installation stops prematurely. The software creates an installation log. You must manually uninstall the software. If you cancel the installation *before* the progress bar is visible, you do not need to uninstall the software.
12. To exit the installation program, click **Done**.
    Several files and program packages are installed to the `/opt/SMgr` directory and the `/opt/StorageManager` directory.
13. If you have volumes mapped to the server from a previous installation of the SANtricity software, run `devfsadm -C`, `devfsadm`, and `cfgadm -al`.
    These commands ensure that the server continues to have access to the mapped volumes.
After you finish

Solaris uses the native MPx10 for failover. After installing the host package, see the SANtricity Storage Manager Multipath Drivers Guide to enable MPx10 on the host.

Checking the installation on the Solaris OS

About this task

After you have completed installing the software packages, check that they installed successfully.

Steps

1. At the prompt, type this command and press Enter:

   pkginfo -l <package name>

   In this command, <package name> is the name of a package that you installed.

2. To determine which software packages reside on your system, type this command at the prompt.

   pkginfo | grep SM

   Look for the storage management software packages, such as SMagent, SMclient, SMutil, and SMruntime.

3. From the /opt/StorageManager directory, review any error messages from the error message log, and correct the problem. If the problem persists, contact technical support.

4. For each package you installed, repeat step 1 on page 21 through step 2 on page 21.

5. Start the storage management software. At the prompt, type this command, and press Enter:

   SMclient

   After the client software starts, the Enterprise Management Window and these dialogs appear:

   • Select Addition Method
   • Enterprise Management Window Task Assistant

   Refer to the online help topics in storage management software for more information about how to manage your storage array.

Uninstalling the storage management software on the Solaris OS

About this task

If you have installed the storage management software, but you determine that you must uninstall it, perform this procedure.

   Note: Uninstalling the software is not the same as removing previous versions of the software.

Steps

1. To change to the Uninstall directory, from the /opt/StorageManager directory, type this command, and press Enter:

   cd “Uninstall SANtricity”
2. From the Uninstall SANtricity directory, type this command, and press **Enter**:

```
./Uninstall_SANtricity
```

The Uninstall window appears.

3. Click **Next**.

The Uninstall Options window appears. You can choose either to perform a complete uninstallation or to select specific packages to uninstall individually.

4. Either select the packages that you want to uninstall, or select a complete uninstallation.

5. Click **Next**.

While the software is uninstalling, the Uninstall window appears. When the procedure has completed, the Uninstall Complete window appears.

6. Click **Done**.

The uninstallation process is complete.

---

**Upgrade instructions for the Linux OS**

Use the procedures in this chapter to upgrade the storage management software on the Linux operating system.

**System requirements for Linux**

Review these specifications to make sure that your system meets the minimum general requirements.

<table>
<thead>
<tr>
<th>Component</th>
<th>With Non-InfiniBand Host Connections</th>
<th>With InfiniBand Host Connections</th>
</tr>
</thead>
</table>
| Operating system version for I/O attached hosts | • RHEL 7.1 (IOP)  
• RHEL 7.0  
• RHEL 6.5  
• RHEL 6.4 |
|                           | • SLES 12 (IOP)  
• SLES 11 SP4 (IOP)  
• SLES 11 SP3 |
| Hypervisor OS for I/O attach hosts | • RedHat Enterprise Virtualization (RHEV)  
• Kernel-based Virtual Machine (KVM) (RHEV and KVM are only supported on RHEL 7.0, 6.5 and 6.4) |
<table>
<thead>
<tr>
<th>Component</th>
<th>With Non-InfiniBand Host Connections</th>
<th>With InfiniBand Host Connections</th>
</tr>
</thead>
</table>
| Operating system version for management stations only (no I/O attached hosts) | • RH5  
• RH6  
• SLES 10 client  
• SLES 11 client | |
| Processor support | Intel Xeon 64 bit, AMD Opteron 64 bit | Intel Xeon 64 bit, AMD Opteron 64 bit |
| Controller-drive trays | • E2600  
• E2700  
• E5400  
• EF540  
• E5500  
• EF550  
• E5600  
• EF560 | • E5400  
• EF540  
• E5500  
• EF550  
• E5600  
• EF560 |
<table>
<thead>
<tr>
<th>Component</th>
<th>With Non-InfiniBand Host Connections</th>
<th>With InfiniBand Host Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host Adapters</td>
<td>Emulex (Fibre Channel)</td>
<td>Mellanox (IB)</td>
</tr>
<tr>
<td></td>
<td>• <strong>8 Gb/s:</strong> LPE12000, LPE12002, LPE12004</td>
<td><strong>40Gb:</strong></td>
</tr>
<tr>
<td></td>
<td>• <strong>16 Gb/s:</strong> LPE16000, LPE16000B, LPE16002</td>
<td>• MHQH19B-XSR, MHQH19B-XTR</td>
</tr>
<tr>
<td></td>
<td>Qlogic (Fibre Channel)</td>
<td>• MHQH29B-XSR, MHQH29B-XTR</td>
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<td>• <strong>8 Gb/s:</strong> QLE2560, QLE2562, QLE2564</td>
<td>• MHQH19C-XSR, MHQH19C-XTR</td>
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<tr>
<td></td>
<td>• <strong>16 Gb/s:</strong> QLE2670, QLE2672</td>
<td>• MHQH29C-XSR, MHQH29C-XTR</td>
</tr>
<tr>
<td></td>
<td>Brocade (Fibre Channel)</td>
<td>• MCX353A-QCAT, MCX353A-QCAT</td>
</tr>
<tr>
<td></td>
<td>• <strong>8 Gb/s:</strong> 815, 825</td>
<td>• MCX353A-QCBT, MCX353A-QCBT</td>
</tr>
<tr>
<td></td>
<td>• <strong>16 Gb/s:</strong> 1860-1, 1860-2</td>
<td>56 Gb:</td>
</tr>
<tr>
<td></td>
<td>HP BladeCenter (Fibre Channel)</td>
<td>• MCX353A-FCAT, MCX354A-FCAT</td>
</tr>
<tr>
<td></td>
<td>• <strong>Qlogic 8Gb:</strong> QMH2572, QMH2562</td>
<td>• MCX353A-FCBT, MCX354A-FCBT</td>
</tr>
<tr>
<td></td>
<td>• <strong>Emulex 8Gb:</strong> LPE1205, LPE1205A</td>
<td>• MCX353A-FCCT, MCX354A-FCCT</td>
</tr>
<tr>
<td></td>
<td>LSI (SAS)</td>
<td>• MCB191A-FCAT, MCB192A-FCAT</td>
</tr>
<tr>
<td></td>
<td>• <strong>6Gb:</strong> 9207-8e</td>
<td>• MCB193A-FBAT, MCB193A-FCAT</td>
</tr>
<tr>
<td></td>
<td>• <strong>12Gb:</strong> 9300-8e</td>
<td>• MCB194A-FCAT</td>
</tr>
<tr>
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<td>Dell</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• <strong>6Gb:</strong> 7e</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• <strong>6Gb:</strong> h222, h221</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NICs, CNAs, LoM (iSCSI)</td>
<td></td>
</tr>
</tbody>
</table>

**Fibre Channel configurations**

Direct Connect and Fabric

**Local file systems supported**

RedHat and Novell provide specific file systems with their individual Linux distributions. NetApp will test a sampling of the inbox file systems but will not limit support to those file systems only. Refer to RedHat's and Novell's list of file systems for official support.
### System requirements for additional Linux distributions

Review these specifications to make sure that your system meets the minimum general requirements.

<table>
<thead>
<tr>
<th>Component</th>
<th>With Non-InfiniBand Host Connections</th>
<th>With InfiniBand Host Connections</th>
</tr>
</thead>
</table>
| Operating system version for I/O attached hosts | • CentOS 7.0  
• CentOS 6.5  
• CentOS 6.4  
• Oracle Linux (OEL) 7.0  
• OEL 6.5  
• OES 6.4 | DMMP (RDAC Handler)  
• SLES11 SP3  
• RHEL 7.0, RHEL 6.5, RHEL 6.4  
MPP: (MPP-RDAC driver)  
• RHEL 6.5, RHEL 6.4  
• SLES 11 SP3 |
| Processor support | Intel Xeon 64 bit, AMD Opteron 64 bit | |

### Component

<table>
<thead>
<tr>
<th>With Non-InfiniBand Host Connections</th>
<th>With InfiniBand Host Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rootboot supported?</td>
<td>No</td>
</tr>
</tbody>
</table>
| I/O path failover                    | DMMP (RDAC Handler with ALUA support)  
• SLES 12, SLES 11 SP4, SLES11 SP3  
• RHEL 7.1, RHEL 7.0, RHEL 6.5, RHEL 6.4  
DMMP: (DMMP-ALUA handler)  
• RHEL 7.1, RHEL 7.0, RHEL 6.5, RHEL 6.4  
• SLES 12, SLES 11SP4, SLES 11SP3  
MPP: (MPP-RDAC driver)  
• RHEL 6.5, RHEL 6.4  
• SLES 11 SP3 | DMMP (RDAC Handler)  
• SLES11 SP3  
• RHEL 7.0, RHEL 6.5, RHEL 6.4  
MPP: (MPP-RDAC driver)  
• RHEL 6.5, RHEL 6.4  
• SLES 11 SP3 |
| Node failover                        | • SIOS (SteelEye) LifeKeeper with SLES  
• Red Hat Cluster Server on RHEL | |
<p>| Providers                            | SMI-S |</p>
<table>
<thead>
<tr>
<th>Component</th>
<th>With Non-InfiniBand Host Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller-drive trays</td>
<td>• E2600</td>
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<tr>
<td></td>
<td>• E2700</td>
</tr>
<tr>
<td></td>
<td>• E5400</td>
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<td>• EF540</td>
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<td></td>
<td>• E5600</td>
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<td></td>
<td>• EF560</td>
</tr>
<tr>
<td>Host Adapters</td>
<td>Emulex (Fibre Channel)</td>
</tr>
<tr>
<td></td>
<td>• <strong>8 Gb/s:</strong> LPE12000, LPE12002, LPE12004</td>
</tr>
<tr>
<td></td>
<td>• <strong>16 Gb/s:</strong> LPE16000, LPE16000B, LPE16002, LPE16002B</td>
</tr>
<tr>
<td></td>
<td>Qlogic (Fibre Channel)</td>
</tr>
<tr>
<td></td>
<td>• <strong>8 Gb/s:</strong> QLE2560, QLE2562, QLE2564</td>
</tr>
<tr>
<td></td>
<td>• <strong>16 Gb/s:</strong> QLE2670, QLE2672</td>
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<td>Brocade (Fibre Channel)</td>
</tr>
<tr>
<td></td>
<td>• <strong>8 Gb/s:</strong> 815, 825</td>
</tr>
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<td>• <strong>16 Gb/s:</strong> 1860-1, 1860-2</td>
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<td>HP BladeCenter (Fibre Channel)</td>
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<td>• <strong>Qlogic 8Gb:</strong> QMH2572, QMH2562</td>
</tr>
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<td>• <strong>Emulex 8Gb:</strong> LPE1205, LPE1205A</td>
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<td>LSI (SAS)</td>
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<td>• <strong>6Gb:</strong> 9207-8e</td>
</tr>
<tr>
<td></td>
<td>• <strong>12Gb:</strong> 9300-8e</td>
</tr>
<tr>
<td></td>
<td>Dell</td>
</tr>
<tr>
<td></td>
<td>• <strong>6Gb:</strong> 7e</td>
</tr>
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<td>HP</td>
</tr>
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<td>• <strong>6Gb:</strong> h222, h221</td>
</tr>
<tr>
<td>Fibre Channel configurations</td>
<td>NICs, CNAs, LoM (iSCSI)</td>
</tr>
<tr>
<td>Rootboot supported?</td>
<td>Yes, where supported by the HBA (not with iSCSI host connections)</td>
</tr>
<tr>
<td>Component</td>
<td>With Non-InfiniBand Host Connections</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Local file systems supported</td>
<td>CentOS and Oracle provide specific file systems with their Linux distribution. Since CentOS is a community-supported Linux distribution, NetApp will test and verify a sampling of the inbox file systems but makes no official support claims. For Oracle Enterprise Linux, refer to Oracle's list of file systems for official support.</td>
</tr>
<tr>
<td>I/O path failover</td>
<td>DMMP (DMMP-ALUA handler)</td>
</tr>
<tr>
<td></td>
<td>• CentOS7.0, CentOS 6.5, CentOS 6.4</td>
</tr>
<tr>
<td></td>
<td>• OEL7.0, OEL 6.5, OEL 6.4</td>
</tr>
<tr>
<td></td>
<td>DMMP: (DMMP-RDAC handler)</td>
</tr>
<tr>
<td></td>
<td>• CentOS7.0, CentOS 6.5, CentOS 6.4</td>
</tr>
<tr>
<td></td>
<td>• OEL7.0, OEL 6.5, OEL 6.4</td>
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<tr>
<td>Node failover</td>
<td>None.</td>
</tr>
<tr>
<td>Providers</td>
<td>SMI-S</td>
</tr>
</tbody>
</table>

**System requirements for Linux with PowerPC processors**

Review these specifications to make sure that your system meets the minimum general requirements.

<p>| Operating system version for I/O attached hosts | • RHEL 7.1 (IOP)                                                                                       |
|                                               | • RHEL 7.0                                                                                               |
|                                               | • RHEL 6.5                                                                                               |
|                                               | • RHEL 6.4                                                                                               |
|                                               | • SLES 12 (IOP)                                                                                          |
|                                               | • SLES 11 SP4 (IOP)                                                                                      |
|                                               | • SLES 11 SP3                                                                                           |
| Processor support                           | IBM Power 5 and newer                                                                                     |
| Controller-drive trays                      | • E2600                                                                                                  |
|                                               | • E2700                                                                                                  |
|                                               | • E5400                                                                                                  |
|                                               | • EF540                                                                                                  |
|                                               | • E5500                                                                                                  |
|                                               | • EF550                                                                                                  |
|                                               | • E5600                                                                                                  |
|                                               | • EF560                                                                                                  |</p>
<table>
<thead>
<tr>
<th>Fibre Channel host adapters</th>
<th>IBM</th>
</tr>
</thead>
<tbody>
<tr>
<td>• <strong>8 Gb/s</strong>: 5273-P, 5735-P, 5729-P</td>
<td></td>
</tr>
<tr>
<td>• <strong>16 Gb/s</strong>: EN0A / EN0B</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>iSCSI host connections</th>
<th>NICs, CNAs, LoM</th>
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</table>

<table>
<thead>
<tr>
<th>Host channel configurations</th>
<th>Direct Connect and Fabric</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Rootboot supported?</th>
<th>Yes, where supported by the HBA (not with iSCSI host connections)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>I/O path failover</th>
<th>DMMP (DMMP-ALUA handler)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• SLES 12, SLES11 SP3</td>
<td></td>
</tr>
<tr>
<td>• RHEL 7.0, RHEL 6.5, RHEL 6.4</td>
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</table>

<table>
<thead>
<tr>
<th>DMMP: (DMMP-RDAC handler)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• SLES 12, SLES11 SP3</td>
</tr>
<tr>
<td>• RHEL 7.0, RHEL 6.5, RHEL 6.4</td>
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</table>

<table>
<thead>
<tr>
<th>MPP: (MPP-RDAC handler)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• RHEL 7.0, RHEL 6.5, RHEL 6.4</td>
</tr>
<tr>
<td>• SLES 12, SLES 11 SP3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Node failover</th>
<th>None</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Providers</th>
<th>None</th>
</tr>
</thead>
</table>

## Installing the storage management software on the Linux OS

### About this task

Use this procedure to install the storage management software packages for the Linux OS. You also can perform the software installation procedure by using a package manager that is compatible with Red Hat Package Manager (RPM) and has a graphical user interface (GUI). When you install the new software, earlier versions of the software are automatically removed as part of that process.

For this procedure, you must first obtain an installation file that is specific to your operating system and to the release level of the storage management software from the NetApp support site at [mysupport.netapp.com](http://mysupport.netapp.com). In the following steps, the installation file is identified as `SMIA-LINUXX64-11.20.0Bnn.nnnn.bin` (for Linux on Intel x64 processors) or `SMIA-LINUX-11.20.0Ann.nnnn.bin` (for all other supported processors). The characters `nn.nnnn` are, in practice, alpha-numeric characters: for example, `SMIA-LINUX-11.20.0400.0178.bin`.

### Steps

1. Make sure that you have root privileges, which are required to install the software.

2. Download or copy the installation file, `SMIA-LINUXX64-11.20.04nn.nnnn.bin` or `SMIA-LINUX-11.20.04nn.nnnn.bin`, to a directory on your host.

3. Change your current directory to the installation directory by typing `cd <install>` on the command line and then pressing **Enter**.

   `<install>` is the name of the directory on your server to which you downloaded the installation file.
4. At the command prompt, type `SMIA-LINUXX64-11.20.04nn.nnnn.bin` or `SMIA-LINUX-11.20.04nn.nnnn.bin`, and then press **Enter**.

   After the software is loaded, the Introduction window appears.

5. Click **Next**.

   The License Agreement window appears.

6. Select the option that accepts the terms of the License Agreement.

7. Click **Next**.

   The Select Installation Type window appears.

8. Based on the type of installation you are performing, select one of these options.

   The steps in this procedure describe a typical (full) installation.

   • **Typical (Full Installation)** – This option, which is the default, installs all of the packages on the system. Choose this option if you do not know which installation type to select.

   • **Management Station** – This option installs the software that is needed to configure, manage, and monitor a storage array. This option is for your workstation or management computer.

   • **Host** – This selection installs the storage array server software. Use this type of installation for the host (server) that is connected to the storage array.

   • **Custom** – This option lets you customize the features to be installed.

   The installation type that you select is highlighted in blue text.

9. Click **Next**.

   The Multi-Path Driver Warning dialog appears.

10. Click **Next**.

    The Pre-Installation Summary window appears.

11. Click **Install**.

    The Installing window appears while the software is loading. When the software is loaded, the Install Complete window appears.

    **Important:**

    If you cancel an installation before the installation completes or while the progress bar is still visible, the installation stops prematurely. The software creates an installation log. You must manually uninstall the software. If you cancel the installation before the progress bar is visible, you do not need to uninstall the software.

12. To exit the installation program, click **Done**.

    Several files and program packages are installed to the `/opt/SM9` directory and the `/opt/StorageManager` directory.

13. Do you want to manually install the RDAC package?

    • **Yes** – Go to step 14 on page 29.

    • **No** – Go to Checking the installation on the Linux OS on page 30.

a. While in the /opt/StorageManager directory, type this command at the prompt, and press Enter. In this command, `<rdac-Package-name>` is the name of the RDAC package.

```
tar -xvf <rdac-Package-name>.tar.gz
```

The source files uncompress into the `linuxrdac-09.01.Bx.xx` directory.

b. To change to the directory where the RDAC source is located, type the command for your version of the kernel, and press Enter.

- 2.4 kernel:
  
  ```
  cd linuxrdac
  ```

- 2.6 kernel:
  
  ```
  cd linuxrdac-09.01.Bx.xx
  ```

c. To remove the previously installed version of RDAC, type this command, and press Enter:

```
make uninstall
```

d. To clean the directory, type this command, and press Enter:

```
make clean
```

e. To compile the modules, type this command, and press Enter:

```
make
```

f. To install RDAC, type this command, and press Enter:

```
make install
```

g. After the make install process has completed, modify your bootloader configuration file. For more information about how to modify the bootloader configuration file, refer to the output from the `make install` command for Linux RDAC.

h. Read the `readme.txt` file in the `linuxrdac` directory to complete the RDAC installation process.

  **Note:** After you update the boot loader, you must reboot the host to apply the new MPP initrd image.

  **Note:** For further details about installing RDAC, refer to the `Multipath Drivers Guide`.

**Checking the installation on the Linux OS**

**About this task**

After you have completed installing the software packages, make sure that they installed successfully.
Steps

1. At the prompt, type this command and press Enter:

```
rpm -qa | grep SM*
```

2. At the prompt, type this command and press Enter. In this command, `<package name>` is the name of a package that you installed.

```
rqm -qi <package name>
```

3. Note any problem that is reported.

4. For each package you installed, repeat step 2 on page 31 through step 3 on page 31.

5. Was the installation successful (no problems were reported)?
   - Yes – Go to step 3 on page 31.
   - No – From the /opt/StorageManager directory, review any error messages from the error message logs, SANtricity_ES_InstallErrorLog.log and SANtricity_ES_InstallLog.log, and correct the problem. If the problem persists, contact technical support.

6. Start the storage management software. At the prompt, type this command, and press Enter:

```
SMclient
```

After the client software starts, the Enterprise Management Window and these dialogs appear:

- Select Addition Method
- Enterprise Management Window Task Assistant

Refer to the online help topics in storage management software for more information about how to manage your storage array.

### Uninstalling storage management software on the Linux OS

**About this task**

If you have installed the storage management software but you have determined that you need to uninstall it, perform this procedure.

**Note:** Uninstalling the software is not the same as removing previous versions of the software.

**Steps**

1. To change to the Uninstall directory, from the /opt/StorageManager directory, type this command, and press Enter:

```
cd “Uninstall SANtricity”
```

2. From the Uninstall SANtricity directory, type this command and press Enter:

```
./Uninstall_SANtricity_ES
```

The Uninstall window appears.
3. Click Next.
   The Uninstall Options window appears. You can choose either to perform a complete uninstallation or to select specific packages to uninstall individually.

4. Either select the packages that you want to uninstall, or select a complete uninstallation.

5. Click Next.
   The Multi-Path Driver Warning dialog appears.

6. Click Next.
   While the software is uninstalling, the Uninstall window appears. When the procedure has completed, the Uninstall Complete window appears.

7. Manually uninstall the RDAC package.
   a. Navigate to the /opt/StorageManager/linuxrdac directory.
      
      Note: In this command, /opt/StorageManager/linuxrdac is the directory in which the RDAC files are stored.

   b. To uninstall RDAC, type this command and press Enter:
      
      `make uninstall`

   c. To clean the directory, type this command and press Enter:
      
      `make clean`

8. Revert the changes you made in the boot-loader configuration file.

9. Click Done.
   The uninstallation process is complete.

10. Reboot the host.

**Upgrade instructions for the Windows OS**

Use the procedures in this section to upgrade the storage management software on the Windows operating system.
## System requirements for Windows OS

<table>
<thead>
<tr>
<th>Operating system version for I/O attached hosts</th>
<th>With Server Core, storage management is available only through the command line interface, SMcli</th>
</tr>
</thead>
</table>
| Supported editions (Windows 2012, Windows 2012 R2 and Windows 2008 R2) | • Standard server and core  
• Foundation server and core  
• Datacenter server and core |
| Supported editions (Windows 2012, Windows 2012 R2) | • Essentials Server and Core  
Supported editions (Windows 2008 R2) |
| • Enterprise Server and Core  
• Windows Storage Server  
• Web Server (Client only, no Failover) | Unsupported editions (Windows 2008 R2) |
| • HPC Server  
• Small or Essentials Business Server  
• Unified Data Storage Server |  
| OS versions for GUI client only | • Windows 7, 8 & 8.1  
• Windows 7, 8 & 8.1 Pro  
• Windows 7, 8 & 8.1 Enterprise |  
| Hypervisor OS for I/O attach | • Windows Server 2012 R2 Hyper-V  
• Windows Server 2012 Hyper-V  
• Hyper-V Server 2008 R2 SP1 (standalone)  
• Windows Server 2008 R2 SP1 Hyper-V (add on to 2008) |  
| Guest OSs for hypervisor | Microsoft provides the list of supported Guest OSs for this hypervisor. NetApp will test a sampling of the supported OSs but will not limit support to those OSs only. Please refer to Microsoft's list of guest OSs for official support. |  
| Processor support | Intel Xeon 64 bit, AMD Opteron 64 bit |
| Controller-drive trays | • E2600  
|                       | • E2700  
|                       | • E5400  
|                       | • EF540  
|                       | • E5500  
|                       | • EF550  
|                       | • E5600  
|                       | • EF560  |
| Fibre Channel host adapters | Emulex  
|                           | • **8 Gb/s:** LPE12000, LPE12002, LPE12004  
|                           | • **16 Gb/s:** LPE16000, LPE16000B, LPE16002, LPE16002B  
|                           | **Qlogic**  
|                           | • **8 Gb/s:** QLE2560, QLE2562, QLE2564  
|                           | • **16 Gb/s:** QLE2670, QLE2672  
|                           | **Brocade**  
|                           | • **8 Gb/s:** 815, 825  
|                           | • **16 Gb/s:** 1860-1, 1860-2  
|                           | **HP Blade Center**  
|                           | • **8 Gb/s:** QMH2572, QMH2562  
|                           | • **16 Gb/s:** LPE1205, LPE1205A  
| SAS host adapters | **LSI**  
|                   | • **6 Gb/s:** 9207-8e  
|                   | • **12 Gb/s:** 9300-8e  
|                   | **Dell**  
|                   | • **6 Gb/s:** 7e  
|                   | **HP**  
|                   | • **6 Gb/s:** h221, h222  
| iSCSI host connections | NIC's and CNA's from multiple vendors will be tested. Support is not limited to the tested NIC's or CNA's as long as the customer uses the supported Software Initiator (SWI). Hardware Initiator (HWI) is not supported.  
| Configurations | Direct connect or Fabric  
| Rootboot supported? | Yes, where supported by the HBA (not with iSCSI host connections)
Installing the storage management software on the Windows OS

About this task

Use this procedure to install the storage management software packages on the Windows OS.

Attention:

Possible data corruption – If a host is allowed to access data on the storage array without RDAC or a valid installation of a path failover product, and has dual paths to the storage array, the data might become unusable.

Review the following important points before you begin to install the software:

- If you are upgrading the storage management software on an I/O-attached host for a storage array that has controller firmware version 7.80 (or a release prior to version 7.80), upgrade the controller firmware and NVSRAM on the storage array to the version 8.20 before you upgrade the storage management software.

- If you are installing the Windows boot device on a storage array, refer to the boot device installation procedures in Appendix A of SANtricity Storage Manager 11.20 Software Installation Reference. Determine where to install the software before you begin this procedure. You should not install your monitoring stations on a root boot device, since doing so can result in the loss of important debug information when the entire system is down.

- Do not restart the system during the installation process. You will restart the system after you install all of the storage management software components.

- Configure the Event Monitor on only one storage management station to prevent receiving duplicate event messages. Duplicate alerts are also sent if the Enterprise Management window and the SMmonitor utility are running simultaneously.

- Before you start the primary server of a server cluster, complete all applicable configuration procedures for each system.

Steps

1. Before you install this software, close all other programs.
2. Download or copy the installation file, SMIA-WinX64-11.20.03nn.nnnn.exe (for Intel x64 processors) or SMIA-WS32-11.20.03nn.nnnn.exe (for Intel x32 processors), to a directory on your host.

3. To launch the installer, double-click the applicable .exe file.

   The InstallAnywhere dialog appears while the software installs. When the software is installed, the Introduction window appears.

4. Click Next.

   The License Agreement window appears.

5. Select the option that accepts the terms of the License Agreement.

6. Click Next.

   The Choose Install Folder window appears, which identifies the default installation location.

7. Click Next.

   The Select Installation Type window appears.

8. Based on the type of installation you are performing, select one of these options.

   The steps in this procedure describe a typical (full) installation.

   • **Typical (Full Installation)** – This selection, which is the default, installs all of the packages on the system. Choose this option if you do not know which installation type to select.

   • **Management Station** – This selection installs the software that is needed to configure, manage, and monitor a storage array. This option is for your workstation or management computer.

   • **Custom** – This selection lets you customize the features to be installed.

   The installation type that you select is highlighted in blue text.

9. Click Next.

   If the software already exists, the Overwrite Warning dialog appears.

10. If the **Overwrite Warning** dialog appears, click OK.

   The Automatically Start Monitor? window appears.

11. Select the appropriate option for your system.

   If you start the Event Monitor on multiple machines, you might receive duplicate error messages from the same storage array. If you do not want to receive duplicate error messages, start the Event Monitor on only one machine. Make sure to run the Event Monitor on a machine that will run continuously.

12. Click Next.

   The Pre-Installation Summary window appears.

13. Click Install.

   The Installing window appears while the software is loading. The Installation/Remove status window also appears throughout the installation process.

   The Security Alert dialog might appear multiple times.

14. Did the **Security Alert** dialog appear?

   • **Yes** – Click Yes, and go to step 15 on page 37.
• No – Go to step 15 on page 37.

Important: When RDAC is not installed, the Install Complete window shows an error message that states that the installation has completed and that there are some warnings. The message suggests that you look at the installation log for details. The installation log contains a warning that a Win32 exception can be found. This is normal and expected behavior. The installation was successful.

Note: If you cancel an installation before the installation completes or while the progress bar is still visible, the installation stops prematurely. The software creates an installation log. You must manually uninstall the software by using the steps in “Uninstalling Storage Management Software on the Windows OS on page 38”. If you cancel the installation before the progress bar is visible, you do not need to uninstall the software.

When the software is loaded, the Install Complete window appears.

15. Make sure that the Yes, restart my system option is selected.

16. Click Done.

Several files and program packages are stored in the `<LOCAL DRIVE>:\Program Files\StorageManager` directory.

Important: If you repeatedly cancel an installation or uninstallation before the process completes fully and try to install the software again, the installation process might not work. In addition, the software might not be installed after the installation process has completed. The installation complete panel tells you where the software is installed, but it is not there. If this problem occurs, delete the `.xml` file from the `Program Files\Zero G` directory.

The installation is completed, and Windows is restarted.

Checking the installation on the Windows OS

About this task

After you have completed installing the software packages, make sure that they installed successfully.

Note: To make sure that all of the packages installed successfully on the Windows OS, go to the registry settings in the `HKEY_LOCAL_MACHINE>Software>Wow6432NodeStorage>Storage>SMInstaller` directory.

Steps

1. Select Start > Programs.

The list of installed programs appears.

2. Make sure that storage management software appears in the program list.

If the storage management software does not appear in the list, refer to the Product Release Notes for the current release, or contact technical support.

3. To start the storage management software, select Start > All Programs > SANtricity Storage Manager Client.

Refer to the online help topics in the storage management software for more information about how to manage your storage array.

After the client software starts, the Enterprise Management window and these dialogs appear:

• Select Addition Method

• Enterprise Management Window Task Assistant
Uninstalling storage management software on the Windows OS

About this task

If you have installed storage management software, but you have determined that you need to uninstall it, perform this procedure.

Note: Uninstalling the software is not the same as removing previous versions of the software.

Note: The procedure in step 1 on page 38 is required only if you are using the storage array as a boot device.

Steps

1. Make sure that a single path exists to the storage array. Choose one of two methods to make sure that the alternate path to the storage array has been removed:

   - Method 1 – Remove the host interface cable to the alternate path. When you are finished, go to step 5 on page 39.
   - Method 2 – Modify NVSRAM to temporarily disable RDAC multi-path functionality at the storage array by performing these substeps:

     Attention: Possible data corruption – If no multi-path driver exists in the host and you send I/O to the storage array, data corruption could occur. Do not uninstall the multi-path driver, even if you are not using the storage array as a boot device.

     a. Select the storage array in the Enterprise Management Window.
     b. Select Tools > Execute Script.
        The Script Editor dialog appears.
     c. In the upper half of the Script Editor dialog, type these commands at the prompt, and press Enter.

        ```
        set controller[a] HostNVSRAmByte[1,0x16]=0xFF,0x20;
        set controller[b] HostNVSRAmByte[1,0x16]=0xFF,0x20;
        ```
     d. Select Tools > Execute Only.
     e. For the NVSRAM modifications to take effect, turn off the power to the controller-drive tray, wait 30 seconds for the controller-drive tray to turn off the power, and turn on the power again.

2. Remove the software packages.

   a. Select Start > Settings > Control Panel > Add or Remove Programs.
      The Add or Remove Programs dialog appears.
   b. Select storage management software from the list of programs.
   c. Click Change/Remove.
      The Uninstall window appears.
   d. Click Next.
   e. Make sure that the Complete Uninstall option is selected.
f. Click **Next**.
   The software uninstallation process begins. The status dialog appears during the uninstallation process. When the procedure has completed, the Uninstall Complete window appears.

g. Make sure that **Yes** is selected so that your computer will restart.
h. Click **Done**.

3. Is the Windows boot device on a storage array?

   **Attention: Possible data corruption** – If the Windows host uses any volumes on the storage array (boot device or otherwise), there is a risk of data corruption if RDAC is removed and there are multiple paths to the storage array.

   • **Yes** – Go to step 4 on page 39.
   • **No** – You have completed the procedure.

4. Shut down the host system.

   **Attention: Possible data corruption** – Because RDAC is removed, only a single path to the storage array is expected. The path goes to the controller that owns the boot volume. If the host is permitted to start without RDAC and still has dual paths to the storage array, the data might become unusable.

5. Start the host system.

**Upgrade instructions for the AIX OS**

Use the procedures in this chapter to upgrade the storage management software on the AIX operating system.

**System requirements for AIX and VIOS**

Review these specifications to make sure that your system meets the minimum installation requirements.

<table>
<thead>
<tr>
<th>Operating system version for I/O attached hosts</th>
<th>AIX 7.1 TL3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AIX 6.1 TL9</td>
</tr>
<tr>
<td></td>
<td>VIOS 2.2.3.x</td>
</tr>
<tr>
<td></td>
<td>VIOS 2.2.2.x</td>
</tr>
</tbody>
</table>

| Processor support | IBM POWER™ 5 and newer |
| Controller-drive trays | E2600  
| E2700  
| E5400  
| EF540  
| E5500  
| EF550  
| E5600  
| EF560 |
| Host adapters | 8 Gb/s  
| 5273-P  
| 5735-P  
| EN0Y  
| 5729-P  
| 16 Gb/s  
| EN0A  
| EN0B |
| Configurations | Direct connect  
| Fabric |
| Rootboot supported? | Yes |
| I/O path failover and mode | Native: (MPIO/non-ALUA)  
| AIX 7.1 TL3  
| AIX 6.1 TL9  
| VIOS 2.2.3.x  
| VIOS 2.2.2.x |
| Node failover | Power HA (HACMP) |
| Providers | None |

Make sure that the maximum kernel parameters are configured depending on the requirements as shown in the following table.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>max_thread_proc</td>
<td>Maximum threads per process</td>
<td>1024</td>
</tr>
<tr>
<td>maxfiles</td>
<td>Soft file limit per process</td>
<td>2048</td>
</tr>
<tr>
<td>maxuser</td>
<td>Influences other parameters</td>
<td>256 or greater</td>
</tr>
<tr>
<td>ncallout</td>
<td>Number of pending timeouts</td>
<td>4144</td>
</tr>
</tbody>
</table>
Installing the storage management software on the AIX OS

About this task

Use this procedure to install the storage management software packages on the AIX OS. When you install the new software, earlier versions of the software are automatically removed as part of that process.

For this procedure, you must first obtain an installation file that is specific to your operating system and to the release level of the storage management software from the NetApp® support site at mysupport.netapp.com. In the following steps, the installation file is identified as SMIA-AIX-11.10.04nn.nnnn.bin. The characters nn.nnnn are, in practice, alpha-numeric characters: for example, SMIA-AIX-11.10.0400.0178.bin.

Steps

1. Make sure that you have root privileges, which are required to install the software.
2. Download or copy the installation file, SMIA-AIX-11.10.04nn.nnnn.bin to a directory on your host.
3. Change your current directory to the installation directory by typing cd <install> on the command line and then pressing Enter.
   
   <install> is the name of the directory on your server to which you downloaded the installation file.
4. At the command prompt, type sh SMIA-AIX-11.10.04nn.nnnn.bin, and then press Enter.
   
   After the software is loaded, the Introduction window appears.
5. Click Next.
   
   The License Agreement window appears.
6. Select the option that accepts the terms of the License Agreement.
7. Click Next.
   
   The Select Installation Type window appears.
8. Based on the type of installation that you are performing, select one of these options.

   The steps in this procedure describe a typical (full) installation.

   • **Typical (Full Installation)** – This selection, which is the default, installs all of the packages on the system. Choose this option if you do not know which installation type to select.

   • **Management Station** – This selection installs the software that is needed to configure, manage, and monitor a storage array. This option is for your workstation or management computer.

   • **Host** – This selection installs the storage array server software. Use this type of installation for the host (server) that is connected to the storage array.

   • **Custom** – This selection lets you customize the features to be installed.

   **Note:** The target directory for installing the SMclient utility must be the root directory of the host system. Do not try to force the installation program to install the SMclient utility in a different location.

   The installation type that you select is highlighted in blue text.
9. Click **Next**.

   The Pre-Installation Summary window appears.

10. Click **Install**.

   The Installing window appears while the software is loading. When the software is loaded, the Install Complete window appears.

   **Note:** If you cancel an installation before the installation completes or while the progress bar is still visible, the installation stops prematurely. The software creates an installation log. You must manually uninstall the software. If you cancel the installation before the progress bar is visible, you do not need to uninstall the software.

11. To exit the installation program, click **Done**.

   Several files and program packages are installed to the `/opt/SM9` directory and the `/opt/StorageManager` directory.

### Checking the installation on the AIX OS

**About this task**

After you have completed installing the software packages, check to make sure that the packages installed successfully.

**Steps**

1. At the prompt, type this command, and press **Enter**:

   ```bash
   swlist | grep SM*
   ```

   This command lists the storage management software packages that you installed.

2. At the prompt, type this command, and press **Enter**:

   ```bash
   swverify -v <package name>
   ```

   In this command, `<package name>` is the name of a package that you installed.

3. Note any failure reported.

4. For each package you installed, repeat step 2 on page 42 through step 3 on page 42.

5. Was the installation successful (no problems were reported)?
   
   • **Yes** – Go to step 6 on page 42.
   
   • **No** – From the `/opt/StorageManager` directory, review any error messages from the error message log, and correct the problem. If the problem persists, contact your technical support Representative.

6. For each system that is used as a storage management station or host, perform the software installation and removal procedures that are described in this chapter.

7. Start the storage management software. At the prompt, type this command, and press **Enter**:

   ```bash
   SMclient
   ```

   After the client software starts, the Enterprise Management Window and these dialogs appear:
Uninstalling storage management software on the AIX OS

About this task

If you have installed the storage management software, but you have determined that you need to uninstall it, perform this procedure.

Note: Uninstalling the software is not the same as removing previous versions of the software.

Steps

1. To change to the Uninstall directory, from the /opt/StorageManager directory, type this command, and press Enter:
   
   ```
   cd "Uninstall SANtricity"
   ```

2. From the Uninstall SANtricity directory, type this command, and press Enter:
   
   ```
   cd ./Uninstall_SANtricity
   ```

   The Uninstall window appears.

3. Click Next.

   The Uninstall Options window appears. You can choose either to perform a complete uninstallation or to select specific packages to uninstall individually.

4. Either select the packages that you want to uninstall, or select a complete uninstallation.

5. Click Next.

   While the software is uninstalling, the Uninstall window appears. When the procedure has completed, the Uninstall Complete window appears.

6. Click Done.

   The uninstallation process is complete.

Upgrade instructions for asymmetric logical unit access (ALUA) with the VMware OS

Use the procedures in this chapter to configure VMware to support ALUA/TPGS. Starting with storage management software version 10.83 and controller firmware version 7.83, any storage array with the ALUA/TPGS feature enabled is managed by the VMW_SATP_ALUA plug-in on VMware.

To use a host running VMware as a management station, you must install SANtricity on one of the guest OSs running over VMware. Use the procedures in the guide for the supported guest OS to upgrade SANtricity on such a management station.
# System requirements for VMware

Systems running VMware are supported only as I/O attached hosts. You must run SANtricity Storage Manager on a management station with a supported OS or on a guest OS running with VMware. For a management station running a guest OS on VMware, you must use out-of-band management.

<table>
<thead>
<tr>
<th>Operating system version for I/O attached hosts</th>
<th>VMware</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• ESXi 5.5 U1</td>
</tr>
<tr>
<td></td>
<td>• ESXi 5.1 U2</td>
</tr>
<tr>
<td></td>
<td>• ESXi 5.0 U3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Processor support</th>
<th>Intel Xeon 64 bit, AMD Opteron 64 bit</th>
</tr>
</thead>
</table>

<table>
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<tr>
<th>Guest OSs</th>
<th>VMware provides the list of supported Guest OSs. NetApp will test a sampling of the supported OS's but will not limit support to those OSs only. Refer to VMware's list of Guest OSs for official support.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Controller-drive trays</th>
<th>• E2600</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• E2700</td>
</tr>
<tr>
<td></td>
<td>• E5400</td>
</tr>
<tr>
<td></td>
<td>• EF540</td>
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<tr>
<td></td>
<td>• E5500</td>
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<tr>
<td></td>
<td>• EF550</td>
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<tr>
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<td>• E5600</td>
</tr>
<tr>
<td></td>
<td>• EF560</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Fibre Channel host adapters</th>
<th>Emulex</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• 8 Gb/s: LPE12000, LPE12002, LPE12004</td>
</tr>
<tr>
<td></td>
<td>• 16 Gb/s: LPE16000, LPE16002</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Qlogic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• 8 Gb/s: QLE2560, QLE2562, QLE2564</td>
</tr>
<tr>
<td></td>
<td>• 16 Gb/s: QLE2670, QLE2672</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Brocade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• 8 Gb/s: 815, 825</td>
</tr>
<tr>
<td></td>
<td>• 16 Gb/s: 1860-1, 1860-2</td>
</tr>
</tbody>
</table>
SAS host adapters | LSI
---|---
| • 6 Gb/s: 9207-8e
| • 12 Gb/s: 9300-8e
Dell
| • 6 Gb/s: 7e
HP
| • 6 Gb/s: H221, H222

iSCSI host connections | You may use any NIC or CNA provided that you use a supported software initiator (SWI). Use of a hardware initiator (HWI) is not supported.

Rootboot supported? | Yes, where supported by the HBA (not with iSCSI host connections)

Local filesystems Supported | VMware provides the list of supported filesystems. NetApp will test a sampling of the supported filesystems but will not limit support to those filesystems only. Please refer to VMware's list of filesystems for official support.

I/O path failover mode | VMware Native failover (VMW SATP ALUA)
| • ESXi 5.5
| • ESXi 5.1
| • ESXi 5.0

Node failover | VMware HA

Providers | None

### Installing ALUA support for VMware versions eSXi5.0 u3, eSXi5.1 u2, eSXi5.5 u1, and subsequent versions

#### About this task
Starting with ESXi5.0 U1 and ESX4.1U3, VMware will automatically have the claim rules to select the VMW_SATP_ALUA plug-in to manage storage arrays that have the target port group support (TPGS) bit enabled. All arrays with TPGS bit disabled are still managed by the VMW_SATP_LSI plug-in.

#### Steps
1. Make sure that the host software on the management station is upgraded to version 11.20.
2. Upgrade the controllers in the storage array to controller firmware version 8.20 and the corresponding NVSRAM version.
3. From host management client, verify that the host OS type is set to VMWARE. Starting with storage management software version 10.84, the VMWARE host type will have the ALUA and TPGS bits enabled by default.
4. Use one of the following command sequences to verify that the TPGS/ALUA enabled devices are claimed by the VMW_SATP_ALUA plug-in.
• For ESX4.1, enter the `#esxcli nmp device list` command on the command line of the host. Check that the output shows `VMW_SATP_ALUA` as the value of `Storage Array Type` for every storage array whose host software level is 10.83 or higher. Storage arrays with lower level host software show `VMW_SATP_LSI` as the value of `Storage Array Type`.

• For ESXi5.0, enter the `#esxcli storage nmp device list` command on the command line of the host. Check that the output shows `VMW_SATP_ALUA` as the value of `Storage Array Type` for every storage array whose host software level is 10.83 or later. Storage arrays with lower level host software show `VMW_SATP_LSI` as the value of `Storage Array Type`. 
Upgrading or replacing all controller canisters in a controller-drive tray

About this task

Use these procedures to replace all of the controllers in a controller-drive tray. You typically use these procedures when you choose to upgrade all of the controllers to a different model or platform. You might also use these procedures in the following situations:

• When all controllers in a controller-drive tray encounter hardware failures and are no longer functional.

• To upgrade the dual inline memory modules (DIMMs) in your controller-drive tray by replacing both controllers with the same model of controllers, but with different DIMMs.

If you are upgrading the host interface cards (HICs) in your controller-drive tray by replacing both controllers with the same model of controllers, but with different HICs, refer to the applicable flyer for upgrade instructions:

• Replacing controller Canisters in the E5512 or the E5524 Controller-Drive tray to Upgrade Host Interface Cards

• Replacing controller Canisters in the E5560 Controller-Drive tray to Upgrade Host Interface Cards

• Replacing controller Canisters in the E5612 or the E5624 Controller-Drive tray to Upgrade Host Interface Cards

• Replacing controller Canisters in the E5660 Controller-Drive tray to Upgrade Host Interface Cards

If you are upgrading the HICs in your controller-drive tray to 56-Gb/sec InfiniBand (IB) HICs, you can use the following document to convert the protocol of the new HIC from iSCSI Extensions for Remote Direct Memory Access (iSER) to Secure Remote Password (SRP).

• Converting an InfiniBand HIC from iSER to SRP

These documents are available at: NetApp E-Series and EF-Series Systems Documentation Center

For duplex controller-drive trays, you replace both controllers. For simplex controller-drive trays, you replace the one controller. In both cases, you must power off the controller-drive tray. As a result, you cannot access data on the storage array until you successfully complete the replacement.

If your storage array participates in remote volume mirroring, only iSCSI or Fibre Channel connections are supported between the primary site and the remote site. If the HIC configuration in your new controllers does not include iSCSI or Fibre Channel connections, remote volume mirroring will not be supported.

If you order a new controller, it will normally be shipped without a battery installed. When possible, you should remove the battery from your old controller and then install that battery in the new controller. However, for some controller upgrades, the battery from the old controller is not compatible with the new controller. In those cases, you must order a battery along with your new controller, and have that battery available before you begin these tasks.

Some controller upgrades result in the Vendor ID in SCSI Inquiry Data changing from LSI to NETAPP. When the Vendor ID changes from LSI to NETAPP, additional steps are required on the Windows, VMware, and AIX operating systems to reclaim devices. Steps for these operating systems are included in this document.
If you are replacing the controllers to upgrade to a new model, keep in mind that your current storage array might have premium features installed that the new model cannot support. For example, E2700 controllers do not support the legacy Snapshot premium feature. If you replace E2600 controllers with E2700 controllers, and your storage array was using the legacy Snapshots feature, you must disable that feature and delete or convert all volumes (that is, snapshots, repositories) associated with that feature before you replace the controllers. You can convert legacy Snapshots to Snapshots.

Before you upgrade a controller-drive tray, you should disable any premium features used on your storage array that are not supported on the new controllers.

If you change your controllers from 5x00 models to 2x00 models, your new storage array configuration will support lower numbers of some objects (for example, volumes) in the storage management software than your old configuration. You must make sure that your old configuration does not exceed the object limits listed below before you replace the controller(s).

- Maximum number of volumes - 512
- Maximum number of partitions - 128
- Maximum number of snapshot volumes - 512
- Maximum number of member volumes per consistency group - 32
- Maximum number of consistency groups - 16
- Maximum number of views - 256
- Maximum number of legacy RVM mirrors - 16
- Maximum number of ARVM mirrors - 32
- Maximum number of ARVM mirrors per mirror group - 32
- Maximum total number or mirrors (Legacy RVM + ARVM) - 32
- Maximum number of volume copies - 511
- Maximum number of thin provisioned volumes - 512
- Maximum number of drive slots in the storage array (controller-drive tray + all attached drive trays) - 192

<table>
<thead>
<tr>
<th>From E2x00</th>
<th>To E2x00</th>
<th>To E5x00</th>
<th>To EF5x0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery</td>
<td>Reuse the old battery</td>
<td>Order a new battery</td>
<td>Upgrades are not supported</td>
</tr>
<tr>
<td>Vendor ID</td>
<td>Additional steps required</td>
<td>Additional steps are required when upgrading from E2600 to E5500 or E5600, or when upgrading from E2700 to E5400</td>
<td></td>
</tr>
<tr>
<td>Feature Support</td>
<td>Legacy snapshots are not supported on the E2700</td>
<td>Legacy snapshots are not supported on the E5500 or E5600</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legacy RVM is not supported on the E5500 or E5600 with iSCSI HICs</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data Assurance is not supported on the E5500 or E5600 with iSCSI HICs</td>
<td></td>
</tr>
</tbody>
</table>
| From E5x00 | To E2x00 | Battery - Order a new battery  
Vendor ID - Additional steps are required when upgrading from E5500 or E5600 to E2600, or when upgrading from E5400 to E2700  
Feature Support - Legacy snapshots are not supported on the E2700 | To E5x00 | Battery - Reuse the old battery  
Vendor ID - Additional steps required when upgrading from E5400 to E5500 or E5600  
Feature Support - No legacy snapshots for E5500 or E5600  
No legacy RVM or Data Assurance for E5400/E5500 with iSCSI HICs | To EF5x00 | Upgrades are not supported  
Battery - Reuse the old battery  
Vendor ID - Additional steps required when upgrading from EF540 to EF550 or EF560  
Feature Support - No Legacy Snapshots for EF550/EF560  
No Data Assurance for EF550/EF560 with iSCSI |

**Attention: Possible loss of data access** – Before you replace the controllers, make sure that any premium features that are installed and any configuration of objects in the storage management software can be supported with your new controllers. Failure to do this will result in an out-of-compliance condition or configuration errors. Contact technical support if you encounter configuration errors.

**Attention: Possible loss of data access** – Before you replace the controllers, upgrade your storage array to the latest version of the operating system (controller firmware), if possible. Normally, you will upgrade the new controllers to the latest version of the operating system after you install them. If you are not able to upgrade the existing controllers to version 8.10.05 or later, then, after you install the replacement controllers, you must install an operating system version on them to match (same major version) what was installed on the old controllers. Contact technical support for assistance in making this determination.

**Attention: Possible loss of data access** – If any controller that you are replacing manages any secure volumes, the new controller needs the correct security key to manage those volumes. After you replace the controller and restore power to the controller-drive tray, you can use SANtricity Storage Manager to load the key from the file in which it was saved. Be sure that such a file exists and that you know the pass phrase required to install the security key before you replace the controller.

To complete this procedure, you will need antistatic protection and one or two new controller canisters. You might also need new controller batteries. If your new controller canisters do not have the same host interface cards as the controller canisters you are replacing, you might need new host bus adapters, cables and Small Form-factor Pluggable (SFP) transceivers to re-cable your host connections. If the new controller canisters support different drive cabling from the old controller canisters, you might also need different drive cables.
Cabling considerations for controller-drive tray hardware upgrades

Compare your current host cabling to the supported cabling for your new controllers to determine whether you can reuse SFPs, QSFPs or cables from your old cabling configuration. The HBAs, HCAs, or Ethernet adapters, as well as switches in the network fabric used to connect your hosts to your storage array must match the HICs in your controller canisters.

Supported cables for E5500, EF550, E5600, and EF560 controller-drive trays

<table>
<thead>
<tr>
<th>HIC</th>
<th>Cable</th>
<th>Number of Connectors</th>
<th>Connector</th>
<th>Type</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 Gb/s SAS</td>
<td>MiniSAS-HD</td>
<td>4</td>
<td>passive copper</td>
<td>1-5m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MiniSAS-HD</td>
<td></td>
<td>active copper</td>
<td>8-15m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MiniSAS-HD</td>
<td></td>
<td>optical</td>
<td>5-100m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fan-out cable type #2</td>
<td></td>
<td>passive copper</td>
<td>2m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fan-out cable type #3</td>
<td></td>
<td>passive copper</td>
<td>2m</td>
<td></td>
</tr>
<tr>
<td>6 Gb/s SAS</td>
<td>MiniSAS-HD</td>
<td>4</td>
<td>passive copper</td>
<td>1-10m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MiniSAS-HD</td>
<td></td>
<td>active copper</td>
<td>5-20m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fan-out cable type #1</td>
<td></td>
<td>passive copper</td>
<td>2m</td>
<td></td>
</tr>
<tr>
<td>56 Gb/s InfiniBand</td>
<td>QSFP+</td>
<td>2</td>
<td>passive copper</td>
<td>1-3m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>QSFP+</td>
<td></td>
<td>optical</td>
<td>5-100m</td>
<td></td>
</tr>
<tr>
<td>40 Gb/s InfiniBand</td>
<td>QSFP+</td>
<td>2</td>
<td>passive copper</td>
<td>1-5m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>QSFP+</td>
<td></td>
<td>optical</td>
<td>10-300m</td>
<td></td>
</tr>
<tr>
<td>16 Gb/s Fibre Channel</td>
<td>SFP+</td>
<td>4</td>
<td>OM2 SW optical</td>
<td>2, 3, 5, 10, 25m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SFP+</td>
<td></td>
<td>OM3 SW optical</td>
<td>50-150m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SFP+</td>
<td></td>
<td>OS2 LW optical</td>
<td>50-300m</td>
<td></td>
</tr>
<tr>
<td>10 Gb/s iSCSI</td>
<td>SFP+</td>
<td>4</td>
<td>OM2 optical</td>
<td>2, 3, 5, 10, 25m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SFP+</td>
<td></td>
<td>OM3 optical</td>
<td>50-150m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Twin-Ax</td>
<td></td>
<td>passive copper</td>
<td>2-7m</td>
<td></td>
</tr>
<tr>
<td>1 Gb/s iSCSI</td>
<td>RJ-45</td>
<td>4</td>
<td>passive copper</td>
<td>2-70m</td>
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</tbody>
</table>
### Supported cables for E2700 controller-drive trays

<table>
<thead>
<tr>
<th>HIC</th>
<th>Cable</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data Rate and Protocol</strong></td>
<td><strong>Number of Connectors</strong></td>
</tr>
<tr>
<td>12 Gb/s SAS</td>
<td>4</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>4</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>16 Gb/s Fibre Channel</td>
<td>4</td>
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<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Gb/s iSCSI</td>
<td>4</td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Gb/s iSCSI</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

### Preparing to replace the controllers

**Steps**

1. Make sure that the existing storage array is updated to the latest released operating system (controller firmware) version.
Note: If you are not able to upgrade the existing storage array to the latest version, keep a record of the current version. You will need to make sure that the operating system version on the new controllers you install matches the version that you are replacing.

2. If an FDE security key exists on the storage array, save the FDE security key to a location not on the storage array.

3. Perform the following steps to record the serial number for your storage array:
   a. In the EMW tree view, double-click your storage array.
      The AMW opens.
   b. In the Summary tab of the AMW, click the View Storage Array Profile link.
   c. Make a record of the value for Chassis Serial Number.
      You need this serial number to perform the steps in "Powering on the storage array."

4. Gather support data about your storage array by using one of these methods:
   • Use the storage management software to collect and save a support bundle of your storage array. From the Array Management Window toolbar, select Monitor > Health > Collect Support Data Manually. Then name and specify a location on your system where you want to store the support bundle.
   • Use the command line interface (CLI) to run the save storageArray supportData command to gather comprehensive support data about the storage array. For more information about this command, refer to the current version of the Command Line Interface and Script Commands Programming Guide.
      Note: Gathering support data can temporarily impact performance on your storage array.

5. Stop all I/O operations between the storage array and all connected hosts.
   Attention: Possible data loss – If you continue with the steps to replace a controller while I/O operations are occurring between the storage array and attached hosts, you might lose data.

6. If the storage array participates in remote volume mirroring, stop all I/O operations on the secondary storage array.

7. On each host that is connected to the storage array, unmount all file systems associated with volumes on the storage array.

8. Wait for five minutes.

9. In the Hardware tab of the AMW, select the graphic representation of the storage array, and then select Monitor > Reports > Operations in Progress to make sure that there are no background operations in progress.
   The Operations in Progress window shows the time remaining for any operations. Wait for those operations to complete before you continue with the next step.

10. Turn off power to the controller-drive tray.

11. Wait for all of the LEDs on the controller-drive tray to go dark.

12. Turn off power to each drive tray that is connected to the controller-drive tray.

13. Wait for two minutes for all of the drives to spin down.

Related tasks
   Powering on the storage array on page 59
Removing controller canisters from a controller-drive tray

About this task

**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:** Potential degraded performance – To prevent degraded performance, do not twist, fold, pinch, or step on the cables. Many cables have a minimum bending radius. Check the specifications for your cables, and do not bend any cable tighter than the minimum specified radius.

2. Label each cable that is attached to the old controller canister. Depending on the HIC configuration, you might be able to reconnect some cables after you replace the controller canister.

3. Disconnect all of the interface and Ethernet cables from the old controller canister.

   If fiber-optic cables are present, you can use the two release levers to partially remove the controller canister. Opening these release levers makes it easier to press down the fiber-optic cable release tab.

4. If the old controller canister contains a Fibre Channel HIC or an InfiniBand HIC, remove the small form-factor pluggable (SFP+) transceivers (for Fibre Channel) or quad SFP (QSFP+) transceivers (for InfiniBand) from the HIC, and save them for possible reuse.

5. Remove controller A.

   a. Unlock and rotate the release handles out to release the controller canister.

   b. Using the release handles and your hands, pull the controller canister out of the controller-drive tray.

The following figures show the release handles for the E2612 and E2624 controller-drive trays and the E2660 controller-drive tray. The other controller-drive trays have a similar configuration for the release handles.

**Removing a controller canister from the E2612 or the E2624 controller-drive tray**
1. Release Handles
2. Controller Canisters

Removing a controller canister from the E2712 or the E2724 controller-drive tray
Removing a controller canister from the E2660 controller-drive tray

1. Release Handles
2. Controller Canisters

Removing a controller canister from the E2760 controller-drive tray
1. Release Handles

2. Controller Canisters

Removing a controller canister from the E5400, EF540, E5500, or EF550 controller-drive tray
Removing a controller canister from the E5460 or E5560 controller-drive tray

1. Release Handles
2. Controller Canisters

6. Set the old controller canister on a flat, static-free surface near the controller-drive tray with the release levers up. Position the controller canister so that you can access the top cover.

7. Choose one of the following options:
   - If you will reuse the battery from the old controller in the new controller, continue with step 8 on page 57.
   - If you will install a new battery in the new controller, go to step 11 on page 58.

8. Press down on both of the top cover latch buttons on the old controller canister, and slide the top cover to the rear of the canister.

9. Perform one of the following options, depending on your model of controller-drive tray, to release the old battery:
   - For the E2600 controller-drive tray or the E2700 controller-drive tray, unscrew the thumb screw that secures the battery to the controller canister.
   - For the E5400 controller-drive tray, the EF540 controller-drive tray, the E5500 controller-drive tray, the EF550 controller-drive tray, the E5600 controller-drive tray, or the EF560 controller-drive tray, release the tab that secures the battery to the controller canister.
10. Remove the battery by sliding it towards the rear of the old controller canister.
11. For a duplex controller-drive tray, repeat step 2 on page 53 through step 10 on page 58 for the second controller canister.

Installing new controller canisters in the controller-drive tray

About this task
Perform the following steps for each controller in the controller-drive tray.

Steps
1. Unpack a new controller canister.
   a. Set the new controller canister on a flat, static-free surface near the controller-drive tray with the top cover up.
   b. Save all of the packing materials so that you can, if necessary, ship the old controller canister.
2. Push down the two top cover latch buttons that secure the top cover to the new controller canister.
3. Remove the top cover by sliding it to the rear of the new controller canister.
4. Are you installing the battery in an E2600 controller-drive tray or an E2700 controller-drive tray?
   • Yes – For an E2600 controller-drive tray or an E2700 controller-drive tray, go to step 9 on page 58.
   • No – Continue with the next step.
5. Insert the battery (either the new battery that you ordered or the battery that you removed from the old controller canister) into the new controller canister. Slide the battery into the canister, making sure it stays below the rivets on the wall of the new canister.
6. Keeping the locking handle at a 45 degree angle, align the connectors at the bottom of the battery with the connectors on the canister.
7. Push the battery down until you hear it click, and move the locking handle up to secure the controller battery to the controller canister.
   Attention: To make sure that the controller battery is seated correctly in an E5400 controller-drive tray, an E5500 controller-drive tray, an E5600 controller-drive tray, an EF540 controller-drive tray, an EF550 controller-drive tray, or an EF560 controller-drive tray, you might need to slide it out and insert it again. You will know it is secure when you hear it click into place, and when the locking handle does not move out of its upright position when you wiggle it.
8. Go to step 11 on page 58.
9. Insert the battery circuit board (either the new battery circuit board that you ordered or the battery circuit board that you removed from the old controller canister) by sliding it towards the front of the new controller canister.
   Note: To ensure that the battery is seated correctly in an E2600 controller-drive tray or an E2700 controller-drive tray, you might need to back it out of the connector to make sure that it is correctly aligned with the thumbscrew.
10. Tighten the thumbscrew to secure the battery circuit board in the new controller canister card.
11. Reinstall the top cover on the new controller canister by sliding it forward until the top latch covers click.
12. Slide the new controller canister all the way into the controller-drive tray. Rotate the release levers towards the center of the controller canister to lock it into place.

13. If your new controller canister has a Fibre Channel HIC or an InfiniBand HIC, install the SFP+ transceivers (Fibre Channel) or QSFP+ transceiver (InfiniBand) into the controller canister.

Depending on the HICs involved in your upgrade, you might be able to reuse SFP+ transceiver or QSFP+ transceivers that you removed from your old controller canister. See Cabling considerations for controller-drive tray hardware upgrades on page 50 for details about cabling requirements.

14. Reconnect all of the cables between the controller-drive tray and the drive trays.

   **Note:** If you are upgrading to E2700 controllers from an earlier model, the drive cabling configuration might be different from the configuration used for the old controllers.

   If the drive cabling configuration is the same as it was with your old controllers, use the labels that you attached to the cables to reconnect the cables correctly.

---

### Powering on the storage array

**About this task**

**Note:** If the controller upgrade involves a protocol change (for example, Fibre Channel to iSCSI), any hosts groups, hosts, and volume-to-LUN mappings defined in the host mappings tab remain intact. However, you must take steps to associate the new host ports with the hosts. If the controller upgrade does not involve a protocol change, all host port mappings will remain intact and no additional steps are required.

**Steps**

1. Turn on the Power switch on the rear of each drive tray that is connected to the controller-drive tray.

2. Wait two minutes for the drives to spin up.

3. Turn on the Power switch on the rear of the controller-drive tray.

4. Wait three minutes for the power-up process to complete.

5. If you saved a security key in Preparing to Replace the Controllers on page 51, perform the following steps on each controller to import that security key.

   a. If there is a mix of secured and unsecured drives in the storage array, create a new FDE security key.

      Unsecured drives are unassigned drives, GHS drives, or drives which are part of a volume group or a disk pool that is not secured by FDE. Secured drives are assigned drives which are a part of an FDE secured volume group or Disk Pool.

   b. Import the FDE security key that you saved in Preparing to Replace the Controllers on page 51.

   c. If there were only secured drives (no unsecured drives) in the storage array, the controller(s) will automatically reboot to complete the import operation. Wait for all controllers to boot up. When a controller finishes booting, its icon will appear in the Enterprise Management Window (EMW).

6. Execute this step if there is a mix of secured and unsecured drives in the storage array:

   a. Run the `set allDrives nativeState` SMcli command.
b. Reset all controllers using SANtricity Storage Manager.

c. Wait for all controllers to boot up. When a controller has finished booting, it appears in the EMW.

7. Look at the LEDs on controller A to make sure that it is booting correctly.

The Host Link Service Action Required LEDs turn green during the reboot. The seven-segment display shows the sequence OS+ Sd+ blank- to indicate that the controller is performing Start-of-day (SOD) processing. After the controller successfully completes rebooting, the seven-segment display shows the tray ID matching the seven-segment display on the second controller. You can then discover the new controller canister by using the storage management software.

**Controller LEDs and seven segment display on the E5500, EF550, E5600 and EF560 controller-drive trays**

![Diagram of E5500, EF550, E5600 and EF560 controllers](image1.png)

1. Controller Service Action Allowed LED (Blue)
2. Controller Service Action Required LED (Amber)
3. Seven-Segment Display
4. Host Link 1 Service Action Required LED (Amber)
5. Host Link 2 Service Action Required LED (Amber)
6. Host Link 3 Service Action Required LED (Amber)
7. Host Link 4 Service Action Required LED (Amber)

**Controller LEDs and seven segment display on the E5400 controller-drive tray**

![Diagram of E5400 controller](image2.png)

1. Controller Service Action Allowed LED (Blue)
2. Controller Service Action Required LED (Amber)
3. Seven-Segment Display
4. Host Link 1 Service Action Required LED (Amber)
5. Host Link 2 Service Action Required LED (Amber)
6. Host Link 3 Service Action Required LED (Amber)
7. Host Link 4 Service Action Required LED (Amber)

**Controller LEDs on the E2600 controller-drive tray**

1. Host Link 1 Service Action Required LED (Amber)
2. Host Link 2 Service Action Required LED (Amber)
3. Battery Service Action Required LED
4. Controller Service Action Allowed LED (Amber)
5. Controller Service Action Required LED (Amber)

**Controller LEDs and seven segment display on the E2700 controller-drive trays**

1. Controller Service Action Allowed LED (Blue)
2. Controller Service Action Required LED (Amber)
3. Seven-Segment Display

8. Perform these steps if any of the controller-drive tray’s Service Action Required LEDs are on, or if the Controller Service Action Required LED is on:
a. Check that the controller canister has been installed correctly and that all of the cables are correctly seated. Reinstall the controller canister, if necessary.

b. Check the controller-drive tray’s Service Action Required LEDs and the Controller Service Action Required LED again. If the problem is not corrected, contact technical support.

9. For a duplex configuration, repeat step 7 on page 60 through step 8 on page 61 for controller B.

10. Using the LEDs and the storage management software, check the status of all of the trays in the storage array.

11. 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 the problem is not resolved, contact technical support.
   - **No** – Go to step 12 on page 62.

12. Remove the antistatic protection.

13. Perform the appropriate action from the following choices to make sure that your new controllers are running with the correct operating system (controller firmware) level.
   - If you were not able to upgrade the original controllers to the most recent operating system version, make sure that the version running on the new controllers matches the version that ran on the original controllers. If necessary, install the appropriate version on the new controllers.
   - If you were able to upgrade the original controllers to the most recent operating system version, make sure that the latest version is also running on the new controllers. If necessary, install the latest version on the new controllers.

14. If your controller upgrade involves a protocol change (for example, Fibre Channel to iSCSI), and you already have hosts defined for your storage array, perform the following steps to associate the new host ports with your hosts:
   a. In the Array Management Window, select the **Host Mappings** tab.
   b. From the **Storage Array** tree on the left of the window, select the host to associate with a port.
   c. From the Array Management Window toolbar, select **Host Mappings > Manage Host Port Identifiers**.
   d. To update the host port identifier information associated with each host, replace the host port IDs from the old host adapters with the new host port IDs for the new host adapter.
   e. Repeat step d for each host.

15. Gather support data about your updated storage array by using one of these methods:
   - Use the storage management software to collect and save a support bundle of your storage array. From the Array Management Window toolbar, select **Monitor > Health > Collect Support Data Manually**. Then name and specify a location on your system where you want to store the support bundle.
   - Use the CLI to run the `save storageArray supportData` command to gather comprehensive support data about the storage array.

For more information about the CLI command, refer to the current version of the *Command Line Interface and Script Commands Programming Guide.*

**Note:** Gathering support data can temporarily impact performance on your storage array.
16. Perform the following steps to open a non-technical case with NetApp Technical Support. This action alerts NetApp Technical Support to the changes that you made to the configuration of your storage array.

   a. Get the serial number of the controller-drive tray that you recorded in *Preparing to replace the controllers* on page 51.

   b. Go to the NetApp support site at mysupport.netapp.com/eservice/assistant.

   c. If the Login page appears, enter your username and password, and select Login.

   The Give Us Feedback page opens.

   d. Select Product Registration from the drop-down list under Category 1.

   e. Enter the following text in the Comments text box, substituting the serial number of your controller-drive tray for serial number:

   Please create alert against Serial Number: serial number. The alert name should be “E-Series Upgrade”. The alert text should read as follows:

   “Attention: The controllers in this system have been upgraded from the original configuration. Verify the controller configuration before ordering replacement controllers and notify dispatch that the system has been upgraded.”

   f. Click the Submit button at the bottom of the form.

Remounting volumes after changing the vendor from LSI to NETAPP

About this task

If your controller upgrade results in changing the vendor ID from LSI to NETAPP, you must take steps on each Windows, VMware or AIX host that uses volumes from the updated storage array. Refer to the task for the corresponding operating system on each host.

Remounting volumes on a Windows host

Steps

1. In the Device Manager, select Show Hidden Devices.

2. For each NETAPP SCSI Disk Device listed in the Device Manager, right-click on the entry and select Uninstall.

   If Windows displays a dialog with a message indicating that you should reboot the host, finish uninstalling all of the volumes before you scan for hardware and reboot.

3. Right-click in the Device Manager and select Scan for Hardware Changes.

4. Reboot the host.
Steps for AIX hosts

About this task

After you replace the controllers, you might observer that host shows the new volumes on the storage array, but also shows the original volumes as failed. If failed volumes appear, perform the following steps.

Step

1. From the command line, run the `cfgmgr` command.

Remounting volumes on a VMware host

About this task

After you replace the controllers, you might observe the following conditions:

- VMware shows new paths for the volumes on the storage array, but also shows the original paths as dead paths.
- The hosts still list the volumes on the storage array as having LSI vendor IDs. This might occur when the volumes were claimed by the LSI rule at the start and so continue to use the same LSI rule when the volumes come back on line.
- The Display Name does not reflect the change from LSI to NetApp. This might occur because the display name became free test after initial discovery. In this case, you can change the Display Name manually.

If dead paths appear, perform the following steps.

Steps

1. Perform a rescan on the each host.
2. Halt all host I/O operations to this subsystem.
3. To reclaim the volumes under NetApp rule, perform the following steps.
   a. From the command line, run the `esxcli storage core device list` command. Check the output from the command to identify volumes whose names have the form `naa.xxxx`.
   b. From the command line, run the command `do esxcli storage core claiming reclaim -d naa.xxxxx` to change the LSI vendor ID to NetApp.
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