



**E2700 and E5600**

# **Software and Firmware Upgrade Guide**

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## Preparing to upgrade your software or firmware

The following table shows the supported upgrade paths for controller-drive trays for SANtricity storage management software version 11.40 and controller firmware (CFW) version 8.40.

Controller-drive tray	Supported upgrade paths for SANtricity Storage Manager	Supported upgrade paths for Controller Firmware
E2712, E2724, E2760	11.10 to 11.40 11.20 to 11.40 11.25 to 11.40 11.30 to 11.40	8.10.xx.xx to 8.40.xx.xx 8.20.xx.xx to 8.40.xx.xx 8.25.xx.xx to 8.40.xx.xx 8.30.xx.xx to 8.40.xx.xx
E5612, E5624, E5660, EF560	11.20 to 11.40 11.25 to 11.40 11.30 to 11.40	8.20.xx.xx to 8.40.xx.xx 8.25.xx.xx to 8.40.xx.xx 8.30.xx.xx to 8.40.xx.xx

**Note:** To make sure that your failover driver is compatible with the new hardware, firmware, and software, see the Power Guide for your operating system (for example, *SANtricity 11.40 Installing and Configuring for Windows Power Guide for Advanced Users*). For the Red Hat Enterprise Linux and SUSE Linux Enterprise Server 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. See the Power Guide for your operating system for information about which host type to select.

**Note:** Solaris 10 MPXIO for I/O path failover is supported only in TPGS/ALUA mode. Non-TPGS mode is no longer supported.

**Note:** CFW release 8.20.xx.xx was the last release with support for SMprovider for Microsoft VSS/VDS. If you are upgrading from a storage array that uses SMprovider for Microsoft VSS/VDS, you will need to select a different SMprovider to manage your storage array.

## Upgrading the storage management software

Before you upgrade SANtricity Storage Manager, check which version of SANtricity Storage Manager is currently installed on your management station, and understand the upgrade path from that version to version 11.40. Decide which SANtricity Storage Manager options you need to install.

Systems running VMware, HP-UX, or Mac OSX 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.

**Note:** With Asynchronous Mirroring, the local storage array and remote storage array can run different versions of firmware. The minimum firmware version supported is 7.84.

### 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.

Software package	Description and usage
SMclient	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.
SMagent	The storage management software that is installed only on a host machine to enable in-band management <sup>1</sup> . You can also use this package to auto-configure host partitions and operating system (OS) type.
SMruntime	The OS-specific storage management software that installs the appropriate Java runtime environment (JRE), which allows Java files to be displayed.
MPIO DSM	The device specific module (DSM) for Microsoft MPIO.
SMutil	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.
SMinstaller	A package that manages the installation of SANtricity Storage Manager.

<sup>1</sup> 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 I/O path. The controllers also use the I/O connections to send event information back to the storage management station through the host.

Installation Option	Runtime	SMclient	SMutil	SMagent	Failover Driver <sup>1</sup>
Typical (Full Installation)	X	X	X	X	Depends on the operating system
Management Station <sup>2</sup>	X	X			
Host	X		X	X	Depends on the operating system

Installation Option	Runtime	SMclient	SMutil	SMagent	Failover Driver <sup>1</sup>
Custom	X	Optional	Optional	Optional	Optional

<sup>1</sup> If you select the **Typical** or **Host Installation** options, a failover driver provided by NetApp might be installed, depending on your operating system. The MPIO DSM driver is included with the Windows version of SMInstaller.

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

## Checking the current version of the storage management software

You can check the version of your storage management software from either the graphical user interface (GUI) or the command line.

### Step

1. Check the version of your storage management software.

In the following table, the `<package name>` placeholder in the commands refers to the name of the software package (SMclient, SMruntime, SMutil, etc.) that is installed.

Option	Description
From SANtricity Storage Manager	Select <b>EMW &gt; Help &gt; About</b> .
From the command line in the AIX operating system	Type the command <code>lspp -L &lt;package name &gt;</code> , and press <b>Enter</b> .
From the command line in the Linux operating system	Type the command <code>rpm -qi &lt;package name&gt;</code> , and press <b>Enter</b> .
From the command line in the Solaris operating system	Type the command <code>pkginfo -l &lt;package name &gt;</code> , and press <b>Enter</b> .
In the Windows operating system	<ol style="list-style-type: none"> <li>a. Select <b>Start &gt; Run</b>.</li> <li>b. Type <code>regedit</code> , and press <b>Enter</b>.</li> <li>c. Select <b>HKEY_LOCAL_MACHINE &gt; SOFTWARE &gt; storage &gt; SMInstaller</b>.</li> </ol>

## Upgrading the storage management software

These steps are required for a successful upgrade to storage management software version 11.40 and controller firmware version 8.40.

### 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 11.40.  
See the NetApp Support Site at [NetApp Interoperability Matrix Tool](#) 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.

See the [NetApp Interoperability Matrix Tool](#) 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 multipath driver is compatible with the new hardware, firmware, and software.

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

**Note:** see the Power Guide for your operating system (for example, SANtricity 11.40 Installing and Configuring for Windows Power Guide for Advanced Users) for more information on compatibility. Additional steps might be required to install a multipath driver on some operating systems.

6. Install storage management software version 11.40 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 SANtricity operating system \(controller firmware\) and NVSRAM](#) on page 22.
9. Update the ESM firmware.  
See the steps in [Upgrading the ESM Firmware](#) on page 24.
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)**.
12. 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.

### Installing the storage management software on the Solaris OS

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

#### Before you begin

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

### About this task

When you install the new software, earlier versions of the software are automatically removed as part of that process. See the [NetApp Interoperability Matrix Tool](#) to make sure that your hardware, software and firmware are compatible with your planned upgrade.

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-SOLX86-11.40.00nn.nnnn.bin (for the Intel x86 platform) or SMIA-SOL-11.40.06nn.nnnn.bin (for the SPARC platform). The characters nn.nnnn are, in practice, alpha-numeric characters: for example, SMIA-SOLX86-11.40.0000.0178.bin.

### Steps

1. Download or copy the installation file, SMIA-SOLX86-11.40.00nn.nnnn.bin or SMIA-SOL-11.40.06nn.nnnn.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 11.40 and related software package for your Solaris platform.

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

In this command, `<installer>` is the name of the directory on your server to which you downloaded the installation file.

3. Change the file permissions for the installer using the `chmod 777 SMIA-SOL<installation package number>.bin` command.

This action allows you to run the installer.

4. Execute the installer using the `./SMIA-SOL<installation package number>.bin` command.

The following messages appear in the console window:

```
Preparing to install...
Extracting the JRE from the installer archive...
Unpacking the JRE...
Extracting the installation resources from the installer archive...
Configuring the installer for this system's environment...
Launching installer...
```

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, choose 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.

**9. Click *Next*.**

A Software Incompatibility Detected screen might 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.

**10. 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.

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

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

**12. 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 MPxIO for failover. After installing the host package, see to the *SANtricity Power Guide for Advanced Users* for Solaris to enable MPxIO on the host.

## Checking the installation on the Solaris OS

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

**Steps**

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

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

**2. 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.

**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 2 on page 9 through step 3 on page 9.**

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

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

## Uninstalling the storage management software on the Solaris OS

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

### About this task

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 Linux server operating systems. Desktop versions of Linux are supported for the SANtricity client only, with no I/O attachment.

## Installing the storage management software on the Linux OS

Use this procedure to install the storage management software packages for the Linux OS.

### Before you begin

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

### About this task

When you install the new software, earlier versions of the software are automatically removed as part of that process. See the [NetApp Interoperability Matrix Tool](#) to make sure that your hardware, software and firmware are compatible with your planned upgrade. As an alternative to this procedure, you can perform the software installation procedure by using a package manager that is compatible with Red Hat Package Manager (RPM) and that has a graphical user interface (GUI).

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 [NetApp Support](#). In the following steps, the installation file is identified as SMIA-LINUX64-11.40.0Bnn.nnnn.bin (for Linux on Intel x64 processors) or SMIA-LINUX-11.40.0Ann.nnnn.bin (for all other supported processors). The characters nn.nnnn are, in practice, alpha-numeric characters: for example, SMIA-LINUX-11.40.0400.0178.bin.

### Steps

1. Download or copy the installation file, SMIA-LINUX64-11.40.0Ann.nnnn.bin or SMIA-LINUX-11.40.0Bnn.nnnn.bin, to a directory on your host.
2. Change your current directory to the installation directory by typing `cd <installer>` on the command line and then pressing **Enter**.  
In this command, `<installer>` is the name of the directory on your server to which you downloaded the installation file.
3. Give the installer execute permissions.
4. At the command prompt, type `./SMIA-LINUX64-11.40.0Ann.nnnn.bin` or `SMIA-LINUX-11.40.0Bnn.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**

10. If the **Multi-Path Driver Warning** dialog appears, click **Next** again to continue.

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.

## Checking the installation on the Linux OS

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**.

```
rpm -qi <package name>
```

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

3. Note any problem that is reported.

4. For each package you installed, repeat Step 2 on page 12 through Step 3 on page 12.

5. Determine whether the installation successful (no problems were reported).

- If the installation is successful, go to Step 3 on page 12.
- If the installation is not successful, from the SANtricity Storage Manager installation directory, review any error messages from the error message logs. The path to the installation directory varies depending on the version that you installed. The log files are identified by a `.log` file extension. Correct any problems listed in the logs files. If the problem persists, contact technical support.

6. Start the storage management software:

```
SMclient
```

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

- Select Addition Method
- Enterprise Management Window Task Assistant

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

## Uninstalling the storage management software on the Linux OS

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

### About this task

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. If the **Multi-Path Driver Warning** dialog appears, click **Next** to continue.

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. If the **Multi-Path Driver Warning** dialog appears, click **Next** again to continue.
7. Click **Done**.

The uninstallation process is complete.

8. 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.

## Installing the storage management software on the Windows OS

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

### Before you begin

See the [NetApp Interoperability Matrix Tool](#) to make sure that your hardware, software and firmware are compatible with your planned upgrade.

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

- If you are installing the Windows boot device on a storage array, see the boot device installation procedures in [SANtricity 11.40 Installing and Configuring for Windows Power Guide for Advanced Users](#). 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.

Before you install this software, close all other programs.

### About this task

**Attention: Possible data corruption** – If a host without a valid installation of a path failover product (such as Windows MPIO) is allowed to access data on the storage array, and has dual paths to the storage array, the data might become unusable.

### Steps

1. Download or copy the installation file, `SMIA-WinX64-11.40.0300.nnnn.exe` (for Intel x64 processors) or `SMIA-WS32-11.40.0300.nnnn.exe` (for Intel x32 processors), to a directory on your host.
2. 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.
3. Click **Next**.  
The License Agreement window appears.
4. Select the option that accepts the terms of the License Agreement.
5. Click **Next**.  
The Choose Install Folder window appears, which identifies the default installation location.
6. Click **Next**.  
The Select Installation Type window appears.
7. 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.

**8. Click Next.**

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

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

The Automatically Start Monitor? window appears.

**10. 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.

**11. Click Next.**

The Pre-Installation Summary window appears.

**12. 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.

**13. Check whether the Security Alert dialog appeared.**

- **Yes** – Click **Yes**, and go to step [15](#) on page 15.
- **No** – Go to step [15](#) on page 15.

**Important:** When an I/O path failover driver is not installed, the Install Complete window might show 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 16. 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.

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

**15. 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

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. If the directory does not exist or is empty, 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

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

### About this task

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>Storage>SMInstaller` directory.

### Steps

1. Select **Start > Programs**.

The list of installed programs appears.

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

If the storage management software does not appear in the list, see 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**.

See 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 the Disk Pool Automatic Configuration wizard appear.

## Uninstalling the storage management software on the Windows OS

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

### About this task

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

### Steps

1. Select **Start > Settings > Control Panel > Add or Remove Programs**.

The Add or Remove Programs dialog appears.

2. Select the storage management software from the list of programs.

3. Click **Change/Remove**.

The Uninstall window appears.

4. Click **Next**.

5. Make sure that the **Complete Uninstall** option is selected.

6. 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.



7. Make sure that **Yes** is selected so that your computer will restart.
8. Click **Done**.

## 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

See the [NetApp Interoperability Matrix Tool](#) to make sure that your hardware, software and firmware are compatible with your planned upgrade. Make sure that the maximum kernel parameters are configured depending on the requirements as shown in the following table.

Parameter	Description	Configuration
max_thread_proc 64	Maximum threads per process	1024
maxfiles	Soft file limit per process	2048
maxuser	Influences other parameters	256 or greater
ncallout	Number of pending timeouts	4144

### Installing the storage management software on the AIX OS

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.

#### Before you begin

You must have 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 [mysupportnetapp.com](http://mysupportnetapp.com).

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

#### About this task

In the following steps, the installation file is identified as `SMIA-AIX-11.40.04nn.nnnn.bin`. The characters `nn.nnnn` are, in practice, alpha-numeric characters: for example, `SMIA-AIX-11.40.0400.0178.bin`.

#### Steps

1. Download or copy the installation file, `SMIA-AIX-11.40.0400.nnnn.bin` to a directory on your host.
2. Change your current directory to the installation directory by typing `cd <installer>` on the command line and then pressing **Enter**.

In this command, `<installer>` is the name of the directory on your server to which you downloaded the installation file.

3. At the command prompt, type `sh SMIA-AIX-11.40.0400.nnnn.bin`, and then press **Enter**.  
After the software is loaded, 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 Select Installation Type window appears.

7. 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.

8. Click **Next**.

The Pre-Installation Summary window appears.

9. 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.

10. 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

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**:

```
swlist | grep SM*
```

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

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

```
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 18 through step 3 on page 19.
5. Check whether the installation successful (no problems are reported).
  - If no problems are reported, go to step 6 on page 19.
  - If problems are reported, from the SANtricity Storage Manager installation directory, review any error messages from the error message logs. The path to the installation directory varies depending on the version that you installed. The log files are identified by a `.log` file extension. Correct any problems listed in the logs files. If the problem persists, contact technical support.
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**:

```
SMclient
```

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

- Select Addition Method
- Enterprise Management Window Task Assistant

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

## Uninstalling the storage management software on the AIX OS

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

### About this task

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.
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.

# Managing storage arrays attached to VMware, HP-UX or Mac OS

---

Use the procedures in this chapter to manage the storage management software on the VMware, HP-UX or Mac operating systems.

## 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. See the [NetApp Interoperability Matrix Tool](#) to make sure that your hardware, software and firmware are compatible with your planned upgrade.

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

Starting with ESXi5.0 U1 and ESX4.1U3, VMware automatically has 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.

### Before you begin

The host software on the management station must be upgraded to version 11.40.

### Steps

1. Upgrade the controllers in the storage array to controller firmware version 8.40 and the corresponding NVSRAM version.
2. 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.

3. 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 SANtricity operating system (controller firmware) and NVSRAM

---

Use this procedure to upgrade the SANtricity operating system and NVSRAM on your storage array.

## Before you begin

Obtain a copy of the installation files to upgrade SANtricity operating system and NVSRAM from the NetApp support site at [mysupport.netapp.com](http://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.

## About this task

**Note:** When you upgrade the SANtricity operating system, you have the option to change the reporting policy for thinly-provisioned volumes. If applications on your hosts use thinly-provisioned volumes, make sure that those applications will respond correctly to a change in the reporting status of a volume from thick to thin before you change the reporting policy. To make sure that the change in reporting policy is recognized by a host, you should reboot the host.

**Note:** For Asynchronous Mirroring, the local storage array and remote storage array can run different versions of firmware. The minimum firmware version supported is 7.84.

## 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. Check whether an **Event Log Error Verification** dialog appears.
7. If the dialog appears, select **Monitor > Reports > Log**, resolve any listed events, and then go to step 7 on page 22.
8. 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.

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

The recommended 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 23.
- If no, continue with step 10 on page 23.

10. 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.

11. Click **Transfer**.

The **Confirm Download** dialog appears.

12. In the **Confirm Download** dialog, click **Yes**.

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

13. In the **Downloading** dialog, when check marks appear beside all steps of the update process, click **Close**.

## Upgrading the ESM firmware

---

Use this procedure to upgrade the ESM firmware on your storage array.

### Before you begin

Obtain a copy of the installation files to upgrade ESM firmware from the NetApp support site at [mysupport.netapp.com](http://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.

### About this task

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 appear. 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 24.
- 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 Spare), 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 Spare), then its firmware may be updated by the Online method or the Parallel method. The parallel method also applies when a download is initiated through a scheduled support window.
- **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 for drive firmware downloads

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.
- You will be blocked from making any configuration changes to the storage array while the firmware is downloading.
- Firmware on RAID 0 volume group drives can only be updated using the Parallel method.

## Steps to upgrade the drive firmware

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* on any volumes that use the drives. You must stop all I/O activity on any volumes that use the drives you are upgrading 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, select one of the following options:
    - 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

Use the Download Drive Firmware - Progress dialog to monitor the progress of the drive firmware download.

### About this task

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 long 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 more than 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.

<b>Transfer Progress Status</b>	<b>Definition</b>
Pending	This status is shown for an online firmware download operation that has been scheduled but has not yet started.
In progress	The firmware is being transferred to the drive.
Reconstruction in progress	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.
Failed - partial	The firmware was only partially transferred to the drive before a problem prevented the rest of the file from being transferred.
Failed - invalid state	The firmware is not valid.
Failed - other	The firmware could not be downloaded, possibly because of a physical problem with the drive.
Not attempted	The firmware was not downloaded, which might 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.
Successful	The firmware was downloaded successfully.

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