



SAN Setup Overview for FCP 1.1

About this document

This document consists of the high-level steps to guide you through the entire setup of your Network Appliance™ storage system in your storage area network (SAN) using Fibre Channel Protocol (FCP) for SCSI. Documents containing detailed information about each step are listed in the table on page 14 and are available online at <http://now.netapp.com/NOW/knowledge/docs/docs.shtml>.

CAUTION: The documents that provide detailed installation procedures might instruct you to turn on the power to the storage appliance, disk shelves, Brocade Fibre Channel switches, or host. Do **not** turn on the power for any of these components until instructed to do so in this document.

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1 Understanding how products are configured and shipped

All Network Appliance storage appliances (such as filers) are shipped with Data ONTAP™ software preinstalled. NetApp® storage appliances purchased for SAN environments are shipped with target host bus adapters (HBAs) and one or more disk controllers preinstalled. Disk shelves are shipped with the disk storage preconfigured and preinstalled.

The following configurations are available:

- ◆ Direct-attached connection, with one storage appliance and one host
 - ◆ Fabric-attached connection, with one R100 series storage appliance and one or more hosts
 - ◆ Fabric-attached single-path connection, with one F800 series filer or FAS series server cluster, two Fibre Channel switches, and one or more hosts
- A single-path host has only one initiator HBA.
- ◆ Fabric-attached multipath connection, with one F800 series filer or FAS series server cluster, two Fibre Channel switches, and one or more hosts

A multipath host has two initiator HBAs and requires additional multipathing software, such as VERITAS® Volume Manager 3.2 for Solaris® with Dynamic Multipathing (DMP) or Microsoft's Multipath I/O for Windows®, available from Network Appliance.

The VERITAS configuration does not support data access on a LUN as an NFS file if it is part of a volume stored under VERITAS Volume Manager. Data on a LUN that has a VxFS file system on it is not accessible through NFS.

Data on LUNs that are not part of a VERITAS volume and do not have a VERITAS filesystem on them can still be accessed through NFS if the partition table conforms to the rules defined in the *Host Bus Adapter Installation and Setup Guide 1.1. for Fibre Channel Protocol on Solaris*.

For fabric-attached configurations:

- ◆ You can install a combination of single-path and multipath hosts.
- ◆ You must use two switches for the F800 series filers and FAS series servers, and they must be the same model.
- ◆ If you intend to use a LUN for NFS access, you must configure the LUN as a “raw” partition with the correct geometry for the host operating system, and the LUN must have the appropriate permissions. Also be aware that lock management is not available, so files being used under NFS cannot be written to under FCP.

Network Appliance recommends that you manage your storage appliances and (for fabric-attached configurations) switches from hosts using a TCP/IP network. You can also use the serial port on the storage appliances, switches, and hosts for setup and configuration tasks.

2 All configurations: Setting up the NetApp storage appliances

The storage appliance and disk shelves you purchased were delivered either in system cabinets or as individual components that you install in equipment racks and then cable appropriately.

NOTE: If you received your system components in a system cabinet, most of the cabling is complete. You have to cable the system only to the network, to sources of power, and to the host.

1. Check the latest information about supported configurations in the *SAN Configuration Guide* at <http://now.netapp.com>.
2. For field upgrades, check the latest information about slot priority in the *System Configuration Guide* at <http://now.netapp.com/NOW/knowledge/docs/hardware/NetApp/syscfg/>.
3. Check the *Site Requirements Guide* to verify compatibility with physical environmental requirements.
4. Install the disk shelves and the storage appliance:
 - ❖ If the storage appliances and disk shelves are shipped in system cabinets, make sure that the power to the storage appliances and disk shelves is turned off.
 - ❖ If the storage appliances and disk shelves are installed in an equipment rack, connect the disk shelves to the storage appliances.

CAUTION: Make sure that the loops are terminated. If there are any unused initiator HBA ports in the storage appliance, they must be terminated using the loop-back terminators.

5. Ground the storage appliances and the disk shelves installed in the equipment racks (storage appliances and disk shelves shipped in system cabinets are already grounded).
6. Connect the storage appliances and disk shelves or the system cabinets to a power source. Use separate power sources if possible.

If the storage appliance system is in a system cabinet, see the *System Cabinet Guide* if you need more information.

If the storage appliance system is in equipment racks, see the hardware guide for that appliance if you need more information.

CAUTION: DO NOT TURN ON POWER TO DISK SHELVES OR STORAGE APPLIANCES UNTIL DIRECTED TO DO SO.

7. Connect the storage appliances to the TCP/IP network to a host is connected that will serve as the administration host.

NOTE: For direct-attached configurations, go directly to section 4, **All Configurations: Turning on power to the storage appliance**.

3 Fabric-attached configurations: Setting up the Brocade Fibre Channel switches

The switches supplied by Network Appliance and shipped with NetApp storage appliances include preconfigured software. If you are using F800 series filers or FAS900 series servers, both switches must be the same model, and they must not be directly connected to each other. If you are using an R100 or R150 storage appliance, only one switch is required.

Installation in a system cabinet

If you purchased an R100 or R150 storage appliance, or clustered storage appliances, in a cabinet, the switches are preinstalled.

1. See the *System Cabinet Guide* to connect the system cabinet to power.

CAUTION: ENSURE THAT POWER IS NOT TURNED ON TO DISK SHELVES OR STORAGE APPLIANCES.

2. Turn on the power to the system cabinet.
3. Turn on the power to the switch.

If you are using 8-port switches, they will power on when you turn on the power to the system cabinet. Eight-port switches have a single power supply and no power switch.

If you are using 16-port switches, turn on the power to both power supplies for each switch.

If you are using 32-port switches, turn on the power to both power supplies for each switch.

CAUTION: DO NOT TURN ON POWER TO THE DISK SHELVES OR STORAGE APPLIANCES.

4. Go to step 5 on this page under **Configuration of network parameters**.

Installation in an equipment rack

If you are installing the switches in an equipment rack:

1. Install the rack mount for the switch.
See the Network Appliance *Installing the rack mount kit* flyer for details.
2. Install the switches in the equipment rack.
3. Connect the switches to separate power sources.

The 16-port and 32-port switches have redundant power supplies. Each power supply should be connected to a separate power source.

The 8-port switches have a single power supply and no power switch. They power on when they are connected to a power source. Each switch should be connected to a separate power source.

4. If you are using 16-port or 32-port switches, turn on the power to both supplies for each switch.

Configuration of network parameters

5. Configure the network parameters for each switch:
 - a. Connect a terminal to the serial port of each switch using the serial cable provided with the Brocade switch.
 - b. Enter the serial parameters 9600, 8, N, 1, and no flow control.
 - c. Log in using the default login **admin** and the default password **password**.
 - d. Run the `ipaddrSet` command to assign an unused IP address and complete the network setup.
For detailed instructions, see the Brocade switch hardware reference guide.

CAUTION: Do not connect the switches to the Ethernet network until the IP address is set correctly.

NOTE: The Brocade licenses provided by Network Appliance include Web tools, Fabric Watch, Quickloop, and Zoning.

CAUTION: If zones are required, you must include the world wide node name (WWNN) for each partner in the cluster in the same zones as the hosts. If you are using multipathing software, ensure that all Fibre Channel devices to which the host has access are in the same zone.

6. Connect the switches to the Ethernet network.
7. Manage the switches according to the instructions at <http://<switchIPaddress>>.

NOTE: For information about Brocade switches and configuration options, see the appropriate Brocade switch documentation at <http://now.netapp.com/NOW/knowledge/docs/brocade/relbroc30/>.

4 All configurations: Turning on power to the storage appliances and disk shelves

1. Check all Fibre Channel (FC) cables from the storage appliances to disk shelves to make sure they are properly seated.
2. On the disk shelves, turn both power switches on each shelf to ON. You can reduce spin-up time for all disks in the DS14 disk shelf by turning on the power switches of both power supplies within 5 seconds of each other.
3. On each storage appliance (clustered or non-clustered), turn both power switches to ON.

5 All configurations: Configuring the storage appliance

1. See the *Best Practices for Reliability–New System Installation* at <http://now.netapp.com> for guidelines about how to install and configure your storage appliance for optimum performance.

For information about the methods you can choose to configure the storage appliance, see the *Data ONTAP 6.4 Software Setup Guide*. For example, after the storage appliance completes system bootup, it automatically begins running the `setup` command. You can continue using that method to configure the storage appliance or select another method.

2. Configure the network parameters for each storage appliance:
 - a. Connect a terminal to the serial port (labeled “Console” on the back of the storage appliance) of each storage appliance using the provided serial cable.
 - b. Enter the network parameters according to the guidelines in the *Data ONTAP 6.4 Software Setup Guide* and the TCP/IP information, such as IP addresses, as provided to you by your system administrator.
3. If you are using clustered pairs of storage appliances
 - a. Ensure that the target HBAs are installed in the same slot of both filers. This enables the b ports on each of the HBAs to be in stand-by mode to handle partner traffic. When failover occurs, the b port in slot x of the takeover filer handles the traffic on slot x, port a of the down filer. For information on how to configure target HBAs, see Chapter 5 of the *Data ONTAP 6.4 Block Access Management Guide*.
 - b. Enter the cluster license code on both storage appliances in a cluster:
4. Verify that the license for Fibre Channel Protocol (FCP) for SCSI is installed by entering the following command:

```
fcps status
```

5. If the FCP license is not installed, enter the following command:

```
license add fcp_license_code
```

6. Enable the FCP service by entering the following command:

```
fcg start
```

7. License and enable optional protocols, if you purchased licenses for them.

See the *Data ONTAP 6.4 Block Access Management Guide* for details.

CAUTION: During the setup process, Data ONTAP creates a root volume (/vol/vol0) by default. Do not use this volume for creating LUNs.

8. Create at least one volume to be used for LUNs:

```
vol create volume_name disk_list options ...
```

9. If you want to use qtrees to organize LUNs, create qtrees to be used for LUNs:

```
qtree create /vol/volume_name/qtree_name
```

NOTE: LUNs must be created in the root of a volume or qtree (but not the root volume).

See the *Data ONTAP 6.4 Block Access Management Guide* for more information.

NOTE: For direct-attached configurations, go directly to section 7: All configurations: Installing the initiator HBA in the host.

6

Fabric-attached configurations: Connecting the storage appliances to the switches

Installation in a system cabinet

If your system is installed in a system cabinet, see the *System Cabinet Guide* for cabling information.

Installation in an equipment rack

If your system is installed in an equipment rack, see the following diagram to connect the optical cables from the storage appliances to the switches. Cables to active ports are shown in the diagram as solid lines; cables to passive ports are shown as dashed lines.

Installation of target HBAs for clustered storage appliances

Install target HBAs in identical slots of both storage appliances in a cluster. The b ports on each target HBA are in standby mode to handle partner traffic. For example, in the diagram on the next page, there are two filers, Filer A and Filer B. On takeover, port b of Slot M in Filer A handles the traffic of port a of Slot M in Filer B.

NOTE: For the latest information about slot priority, see the *System Configuration Guide* at <http://now.netapp.com>.

Connection from target HBAs to switches for clustered storage appliances

CAUTION: To prevent a timeout when a storage appliance fails and takeover occurs, ensure that

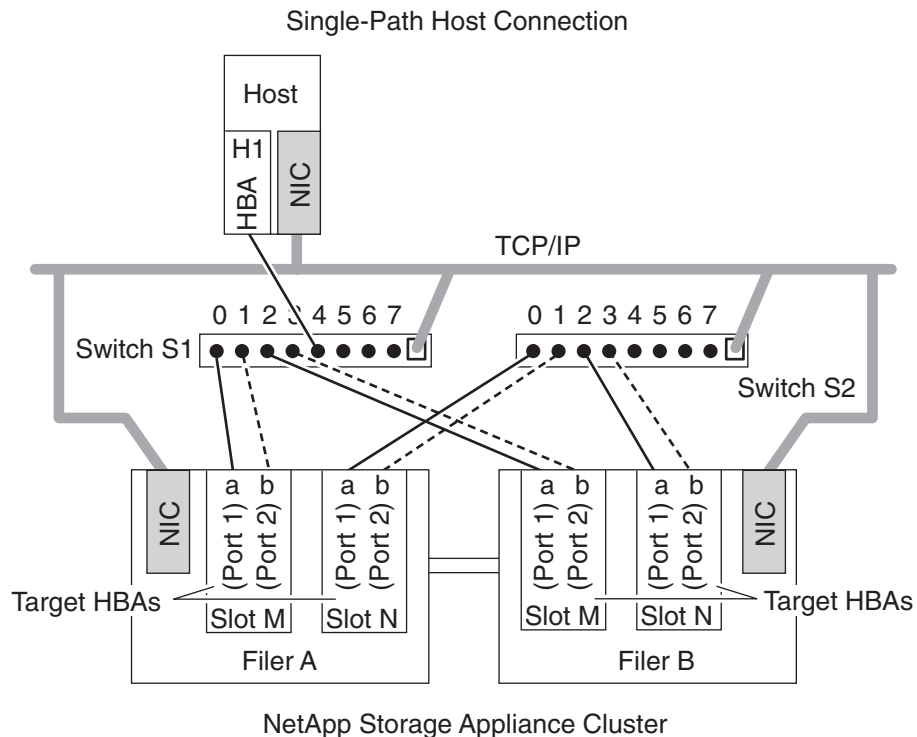
- ◆ Each target HBA in one storage appliance is connected to a different switch (see the diagram on the next page)
- ◆ Both ports of each target HBA are connected to the same switch (see the diagram on the next page)

Connect the first storage appliance (Filer A) to the switches

NOTE: Ports 0 through 3 on the switches should be used for the storage appliances. The remaining ports are available for the hosts.

1. Plug one end of a cable into Port 1 of the target HBA in Slot M of Filer A and plug the other end into port 0 of Switch 1 (S1) (see the following diagram).
Port 1 corresponds to the “a” port and is the active port, as indicated by the solid line.
2. Plug one end of a cable into Port 2 of the target HBA in Slot M of Filer A and plug the other end into port 1 of S1.
Port 2 corresponds to the “b” port and is a passive port and only becomes active in the event of a takeover.
3. Plug one end of a cable into Port 1 of the target HBA in Slot N of Filer A and plug the other end into port 0 of Switch 2 (S2).
4. Plug one end of a cable into Port 2 of the target HBA in Slot N of Filer A and plug the other end into port 1 of S2.
5. Verify that each target HBA is connected to a different switch.

CAUTION: To prevent the introduction of single points of failure, do not connect both target HBAs to the same switch.



Connect the second storage appliance (Filer B) to the switches

6. Plug one end of a cable into Port 1 of the target HBA in Slot M of Filer B and plug the other end into port 2 of S1.
7. Plug one end of a cable into Port 2 of the target HBA in Slot M of Filer B and plug the other end into port 3 of S1.
8. Plug one end of a cable into Port 1 of the target HBA in Slot N of Filer B and plug the other end into port 2 of S2.
9. Plug one end of a cable into Port 2 of the target HBA in Slot N of Filer B and plug the other end into port 3 of S2.
10. Verify that each target HBA is connected to a different switch.

7 All configurations: Installing the initiator HBA in the host

1. Install the FCP initiator HBA in your host.
See Chapter 1 and 2 in the *Host Bus Adapter Installation and Setup Guide for Fibre Channel Protocol* for the host that will be accessing the LUNs, for example, Windows or Solaris.
The initiator HBA does not need to be configured; it is shipped with the correct configuration.

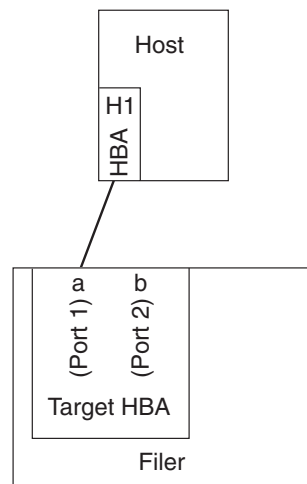
8 Connecting to the host

1. Connect the host to the switches or to the storage appliance, according to the type of configuration you have:
For direct-attached host connection to the storage appliance, see section 8a.
For single-path host connection to the fabric, see section 8b.
For multipath host connection to the fabric, see section 8c
2. Connect any host to serve as the administration host to the TCP/IP network to which the storage appliance is attached.

8a Direct-attached configurations: Connecting the host to the storage appliance

1. Plug one end of the optical cable into Port 1 of the target HBA of the storage appliance (filer). Port 1 corresponds to the “a” port and is the active port (see the following diagram).
CAUTION: In this configuration Port 2 is not used. A terminator must be attached to Port 2, which reduces reboot time by approximately thirty seconds.
2. Plug the other end of the cable into the port of the initiator HBA in the host.
3. Turn on the power to the host.

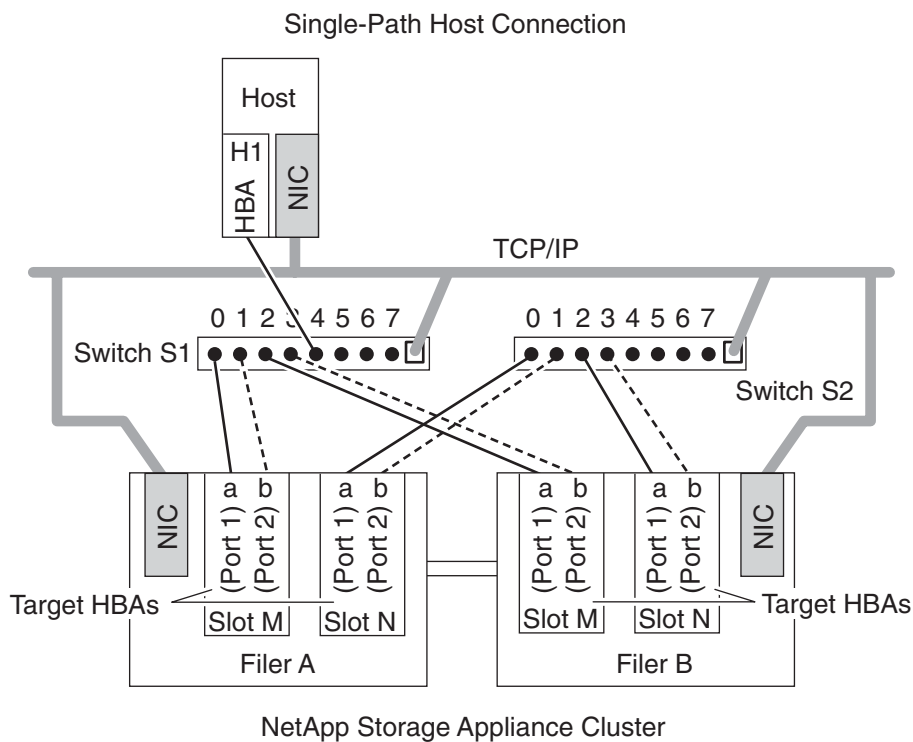
Direct-Attached Host Connection



8b Fabric-attached configurations: Connecting the host to the switches for single-path host connection

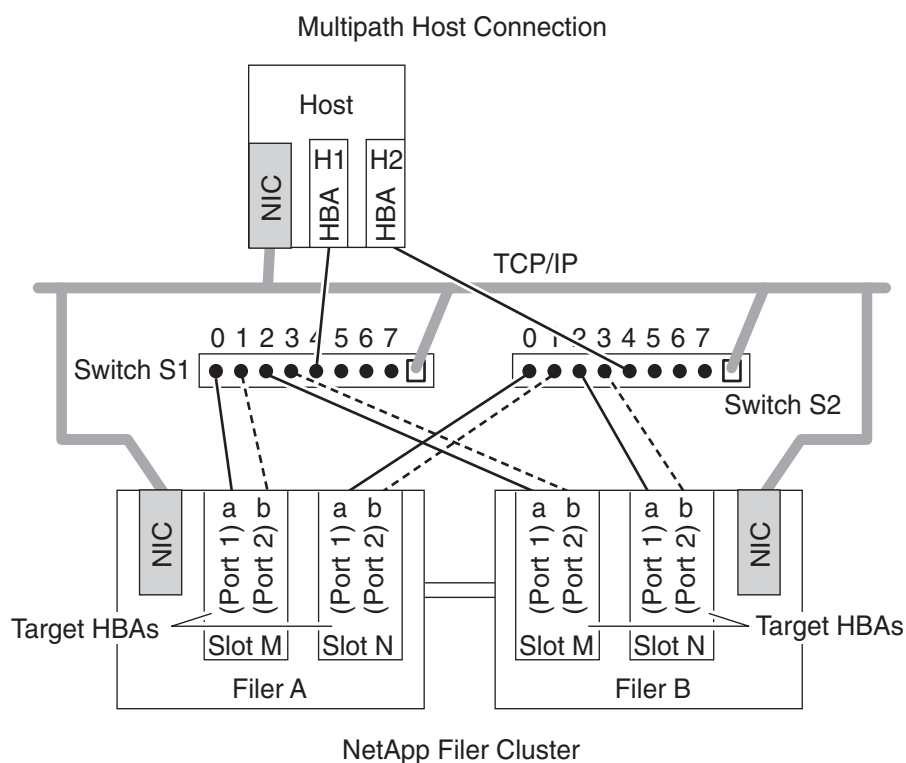
NOTE: Ports 0 through 3 on the switch should be used for the storage appliances. The remaining ports are available for the hosts.

1. Plug one end of an optical cable in the port of the initiator HBA you installed in your host (see the following diagram).
2. Plug the other end of the cable into one of the available ports in one of the switches. Network Appliance recommends that you use port 4 or higher for the first host.
3. Turn on the power to the hosts.
See the *Host Bus Adapter Installation and Setup Guide for Fibre Channel Protocol* for the host that will be accessing the LUNs, for example, Windows or Solaris.



8c Fabric-attached configurations: Connecting the host to the switches for multipath host connection

1. Plug one end of an optical cable into the port of the first initiator HBA (H1) you installed in your host (see the following diagram).
2. Plug the other end of the cable into the next available port in Switch S1. Network Appliance recommends that you use port 4 or higher.
3. Plug one end of the cable into the port of the second initiator HBA (H2) in your host.
4. Plug the other end of the cable into the next available port in Switch S2.
5. Turn on the power to the hosts.
6. See the instructions for the appropriate *Host Bus Adapter Installation and Setup Guide for Fibre Channel Protocol* for the host that will be accessing the LUNs, for example, Windows or Solaris.



9 All configurations: Installing the host HBA software package and configuring the host

For Solaris hosts

See the *Host Bus Adapter Installation and Setup Guide 1.1 for Fibre Channel Protocol on Solaris*.

1. See the *NetApp SAN Support Matrix* at <http://now.netapp.com> to verify that the host and operating system in question are supported and to identify the correct version of the software package and HBA firmware for use in Steps 3 and 5.
2. Patch your Solaris operating system to the minimum required level, which is outlined in the *NetApp SAN Support Matrix*.
3. In the CD-ROM in the media kit, locate the software package, or obtain the software package from the NetApp NOW site at <http://now.netapp.com>.
4. Install the HBA driver and utilities.
The HBA driver is installed with a default configuration suitable for use with NetApp storage appliances.
5. Using Solaris host utilities, verify the firmware version of your HBAs, and, if necessary, upgrade to the most current supported firmware version. To verify the firmware version, enter `pkginfo` at the host.
6. Create initiator groups (see Chapter 4 in the *Data ONTAP 6.4 Block Access Management Guide*).
7. Create LUNs (see Chapter 2 in the *Data ONTAP 6.4 Block Access Management Guide*).
8. Configure the host to find LUN IDs and discover new LUNs (see Chapter 5 in the *Host Bus Adapter Installation and Setup Guide 1.1 for Fibre Channel Protocol on Solaris*).
9. Label new LUNs as disks or partition LUNs for multiprotocol access (see Chapter 5 in the *Host Bus Adapter Installation and Setup Guide 1.1 for Fibre Channel Protocol on Solaris*).
10. For a multipath host connection, install a supported version of Veritas Volume Manager. This might involve more Solaris patches and a system reboot (see the *SAN Host Release Notes 1.1 for Fibre Channel Protocol on Solaris*).

For Windows hosts

See the *Host Bus Adapter Installation and Setup Guide 1.1 for Fibre Channel Protocol on Windows*.

1. See the *NetApp SAN Support Matrix* at <http://now.netapp.com> to verify that the host and operating system service pack level in question are supported. Also identify the correct version of the software package and HBA firmware for use in Steps 2 and 4.
2. In the CD-ROM in the media kit, locate the software package, or obtain the software package from the NetApp NOW site at <http://now.netapp.com>.
3. Install the HBA driver and utilities.
Note that to correctly configure the HBA driver for use with NetApp storage appliances, you must double-click the `regkey.reg` file to add NetApp-specific settings to the registry. (The `regkey.reg` file appears in the top level of the Windows software directory, after it is extracted from the self-extracting archive.)
4. Using Windows host utilities, verify the firmware version of your HBAs, and, if necessary, upgrade to the most current supported firmware version.

5. If you are using the SnapDrive™ product, install and configure SnapDrive 2.0 or later.
See the *SnapDrive Installation and Administration Guide* specific to your version of software.
SnapDrive is the preferred method for creating and managing LUNs from Windows hosts.
6. If you are not using SnapDrive:
 - ❖ Create initiator groups (igroups).
See Chapter 4 in the *Data ONTAP 6.4 Block Access Management Guide* for more detailed information about initiator groups.
 - ❖ Create LUNs (see Chapter 2 in the *Data ONTAP 6.4 Block Access Management Guide*).
 - ❖ Make new LUNs visible as disks on the host.
 - ❖ Partition the disks.
 - ❖ If desired, format the partition.
 - ❖ If desired, map the (formatted) partition to a drive letter.
7. If you want to use the Microsoft Multipath I/O for Windows product, contact your NetApp Sales Representative. Note that SnapDrive 2.1 is required to run the Microsoft Multipath I/O for Windows product.

10 Finding the information you need in the documentation

All of the documents in the following table are available on the NetApp On the Web (NOW) site at <http://now.netapp.com/NOW/knowledge/docs/docs.shtml>. Unless otherwise specified, the documents are printed and shipped with the product.

For information about...	See the following NetApp product documentation...
The latest supported configurations and slot priorities	<i>SAN Configuration Guide</i> (only on NOW) <i>NetApp SAN Support Matrix</i> at (only on NOW) <i>System Configuration Guide</i> at (only on NOW) Read Me First documents for all products, when included Release Notes for all products, when included
Verifying environmental requirements	<i>Site Requirements Guide</i>
Installing the storage appliance and the disk shelves in an equipment rack	Cluster Guide <i>Easy Installation Instructions</i> (printed document only) Fibre Channel DiskShelf hardware guide Hardware guide specific to the storage appliance
Installing storage appliances and disk shelves in a cabinet	<i>System Cabinet Guide</i> (printed document only; shipped with the cabinet)
Configuring the storage appliance	<i>Best Practices for Reliability—New System Installation</i> (only on NOW) <i>Data ONTAP 6.4 Software Setup Guide</i>
Installing and configuring the HBA in Windows hosts	<i>Host Bus Adapter Installation and Setup Guide 1.1 for Fibre Channel Protocol on Windows</i>
Installing and configuring the HBA in Solaris hosts	<i>Host Bus Adapter Installation and Setup Guide 1.1 for Fibre Channel Protocol on Solaris</i>
Installing and configuring SnapDrive for Windows hosts	<i>SnapDrive Installation and Administration Guide</i>
Managing SAN storage on the storage appliance	<i>Command Reference</i> <i>Quick Reference Guide</i> <i>Data ONTAP 6.4 Block Access Management Guide</i> <i>FilerView Online Help</i>
Managing the storage appliance	<i>Data ONTAP 6.4 Data Protection Guide</i> <i>Data ONTAP 6.4 Storage Management Guide</i> <i>Data ONTAP 6.4 File Access Management Guide</i> <i>Data ONTAP 6.4 MultiStore Management Guide</i>
Managing the TCP/IP network	<i>Data ONTAP 6.4 Network Management Guide</i>

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