

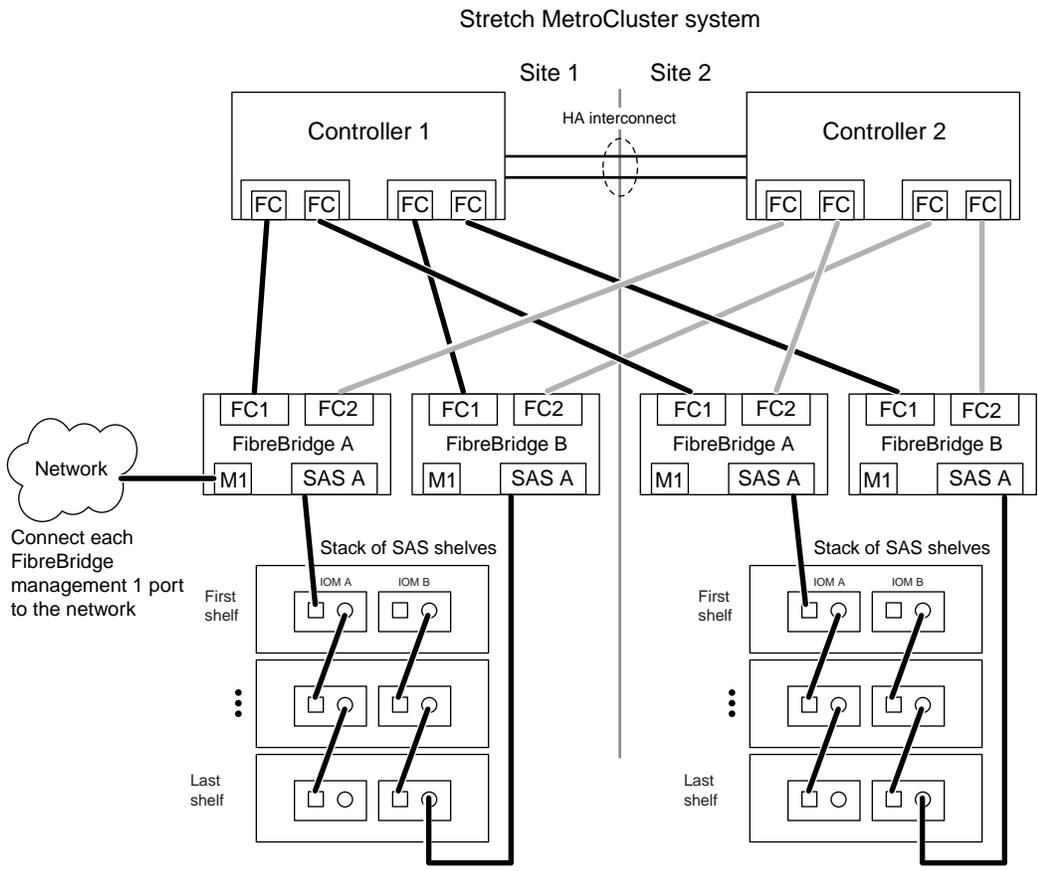
Configuring a MetroCluster system with SAS disk shelves and FibreBridge 6500N bridges

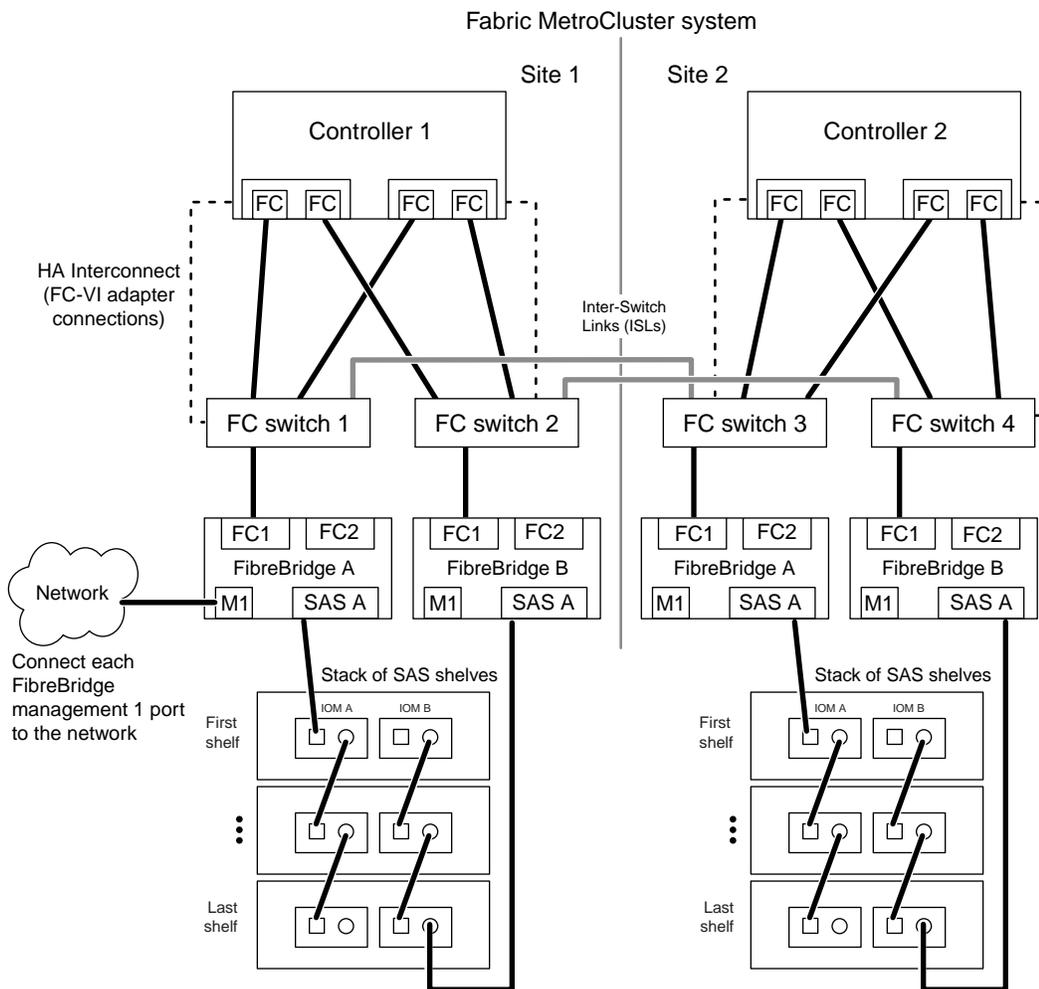
FibreBridge 6500N bridges are used in MetroCluster systems when SAS disk shelves are used. You can install the bridges as part of a new MetroCluster installation, as a hot-add to an existing MetroCluster system with SAS or FC disk shelves, or as a hot-swap to replace a failed bridge. You can also hot-add a SAS disk shelf to an existing stack of SAS disk shelves.

Note: This document assumes you are installing a stretch or fabric-attached MetroCluster configuration. For installing a shared-switch configuration, see the *Data ONTAP 7-Mode High-Availability Configuration Guide*.

MetroCluster configuration examples

The following illustrations are examples of fully cabled stretch and fabric-attached MetroCluster systems. To see an example of a shared-switch configuration, see the *Data ONTAP 7-Mode High-Availability Configuration Guide*.





Installing bridges and SAS disk shelves as part of a new MetroCluster installation

You can install and cable bridges and SAS disk shelves as part of a new MetroCluster installation.

About this task

This procedure is written with the assumption that you are using the recommended bridge management interfaces: the ATTO ExpressNAV GUI and ATTO QuickNAV utility.

You use the ATTO ExpressNAV GUI to configure and manage a bridge, and to configure the bridge Ethernet management 1 port. You use the ATTO QuickNAV utility to update the bridge firmware.

You can use other management interfaces instead, if needed, such as a serial port or Telnet to configure and manage a bridge and to configure the Ethernet management 1 port, and FTP to update the bridge firmware. If you choose any of these management interfaces, you must meet the applicable requirements in the *Other FibreBridge management interfaces* section.

Related references

[Other FibreBridge management interfaces](#) on page 21

Preparing for the installation

Preparing to install the bridges as part of your new MetroCluster system involves ensuring that your system meets certain requirements; meeting setup and configuration requirements for the bridges; and downloading documents, the ATTO QuickNAV utility, and bridge firmware.

Before you begin

- Your system must be running Data ONTAP 8.1 or later.
- For fabric-attached MetroCluster configurations, each FC switch must have one FC port available for one bridge to connect to it.
- For stretch MetroCluster configurations, each controller must have one QLogic 8-Gb or 4-Gb FC port available for each bridge to connect to it.

Only QLogic 8-Gb and 4-Gb ports are supported. These ports can be onboard or on PCIe HBAs. For example, in a configuration with one stack of SAS disk shelves and two bridges at each site, a total of four FC ports is used on each controller.

Note: For improved performance, you should use 8-Gb ports when possible.

- The computer you are using to set up the bridges must be running an ATTO supported web browser to use the ATTO ExpressNAV GUI: Internet Explorer 8 or 9, or Mozilla Firefox 3.
The *ATTO FibreBridge 6500N Installation and Operation Manual* has an up-to-date list of supported web browsers. You can access this document using the information below.

Steps

1. Download the following documents from the NetApp Support Site at support.netapp.com.
 - *MetroCluster Compatibility Matrix*
 - *Data ONTAP 7-Mode High-Availability Configuration Guide*
 - If you are installing a fabric-attached MetroCluster system, *Brocade Switch Configuration Guide for Fabric-attached MetroClusters*
 - *Installation and Service Guide* for your disk shelf model
2. Go to the ATTO FibreBridge Description page on the NetApp Support Site at support.netapp.com and complete the following substeps:
 - a. Navigate to the ATTO FibreBridge Description page by clicking **Software**, scrolling to **Protocol Bridge**, choosing **ATTO FibreBridge** from the drop-down menu, clicking **Go!**, and then clicking **View & Download**.
 - b. Access the ATTO web site using the link provided and download the following:
 - *ATTO FibreBridge 6500N Installation and Operation Manual*
 - ATTO QuickNAV utility (to the computer you are using for setup)
 - c. Go to the ATTO FibreBridge 6500N Firmware Download page and do the following:
 - Navigate to the ATTO FibreBridge 6500N Firmware Download page by clicking **Continue** at the end of the ATTO FibreBridge Description page.
 - Download the bridge firmware file using Steps 1 through 3 of that procedure.
You will update the firmware on each bridge later, when instructed in the *Installing the new system* section.
 - Make a copy of the ATTO FibreBridge 6500N Firmware Download page and release notes for reference when you are instructed to update the firmware on each bridge.
3. Check the *MetroCluster Compatibility Matrix* to verify that your system meets all configuration requirements for the bridge.
4. Check the *Data ONTAP 7-Mode High-Availability Configuration Guide* to verify that your system meets all applicable MetroCluster requirements as defined in the MetroCluster installation section.

5. Gather the hardware and information needed to use the recommended bridge management interfaces—the ATTO ExpressNAV GUI and ATTO QuickNAV utility—by completing the following substeps:
 - a. Acquire a standard Ethernet cable (which connects from the bridge Ethernet management 1 port to your network).
 - b. Determine a non-default user name and password (for accessing the bridge).
It is recommended that you change the default user name and password.
 - c. Obtain an IP address, subnet mask, and gateway information for the Ethernet management 1 port on each bridge.
 - d. Disable VPN clients on the computer you are using for setup.
Active VPN clients cause the QuickNAV scan for bridges to fail.
6. Acquire four screws for each bridge (to secure the bridges to the front of the rack).
The openings in the bridge "L" brackets are compliant with rack standard ETA-310-X for 19-inch (482.6 mm) racks.

Installing the new system

After ensuring that the system meets all the requirements in the *Preparing for the installation* section, you can install your new system.

About this task

- Multipath HA is the only supported configuration for MetroCluster systems using bridges.
Both controllers must have access through the bridges to the disk shelves in each stack.
- A stack of SAS disk shelves can contain shelves of SATA disk drives and shelves of SAS disk drives; however, SATA and SAS disk drives cannot be mixed in the same disk shelf.
- You should use an equal number of disk shelves at each site.
- The system connectivity requirements for maximum distances for disk shelves, FC switches, and backup tape devices using 50 micron multimode fiber optic cables, also apply to FibreBridges.
The *Site Requirements Guide* has detailed information about system connectivity requirements.

Steps

1. Properly ground yourself.
2. Install the platforms and, if applicable, the FC switches.
For instructions on installing the platforms, see the *Installation and Setup Instructions* that came with your platform. For instructions on installing FC switches, see the *Brocade Switch Configuration Guide for Fabric-attached MetroClusters*.
3. Install the disk shelves, power them on, and set the shelf IDs.
For instructions, see the *Installation and Service Guide* for your disk shelf model.
Note: You must power-cycle each disk shelf.
Note: Shelf IDs must be unique for each SAS disk shelf within the entire storage system.
4. Install each bridge by completing the following substeps:
 - a. Secure the "L" brackets on the front of the bridge to the front of the rack with the four screws you acquired in the *Preparing for the installation* section.
 - b. Ground each bridge to the equipment rack.
 - c. Connect each bridge to a power source and turn them on.

Note: Make sure that each bridge is connected to a different power source for resiliency.

The bridge Ready LED might take up to 30 seconds to illuminate, indicating that the bridge has completed its power-on self test sequence.

For information about power requirements and LEDs, see the *ATTO FibreBridge 6500N Installation and Operation Manual*.

5. Connect the Ethernet management 1 port on each bridge to your network using an Ethernet cable.

Note: The Ethernet management 1 port enables you to quickly download the bridge firmware (using ATTO ExpressNAV or FTP management interfaces) and to retrieve core files and extract logs.

6. Set up and configure each bridge by completing the following substeps:

- a. Configure the Ethernet management 1 port for each bridge by following the procedure in the *ATTO FibreBridge 6500N Installation and Operation Manual*, section 2.0.

Note: When running QuickNAV to configure an Ethernet management port, only the Ethernet management port that is connected by the Ethernet cable is configured. For example, if you also wanted to configure the Ethernet management 2 port, you would need to connect the Ethernet cable to port 2 and run QuickNAV.

- b. Configure each bridge by following the procedure in the *ATTO FibreBridge 6500N Installation and Operation Manual*, section 3.0.

You should make note of the user name and password you designate.

7. Update the firmware on each bridge to the latest version by following the instructions—starting with Step 4—on the FibreBridge 6500N Download page.

8. Cable the disk shelves to the bridges by completing the following substeps:

- a. Daisy-chain the disk shelves in each stack.

For information about daisy-chaining disk shelves, see the *Installation and Service Guide* for your disk shelf model.

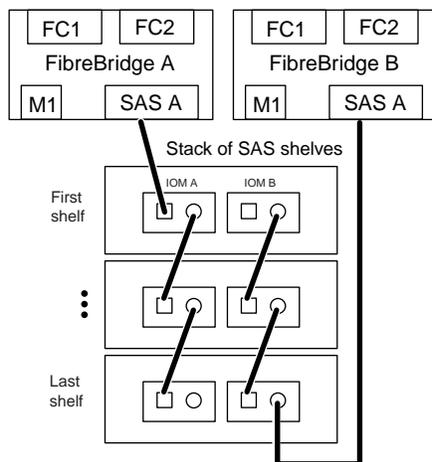
- b. For each stack of disk shelves, cable IOM A square port of the first shelf to SAS port A on FibreBridge A.

- c. For each stack of disk shelves, cable IOM B circle port of the last shelf to SAS port A on FibreBridge B.

Each bridge has one path to its stack of disk shelves; bridge A connects to the A-side of the stack through the first shelf, and bridge B connects to the B-side of the stack through the last shelf.

Note: The bridge SAS port B is disabled.

The following illustration shows a set of bridges cabled to a stack of three disk shelves:



9. Verify that each bridge can see all disk drives and disk shelves it is connected to.

If you are using the...	Then...
ATTO ExpressNAV GUI	<ol style="list-style-type: none"> In a supported web browser, enter the IP address of the bridge in the browser box. You are brought to the ATTO FibreBridge 6500N home page, which has a link. Click the link and enter your user name and the password that you designated when you configured the bridge. The ATTO FibreBridge 6500N status page appears with a menu to the left. Click Advanced in the menu. Enter the following command, and then click Submit: <ul style="list-style-type: none"> sastargets
Serial port connection	Enter the following command: <ul style="list-style-type: none"> sastargets

Example

The output shows the devices (disks and disk shelves) that the bridge is connected to. Output lines are sequentially numbered so you can quickly count the devices. For example, the following output shows that 10 disks are connected.

Tgt	VendorID	ProductID	Type	SerialNumber
0	NETAPP	X410_S15K6288A15	DISK	3QP1CLE300009940UHJV
1	NETAPP	X410_S15K6288A15	DISK	3QP1ELF600009940V1BV
2	NETAPP	X410_S15K6288A15	DISK	3QP1G3EW00009940U2M0
3	NETAPP	X410_S15K6288A15	DISK	3QP1EWMP00009940U1X5
4	NETAPP	X410_S15K6288A15	DISK	3QP1FZLE00009940G8YU
5	NETAPP	X410_S15K6288A15	DISK	3QP1FZLF00009940TZKZ
6	NETAPP	X410_S15K6288A15	DISK	3QP1CEB400009939MGXL
7	NETAPP	X410_S15K6288A15	DISK	3QP1G7A900009939FNNT
8	NETAPP	X410_S15K6288A15	DISK	3QP1FY0T00009940G8PA
9	NETAPP	X410_S15K6288A15	DISK	3QP1FXW600009940VERQ

Note: If the text, "response truncated" appears at the beginning of the output, you can Telnet to the bridge and enter the same command to see all the output.

- Verify that the command output shows that the bridge is connected to all disks and disk shelves in the stack it is supposed to be connected to.

If the output is...	Then...
Correct	Repeat Step 9 for each remaining bridge.
Not correct	<ol style="list-style-type: none"> Check for loose SAS cables or correct the SAS cabling by repeating Step 8. Repeat Step 9.

- Cable each bridge to the controllers or FC switches, depending on your MetroCluster configuration:

If you have a...	Then...
Stretch MetroCluster configuration	<ol style="list-style-type: none"> Cable FC port 1 of bridge A to an 8-Gb or 4-Gb FC port on the controller at Site 1. Cable FC port 2 of bridge A to the same speed FC port on the controller at Site 2. Repeat Substeps a and b for bridge B. <p>Note: For resiliency, connect bridges to different ASIC/chip sets. For example, if you are using onboard ports, cable each bridge to a different port set, such as 0a and 0c or 0b and 0d. If you are using HBAs, connect each bridge to a different HBA.</p>

If you have a...	Then...
Fabric-attached MetroCluster configuration	<p>a. Cable FC port 1 of bridge A to FC switch 1 at Site 1.</p> <p>b. Cable FC port 1 of bridge B to FC switch 2 at Site 1.</p> <p>c. Repeat Substeps a and b for Site 2.</p> <p>Note: You can connect the bridge to any available port on the FC switch. Whichever port you choose, you must use the same port consistently on each FC switch you are connecting at both sites. This is for ease of manageability. For example, if you choose FC switch port 3, use only that port on each FC switch.</p> <p>Note: The FC port 2 on each bridge remains unused.</p>

12. Connect and configure the controllers, and if applicable the FC switches, following the procedure for your MetroCluster configuration in the *Data ONTAP 7-Mode High-Availability Configuration Guide* :

- a. If applicable, configure the FC switches.
- b. Cable the FC-VI and inter-switch link as appropriate for your configuration.
- c. Assign disk ownership by using the information in the *Data ONTAP 7-Mode High-Availability Configuration Guide* .

Note: If you are splitting a single stack of disk shelves between two controllers, you must disable disk autoassignment before assigning disk ownership; otherwise, when you assign any single disk drive, the remaining disk drives might be automatically assigned to the same controller and pool.

To disable disk autoassignment, run the `options disk.auto_assign off` command at the console of both controllers.

- d. Configure the system and enable licenses as needed using the information about configuring an HA pair in the *Data ONTAP 7-Mode High-Availability Configuration Guide* .

13. Verify disk shelf connectivity by entering the following command at the system console of either controller:

```
sysconfig -v
```

The output shows the following:

- Each bridge on a separate line, and for fabric-attached MetroCluster configurations, under each FC port to which it is visible; otherwise, for stretch MetroCluster configurations, directly connected.

For example, output for a fabric-attached MetroCluster configuration would look like the following:

```
FC-to-SAS Bridge:
Brocade300-1:9.126L0      : ATTO      FibreBridge6500N 1.11  FB6500N100189
Brocade300-2:1.126L0    : ATTO      FibreBridge6500N 1.11  FB6500N100162
```

For example, output for a stretch MetroCluster configuration would look like the following:

```
FC-to-SAS Bridge:
125L0      : ATTO      FibreBridge6500N 1.10  FB6500N100053
125L0      : ATTO      FibreBridge6500N 1.10  FB6500N100048
```

- Each disk shelf on a separate line under each FC port to which it is visible (for fabric-attached or stretch MetroCluster configurations).

For example:

```
Shelf  0: IOM6  Firmware rev. IOM6 A: 0111 IOM6 B: 0111
Shelf  1: IOM6  Firmware rev. IOM6 A: 0111 IOM6 B: 0111
```

- Each disk drive on a separate line under each FC port to which it is visible (for fabric-attached or stretch MetroCluster configurations).

For example, output for a fabric-attached MetroCluster configuration would look like the following:

```
Brocade300-1:9.126L1 : NETAPP X421_HCOBD450A10 NA01 418.0GB (879097968 520B/sect)
Brocade300-1:9.126L2 : NETAPP X421_HCOBD450A10 NA01 418.0GB (879097968 520B/sect)
```

For example, output for a stretch MetroCluster configuration would look like the following:

```
125L1 : NETAPP X421_HCOBD450A10 NA01 40.0GB (82262416 520B/sect)
125L2 : NETAPP X421_HCOBD450A10 NA01 40.0GB (82262416 520B/sect)
```

Related concepts

[FibreBridge error messages](#) on page 22

Hot-adding a stack of SAS disk shelves and bridges to an existing MetroCluster system

You can hot-add a stack of SAS disk shelves and set of bridges to an existing MetroCluster system that has SAS or FC disk shelves.

About this task

This procedure is written with the assumption that you are using the recommended bridge management interfaces: the ATTO ExpressNAV GUI and ATTO QuickNAV utility.

You use the ATTO ExpressNAV GUI to configure and manage a bridge, and to configure the bridge Ethernet management 1 port. You use the ATTO QuickNAV utility to update the bridge firmware.

You can use other management interfaces instead, if needed, such as a serial port or Telnet to configure and manage a bridge and to configure the Ethernet management 1 port, and FTP to update the bridge firmware. If you choose any of these management interfaces, you must meet the applicable requirements in the *Other FibreBridge management interfaces* section.

Related references

[Other FibreBridge management interfaces](#) on page 21

Preparing for the hot-add

Preparing to hot-add a stack of SAS disk shelves and bridges involves downloading documents and the disk drive and disk shelf firmware.

Before you begin

- Your system platforms must be supported.
The *System Configuration Guide* has the most current information about supported platforms.
- Your system must be running Data ONTAP 8.1 or later.
- All disk drives and disk shelves in the system must be running the latest firmware version.
- For fabric-attached MetroCluster configurations, each FC switch must have one FC port available for one bridge to connect to it.

Note: If you are hot-adding to a system with FC disk shelves, depending on the FC switch compatibility, you might need to upgrade the FC switch.

- For stretch MetroCluster configurations, each controller must have one QLogic 8-Gb or 4-Gb FC port available for each bridge to connect to it.

Only QLogic 8-Gb and 4-Gb ports are supported. These ports can be onboard or on PCIe HBAs. For example, in a configuration with one stack of SAS disk shelves and two bridges at each site, a total of four FC ports are used on each controller.

Note: For improved performance, you should use 8-Gb ports when possible.

- The computer you are using to set up the bridges must be running an ATTO supported web browser to use the ATTO ExpressNAV GUI: Internet Explorer 8 or 9, or Mozilla Firefox 3.
The *ATTO FibreBridge 6500N Installation and Operation Manual* has an up-to-date list of supported web browsers. You can access this document using the information in the steps.

Steps

1. Download the following documents from the NetApp Support Site at support.netapp.com.
 - *MetroCluster Compatibility Matrix*
 - *Data ONTAP 7-Mode High-Availability Configuration Guide*
 - *Installation and Service Guide* for your disk shelf model
2. Go to the ATTO FibreBridge Description page on the NetApp Support Site at support.netapp.com and complete the following substeps:
 - a. Navigate to the ATTO FibreBridge Description page by clicking **Software**, scrolling to **Protocol Bridge**, choosing **ATTO FibreBridge** from the drop-down menu, clicking **Go!**, and then clicking **View & Download**.
 - b. Access the ATTO web site using the link provided and download the following:
 - *ATTO FibreBridge 6500N Installation and Operation Manual*
 - ATTO QuickNAV utility (to the computer you are using for setup)
 - c. Go to the ATTO FibreBridge 6500N Firmware Download page and do the following:
 - Navigate to the ATTO FibreBridge 6500N Firmware Download page by clicking **Continue** at the end of the ATTO FibreBridge Description page.
 - Download the bridge firmware file using Steps 1 through 3 of that procedure.
You will update the firmware on each bridge later, when instructed in the *Installing the new system* section.
 - Make a copy of the ATTO FibreBridge 6500N Firmware Download page and release notes for reference when you are instructed to update the firmware on each bridge.
3. Check the *MetroCluster Compatibility Matrix* to verify that the disk shelf you are hot-adding is supported.
4. Download the latest disk and disk shelf firmware:

Note: In this step you are only completing the download portion of the instructions provided in the links. You also need to copy the installation portion of the instructions in the links for use later, in the *Hot-adding the stack of shelves* section.

 - a. Download the disk firmware from now.netapp.com/NOW/download/tools/diskfw and make a copy of the disk firmware instructions for reference later.
 - b. Download the disk shelf firmware from now.netapp.com/NOW/download/tools/diskshelf and make a copy of the disk shelf firmware instructions for reference later.
5. Gather the hardware and information needed to use the recommended bridge management interfaces—the ATTO ExpressNAV GUI and ATTO QuickNAV utility—by completing the following substeps:
 - a. Acquire a standard Ethernet cable (which connects from the bridge Ethernet management 1 port to your network).
 - b. Determine a non-default user name and password (for accessing the bridges).
It is recommended that you change the default user name and password.
 - c. Obtain an IP address, subnet mask, and gateway information for the Ethernet management 1 port on each bridge.
 - d. Disable VPN clients on the computer you are using for setup.
Active VPN clients cause the QuickNAV scan for bridges to fail.
6. Acquire four screws for each bridge (to secure the bridges to the front of the rack).

The openings in the bridge "L" brackets are compliant with rack standard ETA-310-X for 19-inch (482.6 mm) racks.

Hot-adding the stack of shelves

After ensuring that the system meets all the requirements in the *Preparing for the hot-add* section, you can hot-add a stack of SAS disk shelves and bridges.

About this task

- This is a nondisruptive procedure if all bridge requirements in the *MetroCluster Compatibility Matrix* are met.
- Multipath HA is the only supported configuration for MetroCluster systems using bridges. Both controllers must have access through the bridges to the disk shelves in each stack.
- You should hot-add an equal number of disk shelves at each site.
- A stack of SAS disk shelves can contain shelves of SATA disk drives and shelves of SAS disk drives; however, SATA and SAS disk drives cannot be mixed in the same disk shelf.
- The system connectivity requirements for maximum distances for disk shelves, FC switches, and backup tape devices using 50 micron multimode fiber optic cables, also apply to bridges. The *Site Requirements Guide* has detailed information about system connectivity requirements.

Attention: Hot-adding a disk shelf requires you to update the disk drive firmware on the hot-added disk shelf by running the `disk_fw_update` command. Running this command can be disruptive if the firmware on existing disk drives in your system is an older version.

Steps

1. Properly ground yourself.
2. Follow Steps 3 through 10 of the *Installing bridges and SAS disk shelves as part of a new MetroCluster installation* section of this document.
3. Assign disk ownership by using the information in the *Data ONTAP 7-Mode High-Availability Configuration Guide*.

Note: If you are splitting a single stack of disk shelves between two controllers, you must disable disk autoassignment before assigning disk ownership; otherwise, when you assign any single disk drive, the remaining disk drives might be automatically assigned to the same controller and pool.

To disable disk autoassignment, run the `options disk.auto_assign off` command at the console of both controllers.

Note: Do not add disk drives to aggregates or volumes until after the disk drive and disk shelf firmware has been updated.

4. Update the disk drive firmware to the most current version by entering the following command at the system console:
`disk_fw_update`
You must run this command on both controllers.
If needed, refer to the instructions you copied when you downloaded the firmware as part of the preparation for this task.
5. Update the disk shelf firmware to the most current version by using the instructions you copied when you downloaded the firmware as part of the preparation for this task.
You can run the commands in the procedure from the system console of either controller.
6. If applicable, repeat this procedure for the remote site.

Related concepts

[FibreBridge error messages](#) on page 22

Hot-swapping a FibreBridge

When a bridge fails, you can hot-swap the bridge without disrupting the storage system when the system is cabled correctly for Multipath HA.

About this task

This procedure is written with the assumption that you are using the recommended bridge management interfaces: the ATTO ExpressNAV GUI and ATTO QuickNAV utility.

You use the ATTO ExpressNAV GUI to configure and manage a bridge, and to configure the bridge Ethernet management 1 port. You use the ATTO QuickNAV utility to update the bridge firmware.

You can use other management interfaces instead, if needed, such as a serial port or Telnet to configure and manage a bridge and to configure the Ethernet management 1 port, and FTP to update the bridge firmware. If you choose any of these management interfaces, you must meet the applicable requirements in the *Other FibreBridge management interfaces* section.

Related references

[Other FibreBridge management interfaces](#) on page 21

Preparing for the hot-swap

Preparing to hot-swap a bridge as part of your new MetroCluster system involves downloading documents and bridge firmware.

Steps

1. Verify that the system is cabled for Multipath HA by entering the following command at the system console of both controllers:

```
sysconfig
```

Note: It might take up to a minute for the system to complete discovery.

For example, the following output states that the system is cabled for Multipath HA:

```
NetApp Release R8.1xN_110610_0200 7-Mode: Fri Jun 10 02:50:01 PDT 2011
System ID: 1573753523 (stqa-3270-2); partner ID: 1573753694 (stqa-3270-1)
System Serial Number: 700000387985 (stqa-3270-2); partner Serial Number: 700000387997
(stqa-3270-1)
System Rev: B0
System Storage Configuration: Multi-Path HA
System ACP Connectivity: NA
```

2. Verify that the command output shows that the system is cabled for Multipath HA.

If the System Storage Configuration states that it is...	Then...
Multipath HA	Go to Step 3.
Mixed-path or single-path HA	You must correct the SAS and FC cabling because not all disk drives are accessible through the new bridge. Attention: If you must correct cabling on a system that is serving data, you can perform hot-cable moves only if one path to the disk drives is maintained. Attention: When bridges are not cabled as Multipath HA, restarting a bridge might cause loss of access to the disk drives and result in a multi-disk panic.

3. Go to the ATTO FibreBridge Description page on the NetApp Support Site at support.netapp.com and complete the following substeps:

- a. Navigate to the ATTO FibreBridge Description page by clicking **Software**, scrolling to **Protocol Bridge**, choosing **ATTO FibreBridge** from the drop-down menu, clicking **Go!**, and then clicking **View & Download**.
- b. Access the ATTO web site using the link provided and download the following:
 - *ATTO FibreBridge 6500N Installation and Operation Manual*
 - ATTO QuickNAV utility (to the computer you are using for setup)
- c. Go to the ATTO FibreBridge 6500N Firmware Download page and do the following:
 - Navigate to the ATTO FibreBridge 6500N Firmware Download page by clicking **Continue** at the end of the ATTO FibreBridge Description page.
 - Download the bridge firmware file using Steps 1 through 3 of that procedure.
You will update the firmware on each bridge later, when instructed in the *Installing the new system* section.
 - Make a copy of the ATTO FibreBridge 6500N Firmware Download page and release notes for reference when you are instructed to update the firmware on each bridge.
4. Complete the following substeps to use the recommended bridge management interfaces: the ATTO ExpressNAV GUI and ATTO QuickNAV utility:
 - a. Determine a non-default username and password (for accessing the bridge).
It is recommended that you change the default username and password.
 - b. Disable VPN clients on the computer you are using for setup.
Active VPN clients cause the QuickNAV scan for bridges to fail.

Note: Use the IP address, subnet mask, and gateway information for the Ethernet management 1 port from the failed bridge for the new bridge.

Hot-swapping the FibreBridge

After ensuring that the system meets all the requirements in the *Preparing for the hot-swap* section, you can hot-swap a bridge.

Steps

1. Properly ground yourself.
2. Power off the failed bridge and disconnect it from the power source.
3. Disconnect the cables connected to the failed bridge.
You should make note of the port each cable was connected to.
4. Remove the failed bridge from the rack.
5. Install the new bridge into the rack.
6. Reconnect the power cord and Ethernet cable.

Note: Do not reconnect the SAS or FC cables at this time.
7. Connect the bridge to a power source and turn it on.

The bridge Ready LED might take up to 30 seconds to illuminate, indicating that the bridge has completed its power-on self test sequence.
8. Set up and configure the bridge by completing the following substeps:
 - a. Configure the Ethernet management 1 port for the bridge by following the procedure in the *ATTO FibreBridge 6500N Installation and Operation Manual*, section 2.0.
 - b. Configure the bridge by following the procedure in the *ATTO FibreBridge 6500N Installation and Operation Manual*, section 3.0.

You should make note of the user name and password you designate.

9. Update the firmware on the bridge to the latest version by following the instructions—starting with Step 4—on the FibreBridge 6500N Download page.
10. Reconnect the SAS and FC cables into the same ports on the new bridge.
11. Verify that each bridge can see all disk drives and disk shelves it is connected to.

If you are using the...	Then...
ATTO ExpressNAV GUI	<ol style="list-style-type: none"> a. In a supported web browser, enter the IP address of the bridge in the browser box. You are brought to the ATTO FibreBridge 6500N home page, which has a link. b. Click the link and enter your user name and the password that you designated when you configured the bridge. The ATTO FibreBridge 6500N status page appears with a menu to the left. c. Click Advanced in the menu. d. Enter the following command, and then click Submit: <code>sastargets</code>
Serial port connection	Enter the following command: <code>sastargets</code>

Example

The output shows the devices (disks and disk shelves) that the bridge is connected to. Output lines are sequentially numbered so that you can quickly count the devices. For example, the following output shows that 10 disks are connected.

Tgt	VendorID	ProductID	Type	SerialNumber
0	NETAPP	X410_S15K6288A15	DISK	3QP1CLE300009940UHJV
1	NETAPP	X410_S15K6288A15	DISK	3QP1ELF600009940V1BV
2	NETAPP	X410_S15K6288A15	DISK	3QP1G3EW00009940U2M0
3	NETAPP	X410_S15K6288A15	DISK	3QP1EWMP00009940U1X5
4	NETAPP	X410_S15K6288A15	DISK	3QP1FZLE00009940G8YU
5	NETAPP	X410_S15K6288A15	DISK	3QP1FZLF00009940TZKZ
6	NETAPP	X410_S15K6288A15	DISK	3QP1CEB400009939MGXL
7	NETAPP	X410_S15K6288A15	DISK	3QP1G7A900009939FNFT
8	NETAPP	X410_S15K6288A15	DISK	3QP1FY0T00009940G8PA
9	NETAPP	X410_S15K6288A15	DISK	3QP1FXW600009940VERQ

Note: If the text, "response truncated" appears at the beginning of the output, you can Telnet to the bridge and enter the same command to see all the output.

12. Verify that the command output shows that the bridge is connected to all disks and disk shelves in the stack it is supposed to be connected to.

If the output is...	Then...
Correct	Repeat Step 11 for each remaining bridge.
Not correct	<ol style="list-style-type: none"> a. Check for loose SAS cables or correct the SAS cabling by repeating Step 10. b. Repeat Step 11.

13. Verify that both controllers have access through the new bridge to the disk shelves (that the system is cabled for Multipath HA), by entering the following command at the system console of both controllers:

sysconfig

Note: It might take up to a minute for the system to complete discovery.

For example, the following output states that the system is cabled for Multipath HA:

```
NetApp Release R8.1xN_110610_0200 7-Mode: Fri Jun 10 02:50:01 PDT 2011
System ID: 1573753523 (stqa-3270-2); partner ID: 1573753694 (stqa-3270-1)
System Serial Number: 700000387985 (stqa-3270-2); partner Serial Number: 700000387997
```

```
(stqa-3270-1)
System Rev: B0
System Storage Configuration: Multi-Path HA
System ACP Connectivity: NA
```

14. Verify that the command output shows that the system is cabled for Multipath HA.

If the System Storage Configuration states that it is...	Then...
Multipath HA	You are done.
Mixed-path or single-path HA	You must correct the SAS and FC cabling because not all disk drives are accessible through the new bridge. Attention: If you must correct cabling on a system that is serving data, you can perform hot-cable moves only if one path to the disk drives is maintained. Attention: When bridges are not cabled as Multipath HA, restarting a bridge might cause loss of access to the disk drives and result in a multi-disk panic.

15. Return the failed part to NetApp, as described in the RMA instructions shipped with the kit. Contact technical support at 888-463-8277 (North America), 00-800-44-NETAPP (Europe), or +800-800-80-800 (Asia/Pacific) if you need the RMA number or additional help with the replacement procedure.

Related concepts

[FibreBridge error messages](#) on page 22

Hot-adding a SAS disk shelf to a stack of SAS disk shelves

You can hot-add one or more SAS disk shelves to a stack of SAS disk shelves.

Preparing for the hot-add

Preparing to hot-add a disk shelf involves downloading documents and the disk drive and disk shelf firmware.

Before you begin

All disk drives and disk shelves in the system must be running the latest firmware version.

Steps

1. Download the following documents from the NetApp Support Site at support.netapp.com:

- *MetroCluster Compatibility Matrix*
- *Data ONTAP 7-Mode High-Availability Configuration Guide*
- *Installation and Service Guide* for your disk shelf model

2. Download the latest disk and disk shelf firmware:

Note: In this step you are only completing the download portion of the instructions provided in the links. You also need to copy the installation portion of the instructions in the links for use later, in the *Hot-adding the shelf* section.

- a. Download the disk firmware from now.netapp.com/NOW/download/tools/diskfw and make a copy of the disk firmware instructions for reference later.
 - b. Download the disk shelf firmware from now.netapp.com/NOW/download/tools/diskshelf and make a copy of the disk shelf firmware instructions for reference later.
3. Check the *MetroCluster Compatibility Matrix* to verify that the disk shelf you are hot-adding is supported.

Hot-adding the shelf

After ensuring that the system meets all the requirements in the *Preparing for the hot-add* section, you can hot-add a disk shelf.

About this task

- This procedure is for hot-adding a disk shelf to the logical last disk shelf in a stack. The logical last disk shelf in a stack is connected from IOM B to bridge B.
- This is a nondisruptive procedure.
- You should hot-add an equal number of disk shelves at each site.
- If you are hot-adding more than one disk shelf, you must hot-add one disk shelf at a time.

Attention: Hot-adding a disk shelf requires you to update the disk drive firmware on the hot-added disk shelf by running the `disk_fw_update` command. Running this command can be disruptive if the firmware on existing disk drives in your system is an older version.

Steps

1. Properly ground yourself.
2. Install and cable the disk shelf by completing the following substeps:
 - a. Install the disk shelf, power it on, and set the shelf ID.

For instructions, see the *Installation and Service Guide* for your disk shelf model.

Note: You must power-cycle the disk shelf.

Note: Shelf IDs must be unique for each SAS disk shelf within the entire storage system.
 - b. Disconnect the SAS cable from the IOM B circle port of the last shelf in the stack and reconnect it to the same port in the new shelf.

The other end of this cable remains connected to bridge B.
 - c. Daisy-chain the new disk shelf by cabling the new shelf IOM square ports (of IOM A and IOM B) to the last shelf IOM circle ports (of IOM A and IOM B).

For an example of a cabled stack of disk shelves, you can reference any of the illustrations in this document.

3. Verify disk shelf connectivity by entering the following command at the system console of either controller:

```
sysconfig -v
```

The output shows the following:

- Each bridge on a separate line, and for fabric-attached MetroCluster configurations, under each FC port to which it is visible; otherwise, for stretch MetroCluster configurations, directly connected.

For example, output for a fabric-attached MetroCluster configuration would look like the following:

```
FC-to-SAS Bridge:
Brocade300-1:9.126L0      : ATTO      FibreBridge6500N 1.11  FB6500N100189
Brocade300-2:1.126L0     : ATTO      FibreBridge6500N 1.11  FB6500N100162
```

For example, output for a stretch MetroCluster configuration would look like the following:

```
FC-to-SAS Bridge:
125L0      : ATTO      FibreBridge6500N 1.10  FB6500N100053
125L0      : ATTO      FibreBridge6500N 1.10  FB6500N100048
```

- Each disk shelf on a separate line under each FC port to which it is visible (for fabric-attached or stretch MetroCluster configurations).

For example:

```
Shelf 0: IOM6 Firmware rev. IOM6 A: 0111 IOM6 B: 0111
Shelf 1: IOM6 Firmware rev. IOM6 A: 0111 IOM6 B: 0111
```

- Each disk drive on a separate line under each FC port to which it is visible (for fabric-attached or stretch MetroCluster configurations).

For example, output for a fabric-attached MetroCluster configuration would look like the following:

```
Brocade300-1:9.126L1 : NETAPP X421_HCOBD450A10 NA01 418.0GB (879097968 520B/sect)
Brocade300-1:9.126L2 : NETAPP X421_HCOBD450A10 NA01 418.0GB (879097968 520B/sect)
```

For example, output for a stretch MetroCluster configuration would look like the following:

```
125L1 : NETAPP X421_HCOBD450A10 NA01 40.0GB (82262416 520B/sect)
125L2 : NETAPP X421_HCOBD450A10 NA01 40.0GB (82262416 520B/sect)
```

4. Assign disk ownership by using the information in the *Data ONTAP 7-Mode High-Availability Configuration Guide*.

Note: If you are splitting a single stack of disk shelves between two controllers, you must disable disk autoassignment before assigning disk ownership; otherwise, when you assign any single disk drive, the remaining disk drives might be automatically assigned to the same controller and pool.

To disable disk autoassignment, run the `options disk.auto_assign off` command at the console of both controllers.

Note: Do not add disk drives to aggregates or volumes until after the disk drive and disk shelf firmware has been updated.

5. Update the disk drive firmware to the most current version by entering the following command at the system console:

```
disk_fw_update
```

You must run this command on both controllers.

If needed, refer to the instructions you copied when you downloaded the firmware as part of the preparation for this task.

6. Update the disk shelf firmware to the most current version by using the instructions you copied when you downloaded the firmware as part of the preparation for this task.

You can run the commands in the procedure from the system console of either controller.

7. If you are hot-adding more than one disk shelf, repeat Steps 1 through 6 for each disk shelf you are hot-adding.

Converting an HA pair or stretch MetroCluster system with SAS disk shelves to a fabric-attached MetroCluster system

You can convert an HA pair or stretch MetroCluster system that has SAS disk shelves to a fabric-attached MetroCluster system.

About this task

This procedure is written with the assumption that you are using the recommended bridge management interfaces: the ATTO ExpressNAV GUI and ATTO QuickNAV utility.

You use the ATTO ExpressNAV GUI to configure and manage a bridge, and to configure the bridge Ethernet management 1 port. You use the ATTO QuickNAV utility to update the bridge firmware.

You can use other management interfaces instead, if needed, such as a serial port or Telnet to configure and manage a bridge and to configure the Ethernet management 1 port, and FTP to update the bridge firmware. If you choose any of these management interfaces, you must meet the applicable requirements in the *Other FibreBridge management interfaces* section.

Related references

[Other FibreBridge management interfaces](#) on page 21

Preparing for the conversion

Preparing to convert an HA pair or stretch MetroCluster system with SAS disk shelves to a fabric-attached MetroCluster system involves ensuring that your system meets certain requirements; meeting setup and configuration requirements for the bridges; and downloading documents, the ATTO QuickNAV utility, and bridge firmware.

Before you begin

- Your system platforms must be supported.
The *System Configuration Guide* has the most current information about supported platforms.
- Your system must be running Data ONTAP 8.1 or later.
- The computer you are using to set up the bridges must be running an ATTO supported web browser to use the ATTO ExpressNAV GUI: Internet Explorer 8 or 9, or Mozilla Firefox 3.
The *ATTO FibreBridge 6500N Installation and Operation Manual* has an up-to-date list of supported web browsers. You can access this document using the information in the steps

Steps

1. Download the following documents from the NetApp Support Site at support.netapp.com:
 - TR-3517, *MetroCluster Upgrade Planning Guide*
 - *MetroCluster Compatibility Matrix*
 - *Data ONTAP 7-Mode High-Availability Configuration Guide*
 - *Brocade Switch Configuration Guide for Fabric-attached MetroClusters*
 - *Installation and Service Guide* for your disk shelf model
2. Go to the ATTO FibreBridge Description page on the NetApp Support Site at support.netapp.com and complete the following substeps:
 - a. Navigate to the ATTO FibreBridge Description page by clicking **Software**, scrolling to **Protocol Bridge**, choosing **ATTO FibreBridge** from the drop-down menu, clicking **Go!**, and then clicking **View & Download**.
 - b. Access the ATTO web site using the link provided and download the following:
 - *ATTO FibreBridge 6500N Installation and Operation Manual*
 - ATTO QuickNAV utility (to the computer you are using for setup)
 - c. Go to the ATTO FibreBridge 6500N Firmware Download page and do the following:
 - Navigate to the ATTO FibreBridge 6500N Firmware Download page by clicking **Continue** at the end of the ATTO FibreBridge Description page.
 - Download the bridge firmware file using Steps 1 through 3 of that procedure.
You will update the firmware on each bridge later, when instructed in the *Installing the new system* section.
 - Make a copy of the ATTO FibreBridge 6500N Firmware Download page and release notes for reference when you are instructed to update the firmware on each bridge.
3. Check the *MetroCluster Compatibility Matrix* to verify that your system meets all configuration requirements for the bridge.
4. Check the *Data ONTAP 7-Mode High-Availability Configuration Guide* to verify that your system meets all applicable MetroCluster system requirements as defined in the MetroCluster system section.
5. Gather the hardware and information needed to use the recommended bridge management interfaces—the ATTO ExpressNAV GUI and ATTO QuickNAV utility—by completing the following substeps:
 - a. Acquire a standard Ethernet cable (which connects from the bridge Ethernet management 1 port to your network).
 - b. Determine a non-default user name and password (for accessing the bridge).
It is recommended that you change the default user name and password.
 - c. Obtain an IP address, subnet mask, and gateway information for the Ethernet management 1 port on each bridge.

- d. Disable VPN clients on the computer you are using for setup.
Active VPN clients cause the QuickNAV scan for bridges to fail.
6. Acquire four screws for each bridge (to secure the bridges to the front of the rack).
The openings in the bridge "L" brackets are compliant with rack standard ETA-310-X for 19-inch (482.6 mm) racks.
7. Update the following to the latest versions for each system as described in the *Data ONTAP 7-Mode Upgrade Guide*:
 - Data ONTAP
Note: Both controllers must be running the same supported Data ONTAP version.
 - Storage system firmware
 - Disk shelf firmware
 - Disk drive firmware
8. If you have a chassis with two controllers, complete the following substeps so that there is only one controller in each chassis:
 - a. Move one controller to a new chassis to form the partner node of the MetroCluster system.
 - b. Obtain and install the FC-VI interconnect card on both systems.
For details about the conversion process, see TR-3517, *MetroCluster Upgrade Planning Guide*.

Converting the system

After ensuring that the system meets all the requirements in the *Preparing for the conversion* section, you can convert your HA pair or stretch MetroCluster system.

About this task

- If you have a standard HA pair, you must make it a mirrored HA pair (in Step 17), which requires you to add disk shelves, disable disk autoassignment, assign the new disk drives to pool 1, and then reboot each controller.
- Multipath HA is the only supported configuration for MetroCluster systems using bridges.
Both controllers must have access through the bridges to the disk shelves in each stack.
- A stack of SAS disk shelves can contain shelves of SATA disk drives and shelves of SAS disk drives; however, SATA and SAS disk drives cannot be mixed in the same disk shelf.
- You should use an equal number of disk shelves at each site.
- You must have two bridges for each stack of disk shelves at each site.
- Each FC switch must have one FC port available for one bridge to connect to it.
- The system connectivity requirements for maximum distances for disk shelves, FC switches, and backup tape devices using 50 micron multimode fiber optic cables, also apply to FibreBridges.
The *Site Requirements Guide* has detailed information about system connectivity requirements.

Steps

1. Make note of the shelf IDs of the disk shelves connected to the system.
You use this information later, when performing the disk autoassignment.
2. Move the NVRAM adapter and FC-VI adapter to the correct slots for your model, as shown in the *System Configuration Guide*.
3. Determine your switch and general configuration by completing the *Planning the fabric-attached MetroCluster installation worksheet* in the *Data ONTAP 7-Mode High-Availability Configuration Guide*.
4. If needed, update the firmware on each FC switch to the latest supported version for the Data ONTAP release your system is running.
The list of supported FC switch firmware is in the *MetroCluster Compatibility Matrix*.

5. Set up and configure the FC switches, and verify your FC switch licenses, as described in the *Brocade Switch Configuration Guide for Fabric-attached MetroClusters*.

Note: The configuration and firmware requirements for Brocade switches in a MetroCluster environment are different from the requirements for switches used in SAN environments. Always refer to MetroCluster documentation when installing and configuring your FC switches.

Note: If you are using FC switches that were previously used for another purpose, you must restore the FC switches to the factory defaults.

6. If you are converting a stretch MetroCluster system, got to Step 11; otherwise, install the bridges by completing the following substeps, and then continuing to Step 8:
 - a. Secure the "L" brackets on the front of each bridge to the front of the rack with the four screws you acquired in the *Preparing for the installation* section.
 - b. Ground each bridge to the equipment rack.
 - c. Connect each bridge to a power source and turn them on.

Note: Make sure that each bridge is connected to a different power source for resiliency.

The bridge Ready LED might take up to 30 seconds to illuminate, indicating that the bridge has completed its power-on self test sequence.

For information about power requirements and LEDs, see the *ATTO FibreBridge 6500N Installation and Operation Manual*.

7. Connect the Ethernet management 1 port on each bridge to your network using an Ethernet cable.

Note: The Ethernet management 1 port enables you to quickly download the bridge firmware (using ATTO ExpressNAV or FTP management interfaces) and to retrieve core files and extract logs.

8. Set up and configure each bridge by completing the following substeps:
 - a. Configure the Ethernet management 1 port for each bridge by following the procedure in the *ATTO FibreBridge 6500N Installation and Operation Manual*, section 2.0.

Note: When running QuickNAV to configure an Ethernet management port, only the Ethernet management port that is connected by the Ethernet cable is configured. For example, if you also wanted to configure the Ethernet management 2 port, you would need to connect the Ethernet cable to port 2 and run QuickNAV.
 - b. Configure each bridge by following the procedure in the *ATTO FibreBridge 6500N Installation and Operation Manual*, section 3.0.

You should make note of the user name and password you designate.

9. Update the firmware on each bridge to the latest version by following the instructions—starting with Step 4—on the FibreBridge 6500N Download page.

10. Cable the disk shelves to the bridges by completing the following substeps:

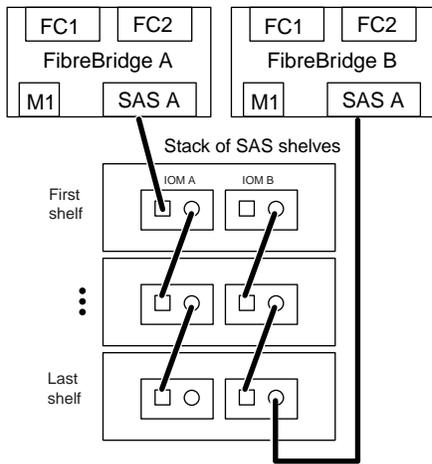
Note: The disk shelves in the stack remain daisy-chained.

- a. For each stack of disk shelves, cable IOM A square port of the first shelf to SAS port A on FibreBridge A.
- b. For each stack of disk shelves, cable IOM B circle port of the last shelf to SAS port A on FibreBridge B.

Each bridge has one path to its stack of disk shelves; bridge A connects to the A-side of the stack through the first shelf, and bridge B connects to the B-side of the stack through the last shelf.

Note: The bridge SAS port B is disabled.

The following illustration shows a set of bridges cabled to a stack of three disk shelves:



11. Verify that each bridge can see all disk drives and disk shelves it is connected to.

If you are using the... Then...

ATTO ExpressNAV GUI

- a. In a supported web browser, enter the IP address of the bridge in the browser box. You are brought to the ATTO FibreBridge 6500N home page, which has a link.
- b. Click the link and enter your user name and the password that you designated when you configured the bridge. The ATTO FibreBridge 6500N status page appears with a menu to the left.
- c. Click **Advanced** in the menu.
- d. Enter the following command, and then click **Submit**:

sastargets

Serial port connection Enter the following command:

sastargets

Example

The output shows the devices (disks and disk shelves) that the bridge is connected to. Output lines are sequentially numbered so you can quickly count the devices. For example, the following output shows that 10 disks are connected.

Tgt	VendorID	ProductID	Type	SerialNumber
0	NETAPP	X410_S15K6288A15	DISK	3QP1CLE300009940UHJV
1	NETAPP	X410_S15K6288A15	DISK	3QP1ELF600009940V1BV
2	NETAPP	X410_S15K6288A15	DISK	3QP1G3EW00009940U2M0
3	NETAPP	X410_S15K6288A15	DISK	3QP1EWMP00009940U1X5
4	NETAPP	X410_S15K6288A15	DISK	3QP1FZLE00009940G8YU
5	NETAPP	X410_S15K6288A15	DISK	3QP1FZLF00009940TZKZ
6	NETAPP	X410_S15K6288A15	DISK	3QP1CEB400009939MGXL
7	NETAPP	X410_S15K6288A15	DISK	3QP1G7A900009939FNNTT
8	NETAPP	X410_S15K6288A15	DISK	3QP1FY0T00009940G8PA
9	NETAPP	X410_S15K6288A15	DISK	3QP1FXW600009940VERQ

Note: If the text, "response truncated" appears at the beginning of the output, you can Telnet to the bridge and enter the same command to see all the output.

12. Cable the bridges to the FC switches by completing the following substeps:

- a. Cable FC port 1 on bridge A to FC switch 1.
- b. Cable FC port 1 on bridge B to FC switch 2.

Note: You can connect the bridge to any available port on the FC switch. Whichever port you choose, you must use the same port consistently on each FC switch you are connecting for both sites. This is for ease of manageability. For example, if you choose FC switch port 3, only use that port on each FC switch.

Note: The FC port 2 remains unused on each bridge.

13. Cable the controllers to the FC switches using the information in the *Data ONTAP 7-Mode High-Availability Configuration Guide*.

14. Assign disk ownership by using the information in the *Data ONTAP 7-Mode High-Availability Configuration Guide*.

You can use the disk drive information you gathered in Step 1.

Note: If you are splitting a single stack of disk shelves between two controllers, you must disable disk autoassignment before assigning disk ownership; otherwise, when you assign any single disk drive, the remaining disk drives might be automatically assigned to the same controller and pool.

To disable disk autoassignment, run the `options disk.auto_assign off` command at the console of both controllers.

15. Install the Data ONTAP licenses on each controller in the following order:

- a. `syncmirror_local`
- b. `cf_remote`

16. Reboot each controller.

17. Configure the controller by using the information in the *Data ONTAP 7-Mode High-Availability Configuration Guide*:

If you are converting a...	Then...
Standard HA pair with SAS storage	Set up mirroring, and then configure the controller. Note: You need to add disk shelves, disable disk autoassignment, assign the new disk drives to pool 1, and then boot each controller.
Stretch MetroCluster system with SAS storage	Configure the controller.

18. Verify that the aggregate Snapshot copy reserve for mirroring is 5% or larger by entering the following command at the console of each controller:

```
aggr options aggrname
```

19. Configure the MetroCluster system by using the information in the *Data ONTAP 7-Mode High-Availability Configuration Guide*.

20. Transport the partner controller, FC switches, disk shelves, and bridge to the remote site.

21. Install and set up the remote site system by repeating this procedure.

Related concepts

[FibreBridge error messages](#) on page 22

Other FibreBridge management interfaces

You can use a combination of serial port, Telnet, and FTP instead of the recommended management interfaces. Your system must meet the requirements for the applicable interface before you install the bridges.

You can use a serial port or Telnet to configure the bridge and Ethernet management 1 port, and to manage the bridge. You can use FTP to update the bridge firmware.

Note: The *ATTO FibreBridge 6500N Installation and Operation Manual* has more information about management interfaces.

You can access this document on the ATTO web site by using the link provided on the ATTO FibreBridge 6500N Description page on the NetApp Support Site at support.netapp.com. From this web site, navigate to the ATTO FibreBridge

Description page by clicking **Software**, scrolling to **Protocol Bridge**, choosing **ATTO FibreBridge** from the drop-down menu, clicking **Go!**, and then clicking **View & Download**.

Serial port

When using the serial port to configure and manage a bridge, and configure the Ethernet management 1 port, your system must meet the following requirements:

- A serial cable (which connects from the bridge serial port to a serial (COM) port on the computer you are using for setup)
The bridge serial port is RJ-45 and has the same pin-out as the controllers.
- A terminal emulation program such as Hyperterminal, Teraterm, or PuTTY to access the console
The terminal program should be capable of logging screen output to a file.
- An IP address, subnet mask, and gateway information for the Ethernet management 1 port on each bridge

Telnet

When using Telnet to configure and manage a bridge, your system must meet the following requirements:

- A serial cable (which connects from the bridge serial port to a serial (COM) port on the computer you are using for setup)
The bridge serial port is RJ-45 and has the same pin-out as the controllers.
- (Recommended) A non-default user name and password (for accessing the bridge)
- A terminal emulation program such as Hyperterminal, Teraterm, or PuTTY to access the console
The terminal program should be capable of logging screen output to a file.

FTP

When using FTP to update bridge firmware, your system must meet the following requirements:

- A standard Ethernet cable (which connects from the bridge Ethernet management 1 port to your network)
- (Recommended) A non-default user name and password (for accessing the bridge)

FibreBridge error messages

Bridge error messages inform you of bridge configuration errors that Data ONTAP has detected when cabling bridges or when downloading disk shelf and disk drive firmware.

Attention: If you must correct cabling on a system that is serving data, you can perform hot-cable changes only if one path to the disk drives is maintained.

config.bridge.adapter.invalid

Message	config.bridge.adapter.invalid
Severity	ERROR
Description	This message occurs when an FC-to-SAS bridge is attached to an unsupported FC adapter port.
Corrective action	Attach the FC-to-SAS bridge to a QLogic 4-Gb/s or 8-Gb/s adapter (which are the only supported adapters). FC ports can be onboard and/or on PCIe HBAs.
SNMP trap ID	N/A

config.bridge.extra.port

Message	config.bridge.extra.port
----------------	--------------------------

Severity	ERROR
Description	This message occurs when both FC ports of an FC-to-SAS bridge are attached to the same controller.
Corrective action	Correct the cabling by following the defined stretch or fabric-attached MetroCluster cabling information and illustrations in this <i>Configuring a MetroCluster system with SAS disk shelves and FibreBridge 6500N bridges</i> document.
SNMP trap ID	N/A

config.bridge.fw.mismatch

Message	config.bridge.fw.mismatch
Severity	ERROR
Description	This message occurs when two or more attached FC-to-SAS bridges are running different firmware versions. All FibreBridges should be running the same firmware version.
Corrective action	Upgrade the firmware version to the latest version on the FC-to-SAS bridges by using the instructions in the ATTO FibreBridge 6500N Firmware Download page on the NetApp Support Site at now.netapp.com/NOW/cgi-bin/software .
SNMP trap ID	N/A

config.bridge.SAS.miswired

Message	config.bridge.SAS.miswired
Severity	ERROR
Description	This message occurs when the SAS disk shelves behind an FC-to-SAS bridge are not wired in the correct order.
Corrective action	Correct the cabling by following the defined stretch or fabric-attached MetroCluster cabling information and illustrations in this <i>Configuring a MetroCluster system with SAS disk shelves and FibreBridge 6500N bridges</i> document.
SNMP trap ID	N/A

config.bridge.SAS2Domain

Message	config.bridge.SAS2Domain
Severity	WARNING
Description	This message occurs when a disk is multipathed to one SAS domain; that is, both ports of the disk are visible from the same bridge FC port.
Corrective action	Recable the disk shelf containing the specified disk, so that the two disk ports are in different SAS domains. You can use the cabling information and illustrations in this <i>Configuring a MetroCluster with SAS disk shelves and FibreBridge 6500N</i> document.
SNMP trap ID	N/A

dfu.badBridgeShelfConfig

Message	dfu.badBridgeShelfConfig
----------------	--------------------------

Severity	ERROR
Description	This message occurs when the disk firmware update aborts because it cannot contact the two peer FC-to-SAS bridges.
Corrective action	Make sure that the storage controller is correctly cabled to the two peer FC-to-SAS bridges and that the bridges are correctly cabled to the SAS disk shelves, and then run the <code>disk_fw_update</code> command again. You can use the cabling information and illustrations in this <i>Configuring a MetroCluster with SAS disk shelves and FibreBridge 6500N</i> document.
SNMP trap ID	N/A

sfu.badBridgeShelfConfig

Message	sfu.badBridgeShelfConfig
Severity	ERROR
Description	This message occurs when the disk shelf firmware update aborts because it cannot contact the two peer FC-to-SAS bridges.
Corrective action	Make sure that the storage controller is correctly cabled to the two peer FC-to-SAS bridges and that the bridges are correctly cabled to the SAS disk shelves, and then run the <code>storage download shelf</code> command again. You can use the cabling information and illustrations in this <i>Configuring a MetroCluster with SAS disk shelves and FibreBridge 6500N</i> document.
SNMP trap ID	N/A

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