NetApp® Filers
F740 and F760 Cluster Guide

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Part number 210-02405-B0
August 2000

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Preface

About this guide

This guide describes how to set up new and convert existing F740 and F760 filers and Fibre Channel StorageShelves into clusters. This guide does not cover basic system or network administration topics, such as IP addressing, routing, and network topology.

Audience

This guide is for system administrators who are familiar with operating a NetApp® F740 or F760 filer and a Fibre Channel StorageShelf FC7 (9-GB disk drives), a Fibre Channel StorageShelf FC8 (18-GB disk drives), or a Fibre Channel StorageShelf FC9 (18-GB and/or 36-GB disk drives).

Terminology

This guide uses the following terms:

- *Filer* refers to an F740 or F760 filer.
- *Disk shelf* refers to a Fibre Channel StorageShelf FC7, Fibre Channel StorageShelf FC8, or a Fibre Channel StorageShelf FC9.

Command conventions

You can enter filer commands on the system console or from any client that has access to the filer using Telnet. In examples of commands run on a UNIX workstation, this guide uses the command syntax and output of SunOS 4.1*x*. If you use a different version of UNIX, the command syntax and output might be different.

Keyboard conventions

This guide uses capitalization and some abbreviations to refer to the keys on the keyboard. The keys on your keyboard might not be labeled exactly as they are in this guide.

What is in this guide...	What it means...
hyphen (-)	Used to separate individual keys. **For example:** Ctrl-D means holding down the Ctrl key while pressing the D key.

What is in this guide...	What it means...
Enter	Used to refer to the key that generates a carriage return, although the key is named Return on some keyboards.
type	Used to mean pressing one or more keys on the keyboard.
enter	Used to mean pressing one or more keys and then pressing the *Enter* key.

Formatting conventions

The following table lists the kinds of formatting this guide uses to identify special information.

Formatting convention	Type of information
Italic type	◆ Words or characters that require special attention. ◆ File names and path names. ◆ Placeholders for information you must supply. For example, if the guide requires you to enter the **`arp -d`** ***`hostname`*** command, you enter the characters “arp -d” followed by the actual name of the host. ◆ Man page names. ◆ Book titles in cross-references.
`Monospaced` font	◆ Command and daemon names. ◆ Information displayed on the system console or other computer monitors. ◆ The contents of files.
`Bold monospaced` font	Words or characters you type. What you type is always shown in lowercase letters, unless you must type it in uppercase letters for it to work properly.

Special messages

This guide contains special messages that are described as follows.

Note

A note contains important information that helps you install or operate the system efficiently.

Caution

A caution contains instructions that you must follow to avoid damage to the equipment, a system crash, or loss of data.

WARNING

A warning contains instructions that you must follow to avoid personal injury.

Safety Information

Safety rules

You must follow these safety rules when working with this equipment:

WARNING

Failure to follow the directions contained in the following statements could result in bodily harm or loss of life.

- When installing disk shelves and a filer/NetCache™ Appliance into a movable cabinet or rack, install the equipment from the bottom up for best stability.
- To reduce the risk of personal injury from hot surfaces, allow the internal components time to cool before touching them or installing options.
- To reduce the risk of personal injury or damage to the equipment, ensure that the equipment is properly supported or braced when installing options.
- This equipment is designed for connection to a grounded outlet. The grounding type plug is an important safety feature. To avoid the risk of electrical shock or damage to the equipment, do not disable this feature.
- This equipment is furnished with one or more replaceable batteries. There is danger of explosion if the battery is incorrectly replaced. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Warning for units with two power supplies

If your filer, NetCache Appliance, or disk shelf has two power supplies and you need to turn the unit off, heed the following warning:

WARNING

This unit has more than one power supply cord. To reduce the risk of electrical shock, disconnect all power supply cords before servicing.

AVERTISSEMENT

Cet appareil comporte plus d'un cordon d'alimentation. Afin de prévenir les chocs électriques, débrancher tous les cordons d'alimentation avant d'effectuer le dépannage.

ACHTUNG

Dieses Gerät besitzt zwei Netzanschlussleitungen. Vor Wartung alle Anschlüsse vom Netz trennen.

Required Materials 1

About this chapter

This chapter lists the information and materials you need to assemble for cabling a new F740/F760 cluster installation or for converting your F740/F760 systems into a cluster.

Required materials checklists

Required tools and equipment

You need the following tools and equipment to assist you in setting up the cluster or converting your filers to a cluster.

	Required tools and equipment	Where needed
☐	#1 Phillips screwdriver	Cabinet horizontal trim piece
☐	#2 Phillips screwdriver	Screws on mounting brackets, front of cabinet, filer front panel, filer slide rails, grounding cable lugs, cabinet trim pieces, system cabinet PDUs, disk shelves, system cabinet side panels, and back of filer
☐	Antistatic wrist strap and grounding leash	Used for grounding yourself during component installation

Required manuals

You need the following manuals to assist you in setting up your cluster or converting your filers into a cluster.

	Required manuals	Reasons
☐	*Start Here*	Provides information for installing and updating Data ONTAP™ software
☐	*Data ONTAP System Administrator's Guide*	Describes system administration functions and procedures, including cluster concepts and configuration
☐	*First-Time Configuration Using the Setup Command*	Provides the information required to configure your new cluster

	Required manuals	Reasons
☐	*System Cabinet Installation Guide*	Required for a new cluster where components are in NetApp System Cabinets
☐	*F700 Series Hardware Guide*	Required for ◆ Installing your new cluster in equipment racks ◆ Connecting your new cluster to your network
☐	Hardware guide for your fibre channel disk shelf	Required for ◆ Installing your new cluster in equipment racks ◆ A cluster conversion
☐	*F700 Series Field Service Guide*	Required for a cluster conversion
☐	*Software and Firmware Update Guide*	Required for updating software and firmware on a cluster conversion

Required labels

You need the following labels, which were provided with your cluster or were in your cluster conversion kit.

	Required labels	Where needed
☐	Solid-colored labels	Labeling all Channel A loop cables
☐	Striped labels	Labeling all Channel B loop cables

Cabling a New Cluster 2

About this chapter

This chapter describes the tasks you need to perform to cable a new cluster in either NetApp System Cabinets or equipment racks.

Topics in this chapter

The following topics are covered in this chapter:

- "Cabling your NetApp System Cabinets into a cluster" on page 6
- "Cabling your equipment racks into a cluster" on page 13

Cabling your NetApp System Cabinets into a cluster

How your NetApp System Cabinets arrive

Your NetApp cluster comes to you in one or more system cabinets, depending on the amount of storage ordered for your cluster.

Single system cabinet: If you ordered six or fewer disk shelves, your cluster arrives in a pre-cabled, single system cabinet. This system cabinet can be configured as follows:

- Three disk shelves mounted at the bottom of the cabinet
- Two F700 series filers mounted above the bottom set of disk shelves
- Three or fewer disk shelves mounted above the top filer

Your single system cabinet comes to you with the Channel A and Channel B disk shelves cabled, and also has the cluster interconnect adapters cabled. All you need to do is connect the cluster to the network, apply power to the system and components, and configure your cluster. See the *F700 Series Hardware guide* for information about connecting your cluster to the network and applying power. See the *System Administrator's Guide* for cluster software configuration information.

Multiple system cabinets: If you have seven or more disk shelves in your cluster, your cluster arrives in two or more system cabinets. Each system cabinet supports up to eight disk shelves and one filer, or two filers and six disk shelves. If you ordered the maximum storage capacity for your cluster, your system cabinets contain the following components:

- Four disk shelves mounted at the bottom of two of the system cabinets
- One filer mounted above the disk shelves in two of the system cabinets
- Four disk shelves mounted above the filers in two of the system cabinets
- The balance of the disk shelves, a maximum of eight disk shelves per system cabinet, in the remaining system cabinets

Required tools and manuals

You need the following tools and manuals to prepare your system cabinets for clustering:

- The *System Cabinet Guide*
- The *F700 Series Hardware Guide*
- #1 and #2 Phillips screwdrivers

Required cables

When you received your system cabinets, you should have received the following cables:

- HSSDC to DB-9 filer-to-shelf cables, one per FC-AL adapter for the Channel B loop
- Cluster interconnect cables, one pair

Note

Your system cabinets arrive with the Channel A and Channel B loops pre-cabled with the shelf-to-shelf cables.

For detailed information

The cabling process is divided into four major steps:

- "Step 1: Preparing the system cabinets" on page 8
- "Step 2: Cabling the cluster interconnect adapters" on page 9
- "Step 3: Cabling shelf 0 for takeover" on page 10
- "Step 4: Completing setup" on page 12

Step 1: Preparing the system cabinets

Setting up the system cabinets

To set up your system cabinets for clustering, complete the following steps.

Step	Action
1	Remove the front and rear doors of the system cabinets. See the *System Cabinet Guide.*
2	Remove the side panels from the system cabinets. You should only remove the panels from the sides that will be connected. See the *System Cabinet Guide.*
3	Connect the system cabinets. See the *System Cabinet Guide.*
4	Connect the filers in your cluster to your network. See the *F700 Series Hardware Guide.*
5	Connect the system cabinets to power sources. See the *System Cabinet Guide.*

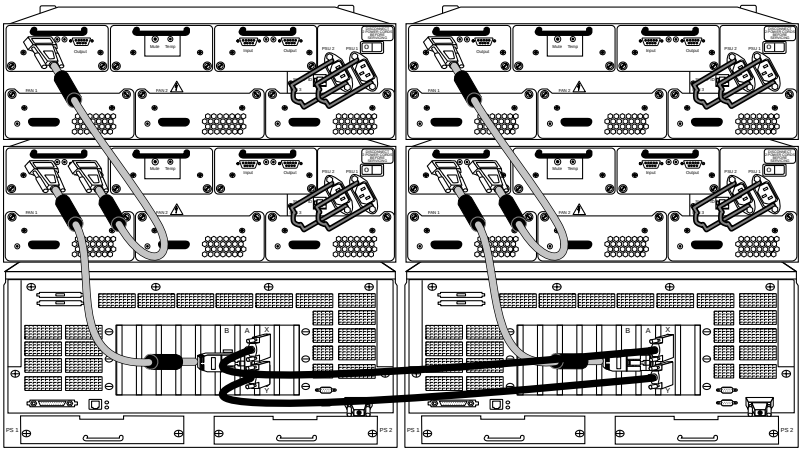
Step 2: Cabling the cluster interconnect adapters

Cluster interconnect adapters cabling diagram

The following diagram shows how the cluster interconnect adapters are cabled between the filers.

Caution

Verify that you correctly cabled the cluster interconnect adapters. The X and Y ports on the filer must be cabled to the corresponding X and Y ports on the partner filer. Incorrect cabling disables the takeover feature.



Cabling the cluster interconnect adapters

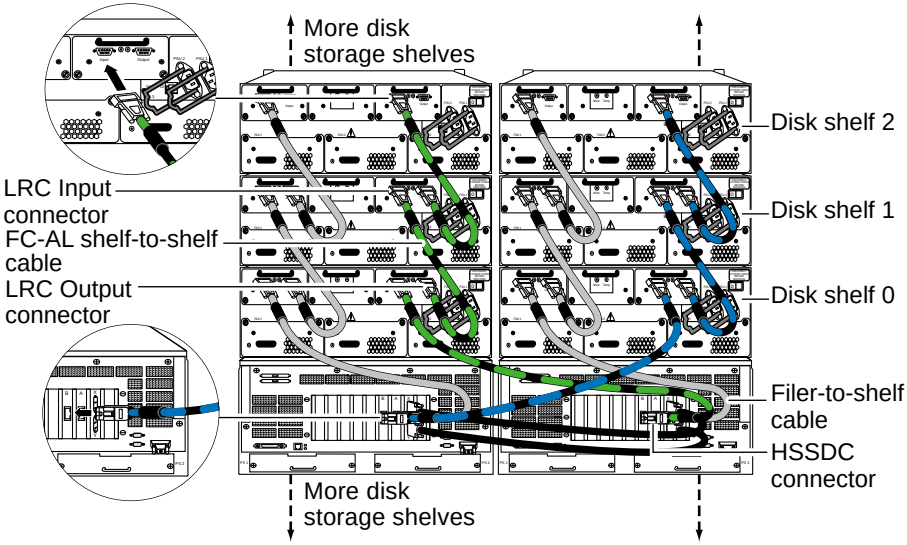
To cable the cluster interconnect adapters to the filers, complete the following steps.

Step	Action
1	Connect one end of the 4m cluster interconnect cable to the X port on the local filer, and the other end to the X port on the partner filer.
2	Connect one end of the 4m cluster interconnect cable to the Y port on the local filer, and the other end to the Y port on the partner filer.
3	Go to section “Step 3: Cabling shelf 0 for takeover” on page 10.

Step 3: Cabling shelf 0 for takeover

Disk shelf 0 cabling diagram

The following diagram shows how the Channel B shelf 0 on the local filer is cabled to the partner filer and how the Channel B disk shelf 0 on the partner filer is cabled to the local filer.



Cabling disk shelf 0 to the filers

To cable disk shelf 0 of the local filer to the partner filer and vice-versa, complete the following steps.

Step	Action
1	Connect the HSSDC connector to the Channel B FC-AL port on the local filer and connect the other end of the cable to the Channel B LRC Input port on disk shelf 0 of the partner filer. **Note** Because the filer-to-shelf cable is long, it must crisscross behind the vertical trim piece on the rear of the system cabinets.
2	Repeat Step 1 for the partner filer.
3	Go to section “Step 4: Completing setup” on page 12.

Step 4: Completing setup

Completing clustered cabinet setup

To comply with FCC noise reduction requirements, you must reinstall the front and rear doors of your clustered system cabinets.

To reinstall the front and rear doors of the system cabinets, complete the following steps.

Step	Action
1	Reinstall the front doors of the cabinets. See the *System Cabinet Guide*.
2	Reinstall the rear doors of the cabinets. See the *System Cabinet Guide.*

Where to go next

After cabling your system cabinets into a cluster, continue configuring your cluster as described in Chapter 4, "Configuring the Cluster," on page 41. Also see the *First-Time Configuration Guide* for more detailed information about configuring your new cluster.

Cabling your equipment racks into a cluster

Basic equipment rack configuration

Depending on the amount of storage you ordered, you need to install the equipment in one or more telco-style equipment racks. These racks can hold one or two filers, along with disk shelves, or up to a maximum of eight disk shelves in a disk shelf-only configuration. For information about how to install the disk shelves in an equipment rack, see the appropriate fibre channel storageshelf guide.

Basic filer configuration

The basic configuration you receive with your cluster is a minimum of two Fibre Channel Arbitrated Loop (FC-AL) adapters per filer. You can add two additional FC-AL adapters per filer.

Your filers also arrive with one cluster interconnect adapter apiece. This adapter enables you to cluster your filers together. For further information about other components you receive, see the *F700 Series Hardware Guid*e.

Required tools and manuals

You need the following tools and manuals to prepare your equipment racks for clustering:

- The *F700 Series Hardware Guide*
- The appropriate disk shelf hardware guide
- #1 and #2 Phillips screwdriver

Required cables

When you received your filers and disk shelves, you should have received the following cables:

- HSSDC to DB-9 filer-to-shelf cables, one per FC-AL adapter
- Shelf-to-shelf cables, two pair per disk shelf for the Channel A and Channel B loops
- Cluster interconnect cables, one pair

For detailed information

The following sections discuss cabling your new cluster.

The cabling process is divided into six major steps:

- "Step 1: Preparing your equipment" on page 15
- "Step 2: Cabling the Channel A loops" on page 16
- "Step 3: Cabling the cluster interconnect adapters" on page 18
- "Step 4: Cabling the Channel B loops" on page 19

Step 1: Preparing your equipment

Preparing your equipment

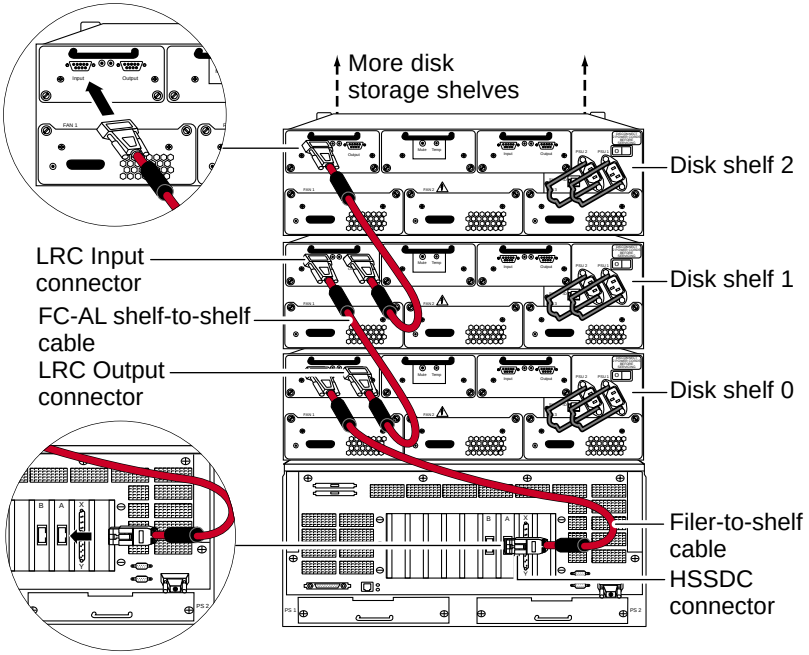
To prepare new equipment for clustering, complete the following tasks.

Step	Action
1	Install both filers. See the *F700 Series Hardware Guide.*
2	Label the FC-AL interfaces as described in Appendix A, "Cluster Configuration Examples," on page 59.
3	Install the disk shelves and set the disk shelf IDs. See the hardware guide for your fibre channel disk shelf.
4	Go to section "Step 2: Cabling the Channel A loops" on page 16.

Step 2: Cabling the Channel A loops

Channel A loops cabling diagram

The following diagram shows how the filer is cabled to Channel A disk shelf 0 and how the balance of the Channel A shelf-to-shelf loops are cabled.



Cabling the Channel A loops

To cable Channel A loops, complete the following steps.

Step	Action
1	Connect the HSSDC connector to the Channel A FC-AL port on your filer and connect the other end of the cable to the Channel A LRC Input port on disk shelf 0.
2	Label this cable with a solid-colored label.

Step	Action
3	Connect one end of the shelf-to-shelf cable to the Channel A disk shelf 0 LRC Output port, then connect the other end to the Channel A disk shelf 1 LRC Input port.
4	Label this cable with a solid-colored label.
5	Repeat Steps 3 and 4, connecting Channel A disk shelf 1 to Channel A disk shelf 2 and so, on for the remaining disk shelves.
6	Repeat Steps 1 through 5 for the partner filer.
7	Go to section “Step 3: Cabling the cluster interconnect adapters” on page 18.

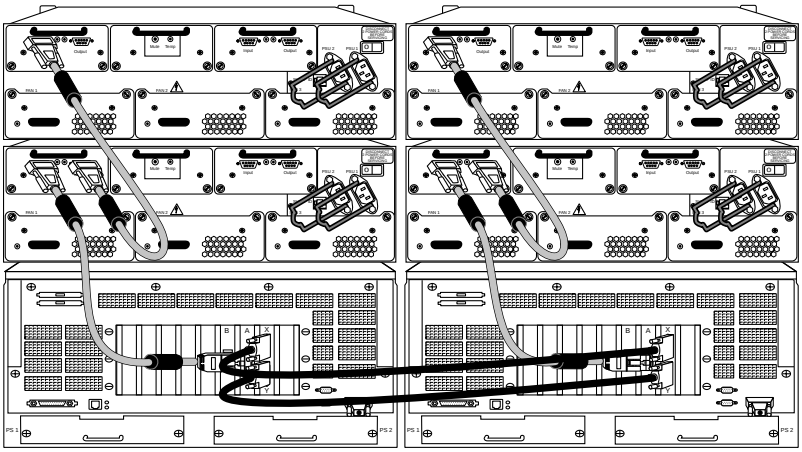
Step 3: Cabling the cluster interconnect adapters

Cluster interconnect adapter cabling diagram

The following diagram shows how the local filer and partner filer are cabled into a cluster through the cluster interconnect adapter cables.

Caution

Make sure that you cable the X port on the local filer to the X port on the partner filer. Incorrectly connecting the cluster interconnect adapter ports disables the cluster takeover feature.



Cabling the cluster interconnect adapters

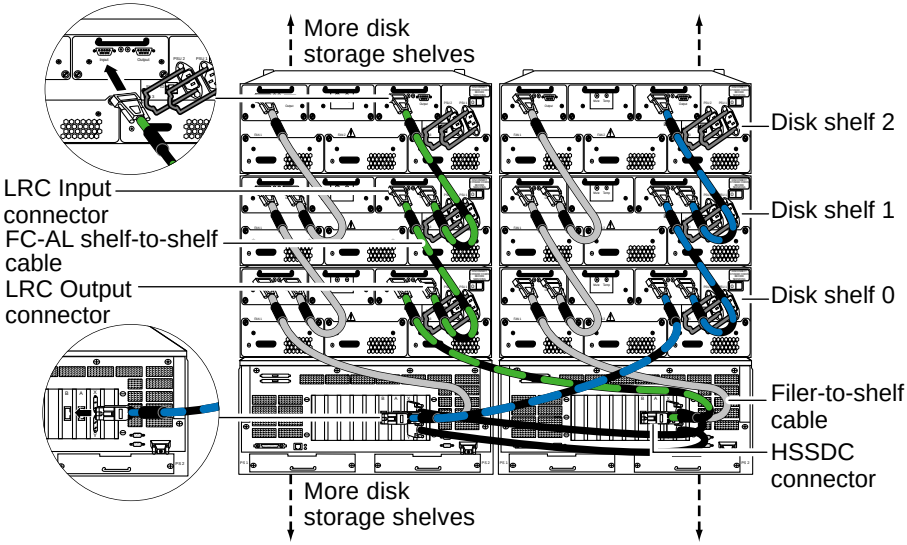
To cable your local filer and partner filer into a cluster through the cluster interconnect adapter, complete the following steps.

Step	Action
1	Connect one end of the 4m cluster interconnect cable to the X port on the local filer, and the other end to the X port on the partner filer.
2	Connect one end of the 4m cluster interconnect cable to the Y port on the local filer, and the other end to the Y port on the partner filer.
3	Go to section “Step 4: Cabling the Channel B loops” on page 19.

Step 4: Cabling the Channel B loops

Channel B loops cabling diagram

The following diagram shows how the local filer is cabled to the Channel B disk shelf 0 on the partner filer, how the partner filer is cabled to the Channel B disk shelf 0 of the local filer, and how the balance of the Channel B loops are cabled.



Cabling the Channel B loops

To cable the Channel B loops, complete the following steps.

Step	Action
1	Connect the HSSDC connector to the Channel B FC-AL port on your local filer, then connect the other end of the cable to the Channel B LRC Input port on disk shelf 0 of the partner filer.
2	Label this cable with a striped label.
3	Connect one end of the shelf-to-shelf cable to the Channel B disk shelf 0 LRC Output port, then connect the other end to the disk shelf 1 Channel B LRC Input port.

Step	Action
4	Label this cable with a striped label.
5	Repeat Steps 3 and 4, connecting disk shelf 1 to disk shelf 2 and so on, for the remaining disk shelves.
6	Repeat Steps 1 through 5 for the partner filer.
7	If your filers have multiple FC-AL adapers installed, see Appendix A, "Cluster Configuration Examples," on page 59 and Appendix B, "Shelf-to-Partner Filer Cabling," on page 67 for diagrams of how to cable multiple FC-AL adapters.

Where to go next

After you cable your filers and disk shelves into a cluster, continue configuring your cluster as described in Chapter 4, "Configuring the Cluster," on page 41. Also see the *First-Time Configuration Guide* for more detailed information about configuring your new cluster.

Cluster Conversion for Existing Installations 3

About this chapter

This chapter describes the tasks you need to perform to convert existing filers into a clustered system.

After reading this chapter, you will know

- What the minimum hardware requirements are for converting your filers
- What the minimum software and firmware levels are that you must have installed to convert your filers
- How to determine your filer configuration and your currently installed software and firmware levels
- How to update the firmware and software on your hardware
- How to cable your filers into a cluster

Topics in this chapter

This chapter discusses the following topics:

- "Verifying your system configuration" on page 22
- "Updating your system" on page 28
- "Cabling your system into a cluster" on page 32

Verifying your system configuration

Hardware required for clustering

The following tables list all the hardware, including any existing hardware, required to convert your filers into a cluster. See the NOW Web page at http://now.netapp.com for current configuration information.

Filer: The following table lists the minimum and maximum configuration for clustering your filers.

Required hardware	Minimum configuration per filer	Maximum configuration per filer
FC-AL adapters	4	Up to 8
Cluster interconnect adapters (each has two ports: an X port and a Y port)	2	2
Main memory	512 MB	1 GB
NVRAM	32 MB	32 MB

Disk shelves: The following table lists the minimum and maximum hardware configurations for your disk shelves.

Required hardware	Minimum configuration	Maximum configuration
LRC cards:		
FC7	4	Up to 48
FC8	4	Up to 24
FC9	4	Up to 12

Required hardware	Minimum configuration	Maximum configuration
Disk shelves: Fibre Channel StorageShelf FC7 only Fibre Channel StorageShelf FC8 only Fibre Channel StorageShelf FC9 only Mix of Fibre Channel StorageShelf FC7, Fibre Channel StorageShelf FC8, and Fibre Channel StorageShelf FC9 **Caution** Do not place 18-GB or 36-GB disks into 9-GB disk shelves.	 2 2 2 2	 Up to 24 Up to 12 Up to 6 The number of disk shelves for both filers must be no greater than the total storage capacity for the filers.

Cables: The following table lists the minumum and maximum number of cables you need to convert your filers into a cluster.

Required hardware	Minimum	Maximum
4m cluster interconnect cables	2	2
1m filer-to-shelf cables: HSSDC to DB-9 cables	 2	 Up to 8
0.5m shelf-to-shelf (DB-9 to DB-9) cables	2	You need (n - l) number of cables, where n is the number of disk shelves and l is the number of loops.
Terminators for FC7 and FC8 only	2	Up to 4

Software requirements

You require the following software to convert your filer to a cluster:

- Data ONTAP™ 5.2.1 software or later for F700 series filers
- Data ONTAP 5.3.2 software or later for support of Fibre Channel StorageShelf FC9
- Data ONTAP 5.3 or later for Gigabit Ethernet (GbE) adapters

Note

The software is on a CD-ROM. You need network connectivity and access to a UNIX or PC system to download the software to the filers.

Filer, disk shelf, and disk firmware required for clustering

The following table lists the firmware levels required by your cluster.

Firmware type	Version
Filer	2.3_a2 for F700 series filers
Disk	◆ NA05 for the 36-GB, 18-GB, and 9-GB disk drives ◆ NA26 for the 18-GB disk drives ◆ 2747 for the 36-GB disk drive ◆ FB59 for the 9-GB HH disk drive
Storage shelves	1.1 for Fibre Channel StorageShelf FC7 and FC8 3.1 for Fibre Channel StorageShelf FC9

If your disk is not listed in this table, contact your Customer Support representative for the current firmware version.

For detailed information

You must determine whether your system meets the minimum requirements, as described in the previous tables. To determine your system configuration and firmware levels, see the following sections:

- "Verifying your hardware configuration" on page 25
- "Verifying your software version" on page 26
- "Verifying your filer and disk shelf firmware" on page 27

Verifying your hardware configuration

Determining your system configuration

To determine your filer configuration, firmware, disk type, disk shelf firmware version, and IP addresses, complete the following steps.

Step	Action
1	At the consoles of each filer, enter the following command to determine your filer's hardware configuration: `sysconfig -v`
2	At the consoles of each filer, enter the following command to determine the filer and disk firmware versions: `sysconfig -v`
3	At the consoles of each filer, enter the following command to determine the filer's IP address: `ifconfig -a`
4	Compare the information you gathered from Steps 1 through 3 with the information listed in "Hardware required for clustering" on page 22, then proceed to "Verifying your software version" on page 26.

Verifying your software version

Determining your software version

To display the version of Data ONTAP currently running on your filers, complete the following steps.

Step	Action
1	At the console of each filer, enter the following command: **`version`** **Result:** The version number and version date are displayed, similar to the following: `NetApp Release 6.0H1: Fri May 12 03:06:00 PDT 2000`
2	Compare the information you gathered from Steps 1 through 3 with the information listed in "Software requirements" on page 24, then proceed to "Verifying your filer and disk shelf firmware" on page 27.

Verifying your filer and disk shelf firmware

Determining your filer and disk shelf firmware version

To display the current version of firmware, complete the following steps.

Step	Action

1	At the console of each filer, enter the following command:
	`sysconfig -v`
	Result: The filer configuration is displayed, similar to the following:
	`NetApp Release 6.0H1 : Sat Jun 10 01:32:18 PDT 2000`
	`  System ID: 0033554494 ()`
	`  System Serial Number: 000047b7`
	`  System Rev: A0`
	`slot 0: System Board 714 MHz (NetApp System Board VII B0)`
	`  Model Name:  F840`
	`  Serial Number:  P200000024`
	`  Firmware release:  2.4_i1`
	`  Memory Size:  3072 MB`
	`slot 0: FastEnet-10/100 Ethernet Controller`
	`.`
	`.`
	`.`
	`slot 8: Fibre Channel Host Adapter 8(QLogic 2200 rev.5, 64-bit)`
	`  Firmware rev:2.1.11`
	`  Host Loop Id:7FC Node Name:2:000:00e08b:02fe07`
	`  Cacheline size:8FC`
	`.`
	`.`
	`.`
	`Shelf 0: VEM  Kernel Version : 2.5  App. Version : 3.0`
	`Shelf 1: VEM  Kernel Version : 2.5  App. Version : 3.0`

2	Compare the information you gathered with the information listed in "Filer, disk shelf, and disk firmware required for clustering" on page 24, then proceed to "Updating your software and firmware" on page 29.

Updating your system

About updating your system

After you determine your filer configuration and the software and firmware levels of your hardware, you need to update those items that are out of date. Depending on the number of disk shelves you have or might add, you might also need to add additional FC-AL cards. You also need to add one cluster interconnect adapter card to each filer. See the NOW Web page at http://now.netapp.com for additional FC-AL configuration information.

Required tools and manuals

You need the following tools and manuals to prepare your equipment racks for clustering:

- The *F700 Series Hardware Guide*
- The *F700 Series Field Service Guide*
- The appropriate disk shelf hardware guide
- #1 and #2 Phillips screwdrivers

For detailed information

To update your system configuration, software, and firmware levels, see the following sections:

- "Updating your software and firmware" on page 29
- "Updating your hardware" on page 30

Updating your software and firmware

Updating your software and firmware

To update your software and firmware, complete the following steps.

Step	Action
1	Back up all your data.
2	Verify that both filers have network connections.
3	Update each filer to the latest version of the Data ONTAP software. See the *System Administrator's Guide* for more information. The latest version of Data ONTAP also includes the latest version of the disk firmware.
4	If needed, update your disk shelf firmware as follows: At the console of the filer that owns the disk shelf, update the disk firmware by entering the following command: **`disk_fw_update`** **Note** The `disk_fw_update` command only upgrades disks for which firmware files are present in the */etc/disk_fw* directory. It does not upgrade other disks. **Caution** To avoid client drop-off, do not upgrade disk firmware on an active filer because disks can take up to two minutes to complete the update. The `disk_fw_update` man page provides information about how to perform this operation.
5	Update your filer firmware. See the *Software and Firmware Upgrade Guide* for more information.
6	Go to "Updating your hardware" on page 30.

Updating your hardware

Hardware slot assignments

When upgrading your hardware, you might need to add the following to your filers and disk shelves:

- One or more additional FC-AL adapters to your filers
- One cluster interconnect adapter card per filer
- Additional LRC adapters for the Channel B loops of your disk shelves

You might have to move or remove other adapters when adding the appropriate FC-AL adapters. You should have a minimum of one FC-AL adapter for your Channel A loops. See the *F700 Series Field Service Guide* for information about slot assignments.

The following diagram illustrates the possible location for cards in your filers. For current information about slot assignments for your filers, see NOW at http://now.netapp.com.

<table>
<tr><th rowspan="2">Filer</th><th colspan="9">Slot</th></tr>
<tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th></tr>
<tr><td>F740</td><td colspan="3">32-bit FC-AL/NIC</td><td colspan="2"></td><td colspan="2">32-bit FC-AL/
Gb Ethernet</td><td rowspan="3">Cluster interconnect adapter</td><td rowspan="3">NVRAM</td></tr>
<tr><td rowspan="2">F760</td><td colspan="3">32-bit FC-AL</td><td colspan="4">Gb Ethernet</td></tr>
<tr><td colspan="4">32-bit FC-AL/NIC</td><td>SCSI tape</td><td colspan="2">32-bit FC-AL/
Gb Ethernet</td></tr>
</table>

Note

You need Data ONTAP 5.3 software or later if you want to install a tape adapter or use four GbE adapters in expansion slot 5.

Installing additional hardware in your filers and disk shelves

To install the hardware you need for clustering, complete the following steps.

Step	Action
1	If your filers are running, shut down the filers from the console, using the `halt` command: **`halt`**
2	Ground yourself to the filer chassis using the antistatic grounding strap, then turn off the power to the filers and disk shelves.
3	Install and label additional FC-AL cards, as described in the *F700 Series Field Service Guide*. Make sure that you label the FC-AL cards appropriately. **Note** Each FC-AL interface on your filers can connect to a maximum of eight daisy-chained disk shelves. The distribution of the storage capacity for a filer with two or more FC-AL interfaces is left to your discretion. See Appendix A, "Cluster Configuration Examples," on page 59 for examples of labeling the FC-AL interfaces.
4	Install the cluster interconnect adapters as described in the *F700 Series Field Service Guide*.
5	Install any LRC cards as needed, as described in the appropriate fibre channel disk shelf guide. If you have a Fibre Channel StorageShelf FC7, you might have to label your LRC cards as well: ◆ Label the LRC card above the EDM card as Channel A. ◆ Label the LRC card below the EDM card as Channel B.
6	Repeat Steps 1 through 5 on the partner filer.
7	Go to "Cabling your system into a cluster" on page 32.

Cabling your system into a cluster

Basic filer configuration

The basic configuration for a cluster is a minimum of two Fibre Channel Arbitrated Loop (FC-AL) adapters per filer. You can add two additional FC-AL cards per filer. You must also add one cluster interconnect adapter per filer. This adapter enables you to cluster your filers together. You might also need to add LRC cards to your disk shelves for the Channel B loops. For further information about other components you receive, see the *F700 Series Hardware Guid*e.

Mixed disk shelf environments

If you are converting filers that have both FC9 and FC7 disk shelves, you must assign the first FC7 disk shelf as shelf 0. See the *Fibre Channel StorageShelf FC9 Hardware Guide* for information about mixed disk shelf environment cabling.

Status of existing fibre channel loops

The existing fibre channel loop on each of your filers is a Channel A loop in your cluster configuration.

Required tools and manuals

You need the following tools and manuals to prepare your equipment racks for clustering:

- The *F700 Series Hardware Guide*
- The appropriate disk shelf hardware guide
- #1 and #2 Phillips screwdriver

Required cables

You should have the following cables:

- HSSDC to DB-9 filer-to-shelf cables, one per FC-AL adapter
- Shelf-to-shelf cables, two pair per disk shelf for the Channel A and Channel B loops
- Cluster interconnect cables, one pair

For detailed information

The following sections discuss cabling your new cluster. The cabling process is broken down into the following steps:

- "Step 1: Cabling the Channel A loops" on page 34
- "Step 2: Cabling the cluster interconnect adapters" on page 37
- "Step 3: Cabling the Channel B loops" on page 38

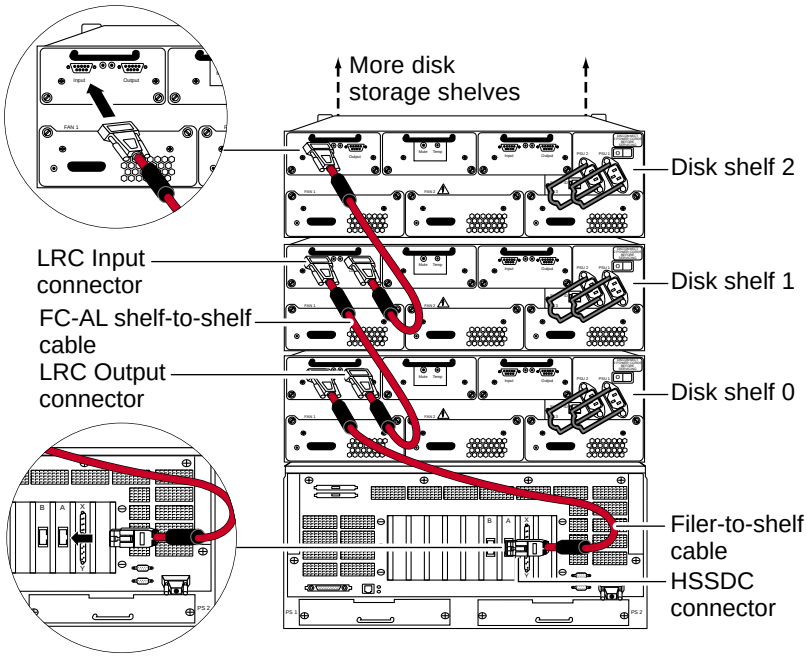
Step 1: Cabling the Channel A loops

Existing Channel A loops

If your filers are currently in service, you already have the Channel A loops cabled. If so, skip this section and go to the section "Step 2: Cabling the cluster interconnect adapters" on page 37.

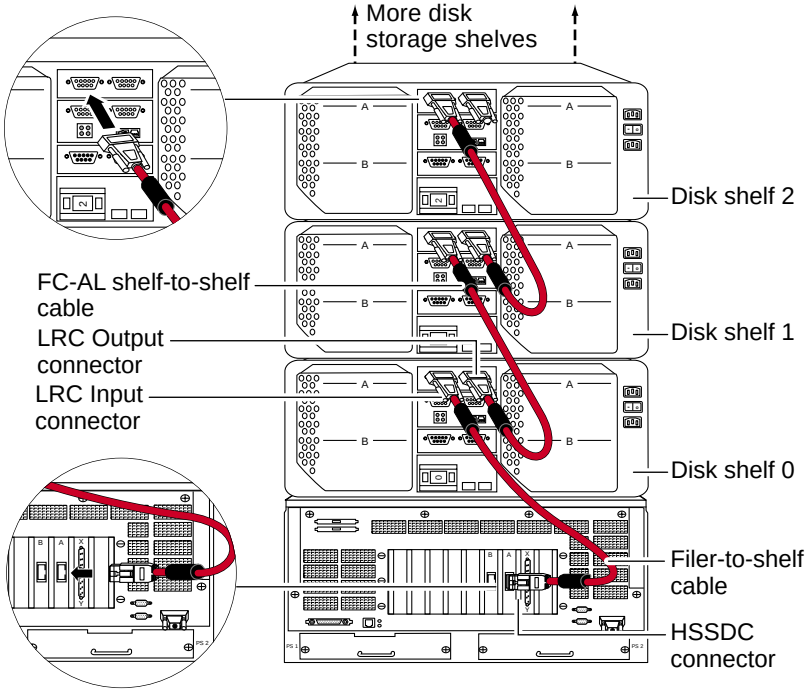
FC9 Channel A loops cabling diagram

The following diagram shows how the local filer is cabled to disk shelf 0 and how the balance of the Channel A loops are cabled on FC9 disk shelves.



FC7 or FC8 Channel A loops cabling diagram

The following diagram shows how the local filer is cabled to disk shelf 0 and how the balance of the Channel A loops are cabled on FC7 or FC8 disk shelves.



Cabling the Channel A loops

To cable the Channel A loops on the local filer and the partner filer, complete the following steps.

Step	Action
1	Connect the HSSDC connector to the Channel A FC-AL adapter on the local filer, then connect the other end of the cable to the Channel A LRC Input port on disk shelf 0.
2	Label this cable with a solid-colored label.
3	Connect one end of the shelf-to-shelf cable to the disk shelf 0 LRC Output port, then connect the other end to the disk shelf 1 LRC Input port.
4	Label this cable with a solid-colored label.

Step	Action	
5	Repeat Steps 3 and 4, connecting disk shelf 1 to disk shelf 2 and so on, for the remaining disk shelves.	
6	**If...**	**Then...**
	You have FC7 or FC8 disk shelves	Terminate the loop with a terminator on the last Channel A LRC Output port.
	You have FC9 disk shelves	Go to Step 6 because the FC-AL loops are self-terminating.
7	Repeat Steps 1 through 6 for the partner filer, then proceed to Step 8.	
8	Go to section "Step 2: Cabling the cluster interconnect adapters" on page 37.	

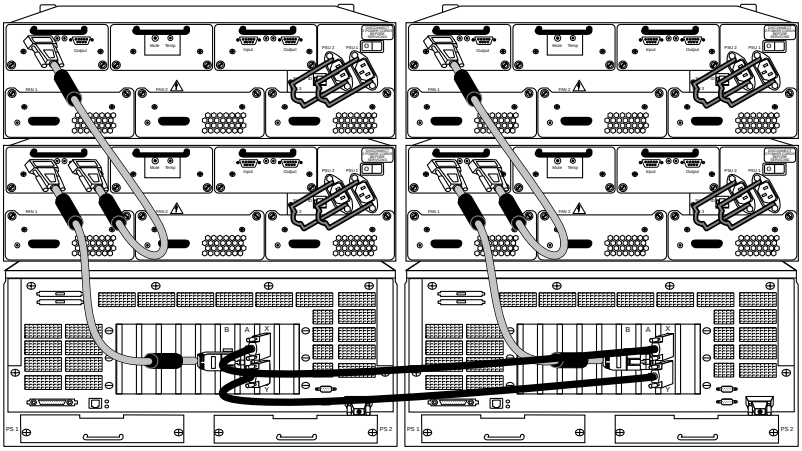
Step 2: Cabling the cluster interconnect adapters

Cluster interconnect adapters cabling diagram

The following diagram shows how the local filer and partner filer are cabled into a cluster through the cluster interconnect adapters.

Caution

Make sure that you cable the X port on the local filer to the X port on the partner filer. Incorrectly connecting the ports disables the cluster takeover feature.



Cabling the cluster interconnect adapters

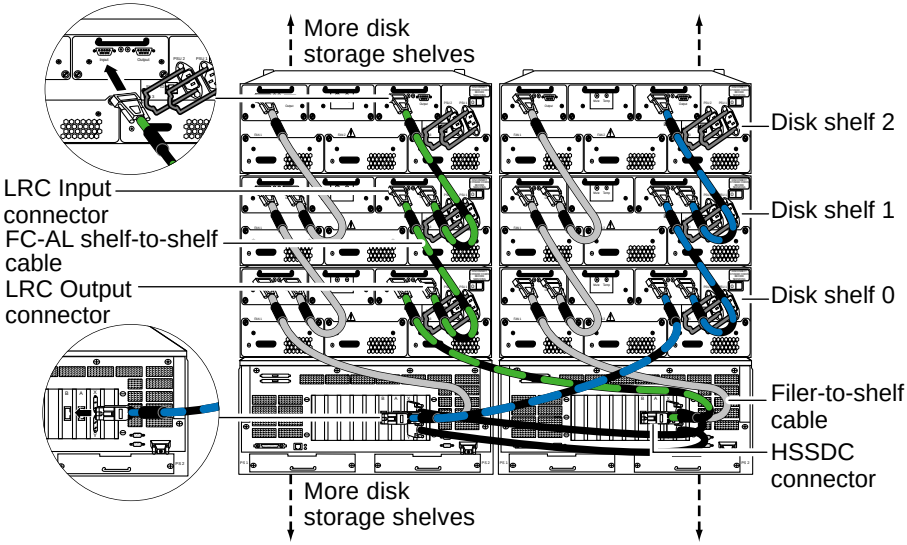
To connect the filers into a cluster through the cluster interconnect adapters, complete the following steps.

Step	Action
1	Connect one end of the 4m cluster interconnect cable to the X port on the filer, and the other end to the X port on the partner filer.
2	Connect one end of the 4m cluster interconnect cable to the Y port on the filer, and the other end to the Y port on the partner filer.
3	Go to section “Step 3: Cabling the Channel B loops” on page 38.

Step 3: Cabling the Channel B loops

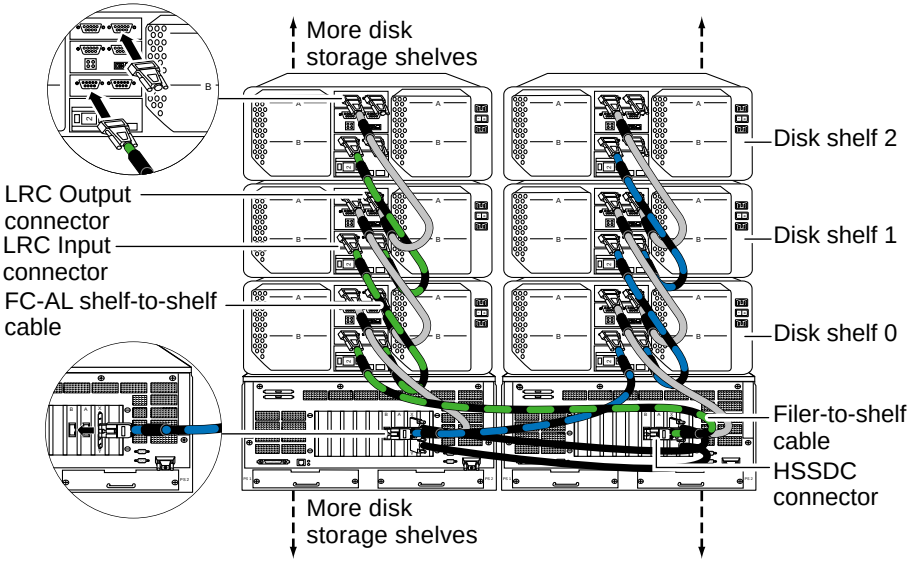
FC9 Channel B loops cabling diagram

The following diagram shows how the local filer is cabled to disk shelf 0 on the partner filer, how the partner filer is cabled to disk shelf 0 of the local filer, and how the balance of the Channel B loops are cabled on FC9 disk shelves.



FC7 or FC8 Channel B loops cabling diagram

The following diagram shows how the local filer is cabled to disk shelf 0 on the partner filer, how the partner filer is cabled to disk shelf 0 of the local filer, and how the balance of the Channel B loops are cabled on FC7 or FC8 disk shelves.



Cabling the Channel B loops

To cable the Channel B loops for your local and partner filers, complete the following steps.

Step	Action
1	Connect the HSSDC connector to the Channel B FC-AL adapter on the local filer, then connect the other end of the cable to the Channel B LRC Input adapter port on the partner filer's disk shelf 0.
2	Label this cable with a striped label.
3	Connect one end of the shelf-to-shelf cable to the Channel B disk shelf 0 LRC Output port, then connect the other end to the disk shelf 1 Channel B LRC Input port.
4	Label this cable with a striped label.
5	Repeat Steps 3 and 4, connecting disk shelf 1 to desk shelf 2, and so on, for the remaining disk shelves.

Step	Action	
6	**If...**	**Then...**
	You have FC7 or FC8 disk shelves	Terminate the Channel B loop on the last LRC Output port.
	You have FC9 disk shelves	Go to Step 7 because the FC-AL loops are self-terminating.
7	Repeat Steps 1 through 6 for the partner filer.	

Where to go next

After you cable the filers and disk shelves together, continue configuring your cluster as described in Chapter 4, "Configuring the Cluster." Also see the *First-Time Configuration Guide* for more detailed information about configuring your new cluster.

For alternate cabling diagrams, see Appendix A, "Cluster Configuration Examples."

For additional Channel B cabling diagrams, see Appendix B, "Shelf-to-Partner Filer Cabling."

Configuring the Cluster 4

About this chapter

This chapter describes the tasks you need to perform after finishing the cabling of your cluster.

After reading this chapter, you will know how to do the following:

- License your cluster
- Set the necessary system parameters and options for your cluster
- Define the necessary networking parameters for your cluster
- Test cluster takeover and giveback for your cluster

Topics in this chapter

This chapter describes the following procedures:

- "Bringing up the cluster" on page 42
- "Configuring the cluster" on page 44
- "Testing takeover and giveback" on page 56

Bringing up the cluster

Booting the new cluster

After cabling your cluster, you need to bring the cluster up so it can be configured.

To bring the cluster up, complete the following steps.

Step	Action
1	Turn on the power to each disk shelf in the cluster.
2	Turn on the power to both filers.
3	At the prompt on each console, enter the following command: **`boot`** **Result:** The filer begins the boot process, booting to the system prompt.
4	Check the status of the cluster by entering the following command on each console: **`cf status`** **Result:** You should see the following output: `cluster monitor not initialized.`
5	Enable the cluster licenses on your filers, as described in "Enabling and licensing clustering on your filers" on page 43.

Enabling and licensing clustering on your filers

To enable clustering and license features on your new cluster, complete the following steps.

Step	Action
1	Enable the licenses on the local filer using the following command: **`license`** ***`option=code`*** *option* is the feature you want to license. *code* is the license code you received for the cluster feature. The following additional licenses must be the same on both filers. These licenses are purchased separately. ◆ Clustering ◆ CIFS ◆ HTTP ◆ NFS
2	Reboot the filer by entering the following commands: **`halt`** **`boot`**
3	Repeat Steps 1 and 2 for the partner filer.
4	On each console, enter the following command: **`cf enable`** **Result:** Clustering is enabled, but not configured.
5	Check the status of your cluster using the following command: **`cf status`** **Result:** You should see the following output: `Clustering enabled, filer 2 is up.`
6	Configure your cluster as described in "Configuring the cluster" on page 44.

Configuring the cluster

Why you must configure your converted filers

You must configure some parameters, configuration files, and network interfaces, and all licenses, in such a way that when one filer takes over the partner filer, it appears as if it were the partner filer; otherwise, the consequences described in the following table can result.

If...	Then...
Specific options or configuration files have different values	The values used in takeover are unpredictable.
A feature such as CIFS is licensed on one filer but not on the partner filer	After a takeover, CIFS clients cannot access their files on the filer that has taken over from the failed filer.
Network interface configurations do not match	Users of the failed filer see broken network connections.

In general, the more similar the configuration of a filer is to that of its partner, the more it behaves like its partner in a takeover. This section describes the tasks you need to perform to ensure a smooth partner takeover.

For detailed information

For detailed information about configuring the cluster see the following sections:

- "Defining takeover parameters and options" on page 45
- "Types of interfaces used by takeover" on page 49
- "Configuring the interface for takeover" on page 51

Defining takeover parameters and options

Parameters that must match

The parameters listed in the following table must match on each filer. See the *System Administrator's Guide* for more information about these parameters.

Parameter	Command
ARP table	`arp`
date	`date, rdate`
NDMP on or off	`ndmpd` {*on* | *off*}
route table published	`route`
routed enabled	`routed` {*on* | *off*}
time zone	`timezone` *name*

Configuration files that must match

The following configuration files must have identical contents:

- */etc/resolv.conf*
- */etc/httpd.mimetypes*
- */etc/dgateways*
- */etc/nsswitch.conf*
- */etc/rc*

Note

The */etc/rc* file of both filers must have the same value for the `nfs` command (`on` or `off`), or the `nfs` command must be absent from the */etc/rc* file on both filers.

Setting matching options

To verify that specific options on the filers have the same settings, complete the following steps.

Step	Action

1	Enter the following command at each filer's console:
	`options`
	Result: The current option settings on the filer are listed. Output similar to the following is displayed:
	`autosupport.doit DONT`
	`autosupport.enable off`
	`.`
	`.`
	`.`
	`dns.domainname fido (shared in takeover)`
	`dns.enable off (shared in takeover)`
	`ftpd.enable off`
	`.`
	`.`
	`.`

2	Verify that the options that have comments in parentheses are set to the same value for both filers. The comments you see are as follows: ◆ Shared in takeover ◆ Must be the same in local+partner ◆ Should be the same in local+partner
3	Set the options to the same values by entering the following command: **`options`** ***`option_name option_value`***

Options that must be the same

The options in the following table must be the same on both filers. If these options are not the same on both filers, the takeover filer cannot take over its partner's resources if the partner fails. See the *System Administrator's Guide* for more information about these options.

Option	Default value
`rsh.enable`	on

Option	Default value
`snmp.enable`	on
`telnet.enable`	on
`telnet.host`	----

Options that should be the same

The options in the following table should be the same on both filers. If these options are not the same on both filers, the takeover filer might not be able to take over its partner's resources if the partner fails. See the *System Administrator's Guide* for more information about these options.

Option	Default value
`timed.max.skew`	30m
`timed.pronto`	ntp
`timed.sched`	hourly
`timed.servers`	----

Options that are shared in takeover

The options in the following table are shared between the filers during takeover. Setting these options to the same values on both filers ensures consistent results during takeover. See the *System Administrator's Guide* for more information about these options.

Option	Default value
`cifs.show_snapshot`	off
`dns.domainname`	----
`dns.enable`	off
`httpd.admin.enable`	off
`httpd.log.format`	common
`httpd.timeout`	300

Option	Default value
`httpd.timewait.enable`	off
`ip.match_any_ifaddr`	on
`ip.path_mtu_discovery.enable`	off
`nfs.per_client_status.enable`	off
`nfs.v2.df_2gb_lim`	off
`nfs.v3.enable`	on
`nis.domainname`	----
`nis.enable`	off
`nis.group_update.enable`	off
`nis.group_update_schedule`	24
`nis.servers`	----
`pcnfsd.enable`	off
`pcnfsd.umask`	11
`raid.timeout`	99
`vol.copy.throttle`	10
`wafl.convert_ucode`	off
`wafl.create_ucode`	off
`wafl.maxdirsize`	9999
`wafl.nt_admin_priv_map_to_root`	on
`wafl.root_only_chown`	off
`wafl.wcc_minutes_valid`	20

Types of interfaces used by takeover

Interface requirements for takeover

In a cluster, you must configure each filer so that if one filer fails, the partner filer can assume its identity. To ensure a successful takeover, your cluster must meet the following requirements:

- Clustered filers must be attached to the same networks and subnetworks.
- Local interfaces on a filer must have a local address (the filer's address) and the address of its partner.

Interface types

There are two kinds of interface configurations you can have for your cluster. The *System Administrator's Guide* provides more information about the types of network interface cards (NICs) that support dual-MAC addresses.

InterfacetType	Description
Single, mirrored NIC	Each filer has a a pair of dedicated interfaces with a local IP address. One of the NICs is a standby interface with the partner's IP address. This configuration is used for adapters that support only a single MAC (media access control) address.
Dual MAC capability	Each filer has a single NIC that supports a pair of dual MAC interfaces, which mirror each other. These NICs can be one of the following: ◆ Single-port 10 Base-T/100 Base-TX Ethernet ◆ Quad-port 10Base-T/100 Base-TX Ethernet ◆ FDDI

Network interface modes

Each network interface in a cluster can act in one of two modes, as follows:

- Normal mode, which is the state where each filer manages its own NICs
- Takeover mode, which is the state where the partner filer takes over control of the failed filer's NICs

Normal mode and takeover mode are described in the following table.

Interface type	Normal mode	Takeover mode
Dedicated	Supports the identity of the local filer	Idle
Standby	Idle	Supports the identity of the partner filer by assuming the partner's IP address
Shared	Supports the identity of the local filer	Supports the identity of ◆ The local filer by retaining the local IP address ◆ The failed filer by assuming the partner's IP address

Configuring the interface for takeover

Interface configuration commands

Interfaces can be configured using either the `setup` command or the `ifconfig` command. The `setup` command runs a script that prompts you for configuration information. The `ifconfig` command lets you manually define the interface parameters for your cluster.

You need to gather the following information prior to configuring your cluster interfaces:

- The IP address for both the filer and partner
- The netmask for both the filer and partner
- The Ethernet addresses for the filer and partner

Using the setup command

When you use the `setup` command, a series of questions appears to enable you to configure the filer. As part of this configuration, the following questions appear for each interface. Answer these questions on both filers, where *n.n.n.n* is the local filer address and the partner filer address for *m.m.m.m*.

See the *System Administrator's Guide* for more information about the `setup` command.

Step	Action
1	Fron the local filer, run the `setup` command by entering the following command at the system prompt: **`setup`**

2	Answer the questions displayed on your screen, including the following questions:
	`Please enter IP address for Network Interface ns0 [`*`n.n.n.n`*`]:`
	`Please enter netmask [255.255.255.0]:`
	`Should interface ns0 take over a partner IP address during failover? [y]:`
	`Please enter the IP address to take over: [`*`m.m.m.m`*`]:`

Step	Action
3	Reboot your filer by entering the following commands: **`halt`** **`boot`**
4	Repeat Steps 1 through 3 for the partner filer.

About the ifconfig command

How you use the `ifconfig` command depends on whether the cluster has a configuration in which

- Each filer has an interface that requires a pair of NICs to facilitate takeover (dedicated and standby)
- Each filer has an interface that requires a single NIC with a dual-MAC address to facilitate takeover (shared)
- Each filer has a dedicated and hot-standby interface for its partner

To configure the interfaces of the converted filers for clusters, place the commands in the following table in each filer's */etc/rc* file.

Type of interface configuration to facilitate takeover	Command

Requires a pair of NICs:
◆ Dedicated
◆ Shared
◆ Standby
	
	`ifconfig e0 local_IP_address`
	`ifconfig e1 local_IP_address partner_IP_address`
	`ifconfig e2 partner partner_IP_address`

Requires a single NIC with dual-MAC addresses	`ifconfig e0 local_IP_address partner \ partner_IP_address`
Dedicated interface with a hot-standby	`ifconfig e0 local_IP_address` `ifconfig e1 partner partner_IP_address`

The *System Administrator's Guide* provides more information about using the `ifconfig` command.

Configuring a pair of NICs with dedicated, shared, and standby interfaces

To set the interfaces for a cluster that has dedicated, shared, and standby interfaces on each filer, complete the following steps.

Step	Action

1	Check the current settings of the local filer by entering the following command on the local filer console:
	`ifconfig -a`
	Result: You should see output similar to the following:
	`e0: Flags=40043<UP,BROADCAST,RUNNING,UP_1ARY> mtu 1500`
	` inet 11.22.33.44 netmask ffffff00 broadcast 11.22.33.45`
	` secondary host inet 11.22.33.70 (not in use)`
	` ether 00:01:00:00:00:00:80 (Data Link Provider Interface)`

2	Set the dedicated network interface IP addresses for the local filer in the */etc/rc* file. Enter the IP addresses using the `ifconfig` command, as follows: `ifconfig e0` *`local_IP_address`*
3	Set the standby network interface IP addresses for the filer's partner filer in the */etc/rc* file. Enter the IP addresses using the `ifconfig` command, as follows: `ifconfig e1` *`local_IP_address`* `partner` *`partner_IP_address`*
4	Set the standby network interface IP addresses for the partner filer in the */etc/rc* file. Enter the IP addresses using the `ifconfig` command, as follows: `ifconfig e2 partner` *`partner_IP_address`*
5	Save the */etc/rc* file.
6	Repeat Steps 1 through 5 for the partner filer.

Configuring single NIC with dual MAC interfaces

To set the interfaces for a cluster that has a single NIC with dual MAC addresses on each filer, complete the following steps.

Step	Action

1	Check the current settings on the local filer by entering the following command on console:
	`ifconfig -a`
	Result: You should see output similar to the following:
	`e0: Flags=40043<UP,BROADCAST,RUNNING,UP_1ARY> mtu 1500`
	` inet 11.22.33.44 netmask ffffff00 broadcast 11.22.33.45`
	` secondary host inet 11.22.33.70 (not in use)`
	` ether 00:01:00:00:00:00:80 (Data Link Provider Interface)`

2	Set MAC network interface IP addresses for the local and partner filers in the */etc/rc* file. Enter the IP addresses using the `ifconfig` command, as follows: **`ifconfig e0 local_IP_address partner partner_IP_address`**
3	Save the */etc/rc* file.
4	Repeat Steps 1 through 3 for the partner filer.

Configuring dedicated and hot-standby interfaces

To set the interfaces for a cluster that has dedicated and hot-standby interfaces on each filer, complete the following steps.

Step	Action

1	Check the current settings on the local filer by entering the following command on console:
	`ifconfig -a`
	Result: You should see output similar to the following:
	`e0: Flags=40043<UP,BROADCAST,RUNNING,UP_1ARY> mtu 1500`
	` inet 11.22.33.44 netmask ffffff00 broadcast 11.22.33.45`
	` secondary host inet 11.22.33.70 (not in use)`
	` ether 00:01:00:00:00:00:80 (Data Link Provider Interface)`

Step	Action
2	Set the dedicated network interface IP addresses for the local filer in the */etc/rc* file. Enter the IP addresses using the `ifconfig` command, as follows: **`ifconfig e0 local_IP_address`**
3	Set the hot-standby network interface IP address for the partner filer in the */etc/rc* file. Enter the IP addresses using the `ifconfig` command, as follows: **`ifconfig e1 partner partner_IP_address`**
4	Save the */etc/rc* file.
5	Repeat Steps 1 through 4 for the partner filer.

Testing takeover and giveback

About takeover and giveback

The `takeover` and `giveback` commands enable you to have a filer take over its partner's disks, then give control of the disks back to the partner.

Testing takeover and giveback on your cluster

To test your configured cluster, complete the following steps.

Step	Action
1	Verify the network addresses by entering the following command from one filer: **`ifconfig -a`** **Result:** The local filer and partner filer IP addresses are listed.
2	Verify that you can create and retrieve files on both filers for each licensed protocol.
3	From the same filer, enter the following command: **`cf enable`** **Result:** The following message is displayed: `Takeover of the partner filer is enabled`

4	Test communications between the local and partner filers. You can use the `vol status` command on the local and partner filers to ensure that each filer can access the other filer's disks. For example:
	`filer1>` **`vol status`**
	`Volume State Status Options`
	`test online normal`
	`vol1 online snapmirrored`
	`vol0 online normal root`
	`filer2>` **`vol status`**
	`Volume State Status Options`
	`test online normal`
	`vol1 online snapmirrored`
	`vol0 online normal root`

Step	Action
5	From the same filer, enter the following command: **`cf takeover`** **Result:** The local filer takes over the partner filer. The following message is displayed: `takeover completed`
6	Make sure that the filer can access the partner filer's disks.
7	From the same filer, enter the following command: **`cf giveback`** **Result:** The partner filer functions normally. A successful giveback ends with the following message: `giveback completed`
8	Repeat Steps 1 through 7 on the other filer.

If takeover fails

If takeover or giveback fails, complete the following steps.

Step	Action
1	Check the Channel B cabling on your disk shelves, and tighten any loose cables.
2	Check the cabling to your cluster interconnect adapters, making sure that the X port on the local filer is connected to the X port on the partner filer. Check the communication between the local filer and partner filer by entering the following command: **`cf status`** **Result:** If there is a cabling error or the X or Y link is down, the system displays a message that tells you where the problem is.

Step	Action
3	Check the licenses on the local and partner filers. Both filers must have the cluster license enabled. Add missing licenses.
4	Check the parameters and options that should be the same. Correct any errors you find.
5	Check for network connectivity. See the *System Administrator's Guide* for more information.
6	Reboot the cluster and rerun the takeover and giveback test.

If you still do not have clustering enabled, call Customer Support.

Where to go next

After successfully configuring the networking interfaces and testing takeover and giveback on your cluster, see the *System Administrator's Guide* for additional cluster configuration and administration information.

See Appendix A, "Cluster Configuration Examples" for alternative configuration diagrams. See Appendix B, "Shelf-to-Partner Filer Cabling" for additional Channel B cabling diagrams.

Cluster Configuration Examples A

About this appendix

This appendix provides you with some examples of the cluster configuration possibilities available for your filer type.

Topics in this appendix

The following topics are discussed in this appendix:

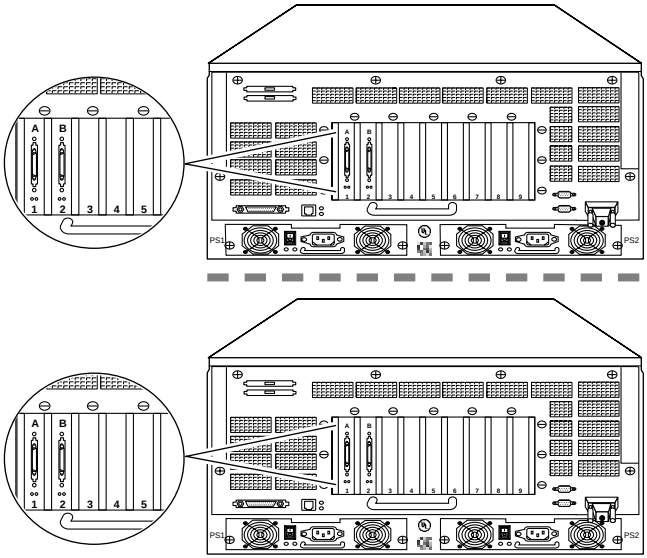
- "FC-AL combinations for F740 filers" on page 60
- "FC-AL combinations for F760 filers" on page 62

FC-AL combinations for F740 filers

F740 with two FC-AL interfaces

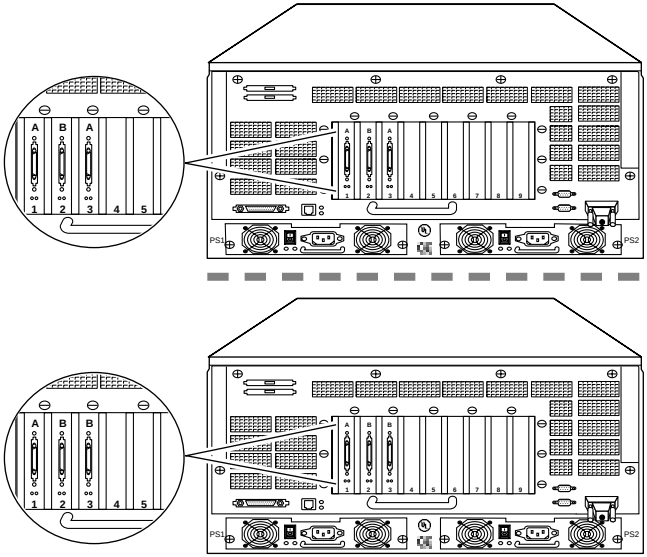
The following cluster configurations are possible:

Two FC-AL interfaces in each filer, with the onboard FC-AL interface labeled Channel A and the FC-AL adapter labeled Channel B in each filer. The following figure is an example of how you can label this cluster configuration.



F740 with three FC-AL interfaces

Three FC-AL interfaces in each filer, with one FC-AL adapter labeled Channel A and one FC-AL adapter labeled Channel B in the local filer, and two FC-AL adapters labeled Channel B in the partner filer. The following figure is an example of how you can label this cluster configuration.

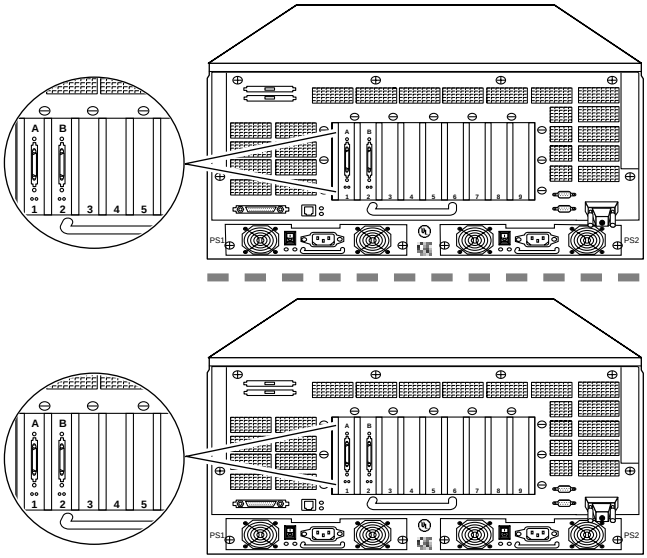


FC-AL combinations for F760 filers

F760 with two FC-AL interfaces

The following cluster configurations are possible:

Two FC-AL interfaces in each filer, with an FC-AL interface labeled Channel A and one labeled Channel B in each filer. The following figure is an example of how you can label this cluster configuration.

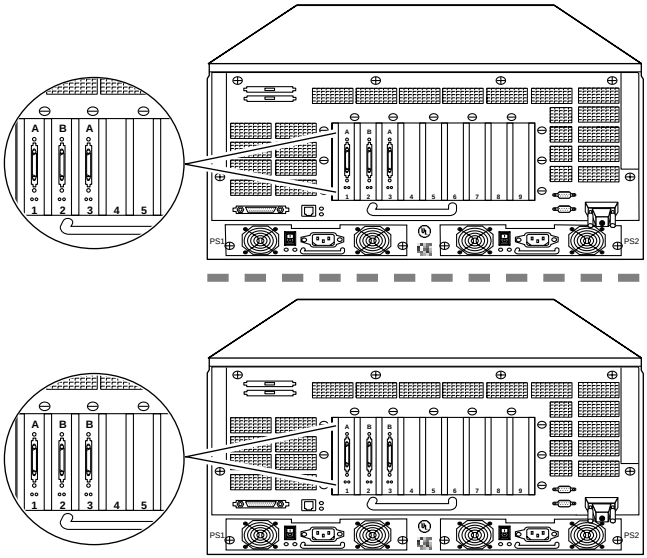


F760 with three FC-AL interfaces

Three FC-AL interfaces in each filer, with two FC-AL adapter labeled Channel A and one FC-AL adapters labeled Channel B in one filer, and one FC-AL interface adapters labeled Channel A and two FC-AL adapters labeled Channel B in the partner filer. The following figure is an example of how you can label this cluster configuration.

Note

The following figure reflects one possible configuration. See the NOW Web page at http://now.netapp.com for more possible slot assignments.

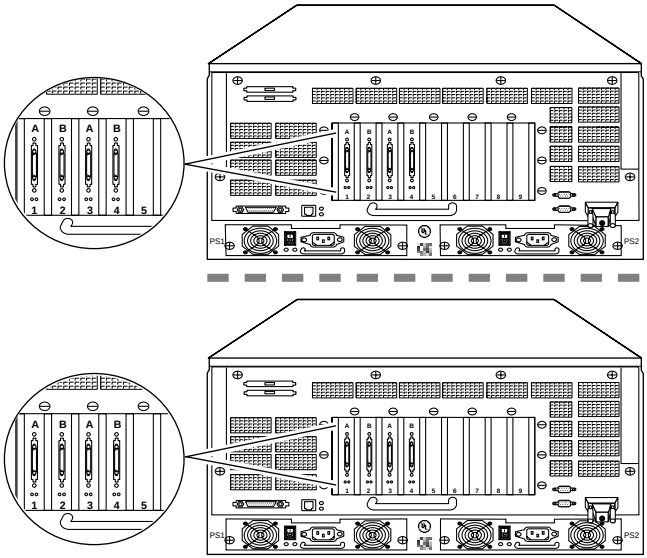


F760 with four FC-AL interfaces

Four FC-AL interfaces in each filer, with two FC-AL adapters labeled Channel A and two FC-AL adapters labeled Channel B in each filer. The following figure is an example of how you can label this cluster configuration.

Note

The following figure reflects one possible configuration. See the NOW Web page at http://now.netapp.com for more possible slot assignments.

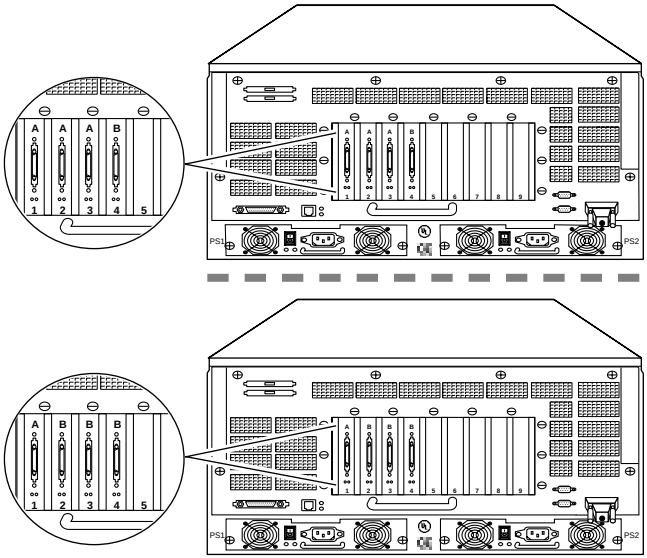


F760 with four FC-AL interfaces, three Channel A adapters

Four FC-AL interfaces in each filer, with three FC-AL adapters labeled Channel A and one FC-AL adapter labeled Channel B in one filer, and one FC-AL interface labeled Channel A and three FC-AL adapters labeled Channel B in the partner filer. The following figure is a an example of how you can label this cluster configuration.

Note

The following figure reflects one possible configuration. See the NOW Web page at http://now.netapp.com for more possible slot assignments.



Other possibilities are for a cluster with four FC-AL adapters are as follows.

Local filer	Partner filer
Three Channel A and one Channel B adapters (AAAB)	One Channel A and 3 Channel B adapters (ABBB)
Three Channel A and one Channel B adapters (ABAA)	One Channel A and 3 Channel B adapters (BABB)
Three Channel A and one Channel B adapters (AABA)	One Channel A and 3 Channel B adapters (BBAB)
Three Channel A and one Channel B adapters (AAAB)	One Channel A and 3 Channel B adapters (BBBA)

Shelf-to-Partner Filer Cabling B

About this appendix

This appendix provides you with a series of figures illustrating how to complete the Channel B loops to the partner filer for clustered filers that have more than two fibre channel interfaces.

Topics in this appendix

This appendix discusses the following topics:

- "Channel B loop cabling between an F740 and disk shelf 0" on page 69
- "Channel B loop cabling between an F760 and disk shelf 0" on page 73

Cabling between the partner filer and disk shelf 0

About these figures

The following series of figures illustrates how to complete the Channel B loops to the partner filer for one possible configuration of an F740 or an F760. The assumption is that the cabling between the cluster interconnect adapters is complete.

Note

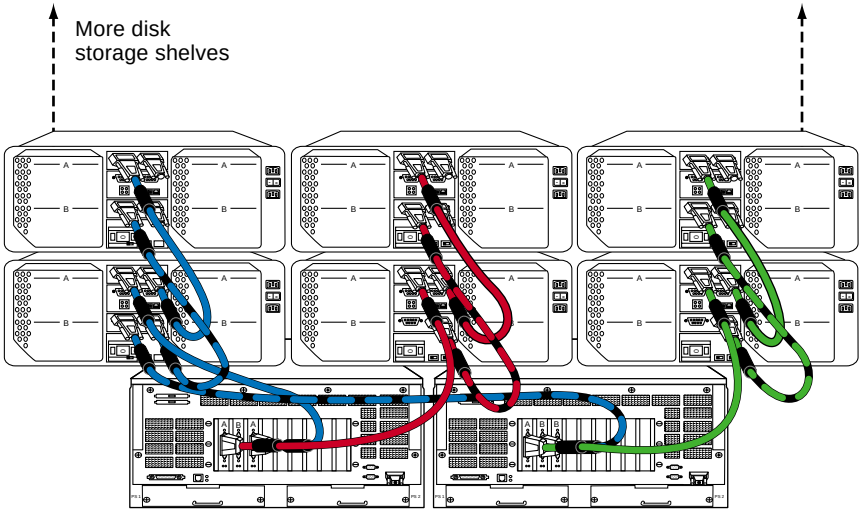
These figures only show how to complete the filer-to-shelf cabling to the partner filer; they do not show the cabling between the cluster interconnect adapters in both filers. This is to reduce the possible confusion resulting from the number of cables involved.

Channel B loop cabling between an F740 and disk shelf 0

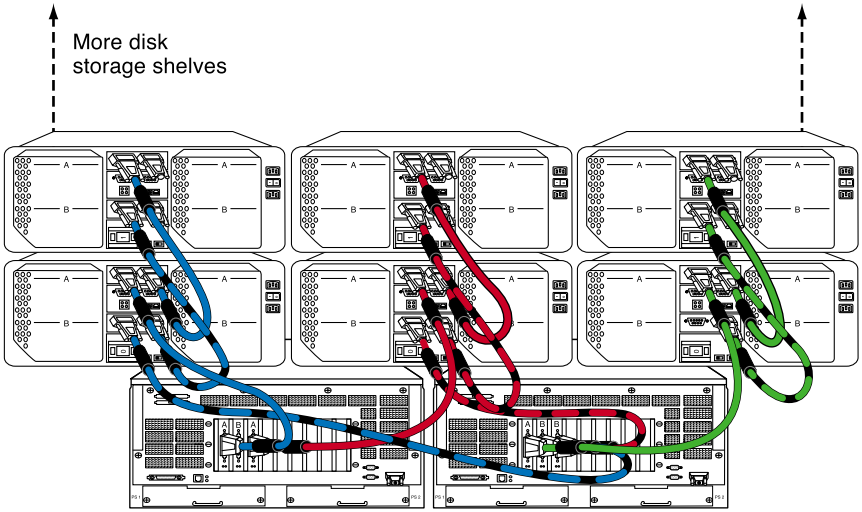
F740 with FC7/FC8 disk shelves

This configuration has three FC-AL interfaces in each filer, with two FC-AL interfaces on the local filer (filer on the left) labeled Channel A and one FC-AL interface labeled Channel B. On the partner filer (filer on the right), there are two FC-AL interfaces labeled Channel B and one FC-AL interface labeled Channel A.

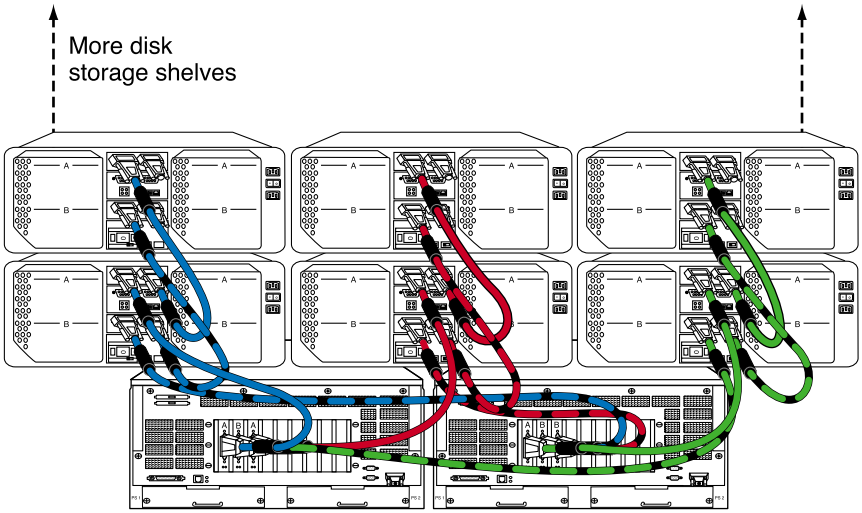
The dashed blue line in this figure between the disk shelves on the left and the partner filer on the right illustrates the first completed Channel B loop in this cluster.



The dashed red line in this figure between the disk shelves in the middle and the partner filer on the right illustrates the second completed Channel B loop in this cluster.



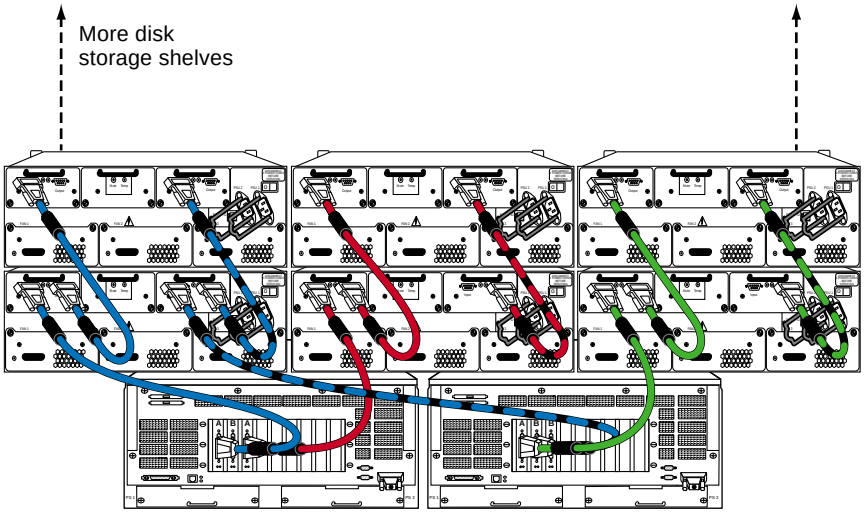
The dashed green line in this figure between the disk shelves on the lower right and the local filer on the left illustrates the third completed Channel B loop in this cluster.



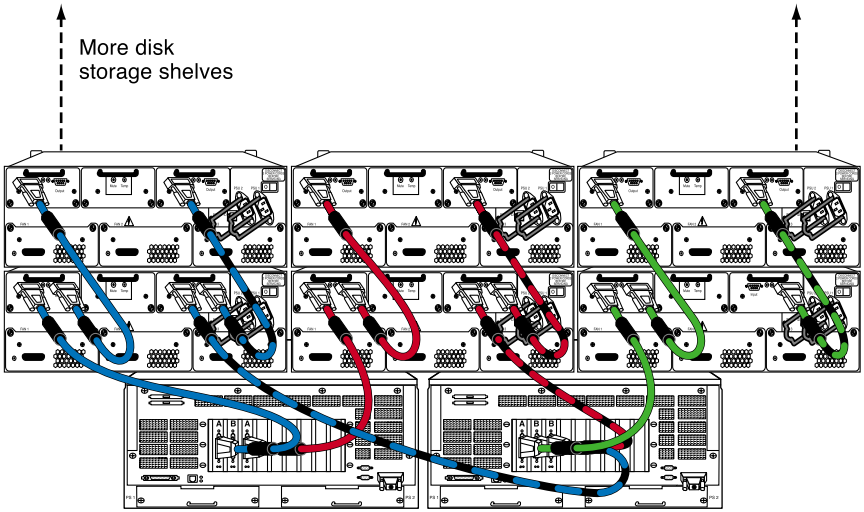
F740 with FC9 disk shelves

This configuration has three FC-AL interfaces in each filer. The local filer (filer on the left) has two Channel A FC-AL interfaces and one Channel B FC-AL interface. The partner filer (filer on the right) has two Channel B FC-AL interfaces and one Channel A FC-AL interface.

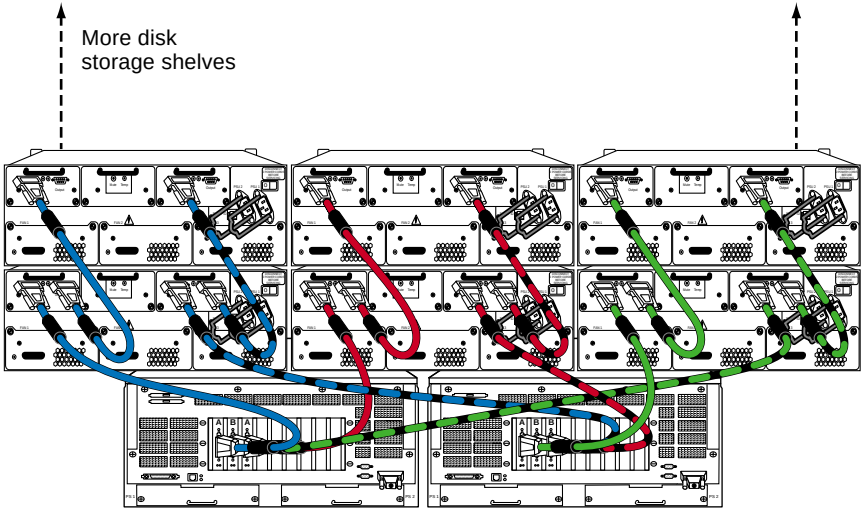
The dashed blue line in this figure between the disk shelves on the left and the partner filer illustrates the first completed Channel B loop in this cluster.



The dashed red line in this figure between the disk shelves in the middle and the partner filer illustrates the second completed Channel B loop in this cluster.



The dashed green line in this figure between the disk shelves on the lower right and the local filer illustrates the third completed Channel B loop in this cluster.

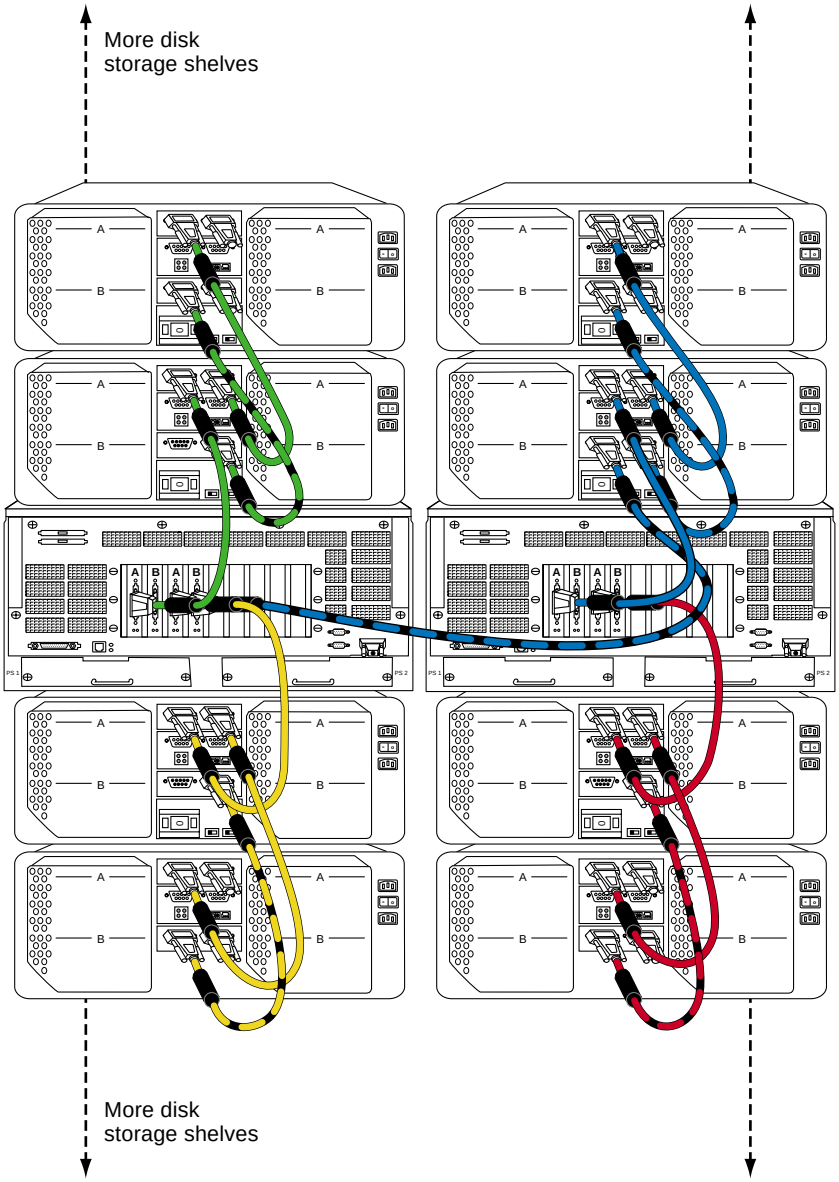


Channel B loop cabling between an F760 and disk shelf 0

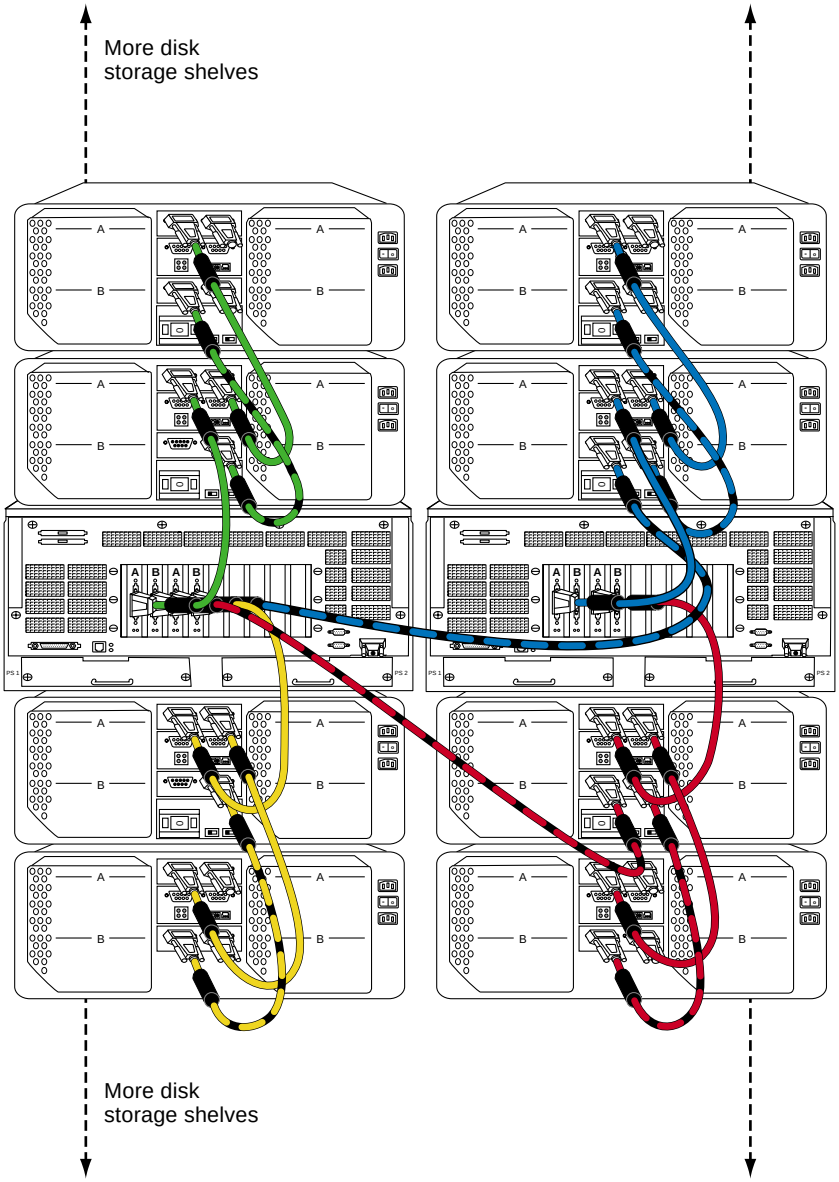
F760 with FC7/FC8 disk shelves

This configuration has four FC-AL interfaces in each filer, with two Channel A FC-AL interfaces and two Channel B FC-AL interfaces in each filer. The filer on the left is the local filer and the filer on the right is the partner filer.

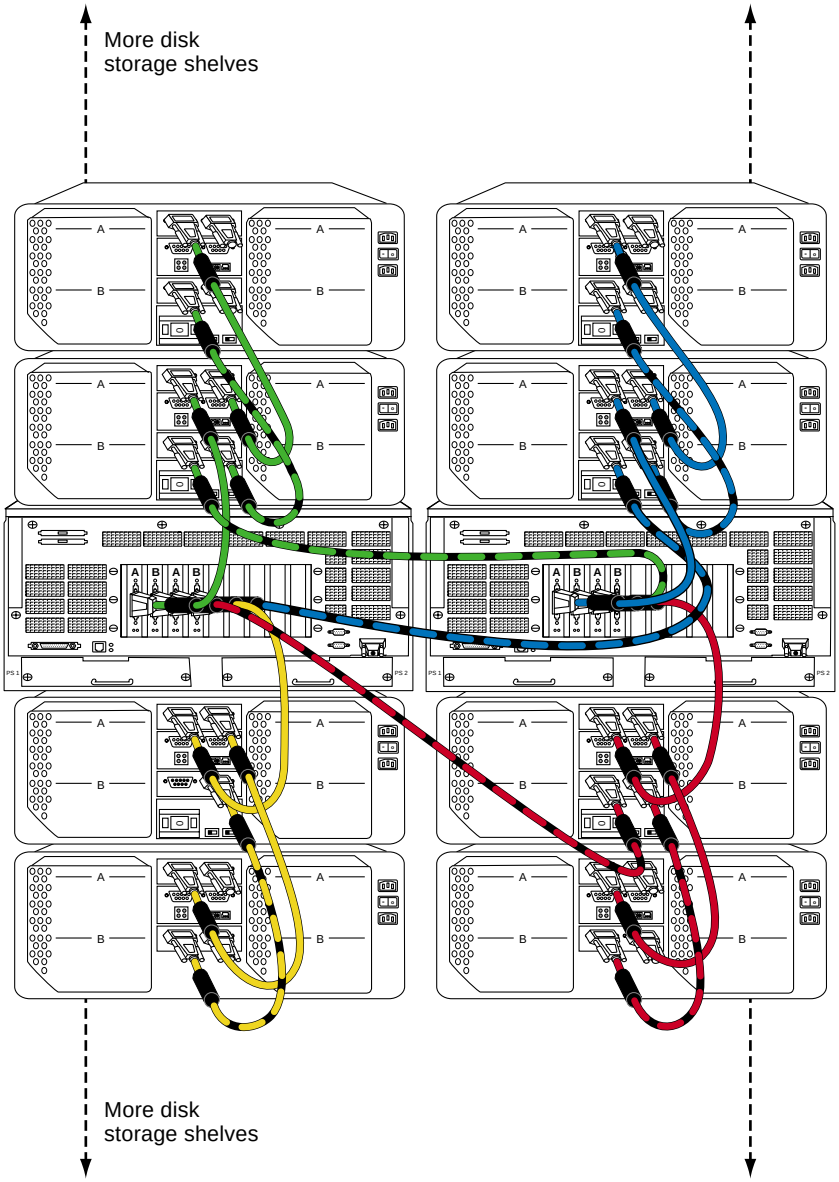
The dashed blue line in this figure between the disk shelves on the upper right and the local filer illustrates the first completed Channel B loop in this cluster.



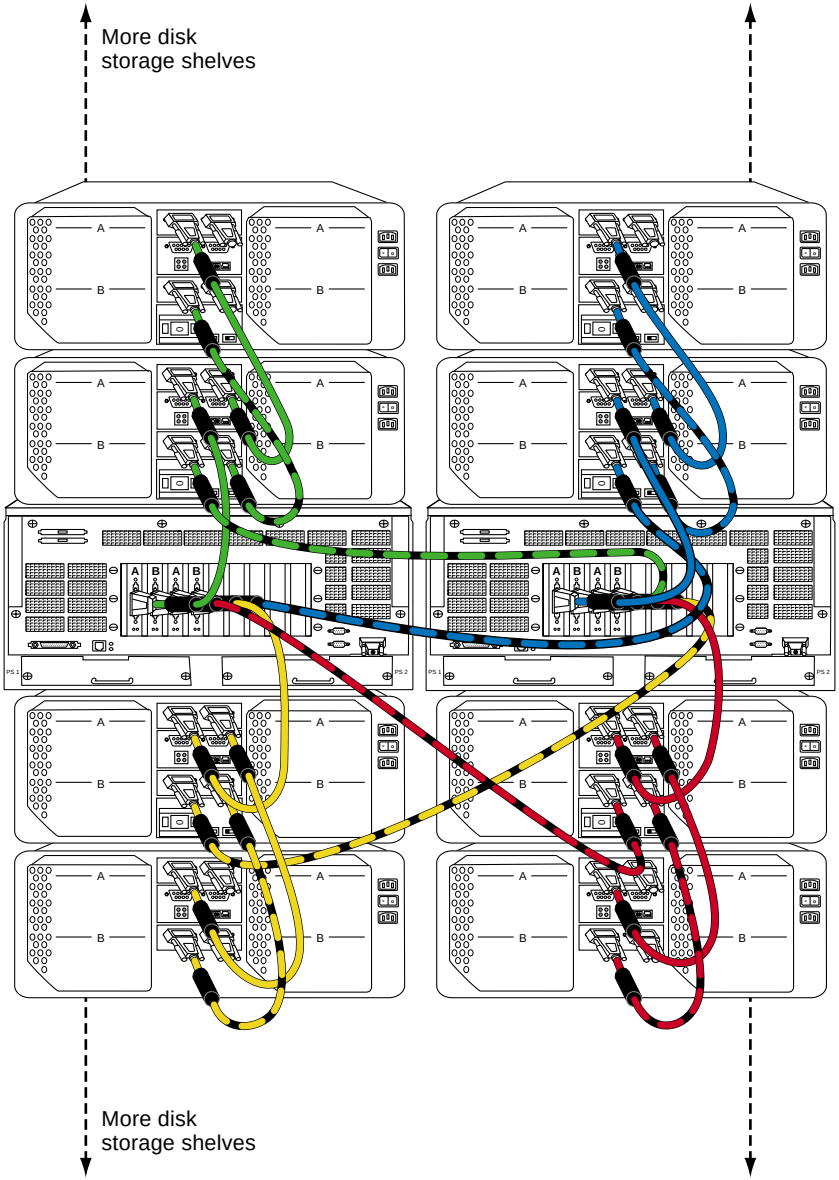
The dashed red line in this figure between the disk shelves on the lower right and the local filer illustrates the second completed Channel B loop in this cluster.



The dashed green line in this figure between the disk shelves on the upper left and the partner filer illustrates the third completed Channel B loop in this cluster.



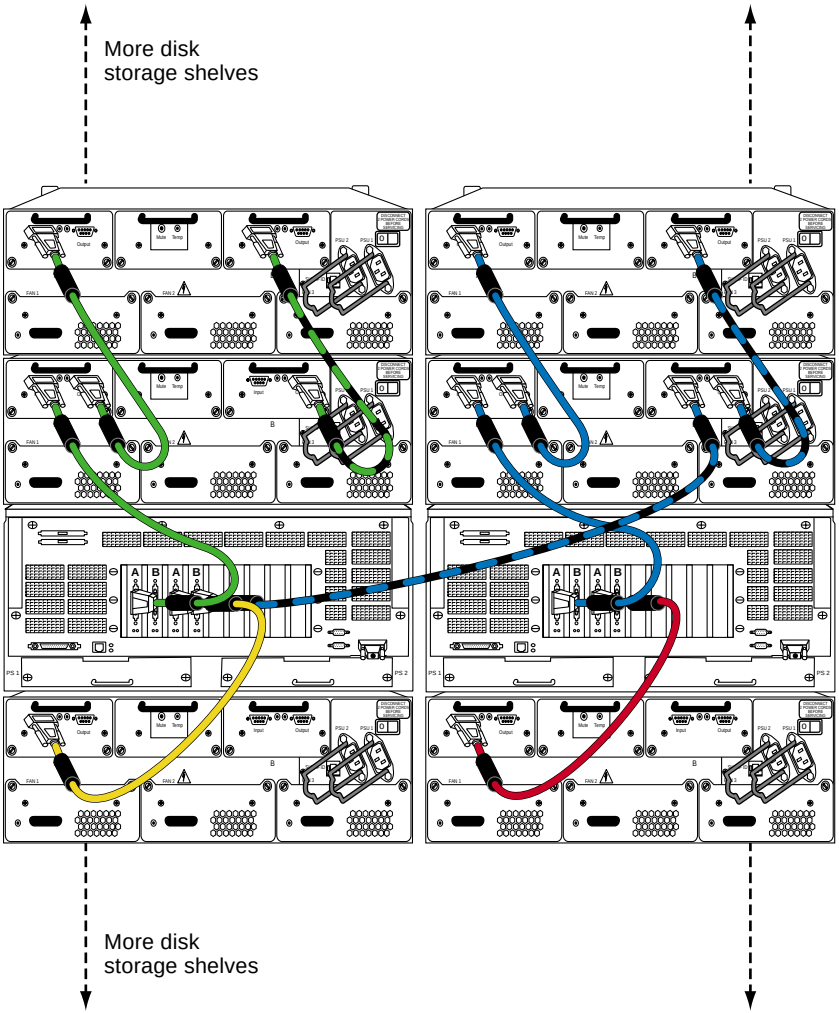
The dashed yellow line in this figure between the disk shelves on the lower left and the partner filer illustrates the fourth completed Channel B loop in this cluster.



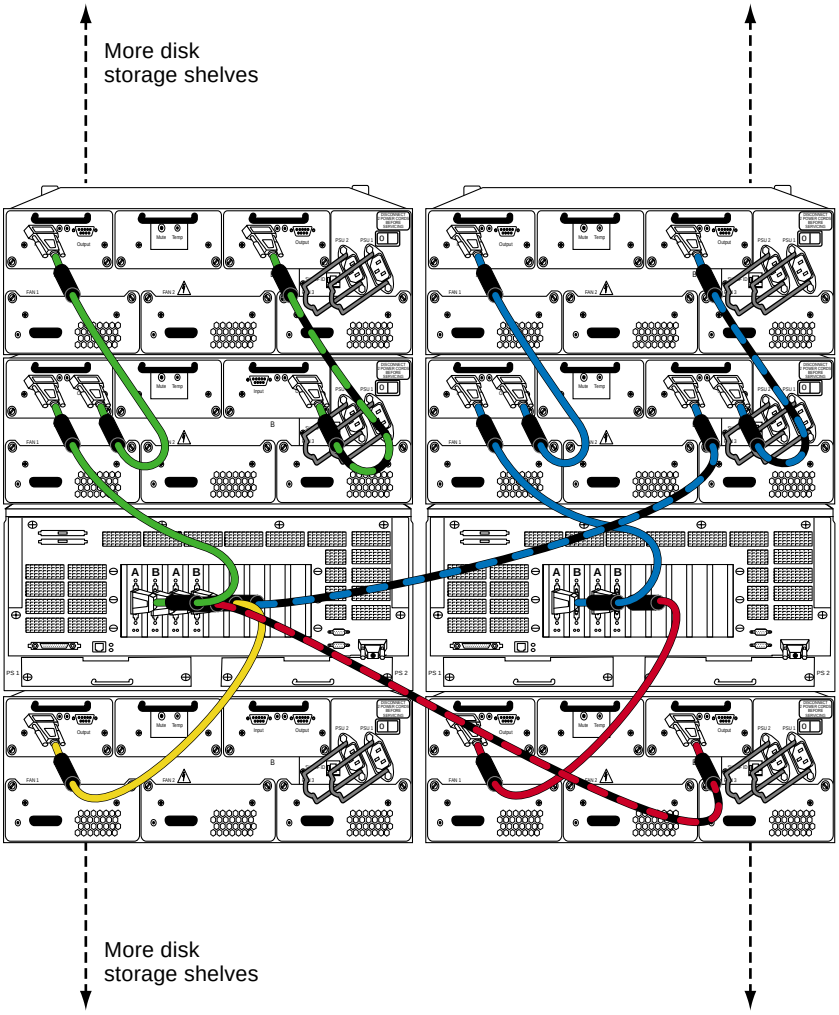
F760 with FC9 disk shelves

This configuration has four FC-AL interfaces in each filer, with two Channel A FC-AL interfaces and two Channel B FC-AL interfaces. The filer on the left is the local filer and the filer on the right is the partner filer.

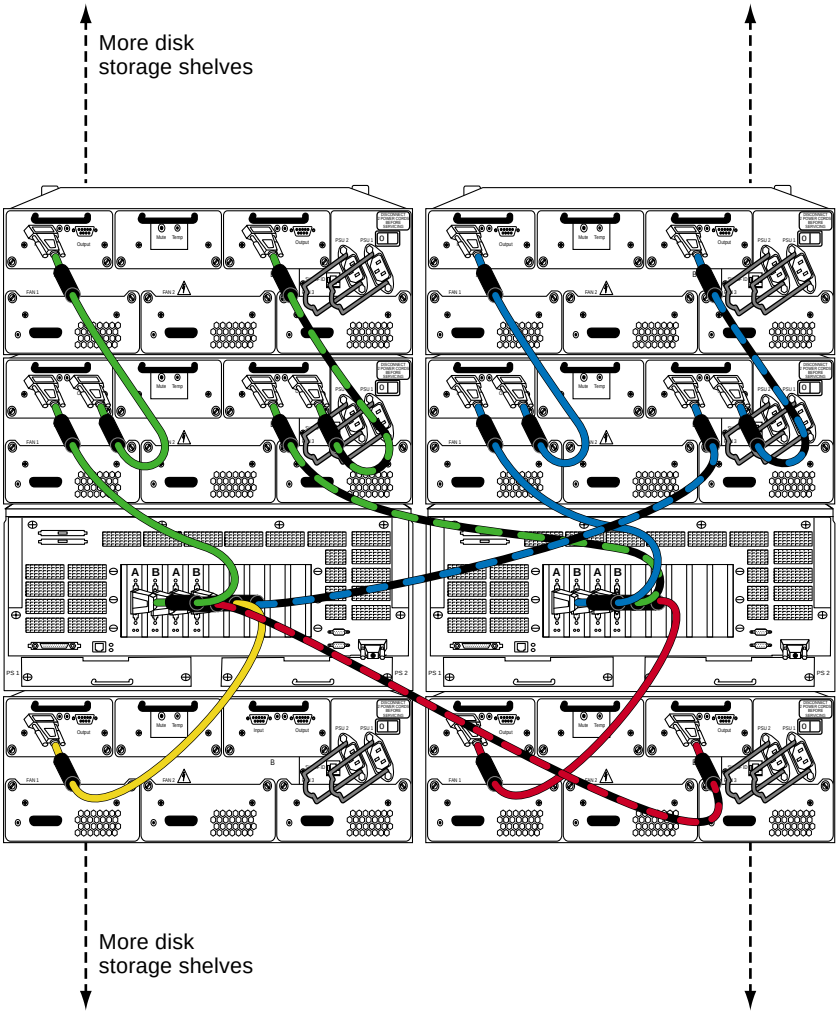
The dashed blue line in this figure between the disk shelves on the upper right and the local filer illustrates the first completed Channel B loop in this cluster.



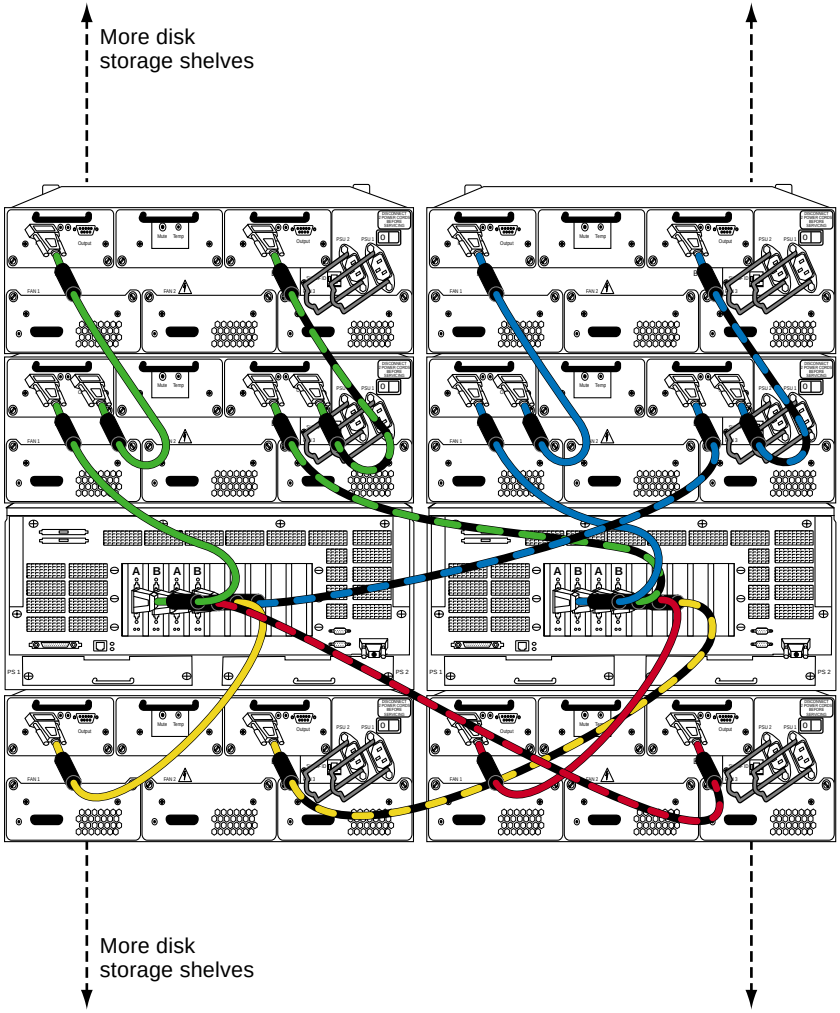
The dashed red line in this figure between the disk shelves on the lower right and the local filer illustrates the second completed Channel B loop in this cluster.



The dashed green line in this figure between the disk shelves on the upper left and the partner filer illustrates the third completed Channel B loop in this cluster.



The dashed yellow line in this figure between the disk shelves on the lower left and the partner filer illustrates the fourth completed Channel B loop in this cluster.



Removing Clustering Capability C

About this appendix

This chapter describes the tasks you need to perform to disable a cluster and return the filers to independent systems.

Topics in this appendix

This appendix discuses the following topics:

- "Removing clustering software" on page 84
- "Removing clustering hardware" on page 85

Removing clustering software

Disabling clustering functionality

To disable clustering functionality, complete the following steps.

Step	Action
1	On the console of either filer, type the following command: **`cf disable`** **Result:** This command disables the clustering functionality on both filers.
2	Disable the clustering license by typing the following command: **`license cluster=DISABLE`** **Result:** The clustering license is disabled, and the single filer license is reenabled.
3	Review the */etc/rc* file in the `root` of the local filer. Remove any commands that reference a partner filer. For example, when viewing the */etc/rc* file, you might see the following entry: `ifconfig e1 partner 10.10.11.12` You need to remove this line, then save the file.
4	Repeat Step 3 on the partner filer.
5	Go to "Preparing for hardware removal" on page 85.

Removing clustering hardware

Preparing for hardware removal

To prepare the filers for hardware removal, complete the following steps.

Step	Action
1	Halt both filers by typing the following command at their consoles: `halt`
2	Power off both filers and all disk shelves.
3	Go to "Removing the Channel B cabling."

Removing the Channel B cabling

To remove the cabling from the local filer disk shelf 0 to the partner filer and from the partner filer disk shelf 0 to the local filer, complete the following steps.

Step	Action
1	Make sure that you have turned off both filers and all disk shelves.
2	Make sure that you ground yourself using the antistatic strap, then remove the HSSDC connector from the Channel B FC-AL adapter on the local filer.
3	Remove all Channel B cabling from the filers and disk shelves, then remove all Channel B LRC cards from the disk shelves. See the appropriate fibre channel disk shelf guide for more information about removing LCR cards.
4	Repeat Steps 2 and 3 for the partner filer.
5	Go to "Removing the clustering hardware" on page 86.

Removing the clustering hardware

To remove the clustering hardware, specifically, the cluster interconnect adapters and the extra FC-AL cards, complete the following steps.

Step	Action
1	Remove the cluster interconnect cables.
2	Open the back of the filer, as described in the *F700 Series Hardware Guide*.
3	While grounded with the antistatic strap, remove the cluster interconnect adapter, as described in the *F700 Series Hardware Guide*.
4	Remove the unused FC-AL cards, as described in the *F700 Series Hardware Guide*.
5	Close the back of the filer, then power on the disk shelves, then the filer. Monitor the messages on the filers during boot.
6	Enter the following command from the console: **`cf status`** **Result:** Cluster monitoring is turned off, as indicated by the following message: **`cf status`** `Cluster disabled.`

Communications Regulations D

About this appendix This appendix lists the regulatory notices you need to be aware of when installing and operating your Network Appliance equipment.

Regulatory notices

FCC notices (U.S. only)

Network Appliance devices are designed for a CFR 47 (Code Federal Regulations) Part 15 Class A environment.

The FCC and Network Appliance guarantee the user's rights to operate this equipment only if the user complies with the following rules and regulations:

- Install and operate this equipment in accordance with the specifications and instructions in this guide.
- Modify this equipment only in the ways specified by Network Appliance.
- Use shielded cables with metallic RFI/EMI connector hoods to maintain compliance with applicable emissions standards.
- If the system has nine or more fibre channel disk shelves, install the system in two or three NetApp System Cabinets to maintain performance within Part 15 of CFR 47 regulations.

Compliance with Part 15 of CFR 47

This equipment has been tested and found compliant with Part 15 of the CFR 47 rules for Class A digital devices. These rules are designed to provide reasonable protection from interference to electronics equipment operated in a commercial environment.

Operation of this device is subject to the following two conditions:

- This device cannot cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Compliance with ICES-003

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A conforme à la norme NMB-003 du Canada.

Compliance with EN regulations

Marking by the symbol CE indicates compliance of this Network Appliance device to the EMC Directive and the Low Voltage Directive of the European Union. Such marking is indicative that this Network Appliance device meets the following technical standards:

- EN 55022—“Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment.”
- EN 55024: 1998—“Immunity of Information Technology Equipment.”
- EN 60950—“Safety of Information Technology Equipment.”
- EN 60825-1—“Safety of Laser/LED Products.”

Caution

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

Bureau of Standards, Metrology, and Inspections notice (BSMI, Taiwan only)

警告使用者:

這是甲類的資訊產品, 在居住的環境中使用時,可能會造成射頻干擾, 在這種情況下, 使用者會被要求采取某些適當的對策.

Translation of the BSMI notice:

Warning: This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

DECLARATION OF CONFORMITY

We, Network Appliance, Inc.,
495 East Java Drive
Sunnyvale, California, 94089, USA

declare under our sole responsibility that the product(s)

Type of Equipment	Description	Part No.	Year of Manufacture
Network File Server	NetApp F700 Series Filer	F720, F740, F760	1998
Web Caching Appliance	NetCache Appliance C700 Series	C720, C720s, C760	1998

to which this declaration relate(s) is in conformance with the following standards:

EN 60950:1992, Information technology equipment (safety)
EN 55022:1987, Emissions requirements for Information technology equipment
EN 50082-1:1992, Generic immunity
IEC 801-2:1984, Immunity to Electrostatic Discharge
IEC 801-3:1984, Immunity to radiated RFI/electromagnetic fields
IEC 801-4:1988, Immunity to Electrical fast transients bursts

following the provisions of the directives listed below:

73/23/EEC, Low Voltage Directive (product safety)
89/336/EEC, Electromagnetic Compatibility Directive

5/12/97
Date

Helen Bradley
Officer of the Company

Part number:
210-02379

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