

F800 Series Hardware Guide

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Preface

- About this guide

This guide describes how to install a NetApp® F800 series filer, connect it to a third-party tape backup device and the network, and start up the system.
- Audience

This guide is for qualified system administrators and service personnel who are familiar with Network Appliance™ filers.
- Terminology

This guide uses the following terms:

 - ◆ *Filer* refers to a NetApp F800 series filer.
 - ◆ *Filer system* or *system* refers, at a minimum, to a filer and a connected Fibre Channel disk storage shelf. A tape backup device can also be a component of the filer system, but is not required.
 - ◆ *Disk shelf* refers to any Fibre Channel disk shelf.
- Formatting conventions

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

Formatting convention	Type of information
<i>Italic type</i>	◆ Words or characters that require special attention. ◆ File names and path names. ◆ Placeholders for information you must supply. For example, if the guide says 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.

Formatting convention	Type of information
Bold monospace 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 (Sicherheitshinweise)

Safety rules

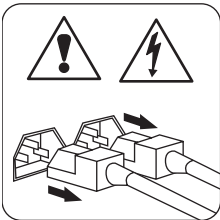
All products are Class 1 laser devices. You must follow these safety rules when working with this equipment:

WARNING

Failure to follow these directions could result in bodily harm or loss of life.

- ◆ When installing disk shelves and a storage appliance into a movable cabinet or rack, install from the bottom up for best stability.
- ◆ DC-based systems must be installed in a restricted access location and the two input power terminals for the DC power supply must be connected to separate isolated branch circuits.
- ◆ To reduce the risk of personal injury or equipment damage, allow internal components time to cool before touching them and 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 multiple power cords



If your storage appliance or disk shelf has multiple power cords 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.

Sicherheitsvorgaben

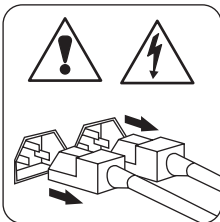
Alle Produkte sind Lasergeräte der Klasse 1. Die folgenden Sicherheitshinweise sind beim Betreiben des Geräts unbedingt zu beachten:

Vorsicht

Nichtbeachtung dieser Anweisungen kann zu schweren Körperschäden führen oder tödlich sein.

- ◆ Bei der Montage der Diskettenregale und Archivierungsgeräte, des NetCache™ -Geräts oder des NearStore™ -Systems in bewegliche Schränke oder Regale sind die Geräte von unten nach oben einzubauen, um optimale Stabilität zu gewährleisten.
- ◆ Gleichstrom-Systeme müssen an Betriebsstätte mit beschränktem Zutritt installiert sein und die beiden Eingangsstromklemmen für das Gleichstrom-Netzteil müssen an separate und isolierte Abzweigleitungen angeschlossen sein.
- ◆ Zum Schutz vor Körperverletzung oder Sachschäden am Gerät lassen Sie die inneren Bauteile stets vor dem Berühren abkühlen. Sorgen Sie dafür, dass das Gerät richtig abgestützt ist oder fest aufrecht steht, bevor Sie neues Zubehör einbauen.
- ◆ Dieses Gerät ist für die Einspeisung aus einer geerdeten Netzverbindung ausgelegt. Der Netzstecker mit Erdungsvorrichtung ist ein wichtiger Sicherheitsschutz. Zum Schutz vor elektrischem Schlag oder Sachschäden am Gerät die Erdung nicht abschalten.
- ◆ Das Gerät ist mit einer oder mehreren auswechselbaren Batterien ausgestattet. Bei unsachgemäßem Auswechseln der Batterie besteht Explosionsgefahr. Batterien nur mit dem vom Hersteller empfohlenen Typ oder entsprechenden Typen ersetzen. Gebrauchte Batterien sind gemäß den Anweisungen des Herstellers zu entsorgen.

Warnhinweis für Geräte mit mehrfachen Netzan-schlussleitungen



Sollte Ihr Archiviergerät, NetCache-Gerät, NearStore-System oder Diskettenregal mehrfache Netzan-schlussleitungen aufweisen und Sie wollen das Gerät abschalten, bitte folgenden Warnhinweis beachten.

ACHTUNG

Gerät besitzt zwei Netzan-schlussleitungen. Vor Wartung alle Anschlüsse vom Netz trennen.

About this chapter

This chapter specifies the preparation requirements for a first-time installation of a NetApp F800 series filer system.

The preparation requirements include tabulated descriptions of site requirements, lists of required tools and equipment, and a plan for the installation of the filer system.

Note

Although this guide does not provide the process for configuring your new filer, it does provide a list of the hardware equipment you require to configure your filer.

Topics in this chapter

This chapter provides information about the following topics:

- ◆ [“Preparing your site”](#) on page 2
- ◆ [“Required tools and equipment”](#) on page 6
- ◆ [“Planning and organizing the installation”](#) on page 8

Preparing your site

About this section

This section tabulates the following information:

- ◆ Filer dimensions
- ◆ Filer weight
- ◆ Environmental requirements for operating or storing your filer system
- ◆ Space requirements for installing your filer system
- ◆ Electrical requirements for your filer system

Filer dimensions

The following table lists the dimensions of the filer.

Dimensions	U.S.	Metric
Height	8.75 in. or 5U, where 1U = 1.75 in.	22.23 cm
Width	17 in.	43.18 cm
Depth	25.25 in.	64.14 cm

Note

The next generation of filers and NetCache appliances is 10.5 inches (266.7 mm) high and requires 6U of rack space above or below the unit.

Filer weight

The filer weighs approximately 66 lbs (29.94 kg).

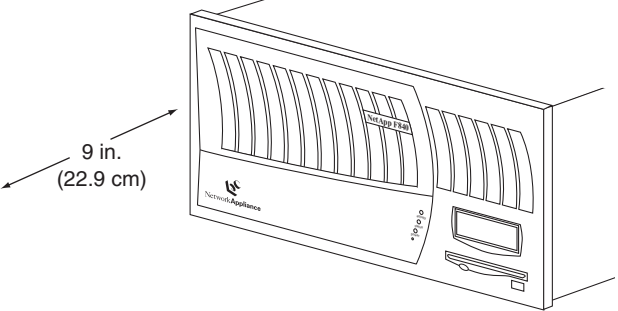
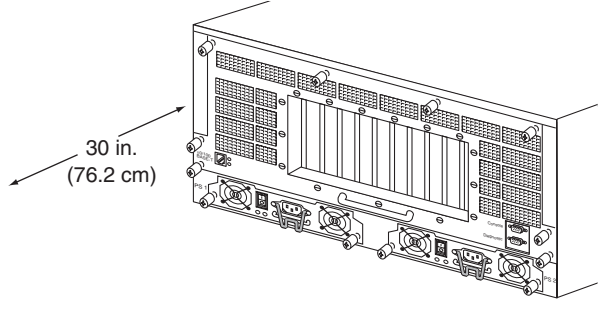
Environmental conditions

The following table lists the maximum environmental conditions that your site must meet to properly run or store your filer.

Environmental condition	Operating condition	Storage condition
Temperature range	50° F to 104° F (10° C to 40° C)	-4° F to 149° F (-20° C to 65° C)

Environmental condition	Operating condition	Storage condition
Relative humidity (noncondensing)	10% to 90%	10% to 90% in original shipping container; otherwise, 50%.

Space requirements The following table describes the recommended minimum clearance for the filer.

Recommended minimum clearance	U.S.	Metric
Front clearance  A perspective view of the front of a Network Appliance filer. A double-headed arrow indicates the distance from the front of the unit to the clearance space, labeled '9 in. (22.9 cm)'. The unit features a large vented area on the left and a control panel on the right with the 'Network Appliance' logo.	9 in.	22.9 cm
Rear clearance  A perspective view of the rear of a Network Appliance filer. A double-headed arrow indicates the distance from the rear of the unit to the clearance space, labeled '30 in. (76.2 cm)'. The rear panel is densely packed with various ports, connectors, and cooling fans.	30 in.	76.2 cm
Clearance in vertical rack space above filer for rear vents	0.5 in.	3.81 cm

Electrical requirements

You can order your filer for AC or DC power.

AC filer: The following table lists the electrical requirements for AC power.

Condition	Requirement
AC power supply	100 to 240V AC single phase
Maximum rated current per AC input	5A at 100 to 240V AC
Typical current per AC input	2A at 100V AC (F810, F820, F825, and F840) 2.25A at 100V AC (F880)
Inrush current	25A maximum at 110V AC per power supply 30A maximum at 220V AC per power supply
Frequency	50 to 60 Hz

DC filer: The following table lists the electrical requirements for DC power.

Condition	Requirement
DC power supply	–40 to –60V DC
Maximum rated current per DC input	5A at –40V
Typical current per DC input	4A at –48V DC (F810, F820, F825, and F840) 4.5A at –48V DC (F880)
Inrush current	15A/100 msec for 48V _{in} per power supply (for reference, 25A/100 msec for 78V)

Power requirements The following table lists the power requirements for both AC and DC filers.

Power	Rating
Watts	300 maximum (with Power Factor correction)
BTU/hr	1025 maximum

Freestanding equipment rack

The freestanding equipment rack must have

- ◆ A width of 19 inches (48.26 cm)
 - ◆ Front installation rails compliant with EIA standard RS-310-C
 - ◆ Adequate space for air circulation directly above the filer ventilation holes
- If you install a device above the filer, leave at least 0.5 inches (1.3 cm) of space directly above the ventilation holes. You can install equipment directly on the unvented area as long as it does not extend over and block the ventilation holes on the filer.

Required tools and equipment

Required tools and equipment for installation

To install the filer system components in an equipment rack, you need the following tools and equipment:

- ◆ Phillips screwdrivers (#0, #1, and #2)
- ◆ #10-32 steel screws for fastening the filer to the rack
- ◆ Antistatic wrist strap and grounding leash

Caution

The filer uses electronic components that are sensitive to static electricity. Static discharge from your clothing or other fixtures around you can damage these components. Wear an antistatic wrist strap and grounding leash so that you are appropriately grounded before touching any electronic components.

Required wiring for a DC power supply

Network Appliance does not supply the three-conductor power supply cable that connects to a DC power source. To connect the DC terminals on the power supply to the DC power source, you must fabricate a three-conductor cable that meets the following requirements.

Recommended wire gauge: 12 AWG with color-coded insulation. Use the color coding scheme used by the facility in which the filer is installed.

Ring terminals: Each wire should be terminated with a ring terminal that accommodates #6 screws and has the following properties:

- ◆ Outer ring maximum diameter—0.30 inch
- ◆ Inner ring—Clearance hole for #6-32 stud
- ◆ Insulated grip sleeve

Maximum distance between power supply and source: The following table lists the maximum distance between the power supply and the DC source based on wire length calculations for 12 AWG wire. You can use a lower number gauge (higher current capacity) wire if a proper size terminal lug is available.

Wire type	Maximum distance
12 AWG (2.05 mm diameter) copper wire	47 ft (14.3m) at 25° C or 38.5 ft (11.7m) at 70° C

Note

Calculated wire length is based on a 2V allowed input voltage. The wire length includes the distance from one power supply terminal to the DC bus and back to the power supply. For detailed information about calculating DC wire lengths, see [“Calculating the length of DC wires”](#) on page 91.

**Required
equipment for
configuration**

To configure your system, you need the following equipment:

- ◆ Network Appliance supports the following types of console/terminal devices:
 - ❖ ASCII terminal (also referred to as an *ANSI terminal*)
 - ❖ Serial concentrator
 - ❖ Communications server

Note

To use a serial concentrator or communications server, you need the documentation for those devices.

- ◆ Null modem cable (optional)

Note

If the DB-9 to DB-9 straight-through serial cable for an ASCII terminal connection provided with your filer is not compatible with your terminal connector, you need a null modem cable or a DB-9 to DB-25 serial cable.

Planning and organizing the installation

Preparing for the installation

This section identifies the components you require for your filer system and the rules and regulations you need to observe for the proper installation of your filer system. It also provides an overview of the entire system installation process and the appropriate documentation references for the procedures.

For detailed information

This section describes the following topics:

- ◆ [“Gathering system components”](#) on page 9
- ◆ [“Installation rules and restrictions”](#) on page 10
- ◆ [“Understanding the entire system installation process”](#) on page 11

Gathering system components

About system components

An F800 series filer system consists of an F810, F820, F825, F840, or F880 filer and connected disk shelves.

To gather all the hardware components for your filer system, you need to

- ◆ Check the contents of your shipment package
- ◆ Gather the system components

Checking shipment package contents

Make sure that your shipment package includes the following items, in addition to this *F800 Series Hardware Guide*:

- ◆ One filer ordered to your network and storage specifications
- ◆ A DB-9 to DB-9 straight-through serial cable for an ASCII terminal connection
- ◆ Cables for connecting the filer to the disk shelves
- ◆ A braided copper cable and Phillips head screws (provided with the filer by Network Appliance) for
 - ❖ Grounding the filer when there is a second or third Fibre Channel loop
 - ❖ Grounding the filer to disk shelf 0 in the first loop when the distance between the filer and disk shelf 0 exceeds 8m

Gathering other components

Disk shelves: You can use previously purchased Fibre Channel disk shelves with your F800 series filer. The System Configuration Guide at <http://now.netapp.com> lists the Fibre Channel disk shelves supported by the F800 series filers.

Tape backup device: You can use a new or previously purchased third-party tape backup device with your F800 series filer. The System Configuration Guide at <http://now.netapp.com> lists the tape backup devices supported by the F800 series filers.

Installation rules and restrictions

Rules and restrictions

Observe the following rules and restrictions when installing a NetApp filer system:

- ◆ You must wear an antistatic wrist strap when you handle electronic equipment.
- ◆ You must work with another person.

WARNING

The filer is extremely heavy. To avoid injuring yourself or damaging the filer, you must work with at least one other person when you install the filer in the rack.

- ◆ If you have a DC system, you must cover the terminal block on each power supply with the provided cover.

WARNING

To protect yourself from possible electric shock, it is important that the terminal blocks are covered when the filer is connected to the DC power source.

- ◆ You must ground the Fibre Channel disk shelves to the filer. All instructions for grounding are in the disk shelf guide.
- ◆ Only install the number of disk shelves supported by your filer model. Go to the System Configuration Guide at <http://now.netapp.com> to determine the current storage limit for your model.

Rules for arranging the components in the racks

You must observe the following rules when arranging the system components in the rack:

- ◆ In a freestanding equipment rack, install either the filer or a telco shelf at the bottom of the rack. Installing the filer or telco shelf at the bottom of the rack adds stability for the disk shelves.
- ◆ The Fibre Channel disk shelves must be installed and connected in the freestanding equipment rack in sequential order, starting from 0 through 7 in a loop. A *loop* consists of the filer connected to one or more disk shelves.
- ◆ Disk shelf 0 (for the FC9 disk shelf) or Disk shelf 1 (for the DS14 disk shelf) must be connected to the filer. See your disk shelf hardware guide.

Understanding the entire system installation process

Overview of the installation and documentation sources

The simplicity of the system installation depends on your specific system needs.

The following table is a guide to understanding the system installation process. It lists the procedures for a complete system installation and the documentation source for each procedure.

Stage	Procedure	For instructions, go to...
1	Install the filer in a freestanding rack.	“Installing the F800 Series Filer” on page 13
2	Install the disk shelves in the rack.	Hardware guide for your Fibre Channel disk shelf
3	Connect the disk shelves to the filer.	Hardware guide for your Fibre Channel disk shelf
4	Ground the Fibre Channel disk shelves and filer.	Hardware guide for your Fibre Channel disk shelf
5	Connect the filer to a tape device.	“Connecting a Filer to a Tape Backup Device” on page 37
6	Connect the filer to the network.	“Connecting the Filer to a Network” on page 19
7	Connect the filer to a power source.	“Powering On the System” on page 43
8	Configure the system.	<i>Data ONTAP Software Setup Guide</i>

About this chapter

This chapter describes the options the F800 series filer provides for positioning the filer in the rack and how to install a filer in a freestanding, 19-inch equipment rack.

Installing the filer in a rack

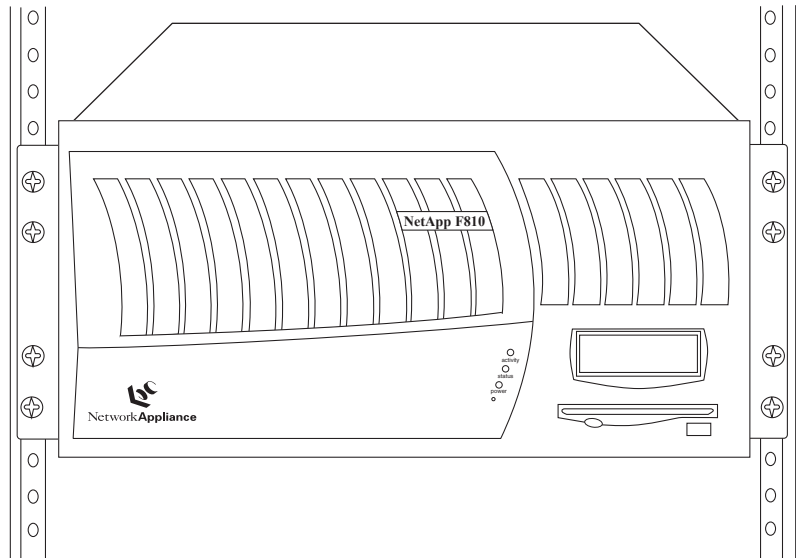
Positioning your filer

The F800 series filer has adjustable installation brackets that enable you to install it in one of three horizontal positions in the rack.

WARNING

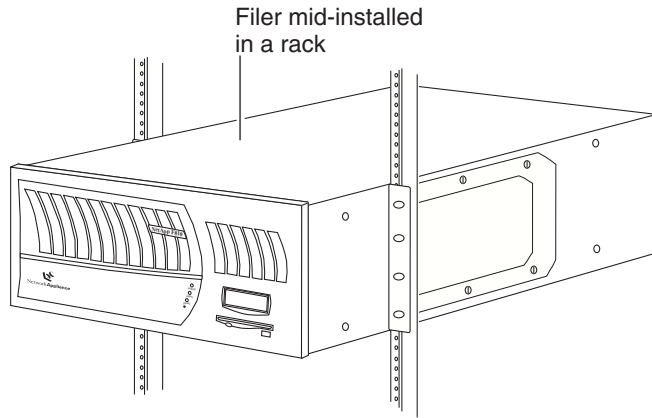
When you install disk shelves and a filer into a rack, install the equipment from the bottom up to ensure the greatest stability.

- ◆ **Front-installed position**—The brackets lie flush with the filer front panel. The filer is shipped with the brackets in this position. The following figure shows a front-installed F810.



- ◆ **Two mid-installed positions**—You can move the brackets to extend the filer 4.75 inches or 9.5 inches in front of the rack, providing more room to service the filer from the back.

The following illustration shows an F880 filer mid-installed (4.75 inches) in a rack.



WARNING

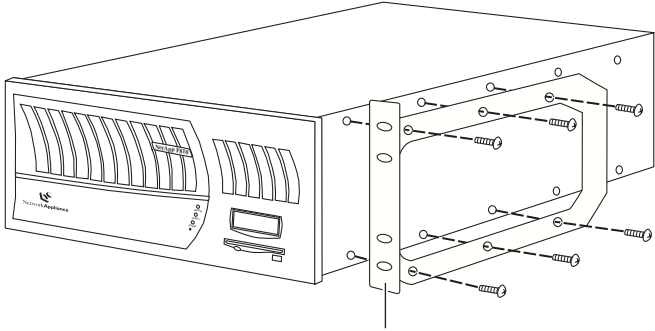
To avoid injuring yourself or damaging the filer, you must work with at least one other person when you install the filer in the rack.

Moving the brackets for a mid-install position

If you want to mid-install the filer in a rack, you must move the brackets on the sides of the filer from the default position.

To move the brackets, complete the following steps.

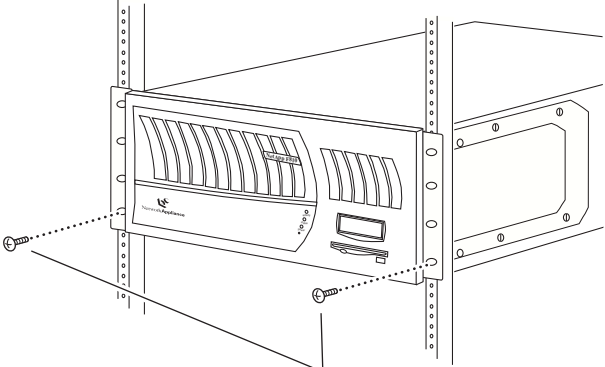
Step	Action
1	Put on an antistatic wrist strap and attach the grounding leash so that you are appropriately grounded.

Step	Action
2	Use a #2 Phillips screwdriver to remove the installation brackets attached to each side of the filer.  Installation bracket
3	For each bracket, select a position 4.75 inches or 9.5 inches from the first hole on one side of the filer and align the bracket holes with the filer holes.
4	Attach each bracket to the filer by inserting screws into the bracket and filer holes and tightening the screws.

Installing the filer

To install the filer in a 19-inch equipment rack, complete the following steps.

Step	Action
1	Put on an antistatic wrist strap and grounding leash.
2	Select four holes on each front rack rail. These holes should have the same spacing as the holes on the filer brackets.
3	Align the rack holes with the filer bracket holes. Work with one side bracket at a time. The person assisting you should stand behind the rack to help support the weight of the filer.

Step	Action
4	Insert the #10 steel screws in the bottom hole on each side first and tighten the screws using a #2 Phillips screwdriver.  Install bottom screws first Caution _____ If the bottom screws are not installed first then the filer will tilt down and bend the mounting brackets. The rack can support the weight of the filer after the filer is attached by the bottom screws.
5	Insert the #10 steel screws in the top hole on each side and tighten the screws using a #2 Phillips screwdriver.
6	Tighten all the screws.
7	Go to the appropriate Fibre Channel disk shelf hardware guide for ◆ Disk shelf installation in a 19-inch equipment rack ◆ Disk shelf connection to your F800 series filer ◆ Disk shelf grounding information

About this chapter

This chapter describes how to connect your filer to the supported networks listed in the following table.

Type of network	Supporting filers
Ethernet	F810, F820, F825, F840, F880
FDDI	F840
ATM	F840 and F880
FCP (target mode interface)	F825 and F880
DAFS	All F800 series filers

Note

For specific information about the slot assignments available and the NICs supported by your filer, see the System Configuration Guide at <http://now.netapp.com>.

Topics in this chapter

This chapter describes the following topics:

- ◆ “[Connecting to an Ethernet network](#)” on page 20
- ◆ “[Connecting to a FDDI Network](#)” on page 26
- ◆ “[Connecting to an ATM network](#)” on page 31
- ◆ “[Connecting to a Fibre Channel network](#)” on page 34
- ◆ “[Connecting to a DAFS network](#)” on page 35

Connecting to an Ethernet network

About this section

This section identifies the types of Ethernet connections supported by your F800 series filer, and how to connect to each type of Ethernet connection.

For detailed information

This section describes the following topics:

- ◆ [“Types of Ethernet networks supported”](#) on page 21
- ◆ [“Connecting to an Ethernet port using copper cabling”](#) on page 22
- ◆ [“Connecting to an Ethernet port using fiber cabling”](#) on page 23

Types of Ethernet networks supported

Supported Ethernet connections

Use the following table to determine the Ethernet connection and cabling requirements of your Ethernet network interface cards (NICs).

Note

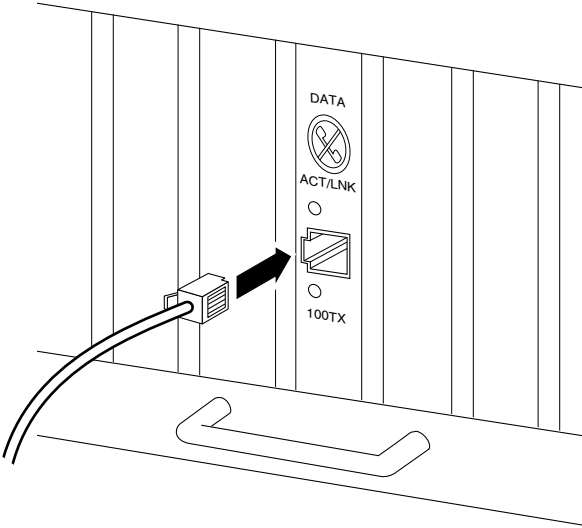
Do not exceed the maximum cable length specification.

Ethernet type	Supported ports	Cabling requirements
10Base-T 100Base-TX	◆ Onboard ◆ Single ◆ Dual ◆ Quad	Category 3 (10Base-T only) or 5 (10Base-T/100Base-TX) unshielded twisted-pair (UTP) copper cable with RJ-45 connectors
100Base-TX/ 1000Base-T	Single	Category 5 unshielded twisted-pair (UTP) copper cable with RJ-45 connectors
10Base-T/ 100Base-TX/ 1000Base-TX	◆ Single ◆ Dual	Category 5 unshielded twisted-pair (UTP) copper cable with RJ-45 connectors
1000Base-SX	◆ Single ◆ Dual	50 micron multimode fiber optic cable with SC or LC connector for up to 550m 62.5 micron multimode fiber optic cable with SC or LC connector for up to 220m

Connecting to an Ethernet port using copper cabling

Connecting to a Ethernet port using copper cabling

To connect the filer to a single Ethernet port using copper cabling, complete the following step.

Step	Action
1	Push the cable with the RJ-45 connector into the RJ-45 port on the Ethernet NIC, until it clicks and locks into place. Repeat this step if your NIC has multiple ports. The following illustration shows a UTP copper cable with an RJ-45 connector connecting to a single-port 10Base-T/100Base-TX NIC. 

Connecting to an Ethernet port using fiber cabling

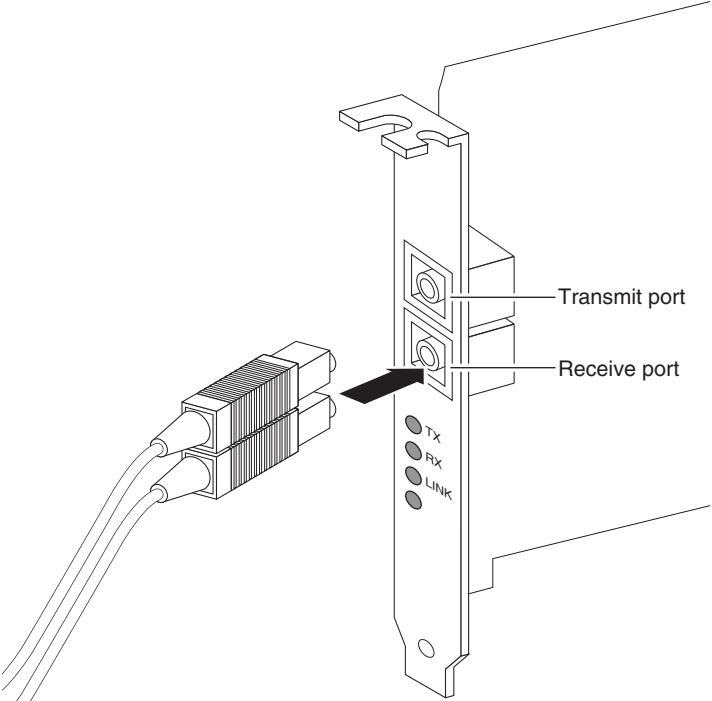
Types of connections

The NICs with fiber cabling have the following types of connectors:

- ◆ SC for single-port
- ◆ LC for dual-port

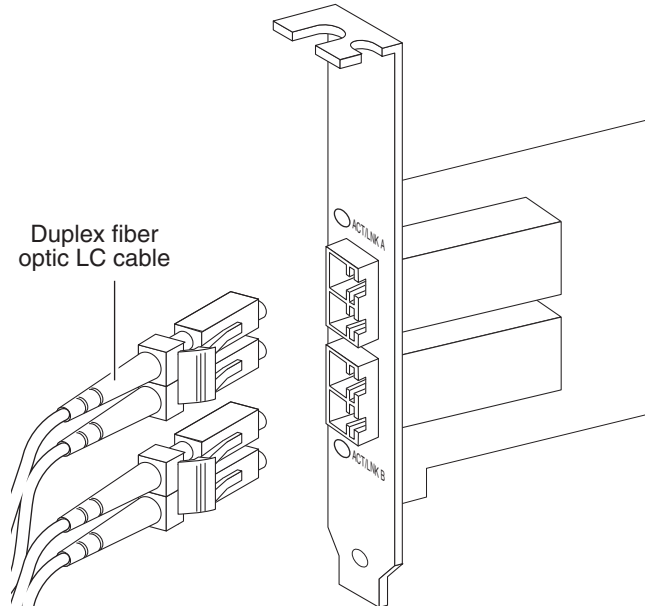
Connecting to a single-port 1000Base-SX fiber port

To connect to a single-port 1000Base-SX NIC using fiber cabling, complete the following step.

Step	Action
1	Push the cable with the SC connector into the port on the 1000Base-SX NIC, until it clicks and locks into place. The following illustration shows a single-port 1000Base-SX NIC.  The diagram illustrates a single-port 1000Base-SX Network Interface Card (NIC) installed in a server rack. The NIC has two ports: a 'Transmit port' (TX) and a 'Receive port' (RX). A fiber optic cable with an SC connector is shown being inserted into the Receive port. Below the ports, there are four status LEDs labeled TX, RX, LINK, and a fourth unlabeled LED. The cable is shown with three fibers, indicating a duplex connection.

Connecting to a dual-port 1000Base-SX fiber port

To connect to a dual-port 1000Base-SX NIC using fiber cabling, complete the following step.

Step	Action
1	Push the cable with the LC connector into the ports on the 1000Base-SX NIC, until it clicks and locks into place. Repeat this step for the second port. The following illustration shows a dual-port 1000Base-SX NIC. 

Connecting to a FDDI Network

About this section

This section identifies the types of FDDI connections supported by your F840 filer and how to connect to each type of FDDI network.

For detailed information

This section describes the following topics:

- ◆ [“Types of FDDI networks supported”](#) on page 27
- ◆ [“Connecting with single-attached FDDI”](#) on page 28
- ◆ [“Connecting with dual-attached FDDI”](#) on page 30

Types of FDDI networks supported

Supported FDDI NICs and network configurations

The following table lists the types of FDDI NICs used in your F840 filer and the network configurations supported.

Type of NIC used	Type of network configuration
Single-attached FDDI-TP with an RJ-45 port	Single-attached FDDI network
Single-attached FDDI-fiber with a duplex SC port	Single-attached FDDI network
Dual-attached FDDI-fiber with two duplex SC ports and one RJ12 port	◆ Single-attached FDDI network (only top SC port used) ◆ Dual-attached FDDI network

FDDI cabling requirements

The FDDI cabling requirements are listed in the following table.

Note

Do not exceed the maximum cable length specification.

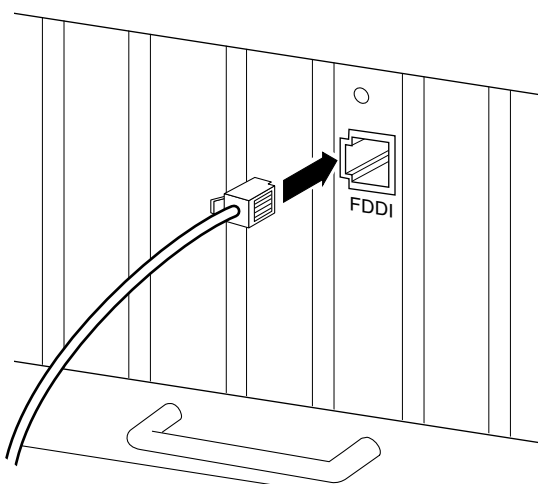
Type of connector	Cabling requirements
RJ-45 connector	Category 5 unshielded twisted-pair (UTP) or a 100-ohm screened twisted-pair (ScTP) cable with a TP-MIC plug
Duplex SC connector	50 micron multimode fiber optic cable for up to 550m.
	62.5 micron multimode fiber optic cable for up to 220m.

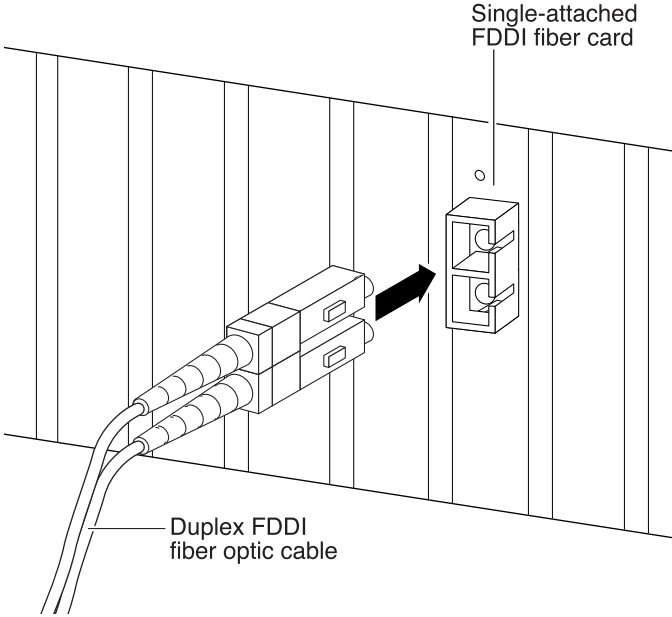
Connecting to a FDDI network

Connecting with single-attached FDDI

Connecting to a single-attached FDDI network

To connect the F840 to a single-attached FDDI network, complete the following step.

Step	Action	
1	If your FDDI NIC is a...	Then...
	Single-attached FDDI-TP NIC with an RJ-45 port	Push the cable with the RJ-45 connector into the port on the FDDI NIC, until it clicks and locks into place.
	The following illustration shows a cable with the RJ-45 connector connecting to a single-attached FDDI-TP NIC.  The diagram illustrates a network panel with several vertical slots. One slot contains a port labeled 'FDDI'. An RJ-45 cable connector is shown being inserted into this port, with a black arrow indicating the direction of insertion. Below the panel, a small L-shaped bracket is shown on the surface.	

Step	Action
	Single-attached FDDI-fiber NIC with a duplex SC port Push the SC connector into the port on the FDDI NIC, until it clicks and locks into place. The following illustration shows a duplex FDDI fiber optic cable connecting to a single-attached FDDI fiber NIC.  The diagram illustrates the connection of a duplex FDDI fiber optic cable to a single-attached FDDI fiber NIC. On the left, a cable with two SC connectors is shown. An arrow points from the cable's connectors to the two ports of a rectangular NIC card mounted on a rack. Labels with leader lines identify the 'Single-attached FDDI fiber card' and the 'Duplex FDDI fiber optic cable'.
	Dual-attached FDDI-fiber NIC with two duplex SC ports and one RJ12 port Push the SC connector into the upper port (Port B) on the FDDI NIC, until it clicks and locks into place. Leave the NIC's bottom port unused.

Connecting to a FDDI network

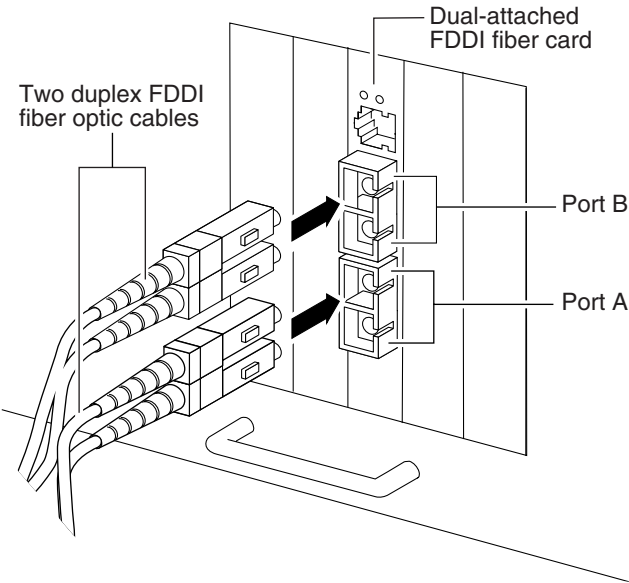
Connecting with dual-attached FDDI

Connecting to a dual-attached FDDI network

To connect the F840 to a dual-attached FDDI network, complete the following steps.

Step	Action
1	Push the SC connector into the lower port (Port A) on the FDDI NIC, until it clicks and locks into place.
2	Push the SC connector into the upper port (Port B) on the FDDI NIC, until it clicks and locks into place.

The following illustration shows Port A and Port B on the dual-attached FDDI fiber NIC and two duplex FDDI fiber optic cables.



Connecting to an ATM network

ATM NICs supported

Your F840 or F880 filer supports both fiber and UTP (copper) ATM NICs.

Note_____

The F810, F820, and F825 filers do not support ATM network connectivity.

Cabling requirements

The cabling requirements for connecting your F840 or F880 filer to an ATM network are listed in the following table.

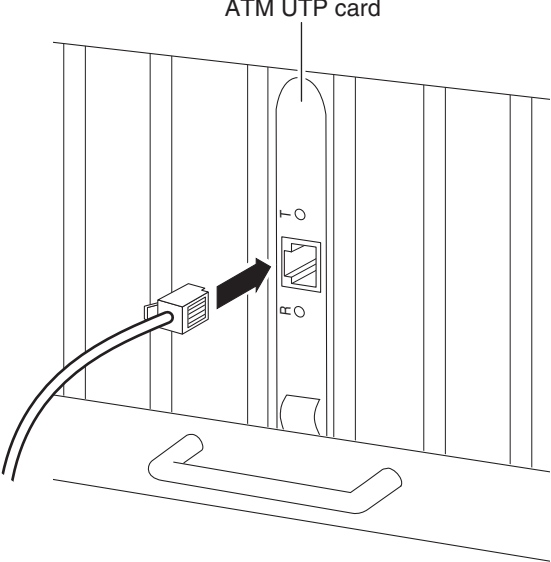
Note_____

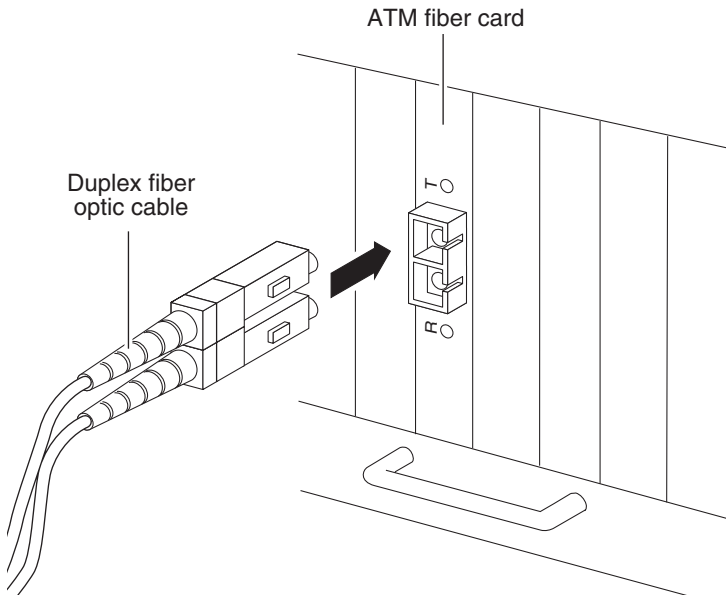
Do not exceed the maximum cable length specified in the appropriate ATM Forum UNI (User Network Interface) standard.

Type of connector	Cabling requirements
RJ-45 connector	Category 5 unshielded twisted-pair (UTP) cable with RJ-45 connector
Duplex SC connector	62.5/125 micron multimode fiber optic cable with an SC connector

Connecting to an ATM network

To connect your F840 or F880 filer to an ATM network, complete the following step.

Step	Action	
1	If your ATM NIC is an...	Then...
	ATM UTP NIC with an RJ-45 port Push the cable with the RJ-45 connector into the port on the ATM UTP NIC, until it clicks and locks into place. The following illustration shows a cable with the RJ-45 connector connecting to an ATM UTP NIC. 	

Step	Action
	ATM fiber NIC with a duplex SC port Push the SC connector into the NIC port until it clicks and locks into place. The following illustration shows a duplex fiber optic cable connecting to the ATM fiber NIC.  The diagram illustrates the connection of a duplex fiber optic cable to an ATM fiber card. On the left, a 'Duplex fiber optic cable' is shown with two SC connectors. An arrow points from one of these connectors to the 'FO' (Fiber Optic) port on the 'ATM fiber card'. The card is shown as a component with multiple ports, and the 'FO' port is specifically labeled. The card is mounted on a panel with a handle at the bottom.

Connecting to a Fibre Channel network

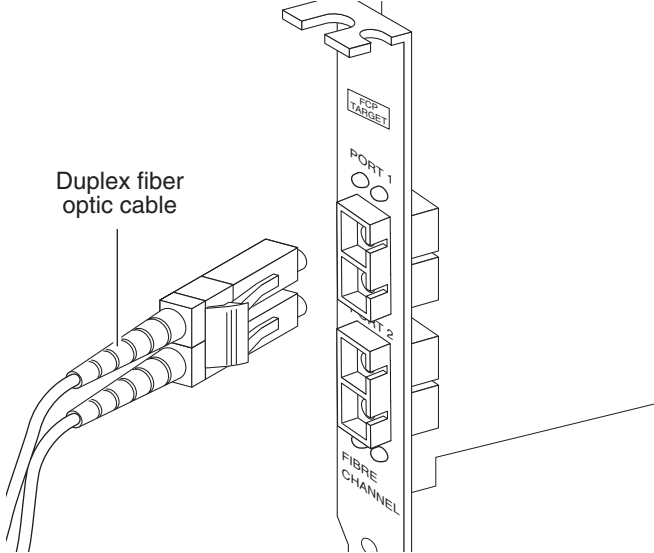
Fibre Channel cabling requirements

Fibre Channel network cables are 50 micron diameter, multimode with LC-to-LC connectors. The supplied cable length is 1m, 5m, or 30m, depending upon your site requirements.

Connecting to a Fibre Channel network

To connect the filer to a Fibre Channel network, complete the following steps.

Note—
The dual-port Fibre Channel adapter marked with an “FCP Target” label on the faceplate is a target-mode adapter required for a Fibre Channel network.

Step	Action
1	Push the cable with the LC connector into port 1 on the dual-port Fibre Channel adapter until it clicks and locks into place. 
2	If necessary, push a second cable with an LC connector into port 2 of the dual-port Fibre Channel adapter until it clicks and locks into place.

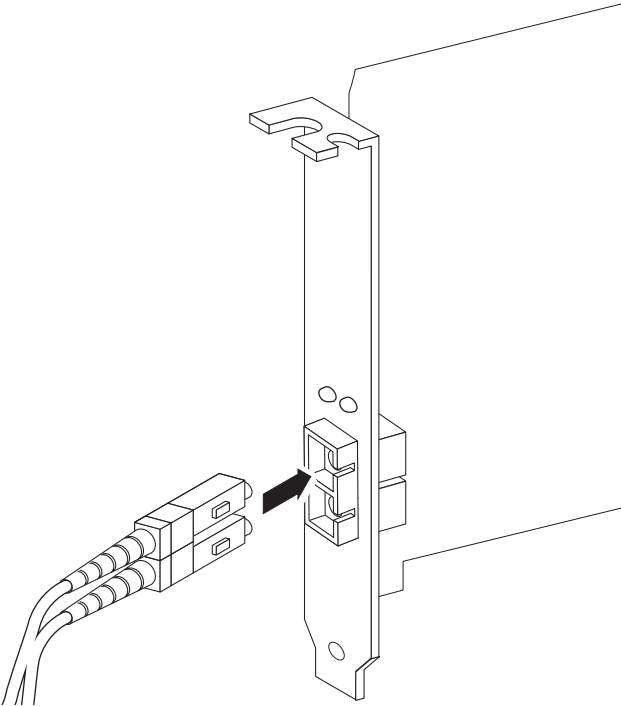
Connecting to a DAFS network

Cabling requirements

A 50 micron multimode fiber optic cable with an LC-to-LC connector is required for a DAFS network.

Connecting to a DAFS network

To connect to a DAFS network, complete the following step.

Step	Action
1	Push the LC cable connector into the port on the DAFS adapter until it clicks and locks into place. A technical line drawing illustrating the connection of an LC cable to a DAFS adapter. On the left, an LC cable connector is shown, consisting of a rectangular plastic housing with two fiber optic cables extending from it. An arrow points from the connector towards a port on a vertical metal adapter. The port is a square-shaped opening with internal locking mechanisms. The adapter has a U-shaped bracket at the top and several mounting holes. Two leader lines extend from the right side of the adapter, one pointing to the top bracket and the other pointing to the port area.

About this chapter

This chapter discusses how to connect your F800 series filer to a third-party SCSI tape backup device or to a third-party Fibre Channel switch that you connect to a third-party FC-AL tape backup device.

Topics in this chapter

This chapter describes the following topics:

- ◆ [“About connecting to third-party tape backup devices”](#) on page 38
- ◆ [“Preparing the third-party tape backup devices”](#) on page 39
- ◆ [“Connecting a filer to a third-party SCSI tape backup device”](#) on page 40
- ◆ [“Connecting a filer to a third-party Fibre Channel switch”](#) on page 41

About connecting to third-party tape backup devices

Supported types of tape backup devices

Your filer can connect to a third-party SCSI tape backup device or to a third-party Fibre Channel switch that you connect to a third-party FC-AL tape backup device. See the System Configuration Guide at <http://now.netapp.com> for the tape backup devices supported by your platform.

Note

Check the System Configuration Guide to verify support for your tape backup device. An unsupported tape backup device might cause the filer to halt.

Rules for connecting the third-party devices

Observe the following rules for connecting the third-party devices:

- ◆ Use a cable that is
 - ❖ Appropriate to the tape adapter installed in your filer
 - ❖ Of an approved length for the third-party device

Note

See the documentation for the third-party device.

- ◆ Check the System Configuration Guide at <http://now.netapp.com> for the expansion slots assigned for the tape adapters in your platform.

Preparing the third-party tape backup devices

Preparing the third-party tape backup devices

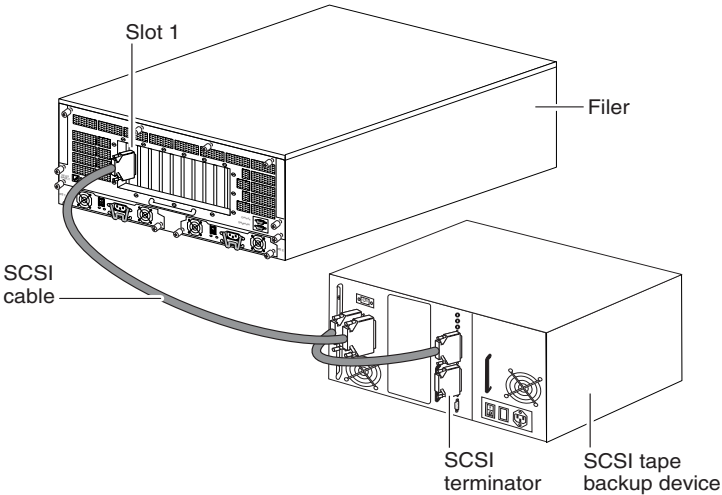
To prepare the third-party tape backup devices, complete the following steps.

Step	Action
1	Set the ID on the tape backup device. See the documentation for the tape backup device.
2	If you have a robotic loader on the tape backup device or a Fibre Channel switch, set its ID.
3	Turn off all third-party devices and go to “Connecting a filer to a third-party Fibre Channel switch” on page 41.

Connecting a filer to a third-party SCSI tape backup device

Connecting a SCSI tape backup device

To connect a third-party SCSI tape backup device to the filer, complete the following steps.

Step	Action
1	Connect the cable provided with the tape device to the following points of connection: a. The appropriate port on the back panel of your filer b. The port on the tape device
2	Tighten each end of the cable.
3	Terminate any open port on the tape backup device with an active SCSI terminator. For information about terminating the open port, see the documentation for the tape backup device.  The diagram illustrates the physical connection between a filer and a SCSI tape backup device. A SCSI cable is shown connecting Slot 1 on the back panel of the filer to the SCSI tape backup device. A SCSI terminator is also connected to the device. Labels include: Slot 1, Filer, SCSI cable, SCSI terminator, and SCSI tape backup device.
4	Go to “Connecting the Filer to a Network” on page 19.

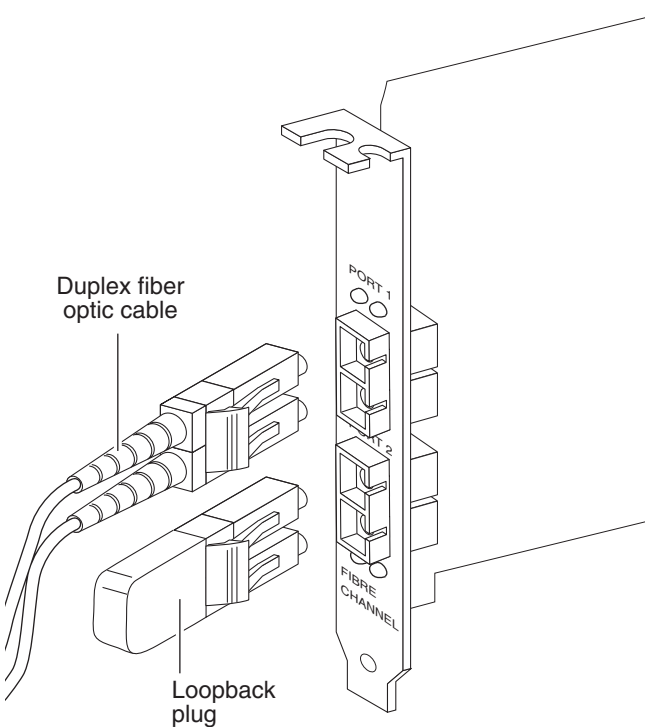
Connecting a filer to a third-party Fibre Channel switch

Connecting to a Fibre Channel switch for tape backup

To connect a filer to a third-party Fibre Channel switch for tape backup, complete the following steps.

Note See the third-party documentation about connecting the Fibre Channel tape-backup device to the Fibre Channel switch.

Step	Action
1	Connect the cable provided with the Fibre Channel switch to the following points of connection: a. The appropriate port on the back panel of your filer b. An available port on the Fibre Channel switch

Step	Action
2	When connecting to a dual-port Fibre Channel adapter in your filer, insert the LC cable into port 1 and the LC loopback plug into port 2 until they click and lock into place.  The diagram illustrates a vertical Fibre Channel adapter card. It has two ports labeled 'PORT 1' and 'PORT 2'. A 'Duplex fiber optic cable' is plugged into 'PORT 1'. An 'LC loopback plug' is plugged into 'PORT 2'. The card is labeled 'FIBRE CHANNEL' at the bottom. Two leader lines point to the ports from the right side of the diagram.
3	Go to “Connecting the Filer to a Network” on page 19.

About this chapter

This chapter describes how to power on the system, including establishing a console connection to the filer. The console connection provides you with a means of viewing system messages as the filer system boots.

Topics in this chapter

This chapter describes the following topics:

- ◆ [“Establishing a console/terminal connection to the filer”](#) on page 44
- ◆ [“Connecting the system to a power source”](#) on page 47

Establishing a console/terminal connection to the filer

About establishing a console/terminal connection

You establish a console/terminal connection to the filer for the following reasons:

- ◆ To observe the system responses on the terminal screen when the system is started
- ◆ To configure the filer after you start it

Protocol used by filer console port

The console port on your filer uses the three-wire protocol in which your filer uses only the RD, TD, and SG pins.

Note

The filer ignores the DCD, DSR, CTS, and RI input pins. You must set the flow control of your console/terminal to *none* and configure your console/terminal to ignore the DTR and RTS output pins.

Pin settings defined by RS-232

The following table lists pin settings defined by RS-232 for DB-9 and DB-25 ports.

Note

The DB-25 pin settings are listed in case you have a 25-pin console/terminal.

The arrows in the table represent the following directions:

- ← Into filer
- Out from filer

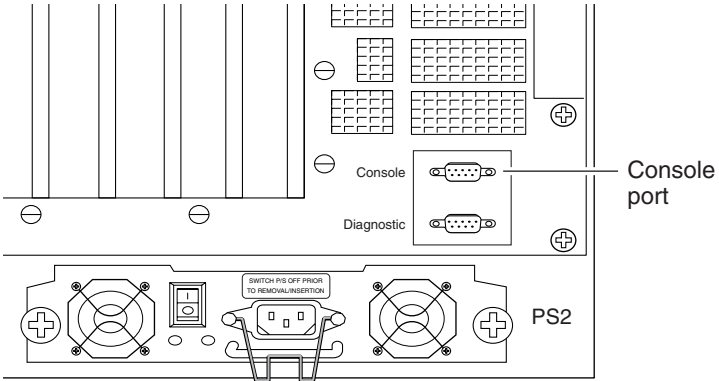
DB-9 pins	DB-25 pins	Name	Direction	Description
1	20	DTR	→	Data Terminal Ready
2	3	RD	←	Receive Data
3	2	TD	→	Transmit Data
4	8	DCD	←	Data Carrier Detect

DB-9 pins	DB-25 pins	Name	Direction	Description
5	7	SG	NA	Signal Ground
6	6	DSR	←	Data Set Ready
7	5	CTS	←	Clear to Send
8	4	RTS	→	Request to Send
9	22	RI	←	Ring Indicator

Connecting an ASCII terminal

To connect an ASCII terminal to the filer, complete the following steps.

Step	Action										
1	Verify that the following communication settings are the same on the terminal and the filer.										
	<table><tr><th>Parameter</th><th>Setting</th></tr><tr><td>Baud rate</td><td>9600</td></tr><tr><td>Data bits</td><td>8</td></tr><tr><td>Parity</td><td>None</td></tr><tr><td>Stop bits</td><td>1</td></tr></table>	Parameter	Setting	Baud rate	9600	Data bits	8	Parity	None	Stop bits	1
	Parameter	Setting									
	Baud rate	9600									
	Data bits	8									
	Parity	None									
	Stop bits	1									
For information about verifying or changing the settings, see the documentation for your terminal.											

Step	Action
2	Connect one end of the DB-9 to DB-9 serial cable to the port labeled Console on your filer and the other end to your ASCII terminal. The following illustration shows the location of the console port. 

Connecting the system to a power source

Powering on all units in the system

You power on the units in your system in this sequence:

- ◆ Third-party tape backup (if applicable)
- ◆ Disk shelves first
- ◆ Filer last

Caution

It is important that you power on the filer after the disk shelves.

The disk shelves and disk drives require time to power on, reset, and prepare to respond to the filer. The filer expects these units to be ready for input/output when it powers on and performs its reset and self-test.

The power-on process for a new installation automatically

- ◆ Checks all connections to the filer
- ◆ Runs the `setup` command

Note

See the *Getting Started Guide* for more information about the resources for configuring your filer.

Powering on the disk shelves

To power on the disk shelves, see your Fibre Channel StorageShelf guide.

Connecting the filer to power

For instructions about connecting your F800 series filer to power, go to one of the following sections:

- ◆ [“Connecting the filer to AC power”](#) on page 48
- ◆ [“Connecting the filer to DC power”](#) on page 50

Connecting the system to a power source

Connecting the filer to AC power

Connecting and powering on an AC system

To connect the filer to an AC power source, complete the following steps.

Step	Action
1	Make sure that the power switch on each power supply is in the Off (0) position.
2	Connect the socket end of the supplied power cord to the recessed power plug on the power supply.
3	Secure the power cord with the retaining clip on the power supply.
4	Plug the other end of the power cord into a grounded electrical outlet.
5	If the filer has a second power supply, repeat Steps 1 through 4. Caution_____ To obtain power supply redundancy, make sure that you connect the second power supply to a separate AC circuit. _____
6	Turn the power switch on the power supplies to the On (I) position. Result: The system verifies the hardware and loads the operating system.
7	Make sure that the front panel, power supply, and network port LEDs illuminate. The LED responses are described in “LED responses at startup” on page 54. Note_____ If the LEDs do not illuminate, contact Network Appliance Technical Support. _____

Step	Action
8	Check the startup messages as they appear on the console or LCD. The system messages are described in “System messages at startup” on page 75. Note_____ If the startup messages do not appear, contact Network Appliance Technical Support. _____
9	Go to the <i>Data ONTAP Software Setup Guide</i> when the following default host name prompt appears on the console screen: toaster>

Connecting the system to a power source

Connecting the filer to DC power

About DC power supply cabling

Network Appliance does not supply the three-conductor power supply cable that connects to a DC power source. To connect the DC terminals on the power supply to the DC power source, you must fabricate a three-conductor cable that meets the requirements described in “[Required wiring for a DC power supply](#)” on page 6.

DC power supply connection requirements

You can use the DC power supply in both positive and negative ground installations. The steps required to connect the power supplies are described in “[Connecting and powering on a DC system](#)” on page 51.

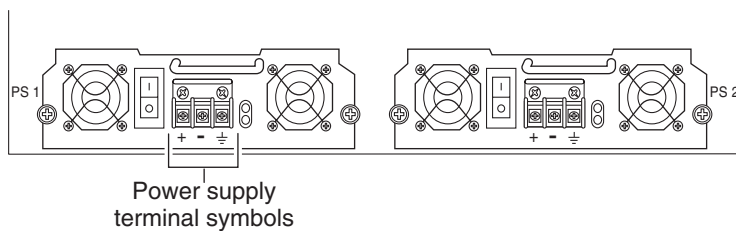
For positive ground systems: Connect the power supply terminals as described in the following table in the order listed.

Power supply terminal	to	DC bus terminal
Ground ($\perp$)	→	System ground ($\perp$)
Positive (+)	→	+ terminal of the 48V power source
Negative (-)	→	- terminal of the 48V power source

For negative ground systems: Connect the power supply terminals as described in the following table in the order listed.

Power supply terminal	to	DC bus terminal
Ground ($\perp$)	→	System ground ($\perp$)
Negative (-)	→	- terminal of the 48V power source
Positive (+)	→	+ terminal of the 48V power source

The following illustration shows the two DC power supplies. The labels for the ground ($\perp$), negative (-), and positive (+) terminals are below the terminals.



Connecting and powering on a DC system

To connect the DC power supply and power on the filer, complete the following steps.

WARNING —
The DC power source must have a 20A circuit breaker.

Step	Action
1	Make sure that the power supplies on the filer and the power source are turned off.
2	Remove the terminal cover from the power supply terminal block and set it aside.
3	Connect the first power supply to a DC bus by connecting the power supply terminals, as described in “DC power supply connection requirements” on page 50. WARNING — Be sure to connect the power supply terminals correctly depending on whether the installation site is positive ground or negative ground.
4	Use the same method to connect the second power supply to the same or a second DC bus, if available.

Step	Action
5	Cover the power supply terminal block with the terminal cover that you set aside. WARNING _____ To protect yourself from possible electric shock, it is important that the terminal blocks are covered when the filer is connected to the power source.
6	Make sure that all disk shelf and filer power switches are turned off, then turn on the power source.
7	Turn the power switch on the power supplies to the On (I) position. Result: The system verifies the hardware and loads the operating system.
8	Make sure that the front panel, power supply, and network port LEDs illuminate. The LED responses are described in “LED responses at startup” on page 54. Note _____ If the LEDs do not illuminate, first verify that your power supplies are connected with the proper polarity, as described in “DC power supply connection requirements” on page 50. If the connections are correct and the LEDs still do not illuminate, contact Network Appliance Technical Support.
9	Check the startup messages as they appear on the console or LCD. The system messages are described in “System messages at startup” on page 75. Note _____ If the startup messages do not appear, contact Network Appliance Technical Support.
10	Go to the <i>Data ONTAP Software Setup Guide</i> when the following default host name prompt appears on the console screen: toaster>

About this chapter

This chapter describes the startup responses from your filer and various hardware components on your filer. These responses include

- ◆ The LED responses from the various hardware components on your filer
- ◆ The system messages displayed on
 - ❖ The filer LCD
 - ❖ The console connected to the filer

Topics in this chapter

This chapter describes the following topics:

- ◆ “[LED responses at startup](#)” on page 54
- ◆ “[System messages at startup](#)” on page 75

LED responses at startup

About this section

This section describes the LED responses from the filer and various hardware components on your filer at startup.

For detailed information

This section describes the following topics:

- ◆ [“Front panel LEDs”](#) on page 55
- ◆ [“Power supply LEDs”](#) on page 57
- ◆ [“Network connection LEDs”](#) on page 59

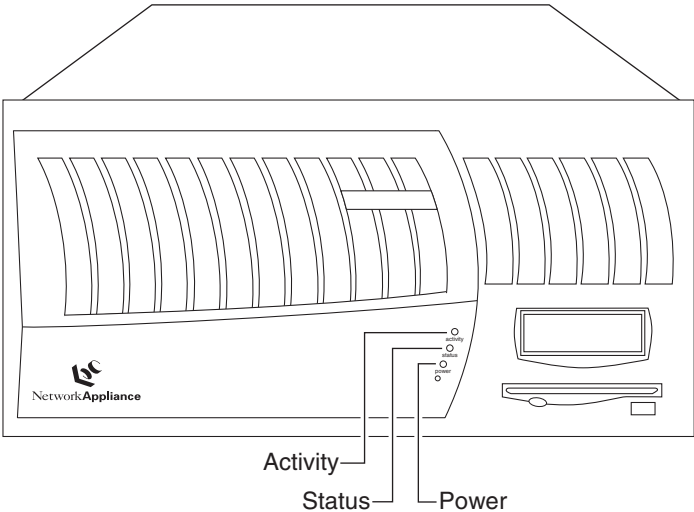
LED responses at startup

Front panel LEDs

Location of front panel LEDs

The following illustration shows the LEDs on the front panel of an F800 series filer.

Note _____
The LEDs on your filer might be in slightly different locations.



Description of front panel LEDs

The following table describes the three LEDs on the front panel.

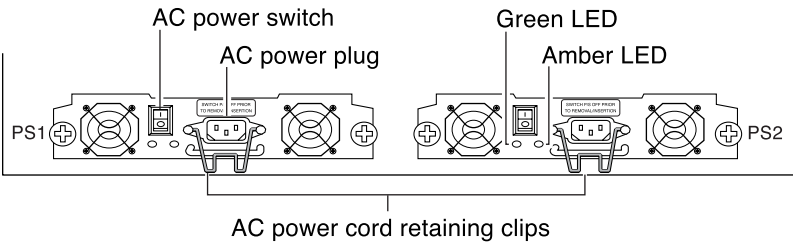
LED	State of illumination	Explanation
Activity	Green	Operation/activity is normal.
	Flashing	CPU activity is detected.
	Off	No activity is detected.

LED	State of illumination	Explanation
Status	Green	The system is operating normally.
	Amber	The Status LED turns amber when you turn on the filer and stays lit while the operating system is loading. Note_____ If the Status LED remains amber, a fault occurred or the system halted. The filer LCD identifies the reason for this continued state of illumination. _____
Power	Green	The system is on.
	Off	The system is off.

About this section This section describes the LED responses for the AC or DC power supplies in your F800 series filer. For each of the following, the location of the LEDs is identified and the LED functionality is described:

- ◆ “AC power supply LEDs” on page 57
- ◆ “DC power supply LEDs” on page 58

AC power supply LEDs **Location of LEDs:** The following illustration shows the AC power supply LEDs on the back panel.

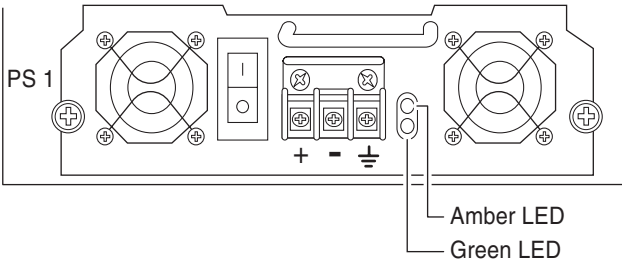


Description of LEDs: The following table describes the AC power supply LEDs.

LED	State of illumination	Explanation
Amber	On	Power supply is receiving AC power.
	Off	AC power is not present.
Green	On	Power supply output is good.
	Off	Power supply output is bad.

DC power supply LEDs

Location of LEDs: The following illustration shows the DC power supply LEDs on the back panel.



Description of LEDs: The following table describes the DC power supply LEDs.

LED	State	Indicates
Amber	On	Input voltage from the DC power source is good; that is, it meets specifications.
	Off	Input voltage from the DC power source does not meet specifications (–40V DC to –60V DC). Check the input voltage with a voltmeter. If the voltage does not meet specifications, correct it. If it does, the power supply is the source of the problem. Replace the power supply.
Green	On	Output voltages from the power supply to the filer are good; that is, they meet specifications.
	Off	A problem exists with the power supply or filer. First try changing the power supply. If the green LED still does not illuminate, the filer could be bad (for example, shorted or overloading the power supply).

Network connection LEDs

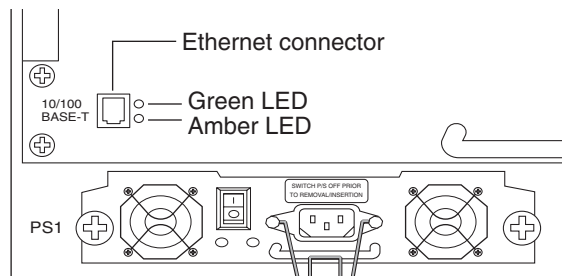
About this section

This section describes the LED responses for the network connections supported by your F800 series filer. For each of the following types of network connections, the location of the LEDs is identified and the LED functionality is described:

- ◆ “Onboard 10Base-T/100Base-TX Ethernet port”
- ◆ “Single-port 10Base-T/100Base-TX NIC LEDs” on page 60
- ◆ “Quad-port 10Base-T/100Base-TX NIC LEDs” on page 61
- ◆ “Single-port 100Base-TX/1000Base-T NIC LEDs” on page 62
- ◆ “Single-port 10Base-T/100Base-TX/1000Base-T NIC LEDs” on page 63
- ◆ “Dual-port 10Base-T/100Base-TX/1000Base-T NIC LEDs” on page 64
- ◆ “Dual-port 10Base-T/100Base-TX/1000Base-T NIC LEDs” on page 64
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- ◆ “Dual-port 1000Base-SX fiber NIC LEDs” on page 67
- ◆ “FDDI NIC LEDs” on page 68
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- ◆ “DAFS adapter LEDs” on page 74

Onboard 10Base-T/100Base-TX Ethernet port

Location of LEDs: The onboard 10Base-T/100Base-TX Ethernet port has two LEDs, as shown in the following illustration.

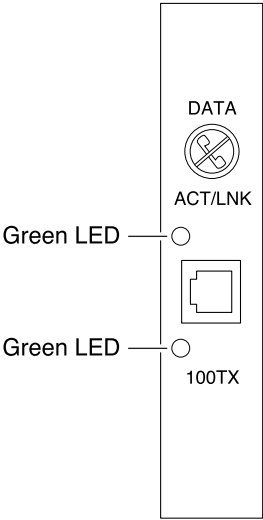


Description of LEDs: The following table describes the LEDs for the onboard 10Base-T/100Base-TX Ethernet port.

LEDs	State of illumination	Indicates...
Green	On	Valid network connection.
	Off	No Ethernet connection is present.
Amber	On	Transmitting and receiving data.
	Off	Idle.

Single-port 10Base-T/100Base-TX NIC LEDs

Location of LEDs: The single-port 10Base-T/100Base-TX Ethernet NIC has one port and two LEDs, as shown in the following illustration.

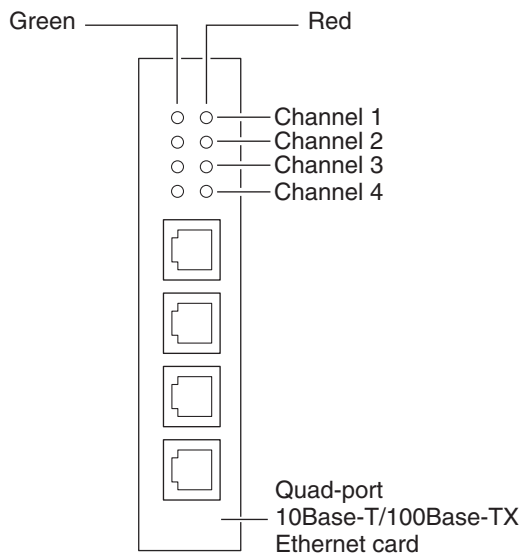


Description of LEDs: The following table describes the LEDs on the single-port 10Base-T/100Base-TX Ethernet NIC.

LEDs	State of illumination	Indicates...
ACT/LNK	On	Valid network connection. For some devices, the LED can take several seconds to light up.
	Off	One of three scenarios: ◆ Idle. ◆ There is no power. ◆ Faulty cable connection.
	Flashing	Transmitting and receiving data.
100	On	Operating at 100 Mbps.
	Off	Operating at 10 Mbps.

Quad-port 10Base-T/100Base-TX NIC LEDs

Location of LEDs: The quad-port 10Base-T/100Base-TX Ethernet NIC has four ports for four channels, with the top port assigned to the first channel. Each port has a corresponding pair of green and red LEDs, as shown in the following illustration.

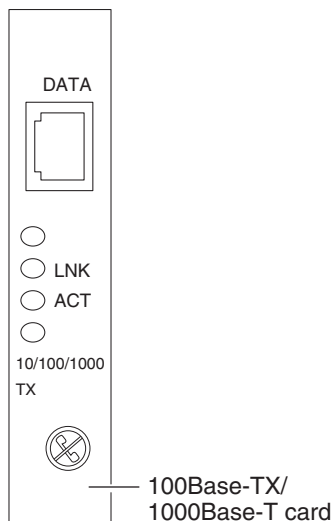


Description of LEDs: The following table describes the function of the LEDs.

LEDs	State of illumination	Indicates...
Green	On Solid	Link is up.
	On Flashing	Network activity.
	Off	Cabling problems.
Red	On	Operating at 100 Mbps.
	Off	Operating at 10 Mbps.

Single-port 100Base- TX/1000Base-T NIC LEDs

Location of LEDs: The 100Base-TX/1000Base-T NIC has one port and four LEDs, as shown in the following illustration.

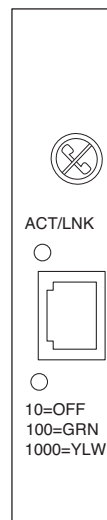


Description of LEDs: The following table describes the LEDs on the 100Base-TX/1000Base-T NIC.

LEDs	State	Indicates...
Top (not labeled)		Not used.
LNK	On	Valid network connection. For some devices, the LED can take several seconds to light up.
	Off	Link to network is not present.
ACT	On	Sending or receiving data.
	Off	Idle.
Bottom (not labeled)	Amber	Operating at 1000 Mbps.
	Green	Operating at 100 Mbps.

Single-port 10Base-T/100Base-TX/1000Base-T NIC LEDs

Location of LEDs: The single-port 10Base-T/100Base-TX/1000Base-T NIC has one port and two LEDs, as shown in the following illustration.



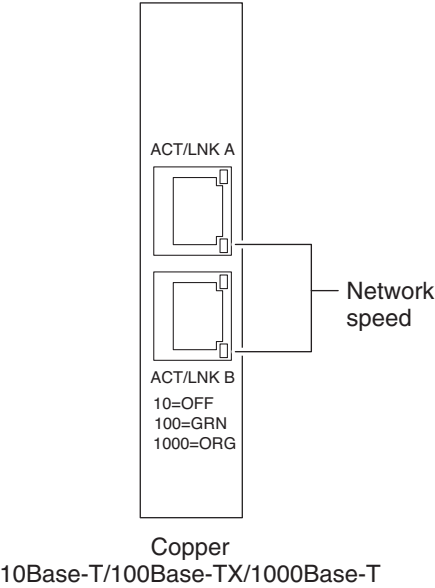
Copper
10Base-T/100Base-TX/1000Base-TX

Description of LEDs: The following table describes the LEDs on the single-port 10Base-T/100Base-TX/1000Base-T NIC.

LED type	Status indicator	Description
ACT/LNK	Green	A valid network connection is established.
	Blinking green	Data is being transmitted across the network.
	Off	There is no network connection present.
10=OFF	Off	Data transmits at 10 Mbps.
100=GRN	Green	Data transmits at 100 Mbps.
1000=YLW	Yellow	Data transmits at 1000 Mbps.

Dual-port 10Base-T/100Base-TX/1000Base-T NIC LEDs

Location of LEDs: The dual-port 10Base-T/100Base-TX/1000Base-T NIC has two ports and four LEDs, as shown in the following illustration.



Description of LEDs: The following table explains what the LEDs on your dual-port 10Base-T/100Base-TX/1000Base-T NIC mean.

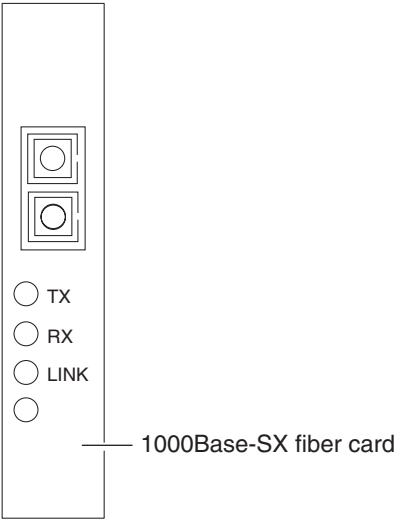
LED type	Status indicator	Description
ACT/LNK	Green	A valid network connection is established.
	Blinking green	Data is being transmitted across the network.
	Off	There is no network connection present.
10=OFF	Off	Data transmits at 10 Mbps.
100=GRN	Green	Data transmits at 100 Mbps.
1000=YLW	Orange	Data transmits at 1000 Mbps.

**Single-port
1000Base-SX fiber
(controller III) NIC
LEDs**

Location of LEDs: The 1000Base-SX fiber NIC has one port and four LEDs, as shown in the following illustration.

Note_____

The F800 series filers use only the TX, RX, and LINK LEDs.



Description of LEDs: The following table describes the LEDs on the 1000Base-SX fiber NIC.

LED	State	Indicates...
TX	On	Transmitting data.
	Off	Idle.
RX	On	Receiving data.
	Off	Idle.
LINK	On	Valid network connection.
	Off	Connections need to be checked.

Single-port 1000Base-SX (controller IV) NIC LEDs

Location of LEDs: The single-port 1000Base-SX NIC has one port and two used LEDs, as shown in the following illustration.



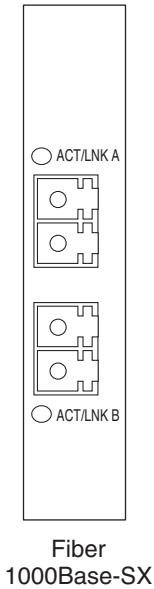
Fiber
1000Base-SX

Description of LEDs: The following table describes the LEDs on the single-port 1000Base-SX NIC.

LED type	Status indicator	Description
LNK	On	A valid network connection is established.
	Off	There is no network connection present.
ACT	On	Data is being transmitted across the network.
	Off	There is no network activity present.

**Dual-port
1000Base-SX fiber
NIC LEDs**

Location of LEDs: The dual-port 1000Base-SX fiber NIC has two ports and two LEDs, as shown in the following illustration.



Description of LEDs: The following table describes the LEDs on the dual-port 1000Base-SX fiber NIC.

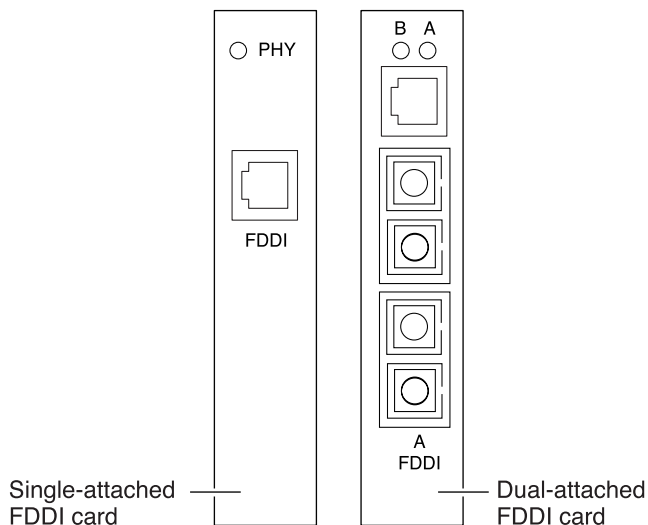
LED type	Status indicator	Description
ACT/LNK	Green	A valid network connection is established.
	Blinking green	Data is being transmitted across the network.
	Off	There is no network connection present.

FDDI NIC LEDs

Number of LEDs: The FDDI NICs supported by the F840 have either one or two bi-color LEDs. The number of LEDs on the NIC depends on the type of FDDI NIC used.

Type of FDDI NIC used	Number of LEDs	LED identification
Single-attached FDDI-TP with an RJ-45 port	1	PHY
Single-attached FDDI-fiber with a duplex SC port	1	PHY
Dual-attached FDDI-fiber with two duplex SC ports and one RJ12 port	2	A and B

Location of LEDs: The ports on a single-attached FDDI-TP NIC and a dual-attached FDDI-fiber NIC are shown in the following illustration.



Description of LEDs: The following table describes the LEDs on a FDDI NIC.

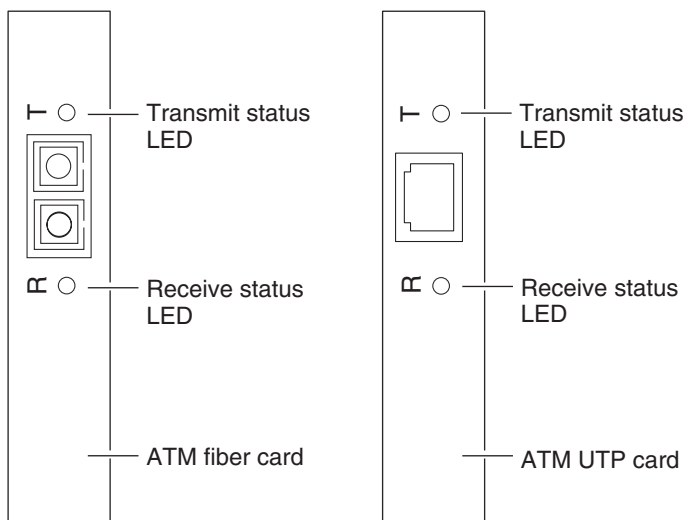
LED	State	Indicates...
PHY or A	Flashes green	One of two scenarios: ◆ Three flashes at startup indicate that the network connection is in progress. ◆ Continued flashing indicates that there is no cable attached.
	Green	Transmitting data.
	Flashes amber	Illegal network topology.
	Amber	One of two scenarios: ◆ If on before the filer boots the operating system, there is a self-test failure. ◆ If on after the filer boots the operating system, there is a port or connection failure.

LED	State	Indicates...
	Alternates green and amber	One of three scenarios: ◆ In standby mode, if the NIC has two duplex SC ports and one RJ12 port and is connected to a concentrator. ◆ A disabled port. ◆ Adapter failure.
B	Flashes green	One of two scenarios: ◆ Three flashes at startup indicate that the network connection is in progress. ◆ Continued flashing indicates that there is no cable attached.
	Green	Transmitting data.
	Flashes amber	Illegal network topology.
	Amber	One of two scenarios: ◆ If on before the filer boots the operating system, there is a self-test failure. ◆ If on after the filer boots the operating system, there is a port or connection failure.

ATM NIC LEDs

Location of LEDs: All ATM NICs have one port and two LEDs. The Transmit LED is located above the port and the Receive LED is located below the port.

The following illustration shows an ATM fiber NIC and an ATM UTP NIC.



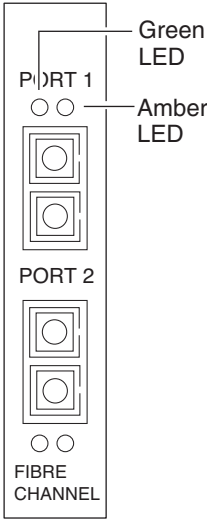
Description of LEDs: The following table describes the LEDs on the ATM NICs.

LEDs	State	Indicates...
T	Green	Transmitting data.
	Off	Idle.
	Amber	SONET alarm condition declared because of trouble with the receiving device.
R	Green	Receiving data.
	On	Idle.
	Red	No carrier available.
	Amber	No carrier available (OC12 only).

Dual-port Fibre Channel HBA LEDs

Location of LEDs: The dual-port Fibre Channel HBA can be used in two modes: Initiator and Target. The LEDs on both cards are the same color and in the same location, but the Status and Activity indications are different.

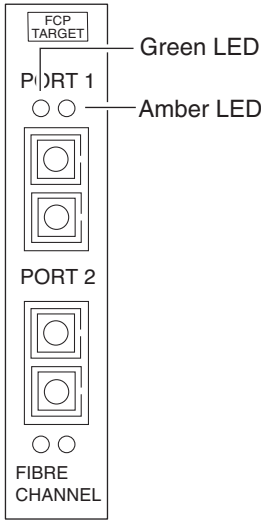
The following illustration shows the LED locations for a dual-port Fibre Channel HBA in Initiator mode.



Description of initiator-mode LEDs: The following table describes the LEDs on the dual-port Fibre Channel HBA in Initiator mode.

Green	Amber	Indicates...
On	On	Power on
Off	Flashing	Loss of synch
Off	On	Signal acquired
On	Off	Ready
Flashing	Flashing	Adapter firmware error

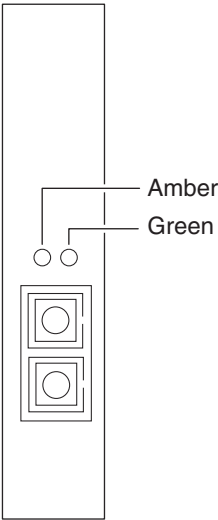
Location of Target-mode LEDs: The following illustration shows the LED locations for a dual-port Fibre Channel HBA in Target mode.



Description of Target mode LEDs: The following table describes the LEDs on the dual-port Fibre Channel HBA in Target mode.

Green	Amber	Indicates...
On	On	Power on
Off	Flashing	Loss of synch
Off	On	Signal acquired
On	Off	Online
Flashing	Flashing	Adapter firmware error

DAFS adapter LEDs **Location of DAFS adapter LEDs:** The following illustration shows the LED locations for a DAFS network adapter.



Description of DAFS adapter LEDs: The following table describes the LEDs for a DAFS network adapter.

Green	Amber	Indicates...
On	Off	Link
Off	Off	No link
Flashing	Off	HBA asserted/panicked
On	Flashing or On	HBA transmitting/receiving data

System messages at startup

About startup messages

When the system is powered on, it verifies the hardware, loads the operating system, and displays the startup messages on the console and LCD.

Types of startup messages

The console displays two types of startup messages:

- ◆ Power On Self-Test (POST) messages
- ◆ Boot messages

POST messages

When you turn on the power, the filer checks the hardware on the motherboard by running a series of POSTs from the PROM (Programmable Read-Only Memory). The exact messages that appear on your system console depend on your system configuration. Verify that the memory size displayed is what you expect for your filer.

The following is an example of the POST messages that appear on the system console of an F840.

Header:

```
Intel Open Firmware by FirmWorks
Copyright 1995-2003 FirmWorks, Network Appliance. All Rights
Reserved.
Firmware release x.x_il
Press <DEL> to abort boot, <ESC> to skip POST
```

POST messages:

```
Memory size is 3072 MB
Testing SIO
Testing LCD
Probing devices
Testing 3072 MB
Complete
Finding image...
Starting
```

Note

The filer LCD displays only the POST messages without the preceding header.

Boot messages

The boot messages appear after the hardware passes all POSTs and the filer begins to load the operating system.

The following message is an example of the boot message that appears on the system console of an F840 when the filer is successfully started for the first time. The exact boot messages that appear on your system console depend on your system configuration.

Boot messages

```
NetApp Release x.x.x: Thu July 11 04:06:00: PST 2002
Copyright (c) 1992-2002 Network Appliance, Inc.
Starting boot on Thu July 11 23:42:47 GMT 2002

System ID: 0016777216 ()
slot 0: System Board
    Memory Size:          3 GB
slot 0: Ethernet Controller e0
    MAC Address:          00:c0:94:00:13:12 (auto-100tx-fd-up)
slot 1: Dual SCSI Host Adapter
    SCSI Host Adapter 5a (Qlogic ISP 1280)
    Ultra2/Wide, Low Voltage Differential
    Firmware Version 8.9          Clock Rate 100MHz.
    3: EXABYTE Mammoth28E0021011211
    SCSI Host Adapter 5b (Qlogic ISP 1280)
    Ultra2/Wide, Low Voltage Differential
    Firmware Version 8.9          Clock Rate 100MHz.
    6: QUANTUM DLT8000          010A
slot 3: Ethernet Controller e3
    MAC Address:          00:a0:92:f7:62:56 (tp-down)
slot 4: Fibre Channel Host Adapter 3(Qlogic ISP2200)
    Firmware rev:         2.0.25
    Host Loop Id:         119
    FC Node Name:         2:100:00e08b:001bc1
    Cacheline size: 8          FC Packet size: 2048
    6 Disks: 102.0GB
    1 shelf with EDM
slot 11: NVRAM
    Memory Size:          128 MB
Please enter the new hostname [ ]:
```

About this chapter

This section identifies and describes the different types of error messages that appear on the LCD and suggests corrective actions for the problems.

Note

If you contact Network Appliance Technical Support for service, report both the LCD message and the console message. Most LCD messages are truncated versions of console messages that provide more information about the error condition than the LCD messages.

Topics in this chapter

This chapter describes the following topics:

- ◆ “[POST error messages](#)” on page 78
- ◆ “[Boot error messages](#)” on page 82
- ◆ “[All other error messages](#)” on page 87

References

The following table lists the manuals that can help you with some of the corrective actions.

If you are troubleshooting...	Then...
F800 series hardware problems and need to open the filer	See the <i>F800 Series Field Service Guide</i>
Fibre Channel disk shelf problems	See <i>your disk shelf hardware guide</i> .
Software problems	See the <i>Data ONTAP System Administrator's Guide</i>

POST error messages

About POST error messages

POST error messages might appear when the filer checks the hardware on the motherboard by running a series of POSTs from the PROM.

The following table describes the error messages that might appear on the LCD if the filer encounters errors during the POSTs.

POST error message	Explanation	Fatal?	Corrective action
*2V power bad *3V power bad *5V power bad *+12V power bad *-12V power bad	One (or more) of the power voltages is bad. This could be due to a bad power supply or power-regulation device.	Yes	Replace the power supply or the motherboard.
* <i>Boot DeviceErr</i>	Diskette drive or PC card could not be found to boot from.	Yes	Replace the diskette drive or insert a PC card.
* <i>Clock bogus. Date reset</i>	The system real-time clock (RTC) contains an invalid date value. The system does not boot, but the date is reset to January 1, 1970, to enable a subsequent boot.	Yes	Reboot the filer and reset the date immediately to avoid file system problems.
* <i>Clock dead</i> *Clock battery is dead	The system RTC failed and its battery expired.	Yes	Replace the failed RTC battery, or replace the motherboard.
* <i>Clock error</i>	The system real-time clock (RTC) is not operating (counting) correctly.	Yes	Replace the motherboard.
* <i>Clock reset</i>	The system RTC is not running. The system does not boot, but the date is reset to January 1, 1970, to enable a subsequent boot.	Yes	Reboot the filer and reset the date immediately to avoid file system problems.

POST error message	Explanation	Fatal?	Corrective action
<i>*CPU ucode err</i>	The CPU microcode update did not occur or, in a multiprocessor system, the microcode updates in the CPUs do not match; that is, they have different revisions.	Yes	Update the firmware to a version that contains an updated microcode database. In a multiprocessor system, ensure that both CPUs are the same revision.
<i>*CPU0 fan failed</i>	The CPU cooling fan is not rotating.	Yes	1. Power off the filer. 2. Make sure that the fan subassembly is plugged in. 3. If necessary, replace the identified CPU fan/heat sink assembly.
<i>*CPU0 fan stopped</i>	The CPU cooling fan has stopped spinning or is spinning too slowly. This can damage the CPU chip.	Yes	1. Power off the filer. 2. Replace the identified CPU fan/heat sink assembly.
<i>*CPU0 power bad</i> <i>*CPU1 power bad</i>	Voltage to the CPU is not within tolerances.	Yes	Replace the motherboard.
<i>*CPU speed err</i>	The CPU's measured clock speed does not match the expected value for the filer model. This indicates problems with system clocks and/or buses.	No	Replace the motherboard.
<i>*Env-A rupt err</i> <i>*Env-B rupt err</i> <i>*Env-C rupt err</i> <i>*Env-D rupt err</i>	One of four environmental status monitors on the filer cannot interrupt the processor, which prevents the filer from properly monitoring its environmental health.	Yes	Replace the motherboard.

POST error message	Explanation	Fatal?	Corrective action
<i>*Env-A stat err</i> <i>*Env-B stat err</i> <i>*Env-C stat err</i> <i>*Env-D stat err</i>	One of four environmental status monitors on the filer indicates that it cannot properly monitor its environmental health.	Yes	Replace the motherboard.
<i>*Fan(s) stopped</i>	One or more chassis fans stopped spinning or are spinning too slowly. If two or more chassis fans fail, the system does not boot.	Maybe	Replace the chassis fan subassembly containing the failed fan.
<i>*FLPY init fail</i> <i>*FLPY reg error</i> <i>*FLPY seek err</i> <i>*FLPY track err</i> <i>*FLPY head err</i> <i>*FLPY format err</i> <i>*FLPY read err</i> <i>*FLPY setup err</i>	These messages indicate that the diskette drive subassembly failed.	No	Replace the diskette drive subassembly or replace the motherboard.
<i>*FP button stuck</i>	The front panel Reset button is stuck.	Yes	1. Make sure that the button is not stuck. 2. Replace the LED/LCD subassembly. 3. Replace the motherboard.
<i>*LCD won't open</i> <i>*LCD cmd stall</i> <i>*LCD cursor err</i> <i>*LCD data error</i>	The system LCD device is not operating correctly. All subsequent POST messages are displayed on the console.	No	Replace the LED/LCD subassembly or replace the motherboard.
<i>*No power info</i>	The system is clearly running but no information about the power supply is being reported. Something is wrong with the power supply or the status reporting circuitry.	No	Replace the power supply or the motherboard.
<i>*Onboard battery low</i>	The lithium battery on the motherboard is low.	No	Replace the lithium battery on the motherboard.

POST error message	Explanation	Fatal?	Corrective action
<i>*Overtemp alert</i>	The internal temperature sensor has detected a dangerously high temperature that can damage the system components inside the chassis.	Yes	1. Power down the filer. 2. Reduce the ambient temperature to 40° C or lower. 3. Make sure that you have proper air circulation through the filer. If the temperature inside the filer is not excessively hot, the sensor itself might have failed. 4. Replace the motherboard.
<i>*PCCRD init fail</i> <i>*PCCRD reg error</i> <i>*PCCRD seek err</i> <i>*PCCRD track err</i> <i>*PCCRD head err</i> <i>*PCCRD format err</i> <i>*PCCRD read err</i> <i>*PCCRD setup err</i>	These messages indicate that the PC card drive subassembly failed.	No	Replace the PC card, the PC card reader subassembly, or the motherboard.
<i>*PS #1 failed</i> <i>*PS #2 failed</i>	If the filer has a second power supply, one of the power supplies has failed and the filer is running on the second power supply.	No	Replace the identified power supply.
<i>*SIO error</i>	The filer SIO or ISA bridge chip failed its timer interrupt test. The system cannot operate properly without this function.	Yes	Replace the motherboard.
<i>*Watchdog failed</i>	The filer watchdog reset hardware, used to reset the filer from a system hang condition, is not functioning properly.	No	Replace the motherboard.

Boot error messages

About boot error messages

Boot error messages might appear after the hardware passes all POSTs and the filer begins to load the operating system.

The following table describes the error messages that might appear on the LCD if the filer encounters errors while starting up.

Boot error message	Explanation	Fatal?	Corrective action
<i>No /etc/rc</i>	The <i>/etc/rc</i> file is corrupted.	No	1. At the <code>hostname></code> prompt, enter setup. 2. As the system prompts for system configuration information, use the information you recorded in the filer configuration information worksheet in the <i>Data ONTAP Software Setup Guide</i>. For more information about the filer <code>setup</code> program, see the <i>Data ONTAP System Administrator's Guide</i>.
<i>No /etc/rc, running setup</i>	The system cannot find the <i>/etc/rc</i> file and automatically starts <code>setup</code> .	No	As the system prompts for system configuration information, use the information you recorded in the filer configuration information worksheet in the <i>Data ONTAP Software Setup Guide</i>. For more information about the filer <code>setup</code> program, see the <i>Data ONTAP System Administrator's Guide</i>.

Boot error message	Explanation	Fatal?	Corrective action
<i>Cannot initialize labels</i>	When the system tries to create a new file system, it cannot initialize the disk labels.	Yes	Usually, you do not need to create and initialize a file system; do so only after consulting Network Appliance Technical Support.
<i>Cannot read labels</i>	When the filer tries to initialize a new file system, it has a problem reading the disk labels it wrote to the disks. This problem can be because the system failed to read the disk size, or the written disk labels were invalid	Yes	Usually, you do not need to create and initialize a file system; do so only after consulting Network Appliance Technical Support.
<i>Disk label processing failed</i>	The filer detects that the disk is not in the correct drive bay.	Yes	Make sure that the disk is in the correct bay.
<i>Dirty shutdown in degraded mode</i>	The file system is inconsistent because you did not shut down the system cleanly when it was in degraded mode.	Yes	Contact Network Appliance Technical Support for instructions about repairing the file system.
<i>Halted: firmware too old</i>	The disk firmware is an old version.	Yes	Update the disk firmware by entering the following command: disk_fw_update
<i>No disk controllers</i>	The system cannot detect any FC-AL disk controllers.	Yes	Turn off the filer power and verify that all NICs are properly seated in the appropriate expansion slots.
<i>No disks</i>	The system cannot detect any FC-AL disks.	Yes	Verify that all disks are properly seated in the drive bays.

Boot error message	Explanation	Fatal?	Corrective action
<i>Drive %s.%d not supported</i>	%s—The FC-AL disk number; %d—The disk ID number. The system detects an unsupported disk drive.	Yes	1. Remove the drive immediately or the system drops down to the PROM monitor within 30 seconds. 2. Check the System Configuration Guide at http://now.netapp.com to verify support for your disk drive.
<i>FC-AL loop down, adapter %d</i>	The system cannot detect the FC-AL loop or adapter.	Yes	1. Identify the adapter by entering the following command: storage show adapter 2. Turn off the power on the filer and verify that the adapter is properly seated in the expansion slot. 3. Verify that all Fibre Channel cables are connected.
<i>Halted: Illegal configuration</i>	Incorrect cluster configuration.	Yes	1. Check the console for details. 2. Verify that the disk shelves in the loop are in correct order. For example, an FC7 disk shelf must always be disk shelf 0. 3. Verify that all cables are correctly connected.

Boot error message	Explanation	Fatal?	Corrective action
<i>File system may be scrambled</i>	One of the following errors causes the file system to be inconsistent:		
	◆ An unclean shutdown when the filer is in degraded mode and when NVRAM is not working.	Yes	Contact Network Appliance Technical Support to learn how to start the system from a system boot diskette and repair the file system.
	◆ The number of disks detected in the disk array is different than the number of disks recorded in the disk labels. The system cannot start when more than one disk is missing.	Yes	Make sure that all disks on the system are properly installed in the disk shelves.
	◆ The system encounters a read error while reconstructing parity.	Yes	Contact Network Appliance Technical Support for help.
	◆ A disk failed at the same time the system crashed.	Yes	Contact Network Appliance Technical Support to learn how to repair the file system.
<i>Invalid PCI card slot %d</i>	%d—The expansion slot number. The system detects a adapter that is not supported by Network Appliance.	Yes	Replace the unsupported adapter with an adapter that is included in the System Configuration Guide at http://now.netapp.com .
<i>Configuration exceeds max PCI space</i>	The memory space for mapping PCI adapters has been exhausted, because either ◆ There are too many PCI adapters in the system ◆ An adapter is demanding too many resources	Yes	Verify that all expansion adapters in the filer are supported. Contact Network Appliance Technical Support for help. Have a list ready of all expansion adapters installed in the filer.

Boot error message	Explanation	Fatal?	Corrective action
<i>No network interfaces</i>	The system cannot detect any network interfaces.	Yes	1. Turn off the system and verify that all NICs are seated properly in the appropriate expansion slots. 2. Run diagnostics to check the onboard Ethernet port. If the problem persists, contact Network Appliance Technical Support.
<i>ServerNet: wrong pci slot</i>	The system detects that the cluster interconnect adapter is in the wrong expansion slot.	Yes	See the System Configuration Guide at http://now.netapp.com and place the adapter in the approved expansion slot.
<i>No NVRAM present</i>	The system cannot detect the NVRAM adapter.	Yes	Make sure that the NVRAM adapter is securely installed in expansion slot 11.
<i>Replace NVRAM batteries</i>	The NVRAM battery is low. The system shuts down immediately.	Yes	Replace the battery.
<i>Replace %s</i>	%s—The number of NVRAM batteries. The F800 series filers have a single NVRAM battery.	Yes	Replace the battery.
<i>NVRAM #n downrev</i>	n—The serial number of the NVRAM adapter. The NVRAM adapter is an early revision that cannot be used with the system.	Yes	Check the console for information about which revision of the NVRAM adapter is required. Replace the NVRAM adapter.
<i>NVRAM test failed</i>	An error occurred while the system tested the NVRAM.	Yes	Contact Network Appliance Technical Support if this message appears.
<i>Unsupported NVRAM size %dMB</i>	%d—The amount of memory on the NVRAM adapter. The specified size is not supported.	Yes	Verify that the system has 128 MB of NVRAM.

All other error messages

About all other error messages

These error messages might appear when the system is operating, when it has halted, or when it is restarting because of system problems.

Error message	Explanation	Fatal?	Corrective action
<i>Disk n is broken</i>	<i>n</i> —The RAID group disk number. The solution depends on whether you have a hot spare in the system.	No	See the <i>Data ONTAP System Administrator's Guide</i> for information about how to locate a disk based on the RAID group disk number and how to replace a faulty disk.
<i>Fans stopped; replace them</i>	One of the fan subassemblies of the filer failed.	No	Replace the failed fan subassembly as soon as possible.
<i>Backplane fans non-functional</i>	One of the fan subassemblies of the filer failed.	Yes	Replace the failed fan subassembly immediately.
<i>Power supply degraded</i>	One of the power supply units is turned off, has been removed from the filer, or has failed.	No	Verify that both power supplies are installed and turned on. If you still get this error, replace the power supplies one at a time to determine the failed power supply.
<i>CPU fan has failed</i>	The CPU fan in an F810, F820, F825, or F840 filer failed. The system automatically shuts down.	Yes	Replace the CPU fan before you restart the system.
<i>Dumping core</i>	The system is dumping core after a system crash.	Yes	Write down the system crash message on the system console and report the problem to Network Appliance Technical Support.

Error message	Explanation	Fatal?	Corrective action
<i>Disk hung during swap</i>	A disk error occurred as you were hot swapping a disk.	Yes	1. Disconnect the disk shelf from the power supply. 2. Wait 15 seconds to allow all disks to spin down. 3. Reconnect the power source to the disk shelf. 4. Restart the system by entering the following command: boot
<i>Error dumping core</i>	The system cannot dump core during a system crash and restarts without dumping core.	Yes	Report the problem to Network Appliance Technical Support.
<i>Panicking</i>	The system is crashing. If the system does not hang while crashing, the message <code>Dumping core</code> appears.	Yes	Report the problem to Network Appliance Technical Support.
<i>System too hot</i>	The temperature sensor indicates that the system temperature is too high.	Yes	Verify that the ventilation holes on the top cover of the system are not blocked. If the ventilation holes are not blocked and the problem persists, contact Network Appliance Technical Support for help.

About this appendix This appendix describes how to determine the power line lengths running from the storage appliance to the power source.

Topics in this appendix This appendix discusses the following information:

- ◆ “[Recommended AC power line sizes](#)” on page 90
- ◆ “[Calculating the length of DC wires](#)” on page 91

Recommended AC power line sizes

About AC power feeds

Longer AC power feeds need to be properly designed to preserve voltage levels to the equipment. The wiring from the breaker panel to the power strip, which supplies power to the storage appliance and disk shelves, can often exceed 50 feet.

Note

Total AC wire length = breaker to wall or ceiling outlet + extension cable or ceiling drop.

The following table lists the recommended conductor size for 2% voltage drop for a particular distance in feet (taken from the Radio Engineer's Handbook).

110V, single-phase	20A circuit	30A circuit	40A circuit	50A circuit
25 feet	12 AWG	10 AWG	8 AWG	8 AWG
50 feet	8 AWG	6 AWG	6 AWG	4 AWG
75 feet	6 AWG	4 AWG	4 AWG	2 AWG

220V, single-phase	20A circuit	30A circuit	40A circuit	50A circuit
25 feet	14 AWG	12 AWG	12 AWG	10 AWG
50 feet	12 AWG	10 AWG	8 AWG	8 AWG
75 feet	10 AWG	8 AWG	6 AWG	6 AWG

The following table list the approximate equivalent wire gauge (American Wire Gauge (AWG) to Harmonized Cordage).

AWG	8	10	12
Harmonized, mm-mm ¹	4.0	2.5	1.5

¹ mm-mm = millimeter squared

Calculating the length of DC wires

Use these variable definitions

To calculate the maximum combined length of the positive and negative wires between the DC source and DC power supplies, use the following variable definitions:		
◆	V_{SOURCE}	Voltage across the internal source resistance
◆	V_{OC}	Voltage across an open circuit of the input source
◆	V_{LOAD}	Voltage across a load, R_{TEST} , connected to the input source
◆	R_{TEST}	Test resistor of known value, that is, 10Ω at 300W
◆	R_{CABLE}	DC resistance of the cable at a given length
◆	R_{SOURCE}	DC resistance of the source
◆	R_{TOTAL}	Combined DC resistance of the cable and DC source: $R_{TOTAL} = R_{SOURCE} + R_{CABLE}$
◆	$V = IR$	Ohm's Law
◆	$V_{OC} = V_{SOURCE} + V_{LOAD}$	Kirchoff's Voltage Law

How to calculate the length

The following two examples show how to calculate the maximum combined length of the positive and negative wires that connect the DC power supply to the DC source.

Example 1: This example uses the following given values.

Given

$V_{\text{DROP}} = 2\text{V}$	Maximum voltage drop through input source and cable
$V_{\text{MIN}} = 40\text{V}$	Minimum input voltage
$I_{\text{MAX}} = 8.6\text{V}$	Maximum input current at 40V
$V_{\text{OC}} = 48\text{V}$	Measured
$V_{\text{LOAD}} = 47.5\text{V}$	Measured
$R_{\text{TEST}} = 10\Omega$	(300W)

Solution

$$V_{\text{DROP}} = I_{\text{MAX}} R_{\text{TOTAL}}$$

$$2 = 8.6 R_{\text{TOTAL}}$$

$$R_{\text{TOTAL}} = 2/8.6$$

$$R_{\text{TOTAL}} = .233\Omega$$

$$R_{\text{SOURCE}} = \left(\frac{V_{\text{OC}}}{V_{\text{LOAD}}} - 1 \right) R_{\text{TEST}}$$

$$R_{\text{SOURCE}} = \left(\frac{48\text{V}}{47.5\text{V}} - 1 \right) 10\Omega$$

$$R_{\text{SOURCE}} = .105\Omega$$

$$R_{\text{CABLE}} = R_{\text{TOTAL}} - R_{\text{SOURCE}}$$

$$= .233 - .105$$

$$R_{\text{CABLE}} = .128\Omega$$

For example, if you have a 12 gauge wire, solid strand, at room temperature, use the following calculation.

$$\text{Total cable length} = \frac{R_{\text{CABLE}}}{\text{DC resis.}^1}$$

$$\text{Total cable length} = \frac{.128\Omega}{.0017\Omega/\text{ft}} = 75 \text{ ft}$$

AWG	Strand	DC resistance ¹ [$\Omega/\text{ft.}$]		Total cable length ² [ft]	
		25° C	75° C	25° C	75° C
12	Solid	.0017	.0020	75	64
12	7/20	.0015	.0018	85	71
12	19/25	.0017	.0020	75	64
12	65/30	.0018	.0022	71	58
12	165/34	.0016	.0019	80	67

¹ Data from Alpha Wire, wire manufacturer

² Combined positive and negative run

Example 2: This example uses the following given values.

Given

$V_{\text{DROP}} = 2\text{V}$ Maximum voltage drop through input source and cable

$V_{\text{MIN}} = 40\text{V}$ Minimum input voltage

$I_{\text{MAX}} = 8.6\text{V}$ Maximum input current at 40V

$R_{\text{SOURCE}} \cong 0$

Solution

$$V_{\text{DROP}} = I_{\text{MAX}} R_{\text{TOTAL}}$$

$$2 = 8.6 R_{\text{TOTAL}}$$

$$R_{\text{TOTAL}} = 2/8.6$$

$$R_{\text{TOTAL}} = .233\Omega$$

$$R_{\text{TOTAL}} = R_{\text{SOURCE}} + R_{\text{CABLE}}$$

$$R_{\text{CABLE}} = R_{\text{TOTAL}} = .233\Omega$$

For example, if you have a solid strand 12 gauge wire at room temperature, use the following calculation.

$$\text{Total cable length} = \frac{R_{\text{CABLE}}}{\text{DC resis.}^1}$$

$$\text{Total cable length} = \frac{.233\Omega}{.0017\Omega/\text{ft}} = 136 \text{ ft}$$

AWG	Strand	DC resistance ¹ [$\Omega/\text{ft.}$]		Total cable length ² [ft]	
		25° C	75° C	25° C	75° C
12	Solid	.0017	.0020	136	116
12	7/20	.0015	.0018	155	129
12	19/25	.0017	.0020	136	116
12	65/30	.0018	.0022	129	105
12	165/34	.0016	.0019	145	122

¹ Data from Alpha Wire, wire manufacturer

² Combined positive and negative run

**About using other
wire sizes**

If you need a longer run for your combined positive and negative DC wires, choose a wire with a lower resistance and calculate the total cable length. For example, a solid #10 AWG has a lower DC resistance than a solid #12 AWG.

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 technical standards listed in "Declaration of Conformity," later in this appendix.

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，使用者會被要求採取某些適當的對策。

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.

Voluntary Control Council for Interference by Information Technology Equipment (VCCI, Japan)

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Translation of the VCCI-A notice:

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. If such trouble occurs, the user may be required to take corrective actions.

Declaration of Conformity

Declaration of Conformity			
Network Appliance, Inc. 495 East Java Drive Sunnyvale, CA 94089, U.S.A., declare under our sole responsibility that the products			
Type of equipment	Description	Model number	Year of manufacture
Network File Server	NetApp F810 Filer	F810	2001
Network File Server	NetApp F820 Filer	F820	2000
Network File Server	NetApp F825 Filer	F825	2002
Network File Server	NetApp F840 Filer	F840	2000
Network File Server	NetApp F880 Filer	F880	2001
to which this declaration relates conform to the following standards: EN 60950:1992, with A1-A4, A11, Information Technology Equipment (Safety) EN 55022:1998, Emissions Requirements for Information Technology Equipment EN 50024:1998, Immunity Requirements for Information Technology Equipment EN 60825-1, Safety of Laser/LED Equipment IEC 1000-3-2:1995 Limits for Harmonic Current Emissions IEC 1000-3-3:1994 Limitation of Voltage Fluctuations and Flicker in Low-Voltage Supply Systems following the provisions of the directives listed below: 73/23/EEC, Low Voltage Directive (Product Safety) 89/336/EEC, Electromagnetic Compatibility Directive Part number: 210-00155			

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