Installation Guide for the Model FS508 Fast Ethernet Switch

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Chapter 1
Introduction

Congratulations on your purchase of the NETGEAR™ Model FS508 8-port Fast Ethernet Switch. This switch is part of the NETGEAR 500 Series product family. The switch provides you with a low-cost, high-performance network solution and is designed to support power workgroups operating at either 10 megabits per second (Mbps) or 100 Mbps.

This guide describes how to install and use the switch. It includes physical configuration guidelines for connecting multiple 10 or 100 Mbps hubs and for connecting 10 or 100 Mbps Fast Ethernet stations, PCs, and servers.

Benefits of Using Switching Technology

A majority of installed networks today are based on shared network technology. With this technology, a number of users or groups of users share a total available network bandwidth (or network capacity) of 10 Mbps, 100 Mbps, or other amounts of network bandwidth. For example, with a total of 10 users, the average bandwidth available to each user on a 10 Mbps network is calculated as 10/100 Mbps, which equals 1 Mbps of bandwidth per user. On a 100 Mbps (Fast Ethernet) network, the average bandwidth available to each of the 10 users is 100/10 Mbps, which equals 10 Mbps of bandwidth per user.

Ethernet switches significantly increase network throughput by segmenting network traffic. They check traffic coming in to each port to learn which network device is located on which segment. Based on this information, switches forward cross-segment traffic only to the appropriate segment. The traffic will not show up in the other segments since it is filtered out. In this way, network capacity is fully reserved for traffic destined for that segment only, and other segments will not be saturated with unnecessary traffic.

Ethernet switches provide private, dedicated, 10 Mbps (or 100 Mbps) capacity to each connected PC/server or hub/workgroup segment, which is significantly higher than in a shared environment. The higher bandwidth enables applications such as multimedia, imaging, video, or high-performance client-server functions among users who are spread out over the network.

This improvement is accomplished very easily, with no change to the desktop (the network interface cards or software and the network wiring). As a result, the performance upgrade and the applications it enables are obtained very quickly and at a low cost.

Types of Ethernet Switches

Ethernet switches can be classified in different ways—as desktop switches or as segment switches. A *desktop switch* is designed to support one or a few PCs per port. It is generally used when the individuals need the full 10 Mbps network throughput to support the applications. Often, these switches support only a single MAC (media access control) address per port, have high-speed 100 Mbps ports to connect to fast servers, and are relatively inexpensive compared to a segment switch. A *segment switch*, in contrast, is designed to support an entire workgroup on each port, with each port having significant memory buffering and supporting thousands of MAC addresses.

Switches can also be classified by speed. As the name suggests, 10 Mbps switches support only 10 Mbps connections. Similarly, 100 Mbps switches support only 100 Mbps connections. Usually, 10/100 Mbps switches have primarily 10 Mbps ports with one or few 100 Mbps ports. Autosensing 10/100 Mbps switches support 10 Mbps or 100 Mbps connections on each port and are the most versatile and adaptive type of switches.

Model FS508 Switch Overview

The Model FS508 switch is an autosensing 10/100 Mbps switch. This feature-rich switch is developed primarily to be used as a segment switch, even though it is priced as a desktop switch.

All eight ports on the Model FS508 switch can adapt automatically to the speed of the connected network or the PC, and the ports can operate at either 10 Mbps or 100 Mbps. In addition, each port can automatically negotiate with the connected device to operate in full-duplex mode. If the connected device is operating at half-duplex mode only or does not have the capability to participate in the negotiation process, the port will default to half-duplex mode. A manual override duplex toggle switch is also provided to force any particular port to operate in full-duplex mode.

The Model FS508 switch can be used to partition a 10 Mbps or 100 Mbps network to enhance the capacity of the network to support advanced applications. In addition, the switch provides a link between traditional 10 Mbps and the faster 100 Mbps networks. By installing a Model FS508 switch, a user can connect any 10 Mbps or 100 Mbps device to the switch without worrying about the running speed of the device. The Model FS508 switch provides a built-in upgrade path; you can remove a 10 Mbps connection and replace the connection with a 100 Mbps connection with little or no change to the rest of the network.

The Model FS508 switch can be effectively used to join multiple 100 Mbps Fast Ethernet segments and to extend the reach of the network. Copper-based Fast Ethernet networks have a network diameter of up to 200 meters, no matter how many Fast Ethernet hubs are cascaded or stacked together. However, the Model FS508 switch can be used to join these segments to enable them to function as a single logical network. With one Model FS508 switch, the reach extends to 400 meters. With two switches, the reach extends to 600 meters. For an illustration of using the switch to extend a network, refer to .

Because the Model FS508 switch is an ISO media access control (MAC) layer device, the switch is network protocol independent and compatible with all popular networks such as the Internet or TCP/IP, NetWare, DECnet, Microsoft NETBEUI, and LANTASTIC.

Features

The Model FS508 switch has the following key features:

- Eight auto-speed sensing 10/100 Mbps Ethernet ports to provide fast information exchange, resource sharing, and client or peer-to-peer communication using simple Category 5 unshielded twisted pair (UTP) cable

- Automatic address learning function to build the packet forwarding information table

  The table contains up to 8,000 MAC addresses (that is, the switch can support networks with as many as 8,000 devices).

- Switch-selectable auto- or full-duplex mode of operation

  Full-duplex mode doubles throughput of point-to-point connections by letting individual ports transmit and receive concurrently when the other end also supports full-duplex mode. The default is half-duplex if the connected device does not support N-way negotiation. The duplex toggle switch can be set to full-duplex if the connected port is operating at full-duplex mode.

- Nonblocking cross-bar switching matrix to allow concurrent operation of up to eight Ethernet segments in full-duplex mode

- Backpressure in half-duplex mode to alleviate congestion

  Network congestion is reduced by slowing down incoming traffic from other segments, when appropriate, by generating collision signals to those segments.

- Wire-speed filtering and forwarding to provide "traffic cop" function by directing traffic to the appropriate route without slowing down the traffic

- Adaptive forwarding modes to automatically change the forwarding mode from cut-through (minimizes network delay) to fragment-free cut-through, to store-and-forward (minimizes bad packets) as the erroneous packets increase in number

- Minimum latency of packet transmission (leading edge to leading edge) less than 20 µs

- Easy Plug-and-Play installation with no software to configure, which saves time and minimizes the potential for configuration errors

- Normal/Uplink push button to simplify network extension

  The switch can be connected to a hub using a simple, straight-through cable.

- Protocol independence and compatibility with all common protocols such as TCP/IP, NetWare, DECnet, and Microsoft Networks

- Eight vista RJ-45 connector ports with built-in LEDs to monitor individual port status

- Microprocessor-based design to monitor network utilization, collisions, and link status

- A comprehensive LED indicator panel for monitoring switching condition and individual port status

- Conformity to the IEEE 802.3u 100BASE-TX standard

- Conformity to the ISO/IEC 8802-3 and ANSI/IEEE 802.3 10BASE-T standards

- A 64-kilobyte (KB) input/output buffer for each port

- Rack Mount Kit provided for installing the switch in a standard 19-inch rack

For further functional descriptions of the switch, refer to Chapter 3, "Applications."

Chapter 2
Physical Description

This chapter describes the hardware features of the NETGEAR Model FS508 Fast Ethernet switch.

Front Panel

For easier management and control of the Model FS508 switch, familiarize yourself with the ports, LEDs, and Normal/Uplink push button on the front panel of the switch, as illustrated in .
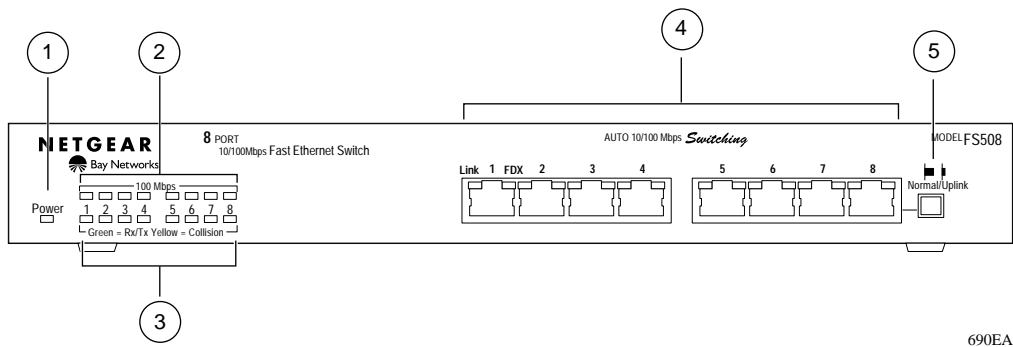
Key:
  1 = Power LED
  2 = 100 Mbps LEDs for ports 1 through 8
  3 = Rx/Tx and Collision LEDs for ports 1 through 8
  4 = 10/100 Mbps ports with Link and FDX LEDs on each port
  5 = Normal/Uplink push button to configure port 8

Figure 2-1.   Front panel of the Model FS508 switch

Fast Ethernet Ports

As illustrated in <u>Figure 2-1</u>, the Model FS508 switch is equipped with eight autosensing 10/100 Mbps Fast Ethernet ports. The network access speed for the 10/100 Mbps ports is automatically sensed and displayed on the front panel by the 100 Mbps LEDs.

The 10/100 Mbps ports support only unshielded twisted pair (UTP) cable using an 8-pin RJ-45 plug.

Each of the 10/100 Mbps ports uses vista RJ-45 connectors that have built-in LEDs, as illustrated in <u>Figure 2-2</u>. The LEDs, as described in <u>Table 2-1</u>, indicate that the connection to the port is valid and that the port is operating in full-duplex mode.

For further information about the vista RJ-45 connector and the RJ-45 connector, refer to <u>Appendix B, "Connector Pin Assignments</u>."

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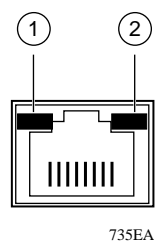
Key:
  1 = Link LED
  2 = FDX LED

Figure 2-2.   The vista RJ-45 connector with built-in LEDs

Normal/Uplink Push Button

The Normal/Uplink push button on the front panel of the switch, as illustrated in <u>Figure 2-1</u>, allows you to select uplink (MDI) or normal (MDI-X) wiring for port 1 on the Model FS508 switch. This port is configured for normal wiring to connect to a PC when the push button is in the out position. When the push button is pressed in, this port is configured for uplink wiring to connect to another switch or to a hub, using a straight-through twisted pair cable.

LEDs

The LEDs on the front panel of the switch and two vista LEDs on each RJ-45 connector allow you to identify the following information:

- Status of the switch power supply

- For each 10/100 Ethernet port:

    — Link status

    — Data transmission or receive activity

    — Collision occurrence

    — Full-duplex or half-duplex mode

    — 10 Mbps or 100 Mbps speed transmission

Table 2-1 describes each LED on the front panel of the switch.

Table 2-1.   LED descriptions

Label	Color	Activity	Description
Power	Green	On	Power is supplied to the switch.
		Off	Power is disconnected.
Rx/Tx/Collision	Green	Blinking	Packet transmission or reception is occurring on the port. The blinking action corresponds to the number of packets that are transmitted or received.
	Yellow	Blinking	Data collisions are occurring on the port. The blinking action corresponds to the number of collisions. When a collision occurs, the connected device pauses and transmits again after waiting a specified time. Note that occasional collisions are normal.
100 Mbps	Green	On	The port is operating at 100 Mbps.
		Off	The port is operating at 10 Mbps.
Link	Green	On	A valid link is established on the port.
		Off	A link is not established on the port.
FDX	Green	On	The port is operating in full-duplex mode.
		Off	The port is operating in half-duplex mode.

Rear Panel

As illustrated in Figure 2-3, the rear panel has a full-duplex (FDX) toggle switch, an auto-duplex (AUTO) toggle switch, a standard AC power receptacle, and fans for cooling.

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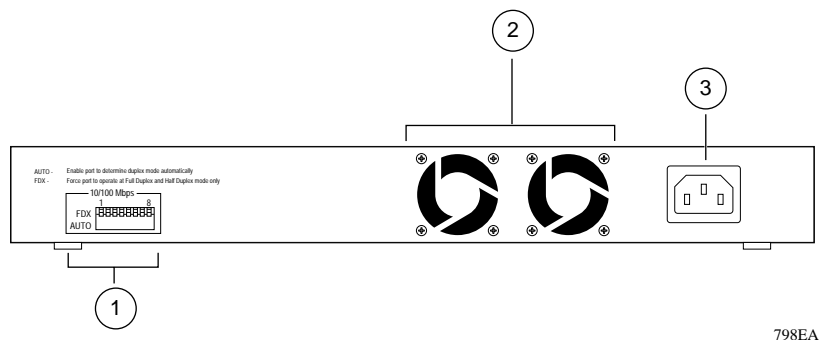
Key:
   1 = FDX and AUTO duplex toggle switches
   2 = Fans
   3 = AC power outlet

Figure 2-3.   Rear panel of the Model FS508 switch

FDX/AUTO Duplex Toggle Switches

Full-duplex mode is supported for all 10/100 Mbps ports and allows the port to transmit and receive data at the same time. Full-duplex operation applies only to point-to-point access (for example, when a switch is connected to a PC, a server, or another switch).

Setting the toggle switch to AUTO on the 10/100 Mbps port enables the port to determine duplex mode automatically. In this mode, the 10/100 Mbps port operates in either full- or half-duplex mode, depending on the operating mode of the remote port. If the remote port cannot provide the proper signal to indicate its own capability, the 10/100 Mbps port on the switch will default to half-duplex mode. Because repeaters and hubs use a common collision domain for all communications and cannot communicate in full-duplex mode, the associated 10 Mbps port on the switch should be set to auto-duplex operation when connecting to these types of devices.

As illustrated in Figure 2-3, one full-duplex (FDX) and auto-duplex (AUTO) toggle switch is assigned to each 10/100 Mbps port on the Model FS508 switch. The communication mode can be set to either full-duplex or auto-duplex mode.

Chapter 3
Applications

This chapter presents an overview of the levels of service provided by incorporating the technology of the NETGEAR Model FS508 Fast Ethernet switch into your network.

The Model FS508 switch is designed to provide flexibility in configuring your network connections. Each switch can be used as a standalone device or can be used with 10 Mbps or 100 Mbps hubs or other interconnection devices in various configurations. The configuration examples in this chapter illustrate the integration of the switches in network environments of all sizes and types. These examples include a network of a few workstations connected to a printer or a segmented network with multiple users or workgroups and other networking devices.

Desktop Switching

Figure 3-1 illustrates the NETGEAR Model FS508 Fast Ethernet switch used as a desktop switch to build a small network that enables users to have 100 Mbps access to a file server.

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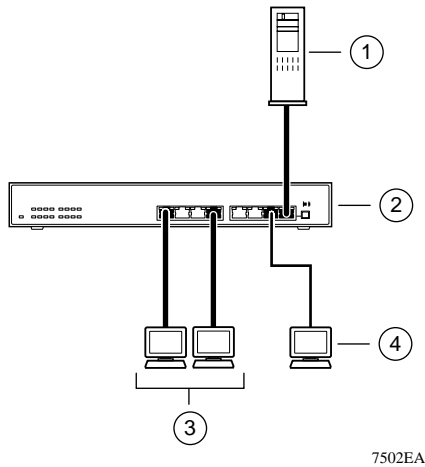
Key:
  1 = Server with 100 Mbps connection
  2 = Model FS508 Fast Ethernet switch (Normal/Uplink push button set to Normal position)
  3 = PCs with 100 Mbps Ethernet adapter cards installed
  4 = PC with 10 Mbps connection

**Figure 3-1.   Using the Model FS508 switch for desktop switching**

→   **Note:** If a full-duplex adapter card is installed in the server or PC, a 200 Mbps connection is possible on the port where the server or PC is connected.

Segment Switching

The Model FS508 switch can segment a network into multiple connected pieces, increasing overall bandwidth and throughput. Figure 3-2 illustrates the NETGEAR Model FS508 Fast Ethernet switch segmenting networks that are built with the NETGEAR Model FE508 and Model FE516 Fast Ethernet hubs.
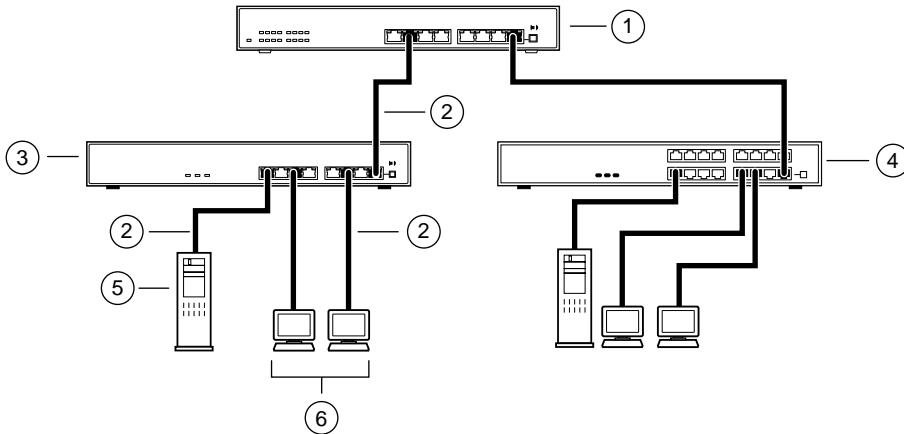
7498EA

Key:
   1 = NETGEAR Model FS508 Fast Ethernet switch (Normal/Uplink push button set to Normal position)
   2 = 100 Mbps connection
   3 = Model FE508 Fast Ethernet hub (Normal/Uplink push button set to Uplink position)
   4 = Model FE516 Fast Ethernet hub (Normal/Uplink push button set to Uplink position)
   5 = Servers with 100 Mbps connection
   6 = PCs with network adapter installed, enabling 100 Mbps connection

Figure 3-2.   Model FS508 switch used as a segment switch

Extending a Network

Ethernet specifications limit the length of cable between hubs and PCs to 100 meters for a total diameter of 200 meters. By adding Fast Ethernet switches between hubs, the network is expanded by 200 Mbps with the addition of each switch. Figure 3-3 illustrates a network of FE508 Fast Ethernet hubs integrated with three NETGEAR Model FS508 Fast Ethernet switches.
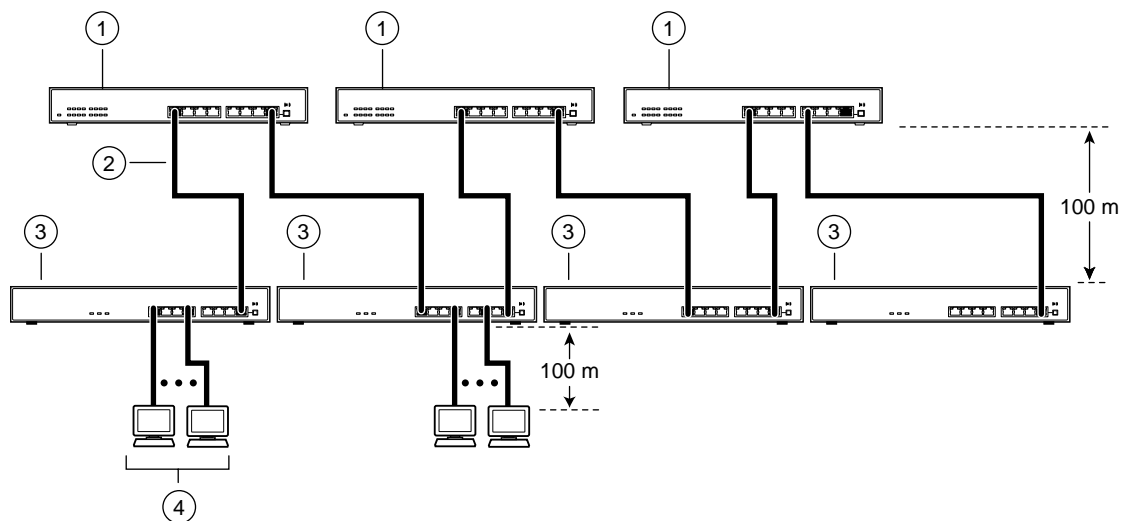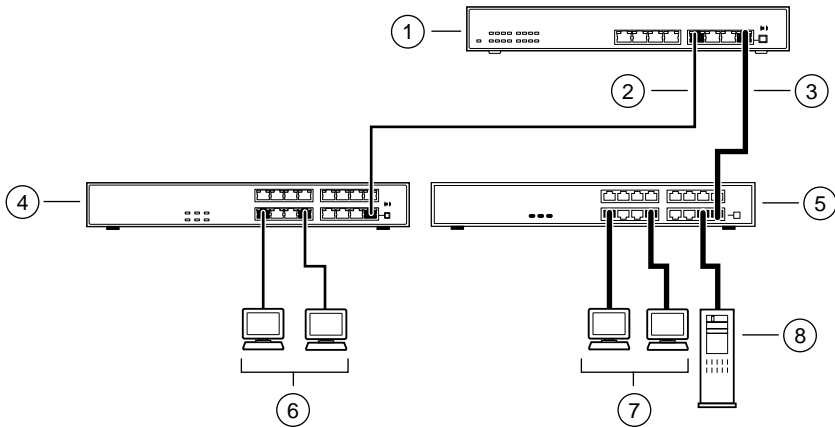

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Key:
  1 = Model FS508 Fast Ethernet switch (Normal/Uplink push button set to Uplink position)
  2 = 100 Mbps connection
  3 = Model FE508 Fast Ethernet hub (Normal/Uplink push button set to Uplink position)
  4 = PCs with 100 Mbps connection

Figure 3-3.   Using the Model FS508 switch for network extension

Bridging from 10BASE-T to 100BASE-TX Networks

The Model FS508 switch can function as a two-port bridge connecting traditional 10BASE-T Ethernet networks to 100BASE-TX Fast Ethernet networks. Users requiring increased network bandwidth can be upgraded to 100 Mbps while remaining connected to the rest of the network. Figure 3-4 illustrates the NETGEAR Model FS508 Fast Ethernet switch integrated with the NETGEAR Model EN516 Ethernet hub and the NETGEAR Model FE516 Fast Ethernet hub.

Key:
  1 = Model FS508 Fast Ethernet switch (Both Normal/Uplink push buttons set to Normal position)
  2 = 10 Mbps connection
  3 = 100 Mbps connection
  4 = Model EN516 Ethernet hub (Normal/Uplink push button set to Uplink position)
  5 = Model FE516 Fast Ethernet hub (Normal/Uplink push button set to Uplink position)
  6 = PCs with 10 Mbps connection
  7 = PCs with 100 Mbps connection
  8 = Server with 100 Mbps connection

Figure 3-4.   Bridging 10 Mbps networks to 100 Mbps networks

High-bandwidth File Servers

The Model FS508 switch increases bandwidth for workgroups and strengthens network throughput when accessing high-volume file servers. The switch provides parallel communication between each of the ports. This method of communication allows multiple conversations to occur concurrently, expands overall throughput, and allows key servers or other heavily used devices to be available to more users. Figure 3-5 illustrates the NETGEAR Model FS508 Fast Ethernet switch integrated with two NETGEAR Model FE108 Fast Ethernet hubs. A full-duplex configurable adapter card installed in the server provides up to 200 Mbps maximum data throughput.
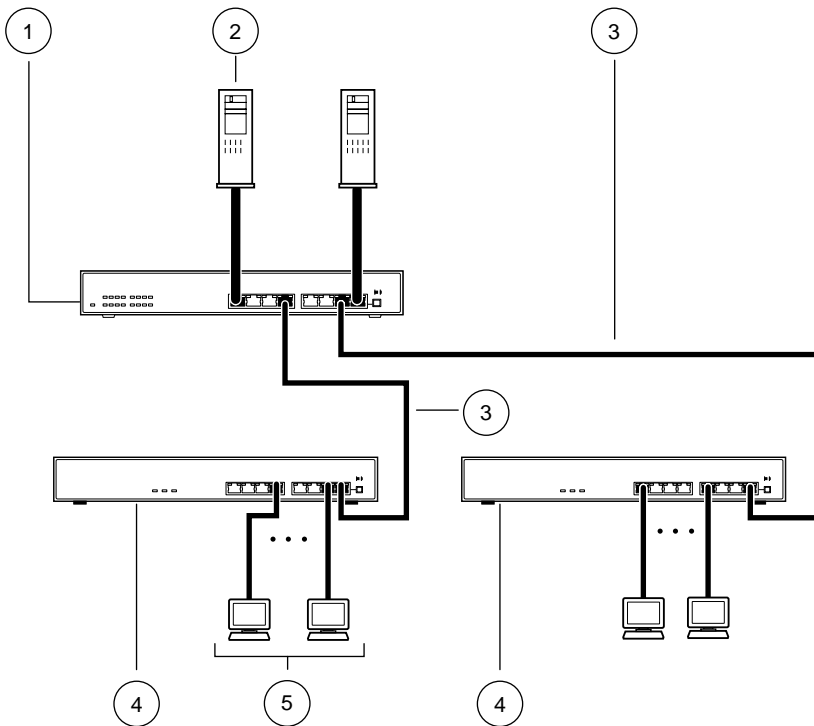
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Key:
   1 = Model FS508 Fast Ethernet switch (Normal/Uplink push button set to Normal position)
   2 = Server with full-duplex 100 Mbps connection (200 Mbps)
   3 = 100 Mbps connection
   4 = Model FE508 Fast Ethernet hub (Normal/Uplink push button set to Uplink position)
   5 = PCs with 100 Mbps connection

Figure 3-5.   High-bandwidth file server connection

Chapter 4
Installation

This chapter describes the installation procedures for the NETGEAR Model FS508 Fast Ethernet switch.

Site Preparation

Before you begin installing the switch, prepare the installation site. Make sure the operating environment meets the physical requirements of the switch, as described in Appendix A, "Technical Specifications."

Package Contents

Unpack the contents of the package and verify them against the following list:

• Model FS508 switch

• Self-adhesive rubber pads for desktop installation

• Rack Mount Kit for rack installation

• AC power cord

• Warranty and Owner Registration Card

• This installation guide

Caution: Use the appropriate power cord as required by your national electrical codes and ordinances.

Call your reseller or customer support in your area if there are any wrong, missing, or damaged parts. Refer to page iii for the location of customer support in your area.

Keep the carton, including the original packing materials. Use them to repack the switch if you need to return it for repair.

To qualify for product updates and product warranty registration, fill in the Warranty and Owner Registration Card within 30 days of purchase and return it to NETGEAR, Inc.

Installing a Switch

To install a switch on a desktop, on another flat surface, or in a rack, follow these steps:

1. **Unpack the switch.**

2. **Choose a location near the devices to be connected and close to an electrical outlet.**

3. **Proceed to "Installing the Switch on a Flat Surface" or "Installing the Switch in a Rack."**

Installing the Switch on a Flat Surface

To install the switch on a desktop or any other flat surface, follow these steps:

1. **Install self-adhesive rubber pads on the bottom of the switch.**

   Peel off the protective backing from the rubber pads and apply one at each marked location on the bottom of the switch.

2. **Set the switch on a desktop or any other flat surface.**

   For proper ventilation, make sure that the switch has at least 2 inches of space on each side and 5 inches of space at the back. It is very important that the fans located in the rear panel are not blocked. Restricted airflow could cause overheating of the components.

3. **Install any additional devices in your stack.**

   Up to four switches can be stacked. For instructions on connecting to additional switches or other devices, refer to "Connecting to Other Devices" later in this chapter.

Installing the Switch in a Rack

For mounting the switch in a standard 19-inch rack, you need the following tools and materials:

- Two mounting brackets supplied from the Rack Mount Kit
- Eight screws supplied from the Rack Mount Kit to attach the mounting brackets to the switch
- Four screws and nylon washers supplied from the Rack Mount Kit to attach the mounting brackets to the rack
- #1 Phillips screwdriver
- #2 Phillips screwdriver

To install the switch in a rack, follow these steps:

1. **Attach the mounting brackets to the sides of the switch as illustrated in Figure 4-1.**

   Hold a mounting bracket against each side of the switch and align the countersunk screw holes in the bracket with the bracket mounting holes in the switch.

2. **Insert the screws provided in the Rack Mount Kit through each bracket and into the bracket mounting holes in the switch.**

3. **Using a #1 Phillips screwdriver, tighten the screws to secure each bracket.**

4. **Hold the switch with the mounting holes in the brackets aligned with the holes in the rack.**
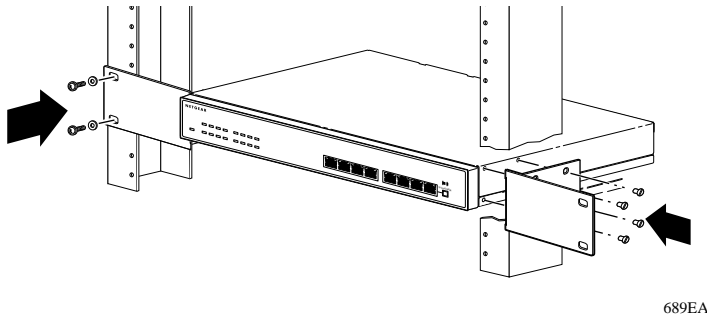
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Figure 4-1.   Attaching mounting brackets to the Model FS508 switch

5. **Insert two pan-head screws with nylon washers through each bracket and into the rack.**

6. **Using a #2 Phillips screwdriver, tighten the screws to secure the switch to the rack.**

7. **Install any additional devices in your stack.**

   For proper ventilation, make sure that the switch has at least 2 inches of space on each side and 5 inches of space at the back. It is very important that the fans located in the rear panel are not blocked. Restricted airflow could cause overheating of the components.

   For instructions on connecting to additional switches or other devices, refer to "Connecting Devices to the Switch."

Connecting Devices to the Switch

To connect devices to the switch, follow these steps:

1. **Connect to another device through any of the ports on the switch.**

   The Normal/Uplink push button eliminates the need to use a crossover twisted pair cable when connecting similarly wired devices. If you are connecting through port 8, set the Normal/Uplink push button using the following guidelines to configure port 8:

   • Set the Normal/Uplink push button to the Normal position and use a straight-through twisted pair cable if the remote end of the cable is connected to an MDI wired device such as a PC, a server, or a router.

   • Set the Normal/Uplink push button to the Uplink position and use a straight-through twisted pair cable if the remote end of the cable is connected to an MDI-X wired device such as a 10 Mbps or 100 Mbps hub or repeater, or for backbone connection to another switch.

   The UTP ports without the Normal/Uplink push button are by default normal ports and cannot be configured for uplink wiring. If you are using one of the ports without the Normal/Uplink push button to connect to another normal port as on a hub or repeater, a crossover twisted pair cable must be used to connect the two ports.

   For further cabling guidelines, refer to Appendix C, "Cabling Guidelines."

2. **Set the FDX or AUTO switches on the rear panel for the duplex mode.**

    A hub and repeater use a common collision domain for all communications and cannot support full-duplex mode. When connecting any of the 10/100 Mbps ports on the switch to a hub, set the port to AUTO. The switch must also be set to AUTO when connecting to any device that does not use NWay auto-negotiation to detect the operating mode. Setting the toggle switch to AUTO will cause the port to default to half-duplex mode when connecting to a port that does not use NWay auto-negotiation.

    When connecting to a PC, a server, or another switch, the duplex setting for the port must be the same as the duplex setting on the PC, server, or other switch.

    To set the 10/100 Mbps ports for the selected duplex mode:

    •   Move the toggle switch into the down position (to AUTO) for auto-duplex mode. The 10/100 Mbps ports will negotiate and automatically determine the duplex mode based on the mode of the connected port. If the connected port cannot autonegotiate, the 10/100 Mbps port will default to half-duplex. The factory setting of the duplex toggle switches is AUTO.

    •   Move the toggle switch into the up position (to FDX) for full-duplex mode.The duplex switch must be set to FDX if you are connecting to legacy full-duplex 100 Mbps devices that do not generate signals indicating duplex mode. If the duplex switch is set to AUTO mode when connecting to legacy full-duplex 100 Mbps devices, the 10/100 Mbps ports will default to half-duplex mode because the port does not receive the proper signal.

3. **Connect one end of the power cord to the power outlet on the back panel of the switch, and connect the other end of the power cord to a wall receptacle.**

    The switch automatically selects the proper voltage in the range of 100 to 240 volts. The Power LED lights and the cooling fans start up after successfully completing the self-tests. The switch is now operational.

Verifying Installation

Verify network communications by ensuring that all the necessary connections have been made, that all connected resources can be accessed, and that the LED indicators on the switch are functioning properly. For additional information, refer to Chapter 5, "Troubleshooting."

Chapter 5
Troubleshooting

This chapter provides information about troubleshooting the NETGEAR Model FS508 Fast Ethernet switch.

LEDs

If the Link LED does not light up after making a connection, there may be a defective adapter card, cable, or port. Check for defects and replace the defective component.

If the Link LED does not light up when a device is connected to its corresponding UTP port, check that both the switch and the connected device are powered on. When connecting devices to the switch with twisted pair cable, make sure that the cable length does not exceed 100 meters. Refer to Chapter 4, "Installation," and Appendix C, "Cabling Guidelines," for additional information on crossover twisted pair or straight-through cable use.

Verify that all other system components are functioning properly. If any component fails to function, contact your NETGEAR distributor for assistance.

FDX/AUTO Duplex Toggle Switches

The factory setting for the duplex toggle switches on the 10/100 Mbps ports is auto-duplex (AUTO) mode.

If performance degradation is a problem or if file transfer is slow, make sure that the half- or full-duplex setting of the NETGEAR switch and the connected device are the same. When connecting the switch to a repeater or hub, the 10/100 Mbps port must be set to auto-duplex (AUTO) mode.

For instructions on setting the duplex toggle switches, refer to "Connecting Devices to the Switch" on page 4-4.

Installation

Verify that all system components have been properly installed. If one or more components are malfunctioning, test them in an alternate environment where all other components are functioning properly.

Cabling

Verify that the cabling is correct. Refer to Appendix C, "Cabling Guidelines." Be sure all cable connectors are securely positioned in the required ports. Straight-through cables should be used for all standard twisted pair connections.

Make sure all devices are connected to the network. Equipment may have been accidentally disconnected.

Network Adapter Cards

Make sure the network adapter cards installed in the PCs are in working condition.

Configuration

If problems occur after altering the network configuration, restore the original connections and determine the problem by implementing the new changes, one procedure at a time. Make sure that cable distances, repeater limits, and other physical aspects of the installation do not exceed the Ethernet limitations.

Switch Integrity

If required, verify the integrity of the switch by resetting the switch. Turn the power to the switch off, and then turn the power to the switch back on. If the problem continues and you have completed all the preceding diagnoses, contact your NETGEAR distributor.

Appendix A
Technical Specifications

This appendix provides technical specifications for the NETGEAR Model FS508 Fast Ethernet switch.

General Specifications

Network Protocol and Standards Compatibility

ISO/IEC 802-3 (ANSI/IEEE 802.3I) 10BASE-T

IEEE 802.3u 100BASE-TX

Data Rate

10 Mbps differential Manchester encoded, IEEE 802.3

100 Mbps with 4B5B encoding and MLT-3 physical interface for 100BASE-TX

Interface

RJ-45 connector for 10BASE-T and 100BASE-TX Fast Ethernet

Electrical Specifications

Power consumption: 22 W

Physical Specifications

Dimensions: (W) 13 by (H) 1.7 by (D) 8 in.
                            (W) 33.0 by (H) 4.3 by (D) 20.3 cm

Weight: 5.07 lb
                            2.3 kg

Environmental Specifications

Operating temperature:	0° to 40° C
Storage temperature:	-32° to 104° C
Operating humidity:	90% maximum relative humidity, noncondensing
Storage humidity:	95% maximum relative humidity, noncondensing
Operating altitude:	10,000 ft (3,000 m) maximum
Storage altitude:	10,000 ft (3,000 m) maximum

Electromagnetic Emissions

Meets requirements of:

CE mark, commercial

FCC Part 15, Subpart B, Class A

EN 55 022 (CISPR 22), Class A

VCCI Class 1

Electromagnetic Susceptibility

CE mark, commercial

Electrostatic discharge (ESD):	IEC 801-2, Level 2/3
Radiated electromagnetic field:	IEC 801-3, Level 2
Electrical fast transient/burst:	IEC 801-4, Level 2
Electrical surge:	IEC 801-5, Level 1/2

Safety Agency Approvals

CE mark, commercial

UL listed (UL 1950)

CSA certified (CSA 22.2 #950)

TUV licensed (EN 60 950)

Performance Specifications

Frame filter rate:	14,800 frames/second, maximum on 10 Mbps port
	148,000 frames/second maximum on 100 Mbps port
Frame forward rate:	14,800 frames/second, maximum on 10 Mbps port
	148,000 frames/second maximum on 100 Mbps port
Forwarding modes:	Cut-through, fragment-free cut-through, store-and-forward
Network latency:	Less than 17 microseconds in cut-through mode
	Less than 20 microseconds for 64-byte frames in store-and-forward mode for 10Mbps to 100 Mbps transmission
Address database size:	4,000 media access control (MAC) addresses per port
Addressing:	48-bit MAC address
Queue buffer:	64 KB

Appendix B
Connector Pin Assignments

This appendix provides information on the RJ-45 plug and the vista RJ-45 connector that is used for the NETGEAR Model FS508 Fast Ethernet Switch.

RJ-45 Plug and vista RJ-45 Connector

In a Fast Ethernet network, it is important that all 100BASE-T certified Category 5 cabling use RJ-45 plugs. The RJ-45 plug accepts 4-pair unshielded twisted pair (UTP) or shielded twisted pair (STP) 100 Ω cable and connects into the vista RJ-45 connector.

The vista RJ-45 connector (also referred to as a 10/100 Mbps port) is used to connect stations, hubs, and switches through UTP cable and supports 100 Mbps data transmission.

The RJ-45 plug and vista RJ-45 connector are both illustrated in Figure 5-1.
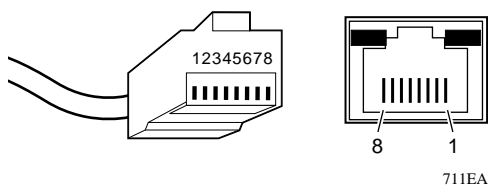
Key:
   1 to 8 = Pin numbers

Figure 5-1.   RJ-45 plug and vista RJ-45 connector with built-in LEDs

Table B-1 lists the pin assignments for the RJ-45 plug and the vista RJ-45 connector.

**Table 5-1.   RJ-45 plug and vista RJ-45 connector
                   pin assignments**

Pin	Normal assignment	Uplink assignment
1	Input Receive Data +	Output Transmit Data +
2	Input Receive Data –	Output Transmit Data –
3	Output Transmit Data +	Input Receive Data +
6	Output Transmit Data –	Input Receive Data –
4, 5, 7, 8	Internal termination, not used for data transmission	

Appendix C
Cabling Guidelines

This appendix provides specifications for cables used for the NETGEAR Model FS508 Fast Ethernet switch.

Fast Ethernet Cable Guidelines

Fast Ethernet uses UTP cable, as specified in the IEEE 802.3u standard for 100BASE-TX. The specification requires Category 5 UTP cable consisting of either 2-pair or 4-pair twisted insulated copper conductors bound in a single plastic sheath. Category 5 cable is certified up to 100 MHz bandwidth. 100BASE-TX operation uses one pair of wires for transmission and the other pair for receiving and for collision detection.

When installing Category 5 UTP cabling, use the following guidelines to ensure that your cables perform to the following specifications:

- Certification. Make sure that your Category 5 UTP cable has completed the Underwriters Laboratories (UL) or Electronic Testing Laboratories (ETL) certification process.

- Termination method. To minimize crosstalk noise, maintain the twist ratio of the cable up to the point of termination; untwist at any RJ-45 plug or patch panel should not exceed 0.5 inch (1.5 cm).

Cable Lengths

Category 5 distributed cable that meets ANSI/EIA/TIA-568-A building wiring standards can be a maximum of 328 feet (100 meters) in length, divided as follows:

*   20 feet (6 meters) between the hub and the patch panel (if used)

*   295 feet (90 meters) from the wiring closet to the wall outlet

*   10 feet (3 meters) from the wall outlet to the desktop device

The patch panel and other connecting hardware must meet the requirements for 100 Mbps operation (Category 5). Only 0.5 inch (1.5 cm) of untwist in the wire pair is allowed at any termination point.

Cable Specifications

Table 5-1 lists the electrical requirements of Category 5 cable.

Table 5-1.　　　Electrical requirements of Category 5 cable

Specification	Category 5
Number of pairs	Four
Impedance	100 $\Omega \pm 15\%$
Mutual capacitance at 1 KHz	$\leq$ 5.6 nF per 100 m
Maximum attenuation (dB per 100 m, at 20° C)	at 4 MHz: 8.2
	at 31 MHz: 11.7
	at 100 MHz: 22.0
NEXT loss (dB minimum)	at 16 MHz: 44
	at 31 MHz: 39
	at 100 MHz: 32

Twisted Pair Cables

For two devices to communicate, the transmitter of each device must be connected to the receiver of the other device. The crossover function is usually implemented internally as part of the circuitry in the device. Computers and workstation adapter cards are usually media-dependent interface ports, called MDI or uplink ports. Most repeaters and switch ports are configured as media-dependent interfaces with built-in crossover ports, called MDI-X or normal ports.

Figure 5-1 illustrates straight-through twisted pair cable.
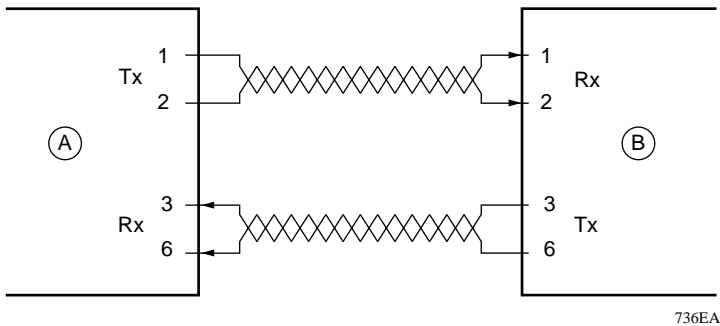

```
Key:
    A = Uplink or MDI port (as on a PC)
    B = Normal or MDI-X port (as on a hub or switch)
    1, 2, 3, 6 = Pin numbers
```

Figure 5-1.   Straight-through twisted pair cable

Figure 5-2 illustrates crossover twisted pair cable.
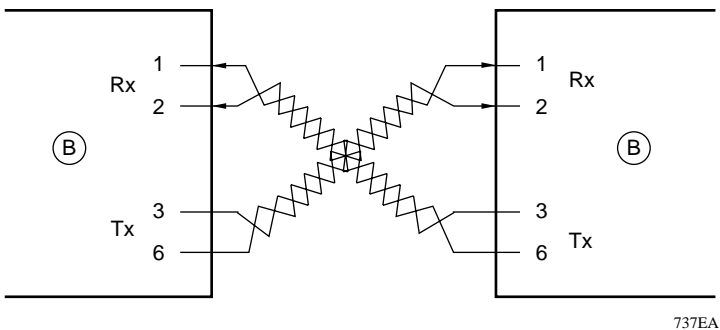

```
Key:
    B = Normal or MDI-X port (as on a hub or switch)
    1, 2, 3, 6 = Pin numbers
```

Figure 5-2.   Crossover twisted pair cable

Patch Panels and Cables

If you are using patch panels, make sure that they meet the 100BASE-TX requirements. NETGEAR recommends Category 5 UTP cable for all patch cables and work area cables to ensure that your UTP patch cable rating meets or exceeds the distribution cable rating.

To wire patch panels, you need two Category 5 UTP cables with an RJ-45 plug at each end, as shown in .
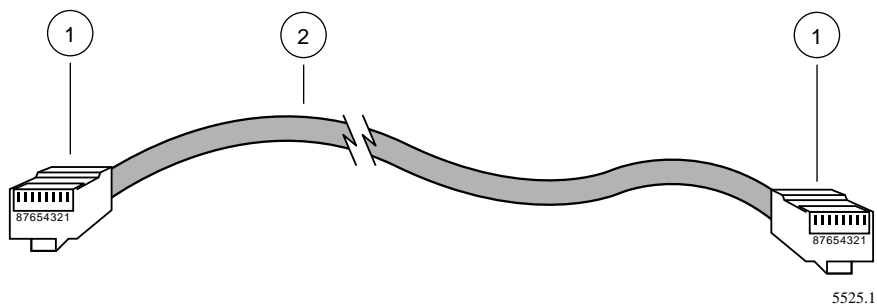
Key:
  1 = RJ-45 plug
  2 = Category 5 UTP patch cable

Figure 5-3.   Category 5 UTP patch cable with male RJ-45 plug at each end

> **Note:** Flat "silver satin" telephone cable may have the same RJ-45 plug. However, using telephone cable will result in excessive collisions and cause the attached port to be partitioned or disconnected from the network.

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