NETGEAR®

FS728TP

Hardware Installation Guide

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Revision History

Publication Part Number	Version	Publish Date	Comments
202-10682-02	v1.0	October 2010	

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Introduction

1

Congratulations on the purchase of your NETGEAR FS728TP Smart PoE Switch. The FS728TP is a supplement to the Gigabit Advanced Smart Switch family. The FS728TP is a PoE-supportable, 24-port Fast Ethernet Smart Switch with 24 PoE ports with 2 combo ports and 2 Gigabit copper uplinks .

This chapter serves as an introduction to the FS728TP and provides the following information:

- **Overview**
- **Features**
- **Package Contents**

Overview

This Installation Guide is for the NETGEAR FS728TP Smart PoE Switch. This product is a 24-port Fast Ethernet Smart Switch with 24 PoE ports with 2 combo ports and 2 Gigabit copper uplinks.

Using Gigabit ports, high-speed connections can be made to a server or network backbone. For example:

- Linking to high-speed servers
- Providing 10/100/1000 Mbps copper connectivity

The FS728TP also provides the benefit of administrative management with a complete package of features for the observation, configuration, and control of the network. With a Web-based Graphical User Interface (GUI), the switch's many capabilities can be viewed and used in a simple and intuitive manner. The switch's management features include configuration for port and switch information, VLAN for traffic control, port trunking for increased bandwidth, and Class of Service (CoS) for traffic prioritization. These features provide better understanding and control of the network. Initial discovery of the switch on the network requires the Netgear Smart Control Center program, a utility that runs on a PC.

The FS728TP is a free-standing switch. It is IEEE-compliant and offers low latency for high-speed networking. All ports can automatically negotiate to the highest speed. This capability makes the switch ideal for environments that have a mix of Ethernet, Fast Ethernet, or Gigabit Ethernet devices. In addition, all RJ-45 ports operate in half-duplex or full-duplex mode. The maximum segment length is 328 feet (100 meters) over Category 5 Unshielded Twisted-Pair (UTP) cable.

Features

The following list identifies the key features of the FS728TP:

- 24-port Fast Ethernet Smart Switch with 24 PoE ports with 2 combo ports and 2 Gigabit copper uplinks.
- Four 10/100/1000 Gigabit Ethernet switching ports.
- Two 1000M SFP Gigabit Ethernet switching ports.
- Full NETGEAR Smart Switch functionality.
- Full compatibility with IEEE standards:
    - IEEE 802.3 CSMA/CD
    - IEEE 802.3i (10BASE-T)
    - IEEE 802.3u (100BASE-TX)
    - IEEE 802.3x (Full-duplex flow control)
    - IEEE 802.3ab (1000BASE-T)
    - IEEE 802.3z (1000BASE-x)
    - IEEE 802.3af (DTE power via MDI)
- Autosensing and auto-negotiating capabilities for all ports.
- Auto Uplink™ on all ports to make the right connection.
- Automatic address learning function to build the packet-forwarding information table. The table contains up to 4K Media Access Control (MAC) addresses.
- Store-and-Forward transmission to remove bad packets from the network.
- Full-duplex IEEE 802.3x pause frame flow control.
- Active flow control to minimize packet loss and frame drops.
- Half-duplex backpressure control.
- Per port LEDs, power LED, PoE Max, and fan.
- Standard NETGEAR 7xx series chassis.
- NETGEAR Green product features.

PoE Features

The FS728TP supports IEEE 802.3af PSE features:

- Ports 1 through 24 support IEEE 802.3af, Alternative A (MDI-X). The total PoE power budget is 192 Watts, with a maximum of 15.4 Watts per PoE port.
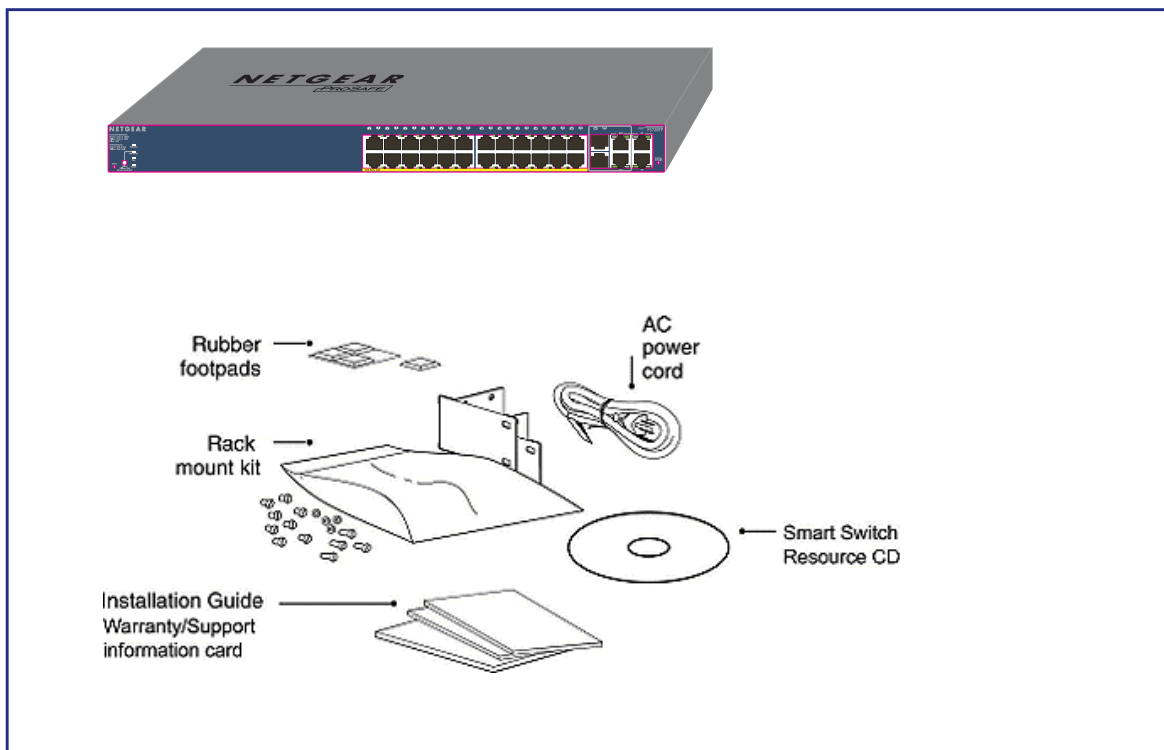- PoE is enabled by default.

Green Features

The FS728TP supports the following power-saving features:

- The power consumption automatically adjusts based on the RJ-45 cable length.
- Each port is configured to power down automatically when the port link is down.

Package Contents

Figure 1 shows the package contents of the NETGEAR FS728TP Smart PoE Switch.

Figure 1. Package Contents

Verify that the package contains the following:

- NETGEAR FS728TP Smart PoE Switch
- Rubber footpads for tabletop installation
- Rackmounting kits
- Power cord
- Installation guide
- Smart Switch Resource CD with Netgear Smart Control Center and User's Manual

If any item is missing or damaged, contact the place of purchase immediately.

Physical Description

2

This chapter describes the NETGEAR FS728TP Smart PoE Switch hardware features. Topics include:

- **FS728TP Front-Panel and Back-Panel Configuration**
- **LED Designations**
- **Device Hardware Interfaces**

FS728TP Front-Panel and Back-Panel Configuration

The FS728TP has 24 10/100 Mbps autosensing, four 10/100/1000 Mbps Gigabit Ethernet switching ports, and two 1000 Mbps SFP Gigabit Ethernet switching ports. Each RJ-45 port is capable of sensing the line speed and negotiating the duplex mode with the link partner automatically.

Figure 2 illustrates the front panel of the NETGEAR FS728TP.
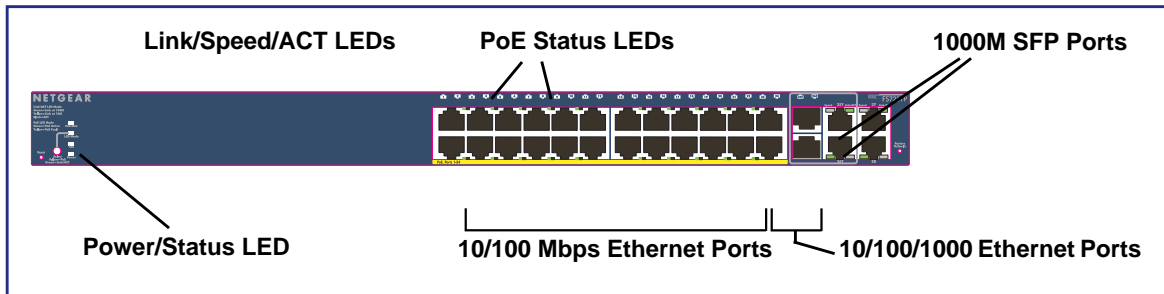
Figure 2. Front Panel

The front panel contains the following:

- 24 RJ-45 connectors for 10/100 Mbps autosensing Fast Ethernet switching ports
- Four 10/100/1000 Gigabit Ethernet switching ports
- Two 1000 Mbps SFP Gigabit Ethernet switching ports
- Reset button to restart the device
- Recessed default reset button to restore the device back to the factory defaults
- Link, Speed, and Activity LEDs for each port
- Power and Status LED
- PoE Max LED
- Fan LED

Figure 3 illustrates the NETGEAR FS728TP back panel.
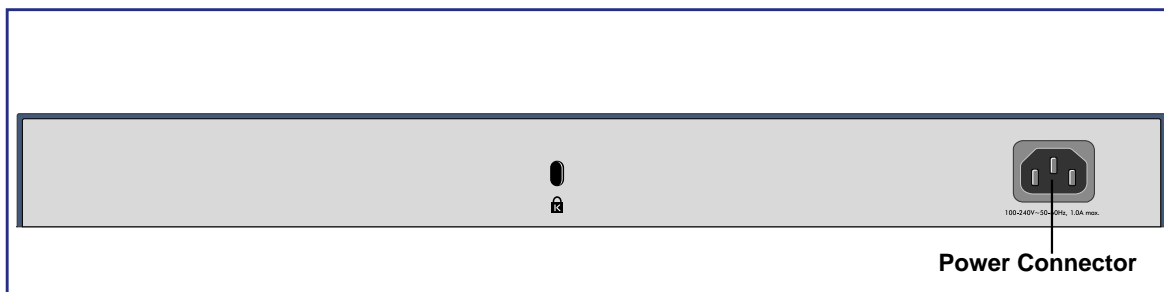
Figure 3. Back Panel

The back panel contains the following:

- A power connector

LED Designations

Port LEDs

The following table describes the RJ-45 and SFP port LED designations. There are two LEDs for each RJ-45 port. Each SFP port has its own indication LED.

LED	Designation
Link/Speed/ACT LED mode for port 1 to 24:	• **Per port**: - **Solid Green**—A valid 100 Mbps link is established. - **Blinking Green**—Packets transmitting/ receiving is occurring at 100 Mbps. - **Blinking Yellow**—A valid 10 Mbps link is established. - **Flashing Yellow**—No link is established.
PoE LED mode for port 1 to 24:	• **Per port**: - **Off**—No PoE powered device (PD) is connected. - **Solid Green**—The PoE powered device (PD) is connected and the port is supplying power. - **Solid Yellow**—Indicates one of the following failures caused the device not delivering power to that port: • Indicates one of the following failures caused the device not delivering power to that port: • PD power demand exceeds the available power • PoE current exceeds PD's classification • Out of proper voltage band (44 VDC–57 VDC for IEEE 802.3af)
Port Speed/Link/ACT LED for SFP ports (port 25 to 26):	• **Off**—No link • **Solid Green**—A valid 1000 Mbps link is established. • **Blinking Green**—Packets transmitting/receiving is occurring at 1000 Mbps. • **Solid Yellow**—A valid 100 Mbps link is established. • **Blinking Yellow**—Packets transmitting/receiving is occurring at 100 Mbps.
RJ-45 jacks with LEDs for the four 10/100/1000 copper ports (port 25 to 28):	• **Right LED (Link/ACT LED):** - **Off**—No link is established - **Solid Green**—A valid link is established. - **Blinking Green**—Packets transmitting/receiving is occurring. • **Left LED (Speed LED):** - **Off**—Either 10 Mbps link is established or no link established. - **Solid Green**—A valid 1000 Mbps link is established. - **Blinking Green**—A valid 100 Mbps link is established.

System LEDs

The following table describes the system LED designations.

LED	Designation
Power	• **Green**—Device is powered on, run-time code is up and running • **Yellow**—Device is powered on, system is being initialized (booting up) • **Off**—Power is not supplied to the device
Fan	• **Yellow**—One or more fans have failed • **Off**—Fans are operating normally
PoE MAX	• **Yellow**—Less than 7W of PoE power is available • **Blinking Yellow**—PoE Max LED was active in the past 2 minutes • **Off**—System has more than 7W of PoE power available for another PD device.

Device Hardware Interfaces

RJ-45 Ports

RJ-45 ports are autosensing ports. When inserting a cable into an RJ-45 port, the switch automatically ascertains the maximum speed (10, 100, or 1000 Mbps) and duplex mode (half-duplex or full-duplex) of the attached device. All ports support only unshielded twisted-pair (UTP) cable terminated with an 8-pin RJ-45 plug.

To simplify the procedure for attaching devices, all RJ-45 ports support Auto Uplink. This technology allows attaching devices to the RJ-45 ports with either straight-through or crossover cables. When inserting a cable into the switch's RJ-45 port, the switch automatically:

- Senses whether the cable is a straight-through or crossover cable.
- Determines whether the link to the attached device requires a "normal" connection (such as when connecting the port to a PC) or an "uplink" connection (such as when connecting the port to a router, switch, or hub).
- Configures the RJ-45 port to enable communications with the attached device, without requiring user intervention. In this way, the Auto Uplink technology compensates for setting uplink connections, while eliminating concern about whether to use crossover or straight-through cables when attaching devices.

Reset Button

The Smart Switch has a Reset button on the front panel to allow you to manually reboot the switch. This action is equivalent to powering the unit off and back on. The last saved configuration is loaded into the switch as it resets. To operate the Reset button, insert a device such as a paper clip into the opening to press the recessed button. The front-panel LEDs should extinguish and light again as the switch performs its Power On Self Test (POST).

Factory Defaults Button

The Smart Switch has a Factory Defaults button on the front panel so that you can remove the current configuration and return the device to its factory settings. When you enable the Factory Defaults button, all settings including the password, VLAN settings, and port configurations are removed. To operate the Factory Defaults button, insert a device such as a paper clip into the opening to press the recessed button for over two seconds.

Applications

3

Your NETGEAR FS728TP Smart PoE Switch is designed to provide flexibility in configuring your network connections. It can be used as a stand-alone device or with 10 Mbps, 100 Mbps, and 1000 Mbps hubs and switches.

Desktop Switching

The FS728TP can be used as a desktop switch to build a small network that enables users to have 100 Mbps access to a file server. With full-duplex enabled, the switch port connected to the server or PC can provide 200 Mbps throughput.
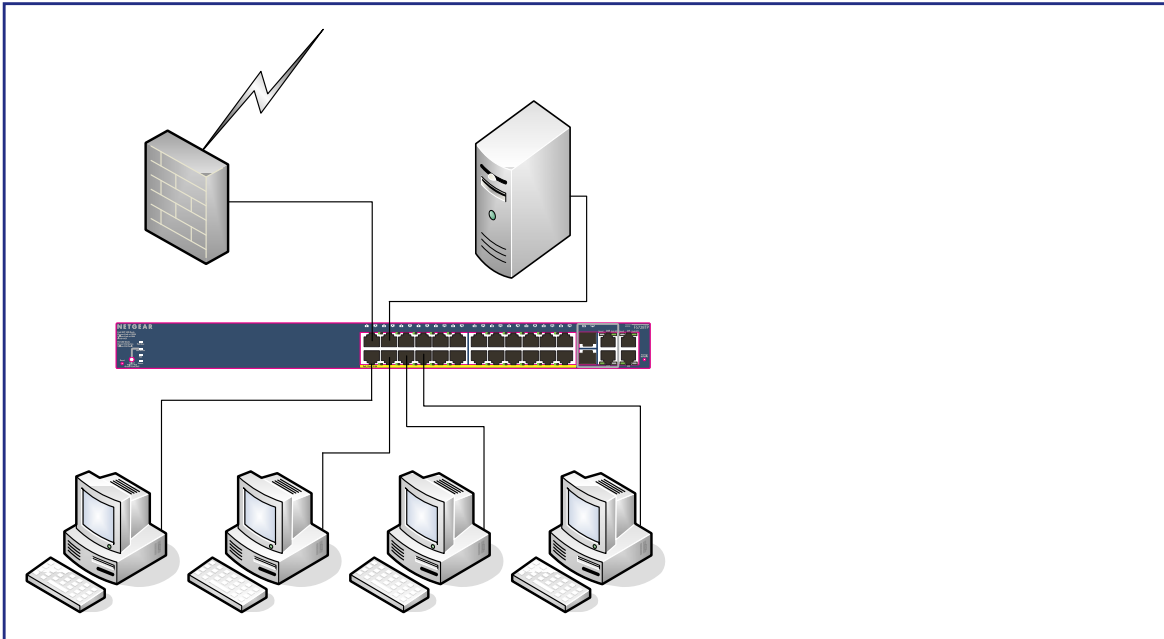
Figure 4. Desktop Switching

Installation

4

This chapter describes the installation procedures for your NETGEAR FS728TP Smart PoE Switch. Switch installation involves the following steps:

Step 1: Preparing the Site

Step 2: Installing the Switch

Step 3: Checking the Installation

Step 4: Connecting Devices to the Switch

Step 5: Applying AC Power

Step 6: Managing the Switch using a Web Browser or the PC Utility

Step 1: Preparing the Site

Before you install the switch, ensure the operating environment meets the site requirements in the following table.

Characteristics	Requirements
Mounting	• **Desktop installations** - Provide a flat table or shelf surface. • **Rackmount installations** - Use a 19-inch (48.3-centimeter) EIA standard equipment rack that is grounded and physically secure. The rackmount kit supplied with the switch is also required.
Access	Locate the switch in a position that allows access to the front-panel RJ-45 ports, view the front-panel LEDs, and access the power connector.
Power source	Provide a power connection cord. Power specifications for the switch are shown in **Appendix A**. Ensure the AC outlet is not controlled by a wall switch, which can accidentally turn off power to the outlet and the switch.
Environmental	• **Temperature** - Install the switch in a dry area, with ambient temperature between 0 and 50ºC (32ºF and 122ºF). Keep the switch away from heat sources such as direct sunlight, warm air exhausts, hot-air vents, and heaters. • **Operating humidity** - The installation location should have a maximum relative humidity of 90%, non-condensing. • **Ventilation** - Do not restrict airflow by covering or obstructing air inlets on the sides of the switch. Keep at least 2 inches (5.08 centimeters) free on all sides for cooling. Be sure there is adequate airflow in the room or wiring closet where the switch is installed. • **Operating conditions** - Keep the switch at least 6 ft. (1.83 meters) away from nearest source of electromagnetic noise, such as a photocopy machine.

Step 2: Installing the Switch

The FS728TP can be used on a flat surface or mounted on the wall.

Installing the Switch on a Flat Surface

The switch ships with four self-adhesive rubber footpads. Stick one rubber footpad on each of the four concave spaces on the bottom of the switch. The rubber footpads cushion the switch against shock/vibrations.

Installing the Switch in a Rack

To install the switch in a rack, you need the 19-inch rackmount kit supplied with switch.

1. Attach the supplied mounting brackets to the side of the switch.
2. Insert the screws provided in the rackmount kit through each bracket and into the bracket mounting holes in the switch.
3. Tighten the screws with a #1 Phillips screwdriver to secure each bracket.
4. Align the mounting holes in the brackets with the holes in the rack, and insert two pan-head screws with nylon washers through each bracket and into the rack.

Step 3: Checking the Installation

Before applying power to the switch, perform the following:

- Inspect the equipment thoroughly.
- Verify that all cables are installed correctly.
- Check cable routing to make sure cables are not damaged or creating a safety hazard.
- Ensure all equipment is mounted properly and securely.

Step 4: Connecting Devices to the Switch

The following procedure describes how to connect PCs to the switch's RJ-45 ports. The FS728TP contains Auto Uplink technology, which allows the attaching of devices using either straight-through or crossover cables.
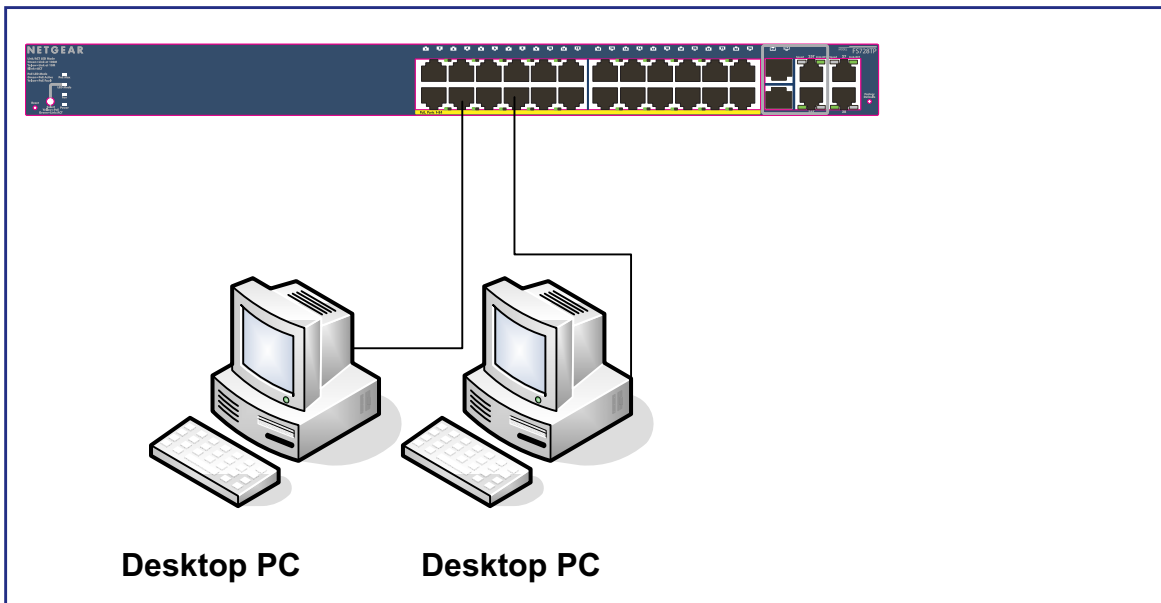
Figure 5. Connecting Devices to the Switch

Connect each PC to an RJ-45 network port on the Switch front panel (**Figure 5**). Use Category 5 (Cat5) Unshielded Twisted-Pair (UTP) cable terminated with an RJ-45 connector to make these connections.

> **Note:** Ethernet specifications limit the cable length between the switch and the attached device to 100m (328 ft.).

Step 5: Applying AC Power

Before connecting the power cord, select an AC outlet that is not controlled by a wall switch, which can turn off power to the switch. After selecting an appropriate outlet, use the following procedure to apply AC power:

1. Connect the end of the power connection cable to the power receptacle on the back of the switch.

2. Connect the AC power connection cable into a power source such as a wall socket or power strip.

When applying power, the Power LED on the switch's front panel illuminates.

If the Power LED does not go on, check that the power cable is plugged in correctly and that the power source is good. If this does not resolve the problem, refer to **Appendix A**.

Step 6: Managing the Switch using a Web Browser or the PC Utility

The FS728TP contains software for viewing, changing, and monitoring the way it works. This management software is not required for the switch to work. The ports can be used without using the management software. However, the management software enables the setup of VLAN and Trunking features and also improves the efficiency of the switch, which results in the improvement of its overall performance as well as the performance of the network.

After powering up the switch for the first time, the Smart Switch can be configured using a Web browser or a program called Smart Control Center Utility. For more information about managing the switch, see the *FS728TP Series Software Administration Manual* on the Smart Switch Resource CD.

Note: When the device powers up, there is a default IP address already configured on the device. The default IP address is with subnet mask 192.168.0.239.

Troubleshooting

A

This chapter provides information about troubleshooting the NETGEAR Smart Switch. Topics include the following:

- **Troubleshooting Chart**
- **Additional Troubleshooting Suggestions**

Troubleshooting Chart

The following table lists symptoms, causes, and solutions of possible problems.

Symptom	Cause	Solution
Power LED is off.	No power is received.	Check the power cord connections and the connected device. Ensure all cables used are correct and comply with Ethernet specifications.
Link LED is off or intermittent.	Port connection is not working.	Check the crimp on the connectors and make sure that the plug is properly inserted and locked into the port at both the switch and the connecting device. Ensure all cables used are correct and comply with Ethernet specifications. Check for a defective PC adapter card, cable, or port by testing them in an alternate environment where all products are functioning.
File transfer is slow or performance degradation is a problem.	Half-duplex or full-duplex setting on the switch and the connected device are not the same.	Make sure the attached device is set to auto-negotiate.
A segment or device is not recognized as part of the network.	One or more devices are not properly connected, or cabling does not meet Ethernet guidelines.	Verify that the cabling is correct. Ensure all connectors are securely positioned in the required ports. Equipment may have been accidentally disconnected.
ACT LED is flashing continuously on all connected ports and the network is disabled.	A network loop (redundant path) has been created.	Break the loop by ensuring that there is only one path from any networked device to any other networked device.

Additional Troubleshooting Suggestions

If the suggestions in Troubleshooting Chart do not resolve the problem, refer to the troubleshooting suggestions in this section.

Network Adapter Cards

Ensure the network adapter cards installed in the PCs are in working condition and the software driver has been installed.

Configuration

If problems occur after altering the network configuration, restore the original connections and determine the problem by implementing the new changes, one step at a time. Ensure 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. To reset the switch, remove the AC power from the switch and then reapply AC power. If the problem continues, contact NETGEAR technical support. In North America, call 1-888-NETGEAR. If you are outside of North America, please refer to the support information card included with your product.

Auto-Negotiation

The RJ-45 ports negotiate the correct duplex mode and speed if the device at the other end of the link supports auto negotiation. If the device does not support auto negotiation, the switch only determines the speed correctly and the duplex mode defaults to half-duplex.

The gigabit port negotiates speed, duplex mode, and flow control, provided that the attached device supports auto-negotiation.

Technical Specifications

B

Network Protocol and Standards Compatibility

IEEE 802.3 10BASE-T

IEEE 802.3u 100BASE-TX

IEEE 802.3ab 1000BASE-T

IEEE 802.3z 1000BASE-X

IEEE 802.3x full-duplex flow control

IEEE 802.3af (Power over Ethernet)

Management

Windows 2000 + XP, Vista; Windows 7, Microsoft Explorer 7.0 or above

IEEE 802.1Q VLAN

IEEE 802.3ad Link Aggregation

IEEE 802.1D Spanning Tree Protocol

IEEE 802.1w Rapid Spanning Tree Protocol

IEEE 802.1X Port Security

IEEE 802.1AB LLDP

IEEE 802.3s MSTP

SNMP v1, v2c, and v3

HTTP and HTTPS

Port Mirroring (RX, TX, and Both)

IGMP Snooping v1/v2/v3

IEEE 802.1p Class of Service (CoS)

SNTP (Simple Network Time Protocol) 2 servers. Disabled by default.

Jumbo Frame Support (2K)

Interface

24 RJ-45 connectors for 10BASE-T and 100BASE-TX (Auto Uplink™ on all ports)

2 RJ-45 connectors for 10BASE-T, 100BASE-TX, and 1000BASE-T (Auto Uplink™ on both ports)

Two SFP slots for SFP modules

LEDs

Per RJ-45 port: Speed/Link/Activity

Per device: Power, Fan, and Max PoE

Performance Specifications

Forwarding modes: Store-and-forward

Bandwidth: 12.8 Gbps

Address database size: 4K media access control (MAC) addresses per system

Mean Time Between Failure (MTBF): 237497 hours

Power Supply

100 VAC–240 VAC/50 Hz–60 Hz, 2.9A Max universal input

PoE Output

PoE total output power is 192 Watts.

Physical Specifications

Dimensions (H x W x D): 1.7 x 17.3 x 10.1 / 43 x 440 x 257 (in/mm)

Weight: 3.57/7.86 (Kg/lb)

Environmental Specifications

Operating temperature: 0°C to 50°C (32°F to 122°F)

Operating humidity: 10% to 90% maximum relative humidity, noncondensing

Storage temperature: –20°C to 70°C (–4°F to 158°F)

Storage humidity: 5% to 95% maximum relative humidity, noncondensing

Electromagnetic Emissions

CE EN 55022, EN 61000 and EN 55024

FCC Part 15 Class A

VCCI Class A

C-Tick

KCC

CCC

Safety

UL/cUL 60950-1

CE EN 60950-1

CCC

CB

Notification of Compliance

C

NETGEAR Wired Products

Regulatory Compliance Information

This section includes user requirements for operating this product in accordance with National laws for usage of radio spectrum and operation of radio devices. Failure of the end-user to comply with the applicable requirements may result in unlawful operation and adverse action against the end-user by the applicable National regulatory authority.

This product's firmware limits operation to only the channels allowed in a particular Region or Country. Therefore, all options described in this user's guide may not be available in your version of the product.

FCC Requirements for Operation in the United States

FCC Information to User

This product does not contain any user serviceable components and is to be used with approved antennas only. Any product changes or modifications will invalidate all applicable regulatory certifications and approvals

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Guidelines for Human Exposure

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

FCC Declaration Of Conformity

We, NETGEAR, Inc., 350 East Plumeria Drive, San Jose, CA 95134, declare under our sole responsibility that the NETGEAR FS728TP Smart PoE Switch complies with Part 15 of FCC Rules.

Operation is subject to the following two conditions:

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

FCC Radio Frequency Interference Warnings & Instructions

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following methods:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an electrical outlet on a circuit different from that which the radio receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Modifications made to the product, unless expressly approved by NETGEAR, Inc., could void the user's right to operate the equipment.

Canadian Department of Communications Radio Interference Regulations

This digital apparatus, NETGEAR FS728TP Smart PoE Switch, does not exceed the Class A limits for radio-noise emissions from digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.

European Union

The NETGEAR FS728TP Smart PoE Switch complies with essential requirements of EU EMC Directive 2004/108/EC and Low Voltage Directive 2006/95/EC as supported by applying the following test methods and standards:

- EN55022: 2006 / A1: 2007
- EN55024: 1998 / A1: 2001 / A2 : 2003
- EN60950-1: 2006+A11:2009
- EN 61000-3-2:2006
- EN 61000-3-3:1995 w/A1: 2001+A2: 2005

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