



8-Port Multi-Gigabit  
Smart Managed Pro Switch  
with two 10G Ports  
Hardware Installation Guide

**Models MS510TX and MS510TXPP**

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350 E. Plumeria Drive  
San Jose, CA 95134  
USA

## 8-Port Multi-Gigabit Smart Managed Pro Switch with two 10G Ports

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This hardware installation guide is for the following NETGEAR switch models:

- 8-Port Multi-Gigabit Smart Managed Pro Switch with two 10G Ports, Model MS510TX
- 8-Port Multi-Gigabit Smart Managed Pro Switch with PoE+ and two 10G Ports, Model MS510TXPP

The switch provides four multispeed Gigabit Ethernet and four 1G Ethernet RJ-45 copper ports with one dedicated 10G RJ-45 copper uplink port and one dedicated SFP+ fiber uplink port that supports 10G and 1G. Two of the four multispeed ports support 5G, 2.5G, and 1G. The other two multispeed ports support 2.5G and 1G. (The 10G RJ-45 copper uplink port also supports 5G, 2.5G and 1G.)

Model MS510TXPP supports Power over Ethernet plus (PoE+) on all four multispeed ports and four 1G ports so that you can let the switch provide power to PoE-capable devices such as WiFi access points, VoIP phones, and IP security cameras. Model MS510TXPP can supply up to 30W PoE+ (IEEE 802.3at) to each port, with a maximum PoE power budget of 180W across all active PoE+ ports.

This hardware installation guide complements the installation guide that came with your switch. The resource CD that came with your switch includes software and additional documentation and support resources.

This chapter serves as an introduction to the switch and includes the following sections:

- *Overview*
- *Features*
- *Safety Instructions and Warnings*

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**Note** For more information about the topics that are covered in this manual, visit the support website at [support.netgear.com](http://support.netgear.com).

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**Note** For technical specifications, see the data sheet at [netgear.com/business/products/switches/managed](http://netgear.com/business/products/switches/managed). For switch documentation, see the resource CD in the product package or visit [downloadcenter.netgear.com](http://downloadcenter.netgear.com).

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## 8-Port Multi-Gigabit Smart Managed Pro Switch with two 10G Ports

### Overview

The switch provides two multispeed gigabit copper ports that support 5G, 2.5G, and 1G; another two multispeed gigabit copper ports that support 2.5G and 1G; four 1G RJ-45 copper ports; one dedicated 10G copper uplink port (which also supports 5G, 2.5G and 1G); and one dedicated SFP+ fiber uplink port that supports 10G and 1G. All copper ports use RJ-45 connectors.

The SFP+ port requires a standard small form-factor pluggable (SFP) gigabit interface converter (GBIC, also referred to as a transceiver module), which is sold separately from the switch. The switch integrates 78 Gbps full-duplex, nonblocking switch fabric for high-performance workgroups.

The PoE model supports PoE+ on all copper ports (except for the 10G uplink port) with a maximum PoE power budget of 180W across all active PoE+ ports.

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**Note** For information about application examples, see *Applications* on page 18.

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The switch provides administrative management options that let you configure, monitor, and control the network. Using the web browser–based management interface, you can configure the switch and the network, including the ports, the management VLAN, VLANs for traffic control, link aggregation for increased bandwidth, Quality of Service (QoS) for prioritizing traffic, and network security.

Initial discovery of the switch on the network requires the Smart Control Center program, which runs on a Windows-based computer and is included on the resource CD. If you do not use a Windows-based computer, get the IP address of the switch from the DHCP server in the network or use an IP scanner utility.

After discovery, you can configure the switch using the web management interface for advanced setup and configuration of features, or the Smart Control Center program for very basic setup. For more information, see the user manual, which you can download from [downloadcenter.netgear.com](http://downloadcenter.netgear.com).

You can install the switch freestanding or rack mounted in a wiring closet or equipment room. The switch is IEEE compliant and offers low latency. All ports can automatically negotiate to the highest speed, which makes the switch very suitable for a mixed environment with multispeed Gigabit Ethernet, Gigabit Ethernet, and Fast Ethernet.

For speeds of 10 Gbps and higher speeds, use Category 6 (Cat 6) cables terminated with RJ-45 connectors; for speeds from 5 Gbps to 10 Gbps, use Cat 5e cables terminated with RJ-45 connectors; and for speeds from 10 Mbps to 5 Gbps, including 2.5 Gbps, use Cat 5e or higher-rated Ethernet cables terminated with RJ-45 connectors.

### Features

The switch supports the following key hardware features:

- Two 5G Ethernet ports (which also support 2.5G and 1G).
- Two 2.5G Ethernet ports (which also support 1G).
- Four 1G Ethernet ports.
- 1 dedicated 10G Ethernet uplink port (which also supports 5G, 2.5G and 1G).
- 1 dedicated SFP+ fiber uplink port capable of 10G. (The port also supports 1G.)
- 1 USB port for configuration and firmware backup and upgrade.

## 8-Port Multi-Gigabit Smart Managed Pro Switch with two 10G Ports

- PoE support (model MS510TXPP):
  - 8 PoE+ (802.3at) ports
  - Total PoE power budget of 180W for the switch
- MAC table size of 16K.
- Variable-speed fan that can lower the noise level during low temperatures.
- Acoustic noise is equal to or less than 30 dBA at 25°C.
- 78 Gbps full-duplex, nonblocking switch fabric.
- Includes 19-inch rack-mount kit for rack installation.
- Full compatibility with IEEE standards:
  - IEEE 802.3 Ethernet
  - IEEE 802.3u 100BASE-T
  - IEEE 802.3z Gigabit Ethernet 1000BASE-SX/LX
  - IEEE 802.3bz NBASE-T and MGBASE-T
  - IEEE 802.3an (10GBASE-T)
  - IEEE 802.3ae 10-Gigabit Ethernet over fiber (10GBASE-SR, 10GBASE-LR)
  - IEEE 802.3ab 1000BASE-T
  - IEEE 802.3i 10BASE-T
  - IEEE 802.1Q VLAN tagging
  - IEEE 802.3x Full-duplex flow control
  - IEEE 802.3ad Link aggregation (LAG with LACP)
  - IEEE 802.1ab LLDP
  - IEEE 802.1p Class of Service (QoS)
  - IEEE 802.1D Spanning Tree Protocol (STP)
  - IEEE 802.1s Multiple Spanning Tree Protocol (MSTP)
  - IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)
  - IEEE 802.1x RADIUS network access control
  - IEEE 802.3az Energy Efficient Ethernet (EEE)
  - IEEE 802.1af (PoE)
  - IEEE 802.1at (PoE+)
- AutoSensing and autonegotiating capabilities for all ports.
- Auto Uplink™ technology is supported on all ports.
- Automatic address learning function to build the packet-forwarding information table. The table contains up to 16K Media Access Control (MAC) addresses.
- Store-and-forward transmission to remove bad packets from the network.

## 8-Port Multi-Gigabit Smart Managed Pro Switch with two 10G Ports

- Active flow control to minimize packet loss and frame drops.
- Half-duplex backpressure control.
- Per-port status LEDs and system status LEDs.
- NETGEAR green power-saving features:
  - Energy efficiency mode that fully conforms to the IEEE802.3az standard
  - Per-port automatic change to a lower power mode when the port link is down

## Safety Instructions and Warnings

Use the following safety guidelines to ensure your own personal safety and to help protect your system from potential damage.

To reduce the risk of bodily injury, electrical shock, fire, and damage to the equipment, observe the following precautions:

- This product is designed for indoor use only in a temperature-controlled (0–50°C) and humidity-controlled (90 percent maximum relative humidity, noncondensing) environment. Any device that is located outdoors and connected to this product must be properly grounded and surge protected. To the extent permissible by applicable law, failure to follow these guidelines could result in damage to your NETGEAR product, which might not be covered by NETGEAR's warranty.
- Observe and follow service markings:
  - Do not service any product except as explained in your system documentation.
  - Opening or removing covers that are marked with the triangular symbol with a lightning bolt can expose you to electrical shock. We recommend that only a trained technician services components inside these compartments.
- If any of the following conditions occur, unplug the product from the electrical outlet and replace the part or contact your trained service provider:
  - The power cable, extension cable, or plug is damaged.
  - An object fell into the product.
  - The product was exposed to water.
  - The product was dropped or damaged.
  - The product does not operate correctly when you follow the operating instructions.
- Keep your system away from radiators and heat sources. Also, do not block cooling vents.
- Do not spill food or liquids on your system components, and never operate the product in a wet environment. If the system gets wet, see the appropriate section in your troubleshooting guide, or contact your trained service provider.
- Do not push any objects into the openings of your system. Doing so can cause fire or electric shock by shorting out interior components.

## 8-Port Multi-Gigabit Smart Managed Pro Switch with two 10G Ports

- Use the product only with approved equipment.
- Allow the product to cool before removing covers or touching internal components.
- Operate the product only from the type of external power source indicated on the electrical ratings label. If you are not sure of the type of power source required, consult your service provider or local power company.
- To avoid damaging your system, be sure that the voltage selection switch (if provided) on the power supply is set to match the power at your location:
  - 115V, 60 Hz in most of North and South America and some Far Eastern countries such as South Korea and Taiwan
  - 100V, 50 Hz in eastern Japan and 100V, 60 Hz in western Japan
  - 230V, 50 Hz in most of Europe, the Middle East, and the Far East
- Be sure that attached devices are electrically rated to operate with the power available in your location.
- Use only approved power cables. If you were not provided with a power cable for your system or for any AC-powered option intended for your system, purchase a power cable approved for your country. The power cable must be rated for the product and for the voltage and current marked on the product electrical ratings label. The voltage and current rating of the cable must be greater than the ratings marked on the product.
- To help prevent electric shock, plug the system and peripheral power cables into properly grounded electrical outlets.
- The peripheral power cables are equipped with three-prong plugs to help ensure proper grounding. Do not use adapter plugs or remove the grounding prong from a cable. If you must use an extension cable, use a three-wire cable with properly grounded plugs.
- Observe extension cable and power strip ratings. Make sure that the total ampere rating of all products plugged into the extension cable or power strip does not exceed 80 percent of the ampere ratings limit for the extension cable or power strip.
- To help protect your system from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply (UPS).
- Position system cables and power cables carefully. Route cables so that they cannot be stepped on or tripped over. Be sure that nothing rests on any cables.
- Do not modify power cables or plugs. Consult a licensed electrician or your power company for site modifications.
- Always follow your local and national wiring rules.

This chapter describes the switch hardware features.

The chapter includes the following sections:

- *Hardware Description*
- *Switch Hardware Interfaces*

## Hardware Description

This section describes the switch hardware features.

### Front Panel

Model MS510TX provides four 1G ports, two 2.5G ports, two 5G ports, one 10G port, and one SFP+ port.

Model MS510TXPP is a PoE+ model that provides four 1G PoE+ ports, two 2.5G PoE+ ports, two 5G PoE+ ports, one 10G port, and one SFP+ port.

The following figure shows the front panel of model MS510TX.

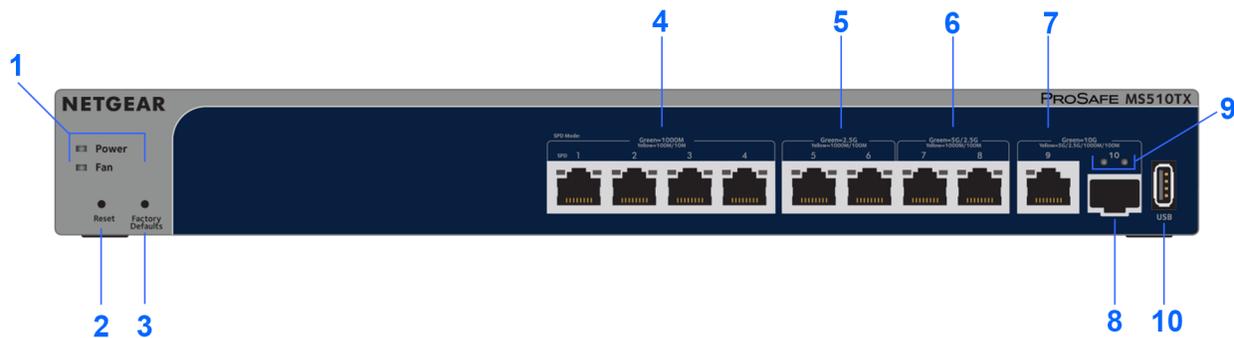


Figure 1. Front panel model MS510TX

Table 1. Front panel components model MS510TX

Number	Description
1	Power LED and Fan LED (see <a href="#">LEDs</a> on page 12).
2	Recessed <b>Reset</b> button (see <a href="#">Reset Button</a> on page 16).
3	Recessed <b>Factory Defaults</b> button (see <a href="#">Factory Defaults Button</a> on page 17).
4	Ports 1, 2, 3, and 4: Four independent 10/100/1000BASE-T RJ-45 ports, each with an LED that functions as the combined link, speed, and activity LED (see <a href="#">LEDs</a> on page 12).
5	Ports 5 and 6: Two independent 2.5GBASE-T RJ-45 ports (also supporting 100/1000BASE-T), each with an LED that functions as the combined link, speed, and activity LED (see <a href="#">LEDs</a> on page 12).
6	Port 7 and 8: Two independent 2.5G/5GBASE-T RJ-45 ports (also supporting 100/1000BASE-T), each with an LED that functions as the combined link, speed, and activity LED (see <a href="#">LEDs</a> on page 12).
7	Port 9: One independent 2.5G/5G/10GBASE-T RJ-45 port (also supporting 100/1000BASE-T) with a left LED that functions as the combined link, speed, and activity LED (see <a href="#">LEDs</a> on page 12).
8	Port 10: One independent SFP+ port in which you can install transceiver modules (see <a href="#">SFP+ Port for Fiber Connectivity</a> on page 16).

## 8-Port Multi-Gigabit Smart Managed Pro Switch with two 10G Ports

**Table 1. Front panel components model MS510TX (Continued)**

Number	Description
9	Two LEDs for Port 10. These LEDs indicate link, speed, and activity (see <a href="#">LEDs</a> on page 12).
10	USB 2.0 port (see <a href="#">USB Port</a> on page 17).

The following figure shows the front panel of model MS510TXPP.

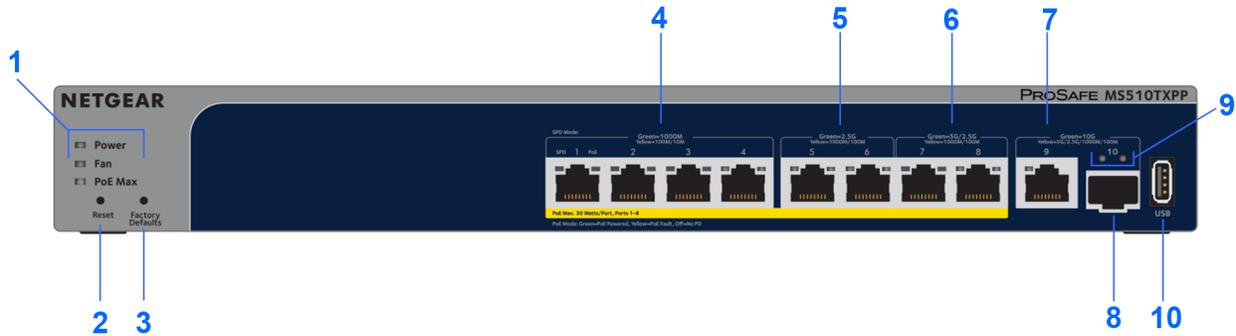


Figure 2. Front panel model MS510TXPP

**Table 2. Front panel components model MS510TXPP**

Number	Description
1	Power LED, Fan LED, and PoE Max LED (see <a href="#">LEDs</a> on page 12).
2	Recessed <b>Reset</b> button (see <a href="#">Reset Button</a> on page 16).
3	Recessed <b>Factory Defaults</b> button (see <a href="#">Factory Defaults Button</a> on page 17).
4	Ports 1, 2, 3, and 4: Four independent 10/100/1000BASE-T RJ-45 PoE+ ports, each with a left LED that functions as the combined link, speed, and activity LED; and a right LED that provides PoE information (see <a href="#">LEDs</a> on page 12).
5	Ports 5 and 6: Two independent 2.5GBASE-T RJ-45 PoE+ ports (also supporting 100/1000BASE-T), each with a left LED that functions as the combined link, speed, and activity LED; and a right LED that provides PoE information (see <a href="#">LEDs</a> on page 12).
6	Port 7 and 8: Two independent 2.5G/5GBASE-T RJ-45 PoE+ ports (also supporting 100/1000BASE-T), each with a left LED that functions as the combined link, speed, and activity LED; and a right LED that provides PoE information (see <a href="#">LEDs</a> on page 12).
7	Port 9: One independent 2.5G/5G/10GBASE-T RJ-45 port (also supporting 100/1000BASE-T) with a left LED that functions as the combined link, speed, and activity LED (see <a href="#">LEDs</a> on page 12).
8	Port 10: One independent SFP+ port in which you can install transceiver modules (see <a href="#">SFP+ Port for Fiber Connectivity</a> on page 16).

## 8-Port Multi-Gigabit Smart Managed Pro Switch with two 10G Ports

**Table 2. Front panel components model MS510TXPP (Continued)**

Number	Description
9	Two LEDs for Port 10. These LEDs indicate link, speed, and activity (see <a href="#">LEDs</a> on page 12).
10	USB 2.0 port (see <a href="#">USB Port</a> on page 17).

## Back Panel

The switch integrates a fixed, internal power supply unit (PSU).

The back panel contains a Kensington lock slot, a console port that is not for customer use (it is for NETGEAR technical support only), and the AC power connector.

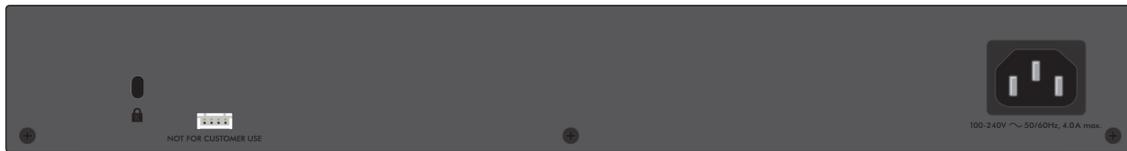


Figure 3. Back panel

## LEDs

This section describes the LED designations of the switch.

The following table describes the LEDs on the front panel of model MS510TX. Ports 1–9 come with a single LED each. Port 10 comes with two LEDs.

**Table 3. LEDs on the front panel of model MS510TX**

LED	Description
Power LED	<b>Solid green.</b> The device is powered on. <b>Solid yellow.</b> The device is booting. <b>Off.</b> Power is not supplied to the device.
Fan LED	<b>Solid green.</b> The fan is operating normally. <b>Solid yellow.</b> A problem occurred with the fan.
1G Ports 1–4 LEDs Link, speed, and activity	<b>Off.</b> No link is established. <b>Solid green.</b> A valid 1000 Mbps link is established. <b>Blinking green.</b> The port is transmitting or receiving packets at 1000 Mbps. <b>Solid yellow.</b> A valid 10 Mbps or 100 Mbps link is established. <b>Blinking yellow.</b> The port is transmitting or receiving packets at 10 Mbps or 100 Mbps.

## 8-Port Multi-Gigabit Smart Managed Pro Switch with two 10G Ports

**Table 3. LEDs on the front panel of model MS510TX (Continued)**

LED	Description
2.5G Ports 5 and 6 LEDs Link, speed, and activity	<p><b>Off.</b> No link is established.</p> <p><b>Solid green.</b> A valid 2.5 Gbps link is established.</p> <p><b>Blinking green.</b> The port is transmitting or receiving packets at 2.5 Gbps.</p> <p><b>Solid yellow.</b> A valid 100 Mbps or 1000 Mbps link is established.</p> <p><b>Blinking yellow.</b> The port is transmitting or receiving packets at 100 Mbps or 1000 Mbps.</p>
5G Ports 7 and 8 LEDs Link, speed, and activity	<p><b>Off.</b> No link is established.</p> <p><b>Solid green.</b> A valid 2.5 Gbps or 5 Gbps link is established.</p> <p><b>Blinking green.</b> The port is transmitting or receiving packets at 2.5 Gbps or 5 Gbps.</p> <p><b>Solid yellow.</b> A valid 100 Mbps or 1000 Mbps link is established.</p> <p><b>Blinking yellow.</b> The port is transmitting or receiving packets at 100 Mbps or 1000 Mbps.</p>
10G Port 9, LED Link, speed, and activity	<p><b>Off.</b> No link is established.</p> <p><b>Solid green.</b> A valid 10 Gbps link is established.</p> <p><b>Blinking green.</b> The port is transmitting or receiving packets at 10 Gbps.</p> <p><b>Solid yellow.</b> A valid 5 Gbps, 2.5 Gbps, 1000 Mbps, or 100 Mbps link is established.</p> <p><b>Blinking yellow.</b> The port is transmitting or receiving packets at 5 Gbps, 2.5 Gbps, 1000 Mbps, or 100 Mbps.</p>
SFP+ Port 10, LEDs Link, speed, and activity	<p><b>Off.</b> No SFP+ module link is established on the fiber port.</p> <p><b>Left LED solid green.</b> The fiber port established a valid 10 Gbps link.</p> <p><b>Left LED blinking green.</b> The fiber port is transmitting or receiving packets at 10 Gbps.</p> <p><b>Right LED solid yellow.</b> The fiber port established a valid 1 Gbps link.</p> <p><b>Right LED blinking yellow.</b> The fiber port is transmitting or receiving packets at 1 Gbps.</p>

The following table describes the LEDs on the front panel of model MS510TXPP. Ports 1–8 come with a left LED and a right LED each. Port 9 comes with a single LED. Port 10 comes with two LEDs.

**Table 4. LEDs on the front panel of model MS510TXPP**

LED	Description
Power LED	<p><b>Solid green.</b> The device is powered on.</p> <p><b>Solid yellow.</b> The device is booting.</p> <p><b>Off.</b> Power is not supplied to the device.</p>
Fan LED	<p><b>Solid green.</b> The fan is operating normally.</p> <p><b>Solid yellow.</b> A problem occurred with the fan.</p>

## 8-Port Multi-Gigabit Smart Managed Pro Switch with two 10G Ports

**Table 4. LEDs on the front panel of model MS510TXPP (Continued)**

LED	Description
PoE Max LED	<p><b>Off.</b> More than 7W of PoE power is available.</p> <p><b>Solid yellow.</b> Less than 7W of PoE power is available.</p> <p><b>Blinking yellow.</b> The PoE Max LED was active in the previous two minutes.</p>
1G Ports 1–4, Left LEDs Link, speed, and activity	<p><b>Off.</b> No link is established.</p> <p><b>Solid green.</b> A valid 1000 Mbps link is established.</p> <p><b>Blinking green.</b> The port is transmitting or receiving packets at 1000 Mbps.</p> <p><b>Solid yellow.</b> A valid 10 Mbps or 100 Mbps link is established.</p> <p><b>Blinking yellow.</b> The port is transmitting or receiving packets at 10 Mbps or 100 Mbps.</p>
1G Ports 1–4, Right LEDs PoE status	<p><b>Off.</b> The port is not delivering PoE.</p> <p><b>Solid green.</b> The port is delivering PoE.</p> <p><b>Solid yellow.</b> A PoE fault occurred. For more information, see <a href="#">PoE Troubleshooting Suggestions</a> on page 30.</p>
2.5G Ports 5 and 6, Left LEDs Link, speed, and activity	<p><b>Off.</b> No link is established.</p> <p><b>Solid green.</b> A valid 2.5 Gbps link is established.</p> <p><b>Blinking green.</b> The port is transmitting or receiving packets at 2.5 Gbps.</p> <p><b>Solid yellow.</b> A valid 100 Mbps or 1000 Mbps link is established.</p> <p><b>Blinking yellow.</b> The port is transmitting or receiving packets at 100 Mbps or 1000 Mbps.</p>
2.5G Ports 5 and 6, Right LEDs PoE status	<p><b>Off.</b> The port is not delivering PoE.</p> <p><b>Solid green.</b> The port is delivering PoE.</p> <p><b>Solid yellow.</b> A PoE fault occurred. For more information, see <a href="#">PoE Troubleshooting Suggestions</a> on page 30.</p>
5G Ports 7 and 8, Left LEDs Link, speed, and activity	<p><b>Off.</b> No link is established.</p> <p><b>Solid green.</b> A valid 2.5 Gbps or 5 Gbps link is established.</p> <p><b>Blinking green.</b> The port is transmitting or receiving packets at 2.5 Gbps or 5 Gbps.</p> <p><b>Solid yellow.</b> A valid 100 Mbps or 1000 Mbps link is established.</p> <p><b>Blinking yellow.</b> The port is transmitting or receiving packets at 100 Mbps or 1000 Mbps.</p>
5G Ports 7 and 8, Right LEDs PoE status	<p><b>Off.</b> The port is not delivering PoE.</p> <p><b>Solid green.</b> The port is delivering PoE.</p> <p><b>Solid yellow.</b> A PoE fault occurred. For more information, see <a href="#">PoE Troubleshooting Suggestions</a> on page 30.</p>

## 8-Port Multi-Gigabit Smart Managed Pro Switch with two 10G Ports

**Table 4. LEDs on the front panel of model MS510TXPP (Continued)**

LED	Description
10G Port 9, LED Link, speed, and activity	<b>Off.</b> No link is established. <b>Solid green.</b> A valid 10 Gbps link is established. <b>Blinking green.</b> The port is transmitting or receiving packets at 10 Gbps. <b>Solid yellow.</b> A valid 5 Gbps, 2.5 Gbps, 1000 Mbps, or 100 Mbps link is established. <b>Blinking yellow.</b> The port is transmitting or receiving packets at 5 Gbps, 2.5 Gbps, 1000 Mbps, or 100 Mbps.
SFP+ Port 10, LEDs Link, speed, and activity	<b>Off.</b> No SFP+ module link is established on the fiber port. <b>Left LED solid green.</b> The fiber port established a valid 10 Gbps link. <b>Left LED blinking green.</b> The fiber port is transmitting or receiving packets at 10 Gbps. <b>Right LED solid yellow.</b> The fiber port established a valid 1 Gbps link. <b>Right LED blinking yellow.</b> The fiber port is transmitting or receiving packets at 1 Gbps.

## Switch Hardware Interfaces

The following sections describe the hardware interfaces on the switch.

### RJ-45 Ports for 10/100/1000M and 2.5G/5G/10G BASE-T Ethernet Connectivity

All RJ-45 copper ports support autosensing. When you insert a cable into an RJ-45 port, the switch automatically ascertains the maximum speed. Depending on the port, the switch can autodetect 10 Mbps, 100 Mbps, or 1 Gbps and duplex mode (half-duplex or full-duplex), or 2.5 Gbps, 5 Gbps, or 10 Gbps of the attached device. All ports support Ethernet cables that are terminated with 8-pin RJ-45 connectors. The following table describes the network cables that you can use for the switch connections and the speeds that these cables can support.

**Table 5. Network cables and supported speeds**

Cable Type	Supported Speeds
Category 5 (Cat 5)	Speeds from 10 Mbps to 5 Gbps, including 2.5 Gbps
Category 5e (Cat 5e)	Speeds from 5 Gbps to 10 Gbps
Category 6 (Cat 6)	Speeds of 10 Gbps and higher speeds

To simplify the procedure for attaching devices, all RJ-45 ports support Auto Uplink technology. This technology allows attaching devices to the RJ-45 ports with either straight-through or crossover cables.

## 8-Port Multi-Gigabit Smart Managed Pro Switch with two 10G Ports

When you insert a cable into the switch's RJ-45 port, the switch automatically performs the following actions:

- 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 you are connecting the port to a computer) or an uplink connection (such as when you are connecting the port to a router, switch, or hub).
- Automatically configures the RJ-45 port to enable communications with the attached device. The Auto Uplink technology compensates for setting uplink connections while eliminating concern about whether to use crossover or straight-through cables when you attach devices.

For model MS510TXPP, copper ports 1 through 8 also support Power over Ethernet (PoE+).

### SFP+ Port for Fiber Connectivity

To enable fiber connections on the switch, SFP+ fiber ports accommodate standard small form-factor pluggable (SFP) gigabit interface converters (GBICs, also referred to as transceiver modules) for fiber connectivity. GBICs are sold separately from the switch.

The switch supports the NETGEAR SFP and SFP+ transceiver modules and cables that are listed in the following table.

**Table 6. Supported SFP and SFP+ transceiver modules and cables**

Speed and Medium	Model	Description
1G Ethernet short-reach fiber	AGM731F	SFP Transceiver 1000BASE-SX
1G Ethernet long-reach fiber	AGM732F	SFP Transceiver 1000BASE-LX
1G Ethernet copper	AGM734	SFP Transceiver 1000BASE-T
10G Ethernet short-reach fiber	AXM761	SFP+ Transceiver 10GBASE-SR
10G Ethernet long-reach fiber	AXM762	SFP+ Transceiver 10GBASE-LR
10G Ethernet	AXC761	SFP+ Direct Attach Cable (DAC), 1 meter
10G Ethernet	AXC763	SFP+ Direct Attach Cable (DAC), 3 meters

For more information about NETGEAR SFP and SFP+ transceiver modules and cables, visit [netgear.com/business/products/switches/modules-accessories](http://netgear.com/business/products/switches/modules-accessories).

### Reset Button

The switch provides a **Reset** button on the front panel so that you can reboot the switch. Save the configuration before you press the **Reset** button.

► **To reboot the switch:**

1. Insert a device such as a straightened paper clip into the opening.
2. Press the recessed **Reset** button.

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The switch reboots.

### Factory Defaults Button

► **To return the switch to its factory default settings:**

1. Insert a device such as a straightened paper clip into the opening.
2. Press the recessed **Factory Defaults** button for more than three seconds.  
The switch reboots and returns to its factory default settings.

### USB Port

The switch provides one USB 2.0 port that lets you upgrade firmware from a disk and back up the configuration to a storage device.

A device that you attach to the USB port must comply with the following requirements:

- The USB device must support USB 2.0.
- The USB device must support the FAT32 file type. The NTFS file type is not supported.

The switch is designed to provide flexibility in configuring multispeed network connections. This chapter shows application examples with 5G, 2.5G, and 1G connections and, for model MS510TXPP, multispeed PoE+ connections.

The chapter includes the following sections:

- *Multispeed Backbone Switching*
- *2.5G Network Storage and Redundancy*
- *Multispeed PoE+ Access Points*

### Multispeed Backbone Switching

You can use the switch as a multispeed backbone switch in a network that serves network components such as high-speed servers, a 2.5G NAS, 2.5G (gaming) computers, and 1G computers.

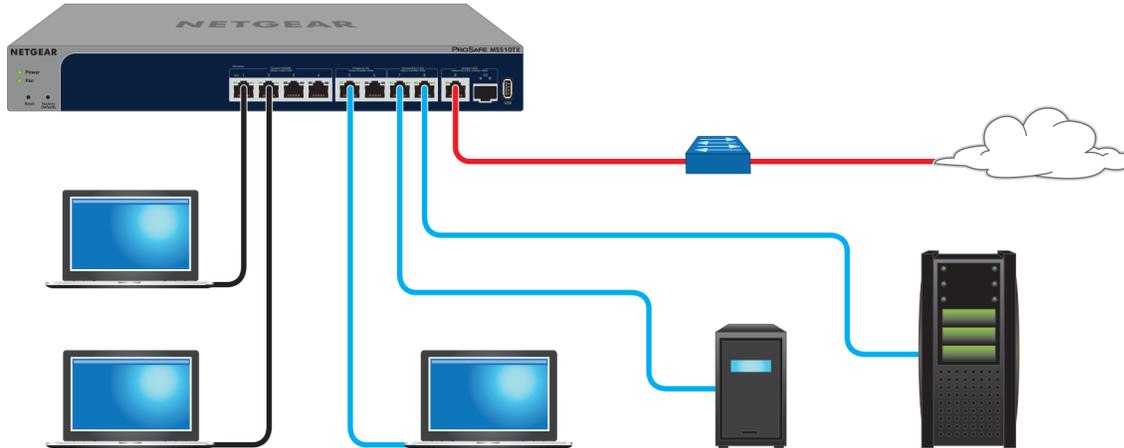


Figure 4. Multi-speed backbone switching

Line Color	Description
Black	1G connection to a computer
Blue	2.5G connection to a computer with a 2.5G network card, 2.5G connection to a 2.5G NAS, or 5G connection to a high-speed server
Red	10G uplink to a network router that is connected to the Internet

### 2.5G Network Storage and Redundancy

You can use the switches to provide 2.5G connections and redundancy between 2.5G ReadyNAS storage platforms and 2.5G or 5G connections to virtual machines or servers.

## 8-Port Multi-Gigabit Smart Managed Pro Switch with two 10G Ports

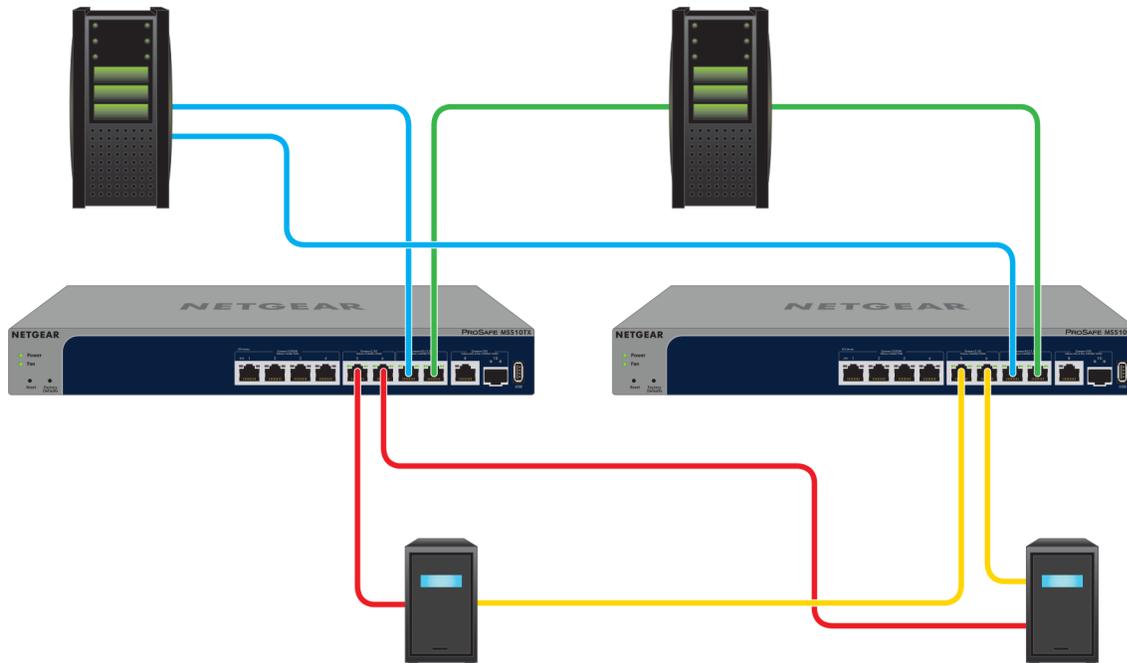


Figure 5. High-speed network storage switching in a redundant configuration

Line Color	Description
Red	2.5G connection to a 2.5G NAS and to a redundant 2.5G NAS
Yellow	2.5G connection to a 2.5G NAS and to a redundant 2.5G NAS
Blue	2.5G or 5G connection to a virtual machine or server and to a redundant virtual machine or server
Green	2.5G or 5G connection to a virtual machine or server and to a redundant virtual machine or server

## Multispeed PoE+ Access Points

Model MS510TXPP supports 8 PoE+ ports. The switch can supply up to 30W PoE+ (IEEE 802.3at) to each port up to its total maximum PoE power budget of 180W across all active PoE+ ports.

Supplied power is prioritized according to the port order, up to the total power budget of the device. Port 1 receives the highest PoE priority, while port 8 is relegated to the lowest PoE priority.

If the power requirements for attached devices exceed the total power budget of the switch, the PoE power to the device on the highest-numbered active PoE port is disabled to make sure that the devices connected to the higher-priority, lower-numbered PoE ports are supported first.

---

**Note** Although a device is listed as an 802.3at PoE+-powered or 802.3af PoE-powered device, it might not require the maximum power limit that is specified by its IEEE standard. Many devices require less power, allowing all 8 PoE+ ports to be active simultaneously when the devices correctly report their PoE class to the switch.

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## Applications

## 8-Port Multi-Gigabit Smart Managed Pro Switch with two 10G Ports

The following figure shows an example of how you can connect multiple multi-speed (2.5G and 1G) PoE access points.

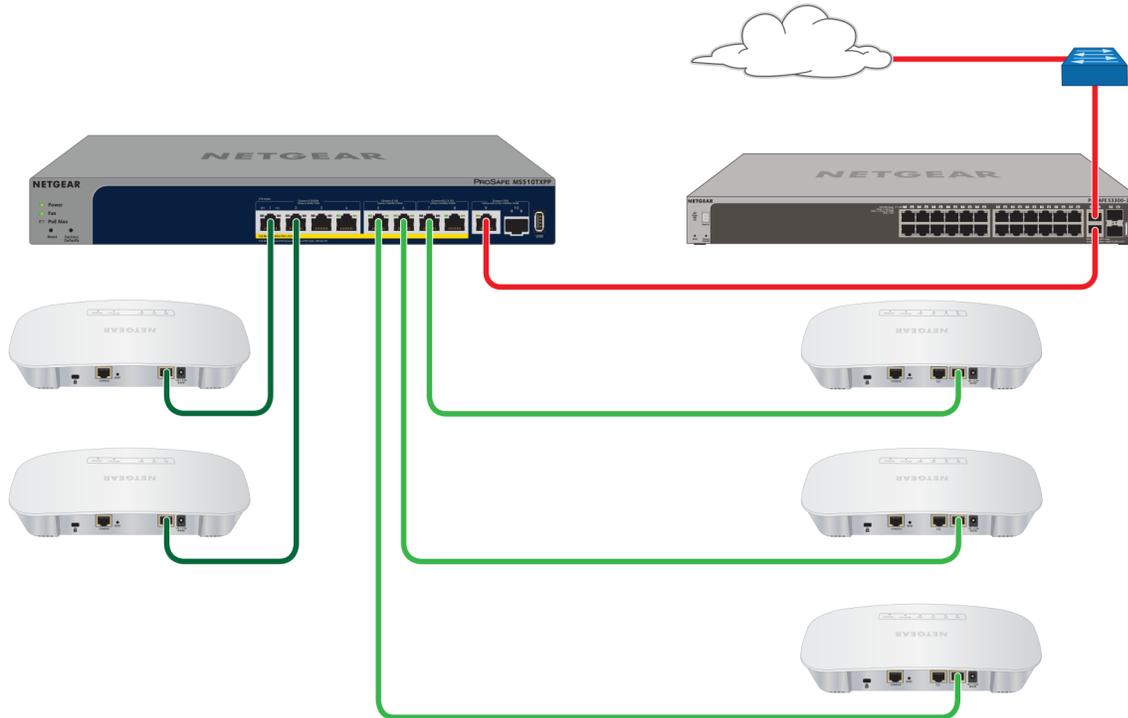


Figure 6. Multispeed PoE+ access points

Line Color	Description
Dark green	1G PoE connection to a WiFi access point such as a NETGEAR WAC720 access point
Light green	2.5G PoE connection to a WiFi access point such as a NETGEAR WAC740 access point
Red	10G uplink to a core switch that is connected to a network router that, in turn, is connected to the Internet

This chapter describes the installation procedures for the switch. Switch installation involves the steps described in the following sections:

- *Step 1: Prepare the Site*
- *Step 2: Protect Against Electrostatic Discharge*
- *Step 3: Unpack the Switch*
- *Step 4: Install the Switch*
- *Optional Step 5: Install an SFP Transceiver Module*
- *Step 6: Connect Devices to the Switch*
- *Step 7: Check the Installation*
- *Step 8: Apply Power and Check the LEDs*
- *Step 9: Manage the Switch*

## Step 1: Prepare the Site

Before you install the switch, make sure that the operating environment meets the site requirements that are listed in the following table.

**Table 7. Site requirements**

Characteristics	Requirements
Mounting	<p><b>Desktop installations.</b> Provide a flat table or shelf surface.</p> <p><b>Rack-mount installations.</b> Use a 19-inch (48.3-centimeter) EIA standard equipment rack that is grounded and physically secure. You also need the rack-mount kit that is supplied with the switch.</p>
Access	Locate the switch in a position that allows you to access the front panel ports, view the front panel LEDs, and access the power connector on the back panel.
Power source	Use the AC power cord that is supplied with the switch. Make sure that the AC outlet is not controlled by a wall switch, which can accidentally turn off power to the outlet and the switch.
Cabling	Route cables to avoid sources of electrical noise such as radio transmitters, broadcast amplifiers, power lines, and fluorescent lighting fixtures.
Environmental	<p><b>Temperature.</b> Install the switch in a dry area with an ambient temperature between 32°F and 122°F (0°C and 50°C). Keep the switch away from heat sources such as direct sunlight, warm-air exhausts, hot-air vents, and heaters.</p> <p><b>Operating humidity.</b> The maximum relative humidity of the installation location must not exceed 90 percent, noncondensing.</p> <p><b>Ventilation.</b> 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. The room or wiring closet in which you install the switch must provide adequate airflow.</p> <p><b>Operating conditions.</b> Keep the switch at least 6 feet (1.83 meters) away from the nearest source of electromagnetic noise, such as a photocopy machine.</p>

## Step 2: Protect Against Electrostatic Discharge



**WARNING:**

Static electricity can harm delicate components inside your system. To prevent static damage, discharge static electricity from your body before you touch any of the electronic components, such as the microprocessor. You can do so by periodically touching an unpainted metal surface on the switch.

You can also take the following steps to prevent damage from electrostatic discharge (ESD):

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- When unpacking a static-sensitive component from its shipping carton, leave it in the antistatic package until you are ready to install it. Just before unwrapping the antistatic package, discharge static electricity from your body.
- Before moving a sensitive component, place it in an antistatic container or package.
- Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads, workbench pads, and an antistatic grounding strap.

### Step 3: Unpack the Switch

The following figure shows the package contents.



Figure 7. Switch package contents

Check the contents of the boxes to make sure that all items are present before installing the switch.

#### ▶ To check the package contents:

1. Place the container on a clean flat surface, and cut all straps securing the container.
2. Unpack the hardware from the boxes by carefully removing the hardware and placing it on a secure and clean surface.
3. Remove all packing material.
4. Verify that the package contains the following items:
  - a. Switch of the correct model.
  - b. Power cord.
  - c. Rubber footpads for tabletop installation.
  - d. Rubber protection cap, which is already installed in the SFP socket. If you install an SFP transceiver module, you must remove the cap from the SFP socket.

## 8-Port Multi-Gigabit Smart Managed Pro Switch with two 10G Ports

- e. Rack-mounting screws.
  - f. Rack-mounting brackets.
  - g. Installation guide.
  - h. Resource CD with NETGEAR Smart Control Center Utility.
5. If any item is missing or damaged, contact your local NETGEAR reseller for replacement.

### Step 4: Install the Switch

You can install the switch in a standard 19-inch (48.26-centimeter) network equipment rack or on a flat surface.

#### Install the Switch in a Rack

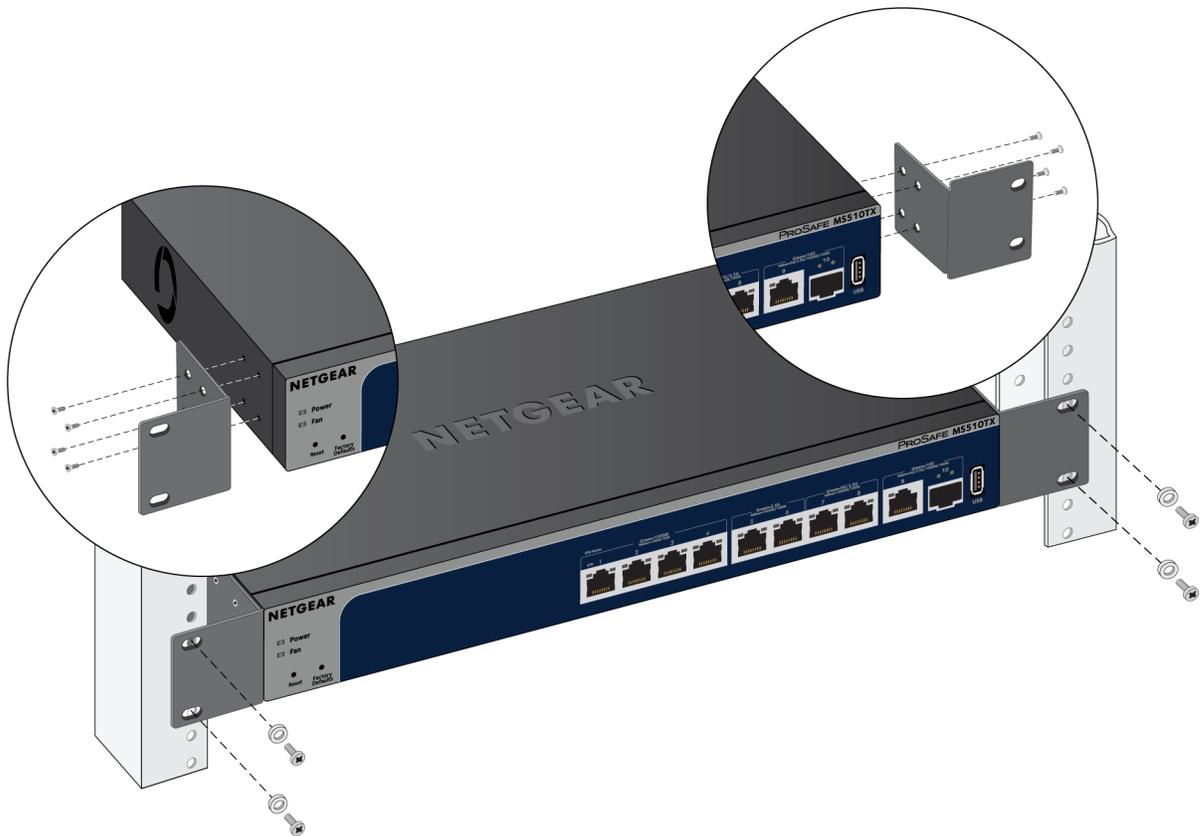
To install the switch in a rack, you need the 19-inch rack-mount kit supplied with the switch.

► **To install the switch in a rack:**

1. Attach the supplied mounting brackets to the side of the switch.
2. Insert the screws provided in the product package through each bracket and into the bracket mounting holes in the switch.
3. Tighten the screws with a No. 2 Phillips screwdriver to secure each bracket.

## 8-Port Multi-Gigabit Smart Managed Pro Switch with two 10G Ports

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.
5. Tighten the screws with a No. 2 Phillips screwdriver to secure mounting brackets to the rack.



### Install the Switch on a Flat Surface

The switch ships with four self-adhesive rubber footpads.

#### ► To install the switch on a flat surface:

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 and vibrations. They also provide ventilation space between stacked switches.

### Optional Step 5: Install an SFP Transceiver Module

The following optional procedure describes how to install an optional SFP transceiver module into the SFP+ port of the switch.

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**Note** Contact your NETGEAR reseller to purchase these modules. If you do not want to install an SFP module, skip this procedure.

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## 8-Port Multi-Gigabit Smart Managed Pro Switch with two 10G Ports

### ▶ To install an SFP transceiver module:

1. Insert the transceiver into the SFP+ port.
2. Press firmly on the flange of the module to seat it securely into the connector.



## Step 6: Connect Devices to the Switch

The following procedure describes how to connect devices to the switch's RJ-45 ports. The switch supports Auto Uplink technology, which allows you to attach devices using either straight-through or crossover cables. Use a Category 5 (Cat 5), Cat 5e, or Cat 6 cable that is terminated with an RJ-45 connector.

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**Note** Ethernet specifications limit the cable length between the switch and the attached device to 328 feet (100 meters).

---

### ▶ To connect devices to the switch's RJ-45 ports:

1. Connect a PoE or non-PoE device to an RJ-45 network port on the switch front panel.
2. Verify that all cables are installed correctly.

## Step 7: Check the Installation

Before you apply power to the switch, perform the following steps.

### ▶ To check the installation:

1. Inspect the equipment thoroughly.
2. Verify that all cables are installed correctly.

## 8-Port Multi-Gigabit Smart Managed Pro Switch with two 10G Ports

3. Check cable routing to make sure that cables are not damaged or creating a safety hazard.
4. Make sure that all equipment is mounted properly and securely.

### Step 8: Apply Power and Check the LEDs

The switch does not provide an on/off power switch. The power cord connection controls the 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.

#### ► To apply power:

1. Connect the end of the power cord to the AC power receptacle on the back of the switch.
2. Plug the AC power cord into a power source such as a wall socket or power strip.
3. Check to see that the LEDs on the front panel of the switch light correctly.

When you apply power, the Power LED on the switch front panel lights and the ports LEDs for attached devices light.

If the Power LED does not light, check to see that the power cord is plugged in correctly and that the power source is good.

### Step 9: Manage the Switch

The switch contains built-in web browser–accessible software for viewing, changing, and monitoring the way it functions. This management software is not required for the switch to work. You can use the ports 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 you power on the switch for the first time, you can configure the switch using the web management interface for advanced setup and configuration of features, or the Smart Control Center program (which requires a Windows-based computer) for very basic setup. For more information about managing the switch, see the installation guide on the resource CD and the user manual, which you can download from [downloadcenter.netgear.com](http://downloadcenter.netgear.com).

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**Note** The switch's default IP address is 192.168.0.239 and its default subnet mask is 255.255.255.0.

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This chapter provides information about troubleshooting the switch. The chapter includes the following sections:

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

## Troubleshooting Chart

The following table lists symptoms, possible causes, and possible solutions for problems that might occur.

**Table 8. Troubleshooting chart**

Symptom	Possible Cause	Possible Solution
Power LED is off.	Power is not supplied to the switch.	Check the power cable connections at the switch and the power source.  Make sure that all cables are used correctly and comply with the Ethernet specifications.
A combined speed and activity LED or an individual speed LED and an individual activity LED are off when the port is connected to a device.	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.  Make sure that all cables are used correctly and comply with the Ethernet specifications.  Check for a defective port, cable, or module by testing them in an alternate environment where all products are functioning.
File transfer is slow or performance is degraded.	One possible cause is that a broadcast storm occurred and that a network loop (redundant path) was created.	Break the loop by making sure that only one path exists from any networked device to any other networked device. After you connect to the switch web management interface, you can configure the Spanning Tree Protocol (STP) to prevent network loops.
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.  Make sure that all connectors are securely positioned in the required ports. It is possible that equipment was accidentally disconnected.
A combined speed and activity LED or an individual speed LED and an individual activity LED are blinking continuously on all connected ports and the network is disabled.	A network loop (redundant path) was created.	Break the loop by making sure that only one path exists from any networked device to any other networked device. After you connect to the switch web management interface, you can configure the Spanning Tree Protocol (STP) to prevent network loops.

## PoE Troubleshooting Suggestions

Here are some tips for correcting PoE problems that might occur:

- Make sure that the PoE Max LED is off. If the PoE Max LED is solid yellow, disconnect one or more PoE devices to prevent PoE oversubscription. Start by disconnecting the device from the highest-numbered port.
- Make sure that the Ethernet cables are plugged in correctly. For each powered device (PD) that is connected to the switch, the associated right port LED on the switch lights solid green. If the right port

## 8-Port Multi-Gigabit Smart Managed Pro Switch with two 10G Ports

LED lights solid yellow, a PoE fault occurred and PoE halted because of one of the conditions that are listed in the following table.

**Table 9. PoE fault conditions and possible solutions**

PoE Fault Condition	Possible Solution
A PoE-related short circuit occurred on the port.	The problem is most likely with the attached PD. Check the condition of the PD or restart the PD by disconnecting and reconnecting the PD.
The PoE power demand of the PD exceeded the maximum level that the switch permits. The maximum level is 15.4W for a PoE connection or 30W for a PoE+ connection.	
The PoE current on the port exceeded the classification limit of the PD.	
The PoE voltage of the port is outside the range that the switch permits.	Restart the switch to see if the condition resolves itself.

## Additional Troubleshooting Suggestions

If the suggestions in the troubleshooting chart do not resolve the problem, see the following troubleshooting suggestions:

- **Network adapter cards.** Make sure that the network adapters that are installed in the computers are in working condition and the software driver was installed.
- **Configuration.** If problems occur after you alter the network configuration, restore the original connections and determine the problem by implementing the new changes, one step 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 necessary, verify the integrity of the switch by resetting it. To reset the switch, disconnect the AC power from the switch and then reconnect the AC power. If the problem continues, contact NETGEAR technical support. For more information, visit the support website at [support.netgear.com](http://support.netgear.com).
- **Autonegotiation.** The RJ-45 ports negotiate the correct duplex mode, speed, and flow control if the device at the other end of the link supports autonegotiation. If the device does not support autonegotiation, the switch determines only the speed correctly, and the duplex mode defaults to half-duplex. The Gigabit Ethernet ports negotiate speed, duplex mode, and flow control if the attached device supports autonegotiation.