



Insight Managed 28-Port
Gigabit Ethernet Smart Cloud
Switch with 2 SFP 1G & 2
SFP+ 10G Fiber Ports
Hardware Installation Guide

Models GC728X and GC728XP

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350 E. Plumeria Drive
San Jose, CA 95134
USA

Insight Managed 28-Port Gigabit Ethernet (PoE+) Smart Cloud Switch

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Conformity

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See the regulatory compliance document before connecting the power supply.

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

- Insight Managed 28-Port Gigabit Ethernet Smart Cloud Switch with 2 SFP 1G & 2 SFP+ 10G Fiber Ports, Model GC728X
- Insight Managed 28-Port Gigabit Ethernet PoE+ Smart Cloud Switch with 2 SFP 1G & 2 SFP+ 10G Fiber Ports, Model GC728XP

The switch provides 24 Gigabit Ethernet RJ-45 copper ports, 2 dedicated Gigabit SFP fiber ports, and 2 dedicated 10G SFP+ fiber ports.

Model GC728XP supports Power over Ethernet Plus (PoE+) on all 24 RJ-45 copper 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 GC728XP can supply up to 30W PoE (IEEE 802.3at) to each port, with a maximum PoE power budget of 390W across all active PoE+ ports.

This hardware installation guide complements the installation guide that came with your switch.

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

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

Note For more information about the topics that are covered in this manual, visit the support website at netgear.com/support.

Note For technical specifications, see the data sheet at netgear.com/business/products/switches/insight-managed-smart-cloud/gigabit-switch.aspx#tab-resources. For switch documentation, visit downloadcenter.netgear.com.

Insight Managed 28-Port Gigabit Ethernet (PoE+) Smart Cloud Switch

Overview

The switch provides 24 Gigabit Ethernet copper ports, 2 dedicated Gigabit SFP fiber ports, and 2 dedicated 10G SFP+ fiber ports. All copper ports use RJ-45 connectors. The SFP ports require 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 full-duplex, nonblocking switch fabric that provides full-wire speed for all packet sizes.

The PoE+ model supports PoE on all copper ports with a maximum PoE power budget of 390W across all active PoE+ ports.

Note For information about application examples, see [Applications](#) on page 17.

The switch provides management options that let you discover the switch on the network and configure, monitor, and control the switch:

- **NETGEAR Insight app.** Using the NETGEAR Insight app, you can discover the switch on the network and add the switch to the NETGEAR Insight app so that you can set up the switch in the network and manage and monitor the switch remotely from your smartphone. You can choose from four methods to add the switch to the NETGEAR Insight app: You can scan your network for the switch, scan the QR code or the barcode of the switch, or add the serial number of the switch. For more information, see the NETGEAR knowledge base articles at netgear.com/support.
- **Insight Cloud portal.** Using the NETGEAR Insight Cloud portal, you can set up the switch in the network, perform advanced remote management, monitor the switch, analyze the switch and network usage, and, if necessary, troubleshoot the switch and the network.
- **Local browser-based management interface.** By default, the management mode of the switch is set to NETGEAR Insight App. With this setting you can manage the switch using the Insight app or the Insight Cloud portal. For complex tasks such as integrating with an existing network of devices that are not managed through Insight, and for debugging purposes, you can change the management mode of the switch to PC Web-browser and access the local browser interface. In this mode, you can change the settings of the specific device, but we recommend that you do not use this mode to change settings that are Insight manageable because they would not be synchronized with Insight or to the network location and other devices to which you assigned the switch.

Note Changes to Insight-manageable settings from the local browser interface might also create conflicts with the rest of the Insight-managed network to which the device is connected. While you manage the switch with the local browser interface, you cannot use the Insight app or Insight Cloud portal. To reenble management of the device remotely or through the cloud, you can return the management mode to NETGEAR Insight App at any time so that you can manage the switch with the Insight app or Insight Cloud portal.

For more information about the local browser interface, see the user manual, which you can download from downloadcenter.netgear.com.

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Note The switch is designed for management by the NETGEAR Insight app on a smartphone or tablet. Alternatively, you can manage the switch from the Insight Cloud portal that is available from a web browser on your Windows-based computer, Mac, or tablet. By default, the local browser interface is disabled and you cannot use it while the switch is managed by the NETGEAR Insight app or Insight Cloud portal.

You can install the switch freestanding (on a desktop) or in a standard 19-inch rack, using the included rack-mount kit. 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 Gigabit Ethernet and Fast Ethernet.

For Gigabit Ethernet connections, use Category 5 (Cat 5) or higher-rated Ethernet cables terminated with RJ-45 connectors.

Features

The switch includes the following key hardware features:

- Twenty-four Gigabit Ethernet ports.
- Two dedicated Gigabit SFP fiber ports.
- Two dedicated 10G SFP+ fiber ports.
- One USB port (for configuration files, firmware updates, and debug logs).
- One micro USB console and debug port. (Use this port only as directed and assisted by technical support.)
- PoE+ on copper ports (model GC728XP):
 - Twenty-four ports PoE+ (IEEE 802.3at)
 - Total PoE power budget of 390W
- MAC table size of 16K entries.
- Switch fabric full-duplex nonblocking.
- Includes the following mounting hardware:
 - Four rubber footpads for tabletop installation
 - Rack-mount kit (brackets and screws) for rack installation
- Full NETGEAR Smart Managed Pro Switch features and functionality.
- Full compatibility with IEEE standards:
 - IEEE 802.3 Ethernet
 - IEEE 802.3u 100BASE-T
 - IEEE 802.3ab 1000BASE-T
 - IEEE 802.3z Gigabit Ethernet 1000BASE-SX/LX

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- IEEE 802.3ae 10-Gigabit Ethernet Over Fiber (10GBASE-SR, 10GBASE-LR, 10GBASE-LRM, 10GBASE-ER, 10GBASE-LX4)
 - IEEE 802.3aq 10-Gigabit over Fiber (10GBASE-LRM)
 - 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 802.3af (PoE) (model GC728XP)
 - IEEE 802.3at (PoE+) (model GC728XP)
-
- 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.
 - Active flow control to minimize packet loss and frame drops.
 - Half-duplex backpressure control.
 - Per-port status LEDs and system status LEDs:
 - System Power LED
 - Cloud Connection LED
 - PoE Max or Fault LED (model GC728XP)
 - Fan LED
 - Per-port link, speed, and activity LED for copper ports
 - Per-port PoE status LED for copper ports (model GC728XP)
 - Per-port link and activity LED for SFP and SFP+ fiber ports
 - NETGEAR green power-saving features:
 - Energy efficiency mode that fully conforms to the IEEE 802.3az 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 can 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.
- 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:

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- 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 the supplied DC power adapter. If you were not provided with a DC power adapter, contact your reseller.
 - 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

The following sections describes the switch hardware features.

Front Panel

Model GC728X provides 24 10/100/1000BASE-T RJ-45 ports, 2 dedicated Gigabit SFP fiber ports, and 2 dedicated 10G SFP+ fiber ports

Model GC728XP provides 24 10/100/1000BASE-T RJ-45 *PoE+* ports, 2 dedicated Gigabit SFP fiber ports, and 2 dedicated 10G SFP+ fiber ports.

The following figures show the front panels.

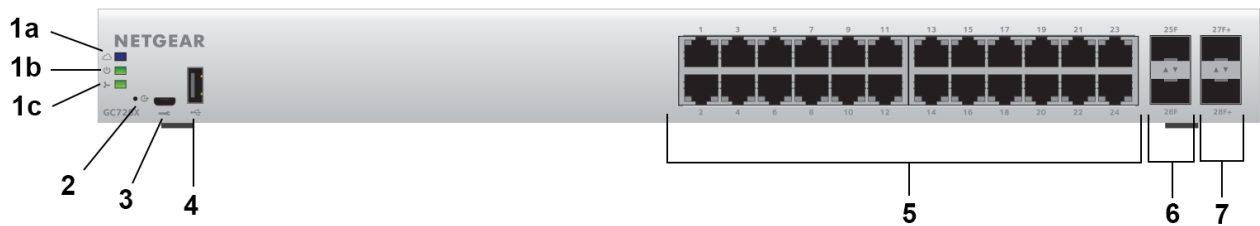


Figure 1. Front panel model GC728X

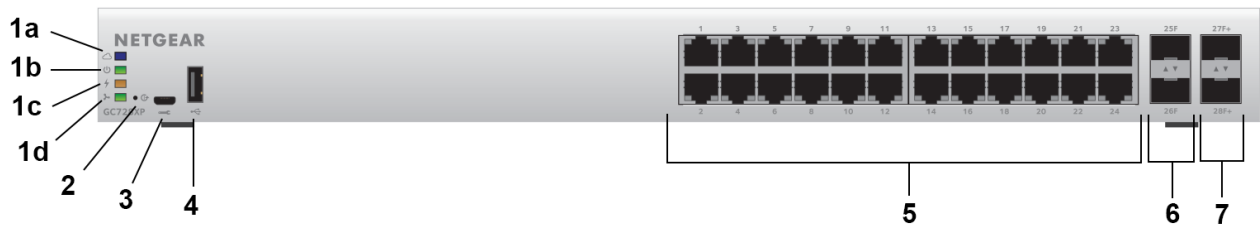


Figure 2. Front panel model GC728XP

Table 1. Front panel components

Number	Description
1a	Cloud Connection LED
1b	Power LED
1c	PoE Max or Fault LED for model GC728XP only
1d	Fan LED
2	Recessed multifunction Reset button (see Multifunction Reset Button on page 16)
3	One micro USB console and debug port. Use this port only as directed and assisted by technical support.
4	USB 2.0 port (see USB Port on page 16)

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Table 1. Front panel components (Continued)

Number	Description
5	<p>Model GC728X. Twenty-four independent 10/100/1000BASE-T RJ-45 ports, numbered 1 through 24. Each port provides one LED that functions as the combined speed and activity LED.</p> <p>Model GC728XP. Twenty-four independent 10/100/1000BASE-T RJ-45 PoE+ ports, numbered 1 through 24. Each port provides a left LED that functions as the combined speed and activity LED and a right LED that indicates the PoE status.</p>
6	Two dedicated Gigabit SFP fiber ports, numbered 25F and 26F, that can accept optional transceiver modules. Each port provides a single LED that functions as the combined link and activity LED.
7	Two dedicated 10G SFP fiber ports, numbered 27F+ and 28F+, that can accept optional transceiver modules. Each port provides a single LED that functions as the combined link and activity LED.

For information about the LEDs, see [Status LEDs](#) on page 12.

For information about optional transceiver modules, see [SFP and SFP+ Ports for Fiber Connectivity](#) on page 15.

Status LEDs

This section describes the status LED designations of the switch.

Table 2. LEDs on the front panel of model GC728X

LED	Description
Cloud Connection LED	<p>Solid blue. The switch is connected to the cloud server and is set up to be managed by the NETGEAR Insight app and Insight Cloud portal.</p> <p>Off. The switch is not connected to the cloud server or is set up to be managed by the local browser interface.</p>
Power LED	<p>Solid green. The switch is powered on.</p> <p>Solid amber. The switch is starting.</p> <p>Off. Power is not supplied to the switch.</p>
Fan LED	<p>Solid green. The fan is operating normally.</p> <p>Solid amber. A problem occurred with the fan.</p>
RJ-45 LED Link, speed, and activity for Ethernet ports 1 to 24	<p>Off. No link is established.</p> <p>Solid green. A valid 1 Gbps link is established.</p> <p>Blinking green. The port is transmitting or receiving packets at 1 Gbps.</p> <p>Solid amber. A valid 10 Mbps or 100 Mbps link is established.</p> <p>Blinking amber. The port is transmitting or receiving packets at 10 Mbps or 100 Mbps.</p>

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Table 2. LEDs on the front panel of model GC728X (Continued)

LED	Description
Link/ACT LED Link and activity for SFP fiber ports 25F and 26F	<p>Off. No SFP module link is established.</p> <p>Solid green. A valid 1 Gbps link is established.</p> <p>Blinking green. The SFP fiber port is transmitting or receiving packets at 1 Gbps.</p>
Link/ACT LED Link and activity for SFP+ fiber ports 27F+ and 28F+	<p>Off. No SFP+ module link is established.</p> <p>Solid amber. A valid 1 Gbps link is established.</p> <p>Blinking amber. The SFP+ fiber port is transmitting or receiving packets at 1 Gbps.</p> <p>Solid green. A valid 10 Gbps link is established.</p> <p>Blinking green. The SFP+ fiber port is transmitting or receiving packets at 10 Gbps.</p>

Table 3. LEDs on the front panel of model GC728XP

LED	Description
Cloud Connection LED	<p>Solid blue. The switch is connected to the cloud server and is set up to be managed by the NETGEAR Insight app and Insight Cloud portal.</p> <p>Off. The switch is not connected to the cloud server or is set up to be managed by the local browser interface.</p>
Power LED	<p>Solid green. The switch is powered on.</p> <p>Solid amber. The switch is starting.</p> <p>Off. Power is not supplied to the switch.</p>
PoE Max/Fault LED	<p>Off. Sufficient (more than 7W of) PoE power is available.</p> <p>Solid amber. Less than 7W of PoE power is available.</p> <p>Blinking amber. At least once during the previous two minutes, less than 7W of PoE power was available.</p>
Fan LED	<p>Solid green. The fan is operating normally.</p> <p>Solid amber. A problem occurred with the fan.</p>
RJ-45 left LED Link, speed, and activity for Ethernet ports 1 to 24	<p>Off. No link is established.</p> <p>Solid green. A valid 1 Gbps link is established.</p> <p>Blinking green. The port is transmitting or receiving packets at 1 Gbps.</p> <p>Solid amber. A valid 10 Mbps or 100 Mbps link is established.</p> <p>Blinking amber. The port is transmitting or receiving packets at 10 Mbps or 100 Mbps.</p>
RJ-45 right LED	<p>Off. The port is not delivering PoE power.</p> <p>Solid green. The port is delivering PoE power.</p> <p>Solid amber. A PoE fault occurred.</p>

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Table 3. LEDs on the front panel of model GC728XP (Continued)

LED	Description
Link/ACT LED	Off. No SFP module link is established.
Link and activity for SFP fiber ports 25F and 26F	Solid green. A valid 1 Gbps link is established. Blinking green. The SFP fiber port is transmitting or receiving packets at 1 Gbps.
Link/ACT LED	Off. No SFP+ module link is established.
Link and activity for SFP+ fiber ports 27F+ and 28F+	Solid amber. A valid 1 Gbps link is established. Blinking amber. The SFP+ fiber port is transmitting or receiving packets at 1 Gbps. Solid green. A valid 10 Gbps link is established. Blinking green. The SFP+ fiber port is transmitting or receiving packets at 10 Gbps.

Back Panel

The back panel contains a Kensington lock for an optional security cable and an AC power connector. Both models integrate an internal power supply, require AC power, and come with a power cord.



Figure 3. Back panel

Switch Hardware Interfaces

The following sections describe the hardware interfaces on the switch.

RJ-45 Ports for 10/100/1000M 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 (10 Mbps, 100 Mbps, or 1 Gbps) and duplex mode (half-duplex or full-duplex) of the attached device. All ports support a Category 5e (Cat 5e) cable (or higher-rated Ethernet cable) terminated with an 8-pin RJ-45 connector.

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.

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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.

All RJ-45 copper ports on model GC728XP support Power over Ethernet (PoE+).

SFP and SFP+ Ports for Fiber Connectivity

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

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

Table 4. Supported SFP and SFP+ transceiver modules

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
10GBASE short-reach fiber	AXM761	SFP+ transceiver 10GBASE-SR multimode
10GBASE long-range fiber	AXM762	SFP+ transceiver 10GBASE-LR single mode
10GBASE long-range fiber	AXM763	SFP+ transceiver 10GBASE-LRM multimode
10GBASE long-range fiber lite	AXM764	SFP+ transceiver 10GBASE-LR Lite single mode
10GBASE copper	AXM765	SFP+ Transceiver 10GBASE-T
10G Ethernet copper	AXC761	SFP+ DAC cable, 3 feet (1 meter)
10G Ethernet copper	AXC763	SFP+ DAC cable, 9 feet (3 meters)

For more information about NETGEAR SFP and SFP+ transceiver modules, visit netgear.com/business/products/switches/modules-accessories.

Note If you use a third-party passive direct-attach cable (DAC), the length of the cable must not exceed 16.4 feet (5 meters).

USB Port

The switch provides one USB 2.0 port that lets you upload firmware, upload or download (back up) the configuration settings file, and download a memory dump (for debugging purposes) using a USB storage device.

The USB storage 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 or VFAT file type. The NTFS file type is not supported.

Console Port

The switch provides one micro USB port for console access and debug purposes. Use this port only as directed and assisted by technical support.

Multifunction Reset Button

The switch provides a recessed multifunction **Reset** button on the back panel so that you can either restart the switch, reset the switch to the most recently saved cloud-managed configuration, or return the switch to its factory default settings, causing all custom settings to be erased. The factory default settings function of the **Reset** button is available only after you use the NETGEAR Insight app to remove the switch from your network.

▶ To restart or reset the switch or return the switch to its factory default settings:

1. Insert a device such as a straightened paper clip into the opening.
2. Do one of the following:
 - **Restart the switch.** Press the **Reset** button for about two seconds. (Do not press the button for more than five seconds!)
The switch restarts but retains its custom settings. During this process, the Power LED lights amber.
 - **Reset the switch to the most recently saved cloud-managed configuration.** Press the **Reset** button for at least five seconds.
The switch restarts and returns to the most recently saved cloud-managed configuration. During this process, the Power LED lights amber.
 - **Return the switch to its factory default settings.** After you use the NETGEAR Insight app to remove the switch from your network, press the **Reset** button for at least five seconds.
The switch restarts and returns to its factory default settings. During this process, the Power LED lights amber.

The switch is designed to provide flexibility in configuring network connections. The switch can be used as an aggregation switch in a larger network or as a backbone switch in a small office or home office network to support 10 Mbps, 100 Mbps, and 1 Gbps Ethernet and fiber routers, switches, and hubs and to support 10G high-speed devices and uplinks over fiber or copper. You can connect PoE and PoE+ devices (model GC728XP) and non-PoE devices (model GC728X and model GC728XP) directly to the switch.

This chapter includes the following sections:

- *Aggregation and Backbone Switching*
- *PoE Overview*
- *Aggregation and Backbone Switching With PoE*

Aggregation and Backbone Switching

You can use model GC728X or model GC728XP as an aggregation or backbone switch in a network that gives users high-speed access to network devices and the Internet.

In a small office or home office network, you can use the switch as a backbone switch and connect it directly to your Internet router or Internet modem. The switch can provide 10G Internet speeds only if your Internet connection supports 10G.

The following figure shows the switch functioning as an aggregation switch with an uplink to a high-speed network router, a firewall, and the Internet and connected to a high-speed storage device, routers, and network devices.

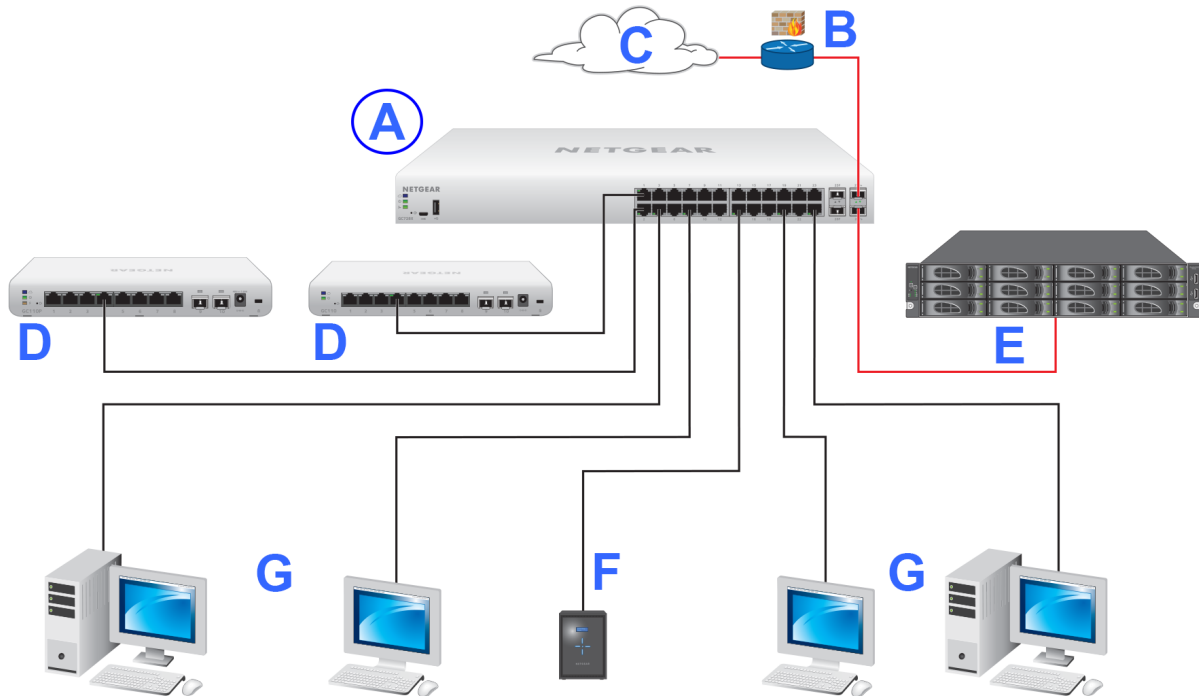


Figure 4. Sample aggregation switching

Letter	Device	Letter	Device
A	Switch model GC728X	E	10G-capable ReadyNAS
B	Network router or firewall	F	1G-capable ReadyNAS
C	Internet	G	Computers and workstations
D	Switch model GC110		
Line Color	Connection		
Red	10G connection to a network router or firewall and the Internet or 10G connection to a storage device such as a ReadyNAS		
Black	1G connections to network devices, including routers such as the GCS110 and GC110P, computers, workstations, and storage devices such as a ReadyNAS		

PoE Overview

Model GC728XP supports 24 Power over Ethernet Plus (PoE+) ports and can supply up to 30W PoE+ (IEEE 802.3at) to each port up to its total maximum PoE power budget of 390W across all active PoE+ ports. The switch is backward compatible with PoE (IEEE 802.3af).

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 24 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.

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 24 PoE+ ports to be active simultaneously when the devices correctly report their PoE class to the switch.

Using the advanced PoE controls in the NETGEAR Insight app and Insight Cloud portal, you can control how PoE power is allocated across active PoE+ ports by overriding the default or autodetected PoE power limits for individual PoE+ ports. You can also specify the exact PoE power limit per port from 3.0W to 30.0W.

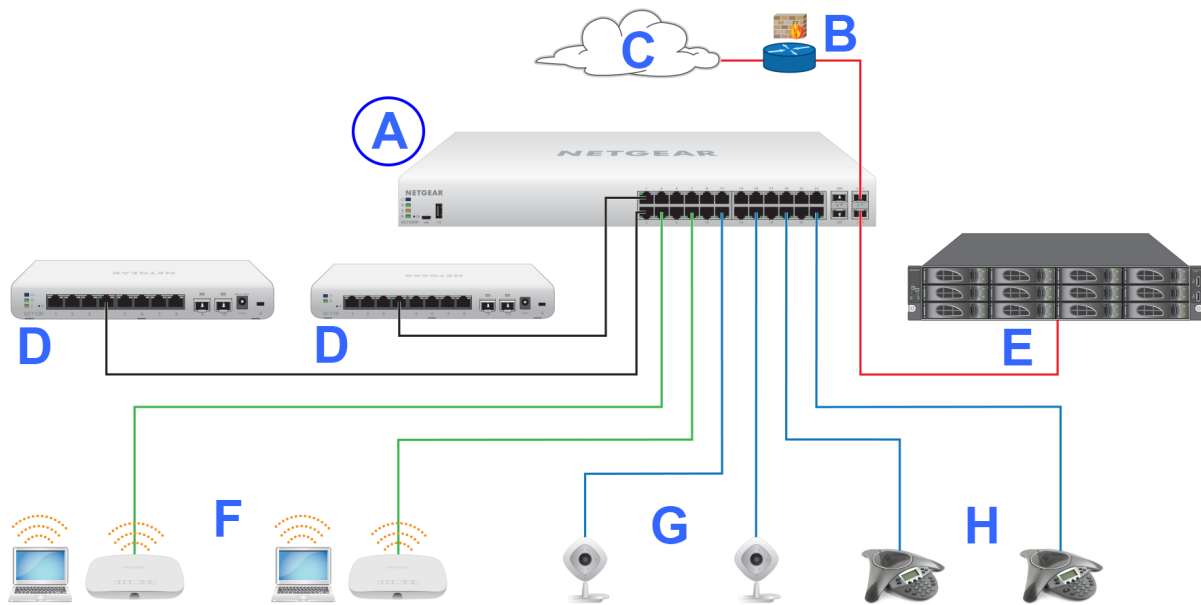
Aggregation and Backbone Switching With PoE

You can use model GC728XP as an aggregation or backbone switch that serves as power sourcing equipment (PSE) in a network that gives users high-speed access to network devices and the Internet. This model can provide PoE or PoE+ to devices such as WiFi access points, cameras, and VoIP phones.

The following figure shows the switch functioning as an aggregation switch with an uplink to a high-speed network router, a firewall, and the Internet and connected to a high-speed storage device, 1G routers, and PoE and PoE+ devices.

In a small office or home office network, you can use the switch as a backbone switch and connect it directly to your Internet router or Internet modem. The switch can provide 10G Internet speeds only if your Internet connection supports 10G.

Figure 5. Sample aggregation switching with PoE and PoE+



Letter	Device	Letter	Device
A	Switch model GC728X	E	10G-capable ReadyNAS
B	Network router or firewall	F	PoE+ WiFi access points
C	Internet	G	PoE cameras
D	Switch model GC110	H	PoE VoIP phones
Line Color	Connection		
Red	10G connection to a network router or firewall and the Internet or 10G connection to a storage device such as a ReadyNAS		
Black	1G connections to network devices, including routers such as the GCS110 and GC110P, computers, workstations, and storage devices such as a ReadyNAS		
Green	1G PoE+ connections to devices such as WiFi access points		
Blue	1G PoE connections to devices such as cameras and VoIP phones		

Applications

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 SFP Transceiver Modules*
- *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 5. Site requirements

Characteristics	Requirements
Mounting	<p>Desktop installations. Provide a flat table or shelf surface.</p> <p>Rack-mount installations. 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>Temperature. 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>Operating humidity. The maximum relative humidity of the installation location must not exceed 90 percent, noncondensing.</p> <p>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. The room or wiring closet in which you install the switch must provide adequate airflow.</p> <p>Operating conditions. 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.

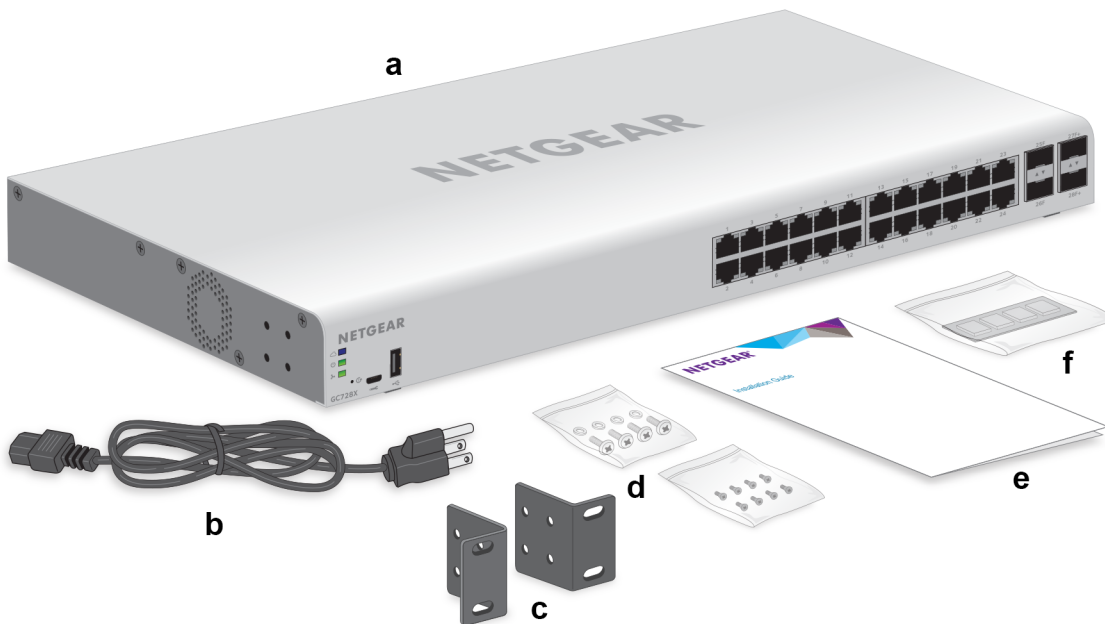


Figure 6. Switch package contents

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 model GC728X or GC728XP
 - b. Power cord (localized to the country of sale)
 - c. Rack-mounting brackets
 - d. Rack-mounting screws

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- e. Installation guide
 - f. Four rubber footpads for tabletop installation
5. If any item is missing or damaged, contact your local NETGEAR reseller for replacement.

Step 4: Install the Switch

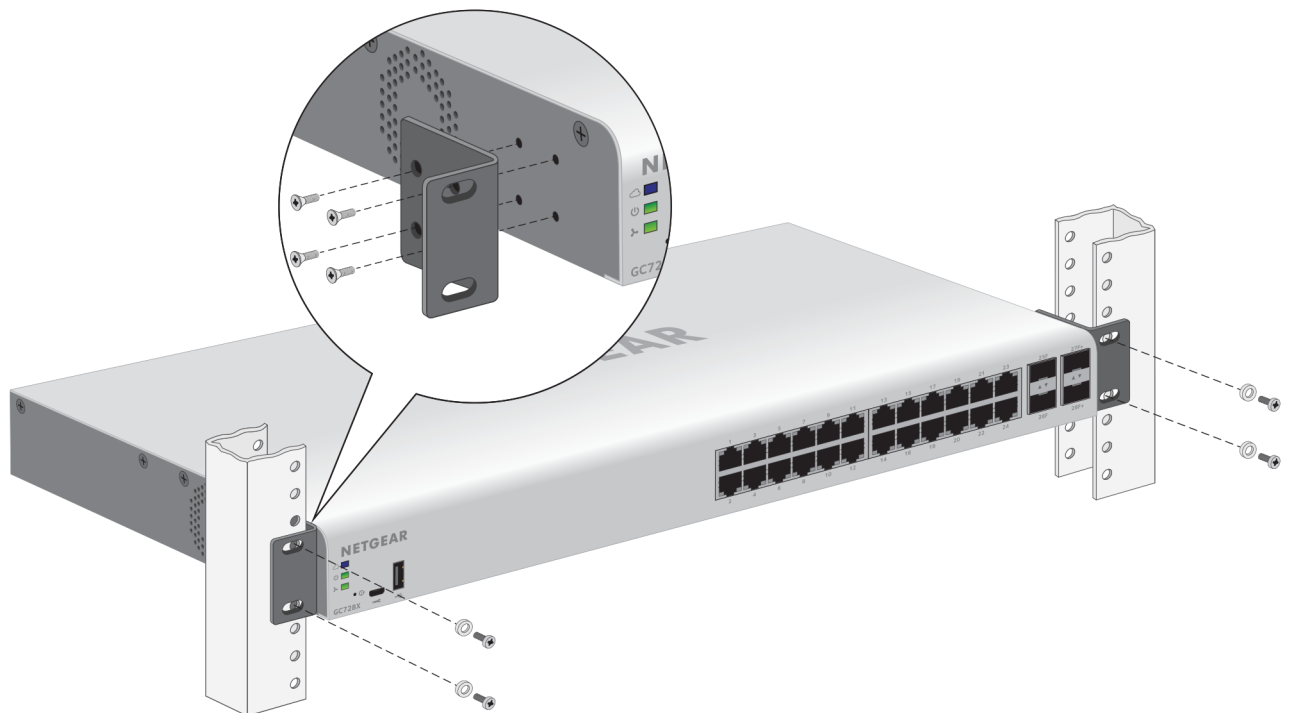
You can install the switch in a standard 19-inch (48.26-centimeter) network equipment rack or on a flat surface.

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.
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.

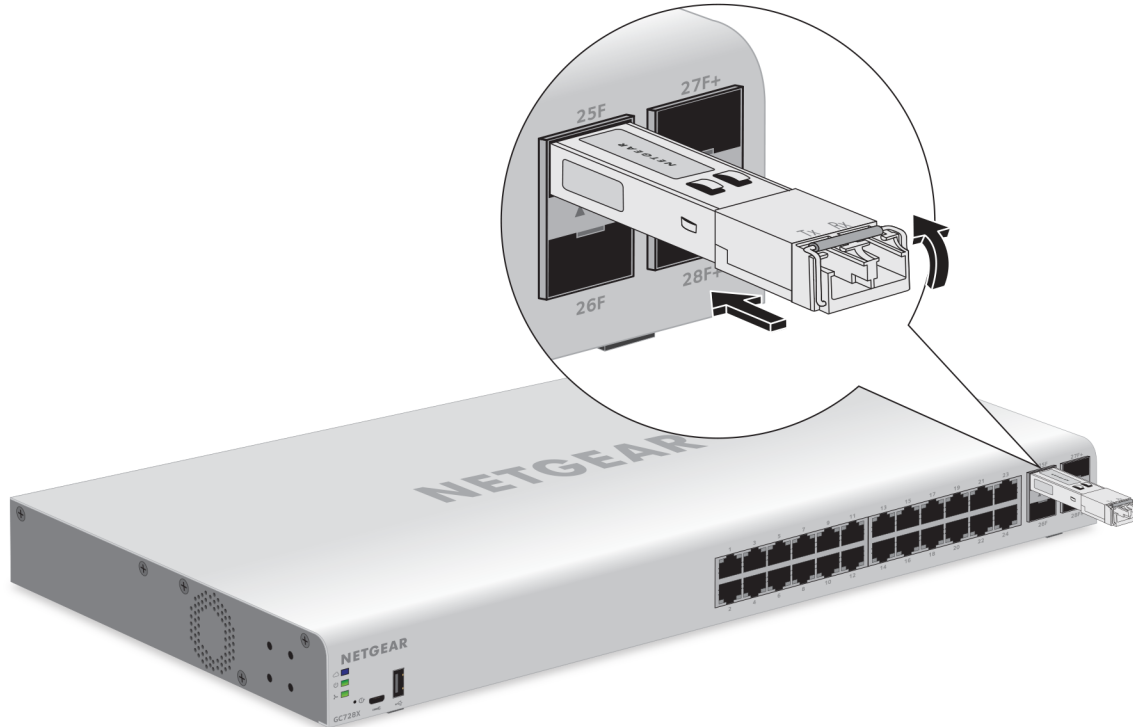
Optional Step 5: Install SFP Transceiver Modules

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

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

► 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.

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.
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.
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 switch light correctly.

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

Note After you apply power, the Power LED lights solid amber while the switch starts. After two or three minutes, the switch completes its startup process and the Power LED turns from amber to solid green.

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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

Using the NETGEAR Insight app and Insight Cloud portal, you can discover the switch on the network and add the switch to the Insight app and Insight Cloud portal so that you can perform setup, remote management, and monitoring tasks from your smartphone, tablet, or computer.

The switch is a plug-and-play device that starts switching as soon as you plug it into power and your network. You can use the switch without creating an Insight-managed topology (using the Insight app or Insight Cloud portal), but in that situation you cannot remotely monitor, manage, and troubleshoot the switch, nor receive push notifications from the switch, and the switch operates in standalone mode only, like a traditional NETGEAR Smart Managed Pro Switch.

Using the Insight app and Insight Cloud portal, as well as network-based policies and zero-touch deployment and configuration, you can configure and manage the switch, along with Insight-managed WiFi access points and NAS devices, at the network level. Also, using the Insight app or Insight Cloud portal, you can set up features such as VLANs and trunking and improve 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 Insight app or Insight Cloud portal.

For more information about Insight, visit netgear.com/insight and see the NETGEAR knowledge base articles at netgear.com/support.

For information about managing the switch without the benefits of the Insight app and Insight Cloud portal, see the user manual, which you can download from downloadcenter.netgear.com.

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

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 6. 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.
Cloud Connection LED is off.	The switch is not connected to the Internet or is not yet discovered and activated through the NETGEAR Insight app.	Make sure that the switch is connected to the Internet and that you discover and add the switch to your network by using the NETGEAR Insight app.
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 local browser 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 local browser 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 amber, 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 LED lights solid amber, a PoE fault occurred and PoE halted because of one of the conditions that are listed in the following table.

Table 7. 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 netgear.com/support.
- **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.