

NETGEAR®

Connecting with Power Over Ethernet (PoE)

*NETGEAR provides easy-to-deploy
Power over Ethernet solutions*

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Connecting with Power over Ethernet (PoE):

NETGEAR provides easy-to-deploy Power over Ethernet solutions

Power over Ethernet (PoE) has garnered significant attention as a way to cut IT costs, reduce complexity and enable greater convergence of advanced services over the IP network. Basically, PoE extends power from a Powered Source Equipment (PSE), such as a switch, to a Powered Device (PD), such as an IP phone, surveillance camera, wireless access point and other appliance. Because it can power an adverse range of devices over an Ethernet LAN cable, PoE provides flexibility, mobility and cost savings and is often a preferred option for small to medium-sized companies.

The IEEE 802.3af Standard

In 2003, the IEEE ratified the PoE standard—802.3af. The standard works by injecting direct current (DC) power over Ethernet cable wires, typically through LAN switches, and delivering three levels of power: 4, 7 or 15.4 Watts. PoE provides 48 volts of DC over two out of four available pairs on a Cat.3/Cat. 5 cable, producing a maximum current of 400 millamperes for maximum loadpower of 15.4 Watts. Data can be carried on the same cable as the power, thereby enabling use with 10Base-T, 100Base-T and even Gigabit Ethernet. Power-sourcing equipment (PSE) can detect the presence of a PD and will then inject the applicable current into the data cable. PoE+ is a new standard being developed by the IEEE 802.3 at task force to supply up to 56 Watts of power over a standard Ethernet Cat.5 cable.

PoE+ will allow new self-powered equipment to be operated over PoE, such as WiMAX transmitters, pan-tilt-zoom cameras, videophones and thin clients.

Today, businesses of all sizes are interested in using PoE to reduce the cost and hassle of connecting Power Devices to the corporate network. PoE has stimulated growth in the wireless market and has extensive application in industrial environments. PoE has inspired the creation of PoE capable devices such as video cameras, retail kiosks, point-of-sale devices, card scanners and more. To take advantage of its many uses and benefits, companies should ensure their IT infrastructure supports PoE. This can be accomplished easily by simply installing PoE capable switches.

How it works

How PoE works is simple: Power is transmitted over an RJ45 Ethernet Cable defined by the IEEE 802.3af standard (see Sidebar: The IEEE 802.3af Standard). Because it leverages existing Ethernet connections, PoE eliminates the need for adding power cables and power outlets. This provides greater deployment flexibility. For example, a wireless LAN access point can be mounted in rooms that don't have power outlets or near the ceiling or a window to provide better wireless reception. Since only a single Ethernet cable (Category 3, 4, 5 or 6) is needed, the cost of hiring electrician's to install electrical wiring and outlets in multiple locations is eliminated. Deploying an Access Point or IP phone in the middle of a warehouse or a Camera on a tower is as simple as extending an Ethernet cable to that location.

Key benefits of PoE include:

- *Cost-effectiveness:* Reduces high costs of deployment by eliminating the need for additional wiring and outlets.

- *Flexibility*: Offers freedom to install access points where it makes sense or where reception is better.
- *Reliability*: Adding a Universal Power Supply to the Power Source, IE, Switch, automatically puts the end devices on UPS backup as well.
- *Mobility*: Power can be accessed anywhere there is an Ethernet cable. Allowing the business to cost affectively expand the reach of the network.

Powered devices range in power consumption. This will dramatically change the number of PD's a switch will support. For instance, a simple IP Phone is typically either a class 1 or 2 utilizing 7 watts at the most, while a more advanced product such as a Video IP Phone will utilize up to 15.4 watts to support the extra features. This is important when selecting the PSE or switch. Use the charts below to determine what kind of switch best suits your needs.

Class	Usage	Minimum Power Levels Output at the PSE	Maximum Power Levels at the Powered Device
0	Default	15.4W	0.44 to 12.95W
1	Optional	4.0W	0.44 to 3.84W
2	Optional	7.0W	3.84 to 6.49W
3	Optional	15.4W	6.49 to 12.95W
4	Reserved for future use	Treat as Class 0	Reserved for Future Use: A class 4 signature cannot be provided by a compliant powered device

IEEE 802.3af Powered Device Classification

Switching intelligence a perfect combination with PoE

Switching intelligence at the network's edge allows for more advanced solutions, such as Voice over IP, video and wireless. While PoE allows users to attach PD's like VoIP phones, IP cameras, wireless access points and other devices to the network is necessary, it is also to have an intelligent switch with the following advanced features:

- Quality of Service (QoS): QoS is a technology that allows for traffic prioritization.

An example is allowing VoIP traffic higher priority than HTTP traffic.

- Virtual LANs (VLANs): VLANs are a function of separating traffic on a switch. An example of this is putting all the VoIP traffic on one VLAN and HTTP traffic on a separate VLAN. This helps to isolate various types of traffic, which enhances application performance.
- Rate limiting: Rate Limiting is the ability to put a virtual cap on the amount of traffic that can be used on a specific port. This can be applied to traffic coming into the port (ingress traffic) or leaving the port (egress traffic).
- Multicast support: Multicast is important for video-based applications that allows for certain ports or applications to join a video stream, such as IP Television (IPTV). This way the IPTV traffic does not flood the network and caters only to those applications requesting to view the IPTV stream.
- Security: There are different levels of security- best practices, port security and access security. Examples of these are blocking unwanted traffic, separating unwanted traffic using virtual LANs, applying enhanced authentication for users and devices, or simply disabling unused ports.
- Enhanced management: Enhanced management on the switch allows the switch administrator to control all these features, monitor the switch, and in collect valuable information such as which the current PoE utilization.

NETGEAR ProSafe switch product line offers three switch families with a wide range of functionality and features sets as well as a full wireless solution. These product lines are the ProSafe Unmanaged Switches, ProSafe Smart switches with web management, and the ProSafe Managed Switches with full management features console access and command line interface (CLI) support. All NETGEAR ProSafe products are supported by NETGEAR's lifetime warranty. For more information on NETGEAR products and lifetime warranty please visit <http://www.NETGEAR.com>.

PoE Support in High-Performance NETGEAR ProSafe™ Products

NETGEAR ProSafe™ Product line consists of switches that offer power as well as access points that are powered devices. The ProSafe switches consist of three product categories that supply PoE. These families are the ProSafe Unmanaged switches, ProSafe Smart switches, and ProSafe Managed switches. NETGEAR also offers a line of ProSafe wireless products that are PoE-enabled. The wireless products consist of the ProSafe Wireless Controller, and ProSafe Access Points. NETGEAR's portfolio empowers customers with a full breadth of product options for virtually any type of IP-based PoE deployment, ranging from VoIP to retail based card scanners and surveillance cameras.

ProSafe Unmanaged Switches with PoE

The FS108P and FS116P ProSafe Desktop Switches with PoE provide 8 and 16

10/100 ports respectively. The FS108P with four PoE ports and the FS116P with eight PoE ports can power IEEE 802.3af-compliant IP-based devices such as wireless access points, Voice-over-IP (VoIP) telephones, surveillance cameras, and card scanners, while maintaining connectivity to standard 10/100 Mbps devices. Easy to install and use, these desktop PoE switches can provide power for up to four ProSafe Access Points, enabling the flexibility to place these access points high on walls or in ceilings where AC power is difficult to access.

ProSafe Smart Switches with PoE

The NETGEAR ProSafe Smart switch family offers more in-depth features and functionality. This line of products is an example of NETGEAR's innovation and leadership in the networking market. The term smart refers to switches that are managed with a web based Graphic User Interface (GUI). Web GUI allows the administrator to log into the switch and configure advanced features, such as PoE, VLANs, and QoS. Designed to support the needs of growing SMB and mid-market companies, the ProSafe Smart Switches consist of the following line of products. The ProSafe Fast Ethernet Smart Switches with PoE are the FS726TP, FS728TP and the FS752TPS with 24 port and 48 ports. The ProSafe Gigabit Ethernet switches with PoE are the GS724TP and the GS748TP. Please use Figure 3 below to view PoE Power Budget to assist in number of PoE PD's these switches support.



Figure 1. GS748TP ProSafe™ 48-port GE PoE Smart Switch

ProSafe Managed Switches with PoE

NETGEAR's ProSafe Managed Switches are fully managed switches. These switches are designed for deployments requiring more advanced features and functionality. This includes Layer 3 routing, Command Line Interface (CLI) and web GUI access, as well as full features and functionality including advanced QoS, VLANs, multicast support and security. The ProSafe Managed switch family with PoE support include the Fast Ethernet FSM7352PS ProSafe 48 Port 10/100 Managed Stackable switch, the FSM7328PS ProSafe 24 Port 10/100 Managed Stackable switch, and the FSM7326P ProSafe 24 Port 10/100 Managed switch. All switches support both Layer 3 and Layer 2 networking. Use Figure 3 to view PoE Power Budget to determine the number of PoE PD's these switches support.



Figure 2. FSM7352PS ProSafe™ 48-Port 10/100 L3 Managed Stackable Switch

NETGEAR has an extensive portfolio of PoE capable switches for different PoE deployment scenarios. The product portfolio ranges from unmanaged to fully managed layer 3 switches with PoE. The chart below lists components of the NETGEAR ProSafe PSE product family. Businesses can choose from a 4-port unmanaged PoE switch to a fully managed layer 3 48-port switch with full PoE support.

Figure 3. NETGEAR ProSafe Powered Source Equipment (PSE) list:

		Max Available PoE ports by PoE class				
	Product	Port POE Allocation	Port Budget	Class 1 4.0 Watts	Class 2 7.0Watts	Class 0/3 15.4Watts
ProSafe™ Unmanaged switch	FS108P ProSafe™ 8 port FE switch with 4 PoE Port Support	4 Ports	32 Watts	4 Ports	4 Ports	2 Ports
	FS116P ProSafe™ 16 Port FE Desktop Switch with 8 PoE Port Support	8 Ports	55 Watts	8 Ports	7 Ports	3 Ports
ProSafe™ Smart Fast Ethernet	FS726TP ProSafe™ 24 Port FE Smart Switch with 2 GE Uplink Ports and 12 PoE Port Support	12 Ports	100 Watts	12 Ports	12 Ports	6 Ports
	FS728TP ProSafe™ 24 Port FE Smart Switch with 4 GE Uplink Ports and 24 PoE Port Support	24 Ports	195 Watts	24 Ports	24 Ports	12 Ports
	FS752TPS ProSafe™ 48 Port 10/100 Stackable Smart Switch with 4 GE Uplink ports and 24 PoE Port Support	24 Ports	180 Watts	24 Ports	24 Ports	11 Ports
ProSafe™ Smart Gigabit	GS724TP ProSafe™ 24 Port GE Smart Switch with 4 GE Uplink Ports and 24 PoE Port Support	24 Ports	192 Watts	24 Ports	24 Ports	12 Ports

Max Available PoE ports by PoE class

	Product	Port POE Allocation	Port Budget	Class 1 4.0 Watts	Class 2 7.0Watts	Class 0/3 15.4Watts
ProSafe™ Smart Gigabit	GS748TP ProSafe™ 48 Port GE Smart Switch with 4 GE Uplink Ports and 48 PoE Port Support	48 Ports	384 Watts	48 Ports	48 Ports	24 Ports
ProSafe™ Managed Fast Ethernet	FSM7352PS ProSafe™ 48 Port FE L3 Managed Stackable Switch with 4 GE Uplink Ports and 48 PoE port Support	48 Ports	440 Watts	48 Ports	48 Ports	28 Ports
	FSM7328PS ProSafe™ 24 Port FE L3 Managed Stackable Switch with 4 GE Uplink Ports and 24 PoE Port Support	24 Ports	180 Watts	24 Ports	24 Ports	11 Ports
	FSM7326P ProSafe™ 24 Port FE L3 Managed Switch with 2 GE Uplink Ports and 24 PoE Port Support	24 Ports	170 Watts	24 Ports	24 Ports	11 Ports
ProSafe™ Smart Wireless Controller	WFS709TP ProSafe™ 8 Port FE Wireless Controller with 1 GE Uplink Port and 8 PoE Port Support	8 Ports	100 Watts	8 Ports	8 Ports	6 Ports

ProSafe Wireless Solutions

The NETGEAR ProSafe Wireless solution consists of centralized wireless management as well as traditional individually managed Wireless Access Points (WAP or AP). Traditional WAP include three models all of which are PoE Powered Devices: the WG102, WG302 and WAG102. These value-packed access points support the demanding networking requirements of growing businesses and are easy to deploy in even the most challenging office environments. For a centralized management solution, NETGEAR offers the ProSafe Wireless Smart Controller the WFS709TP. The ProSafe WFS709TP is a powerful tool that allows businesses to

deploy complex wireless networks easily and quickly. With Aruba based technology such as IntelliFi RF management, The NETGEAR ProSafe Smart Wireless Controller makes complex tasks such as RF planning, wireless management, and Voice over Wifi roaming easy. With support of up to 256 users and 16 access points the Smart Wireless Controller and the ability to manage up to 48 access points in a master/local deployment, it is a very scalable solution great investment protection and administrative cost savings. The ProSafe WFS709TP can also be deployed in a redundant mode supporting up to 32 access points for high availability. There are two AP's that are supported by the WFS709TP the WGL102 and the WAGL102. For more information on the NETGEAR ProSafe wireless solutions please visit <http://www.NETGEAR.com>.

Access points

Figure 5: NETGEAR ProSafe Powered Device (PD) list:

NETGEAR Powered Devices

Product	802.3af PoE Class	Actual Power Consumption
WAG102 ProSafe™ Dual Band Wireless Access Point	Class 3	8.5 Watts
WG102 Prosafe™ 802.11g Wireless Access Point	Class 2	4.3 Watts
WG302 ProSafe™ 802.11g Wireless Access Point	Class 2	5 Watts
WGL102* ProSafe™ 802.11g Light Wireless Access Point	Class 2	5 Watts
WAGL102* ProSafe™ Dual Band Light Wireless Access Point	Class 3	8.5 Watts

* Light Access Points can only be used with the Wireless Smart Controller

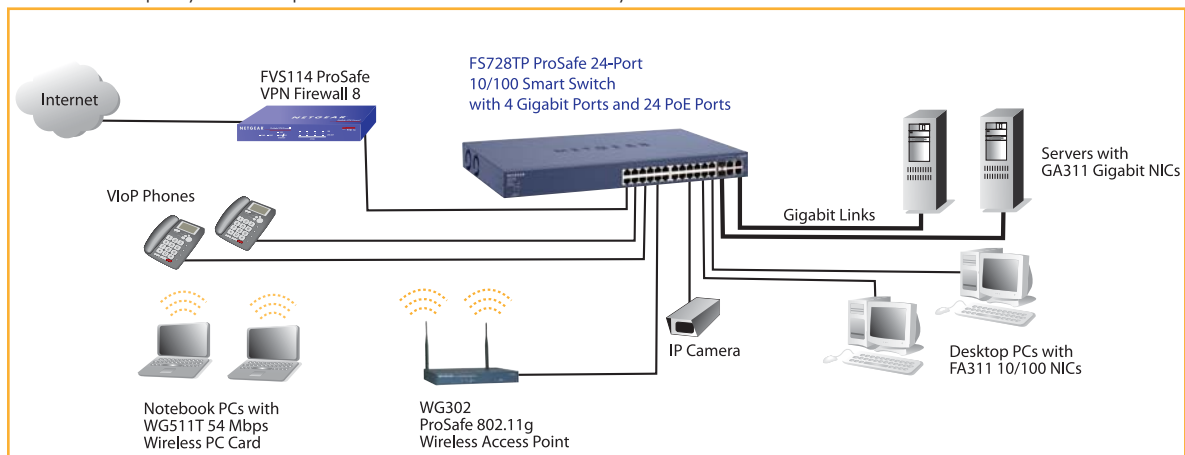
Key Features/Benefits

- Optimized installation and power management of IEEE 802.3af standard-based network devices.
- Comprehensive set of Layer 3 in Layer 3 managed switches enhance data net working and enable new network applications such as voice and video.
- Multiple VLAN support, wire speed routing to off load expensive routers, resiliency, and redundancy.

- Built-in Gigabit Ethernet ports for fast connections to servers over a Gigabit-speed backbone, and combo interfaces for greater flexibility.
- Web-based Smart management features such as performance monitoring, port configuration, VLAN, port trunking, and Class of Service (CoS).
- Optimized for ProSafe Network Management Software (NMS100).
- Robust security features, including 802.1x port-based authentication and access control lists; Secure Sockets Layer (SSLv3) for the Web GUI; and Secured Shell (SSH) for command-line sessions.
- Stackability for easy management and administration.

PoE—A business-enabling technology

Enabling PoE in your network will be an essential business tool moving forward as more and more devices are used to access the network from multiple, increasingly diverse and sometimes remote locations. NETGEAR's ProSafe switches with PoE support offer flexible, scalable, high-performance solutions for delivering maximum throughput and flexible deployment options when and where you need them.



For more information on NETGEAR PoE product offerings, please visit <http://www.NETGEAR.com>



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