atop Technologies

How to Take Advantage from Power over Ethernet

Benefits of using PoE

With device numbers surpassing the human population, Internet of Things (IoT) has long ceased being a concept or even a goal—it is the reality, while still growing rapidly. Networked devices are usually electronic. So Power over Ethernet (PoE), which uses the same cable to send both electric power and data to connected devices, is a very useful tool in IoT. Benefits of PoE include:

Simple installation: By eliminating dedicated power cables, wiring is greatly simplified for faster, easier system installation.

Spatial efficiency: Likewise, cleaner system architecture allows for more efficient space utilization, especially in manufacturing and automation plants, where every surface may have various potential uses.

Cost savings: PoE reduces the need for up to half the total cabling, as well as electrical equipment such as outlets and extension cords. A single line may not seem expensive, but in sites where the connection distance is long or the number of devices is great, costs can add up.

Flexibility: Less cabling also means less restrictions. Wherever a data cable can extend to, so can a PoE device. Furthermore, adding new devices to the network is virtually painless—just plug in to the PoE port, no electrical work required.

PoE standards and applications

Over the years, the Institute of Electrical and Electronic Engineers (IEEE) released different standards for PoE supply according to the power budget provided per port. Most ATOP PoE ports support both Type 1 and Type 2, so can power advanced end-devices such as pan-tilt-zoom (PTZ) cameras, video phones, LCD displays, wireless access points (APs) and routers with more than 2 antennas, as well as simpler devices like sensors and meters. The relatively new PoE++ types, defined by IEEE 802.3bt-2018, are often used for commercial applications like point of sale (PoS) systems or smart buildings, and are currently less common for industrial applications.

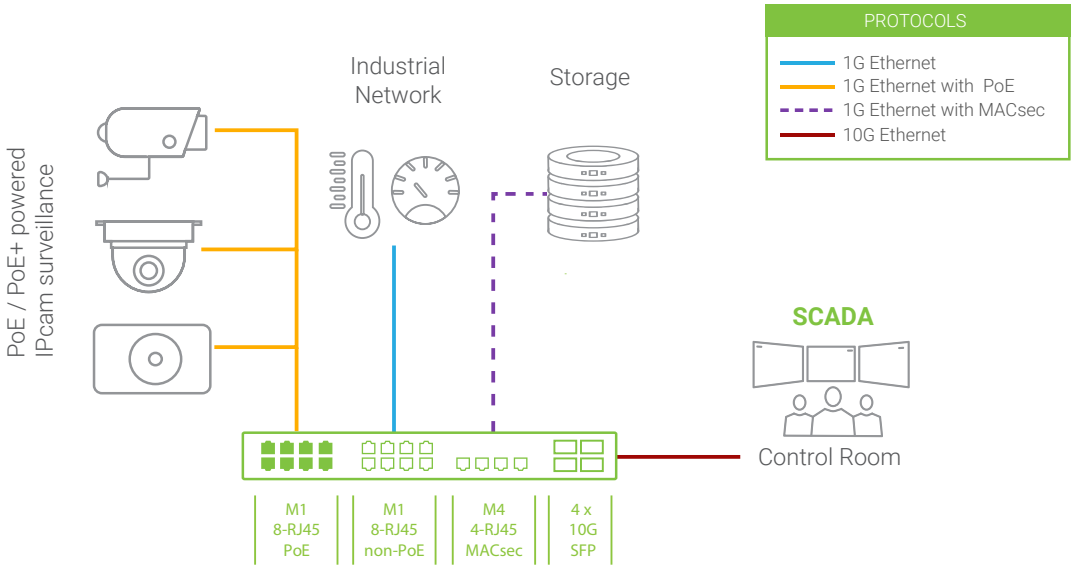
Type	IEEE Standard	Power budget up to (W/port)	Common applications
Type 1 "PoE"	802.3af	15.4	Sensors, meters, simple IP cameras, IP phones, wireless routers & APs
Type 2 "PoE+"	802.3at	30	PTZ cameras, video phones, alarms, advanced wireless routers & APs, LCD displays
Type 3/ Type 4 "PoE++"	802.3bt	60/90	Lighting, PoS systems, laptops, video conferencing equipment

ATOP PoE PSE

Devices that supply power to others through Ethernet cables are known as PoE power sourcing equipment (PSE), and are often network switches. Examples include ATOP EHG76XX series, RHG7528 and RHG7628 series. For factories and industrial sites, PoE is most useful in reducing the cabling for large numbers of sensors in harsh environments or at long distances from controllers, so the high port density and rugged exteriors of these switches are most desirable features.

Model (image)		Description	Data ports	PoE ports	Housing
	EHG7612	High-Bandwidth Industrial Managed Layer-3 Gigabit PoE Switch	8 GbE; 4 1/10 GbE uplinks	Up to 8 PoE/ PoE+	IP30 metal
	EHG7616	High-Bandwidth Industrial Managed Layer-3 Gigabit PoE Switch	12 GbE; 4 1/10 GbE uplinks	Up to 8 PoE/ PoE+	IP30 metal
	EHG7620	High-Bandwidth Industrial Managed Layer-3 Gigabit PoE Switch	16 GbE; 4 1/10 GbE uplinks	Up to 8 PoE/ PoE+	IP30 metal
	RHG7528	Industrial Rack-Mount Managed Layer-2 Modular Gigabit PoE Switch	Up to 24 GbE; 4 1/10 GbE uplinks	Up to 24 PoE/ PoE+	Modular
	RHG7628	Industrial Rack-Mount Managed Layer-3 Modular Gigabit PoE Switch	Up to 24 GbE; 4 1/10 GbE uplinks	Up to 24 PoE/ PoE+	Modular

The RHG7528 and RHG7628 series are particularly interesting with their modular design allowing easy customization of features. In this example, a PoE module, a non-PoE module, and a MACsec secured module supply different uses on a single device: the regular non-PoE ports control process equipment, the PoE ports connect surveillance systems, the secure ports transmit to databases, and the built-in 10G uplinks help process the large amounts of data consolidated from the whole network.



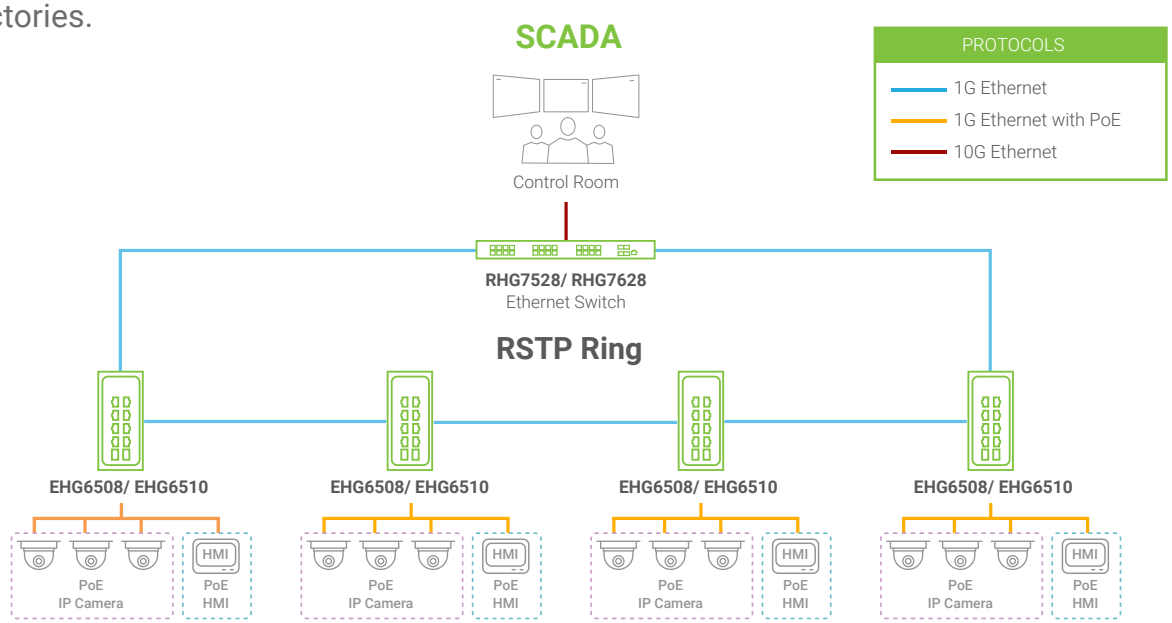
RHG7628(with one 8-PoE module)

ATOP PoE booster

Type 1 PoE, with the lowest voltage requirement, is supplied with 44-57 V power, while the other types need 50- or 52-57 V. Many factories, however, have 24 V power lines for safety and for standardization reasons. So, in order to apply PoE PSEs, the site has three options: A) bring in a dedicated power line with higher voltage, B) connect an additional voltage booster to supply the PSE itself, or C) choose ATOP EHG64XX or EHG65XX series, which offer an integrated PoE booster that utilizes as low as 12 V input power. Considering costs and spatial efficiency, the winning choice is clear. Why add more components when you can have their functions combined in one?

Model (image)		Description	Power source	Housing
	EHG6408	Industrial Unmanaged PoE Gigabit Switch with Voltage Booster	12-57 VDC	Up to 8 PoE/PoE+
	EHG6410	Industrial Unmanaged PoE Gigabit Switch with Voltage Booster	12-57 VDC	Up to 8 PoE/PoE+
	EHG6508	Industrial Lite-Managed PoE Gigabit Switch with Voltage Booster	12-57 VDC	Up to 8 manageable PoE/PoE+
	EHG6510	Industrial Lite-Managed PoE Gigabit Switch with Voltage Booster	12-57 VDC	Up to 8 manageable PoE/PoE+

The EHG65XX series is capable of powering multiple devices while facilitating their data flow up to SCADA or higher storage and analysis centers. Furthermore, it supports RSTP ring topologies that enable self-healing in case of any link failure, which is a critical issue when vast amounts of devices are connected. Used in conjunction with RHG7528 or RHG7628, it offers a simple yet reliable solution for smart cities and factories.

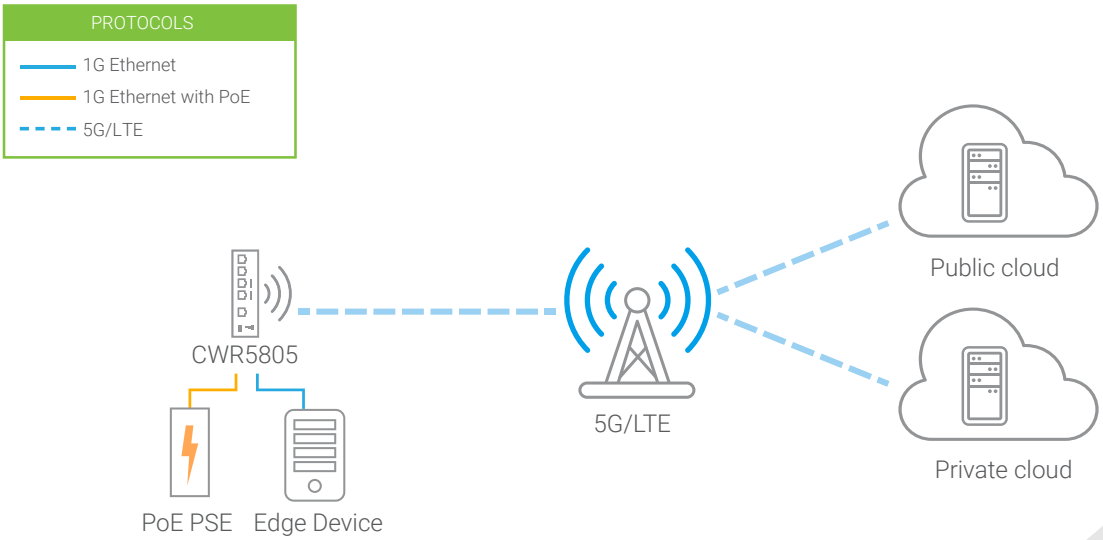


ATOP PoE PD

A device that utilizes PoE is called a PoE powered device (PD). Wireless networking devices are common PDs, and utilize Type 1 or Type 2 PoE depending on its complexity. The ATOP CWR5805 5G-NR/Wi-Fi Mesh Router supports PoE both as an alternate or redundant power source. This means that it can be used either in a traditional site where DC power is already available, in an economized site where cabling is conserved, or connected to both power types for backup in case of one's unexpected failure. In short, it retains flexibility and resilience for any scenario.

Model (image)		Description	Antennas	Power source
	CWR5805	Industrial 5G-NR & Wi-Fi Mesh Router	2 or 4 Cellular; 2 Wi-Fi	DC 12-48 V; 802.3at Mode A

CWR5805 is developed specifically with IoT in mind. It links edge and end devices through its LAN ports or Wi-Fi to cloud storage through wired or cellular means. Redundancy is the key word here: In addition to the multiple connectivity choices on either side, Wi-Fi Mesh and dual SIM auto-switch ensure stable data transfer even when a connection node is down, just as the way power backup is achieved with PoE and DC.



ATOP PoE management

Some PoE PD, such as wireless APs, are necessary only within a site's operating hours, while others, like surveillance cameras, work during off-hours. Even in factories that run 7/24, specific processes may occur only for certain work shifts. Powering off equipment when not in use is a straightforward way to conserve resources and to avoid unnecessary costs, but to regularly unplug or shut down devices is hardly practical in an automated site. The ATOP EHG75XX series as a PSE offers built-in **scheduling** functions, allowing automatic power on/off of connected devices at set times by a simple interface configuration. Use this feature to economize as well as to achieve greener, more sustainable operations with ease.

Another useful PoE management feature is **ping reset**. PoE is often applied in remote areas or harsh environments, and imagine a camera on site that gets stuck. A quick reboot will sort out the problem, but unfortunately no one can run over to turn the camera off and on. Should you disconnect and reconnect the PSE cable, then? No—the EHG75XX detects the fault on its own, and resets the port automatically. The goal of PoE is to streamline systems and work, so we make sure that our solutions address real needs of real users.

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All-round solutions for industrial PoE

Electricity and data connection, each a novelty in its time, are now essentials for daily life and industries alike. Combining their distribution is therefore a logical means to simplify systems and to reduce costs. PoE is especially beneficial for industrial systems which are widespread or in harsh environments, and for these scenarios, the device robustness and supporting features are important as well.

ATOP PoE devices are ruggedized to operate under severe conditions, while flexible for your specific applications. High bandwidth and redundancy ensure fast, reliable connections. Let our experts help you plan and choose what you need to create an integrated, total solution.

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