Choosing the right Power Sourcing Equipment

Security Cameras and Wireless Access Points (WAPs) are often installed in locations where electrical wiring and outlets do not exist, such as exterior walls, ceilings, light posts, pipelines, and kiosks. Hiring an electrician to hard wire electrical outlets in these hard to reach locations may not be a feasible cost-effective option. A PoE Injector provides the ideal solution by serving as the Power Sourcing Equipment (PSE) for attached Powered Devices (PDs). The PSE provides the power and the PD accepts the power. Over time, the need to connect power-hungry IoT devices, like pan-tilt-zoom (PTZ) security cameras with heaters, LED lighting in building management, and 802.11ax/ac wireless access points have driven the IEEE to introduce new standards to provide higher wattage levels and support more types of PDs.

As devices that require power (PDs) are upgraded, it is important to ensure the Power Source Equipment (PSE) that you choose will not need to be replaced. So, here are some things to consider:

Don't get trapped by custom solutions:

Some PoE vendors use their own proprietary protocol for power over Ethernet. If you choose a product from a vendor that has a proprietary PoE implementation, that product will not be able to work with any other vendor product on the network as their devices are incompatible with the industry at large. To ensure interoperability, only choose products that comply with the IEEE PoE standards.

IEEE PoE standards have backward compatibility:

There are three IEEE PoE standards -- 802.3af, 802.3at, and 802.3bt. It is critical to select both PD's and PSE's that are in full compliance with these standards to protect your equipment from damage, maintain network availability, and ensure interoperability between products and vendors. And, while a PSE with an older standard might meet your needs today, it may be in your best interest to think long term. The latest standard, IEEE 802.3bt, is fully backward compatible with the older IEEE 802.3af PoE and IEEE 802.3at PoE+ standards. **Because all PD's are supported under 802.3bt, the need to replace the PSE as PDs are updated is eliminated ... if you choose an 802.3bt compliant PSE.**

IEEE PoE Specifications for Cat5e @100m								
Standard / Type	**802.3af Type 1**			**802.3at Type 2**	**802.3bt Type 3**		**802.3bt Type 4**	
Name / Year	PoE / 2003			PoE+ / 2009	Hi-PoE / 2018		Hi-PoE / 2018	
PSE Input Voltage (Min)	44V/50V				50V		52V	
Supported PD Class	1	2	3	4	5	6	7	8
PSE Output Power to Single-Signature PD	4W	6.7W	14W	30W	45W	60W	75W	90W - 100W
Single-Signature PD Input Power (Min)	3.84W	6.49W	13W	25.5W	40W	51W	62W	71.3W
PSE Output Power to Dual-Signature PD (per pairset)	4W	6.7W	14W	30W	45W	--	--	--
Dual-Signature PD Input Power (pairset / total)	3.84W / 7.68W	6.49W / 12.98W	13W / 26W	25.5W / 51W	35.6W / 71.2W	--	--	--
Ethernet Pairs	2-Pair			2-Pair or 4-Pair	4-Pair			

802.3bt Type 3 vs Type 4:

Many PSE claiming 802.3bt only provide up to 60 watts PoE. This means that they can only work with Type 1, 2, & 3 PDs in classes 1 thru 6. A fully 802.3bt compliant PSE can provide up to 100 watts PoE. This means with will work with Type 1, 2, 3, & 4 PDs in classes 1 thru 8.

Single-signature and Dual-signature:

802.3bt introduced two new PD topologies -- single-signature and dual-signature. Single-signature PDs share the same detection signature, classification signature, and maintain power signature between both pair sets. This is usually used with single load applications. Dual-signature PDs have independent detection signatures, classification signatures, and maintain power signatures on each pair set. This is ideal for multi-load applications, like a surveillance camera with a heater. Today, deployments of dual-signature PDs allow for 51W to be delivered at the PD. However, newer PD deployments are likely to use single-signature PDs to save on overall product cost and take advantage of the higher 71W power availability. It will be important to determine if the PSE you choose supports single-signature PDs, dual-signature PDs, or both when planning a deployment. **An 802.3bt compliant PSE will support both and will not need to be replaced as PDs are updated.**

PSE Maximal Power Supply:

The more power you have, the more you can deliver per port. Therefore, choosing a PSE that can deliver total higher Wattage reduces your chances of needing an upgrade at a later date. If the maximal power supply of all your PDs exceeds your PSE power cap, then the PSE will not provide enough power for all your PDs. Insufficient power supply to the PD is a common culprit for video loss and IP camera poor performance.

PD Power Reset:

It is important that the PSE supports the capability to reboot the PD remotely. Many times a simple PD power reset from the PSE will save the technician a trip to the PD location, which may be very difficult to access.

PoE Switch vs PoE Media Converter vs PoE Ethernet Extender vs PoE Injector:

The number of devices that you need to connect and your network environment will largely define the type of PSE you choose. If you need to connect multiple PD's a PoE Switch can provide up to 100 Watts PoE to multiple attached devices while offering complete managed or unmanaged switch capabilities. The main differences between an unmanaged and managed PoE switch lie in functionality, configurability, and of course, the price tag. An unmanaged PoE switch is cheaper and plug-and-play with no setup required. A managed PoE switch allows you to configure networking protocols and features such as VLANs, IGMP Snooping, QoS, and more.

But what about scenarios where you have remote devices that need to receive power and data beyond the 100 meter reach of copper? PoE Media Converters function as a fiber to copper Ethernet converter with a built-in PoE Injector. These PSEs provide up to 100 Watts PoE to two attached devices while linking copper Ethernet networks to fiber cables such as multimode, single mode, or single strand fiber. If fiber cabling is unavailable or cost-prohibitive, Ethernet Extenders are the perfect solution. These PSEs provide up to 30 Watts PoE to one or four attached devices while transmitting Ethernet data over Coax or any 2-wire 24 AWG twisted pair up to 1.9 Miles (3km).

However, if you only need to connect one PD at a maximum distance of 100 meters, and you do not already have a PoE Switch, a PoE Mid-Span Injector may be the quickest, most efficient, and cost-effective way to add PoE capability to a regular non-PoE network link.

Perle supplies a range of 802.3bt compliant solutions that can provide up to 100 watts PoE to both Single-signature and Dual-signature PDs. Investments in Perle PSEs are protected as they will not need to be replaced when the PD is updated.

Perle PoE Injector Options

Industrial PoE Switches

Network switches with a built-in PoE Injector. These PSEs provide up to 100 Watts PoE to multiple attached devices while offering complete managed or unmanaged switch capabilities.

- Up to 8 x 10/100/1000 Ethernet Ports
- Provide 4 to 100 Watts of PoE power
- 802.3bt, 802.3at, and 802.3af compliant
- Support PDs Class 1 to 8 & Type 1, 2, 3, and 4
- Support for Single-signature or Dual-signature PDs
- Isolated power and Ethernet lines
- Operating temperatures from -40C to +75C
- Industrial safety certification and approval for hazardous locations

PoE Media Converters

Fiber to copper Ethernet converter with a built-in PoE Injector. These PSEs provide up to 100 Watts PoE to two attached devices while linking copper Ethernet networks to fiber cables such as multimode, single mode, or single strand fiber.

- Up to 2 x 10/100/1000 Ethernet Ports
- Provide 4 to 100 Watts of PoE power
- 802.3bt, 802.3at, and 802.3af compliant
- Support PDs Class 1 to 8 & Type 1, 2, 3, and 4
- Support for Single-signature or Dual-signature PDs
- Operating temperatures from -40C to +75C

PoE Ethernet Extenders

Ethernet Extenders with a built-in PoE Injector. These PSEs provide up to 30 Watts PoE to one or four attached devices while transmitting Ethernet data over Coax or any 2-wire 24 AWG twisted pair up to 1.9 Miles (3km).

- Up to 4 10/100/1000 Ethernet Ports
- Provide 4 to 30 Watts of PoE power
- 802.3at and 802.3af compliant
- Support PDs Class 1 to 4 & Type 1 and 2
- Reboot remote PoE devices
- Also operates as a PoE Powered Device
- Operating temperatures from -40C to +75C

PoE Mid-Span Injectors

Add PoE capability to regular non-PoE network links. These plug-and-play PSEs provide up to 60 Watts PoE to an attached device while simultaneously transmitting and receiving data.

- 1 x 10/100/1000 Mbps Ethernet Port
- Provide 4 to 60 Watts of PoE power
- 802.3bt, 802.3at, and 802.3af compliant
- Support PDs Class 1 to 6 & Type 1, 2 and 3
- Operating temperatures from -40C to +75C