

A Background on Power Over Ethernet (PoE & PoE+)

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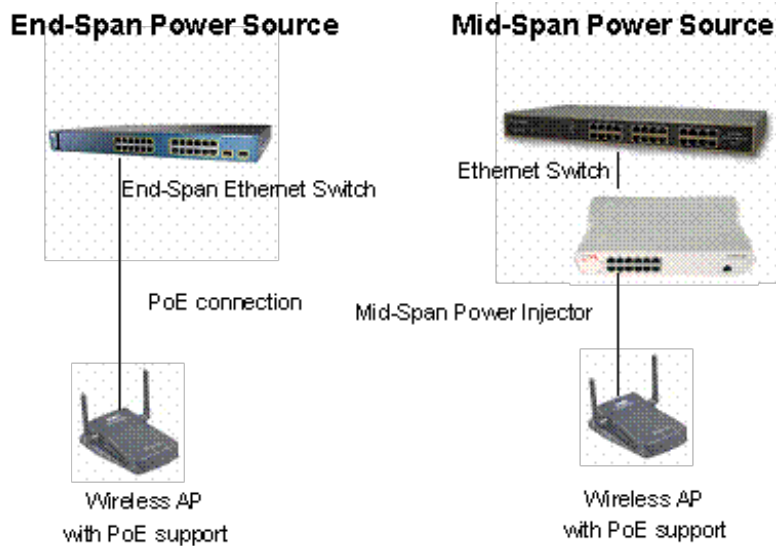
PoE Injectors, PoE Device Servers, PoE Media Converters, PoE Ethernet Extenders & PoE DIN Rail Switches

Similar to the way the wire pair that carries your POTS (Plain Old Telephone System) telephone signal into your house provides sufficient power for the headset, dial, and ringer systems for your telephone, PoE delivers DC power over standard Ethernet cabling (CAT5 and better). This is enough to power a growing number of commonly-used devices, as well as IT equipment. Such devices include VoIP phones, security cameras, wireless access points, remote POS kiosks, device servers and Ethernet Extenders.

Power over Ethernet (PoE) has been around for a number of years with proprietary, and often non-interoperable, implementations from various vendors to power devices. In June 2003, the IEEE ratified its 802.3af Power over Ethernet standard which spurred standard-compliant 802.3af products. In 2009, the IEEE ratified the 802.3at PoE Standard, commonly known as PoE+. Using these standards, organizations deploy equipment in locations that are difficult or too costly to have separate AC power installed -- such as ceilings, walls and kiosks.

PoE, sometimes referred to as “inline power”, significantly reduces the number of wires that must be strung to install a network. Additional advantages include greater flexibility for the location of installed equipment, less downtime and lower wiring and power costs.

There are two main types of devices used in a PoE environment -- the Power Source Equipment (PSE) and the Powered Device (PD). The PSE provides the power and the PD accepts the power. A PoE PSE provides a maximum of 15.4 watts of power at 48vDC. A PoE+ PSE provides a maximum of 30 watts of power at 48vDC. A PD can have a maximum input power requirement of 12.95 watts. This accounts for degradation of power over the cable. Four pair cable is required by the 802.3af standard. CAT5 cable has four twisted pairs, however, only two of the pairs are used for data. The 802.3af specification allows for either the spare pairs or the data pairs to be used to carry the power.



Power is “injected“ into the cabling at the wire-closet side. This can be done through “end-span“ LAN/WAN switches which incorporate power supply circuitry. Alternatively, if you don't want to replace existing LAN switches, or only want to power some segments, “mid-span“ power patch panels or injectors can be connected in-between the switch and the Powered Device (PD). The end PDs have to support PoE. Many PoE switches are also capable of power management so that PoE devices connected to it can actually be power cycled. This is ideal for remote management applications where IT equipment such as servers and routers may need to be power cycled in order to recover.

When an 802.3af (PoE) Powered Device (PD) is turned on, the PD informs the Ethernet end-span or mid-span switch through an information exchange that it can receive power through the Ethernet cable. A fully compliant 802.3af PD can accept power over the data lines or unused pins on the Ethernet interface. In this area network administrators need to be cautious because some PD's claiming compliancy with 803.2af are restricted to using mid-span power sources utilizing only the unused pairs. Mid span injectors do not always verify the end device they are powering is a PD and could therefore cause damage to non-PD devices.

To protect the PD's from input current rushes that may occur during power up, it is important that the PD have inrush current protection. The PD with this protection begins with a low current draw stage to protect the power sourcing equipment (PSE) and then switches to a high current stage allowing the PD to draw its required power up a maximum 12.95 watts.

Going beyond 100 meters

For remote devices that need to receive power and data, but are beyond the 100 meter reach of copper, network managers have several options. They could add a remote data closet, use LAN extenders that convert Ethernet to DSL, use UTP to coax converters, install wireless technology or, they could utilize the benefits of fiber optic cable to extend the distance of the network.

Fiber extends network distances up to 100 miles (160 km) per link without the long distance data deterioration associated with copper cabling. LAN extenders can extend network distances up to 6 miles (10 km), but anything beyond 328 ft will have significantly slower data speeds. Instead of 100 Mbps, your data rate will slow down to as little as 2.3 Mbps. Furthermore, fiber cabling provides

security benefits. It does not generate electro-magnetic emission and is very difficult to tap. And, since it is not susceptible to electrical interference, or data loss due to temperature or atmospheric conditions, Fiber is extremely reliable.

Fiber can be run from an existing data closet to an area with access to power. A PoE Media Converter can be powered by either 48vDC or standard 100 to 240 AC power. The media converter is attached to the power supply and the fiber cable. Copper (UTP or STP cable) Ethernet can be extended another 100 meters to the PD. The [PoE Media Converter](#) is converting the data from fiber to copper, adding power and transmitting it to the PD.

When you need to extend Ethernet services beyond the general IEEE 802.3 limits of 328ft / 100m, and new fiber cabling is cost prohibitive, Ethernet Extenders are the perfect solution. Ethernet Extenders transparently extend 10/100/1000 Ethernet connections across copper wiring. Use single twisted pair (CAT5/6/7), coax or any existing copper wiring previously used in alarm circuits, E1/T1 circuits, RS-232, RS-422, RS-485, CCTV and CATV applications. A [PoE Ethernet Extender](#) can operate as a PD or a PSE.

In summary, the benefits of PoE technology are;

- Only one set of wires to bring to your Ethernet appliance - simplifies installation and saves space.
- There is no need to pay for an expensive electrician, or delay your installation to meet the electrician's schedule - saves time and money.
- The appliance can be easily moved to wherever you can lay a LAN cable - minimal disruption to the workplace.
- Safer - no mains voltages anywhere.
- A UPS can guarantee power to appliances even during a mains power failure.
- Appliances can be shut down or reset remotely - no need for a reset button or power switch.

Learn more about [Perle PoE+ Injectors](#) – PSE's

Learn more about [Perle IOLAN PoE Device Servers](#) – PD's

Learn more about [Perle PoE Media Converters](#) – PSE's

Learn more about [Perle PoE Ethernet Extenders](#) – PD's and PSE's

Learn more about [Perle Industrial Ethernet Switches](#) – PSE's