

Power over Ethernet Defined

Power over Ethernet (PoE) is an evolving technology that extends the already ultra-broad functionality of Ethernet by supplying reliable DC power over the same cables that currently carry Ethernet data. PoE, modeled after the technology used by the telecommunications industry to supply reliable power to telephones, enables lifeline quality power for IP telephones (VoIP) as well as many other low power Ethernet network devices like wireless access points (WAP) and IP security cameras.

In 1999, the IEEE (Institute of Electrical and Electronics Engineers) began developing the 802.3af standard, which defined the transmission of Power over Ethernet to address the need to ensure interoperability among a growing number of proprietary methods of distributing DC power to network devices.

Since acceptance of IEEE 802.3af standard in 2003, PoE equipment vendors have been designing standards-based products that leverage the numerous advantages offered by PoE, such as:

- IP Telephony Sets
- Wireless Amplifier/Boosters
- Wireless Access Point Radios (WAPs)
- IP Surveillance Cameras
- Network Clocks
- IP enabled Kiosks

For purposes of this discussion, we will focus on the impact that PoE has on WAPs. Traditional access points for wireless networks are limited by power supply. A hotspot has always required AC power. The only alternative to network design is to find a convenient location to install new power outlets at points where it's suitable to run conduit and mount outlet boxes. Both of these solutions limit the location of access points and can incur significant costs if new outlets must be installed.

A PoE solution only requires technicians to run one Ethernet cable to the access point for supplying both power and data. An access point can operate solely from the power it receives through the data cable.

By avoiding the need for AC power cords, PoE solutions have the following benefits on WAPs:

- **Cost savings.** PoE reduces the need for electricians to install conduit, electrical wiring, and outlets throughout the facility. On a larger installation, the electrical updates can prove to be expensive. The updates require lots of conduits, outlet boxes, electrical wiring. There is lots of new equipment to purchase and an electrician's time is not cheap. The low costs of deploying PoE solutions compared to traditional electrical circuits leads to worthwhile returns on investment.

- **Flexible access point locations.** With PoE, a wireless LAN designer has greater freedom to locate access points. Without PoE a designer must use locations within short distances from AC outlets. The independence from AC outlets also makes it easier to relocate access points in the future if needed to fine-tune RF coverage or increase capacity. PoE enables companies to more easily maximize the performance of a wireless LAN.
- **Higher reliability.** Systems with fewer wires tend to be more reliable. With WLANs not using PoE, cleaning people may unplug an access point to use its AC outlet to power vacuum and buffing equipment. Electricians rewiring electrical circuits could inadvertently cut power to an access point. PoE eliminates the possibility of situations that disrupt the operation of the network.
- **Enhanced operational support.** Many PoE devices implement SNMP (simple network management protocol). This enables support staff to remotely manage the electrical power supplied to the access points. For example, support staff can disable a PoE-enabled access point by shutting off its power after detecting a breach of security. The temporary disabling of the access point can protect against an intruder from continuing unauthorized access to corporate systems. Furthermore support staff can monitor the condition and consumption of power. This added monitoring ensures smooth and efficient network operations.
- **Simple international development.** For manufacturers, PoE offers the benefit of the vendor not needing to provide different power supplies for various countries. This keeps cost lower and makes your materials list simpler.

How Does Power over Ethernet Work?

There are two basic components in an IEEE 802.3af compliant PoE network:

- **Power Sourcing Equipment (PSE) Typically called an PoE Injector**
A device that supplies power
- **Powered Device (PD) Typically called an PoE Splitter or Adapter**
A device that receives and utilizes the power

When the PSE connects to a network device, the PSE determines or "discovers" if the device is a PD or not. This prevents non-PoE enabled Ethernet equipment from receiving power, which could cause damage. The PSE applies two small current-limited voltage signals across the cable as it checks for the presence of a characteristic resistance. If resistance is detected, power is provided. A PD may also classify how much power it will require from the PSE. This feature supports the PSE by helping it supply power in an efficient way.

After the PSE has discovered a PD, it supplies 48 V and a maximum current of 350 mA. Voltage may be lost along the cable, depending on distance. However, a minimum of about 13 W is available to each PD, which is adequate power for numerous applications including VoIP telephones, WAPs, security cameras and building access systems.

Once the PSE begins to provide power, it continuously monitors the PD current draw. Once the PD current consumption drops below a minimum value, for example when the device is unplugged, the PSE discontinues supplying power and the discovery process begins again.

Conclusion:

PoE is an established technology that is enabling the efficient deployment of reliable VoIP, wireless networking and other LAN devices to:

- Increase the efficiency of communication across the enterprise
- Provide network design flexibility
- Enable network modularity and scalability to grow as needed
- Lower the overall cost of installation and peripheral components
- Reduce the overall cost of network ownership

Enable-It provides several products that utilize PoE benefits and can extended your existing PoE Injector reach to match your Extended Ethernet distances.

The following products are available from Enable-IT that support PoE:

- All Ethernet Extender kits
 - 820 – Native PoE support built in
 - 890 – PoE capable via spare pairs
 - 895 – PoE capable using spare pairs
 - 860 – PoE capable using spare pairs
- Wireless Amplifier / Booster Kits
 - 500mw 2.4GHz Indoor Amplifier kit
 - 1W 2.4GHz Outdoor Amplifier kit
 - 2W 2.4GHz Outdoor Amplifier kit