The Benefits of PoE For Industrial Applications

The drive for Power over Ethernet (PoE) started in the late 1990's. At first, Voice Over IP needed power from a separate source. The simple DC power of Plain Old Telephone Service was missed. PoE answered the question of how to provide power and data over a single cable, simply and dependably.

Early proprietary solutions for PoE gave way to standards based ones, after IEEE 802.3af was finalized in 2003. The standard provides for 15 watts at the source, at a nominal 48 VDC. Key devices are Power Sourcing Equipment or PSE (usually a PoE enabled switch) at one end and a Powered Device or PD at the other.

The reliability and cost effectiveness of providing both data and power over a single cable are improved with PoE. We're just starting to explore what PoE can do.

A "Missing Feature" Finds A Home In Industry

PoE is an elegant technical solution. As Ethernet-TCP/IP has become common in control rooms and network backbones and access links, PoE will expand the use of Ethernet on the factory floor.

There's now no technical reason why Ethernet can't reach and power most industrial devices. Here are some of the benefits that motivate the move to PoE in industrial settings.

Cost
Using one cable for both data and power to industrial devices is most cost effective, for both installation and maintenance. The cost to run a power cable can be $10 to $100 per foot, and changes may be frequent.

Safety
PoE is a safe power solution. Maximum voltage is under the limit for "high voltage" applications. To avoid damaging devices or accidental contact with even this relatively safe level, the PSE sends a 10 volt test current to verify there's a 25 ohm resistor at the PD before full power is applied. If the PD stops using power, power from the PSE stops and testing resumes. Over-current, under-current and fault protection are also part of the PoE standard.

Flexibility
PoE is standards based, so interoperability across vendors is guaranteed. All variations of network topologies can be configured with PoE, including ring, mesh and other networks. Plus, industrial

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Cost effectiveness make PoE a natural fit for industrial applications. And as the technology matures, it will become the logical choice for many reasons.

PoE has advantages for the factory floor, especially as more industrial edge devices become available.

network management tools such as RSTP/STP, IGMP and VLANs are available on the high quality industrial PoE switches.

Single-cable power and data delivery, typical in fieldbus networks, is available with PoE. Plus, configuration changes on the factory floor are made simple by PoE. It just makes sense to do it with a single cable instead of two, where possible.

If the end device isn't designed for PoE, a PoE splitter can provide separate outputs for power and data. Mid-span PoE injectors can also inject power where a switch wasn't designed to do so, but are less common now that industrial grade PoE switches are so available.

Industrial PoE Splitter
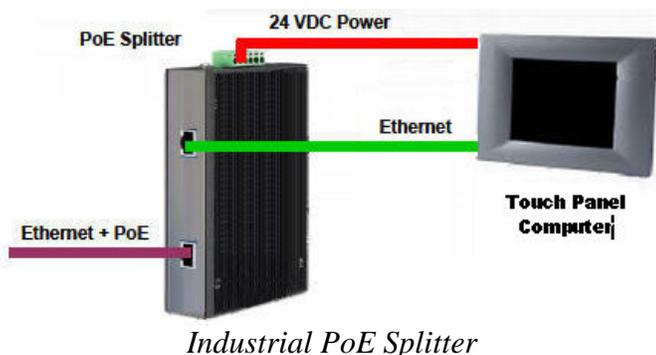
Reliability
PoE is one means of providing power source redundancy. When added to the ability to configure Ethernet for redundant data configurations, it's a powerful combination. The complexity of combining various networks often requires more equipment, programming and maintenance. A single network is simpler and has real advantages.

Systems Integration
A simple interface, with multiple systems and locations managed via graphic interface, is a powerful lure that Ethernet makes possible – and PoE enhances the potential.

Industrial Applications

The reason for any technology is the ability to get a job done. And PoE is best where large data transfers and flexible distribution of power are needed. Here are some of the more significant ones.

PoE is a part of the development path to full industrial Ethernet becoming possible.

Security – IP surveillance cameras use huge amounts of bandwidth, and can greatly benefit from PoE and its scalable backbone topologies. With the ability to also provide power and control to gate entry systems, PoE is ideal for any automated security system.

RFID/Infrared – From infrared bar code readers to Radio Frequency Identification, devices that track components, assemblies and people

have many industrial uses. Inventory control, material flow and security options are enhanced. PoE simply makes it easy to place readers in more places, faster and for less.

Wireless Access Points – Wireless can be the means of implementing many systems more flexibly. From Bluetooth technology to all flavors of 802.11, if something is moving or can't easily be wired, PoE expands options for optimal placement of the last wired link.

Interconnectivity/Accessibility – Ethernet provides connectivity and backbone service. As PoE extends Ethernet closer to the factory floor, the best of both serial/bus and TCP/IP worlds come together.

Power Backups – Devices such as I/O modules and PLCs already have Ethernet links, but power needs can be so high PoE isn't possible. PoE power of control and communication modules helps with backup, continuity and orderly shutdown if primary power fails.

One set of benefits tells why PoE will succeed in industrial settings.

Industrial PoE Components
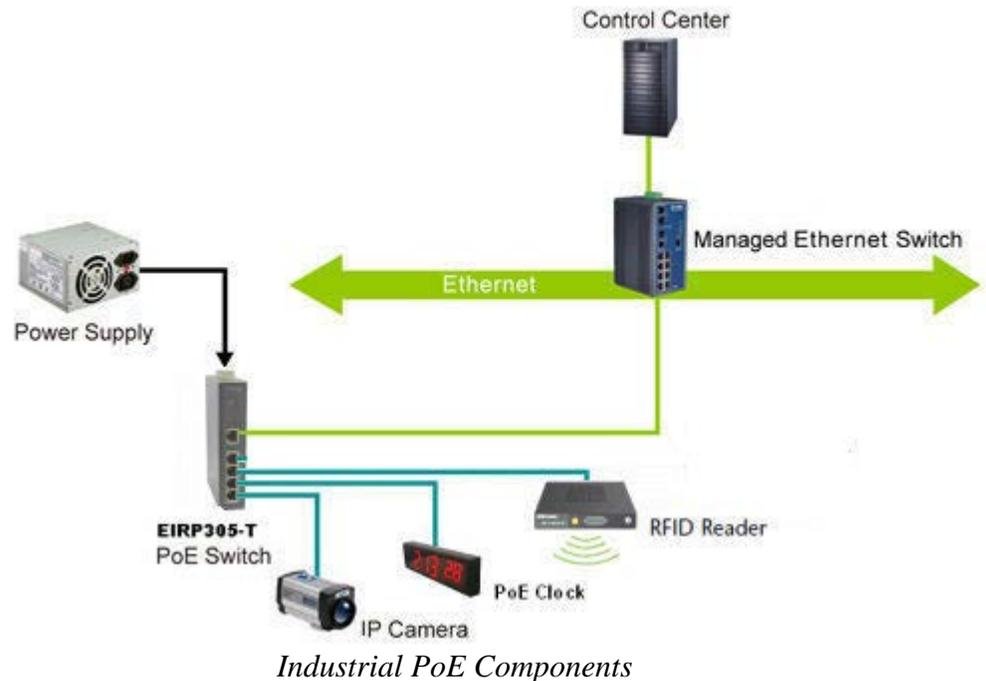
<u>Other Uses</u> – Here are some applications and devices currently available. More sensors and edge devices are in the works:

- Smart signs/web signs.
- Rugged VOIP.
- Lighting controllers.
- Audio and video systems.
- Retail and shipping point of information systems.
- EPOS systems.
- Building access control systems.
- Time and attendance systems.
- Building automation.
- Battery chargers for phones, PDAs, etc.
- Laptop and PDA access points

The Key To Full Industrial Ethernet

While PoE is capable of direct linking with every device, the right solution involves factors such as data, power and cost. Complex devices such as Human-Machine Interfaces, optical sensors and level measurement devices are the most likely current applications for PoE.

Many end devices have a very simple data interface. It doesn't take much data flow to trip a switch or read a basic pressure or temperature sensor. Equipping simple devices with the processing power to connect direct to the Ethernet, plus the expense of needing a separate port for each device, make this choice easy in most cases. For most edge devices the final link will continue to be serial.

PoE is an important piece in the puzzle of full industrial Ethernet. Wider implementation will come when volume of devices, technical progress of components and prices come together to make it a logical choice.

PoE+

The IEEE 802.3at standard for PoE+ (high power PoE) will finalize in 2009. It's anticipated to have transmitted power limits of 30 watts for 2 pairs of wires. Cat5E or better cable is mandatory.

PoE+ provides added power so that Pan-Tilt-Zoom security cameras, thin clients, video phones and WiMAX transmitters can be connected. The extra power will also expand PoE to more of the factory floor, making it possible to power a larger number of edge devices from a single PoE port.

Making Rugged Reliability A Matter Of Course

PoE is a case of relearning old lessons. There's much to be admired about a technology that simply works well without problems or questions about its safety for many years. Take the track record of PoE, add the fine tuning of the IEEE and potential for a stable, scalable platform for years to come, and it's just the thing to make an engineer, plant manager or technician grin from ear to ear.

Stability, reliability and inherent ruggedness of the technology are the real reasons for this potential. That's what makes PoE a likely candidate for full scale adoption in industrial settings. It's more important than bandwidth. If that's all there was, PoE would likely remain outside the core of industrial networks for a very long time.

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B&B Electronics' **E**Linx EIRP610-2SFP-T 10-Port Industrial PoE Switch with Gigabit Uplinks.

An industrial hardened switch, it supports a variety of management functions, including X-Ring, RSTP/STP, IGMP, VLAN, QoS, RMON, bandwidth management and port mirroring.

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