

Power over Ethernet Planning

Overview

Power over Ethernet (PoE) is a standard for providing both power and network connectivity via a single Ethernet cable. PoE is commonly used to power and connect VoIP phones and wireless access points. In the future, PoE will power and connect a variety of devices such as:

- overhead lighting
- computer displays
- closed circuit TVs/webcams
- door locks
- building management systems
- environmental sensors
- Internet of Things (IoT)
- etc...

In summary, for devices that require modest power (< 60 watts) and network connectivity, PoE is a candidate for providing both over a single cable.

This document is intended to inform facility and network designers of the potential role of PoE and its implications for infrastructure requirements.

PoE Background

PoE is an emerging standard, and there are vendor-specific variations. Initially, PoE was limited to 12 watts of power per Ethernet port. More recent standards support up to 25 watts of power, and non-standard implementations support 50 watts and more. Energizing the Ethernet cable to support PoE is a function of the Ethernet switch. Since the lifetime of an Ethernet switch can be 5-7 years, or longer, switch selection should include consideration for future PoE requirements.

Life Safety

Infrastructure for PoE-connected devices that require resilient power and network connectivity to ensure safety (e.g., VoIP phones, door locks, lighting, etc.) may require planning, design, operation, and coordination among multiple units (e.g., campus network, architect's office, and building operations). For example, to ensure VoIP devices continue to operate during a campus power outage, resilient power may be required both for the VoIP phone, via an uninterrupted power supply (UPS) for the Ethernet switch, as well as resilient power to **all** network equipment required to connect the phone to the campus's VoIP controller. This may require the entire campus network be provisioned with resilient power.

Electrical & Environmental Capacity

PoE-connected devices are powered by their Ethernet switch, which, in turn, is provided by the switch's electrical outlet. In addition to the power requirements, roughly ten percent of the PoE

power consumed by Ethernet switches is transformed into heat. For example, 100 PoE-powered light fixtures could result in 500 watts of additional heat generated by the switch, requiring 2000 BTUs an hour of additional cooling capacity. Powering the light fixtures would require 45amps of additional power (assuming 120 volts). Powering the lights during a power interruption would require a large UPS. If the lights were controlled by a campus server, *all* network gear required to connect the lights to the campus server would require resilient power.

Recommendations

- Develop a campus plan that coordinates PoE capabilities, power and environmental requirements, and safety needs, with the appropriate representatives.
- Deploy PoE operation and environmental monitoring in the campus network operations center.
- If UPSs are used, plan and budget for preventive maintenance, including battery replacement.
- Ensure new building initiatives (renovations, upgrades, new facilities) include PoE considerations upfront.