

Introduction

This overview will address the 802.3af standard, provide an overview of the technology and furnish users with applications for its use.

Technology

The 802.3af Power over Ethernet standardization project began in 1999 and was ratified on June of 2003. The end result of this long standardization process is that there are many products available that claimed compliance with the standard before it was final. Each user will need to assess their requirements and compare manufacturer's products. In general, most recently designed products will comply with the final standard.

Power over Ethernet (PoE) is the ability for wired Local Area Networks to allow the electrical current necessary for the operation of each device, to be carried by the data cables rather than by power cords. This capability is sometimes referred to as "inline power". This capability minimizes the number of wires that must be strung in order to install the network. Power over Ethernet (PoE) has many advantages including easier greater flexibility for installation of equipment, less downtime and lower costs than running individual wiring for power.

Two devices are identified when discussing PoE, the power source equipment (PSE) and the powered device (PD). The PSE provides the power and the PD accepts the power. An example of power sourcing equipment is a midspan hub. Examples of a powered device could be a VOIP phone, a security camera, or a wireless access point.

For PoE to work, the electrical current must travel on a standard CAT5 Ethernet cable or better. A CAT5 cable has four twisted pairs, but only two of the pairs are used for data. The 802.3af specification allows either the spare pairs to be used (pins 4,5 and 7, 8) or the data pairs (pins 1,2 and 3,6) to carry the power. Four pair cable is required by the standard. A PSE provides a maximum of 15.4 watts of power at -48VDC and a PD can have a maximum input power requirement of 12.95 watts, this accounts for degradation of power over the cable.

Power over Ethernet allows network devices to be powered in remote locations where access to power is unavailable or difficult to install. For applications that are within 100 meters of a data closet, users can install one of the Power over Ethernet switches that are available on the market or use a standard switch with a mid span injector. A mid span injector combines the data and power and transmits over the data cable. A network manager needs to be cautious when using mid span injectors because unlike 802.3af compliant devices, mid span injectors do not verify the end device they are powering is a PD. A discovery protocol was implemented in the 802.3af standard that requires a PSE to probe end device and determine if the end device is a PD and if it is, what is its capability. This prevents damage from occurring to non-PD devices.

A power over Ethernet media converter combines the benefits of media conversion with the benefits of 802.3af. If a network manager has remote devices that need to receive power and data, but are beyond the 100 meter reach of copper, a remote data closet would need to be added. With a power over Ethernet media converter the network manager can utilize their current data center, run fiber to a PoE media converter, the converter converts the data from fiber to copper adds power and transmits it to the PD.

Applications for PoE

- Voice over IP telephones
- Cameras
- Remote POS kiosks
- Wireless LAN Access Points - Airports, warehouses, etc.

Power over Ethernet is in a sweet spot for three of the hottest segments in technology today; Voice over IP (VoIP), 802.11 Wi-Fi wireless networks, and security. Utilizing a PoE media converter provides a network manager with more options when deploying these new technologies. One example is a company deploying a wireless network in their office or a large warehouse. Wireless access points need to be deployed throughout the facility to ensure complete coverage for reliability. The network manager will likely incur the need to extend beyond the 100 meters of the copper cable to reach many of the wireless access points. Fiber is run from a data closet to an area with access to power; the PoE media converter can be powered by either 48VDC or standard 100 to 240 VAC power. The converter is attached to the power supply, the fiber cable is attached to the converter, and then UTP/STP cable can be extended another 100 meters to the wireless access point. (Figure 1)

Figure 1: POE Application



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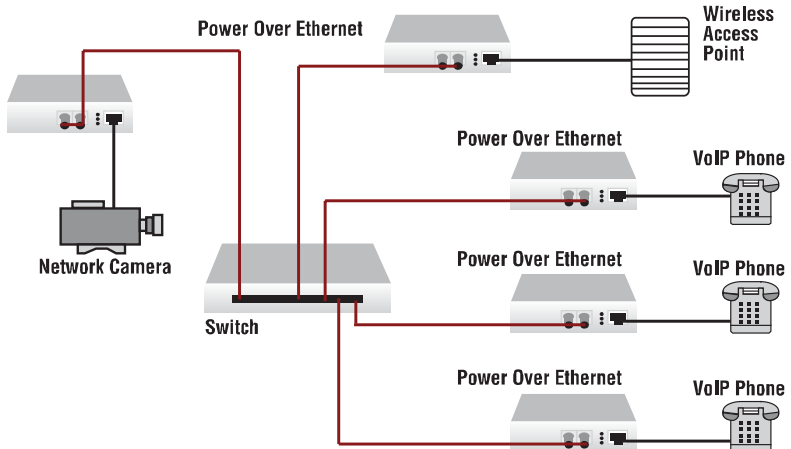
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A network manager can incur similar problems when installing security cameras because they are typically installed in remote locations throughout a facility. Again, the network manager can take advantage of media conversion by extending the reach of their data closet with fiber, converting the signal back to copper, add power and connect the camera to their network. This would only apply to IP cameras that are powered devices. The same application can be used with Voice over IP phones, but may not be as attractive to network managers considering the density of VoIP users. It may be more cost effective to install a small data closet with an Ethernet switch that is a PSE.

Today, there are a small amount of applications for PoE, however with the ratification of the standard the uses and the amount of PoE devices being manufactured are rapidly expanding.