



Power over Ethernet (PoE) Solutions

For SOHware Business Wireless

By

Hien Ly, Application Engineer
And
Charles Tucker, Product Marketing

May 1, 2003 revised

Power over Ethernet (PoE) For BUSINESS Solutions

SOHOfware has implemented 802.3af compliant Power over Ethernet for key wireless LAN products in its business solutions portfolio. Power over Ethernet (PoE) is a critical value for business wireless applications and is one of several key factors that make SOHOfware's solutions commercial deployment ready. This paper describes the value of Power over Ethernet, why it is important to be compliant with standards, and what the installation scenarios are for considering when to use the PoE feature.

One of the many challenges to implementing and deploying a Wireless LAN (WLAN) system is how to power the access points (AP's). For commercial applications, the physical location of the installation may pose radical conditions that dramatically increase the cost of deployment, which for solution providers and system integrators can result from the absence of readily available AC power in facilities such as warehouses, distribution centers, utility plenums and manufacturing areas. In considering why AC would be unavailable, one need only look at wireless LAN technology and best practices for RF installation and antenna placement. For performance reasons, it is typically desired to locate access points at the highest elevation available in a given space, where power outlets are rarely available.

Reducing the Cost of Installation

An integrator who must add the routing of electrical conduit to each access point as part of the proposal may find the customer questioning the value of a wireless installation, given the costs to meet building code standards. Even when installed, the use of fixed conduit eliminates the option to move or adjust access point locations, which may be desirable to facilitate changes in coverage or the layout of the building. Power over Ethernet (PoE) solves these problems. The solution provider or system integrator who is able to provide PoE is at a significant advantage in the bidding process over those who do not.

Power over Ethernet (PoE) has been recognized and used by many wireless manufacturers; however, each manufacturer originally had their own way to provide low voltage DC over the Ethernet cable, resulting in the inevitable incompatibility when attempting to mix products from different manufacturers.

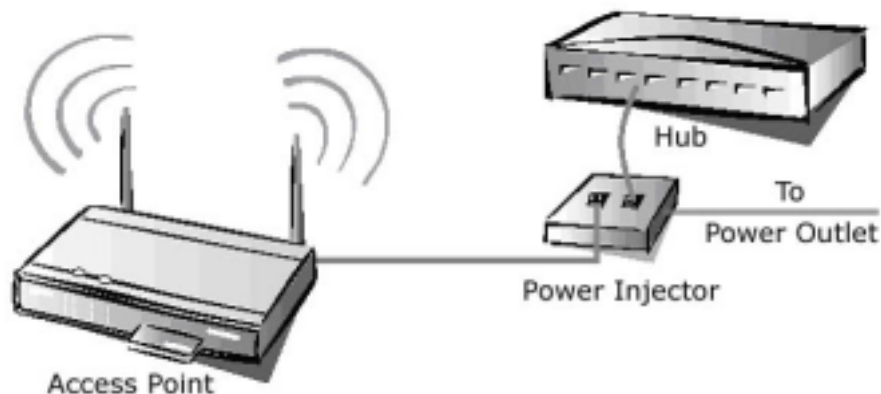


Figure 1

Standards Based

To eliminate incompatibility, the Institute of Electrical & Electronic Engineers (IEEE) has given Power over Ethernet (PoE) a specification standard known as 802.3af. The IEEE has standardized on the use of 48VDC as the injected PoE voltage. Part of the 802.3af standard allows the Power Sourcing Equipment (PSE) to automatically sense if the connected device is PoE capable, and if not, the PSE will not put power on the cable thus preventing the end user equipment from being damaged (Figure 1). 802.3af also provides SNMP management of the PSE (often called an Injector) and can alert a network management system if a device is in trouble. Furthermore, 802.3af supports PoE in what is called a Mid-Span configuration, where the Injector is located with the Ethernet hub or switch. An Ethernet cable (RJ-45) connects the hub port to a port on the Injector. The RJ-45 is then run from the Injector to the access point. As the result of 802.3af, wireless LAN systems are interoperable between manufacturers without the worry of incompatible power systems.

How exactly does Power over Ethernet work and what are the requirements? In a typical Ethernet cable (RJ-45), there are eight wires (4-pairs of wires). These wires all have different colors: orange, green, blue, and brown, each is paired with a white wire with matching colored stripe. Only four wires (2-pairs) are used for transmitting Ethernet data. The extra four wires, since not transmitting data, are available for use in PoE to convey DC (Direct Current) voltage to the device. Positive voltage is injected on pairs 4-5 (blue), and Ground/Negative use pairs 7-8 (brown) as shown on Figure 2.

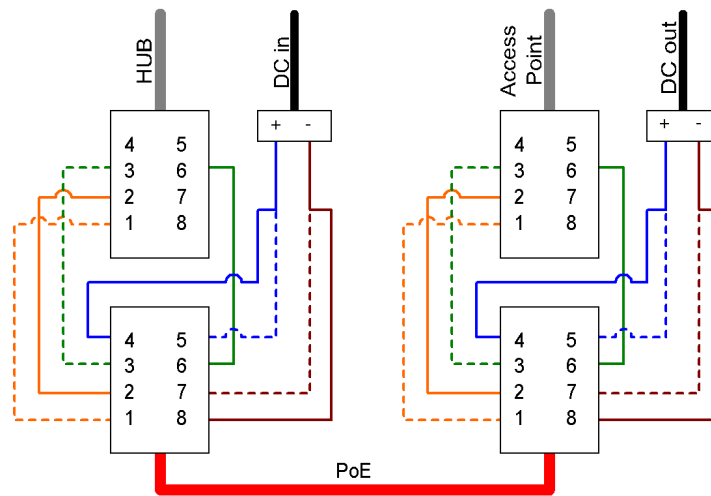


Figure 2

The DC current enters the cable by means of a component called an Injector, which utilizes the correct unused pairs and maintains separation of the current and data signals to avoid interference. If the access point at the other end of the cable is PoE compatible, then it will function properly without modification. If the AP is not PoE compatible, then a component called a picker or tap must be installed to remove the current from the cable. These are also known as PoE Splitters. The splitter 'picks-off' the DC voltage that has been injected in the Ethernet cable and makes it available to the device through the regular DC power jack.

Flexibility and Interoperability

Selecting an injector with or without a splitter depends on whether the access point is designed to use Power over Ethernet (PoE). The decision is as follows:

- **Power Injector + PoE-compliant/compatible device**
- OR –
- **Power Injector + non-PoE compliant/compatible device + Splitter**

Power over Ethernet (PoE) provides a standard way for Wireless LAN systems to receive power even when they're installed far from a convenient AC power source. With the addition of the splitter, a solution provider or system integrator can easily utilize the benefits of PoE with the flexibility to install any model of access point they have available, PoE enabled or not.

Advanced injectors include option for single or multiple ports, with multiple port versions incorporating full switch routing to combine both Ethernet hub/switch features with PoE, thereby eliminating the need for deploying both devices. The PoE switch includes both PoE and standard ports to simplify Ethernet routing depending on the destination device's requirements.

End-to-End Solution

SOHware now offers a complete Power over Ethernet solution to facilitate the wireless network of virtually any commercial installation. The product selection includes 802.3af compliant devices that present an end-to-end solution as shown in Figure 3.

1. NWH660-PoE: a manageable and fully 802.11b compliant access point with 802.3af compliant PoE functionality
2. PoE Injector: an 802.3af compliant DC injector series available in one (L1611) and six (L1616) ports that include fault protection and choice of data+power or data only ports
3. PoE Splitter: an 802.3af compliant splitter that provides a DC jack to mate with the DC input on the NWH660 access point.

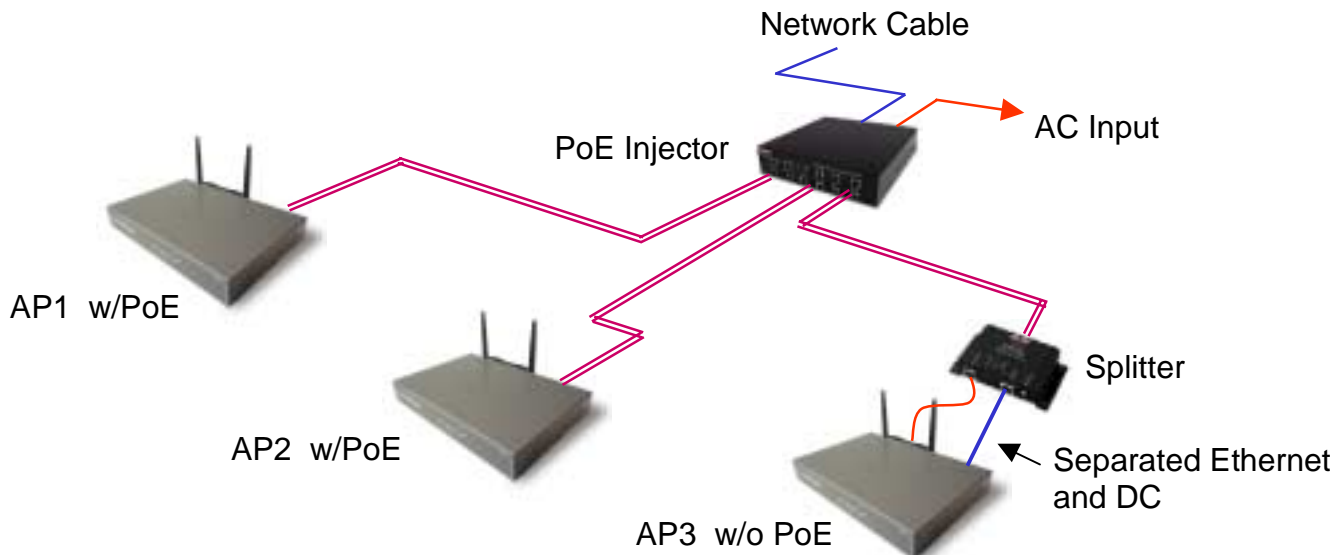


Figure 3

SOHware White Paper Series
SOHO-WP100131

Conclusion

For commercial deployments of wireless LAN technology, the solution provider or system integrator can find rapidly inflating installation costs in many applications to achieve highly effective RF coverage and performance. Power over Ethernet is one of the key factors in selecting commercial ready solutions that will effectively control costs. By utilizing PoE that is integrated with a complete solution and complies with industry standards, the result will be an installation that is simpler to install and remains flexible to change.

SOHware is dedicated to complete Power over Ethernet solutions that are standards based and complimentary to its line of business-class wireless solutions.