PoE Midspans Harness Universal Power for Your Network

White Paper

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Power-over-Ethernet (PoE) has emerged as one of the most widely used solutions for powering networked devices ranging from VoIP phones and WLAN access points (APs) to IP security cameras and complete access control systems. The latest IEEE802.3at-2009 standard with four-pair powering enables PoE to deliver up to 60 watts (W) of safe, uninterrupted power over the existing LAN infrastructure to powered devices (PDs), at voltages from 50 to 57 volt (V) levels. When PoE is made an integral part of the network, the RJ45 connector becomes a universal plug that provides both power and data to each PD, and power becomes an easily scalable resource anywhere in the network, using solutions that can be deployed in any region or country across a wide and growing variety of PDs.

Universal Power Availability

PoE ensures that power is no longer a local resource, restricted to the nearest available alternating current (AC) electrical outlet. Instead, power becomes a universally available resource providing scalability and optimal powering throughout the network. PoE eliminates the need to meet location specific power standards—110V, 220V or others—to power WLAN APs and other devices, safely converting these voltages so they can run over the same, single Category 5 (CAT5) or better Ethernet cable that carries data to each PD.

Ideally, power should also be a resource that can easily scale to meet growing demands, without impacting or requiring any changes to the data infrastructure. To achieve this, PoE must be deployed using midspans, which are installed between the existing switch and PDs. Midspans decouple the power and data infrastructures, optimizing deployment flexibility by enabling the incremental addition of PoE ports, as they are needed. Midspans are an ideal solution when there is no need to upgrade the current network switch; when there is a desire to invest in PoE ports for up to 16 years or when long-term investment is a concern. To maximize scalability, midspans are available in a variety of port densities enabling the power infrastructure to be expanded in as little as one-port midspan increments as new PDs are added. This contrasts with PoE switches, for which best practices typically dictate that PoE be deployed on as many ports as possible to ensure support for future growth. Other midspan options that further enhance flexibility include the ability to use DC inputs with external power supplies for incremental power capacity or redundancy, and flexible powering from AC, DC or another midspan.

Deploying PoE as part of the network infrastructure, rather than as a component of the data network, allows for additional reliability and therefore greater security for the data network. Interconnected midspans can back each other up, and when the midspan is integrated with a UPS system, the remote power-off/power-on capability also enables low-priority ports to be disconnected during external AC power failures. If a PD is plugged into an AC outlet and the power goes out, device power is lost. If there is no UPS, all PDs lose power. The same is true when devices are connected to a PoE-enabled switch; the devices and the switch will lose power in the case of an external power outage. On the other hand, when PoE is separated from the data network, devices such as cameras are able to continue recording and storing data even if the switch has stopped working.

Fig. 1 shows a typical data and power infrastructure that also includes extender technology which increases how far administrators can position PDs away from the midspan.

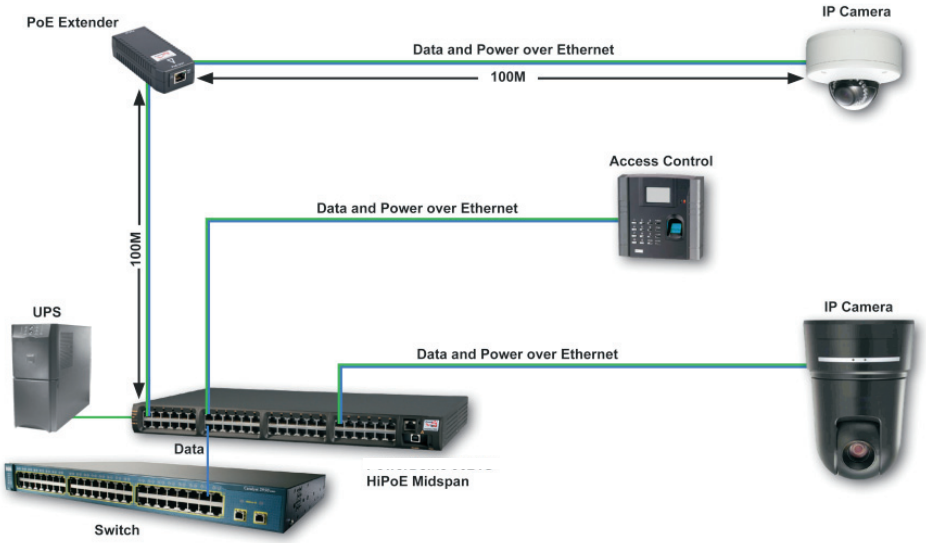

Fig. 1

Universal Power Savings and Safety

Making PoE an integral part of the network also delivers cost and energy savings, as well as improved safety.

Network administrators can leverage remote PD monitoring and configuration capabilities; monitor per-port and total power consumption; and configure PDs for instant and scheduled port ON/OFF functions, as well as UPS status port ON/OFF functions. Midspans also deliver a third cost-saving capability because of their distributed power architecture, which enables smaller (450W) internal power supplies to be augmented only when needed. This minimizes the effects of idle power consumption associated with larger supplies. If more power is required down the road, the smaller supply can be augmented with external 450W to 1kW power supplies.

Making PoE an integral part of the network is also the safest powering solution. Unlike AC outlets, which pose electrocution risks, PoE only delivers power when a valid device is identified as being PoE-enabled. Power is disengaged when the device is disconnected or a short circuit takes place, reducing the risk of any accidental harm to personnel. Today's midspans can detect non-PoE-compliant PDs and automatically disconnect compliant ones in the event of overload, short circuit or under-load conditions.

Universal Power Deployment

The universal powering benefits of PoE also extend across borders. Since its original 2003 ratification, PoE has been recognized as the first international power standard. This contrasts with electrical plugs and sockets which may differ by country in their nationally standardized voltage and current as well as their rating, shape, size and the types of connectors that are used. With PoE, product manufacturers can avoid supplying a different power supply for different countries, and PoE installers needn't worry about different equipment and power cords. Regardless of the country or region, a PoE power source will provide the same, standardized power capabilities.

PoE provides these capabilities across a broad and growing range of PDs. Today's industry-standard PoE midspans can fuel PDs that previously required more power than what was available with earlier PoE specifications. As an example, an access control system with a controller, reader and multiple door locks can consume as much as 45W of power, and is easily supported by today's PoE standard.

Virtually any device that consumes up to 60W can be powered over Ethernet—even if it wasn't originally designed to do so. Splitters make this possible. Splitters function as a PoE PD, and convert the PoE voltage to commonly used DC voltages such as 5V, 12V, 18V or 24V, without touching the data. Splitters can power devices such as WIMAX APs, small WIMAX base stations, 802.11n APs, thin clients and pan/tilt/zoom (PTZ) IP cameras, among others.

PoE splitters not only enable flexible deployment of Ethernet devices, but can also be used with other data technologies such as HDBaseT that operate over CAT5 or better cables. HDBaseT is an important emerging consumer electronics digital connectivity standard that enables up to 10.2 Gbps of uncompressed video and audio, 100BaseT Ethernet, control signals and power to all share the same cable, across distances up to 100m using standard RJ-45 connectors. Geared towards connecting audio and video equipment, HDBaseT uses a technology called Power over HDBaseT (PoH), which is based on PoE. PoH technology delivers up to 95W to PDs such as 40-inch LED TVs requiring 70W of power, as well as new TVs governed by the 108W restrictions of the EnergyStar™ 5.1 standard that has been in effect since October 1, 2011. Table 1 shows typical power requirements supported by PoH.

Consumer Electronic Device	Power Requirement
Energy Star™ 5.1 Televisions: 20" to 30" 16x9	26W to 51W
Energy Star™ 5.1 Televisions: 31" to 48" 16x9	52W to 100W
Energy Star™ 5.1 Televisions: >48" 16x9	100W to 108W (worst case)
Interactive Displays >25"	25W to 108W
Blu-Ray Players	Up to 29W
Power forwarding Network switches	Up to 50W
Thin/Zero Clients with Built-in Screen	Up to 50W
IP Speaker with Class-D amplifier	Up to 100W
Solid State Lighting for General Illumination	Up to 60W
Industrial Human Machine Interfaces (HMI)	30W to 60W
Laptops	Up to 90W
Point of Sales and Information Kiosks	13W to 60W

Table 1

HDBaseT deployment benefits from PoH technology's foundational PoE capabilities, which have been proven for the past decade in enterprise networking and IP-based security and surveillance systems to reduce installation cost and complexity while also cutting energy consumption and maintenance requirements. The PoH twin PSE specification, which allows the delivery of 60W (twin type 2) or 95W

(twin type 3) of power, was defined so the PD can be implemented at the lowest possible cost. This is done by synchronizing the detection, classification and power on of each of the two pairs in the twin PSE.

HDBaseT and PoH-compliant equipment utilizes four-pair technology which offers additional energy savings and deploys detection technology that will support all types of four-pair PDs including Cisco UPoE PDs, while also delivering power to two-pairs PDs in the most energy-efficient way possible. Therefore, energy efficiency and higher flexibility provide strong reasons to deploy PoH-compliant PSEs, even if the targeted powered application is a Cisco UPoE PD. There will be many opportunities to exploit PoH technology's breakthrough opportunity to turn the RJ45 jack into the first universal power plug—not just for enterprise applications, but for consumer uses, as well.

Universal Power for Diverse Applications

Whether in a traditional PoE environment or supporting next-generation PoH-compliant infrastructures, there are many benefits to a universal powering solution. As an integral part of the network, PoE makes power a pervasively available and easily scalable resource and maximizes the flexibility to position network PDs wherever they are needed, while cutting costs and improving reliability and safety. At the same time, PoE ensures that solutions can be deployed anywhere in the world, using a rapidly growing range of both enterprise and consumer PDs.

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