Alan Stevens has implemented and supported networks for over 25 years, working for IT vendors, system integrators and customers. He now mostly researches and writes about networking matters.

→ **Comments welcome on the Networks column.**
Email networks@pcw.co.uk
Please do not send unsolicited file attachments.

A question of power

How and when to use Power over Ethernet to support your peripheral devices

This month's Network Hands on is all about Power over Ethernet (PoE), concentrating on how it works and what you can do with it. I'll also discuss the IEEE standard governing the technology and the pitfalls to look out for when choosing and configuring PoE kit.

What is Power over Ethernet?

The first thing to understand is that PoE has nothing to do with so-called 'Powerline' or 'Homeplug' networking, which use your mains wiring to transmit network data. It's almost the exact opposite.

What PoE does is eliminate the need for a separate AC power supply and an AC-to-DC transformer for individual network devices. Instead DC power is centrally generated and sent to compatible devices using spare wire pairs in the UTP (unshielded twisted pair) wiring used to cable up most data networks.

The benefits are obvious. Only one cable is required for both power and data, making it a lot easier to position wireless access points, surveillance cameras and other devices in locations where power outlets are unavailable. Similarly it cuts down on cable clutter and eliminates the need to find spare sockets for all those ugly AC adapters, or wall-warts as some call them.

PoE also allows power distribution to be centrally managed – an increasingly crucial consideration in this era of high energy costs. You can control the power to devices remotely and, by adding a central Uninterruptible Power Supply (UPS), protect network devices from the vagaries of the mains supply.

Of course there are downsides as well. The devices involved must be designed to receive their power over the Lan, although some enterprising vendors offer splitters to separate the power for use with non-PoE enabled devices, such as the D-Link DWL-P50 (pictured above left), which can be bought for about £15.

Left: If a device doesn't have PoE support you may be able to power it using an adapter like the DWL-P50 from D-Link

Right: A mid-span PoE hub has two sets of UTP ports and sits between a network switch and powered devices

There are strict limits to how much power can be delivered, primarily to prevent the cables from getting too hot, the plastic sheathing cracking and shorts appearing. Safeguards are also needed to protect sensitive device electronics where cables have been wired incorrectly or a non-PoE device gets plugged into a PoE-enabled port.

Fortunately most of these problems are addressed by the IEEE 802.3af standard, to which most PoE-enabled products adhere. However, check for conformance before ordering as there are still non-standard solutions around.

What the standard says

The 802.3af specification covers the two components required for PoE – the powered device (the PD) and the power sourcing equipment, or PSE.

Power sourcing equipment can take two forms: mid-span hubs that inject power into the cabling between a network switch and attached devices, or end-span hardware, where PoE support is built directly into the network switch.

There are pros and cons to each. Mid-span hubs cause little disruption because they work with existing network switches. However, they take up space and you have to run extra cables. That's because each switch port requires a cable to the mid-span, where the power is injected, then another to carry the mixed power and data to the device. For this reason, mid-span hubs have two sets of UTP ports (in and out, pictured left), and come in similar range of port sizes to the switches they connect to.

Replacement switches are neater, but ripping out and replacing hardware can be costly, especially on a big network.

It's also worth mentioning that although there are no 'spare' pairs on a Gigabit Ethernet connection, it is possible to transmit 802.3af compatible power across such a link. However, I've only seen PoE support on expensive enterprise Gigabit Ethernet switches.

PoE devices

Powered devices include wireless access points, cameras and IP telephones, which operate on little power. That's because the 802.3af standard specifies transmission of 48V with a maximum allocation of 15.4W per device.

The Linksys SRW208P has PoE support built in and is an affordable small business solution

You can't charge the battery of a notebook or run a desktop PC using PoE, although that may change as the IEEE is at work on a follow-up PoE Plus specification (802.3aF) that may eventually enable up to 50W to be carried over UTP network cabling, with some pre-standard solutions already available from Powerdsine (**www.powerdsine.com**) and others.

Distance also has an effect. The maximum allowed for by 802.3aF is 100m, but additional power will be dissipated as cable length increases such that only about 13W will be available at the full distance.

A real PoE example

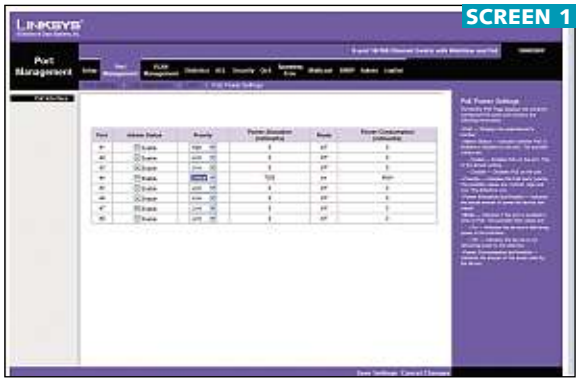
When first introduced in 2003, PoE equipment was costly and mostly aimed at large enterprises. Recently, prices have tumbled and cheaper small-business products have been introduced, some even falling within the range of the ambitious home user.

One is the Linksys SRW208P, an eight-port 10/100Mbits/sec Ethernet switch, which comes with two Gigabit Ethernet uplinks and web-based management, plus support for PoE on all eight Fast Ethernet connectors (see picture on previous page).

Selling for about £150, the SRW208P is an affordable solution if you want to add power to a small network. But like many low-end PSE products, it suffers a big drawback – a limit on the amount of power it can deliver at any one time. In fact it can only provide the full 15.4W specified by the 802.3aF standard to up to four ports at a time. Plug in more than four PoE devices and the amount each port can draw starts to drop. Use all eight connectors, and you're limited to just 7.5W per port.

Still, 7.5 watts is more than enough for many devices. Most basic IP phones can operate on 5-7W and the SRW208P also has built-in Quality of Service features, making it worth considering if you're deploying a small IP-based telephony system. Moreover, it's possible to see exactly how much power attached devices are consuming via the web-based management console, and prioritise PoE delivery on a port-by-port basis (see screen 1) to share out what's available more effectively.

It's very easy to install and set up with PoE enabled, by default, on all eight ports. All you really have to do is plug it in and turn it on, although you may want to fine-tune the networking features and power delivery once it's up and working.



On most PoE switches you can prioritise power delivery to share out limited resources

Similarly, at the device end all that's needed is to plug the hardware into the Lan. If a device isn't PoE enabled the PSE will notice it doesn't have the resistors specified by the 802.3aF standard and turn off power to that port. If it is, the device should simply power up as normal within a few seconds of being connected.

What's it good for?

So it's easy, but why might you want to consider PoE on a small home or business network? After all, if you only have a few users it may not be worth the extra expense and bother.

In its defence, PoE doesn't have to be that expensive and, with low-cost products like the SRW208P, can work out cheaper than employing a Part P qualified electrician to run extra sockets. I recently wanted to install a network camera by my front door and had no trouble at all running a UTP lead across to it. All the nearby power sockets, however, were down at floor level while the camera was high up outside. Quotes for a new AC outlet came in at about £200-£300 – a lot more than using PoE.

Remember power limits, though. 15W is enough to drive most fixed-lens cameras but you're unlikely to find products with pan, tilt and zoom features able to get power this way.

With wireless access points, too, the value of PoE is debatable, as on a small network there's usually no need to locate access points in out-of-the-way places to get adequate coverage. Moreover, you won't find PoE support on any of the access points or wireless routers aimed at the home and small-business market.

Which, at present, just leaves IP telephony as the main driver for PoE deployment, making it more a business than home user technology. This is all the more so given that most home users now favour wireless over cabled networks and, as much as they'd like to, network vendors have yet to come up with a way to distribute power over a wireless Lan. **PCW**

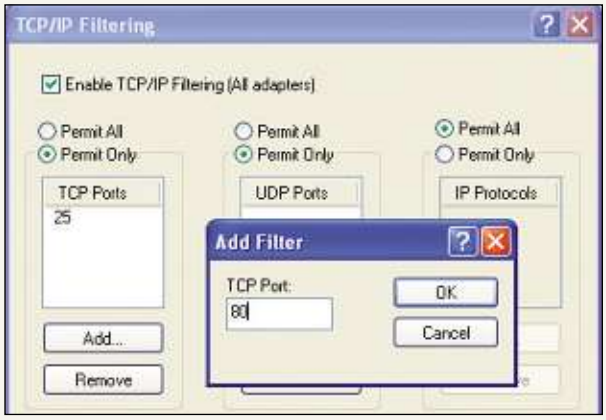
Windows port filtering

Thanks to reader Geoffrey Smith who emailed to point out that I'd overlooked an easy-to-use port-filtering tool in a recent article on that subject (March 2007, see **www.pcw.co.uk/2173555**).

To get to this tool, open a Windows network connection and click on Properties before choosing Properties for the Internet Protocol (TCP/IP) entry. Click on the button marked Advanced; you should find TCP/IP Filtering under the Options tab. Highlight it and choose Properties again to get to the dialogue box (see screen below) from which you can tell Windows to filter traffic and allow communication only on certain ports.

On the downside you need to know which port numbers you want to leave open, with no useful list or explanations like those provided by a lot of firewalls. And if you turn filtering on for one adapter, it's applied to all, which could be a bit restrictive where the PC is connected to the internet and a local network. It's not a good idea to consider using this tool if you're also using the built-in XP desktop firewall or a third-party alternative.

Still, it's easy enough to use and can filter TCP and UDP ports independently, and block other unwanted protocols. Plus it's installed for you as part of the operating system and is available in Windows NT and 2000 as well as XP.



If you want to restrict IP port access on a Windows PC, you can use the TCP/IP port filtering option in the network connection properties