



PowerLine networking

When wireless lets you down, the solution may lie in your power lines.



In theory, wireless networking is close to being the perfect technology. You can connect your laptop to routers and printers that are dozens of metres away without any need for messy cables, but as we all know, the reality rarely matches the theory. A strong signal can degrade for no apparent reason or it may become impossible to connect to a router that is within touching distance. Then there are the inherent security issues. Sure, it's easy to set up and manage, but are you confident enough to manage the network's security?

Fixed Ethernet cabling will always provide a reliable connection, but it can be expensive to lay cables under the carpet or flooring.

The alternative is PowerLine networking, which uses the electrical system to connect your devices together at the same time that it feeds them power. It's brilliantly simple, provided you have suitable networking adapters, which brings us neatly to our group test. This month we're looking at networking without laying any additional cables and we guarantee a rock-solid connection at all times.

Reviews: Leo Waldoek

	DEVOLO dLAN Wireless Extender £115 (inc. VAT)	A versatile set of PowerLine plugs, but you'll be paying for the privilege
	D-LINK DHP-301 PowerLine HD £70 (inc. VAT)	A former medal-winner, but does it still have the same level of appeal?
	EDIMAX HP-2001AV 200Mbps £80 (inc. VAT)	Edimax's first PowerLine adapter, offering great value for money
	NETGEAR XEB1004 £69 (inc. VAT)	The cheapest set here, but you will need to buy your own Ethernet cables
	SOLWISE PL-200AV-PIGGY £107 (inc. VAT)	The odd name makes sense, as this adapter also allows you to plug in extra devices



DEVOLO dLAN Wireless Extender

► PRICE £115 (inc. VAT) ► PRICE CHECK: www.techradar.com/31301

The Devolo dLAN Wireless Extender Starter Kit is an intriguing piece of hardware that mixes a number of technologies. Both adapters are blue in colour, which seems to denote HomePlug 1.0 and 802.11g standards, as faster Devolo HomePlug AV sets are shiny and white (see boxout on page 66). That's where the similarity between the two adapters ends, as the primary unit which connects to your router with Ethernet is compact in size with a translucent blue shell. The second adapter is larger with a shiny dark-blue finish and an antenna on top.

In addition to the usual wired Ethernet connection on the adapter, you can connect to the Devolo with the full 54Mbps signal strength of 802.11g wireless.

As this kit is based on existing Devolo hardware, we weren't surprised to see that the software consists of Devolo's three usual utilities. The dLAN Configuration Wizard allows you to assign a password based on the security ID of the adapter.

Then we have Devolo Informer which advises you of the MAC addresses and firmware versions of the adapters on the network and is handy for network administration.

The third utility is Devolo Easyshare, which assists you in sharing folders and files across your network. Then there is the new utility called Wireless Extender Configuration that handles your 802.11g wireless connection. It's a simple yet effective set of tools which does an admirable job.

This is also our opinion of the Devolo dLAN Wireless extender, as it brings a decent wireless signal to within a few metres of your laptop.

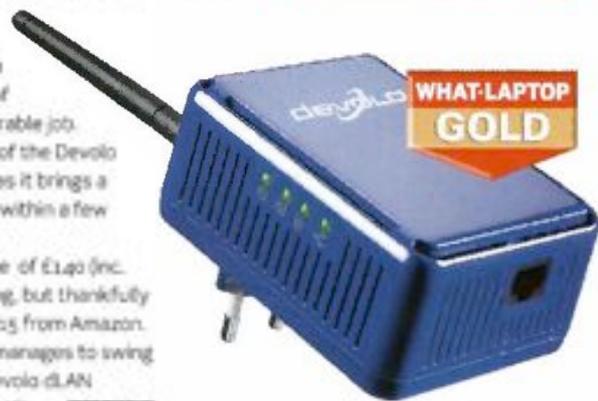
The recommended price of £140 (inc. VAT) is positively horrifying, but thankfully you can buy the kit for £115 from Amazon. It's still expensive, but it manages to swing the Gold Award for the Devolo dLAN Wireless Extender Starter Kit.

WHAT-LAPTOP

SUPPLIER	WWW.DEVOLO.COM
PRICE PER PAIR	£115 (INC. VAT)
ETHERNET TECHNOLOGY	10/100BASE-TX
CONNECTION STANDARD	HOMEPLUG 1.0
MAXIMUM POWERLINE DATA RATE	85MBPS
MAXIMUM ETHERNET DATA RATE	10/100MBPS
SECURITY	128-BIT AES ENCRYPTION
WIRELESS CONNECTION	85MBPS WITH WEP, WPA AND WPA2
SYSTEM REQUIREMENT	WINDOWS XP, VISTA
DIMENSIONS	70 X 201 X 63MM
WEIGHT PER ADAPTER	142G WIRED + 216G WIRELESS

RATING

9



WHAT-LAPTOP GOLD

WHAT-LAPTOP

SUPPLIER	WWW.DLINK.CO.UK
PRICE PER PAIR	£70 (INC. VAT)
ETHERNET TECHNOLOGY	10/100BASE-TX
CONNECTION STANDARD	DS2
MAXIMUM POWERLINE DATA RATE	200MBPS
MAXIMUM ETHERNET DATA RATE	10/100MBPS
SECURITY	MIXED DES/3DES ENCRYPTION
WIRELESS CONNECTION	N/A
SYSTEM REQUIREMENT	WINDOWS 2000 SP4, XP SP2
DIMENSIONS	72 X 102 X 42MM
WEIGHT PER ADAPTER	192G

RATING

8



D-LINK DHP-301 PowerLine HD

► PRICE £70 (inc. VAT) ► PRICE CHECK: www.techradar.com/31617

The D-Link DHP-301 PowerLine HD Ethernet Starter Kit won our HomePlug group test in the April 2008 issue. Since then the price has dropped from £87 to £70 (inc. VAT), but it isn't all good news. We've come to the realisation that the DHP-301 is not compliant with the HomePlug standard, as it uses a DS2 chipset. This means that the DHP-301 is incompatible with HomePlug equipment and cannot coexist on the same power circuit.

Having said that, DHP-301 works perfectly well if you wish to extend your home network over the electrical system, but the lack of HomePlug compatibility may cause you problems if you wish to extend your network further in the future.

This rather throws the emphasis on the rest of the D-Link package and that continues to be something of a disappointment. The design of the matt-white plastic casing of the adapters is uninspiring and the three green activity LEDs give you very basic information about Power, Powerline and Ethernet

connections. There are no reset buttons and the Ethernet cables are only 1.5 metres in length.

The software installer checked and found that an update was available for WinPcap, while the main D-Link utility is still on the original version. This is the point where things get a bit sticky for D-Link as WinPcap is link-layer network access software that has no obvious role in the home and this product is clearly aimed at the home user. Despite this, the D-Link utility labels the two adapters as the 'ETH connected node' and the 'PLC connected node' which is a horrible piece of jargon.

It's a shame, as the D-Link utility configures encryption on the network as competently as other units, and the hardware works well. Add to this the fact that the price is attractively low and it's a tempting device - provided you don't expect to mix and match D-Link with other brands of hardware. However, we feel that the DHP-301 PowerLine HD is outclassed by the competition in this group.



WHAT LAPTOP

SUPPLIER	WWW.EDIMAX.CO.UK
PRICE PER PAIR	£80 (INC. VAT)
ETHERNET TECHNOLOGY	10/100BASE-TX
CONNECTION STANDARD	HOMEPLUG AV (NOT CERTIFIED)
MAXIMUM POWERLINE DATA RATE	200MBPS
MAXIMUM ETHERNET DATA RATE	10/100MBPS
SECURITY	128-BIT AES ENCRYPTION
WIRELESS CONNECTION	N/A
SYSTEM REQUIREMENT	WINDOWS 98SE, 2000, XP, VISTA
DIMENSIONS	64 X 98 X 37MM
WEIGHT PER ADAPTER	136G

RATING 8



EDIMAX HP-2001AV

► PRICE £80 (INC. VAT) ► PRICE CHECK: www.techradar.com/472732

The new Edimax HP-2001AV 200Mbps PowerLine Ethernet is the company's first HomePlug AV product and has a maximum speed of 200Mbps.

In our testing the Edimax kit was fully compatible with the Solwise PL-200AV-PGGY, which supports the same HomePlug AV standard. However, it is worth noting there are no Edimax products listed on the HomePlug.Org website.

The Edimax units have a pearl finish that is curiously nondescript and they would ordinarily blend into almost any room, but this might not happen as the HP-2001AV has been designed upside down. We would usually expect the HomePlug unit would hang down from the three-pin mains plug, but instead the unit points upwards and, as a result, the printed lettering is upside down and the Ethernet cable sticks out of the top. It looks rather comical.

Installing the Edimax adapters was quick and simple, although we could have chosen to make life slightly more

complicated by using the Group button to link groups of Edimax adapters on the same electrical circuit. If you do this, adapters in Group A cannot see those in Group B, but we would have needed another pair to make the Group System work. Additional adapters cost £40 each.

We had a touch of déjà vu when we used the Edimax Setup Utility, which is also called PowerPacket. It performs in a similar way to the Netgear utility and gives you information about line quality, which was described as Good in our case and displayed the connection speed as 'over 200Mbps'. This information is clearly of critical importance as the software pops up a 'scanning' message every few seconds to let you know that it is keeping an eye on your network.

The cost of these adapters is modest and the connection speed is very fast, so if you simply want a wired network connection, we'd strongly recommend the Edimax HP-2001AV for the job. **WHATLAPTOP**

The mysteries of PowerLine networking

PowerLine networking uses your electrical cabling in much the same way that wireless networking uses the airwaves. The original HomePlug standard used a frequency range 4MHz-21MHz that was divided into 84 bands. The frequency range was stretched to 2MHz-28MHz for HomePlug AV and the number of bands was extended quite significantly to 1,536, so each band covers a far tighter range.

The main difference between the two technologies is the way they communicate. HomePlug 1.0 uses CDMA (Code Division Multiple Access), which is a digital radio technology that allows every device on the network to talk simultaneously.

Each device uses its own code so the signals don't get mixed, but there is a distinct limit on the number of devices that can be connected at any one time.

HomePlug AV takes a leaf from the mobile phone book and employs TDMA

(Time Division Multiple Access). A master device on the network acts as the conductor of the orchestra and divides the time equally between all of the adapters to ensure they all get a fair crack of the whip. The result is better management of the network and an ability to connect

as many as 20 or 30 devices.

The downside is that HomePlug 1.0 cannot work with HomePlug AV, although the two systems can coexist. HomePlug AV hardware detects the presence of older equipment and allows the CDMA signals to flow without interruption.



Thankfully, HomePlug 1.0 and HomePlug AV can coexist perfectly well together



What is HomePlug?

It's not especially difficult to develop networking hardware that works across mains power cabling, but it's a different story if you want different makes of hardware to be compatible with each other. In 2003, the HomePlug trade group (www.homeplug.org) was formed to tackle the problem of compatibility and standards and they came up with HomePlug 1.0, which allows hardware to communicate at a nominal speed of 14Mbps – this has superior real-world performance to 802.11b wireless.

Then along came 802.11g wireless, so HomePlug responded with HomePlug 1.0 Turbo, which works at a much more useful nominal speed of 85Mbps, although the true speed will be in the range of 15Mbps-25Mbps.

The next step was a HomePlug standard that could handle streaming video and VoIP, as HomePlug isn't really an IT technology, but is more focused on home automation and entertainment. HomePlug AV was

finalised in 2005, with a theoretical maximum speed of 200Mbps and a genuine speed of 40Mbps or more. The only snag is that HomePlug AV is not compatible with HomePlug 1.0, although the two technologies can coexist on the same power circuit.

In other words, you can use a network of Edimax HomePlug AV adapters and another network of Netgear HomePlug 1.0 adapters in the same building, but they won't be able to communicate with each other. If you then decide to plug in some non-HomePlug adapters, such as D-Link DHP-100, you'll find the network breaks down as the DSA chipset is incompatible with all versions of HomePlug.

This could be a problem if you're extending a large network in an office, but the typical home user is unlikely to be troubled by issues of compatibility.



The HomePlug trade group handles PowerLine compatibility issues

WHAT LAPTOP

SUPPLIER	WWW.NETGEAR.CO.UK
PRICE PER PAIR	£69 (INC. VAT)
ETHERNET TECHNOLOGY	10/100BASE-TX
CONNECTION STANDARD	HOMEPLUG 1.0
MAXIMUM POWERLINE DATA RATE	85MBPS
MAXIMUM ETHERNET DATA RATE	10/100MBPS
SECURITY	56-BIT DES ENCRYPTION
WIRELESS CONNECTION	N/A
SYSTEM REQUIREMENT	WINDOWS XP/SP2
DIMENSIONS	71 X 97 X 51MM
WEIGHT PER ADAPTER	180G

RATING 8



NETGEAR XEB1004

► PRICE £69 (inc. VAT) ► PRICE CHECK: www.techradar.com/472749

Netgear has an extensive range of Powerline products with lowly speeds of 14Mbps at the low end and 200Mbps HomePlug AV at the top end. You can extend the Powerline network with Netgear adapters that sport 802.11g wireless, so Netgear's choice for this group test was very interesting. The XEB1004 adapters support 85Mbps HomePlug 1.0, rather than the faster HomePlug AV standard, but they have a novel feature, as each adapter has four Ethernet ports.

This sounds like a fine idea, in principle, as you can use HomePlug to extend your network around a tricky wall or connect computers on different floors, with the bonus that you can connect as many as four PCs to the far end of the network. This may sound appealing if you're feeding Broadband to the kids' bedrooms, for example, but it's bound to cause a certain amount of mess when you string Ethernet cable from a single plug point.

Netgear charges a low price for a pair of

these adapters, but you will need to factor in the cost of Ethernet cable, as you only get two 1.5-metre pieces in the package.

The nominal bandwidth of 85Mbps equates to a realistic 15-25Mbps, which outstrips any internet connection for a single user, but you may well see your connection speed degraded when multiple users are connected.

During installation the software checked for updates and found the CD was up to date. We found the PowerLine Encryption Utility to be a handy piece of software that allows you to enable encryption as well as see the status of your connections. It has a bar chart that shows line quality similar to the signal meter on your mobile phone. You also see a figure for the connection speed which hovered around an indicated speed of 63Mbps during our testing and which was rather optimistic.

The XEB1004 is a neat idea, but we think the Devolo wireless approach makes life so much easier.



WHAT LAPTOP

SUPPLIER	WWW.SOLWISE.COM
PRICE PER PAIR	£107 (INC. VAT)
ETHERNET TECHNOLOGY	10/100BASE-TX
CONNECTION STANDARD	HOMEPLUG AV
MAXIMUM POWERLINE DATA RATE	200Mbps
MAXIMUM ETHERNET DATA RATE	10/100Mbps
SECURITY	128-BIT AES ENCRYPTION
WIRELESS CONNECTION	N/A
SYSTEM REQUIREMENT	WINDOWS 98SE, ME, 2000, XP
DIMENSIONS (WXHXD)	50 X 123 X 71MM
WEIGHT PER ADAPTER	280G

RATING 8



SOLWISE PL-200AV-PIGGY

► PRICE £107 (inc. VAT) ► PRICE CHECK: www.techradar.com/472761

The strange name of the Solwise PL-200AV-PIGGY adapter makes more sense once you unpack the box. Each adapter is rather tall at 123mm and is also relatively deep at 71mm because it carries a female three-pin mains power socket piggy-back style. It's a simple idea that allows you to leave a network adapter plugged into a mains socket without losing a power point or, heaven help us, resorting to a two- or three-way adapter.

This convenience has another aspect, as each unit is very slim and will comfortably fit next to other plugs in their wall sockets. The other adapters in this group are fairly wide and could possibly cause problems next to chunky power adapters.

The plug-through unit can support a maximum load of 8Amps, so you'll be able to use it as a regular socket, unless you want to plug in a three-bar heater, and the premium for this feature is a mere £5 on top of a regular Net-PL-200AV-PUSH.

These were among the simplest devices to connect in the group. Plug in the first

adapter, push the Simple Connect button, then plug in the second unit and push its button within two minutes and the green activity lights come to life. This allows the units to handshake with 128-bit AES encryption enabled without messing around with passwords.

Solwise includes its HomePlug AV Utility, which includes options to enable Quality of Service settings that favour gaming, audio or VoIP services over other traffic. There's another option that allows you to update the firmware on the adapter which helps to maintain compatibility between different models of HomePlug AV adapters.

You can also use the AV Utility to configure your security settings if the idea of pushing buttons seems too laborious.

Add that lot together and you have a very capable set of HomePlug AV adapters that may save your bacon if you're short on electrical sockets. Unfortunately, they also look rather unappealing and cost a pretty penny into the bargain. **WHAT LAPTOP**

POWERLINE NETWORKING AWARD WINNERS

This was an incredibly close group test where the winning adapters from Devolo scored nine marks and the other four came in equal second place with eight points. We had a good selection of hardware from the relatively basic and cheap D-Link set to the curiously named Solwise which saves you a plug socket. The most interesting adapters came from Devolo which added wireless to the equation and Netgear which added wireless to the equation and Netgear with four ports on each adapter instead of the usual one.

GOLD AWARD

Devolo dLAN Wireless Extender Starter Kit

Routing a network connection through the mains power is a neat trick, but most HomePlug hardware still insists you plug an Ethernet cable into the back of your laptop. Devolo gives you the choice of a wired or wireless connection and that makes it a winner.



Name	Devolo dLAN Wireless extender Starter Kit	D-Link DHP-301 PowerLine HD Ethernet Starter Kit	Edimax HP-2001AV 200Mbps PowerLine Ethernet Adapter	Netgear XEB1004	Solwise PL-200AV-PIGGY
PRICE	£115 (inc. VAT)	£70 (inc. VAT)	£80 (inc. VAT)	£69 (inc. VAT)	£107 (inc. VAT)
RATING (OUT OF TEN)	9	8	8	8	8
URL	www.devolo.com	www.dlink.co.uk	www.edimax.co.uk	www.netgear.co.uk	www.solwise.com
ETHERNET TECHNOLOGY	10/100BASE-TX	10/100BASE-TX	10/100BASE-TX	10/100BASE-TX	10/100BASE-TX
CONNECTION STANDARD	HomePlug 1.0	DS2	HomePlug AV	HomePlug 1.0	HomePlug AV
MAXIMUM POWERLINE DATA RATE	85Mbps	200Mbps	200Mbps	85Mbps	200Mbps
MAXIMUM ETHERNET DATA RATE	10/100Mbps	10/100Mbps	10/100Mbps	10/100Mbps	10/100Mbps
SECURITY	128-bit AES encryption	Mixed DCS/3DES encryption	128-bit AES encryption	56-bit DES encryption	128-bit AES encryption
WIRELESS CONNECTION	85Mbps with WEP, WPA, WPA2	N/A	N/A	N/A	N/A
MINIMUM SYSTEM REQUIREMENT	Windows XP, Vista	Windows 2000 SP4, XP SP2	Windows 98SE, 2000, XP, Vista	Windows XP SP2	Windows 98SE, Me, 2000, XP
DIMENSIONS	70 x 201 x 63mm	72x102x42mm	64 x 96 x 37mm	71 x 97 x 51mm	50 x 123 x 71mm
WEIGHT	142g + 216g wireless	192g each	136g each	180g each	280g each