

ADSL Around the Home

At Solwise we get questions every day, which go something like: "How can I set up my broadband connection so that I can use it in a different location in my house". Sometimes there is a need to use several computers at the same time and sometimes it is one computer, which is, situated a long way from the 'master' socket.

There are a number of technologies involved in producing the optimum solution. An appropriate combination of these will depend on the exact layout of your desired system. In this article we will consider four methods, which, in some combination, cover 99% of all requirements. These technologies are:

ADSL Filtering
Wired Networking
Wireless Networking
Networking-Over-Mains.

This article is designed as an introduction to these technologies. Further information can be gleaned by checking out the specs for the various ranges and individual products on our web site

ADSL Filtering

Even if you only have one computer, and it is near your 'master' socket, you will need to consider ADSL filtering. This is because the ADSL signal shares the same pair of wires from the exchange with your telephone. Unfortunately, if we don't separate the two signals then the phone tends to drain away the ADSL signal. The solution to this problem is called a microfilter or splitter.

In principle you only need one filter, you just ensure that all your telephone devices are connected 'down-stream' of this one filter. However, unless you have no extensions around the house at all, you will need to understand the way your telephones are wired to achieve this ideal solution. As a result most people just add a filter at each location where a telephone device is plugged in. (Don't forget your satellite TV box or Alarm!). You do not need to filter un-used extensions.

At Solwise we stock a range of filters suitable for this 'filter-every-extension' solution. The simplest is our 'Plug-in Splitter'. At each extension you just plug your telephone device into the splitter and the splitter into the wall. With this solution you can connect your modem wherever you wish, though, you can only connect one ADSL modem to the line. You cannot share your ADSL connection by simultaneously connecting two modems.

		
ADSL Plug Splitter/Microfilter	ADSL Faceplate Splitter	ADSL Filtered BT Faceplate

If you think the Plug-in Splitter is a little untidy for some of your extensions you have the option to replace the front of that extension with a 'Filtered-Faceplate'. We offer these in the two popular sizes of 65mm and 85mm square, (measure your own extension faceplates to see which is appropriate). The 85mm variant is also available with a modem connection as well as a phone connection.

Getting Clever.

Apart from being tidier, the second advantage of the filtered faceplate range is that a filtered signal can be taken from the rear to feed all down-stream telephone sockets. This can greatly simplify the ADSL-conversion of a house with many telephone extensions. If you are not sure whether your skills with a screwdriver are up to this task, have a look at the diagrams of sample installations shown here. The instruction sheet for the filtered faceplates can also be downloaded from our web site and offers further technical information, which may help you, decide on the best solution for you.

Getting Technical about Ring Signals

If you decide to instigate a clever wiring scheme based on filtered faceplates, then a little background information on ring signals may be useful.

Many years ago the UK telephone system adopted a different policy to that in the rest of the world. Here in the UK we made a choice to move a component, which enables the telephone to ring, out of the telephone and into the socket on your wall. The main reason for this involved 'pulse-dialling', which has now been replaced by 'tone-dialling'. It was a good idea at the time because it made it possible to stop the 'tinkling' that occurred on other extensions when a phone was dialling.

However, there was a downside: To get the ring signal into the telephone we now have to run a third wire from the socket to the phone. Also, since we only need one ring capacitor on our line, and it is located at the 'master' socket, we have to take three wires to all our extensions, rather than the two wires which come to the house. On most modern wiring you will find the original phone signal connected on the 'blue-white' pair of wires and the extra 'ring' signal connected on an orange wire, though this convention is not universal.

Now, since ADSL filters only filter the main telephone pair, they must re-generate the ring signal themselves. All of this is of only passing interest but it does mean that you only need to feed an ADSL filter with two wires. The ring signal for the third pin on the attached phone is generated internally. Since most telephone extension wiring consists of two pairs, you may find this information particularly useful if you need to use a particular run of pre-installed cable for both a filtered and unfiltered signal. I'll leave it to your own ingenuity to determine if this situation is of value to your own installation.

Getting Technical about Signal Quality

If your ADSL service is delivered a long way (more than 3km) from its exchange the signal may be weak. Although the situation is rare, it is possible that the layout of the extension wiring within your house can degrade the signal even further. If you

suspect that you may have this problem then you will need to do all you can to optimise your wiring.

The basic principle is to ensure that there is only one path for the ADSL signal - from your master socket to your modem. There should be no blind alleys caused by t-junctions or branches on the way. All of these blind alleys should be closed off with a filter so that the ADSL signal cannot pass down them.

The best solution is to put your modem next to the master socket using our 'Faceplate-Splitter'. This is an extra-high-performance ADSL filter designed to replace the lower half of the BT Master socket (called an NTE5). This places the filter as close as possible to the incoming ADSL signal and provides hard-wired, filtered connections at the rear for all the other telephone extension in your house. The only place the ADSL signal is available is at the front of the faceplate.

Of course, next to the master socket may not be where you want your ADSL service, which brings us neatly to the other technologies for getting the ADSL service around your home.

The Internet as a Network Resource

All of the distribution mechanisms that I cover here are networking technologies. This means that you will need a router of some sort, to present your ADSL service as an Ethernet signal. This could be a computer running internet-sharing software but you are more likely to choose a modem-router. This is a device with a modem interface at one side (the WAN side), which connects directly to the ADSL wall socket, and an Ethernet or LAN interface of some sort on the other side (called the LAN side). There are several reasons why this choice is preferable but one of the most important is security.



If you connect your computer using a USB or internal modem directly to the Internet then it becomes part of the Internet generally. It is visible to all other people using the Internet and you must take the necessary steps to ensure that your computer and the data on it are kept private. When you choose to connect to the Internet via a modem-router, you will normally select a mode called NAT (for network address translation). In this mode the WAN (Wide Area Network) side of the router joins the wider Internet, and the computers(s) on the LAN (Local Area Network) side are completely hidden. They can see out but the world cannot see in.

With a modem router, the user-name and password for your Internet account are held in the router, not your computer. This is because it is the router which logs-in to the Internet service, not your PC.

Another reason to select a routed solution is that your computer will use its network interface, sometimes called the Ethernet or LAN interface for its Internet connection. The drivers for this type of interface are very mature, very stable and usually supplied with Windows (or Mac OS, or Linux or Unix) itself. Drivers for other interfaces such as USB or PCI devices often fail to provide the same level of compatibility, reliability and stability.

If you have more than one computer, or if you have extra peripherals, such as a printer in a different room, then networking comes into its own. All your computer devices become network resources, which can be shared, or not, as you see fit.

There are several types of network interface available for your computer. In the following paragraphs I will explain the important features of wired, radio-wireless and networking-over-mains Ethernet distribution. At the time of writing (early 2006) there is no significant cost difference between the three technologies, except that the cost for wired Ethernet is principally labour based, so if you are doing the work yourself this option may work out very economical.

Wired Ethernet.

Many people reject the idea of wiring their homes for a computer network out of hand. I consider this to be a mistake. Adding a few sockets on the skirting boards in discreet locations and running wires between them can be a very low-cost option, not just now but for the next twenty years. How many generations of active devices will have come and gone, and have been bought and thrown away, over the period you expect to be using your computer? Whatever that number is, it is very unlikely that your installed Ethernet wires will have lost their value. They will still be working and, because of the huge amount of installed infrastructure, the hardware to drive them will still be available, and probably getting faster and cheaper.

Whilst you are at it, the wires can also be used to add extra telephone points if you need them. Also, Ethernet is the coming format for the distribution of audio and video around the home, so a socket behind the TV may be a good idea.

The cable and connectors are all available from us at Solwise; they are cheap and easy to fit. The main problem you (or your wife) will have is hiding the wires. In most cases the best solution is to take the wires through to an outside wall and run them on the outside of the house. If you don't fancy drilling such holes yourself, then you can get a local electrician to take on as little or as much of the work as you see fit. This is probably the only way in which the cost can approach that of the other solutions I present here.

If you select wired Ethernet, or some combination of technologies including it, then the principle is to have some central location, which includes a 'hub' or 'switch'. This device is a low-cost box with a number (typically 5, 8 or 16) of Ethernet ports. You simply arrange for one or more of these ports to be connected to an Ethernet wall-socket near each of your computing devices. Most of the Solwise range of modem-routers come with 4 of these Ethernet ports built in, they could be called modem-router-hubs.

Radio-Wireless Ethernet (Wi-Fi)

Wi-Fi is a variety of Ethernet networking which uses an unlicensed radio band around 2.4GHz (giga-Hertz). Devices are available in a number of formats including USB "dongles", PCMCIA cards, internal PCI cards and Access-Points. An access-point is the link between wired and wireless Ethernet.

If you want to be able to wander about your home and garden using your laptop whilst connected to the Internet then Wi-Fi will definitely form part of your solution. As a minimum you will need an access-point, or a router with this built-in, and a Wi-Fi enabled laptop. If your laptop does not have Wi-Fi included you will need to add a Wi-Fi device, probably using a PCMCIA card or a USB dongle. Some non-wireless laptops have space internally for a mini-pci card to provide this function. All of these device types are available from Solwise.

All Wi-Fi devices come with some level of security, which will exclude all but fairly determined snoopers.

Wi-Fi Range and Penetration

The 2.4GHz band used for Wi-Fi is quite a high frequency which results in its behaviour in some ways being more like light than the signals we get from the BBC for radio. For instance it is rather poor at penetrating brick walls but usually passes quite easily through a window, as long as it is not of the metal-coated K-glass type. Wi-Fi signals tend to pass reasonably well through floors and ceilings, as long as there is no foil-lined plasterboard in between. Most devices claim a coverage of up to 300 meters, but remember that this is in free-space, not your home.

With these points in mind, you can expect good coverage from a Wi-Fi set-up in the same room. Unless your house was built in the last few years, resulting in all the walls being foil-lined, you can expect reasonable coverage from the loft to the ground and through up to one single brick wall. If you live in an old house with thick stone walls, I suggest you look for an alternative solution to the connection between rooms.

Wi-Fi comes in three principle formats, 802.11b and 802.11g at 2.4GHz ranges and the new 802.11a at the 5GHz range. The 2.4GHz standards are also often referred to by their data rates:

- 11Mbps (11 mega-bits per second, 11b standard)
- 54Mbps (54 mega-bits per second, 11g standard).

A new standard call 802.11n (also called pre-n or mimo) promises to improve wireless performance generally but is only likely to improve indoor performance where a clear line-of-sight or reflective path exists between the two ends.

Though it is outside the scope of this article, it is worth bearing in mind that Wi-Fi is an excellent technology for connecting buildings. It is frequently the basis of wireless community projects where a network is created across whole villages or neighbourhoods. See our articles [Connecting Buildings Using Wireless](#) and [Wireless Around the Home](#) for more information on wireless technology.

Networking-Over-Mains Ethernet

Networking-over-mains uses the existing mains power wiring in your home to carry Ethernet signals. The technology for carrying signals through the mains has been

around, notably in the form of wireless baby monitors, and its use for carrying Ethernet signals has been common for some years in the US. This flexible method for home network distribution is now catching on in Europe.

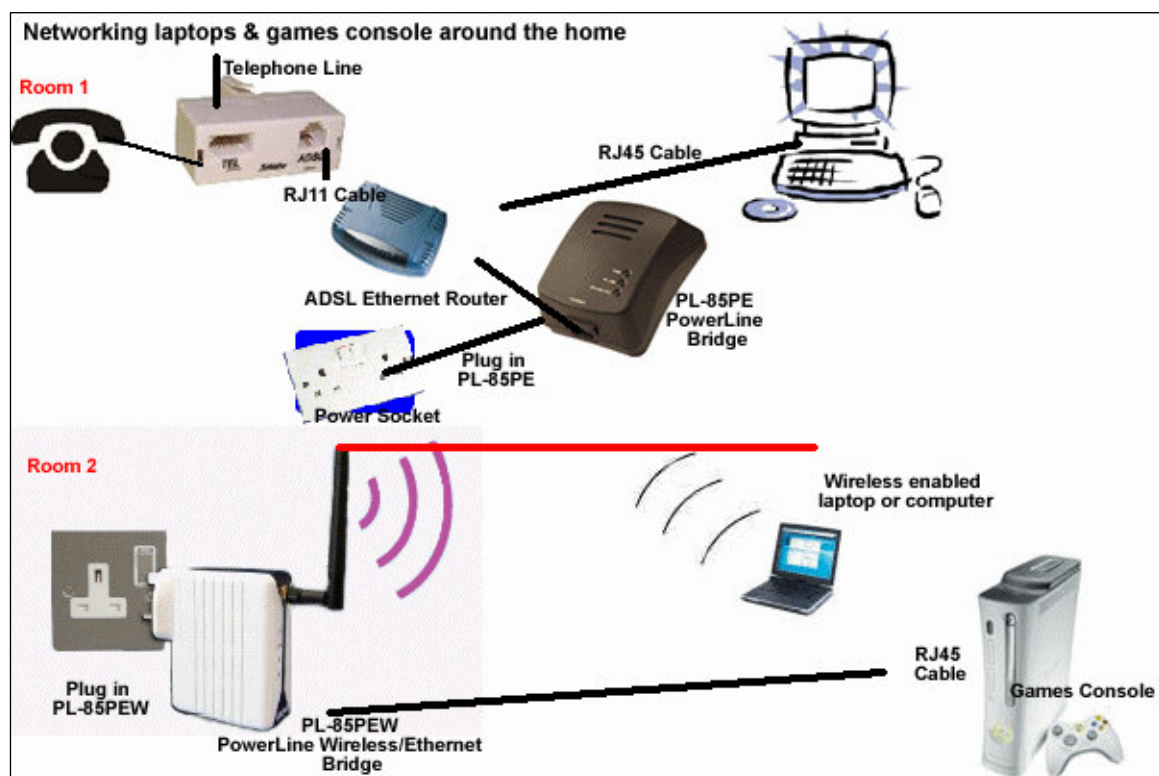
In its simplest form, PowerLine networking consists of a box at each location requiring a network connection. The box is plugged in to the mains and has one other connection, an Ethernet socket, just like the wired Ethernet socket you could connect with wires. You can use several of the boxes around your home (the lowest standard supports up to 12). You can have several isolated networks on the same mains wiring if you wish, each using its own password. The standard to look for is called 'HomePlug'. Any device with this branding should inter-operate. The data-rate is up to 85Mbps but the most popular speed is 14Mbps (14 mega-bits per second – perfectly okay for sharing ADSL internet access).

The range for mains networking is usually stated at 100m but this limitation is important only if you need to reach the garden shed or similar. Generally you will get a connection to any socket in your home as long as you have a single-phase supply. A single-phase supply usually has only one electricity meter, which covers the vast majority of homes.

Solwise also stock ADSL modem-routers with the HomePlug system built-in and new devices, such as wireless access-points and security cameras with HomePlug built-in are also available.

The Combination Solution

For most homes a combination two or more of the four techniques covered in this article can provide the cover you need throughout your home, hopefully at acceptable cost. The exact combination will depend on many factors including: The build-type, layout and size of your home, the number and distribution of the required end-points and, of course, your budget.



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