Breaking down barriers

MARK WHITEHORN OPTS OUT OF MANUAL LABOUR AND TAKES **THE WIRELESS ROUTE** TO CONNECTING UP HIS FARMHOUSE.

WIRELESS: EVEN THE name makes it instantly desirable – networking without all of those annoying dangly bits. A wireless networked laptop would allow you to roam around a building, keeping track of your email no matter where you were. Even better, imagine the same thing at home – you could work in whichever room was currently considered uncool by your children and their noisy friends. Or take it one step further: you could write that report while sitting in a deck chair out in the garden under the apple tree, or even in the tool shed (depending upon just how noisy your children's friends are).

We all know the technology is there, it's been around for a while but was too expensive and complex – certainly out of the reach of the small to medium-sized enterprises (SMEs) that make up the majority of employers in the UK. And certainly out of reach for home use.

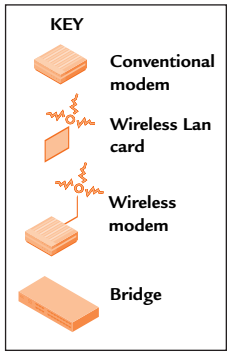
However, recent work by manufacturers has greatly reduced the complexity of wireless networking. Not only that, but the cost of wired versus wireless has seen some big changes and it is now not only convenient to use wireless, but also cheaper too. However, as we found out when we tried it for real, the pros and cons are still finely balanced, so you need to consider them all carefully before coming to a decision.

My wife and I are an SME (with the emphasis on small) but since our business involves not only writing about computing, but also consultancy work for database design and development, our networking requirements are more like that of a medium-sized SME than the two bodies would otherwise suggest. We work from home and moved into our current house two years ago. It is an old farmhouse, thankfully not listed, but boasting 18in-thick stone walls. As soon as we moved in we thought about wireless, but at that time it still looked too expensive, too slow and too flaky. So we bit the bullet, drilled the walls and installed enough cable to connect the servers (one file, one database and one OLAP) to the most likely working points.

Two years on we are refreshing the parts of the house that the previous owners failed to reach - that is, making the old stables and mill room fit for human habitation – so the network needs to be extended. Memories of the joys of drilling solid stone walls and crawling in the roof-space made us look carefully at the alternatives again.

However, before discussing what we decided to do, here is a brief recap of some background information. Most current networks run at 10Mbit/sec to the desktop, but the majority of modern network cards are capable of operating at 100Mbit/sec and most current wiring is Category 5 (Cat 5), which will also run at 100Mbit/sec.

So, if you currently have an existing wired network, the chances are that it is running at 10Mbit/sec, but it can probably be upgraded to 100Mbit/sec without too much extra cost. However, what if your existing wired network isn't Cat 5 (and therefore destined always to run at 10Mbit/sec) or you have no existing network at all? No problem, these aren't pre-requisites for wireless at all; we have simply chosen to compare wireless with 100Mbit/sec wired networks so that



the die are loaded against the new technology. If it is worth trying, it has to be able to compete with the best existing technology.

Wireless currently offers around 2Mbit/sec, which is at best five times and potentially 50 times slower than wired. But then, does this really matter? Well, consider the reasons why you want a network in the first place. These include sharing an Internet connection, using peer-to-peer connectivity, sharing printers and accessing servers (database, file, etc).

Of course, we all want the fastest network connection possible, but remember that web access is usually limited by the speed of the web itself, or by the Internet connection, not by the network speed. And if the documents you move around or open on a server, are 'typical' in size (under about 50K), then the difference in time required will be trivial. Even access to a database server won't suffer, if it is a well-designed client-server system that keeps the network traffic to a minimum. In fact, the main reason that networks need high bandwidth is to support large numbers of simultaneous users, which isn't the typical situation for many SMEs.

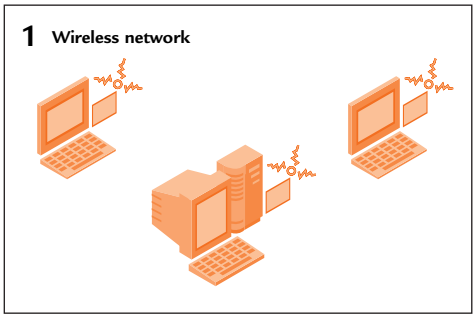
So let's look at the outlay involved in this area. Networking has several inherent costs, but only three are influenced by wired/wireless considerations: cabling, hubs and network cards.

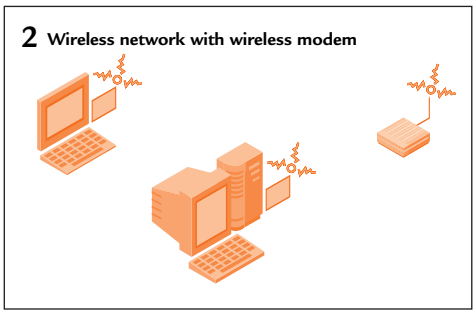
Cabling has been getting cheaper, but about £80 per socket seems to be our current, local price (your mileage may vary). This is unlikely to fall much further because the majority of this cost is labour. Of course, you can do it yourself, as we did two years ago. However, if you are crawling in the roof-space with an electric drill in your hand and glass fibre up your nose, then you aren't earning money doing your real job, so it costs you money one way or another.

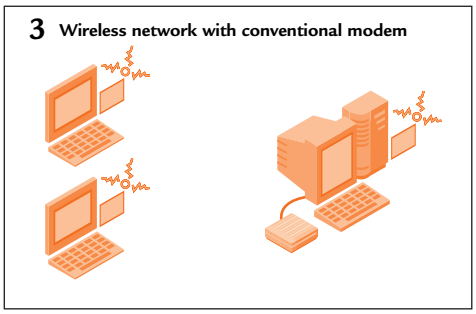
It is also worth remembering that cabling older buildings is usually more expensive (the walls are usually thicker and harder) and also that listed buildings are like Ferraris – very beautiful but more expensive to work upon than you could possibly imagine.

Hub costs in an SME are generally lower on a per-connection basis than in larger organisations. This is mainly because the data rates are lower and so there is no need for large powerful switches. In a firm with eight employees, for example, even choosing 100Mbit hubs we are only talking about £110 for a simple unmanaged hub – which works out at less than £15 for each connection. Also, 100Mbit cards are ridiculously cost-effective: buy in bulk and they can cost as little as £11. But to be safe it's best to allow £20 each, and say £80 for PC Cards. So, the cost for the 'wired' part of a wired network works out at roughly £80 + £15 + £20 = £115.

Wireless cards are much more expensive than their wired counterparts, costing perhaps £85 each or about £115 for PC Card versions. Even so, by definition, you don't need the wiring or the hub, so wireless must win out. This turns out to be the case, but the comparison isn't quite that







Choosing a network to suit your needs

1 Wireless network
If you have no existing infrastructure and simply need peer-to-peer connectivity, all you need is a wireless network card in each machine.

2 Wireless network with wireless modem
If you want all of the PCs to share modem access to the Internet, you can add a wireless modem. These are more expensive than conventional ones, but you save on the additional wiring.

3 Wireless network with conventional modem
If you have an existing conventional modem, you can still share it with wireless connections.

4 Extending a conventional network
If you have an existing wired network, one of the best ways to integrate wireless-connected machines is to add a wireless Ethernet bridge. This plugs into the existing hub and allows each of the wireless machines to talk to the hub and hence to the network as a whole. The beauty of this approach is that all of the machines can see each other, regardless of the way in which they are connected. This also means that if you have an existing Internet connection (*see 5*), the wireless machines can use it. (*See over for diagrams of points 4 and 5.*)

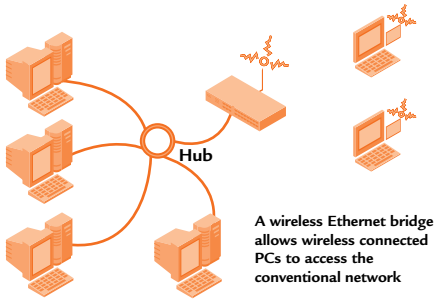
Connecting Windows CE machines

Many Windows CE machines now boast excellent screens, keyboards and battery life, as well as offering easy conversion between the Microsoft file formats, making them a tempting addition to a network.

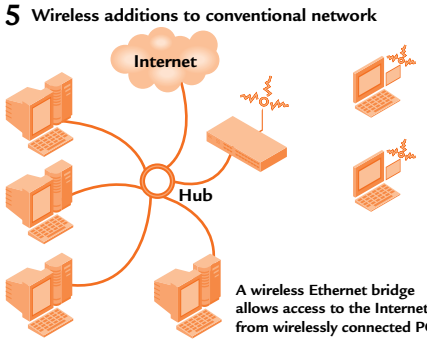
Unfortunately, while Proxim's more expensive RangeLAN2 7410 CE card does support Windows CE machines, users of its cheaper Symphony range (which we chose) are not supported.

The Symphony PC Cards will, of course, fit into Windows CE machines and – unofficially – Proxim PC Cards seem to work in a peer-to-peer wireless network (see www.cewindows.net/wce/symphony.htm), but bear in mind that Proxim makes no guarantees about this, indeed the company's official line is that WinCE is not supported. Alas, this solution does not work for our network because we used a wireless bridge.

4 Wireless additions to a conventional network



5 Wireless additions to conventional network



simple – because there are several ways of structuring a wireless network (*see box, previous page*), particularly when it is integrated with an existing wired network. These different structures yield different benefits, and the costs also vary.

We've used an Ethernet bridge, but you could install a wired and a wireless card in the same machine to connect the two networks. The disadvantage is that you have the added complexity of setting up a machine with two network cards (the Ethernet bridge is simpler by comparison). In addition, that machine has to be booted up before the two sections of the network can communicate. The downside of the bridge is that it is expensive, costing £299.

In fact, the possible ways of interconnecting wired and wireless networks is more extensive that we have shown – the ramifications are almost endless. If you decide to go wireless, you need to check with the supplier to make sure that the options you want are fully supported.

The two main suppliers are Zoom and Proxim. Standards in wireless networking are currently as fluid as an election manifesto. This will change in the future, but for now it is really a case of buyer beware. However, if you want to go wireless now, you will have to jump in one direction. Zoom appears to offer greater adherence to standards, but Proxim offers an Ethernet bridge. The choice is yours, and both companies seem to offer good, stable products.

Both suppliers have recently turned their attentions to the SME/home market and have come out with not only very cost-effective kits, but also wizard-driven installation procedures, which make life much easier. These kits restrict the number of connections that can be made to the network, but this shouldn't be a problem if you have a small number of employees.

We elected to go for Proxim in the end, but this was only because we wanted the functionality offered by the Ethernet bridge.

So, what was our final calculation? Our requirements were that if we were installing hard network points, we would have put in six (three in each new room). That's 6 x £95 = £570. We have three laptops that we wanted to connect, so that's an additional 3 x £80 =£ 240 for wired cards, making a total of £570+ £240 = £810 for wired.

Taking the wireless route, using the Ethernet bridge, the costs are £299 + (3 x £115) = £644.

Given our setup, wireless was the best option because it was:

- Cheaper
- More versatile in terms of where we could work
- Less messy
- Faster to install.

On the down side:

- The wireless network is much slower
- The PC Cards drain more power from the laptops, so battery life is reduced
- We can't wirelessly network the Windows CE machines (because even the unofficial way of using Proxim cards [*see box above*] doesn't work with the Ethernet bridge).

At the end of the day you have to make your own decision. However, we found that wireless networking is very suitable for SMEs, because the low bandwidth – always the Achilles heel of the technology – has less impact on networks where the number of users is low. The real barriers – until recently – were price and ease of use, but these have also been surmounted. □

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