Wireless working

Networking without cables – particularly outside of the office – seems an attractive proposition. But is the technology ready for corporate adoption?

Wireless connectivity is, in theory, an attractive proposition for many organisations. It will, say suppliers, enable them to provide employees with pervasive Internet access to corporate systems, regardless of their location or the type of device they are using. In practice, however, wireless technologies continue to be hampered by problems of performance, maturity and price.

"Wireless LANs are relatively expensive and slow," says Alan McGibbon, managing director of network integration company Scalable Networks. "Are companies really going to overhaul their network infrastructure in order to allow employees to wander around the office with their laptop and still remain connected? There seems little point in sacrificing performance and security for what is at best a neat trick."

The gap between wireless connectivity in theory and in practice is the source of significant ambivalence among corporate users. A study carried out by Forrester Research found that FTSE 500 companies expect their average spending on wireless technologies to increase from £500,000 in 2002 to about £1.2 million in 2003. What the research also found, however, is that a third of the companies that are already spending on wireless technologies say they are unable to measure any benefits from these investments.

OUT AND ABOUT

The problems surrounding the performance and security of wireless networks are particularly acute for employees working away from the office, where different technologies from those used to enable wireless connectivity within offices are employed. Outside of the office, telecommunications companies are the main providers of wireless access, with the GPRS (General Packet Radio Service) standard looking like a promising step towards always-on 3G (third-generation) networks, at the expense of the floundering WAP (wireless application protocol) standard (see box, *Wireless standards: the runners*).

Using either a GPRS modem in a laptop, or a GPRS-enabled mobile phone or personal digital assistant (PDA), employees are able to access the Internet, even when they are not near a phone socket. As a result, the days of plugging modems into hotel room sockets may be drawing to a close – at least in the UK. The speed offered by GPRS, however, is only on a par with that offered by a 56 kilobits per second (Kbps) modem, and its availability is only as good as the mobile network to which the user subscribes.

Alternatively, a laptop user can connect their computer to a mobile phone using Bluetooth, a wireless, short-range system for connecting peripherals to computers. But Bluetooth-equipped systems are only just becoming available. "[Bluetooth] technology got off to a good start, but it was a year behind the original schedule when it came to market," says Dick Clark, senior consultant at systems integration company Consult Hyperion. "And there are a host of new concerns surfacing: concerns about the interoperability of devices, spectrum utilisation, costs and security. One might ask if it's worth bothering with Bluetooth at all."

According to Sara Gemmell, business director at outsourced business communications company Nextra, many

Under investigation: Cooltown, UK

IT is 5am. Your radio alarm clock wakes you. There is congestion on the motorway, so it has taken the liberty of rousing you half an hour early to ensure that you still make your client breakfast meeting on time. Is this Hell or the high-tech future? Neither. It is Hewlett-Packard's 'Cooltown'.

Cooltown, based in Wokingham, is a project designed by HP to illustrate how pervasive Internet technology and wireless networking are going to revolutionise business and everyday life. The Cooltown vision is that, in the not too distant future, every device will have a URL (universal resource locator) and every person will have constant web access via a 3G (third-generation network) phone, Bluetooth-enabled personal digital assistant (PDA), wireless local area network-enabled laptop or digital subscriber line-equipped office or home.

HP, for its part, hopes the benefits of wireless initiatives like those being explored at Cooltown will come not just from being able to access corporate information on the move, but from being able to access any information, at any time. On top of the obvious corporate applications, it expects a number of third-party services to spring up such as 'intelligent agents' that can access diaries, bookings, computers, weather and traffic reports to users on demand.

To bring the concept alive, HP has constructed five 'vignettes' at the European Cooltown site: home, car, shopping, work and leisure. In addition to the Wokingham facility, HP has already completed so-called "Cooltown experience centres" in Palo Alto in the US and Toronto in Canada.

HP admits that there is still some way to go before the infrastructure is in place to support its vision. And there are human issues: "There will always be technophobes who won't want to use the technology, no matter what we do," concedes one researcher.

organisations are answering that question with a resounding 'No'. Bluetooth, she says, "isn't on the corporate agenda." Nextra, which conducts a survey of remote working practices each year, has failed to identify any organisations using Bluetooth among its respondents.

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Clark, however, says it is too early to write off Bluetooth. "It's important to point out that Bluetooth does actually work. We have a variety of devices in our office and have been experimenting with them in various business scenarios. The basic set-up – using a laptop to get an Internet connection through a nearby mobile phone – works, though the connections are slow. A Bluetooth PC card for a laptop works much better than other interfaces – it's possible to imagine using them to swap files with a colleague on a train. But trying to set up reliable connections between different manufacturers' devices has remained problematical," he says.

Michael Wall, wireless research analyst at Frost & Sullivan, says that industry hype "exceeded reality and inflated expectations" during the early years of Bluetooth's development in the late 1990s. While mobile phone vendors have progressed Bluetooth's case well, he argues, operating system developers have been holding it back. "Support within the operating system is the key to guaranteeing interoperability between different devices," he adds. With native support in Windows XP just around the corner, according to Microsoft executives, the standard is due for a kick-start soon.

But once the 'road warrior' returns to the office, the expectations for data access speeds are a lot higher. "Speed's still one of the issues for getting at corporate applications," Gemmell advises, citing the results of Nextra's surveys. "The perception outside the office is that dial-up or ISDN aren't that slow [given how remote the user is from its employer's corporate systems], but inside, [their expectations are] a lot different."

OFFICE POLITICS

Inside the office, Wi-Fi is now the dominant standard for wireless networking. Similar to Ethernet, it operates at approximately 11 megabits per second (Mbps). Vendors such as Dell offer combined GPRS modem/Wi-Fi networking cards to make the switch between systems almost seamless; when the mobile officer worker enters the wireless network's range, the computer's operating system detects the presence of the faster network and automatically logs on to it.

But few companies have started implementing Wi-Fi yet – and many of those decisions have been dictated by an organisations' physical environment. "Many of the implementations we have seen have been for small workgroups who faced real environmental issues that inhibited a wired approach, such as large retail or logistics premises, and other buildings where traditional cabling is not always possible," says McGibbon of Scalable Networks.

"So far, wireless implementations are quite experimental," Gemmell agrees. "Wireless is seen in a few areas, mainly: schools, hospitals and retail outlets." One of the key barriers is security, she says: IT managers are worried about what data will travel across a wireless LAN, which they consider to be inherently insecure.

Wi-Fi supports Wireless Equivalency Protocol (WEP), which can encrypt traffic with a 128-bit key, but this has been shown to be relatively easy to break. An updated version of WEP is currently being devised. In the meantime, says Gemmell, Virtual

Inside out

ALTHOUGH the wireless connectivity standard Wi-Fi is chiefly used inside offices, several retailers including coffee shop chain Starbucks are already providing wireless networks in their outlets so that customers can access the Internet at broadband speeds – without the need for outlets to install cabling or floor ports.

Networking giant Cisco sees wireless and broadband Internet provision as a differentiator for service companies wanting the upper hand in attracting business customers. Cisco Mobile Office (CMO) is the company's initiative to provide an umbrella for disparate systems by partnering with airports, hotels and restaurants that want to offer customers wireless Internet connections.

John Mason, European vice president for the company, explains that by working with partners to offer 'hot spots' where business people can access the Internet, Cisco hopes to make not only its own products popular to partners but to make Internet-availability as much of a prerequisite in customer choice as access to a fax machine or a VIP lounge might be today.

Subscribers to CMO are able to go to web sites or even have SMS messages sent to them to highlight the nearest hotspot. They can then join the wireless network using pre-paid cards or on account. At the end of the month, customers will receive a single invoice for their Internet access, no matter how many different airports or shops they have visited.

However, one problem involved in wireless Internet provision comes from its very selling point: its lack of cabling. If a company such as a hotel is charging for use of wireless Internet access, it needs to find a way of overcoming wireless's ability to pass through walls to a neighbouring access point – or else guests at hotels will be able to use other guests' access points and avoid being charged for their own Internet use.

Wireless standards: the runners

VARIOUS wireless technology standards are competing to become the de facto standard used within organisations. But they all have their limitations, their drawbacks, their proponents and their detractors.

Bluetooth

Bluetooth is a 'personal LAN (local area network)' technology, designed to connect peripherals and small clients to each other, rather than to a network. Bluetooth has a range of approximately 150 metres and works well in devices such as personal digital assistants (PDAs) and mobile phones because its power consumption is limited. Although available in few devices at the moment, Bluetooth adaptors for most existing PDAs are available, and the technology will become far more widespread in 2003 and 2004 as desktop computer vendors, phone manufacturers and PDA vendors make it standard on their mid- to high-end ranges.

Wi-Fi

Also known as 802.11b, Wi-Fi uses the unlicensed part of the radio spectrum used by mobile phones and microwave ovens to transmit Ethernet-style data traffic. Since Wi-Fi uses a variant of the Ethernet protocol, Windows networking, TCP/IP and other standard network systems are compatible with it – so a Wi-Fi equipped computer can communicate with computers and peripherals on a standard wired LAN, provided there is a base station connected to the LAN to act as a bridge between wired and wireless systems. Wi-Fi devices can also communicate directly with other wireless devices to create ad hoc networks in a similar manner to Bluetooth devices.

Wi-Fi successors

Successors to Wi-Fi are upping the standard's speed and range. The earliest version (802.11a), created by microprocessor giant Intel, is capable of 54 megabits per second but operates at different radio frequencies from the later Wi-Fi (802.11b) – as a result, it is not compatible with that standard. Also, although the radio spectrum allocated to wireless local area networks (LANs) in Europe is wider than in the US, systems have to share the spectrum with satellite uplink signals. EU law calls for dynamic frequency and power controls in systems that use this part of the spectrum, features that have been added to 802.11a to produce a Euro-friendly 802.11h. However, 802.11a has now been approved for use in the UK and is likely to be approved for European use in the second-half of the year. In contrast, an upgraded version of Wi-Fi that is capable of similar speeds to 802.11h is being approved: 802.11g operates at the same frequencies as Wi-Fi and so is backwards-compatible, allowing Wi-Fi clients to connect to 802.11g networks, albeit at a lower speed than the native clients. The result is that a future European base station will only need to have 802.11g and 802.11h (or 802.11a) receivers to cater for all legal clients, rather than 802.11a, 802.11b, 802.11g and 802.11h receivers.

WAP

WAP (Wireless Application Protocol) is the current standard method of Internet access for mobile phones. It has proved unpopular with users and is slow compared even with standard modem access. It is gradually being superseded by GPRS.

GPRS

GPRS (General Packet Radio Service) is the replacement for WAP that UK mobile phone operators are currently introducing. It is superior to WAP in several ways: it is approximately as fast as 56K modem Internet access; it is always on, so there is no wait to dial up for access; and more importantly, telecoms companies charge for the amount of data downloaded rather than the time online. GPRS will, in turn, be supplanted by 3G (third generation) mobile phone telephony, which will provide broadband data access speeds.

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Private Networks are favoured by security-conscious companies to prevent corporate data from being eavesdropping by hackers. She is confident, though, that the security flaws in WEP will be fixed.

While Wi-Fi is sufficiently mature that different vendors' products are able to use it to interact, Consult Hyperion's Clark says that incompatibility problems do arise. "One particular problem in our office is that interference between lower-powered Bluetooth devices and higher-powered 802.11 devices significantly reduces the range and speed of Bluetooth connections." So while a PDA might try to print to a nearby Bluetooth-enabled printer, it might find it has a better chance by joining the corporate Wi-Fi network. Either way, Bluetooth's use in anything other than personal peripherals looks unlikely to take off in a corporate setting.

For most CIOs, Gemmell believes, the benefits of wireless are in the lack of cabling, rather than flexibility of access. "In London and in metropolitan areas, we're seeing a lot more interest, particularly in companies that rent office space," she claims. Free of cables to manage and floor ports to provision and monitor, companies can cut costs and offset the far higher costs of wireless networking hardware (while an Ethernet card may cost only £10, a wireless networking PC card costs at least £70).

"Bluetooth prices have stayed stubbornly high," Clark complains. "Adding a Bluetooth sleeve to a Palm costs about $200 and to a mobile phone costs the same again: $400 to replace the infrared link between my Palm and my phone. Assuming realistic pricing, a Bluetooth earpiece and microphone for hands-free operation of my phone, and a Bluetooth card for my Palm would be natural purchases – once I was sure that no-one could listen in to my phone conversations from the next office or read my appointments calendar on the train."

For most companies, the argument for wireless networking is unconvincing. Costs are too high, speed is too low, security is too patchy, the technology lacks maturity and there are very few areas other than cabling where the benefits of wireless technologies exceed wired capabilities. Until the industry is able to show that wireless networks can be trusted and perform as well as their wired counterparts, the vast majority of organisations are unlikely to entrust their data to them.

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