

A Guide to...
...Wireless Networks

By

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Wireless Communications

The four key benefits of wireless technology are:

- Increased efficiency - improved communications leads to faster transfer of information within home/business users.
- You are rarely out of range - you don't need to carry cables/leads to be able to access office networks.
- Greater flexibility and mobility for users - home users can be sat in the garden using a laptop, as can a business person sit elsewhere rather than at a 'dedicated' desk.
- Reduced costs - wireless networks are significantly cheaper to install and maintain.

What are wireless communications?

The benefits

There are several kinds of wireless technologies, the main difference being their range. Some offer connectivity over a small area as large as your desktop, whilst others can cover a medium-sized office space. The most familiar wireless network is the mobile phone it covers whole continents. Wireless technology can offer homes/businesses more flexible and cheaper ways to send and receive data, browse the internet etc...

Local Wireless

Local wireless or PAN - Personal Area Network solutions may be sufficient if you want to free up space, get rid of cables and allow unrestricted based work out of the office or house.

Wireless Network

Wireless network or WLAN - Wireless Local Area Network solutions can help if you need a network providing shared internet, extranet or intranet access, or wish to connect several non-cabled spaces. For businesses they are also a good option if you want to offer convenient network access to visiting employees or clients.

Mobile Phone Network

Mobile phone network or WAN - Wide Area Network technologies can help businesses with non-stationary sales staff.

Local Wireless or PAN

What is it?

- Cordless products, such as mice and keyboards that use radio or infrared technology. These are relatively cheap to buy and easy to install and use. They allow you connectivity within the range of the

desktop, and for certain products, such as a cordless desk phone, a considerably larger coverage.

- Bluetooth, a relatively new and versatile short range radio technology, allows enabled devices such as phones, mobiles, mice, headsets, PCs, printers and keyboards to connect wirelessly within a distance of 10m. Bluetooth technology is increasingly built into up to date mobile phones, PDAs, PCs and PC-related products, while other models can be easily upgraded with a Bluetooth card.

For more information on Bluetooth, see our separate guide available from: http://www.wiredsafety.org/location_goes_here.pdf

What can it do?

- Wire-free connectivity between mobiles, PDAs, keyboards, laptops and printers increases convenience and flexibility, removing the need for cables. Being wire-free makes mobile workers' 'desktop' much lighter.
- A connected Bluetooth device can synchronise data downloads and uploads and exchange information.

Who is it designed for?

- Because they are cable free, wireless connections between PCs and other peripherals free up floor space and liberate floor plans; ideal for businesses which are space sensitive.
- Bluetooth-enabled products are useful for mobile employees needing to update and synchronise information across office systems. Remote workers visiting the office periodically can bring in Bluetooth equipment and access enabled peripherals such as printers.
- New Bluetooth hardware, for example Bluetooth in-store devices, means that several devices are suitable for the smaller business.
- In industry, Bluetooth can be used to wirelessly control equipment and machinery (such as laser cutters, milling machines etc.) - perfect for servicing hard to reach devices.

Costs

- Individual devices vary in price but most products are cost effective and within the range of £50-£400 (\$87-\$700). For example, a mouse typically costs between £30-£50 (\$52-\$87), whereas PDAs can range from £300-£400 (\$520-\$700). Bluetooth adaptors for PCs cost from £30 (\$52) while a Bluetooth card for a PDA costs up to £150 (\$180).

Pros and Cons

- Cordless technology and Bluetooth are efficient, cost effective and convenient.
- It is unlikely that different wireless systems will interfere with each other, although with new technologies and products entering the market, extensive tests have yet to be carried out.
- Bluetooth networks are relatively secure, but can be slow in transferring large files in an office network (where lots of people may use the service).
- Bluetooth networks within a room or a building provide secure, wireless communication with the flexibility of working anywhere within the network range.
- Bluetooth is a short-range solution and may not be suitable if your business/home needs wireless connection over larger distances.

Wireless Network (WLAN)

What is it?

- A WLAN is a network without cables, hence wire-less. Wireless networks can offer all the benefits of traditional cabled networking but without the restriction of being at a desk, near a Network Access Point.
- WLAN devices are connected whenever they are in a wireless network's range. All you need to set up a WLAN is an access point, antennas and adapters for each device - though most modern laptops have this built in.
- You may have heard the term 'WiFi' in connection with WLANs. Often they are assumed to be the same and you may read more in the media about WiFi than WLAN. In fact, WiFi is short for Wireless Fidelity and is a set of industry standards (IEEE 802.11) that most WLANs are built to.

What can it do?

- WLAN enables workers to easily share a single business broadband connection across the office/home, and to remain online if they move their device around the wireless covered area.
- WLANs can be used to easily extend network accessibility to areas where cabling might not be cost effective or practical, for example from an office to its adjacent warehouse. Mechanics in a warehouse can access parts information via a handheld PDA rather than continually going to check a PC.
- Wireless connectivity allows users to make more flexible and efficient use of space and to provide non-networked users with access to hardware, such as printers and other peripherals.
- WLAN 'hotspots' are areas offering customers access to a broadband internet connection, usually for a usage fee.
- Places in France have adopted this idea, because there village is one of few which does not have broadband. They use WiFi to provide internet access from a cabin located near the edge of the town, where broadband is found.

Who is it designed for?

- The size of your business or home premises will dictate your wireless needs. A WLAN access point or gateway serves as the central base station for your network. A standard WLAN access point can support 15 to 20 users, so most home and small office users need only a single access point. A single WLAN can cover up to 100m indoors and 300m outdoors. It can vary depending on the environment you use it in.

- WLAN technology suits relatively fixed or slow-moving, but not desk-bound, users in a defined area.
- With additional hardware (networking bridge) or linked hotspots, businesses that have separate locations up to a few miles apart can use a WLAN to network offices.
- WLAN provides a good networking basis for users wanting to use VoIP-type systems (Voice over Internet Protocol). Using VoWLAN (Voice over WLAN) technology, along with special handsets that look like phones, wireless networks can carry voice data in the same way that VoIP does, allowing a complete ‘hot desking[†]’ scenario in the office.

Costs

- Setting up a WLAN requires an access point or base station, antennas and an adapter for each device that is to access the network. Many of them now come with WLAN adapters or cards built in, and adapters/cards are widely available for those that don’t. WLAN is easily and quickly installed and relatively cost effective - around £315 (\$550) for a small office/home network.
- Costs for access to WLAN hotspots are currently from £5 to £15 (\$9 to \$26) per 24 hours, or from £20-£40 (\$35-\$70) per month. Many WLAN hotspots are provided free for customers’ use, for example in cafés.

Pros and Cons

- Using WLAN devices in commercially developed ‘hotspots’ is more cost effective, especially when compared to the cost of using mobile phone services to access the internet or to send and receive files.
- Metal and other dense materials can have affect on the transmission of radio waves, and stone, brick, heavy woods and even water can also affect range.
- You can improve the network’s range and performance by experimenting with the placement of the base station, antennas and receiving hardware such as laptop computers and PDAs. Setting up a unidirectional antenna can narrow the overall beam width of your base station, providing a much improved range.
- WLANs need to be used in combination with security practices.

[†] A secure and fast connection with other users on the WLAN.

- WLAN, like wired networks, is a shared medium. Depending on conditions, a standard WLAN can provide up to 11Mbps of bandwidth shared between users. If ten users are simultaneously using the network, each may get only 1Mbps. Just sending and receiving e-mail barely puts strain on the network, whilst a roomful of WLAN users accessing high resolution files over a single access point may result in a slowdown.
- Easy to install, no cables to tie.
- Adding new users to a wireless network or moving desk locations within the network range does not require costly changes to the network infrastructure.

Mobile Phone Network

What is it?

- These networks are increasingly used for much more than voice calls. The improved capability of handsets and the networks' increased data transfer speeds means more sophisticated mobile phones and handheld PCs.
- The following is a list of the most common abbreviations connected with mobile phone services.

What can they do?

- Mobile handsets can offer access to e-mail, SMS, GPS, IM, MMS and WAP.
- More and more, smart handsets can offer remote workers access to mobile business applications and wireless internet services, for example combining MMS with internet technology enables staff to take, record and show images and pictures in real time.
- Using web services technology, businesses can create new applications for mobile phone business use, for example enabling customers using mobiles or PDAs to access ordering, billing and online buying.

GPS

Global Positioning System

IM

Instant Messaging

SMS

Short Messaging Service (Text messaging)

MMS

Multimedia Services

Who are they designed for?

- GSM/GPRS networks offer national and international coverage and connectivity for out of office workers using a mobile phone, a handset, a PDA or a laptop.
- Developing services include mobile phones' attached with barcode scanners for delivery workers, allowing them to scan parcel data.

Costs

- Costs for both handsets and network operators' packages vary enormously. Business packages tend to offer more advanced features and tariffs than personal ones, such as unlimited data usage for a fixed monthly sum.

Pros and Cons

- Mobile networks offer tried and tested technology, proven national and global connectivity and billing systems, rival WLAN hotspots cannot match this yet.
- Data services may initially be expensive to use.
- Mobile network speeds are not increasing as quickly as predicted and, although many new handsets are available; their real success depends on the networks delivering the promised faster network speeds.

North Link Ferries – Case Study

With five port offices in five different locations, four ships constantly ferrying freight and passengers as well as a separate head office where the reservations system is based, the communication system needed to be extremely robust.

All operational areas including the ships are part of a WiFi LAN, Virtual Private Network network. The ships' computers can connect to the port office computers via a wireless cloud when they are within range (15 minutes from port). The port office computers can connect with the head office system using ISDN, unmetered dial-up and ADSL, and the head office itself can connect to the ships using an emergency ship-to-shore data network via satellite. This means that all the different business areas have a quick and reliable channel for communicating.

Having secure network connections lets North Link quickly transfer data from different areas. For example, the EPOS (Electronic Point of Sale) system used on board ships automatically transfers data to the port offices, updating information on stock and on-ship staff/resource management. The result is up to the minute finance and management information.

Effective communication also brings productivity savings in managerial effectiveness.

North Link's 20 managers frequently travel between the port offices and the ships, so it is vital that they can work remotely. With wireless connectivity they can access the network via a laptop and keep up to date with all the latest information. The savings made in terms of time efficiency are estimated at around £30,000 (\$52,300) annually. North Link Ferries invested in technology in order to gain the efficiencies that technology brings. Without the savings that effective communication and data transfer have made, North Link Ferries would be unable to provide the level of service it's contractually obliged to deliver. "It wasn't a matter of choice," says Operations Manager Richard Foster. "Using technology was the only way we could cost effectively deliver the service we had committed to."

North Link Ferries provides passenger and freight transport services between the Scottish mainland and the Orkney and Shetland Islands. Delivering accurate, timely information to relevant staff and managers is vital for smooth operations.

With thanks to North Link Ferries for supplying information and answering questions for me to use in this article.

Security

Networks

- Wireless networks can be more vulnerable than traditional wired networks, although security is improving and is, to a large extent, dependent upon the user making the most of the options available. Make sure that you build in security to your WLAN.
- Make sure that access to a WLAN is password protected. Most products allow this facility but, in tests, few users had enabled it.
- Security standards are constantly evolving and you may be able to upgrade your network, so research the market thoroughly and choose upgradeable kit.
- Always activate the Wired Equivalent Privacy (WEP) encryption standards that come with most WLAN networks, using the 128-bit key if possible, and remember to reset the default passwords. Some WLANs are upgrading to the more secure WiFi Protected Access (WPA) standard, so check what is on offer before you buy the hardware.

Devices

- Protect data: if a PDA or laptop should be lost or stolen, how quickly and efficiently can you shut down its access to the network?
- Many handheld devices now feature in-built security and encryption options, and off the shelf software can also strengthen device security.

Considerations

Once you have considered the pros and cons of the various systems, there are several other issues you will need to consider.

Wireless: Future Developments

Wireless services are quickly gaining popularity across the world and, as they do, products and services are being upgraded.

- WLAN hotspots, also known as WiFi hotspots, (subscription only, pay-per-use and free for customers) are being rolled out globally. BT[†] has plans to offer a GPRS/WLAN access package that would enable nationwide wireless connectivity using a combination of GPRS mobile phone and BT WLAN hotspot access.
- One current issue is that different service and equipment providers may not be using agreed standards, so you'll need to check that any products you buy will be compatible with the services you plan to use.
- Increasingly, products and standards are being agreed and, as more WLAN hotspots appear in airports, hotels, cafés, pubs and motorway service stations, operators are beginning to get together and offer mobile phone style 'roaming' facilities that will mean you only need to subscribe to one service.
- UK WLAN hotspot providers, needing at least one broadband connection to offer to users, are beginning to deliver broadband to increasingly remote areas of the UK and rural businesses may be able to 'piggy-back' on these extended broadband services.
- Most WiFi networks today are based on a common set of standards (IEEE 802.11). The Institute of Electrical and Electronics Engineers is currently working on new versions of these standards that will enhance the speed and security of WLANs.

With thanks to British Telecom (BT.com), for supplying information on the soon to be available BT: WLAN, GPRS and WiFi connections.

[†] BT = British Telecom