Understanding Wireless Networks

Do you feel like a complete dummy when it comes to wireless networks? Would you like to learn more about going wireless technology? Thinking about buying a wireless router? But you haven't a clue where to start? Here's a quick and easy way to learn all about the wireless technology. I'll make a prediction now: I think that, within a decade, wireless access will be making everyone's life much easier, and they won't even notice it's there.

What is Wireless Networking?

Wireless networking is just what it sounds like -- a way of creating networks without any wires! If this sounds exciting to you, then read on. With a wireless network, you can create radio connections between computers that let them communicate and connect to the Internet without you having to go to all the trouble of connecting them with wires. The computers don't even need to have a clear path for the signal, as the wireless signal can go through walls and between floors easily.

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Wireless at Home.

When most people talk about wireless networks, they are talking about wireless LANs (local area networks). A local area network doesn't mean that it covers your whole neighborhood -- the 'local area' in question can be only one building, such as your house. So if you want wireless networking in your home, you want a wireless LAN.

Once people have wireless in their home, they always seem to act as if there's been an absolute miracle. After years of drilling holes in the walls and running wires all over the place, suddenly seeing them gone is really amazing.

The Myths.

Wireless networking is expensive. Well, wireless networking used to be expensive when it was new, but now the prices have come way down thanks to competition and mass production. There are hundreds of manufacturers of wireless equipment, with something for every budget. Your costs will depend on how many computers you want to connect and how far apart they are, but a typical family should still be able to do it for less than $100 overall. If you're willing to leave one of the computers on whenever you're using the other one, you could do it for as little as $20! Best of all, once you've spend the money, there's nothing more to pay after that.

Wireless networking is hard. Again, this myth is a holdover from the early days of wireless. It used to be very difficult, with you needing to fiddle endlessly with the configuration on each computer just to get the simplest things to work. Now, though, Windows supports wireless out of the box, and setting it up is easier than ever. You can usually plug in what you've bought, put the CD in the computer and then sit back and watch it all work perfectly!

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Wireless networking is insecure. You might think it's dangerous to have all your personal data floating around in the air for anyone to read. Well, if you want, it's dead easy to enable encryption for your wireless signals. It's already difficult for outsiders to intercept wireless signals at all, and they certainly won't be able to decode them as well.

Not Just at Home.

It was home users that were quickest to adopt wireless technology, willing to pay any amount to finally be free of needing to run wires all over their house. Since then, though, the technology has started to spread to offices, universities, and all sorts of other places.

Chains of coffee shops and cafes have found that their customers will stay for hours if they offer wireless Internet access, and it's also becoming more common in hotels and airports. This means that once you set up a laptop for wireless, it becomes far more portable than it ever was before.

How Do Wireless Networks Work?

Wireless networks work using radio waves instead of wires to transmit data between computers. That's the simple version. If you're curious to know what's going on in more detail, then it's all explained in this article.

Ones and Zeros.

I'm sure you know that computers transmit data digitally, using binary: ones and zeros. This is a way of communicating that translates very well to radio waves, since the computer can transmit ones and zeros as different kinds of beep. These

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beeps are so fast that they're outside a human's hearing range -- radio waves that you can't hear are, in fact, all around you all the time. That doesn't stop a computer from using them, though.

Morse Code.

The way it works is a lot like Morse code. You probably already know that Morse code is a way of representing the alphabet so that it can be transmitted over radio using a dot (short beep) and a dash (long dash). It was used manually for years, and became a great way of getting information from one place to another with the invention of the telegraph. More importantly for this example, though, it is a binary system, just like a computer's ones and zeros.

You might think of wireless networking, then, as being like Morse code for computers. You plug a combined radio receiver and transmitter in, and the computer is able to send out its equivalent of dots and dashes (bits, in computer-speak) to get your data from one place to another.

All About Frequencies.

You might wonder, though, how the computer could possibly transmit enough bits to send and receive data at the speed it does. After all, there must be a limit on how much can be sent in a second before it just becomes useless nonsense, right? Well, yes, but the key to wireless networking is that it gets around this problem.

First of all, wireless transmissions are sent at very high frequencies, meaning that more data can be sent per second. Most wireless connections use a frequency of 2.4 gigahertz (2.4 billion cycles per second) -- a similar frequency to mobile phones and microwave ovens. As you might know, though, a frequency this high

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means that the wavelength must be very short, which is why wireless networking only works over a limited area.

In addition, wireless networks make use of a technique known as 'frequency hopping'. They use dozens of frequencies in the range they are given, and constantly switch between them. This makes wireless networks more immune to interference from other radio signals than they would be if they only transmitted on one frequency.

Access Points.

The final step is when it comes to all the computers on a network sharing Internet access. This is done using a special piece of wireless equipment called an access point. Access points are more expensive than wireless cards for one computer, as they contain radios that are capable of talking to around 100 computers at the same time, and sharing out access to the Internet between them. Dedicated access points are only really essential for larger networks, though -- if you only have a few computers, it is possible to use one of them as the access point, or you could just get a wireless router.

They Understand Each Other.

That's all well and good, then, but how does wireless equipment made by entirely different companies manage to work together when this is all so complicated? Well, the answer is that there are standards that all wireless devices follow. These standards are technically called the 802.11 standards, and are set by the IEEE (Institute of Electrical and Electronics Engineers). It is thanks to people sticking to their standards that wireless networking is so easy and cheap to use today

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You Don't Need to Worry.

If all this talk of frequencies has you a little worried, you don't need to be – wireless networking hardware and software handles all of this automatically, without you needing to do a thing. Don't think that you're going to have to tell one wireless device what frequency another is using, because it's just not going to happen, alright? Wireless networking, for all its complicated workings, is really far more simple to use than you'd ever expect.

5 Reasons Why You Need a Wireless Network.

As far as I'm concerned, wireless networks are one of the best inventions in history – they really are the best thing since sliced bread. I mean, really, bread is easy enough to cut yourself, but have you ever tried to wire up a network? So, in the spirit of spreading the word, I'm going to give you five reasons why you need a wireless network.

Share Internet Access.

Wireless networking gives you a cheap and easy way to share one Internet connection between multiple computers, eliminating the need for more than one modem. You can even add new computers to your network simply by plugging in a wireless card and switching them on -- they get an Internet connection straightaway! There aren't many wired networks that can say that.

Share Files and Printers.

A wireless network gives you access to your files wherever you are in your home, and makes it easy to synchronize the data on a laptop with a home computer. It is much easier to send files between computers with a wireless network than it is to send them by email, or even by burning them to a CD.

Plus, with the printer connected, you can also write things wherever you want,

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press print, and go and collect them from a printer connected to another computer – printers that are plugged into one of the computers on the network are shared between all the computers automatically.

Play Games.

You might have seen an option in your favorite game to play over a LAN. Well, wireless networks are LANs, which means that your whole family can play that game together – without needing the computers to be anywhere near each other. It's far more fun to play against real people you know than to play against random people over the Internet, not to mention that the game will work much faster. You could even invite your friends to bring their computers and join in -- a 'LAN party'!

An added benefit is that wireless equipment lets you easily connect any games consoles you or your kids might have to the Internet, and start playing online. It's far easier to play online with a wireless connected Xbox or PlayStation 2 than to have to connect it to your modem every time.

Always On.

A big factor in the spread of broadband was that it let Internet connections be always-on, without needing to dial in. Well, wireless networking lets network connections be always-on, meaning that any of your computers can connect to the Internet whenever you want! You can take laptops from room to room, and it doesn't matter – they'll always have access. Plus, there's not even any need to set up a user-name and password system, as wireless networks work without logging in. It's just so convenient!

No More Wires.

This, of course, is the biggest reason why you should switch your network over to wireless. Wires are inconvenient, expensive, ugly and dangerous -- you'll be delighted to see the back of them.

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The average Ethernet wire doesn't cost that much per meter, but once you've bought enough meters to do whatever you need to do, well, it tends to add up quickly. Not only that, but if you want to run your wire between rooms or floors, you have to knock holes in the walls -- which might not even be allowed if you're renting. I know plenty of people in rented apartments who had to keep their network confined to one room until they went wireless. With wireless networking, well, you can even take your computer outside, if you want to!

No more wires also means no more spaghetti all over the floor and in the corners. Not only does this improve the safety of your home, as it's all too easy to trip over exposed wires, but it also means that you don't have to go to all the trouble of packing all the wires up and re-connecting them at the other end when you move. It also means that you don't have to examine every wire for damage if your Internet connection breaks down.

Convinced?

If you're excited, then that's great -- keep reading these articles for advice on how to set everything up. If you don't think it's for you yet, well, don't give up on it – I'm sure you'll come round when you realize just how easy and cheap wireless really is.

Confused Yet? Wireless Jargon.

Wireless networking, like so many things in life -- and especially the ones that have anything to do with computers -- is filled with jargon. Don't be intimidated, though: here's a quick computer-speak to English guide to help you get by.

802.11. The name of the wireless networking standard, set by the IEEE. Ensures that wireless devices are interoperable.

Driver. A piece of computer software that tells the computer how to talk to

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devices that are plugged into it. For wireless networking, the drivers you need to install will come on a CD with any equipment you buy.

Ethernet. The most common way of connecting to a LAN. Any wires you might have connecting your computers together now are Ethernet wires, and the cable connecting your modem to your computer is probably an Ethernet wire too.

Ghz. Gigahertz. A measurement of frequency -- one gigahertz is one billion cycles per second. You may recognize the measurement from computer processor speeds, which are now also measured in Ghz.IEEE. The Institute of Electrical and Electronics Engineers. In charge of the wireless networking standard, as well as many other computer-related standards (including the Ethernet standard). They ensure that computer equipment made by different manufacturers can work together.

Interoperable. Means that two pieces of equipment are compatible -- you can use them together, because they stick to the standards. You should not get any wireless equipment that isn't interoperable.

LAN. Local Area Network. A network that is generally confined to one building, such as a home or office. A wireless LAN is also known as a WLAN.

Linux. An alternative operating system to Windows. Computers running Linux can run many programs and connect to the Internet without needing Windows. Linux is free to download and you are allowed to give it to friends to use. A lot of wireless devices run Linux, or are compatible with it.

MAN. Metropolitan Area Network. A network that covers a larger area, for example a town or city. Wireless MANs (men?) spread Internet access all over the area, but are expensive to set up. They are sometimes used on university campuses. Mbps. Megabits per second, a measurement of connection speed. Not to be confused with MBps, megabytes per second. There are eight megabits in a megabyte.

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PAN. Personal Area Network. These are networks made up of devices connected together in one small area. For example, your computer with a USB keyboard and mouse connected is a PAN. PANs can be wireless, using a technology called Bluetooth.

PCI. Peripheral Component Interconnect. This is a way of installing new devices inside your computer, such as graphics cards and network devices. If you want to install a wireless card inside your computer, you will be using PCI.

PCMCIA. Personal Computer Memory Card International Association (some say it should stand for 'People Can't Memorize Computer Industry Acronyms'). A standard for plugging credit card-sized devices into a laptop, to give it extra capabilities.

PCMCIA is a great way of adding wireless networking to your laptop as easily as inserting a disk.

USB. Universal Serial Bus. A port used for connecting all sorts of devices to a computer, including keyboards, mice, printers, external drives, and almost anything else you can think of. If you don't want to open up your computer and you don't have a laptop, you can get a USB wireless device.

WAN. Wide Area Network. A network that is connected over more than one physical site, such as a business that has its computers in two countries connected on one network. The Internet, for example, is a WAN -- the biggest WAN in the world.

WEP. Wired Equivalent Privacy. The old standard for encrypting wireless networks. Unfortunately, it was found to be insecure back in 2001, and so should no longer be used.

WPA. Wi-Fi Protected Access. Basically an upgrade of WEP to fix its security

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