

## Chapter 1

# Introducing Wireless Home Networking

---

### *In This Chapter*

- ▶ Jump-starting your wireless revolution at home
  - ▶ Comparing wired and wireless networks — and why wireless wins!
  - ▶ Picking out a wireless standard to meet your needs
  - ▶ Choosing the right wireless equipment
  - ▶ Planning for your wireless home network
- 

**W**elcome to the wireless age! Nope, we're not talking about your grandfather's radio — we're talking about just about everything under the sun — truly. What's not going wireless? Wanna say your refrigerator? Wrong — it is. How about your stereo? Yup, that too. Watches, keychains, baby video monitors, high-end projectors — even your thermostat is going wireless and going digital. It's not just about computers any more! Your entire world is going wireless, and in buying this book, you're determined not to get left behind. Kudos to you!

A driving force behind the growing popularity of wireless networking is its reasonable cost: You can save money by not running network wiring all over your house, by spending less on Internet connections, by sharing peripherals (such as printers and scanners), and by using your PC to drive other applications around your home, like your home entertainment center, or to talk on the phone. This book helps you spend your money wisely by helping you decide what you need to buy and helping you choose between the products that are on the market. Wireless networks are not only less expensive than more traditional wired networks, but are also much easier to install. An important goal of this book is to provide you with “the skinny” on how to install a wireless network in your home.

Whether you have one computer or several, you have several good reasons to want a personal computer network that until recently just didn't exist. The plummeting cost of wireless technologies, combined with their fast-paced

technical development, has meant that more and more manufacturers are getting on the home networking bandwagon. That means that more applications around your house will try to ride your wireless backbone — by talking among themselves and to the Internet. So, wireless is here to stay and is critical for any future-proofed home.

## *Nothing But Net (work): Why You Need (Or Want) One*

Wireless home networking isn't just about linking computers to the Internet. Although that task is important — nay, critical — in today's network-focused environment, it's not the whole enchilada. Of the many benefits of having wireless in the home, most have one thing in common: sharing. When you connect the computers in your house through a network, you can share files, printers, scanners, and high-speed Internet connections between them. In addition, you can play multiuser games over your network, access public wireless networks while you're away from home, check wireless cameras, use Internet Voice over IP (VoIP) services, or even enjoy your MP3s in your stereo system from work — really!

Reading *Wireless Home Networking For Dummies*, 2nd Edition, helps you understand how to create a whole-home wireless network to reach the nooks and crannies of your house. Wireless home networks don't have to be all about your PC. The big initial reason that people have wanted to put wireless networks in their homes has been to “unwire” their PCs, especially laptops, to enable more freedom of access in the home. But, just about every major consumer goods manufacturer is hard at work wirelessly enabling its devices so that they too can talk to other devices in the home.

Along these lines, we encourage you to think of your wireless home network as another utility network in your house — just like electricity or just like water. Rather than have outlets or spigots, your connection is in the air floating around your head. If you have a device that has the right protocols and passwords — and is in range — it can log on to this wireless *backbone* in your home. Over this backbone can ride data, running between computers and the Internet; MP3s, going from your stereo to your car; videos, from the Internet to your TV set; phones on your regular phone lines or over the Internet; and more. As you find more and more consumer devices sporting wireless interfaces, you can be happy that you have a wireless home network for them to log on to and link to your other devices and network connections — and your PC!

## *File sharing*

As you probably know, computer *files* are created whenever you use a computer. If you use a word processing program, such as Microsoft Word, to write a document, Word saves the document on your computer's hard drive as an electronic file. Similarly, if you balance your checkbook by using Intuit Quicken, this software saves your financial data on the computer's drive in an electronic file.

A computer network lets you share those electronic files between two or more computers. For example, you can create a Word document on your computer, and your spouse, roommate, child, sibling, or whoever can pull the same document up on her computer screen over the network. With the right programs, you can even view the same documents at the same time!

But, here's where you get into semantics: What's a computer? Your car has more computing and networking capability than the early moon rockets. Your stereo is increasingly looking like a computer with a black matte finish. Even your refrigerator and microwave are getting onboard computing capabilities — and they all have files and information that need to be shared.

The old way of moving files between computers and computing devices involved copying the files to a floppy disk and then carrying the disk to the other computer. Computer geeks call this method of copying and transferring files the *sneakernet* approach. In contrast, copying files between computers is easy to do over a home network and with no need for floppy disks (or sneakers). It's almost as simple as copying files from your computer's hard drive to a floppy disk.

What's interesting is that more computers and devices are getting “used to” talking to one another over networks in an automated fashion. A common application is *synchronization*, where two devices talk to one another and make the appropriate updates to each other's stored information so that they're current with one another. Rockford Corporation ([www.omnifimedia.com](http://www.omnifimedia.com)), for example, offers MP3 servers for cars that have wireless connectivity built in so that when your car returns home, it can “talk” to your wireless home network and computers and add any new CDs to its hard drives that your spouse may have added while you were gone. That way, you always have your music, “podcasts,” and audiobooks at your fingertips — literally.

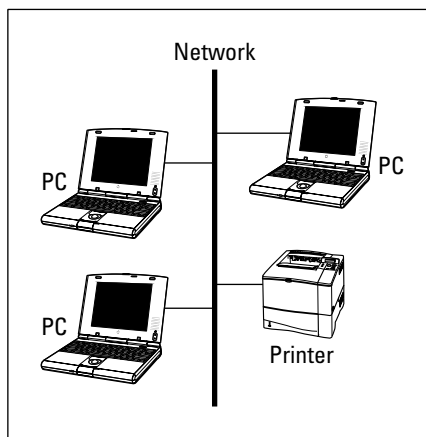
## *Printer and peripheral sharing*

Businesses with computer networks have discovered a major benefit: sharing printers. Companies invest in high-speed, high-capacity printers that are

shared by many employees. Sometimes an entire department shares a single printer or perhaps a cluster of printers is located in an area of the office set aside for printers, copy machines, and fax machines.

Just like in a business network, all the computers on your home network can share the printers on your network. The cost-benefit of shared printers in a home network is certainly not as dramatic as in a business, but the opportunity to save money by sharing printers is clearly one of the real benefits of setting up a home network. Figure 1-1 depicts a network through which three personal computers can share the same printer.

**Figure 1-1:**  
Share and  
share alike:  
Share one  
printer via  
your home  
network.



Other peripherals, such as extra storage for your computers or for all those MP3s that someone in the household might be downloading, also are great to share. Anything connected to your PCs or which has a network port (we talk about these in great detail throughout the book) can be shared anywhere on your wireless network.

## *Internet connection sharing*

Another driving reason behind many homeowners' interest in wireless home networking is a desire to share an Internet connection. As the Internet becomes a critical part of day-to-day living — from kids doing their homework to your managing your bank account — it's only natural that more than one person in the household wants to get online at the same time. And, with the sudden interest in *broadband connections* — cable, digital subscriber line (DSL), and satellite modems — for Internet connections, we can guess that the demand at home has only soared.



High-speed (*broadband*) Internet service is very appealing. Not only is the connection to the Internet as much as 50 times or more faster than a dial-up connection, with sharing enabled over your wireless network, all the computers connected to the network can access the Internet at one time through the same broadband service for one monthly fee. (It can be as low as \$14.95 per month in some areas.) And, you can surf and talk on the phone at the same time. No more having your dial-up connection tie up your phone line!

### *Modem types*

Your wireless network helps you distribute information throughout the home. It's independent of the method you use to access your outside-of-home networks, like the Internet. Whether you use a dial-up connection or broadband, your wireless home network will be applicable.

- ✓ **Dial-up modem:** This device connects to the Internet by dialing an Internet service provider (ISP), such as America Online (AOL) or EarthLink, over a standard phone line.
- ✓ **Cable modem:** This type of modem connects to the Internet through the same cable as cable TV. Cable modems connect to the Internet at much higher speeds than dial-up modems and can be left connected to the Internet all day, every day.
- ✓ **DSL modem:** Digital subscriber line modems use your phone line, but they permit the phone to be free for other purposes — voice calls and faxes, for example — even while the DSL modem is in use. DSL modems also connect to the Internet at much higher speeds than dial-up modems and can be left connected 24 and 7.
- ✓ **Broadband wireless modem:** The same wireless airwaves that are great for around the house communications are great for connecting to the Internet as well. Although the frequency may be different and the bandwidth much less, broadband wireless modems give you connectivity to your home's wireless net, in a similar fashion as DSL and cable modems.
- ✓ **Satellite modem:** Satellite modems tie in to your satellite dish and give you two-way communications even if you're in the middle of the woods. Although they're typically not as fast as cable modems and DSL links, they're better than dial-up and available just about anywhere in the continental United States.
- ✓ **Fiber optic modem:** We're at the front end of the fiber-fed revolution as the telephone and cable companies push to outcompete each other by installing extremely high-capacity fiber optic lines in homes to allow all sorts of cool applications. Until now, the broadband access link has been the limiting bottleneck as wireless networks tried to communicate with the Internet. With fiber optics, you could see the broadband access capacity equal that of your wireless network.

### *Phone jacks versus a network*

Most homes built in the past 20 years have a phone jack (outlet) in the wall in every room in the house where you would likely use your computer. Consequently, connecting your computer to the Internet via a dial-up modem over a telephone line doesn't require a network. You simply run a phone line from your computer's modem to the phone jack in the wall and you're in business.

However, without a network or Internet connection sharing turned on at the computer, the connection cannot be shared between computers; only one computer can use a given phone line at any given time. Not good.

With a wireless home network, we can help you extend that modem connection throughout the home. The same is true with your broadband modem — it can be shared throughout the home.

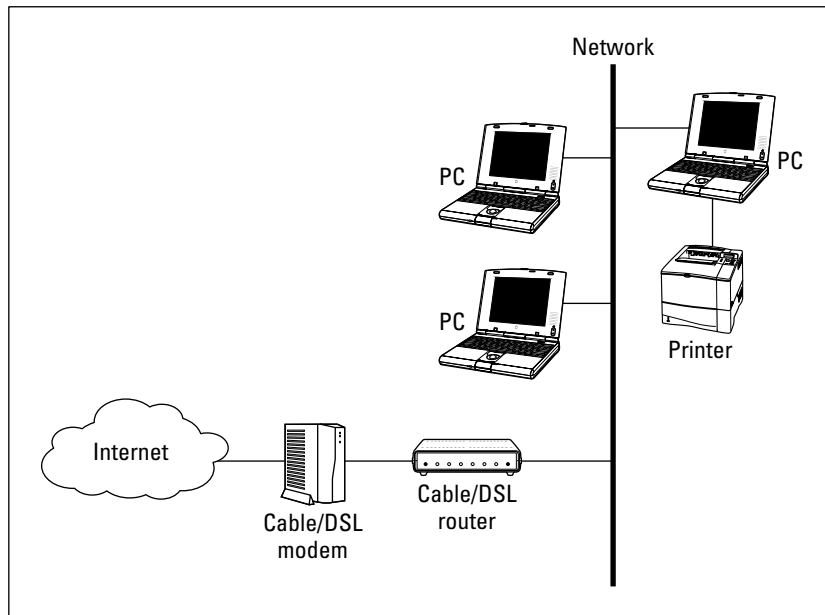


Sure, you could have more than one cable or DSL modem in your house, but don't bother. Because of their speed (bandwidth), cable and DSL modems can easily handle the Internet traffic generated by many individual computers, just like a 50-lane interstate can handle lots of cars at one time. Use a network to connect multiple computers to a cable modem or DSL modem to share an Internet connection.

When configuring your PCs on a network, you can buy equipment that lets you connect multiple computers to a regular or high-speed modem through the phone lines — or even through the coaxial wiring or the power lines — in your house. No matter what the physical connection is among your networked devices, the most popular language (or *protocol*) used in connecting computers to a broadband modem is to use a network technology known as Ethernet. *Ethernet* is an industry standard protocol used in virtually every corporation and institution; consequently, Ethernet equipment is plentiful and inexpensive. The most common form of Ethernet networking uses special cables known as *Category 5 UTP* (or unshielded twisted pair). These networks are named after their speed — most are 100 Mbps (much faster than alternative networks that run over powerlines or phone lines) and are called 100BaseT (you also find 1000BaseT networks, which run at 1 *gigabit* per second. Figure 1-2 illustrates a network that enables three personal computers to connect to the Internet through a DSL or cable modem (it works the same for a satellite or dial-up modem).

See Chapter 4 for more information about planning and budgeting for your network and Chapter 5 for help in selecting your wireless networking equipment.

**Figure 1-2:** Internet for all: Set up a network that enables many PCs to connect to the Internet through a DSL or cable modem.



## *Phone calling for free*

With some new wireless phone capabilities, you can get rid of the static of your cordless phone and move digital over your wireless home network, thus saving money on calls by using less-expensive, Internet-based phone calling options. What started as a hobbyist error-prone service has grown into a full-fledged worldwide phenomenon — phone calling over the Internet is now ready for prime time.

- ✓ **Free and for-fee services are available.** Services like Vonage ([www.vonage.com](http://www.vonage.com)) and Skype ([www.skype.com](http://www.skype.com)) allow you to use your regular phones to call over the Internet for free or low-cost monthly services.
- ✓ **Add-ons to popular software programs are available.** Internet calling and even videoconferencing has been added to instant messaging programs like AOL Instant Messenger (AIM) so that you can talk to the people you used to only “IM” with.
- ✓ **New devices make it simple.** New devices, such as the Olympia DualPhone ([www.dualphone.net](http://www.dualphone.net)), are designed to ease access to these Internet calling services — so that you don’t have to don a headset every time you want to make a phone call.

The best part is that it's all moving toward wireless too. Throw away that old cordless phone and replace it with a new wireless handset or a neat Wi-Fi phone that you can take on the road to make free calls from any Wi-Fi network on the road.

The convergence of wireless and Voice over IP is one of the major megatrends going on in the telecommunications and Internet markets today — you can bet that you want it in your home too!

## *Home arcades and wireless to go*

If you aren't convinced yet that a wireless home network is for you, we have four more points that just may change your mind. Check them out:

- ✔ **Multiuser games over the network:** If you're into video games, multi-player card games, or role-playing games, you may find multiuser games over the network or even over the Internet fascinating. Chapter 12 discusses how to use your wireless network to play multiuser games.
- ✔ **Audio anywhere in the household:** Why spend money on CDs and keep them stacked next to your stereo? Load them on your PC and make them wirelessly available to your stereo, your car, your MP3 player that you take jogging, and lots more. Check out Chapter 13 for more info on how to use your wireless network to send audio and video signals around the house.
- ✔ **Check your home wireless cam:** You can check out your house from anywhere in the house — or in the world — with new wireless cameras that hop on your home network and broadcast images privately or publicly over the Internet. Want to see whether your kids are tearing apart the house while you're working in your office downstairs? Just call up your wireless-networked camera and check them out. (In our generation, we always said, "Mom has eyes in the back of her head"; this generation will probably think that Mom is omniscient!)
- ✔ **Wireless on the go:** This concept is great if you have a portable computer. Many airports, hotels, malls, and coffee shops have installed public wireless networks that enable you, via hot spots, to connect to the Internet (for a small fee, of course). See Chapter 16 for more information about using wireless networking while away from home.

## *Wired versus Wireless*

Ethernet is the most-often-used method of connecting personal computers to form a network because it's fast and its equipment is relatively inexpensive.



In addition, Ethernet can be transmitted over several types of network cable or sent through the air by using wireless networking equipment. Many new computers have an Ethernet connection built in, ready for you to plug in a network cable. The most popular wireless networking equipment transmits a form of Ethernet — simply using radio waves rather than Category 5e cables.

## *Installing wired home networks*

Even though we're talking mostly about wireless networks in this book and how great they are, we would be misleading you if we told you that wireless is the only way to go. Wireless and wired homes each have advantages.

Wired homes are

- ✓ **Faster:** Wired lines can reach speeds of 1000 Mbps, whereas wireless homes tend to be in the 10 Mbps to 100 Mbps range. Both wireless and wired technologies are getting faster and faster, but wired will always be ahead.
- ✓ **More reliable:** Wireless signals are prone to interference and fluctuations, and degrade quickly over short distances; wired connections typically are more stable and reliable all over your home.
- ✓ **More secure:** You don't have to worry about your signals traveling through the air and being intercepted by snoopers, as you do with unsecured wireless systems.
- ✓ **Economical over the long term:** The incremental cost of adding Cat 5e voice and data cabling and RG-6 coaxial cabling into your house — over a 30-year mortgage — will be almost nothing each month.
- ✓ **Salable:** More and more home buyers are not only looking for well-wired homes but also discounting homes without the infrastructure. As good as wireless is, it isn't affixed to the house and is carried with you when you leave. Most new homes have structure wiring in the walls.



If you're building a new home or renovating an old one, we absolutely recommend that you consider running the latest wiring in the walls to each of your rooms. That doesn't mean that you won't have a wireless network in your home — you will. It just will be different than if you were wholly reliant on wireless for your networking.

If you choose to use network cable, it should ideally be installed in the walls, just like electrical and phone wiring. Network jacks (outlets) are installed in the walls in rooms where you would expect to use a computer. Connecting your computer to a wired network is as easy as plugging a phone into a phone jack — after the wiring is in place, that is.

Without question, the most economical time to install network cable in a home is during the home's initial construction. In upscale neighborhoods, especially in communities near high-tech businesses, builders often wire new homes with network cable as a matter of course. In most cases, however, the installation of network cable in a new home is an option or upgrade that's installed only if the new owner orders it and pays a premium. Installing a structured wiring solution for a home can cost at least \$2,000–\$3,000, and that's for starters.

Although the installation of network cable in an existing home certainly possible, it's much more difficult and expensive than installing cable during construction. If you hire an electrician to run the cable, you can easily spend thousands of dollars to do what would have cost a few hundred dollars during your home's construction. If you're comfortable drilling holes in your walls and crawling around in attics and crawl spaces, you can install the cabling yourself for the cost of the cable and outlets.



The reality is that no home will ever be purely wireless or wireline (wired). Each approach has benefits and costs, and they coexist in any house. If you're building a new house, most experts tell you to spend the extra money on a structured wiring solution because it adds value to your house and you can better manage all the wiring in your home. We agree. But no wiring solution can be everywhere you want it to be. Thus, wireless is a great complement to your home, which is why we advocate a whole-home wireless network for your entire home to use.

## *Installing wireless home networks*

If you're networking an existing home or are renting your home, wireless has fabulous benefits:

- ✓ **Portable:** You can take your computing device anywhere in the house and be on the network. Even if you have a huge house, you can interconnect wireless access points to have a whole-home wireless network.
- ✓ **Flexible:** You're not limited to where a jack is on the wall; you can network anywhere.
- ✓ **Cost effective:** You can start wireless networking for a couple of hundred dollars. Your wiring contractor can't do much with that!
- ✓ **Clean:** You don't have to tear down walls or trip over wires when they come out from underneath the carpeting.

What's more, there's really no difference in how you use your networked computer, whether it's connected to the network by a cable or by a wireless networking device. Whether you're sharing files, a printer, your entertainment system, or the Internet over the network, the procedures are the same on a wireless network as on a wired network. In fact, you can mix wired and

wireless network equipment on the same network with no change in how you use a computer on the network.

It's time for the fine print. We would be remiss if we weren't candid and mention any potential drawbacks to wireless networks compared with wired networks. The possible drawbacks fall into four categories:

- ✓ **Data speed:** Wireless networking equipment transmits data at slower speeds than wired networking equipment. Wired networks are already networking at gigabit speeds, although the fastest current wireless networking standards (in the best situations) top out at 54 Mbps. (Some vendors have proprietary extensions that take the speed higher, but even these top out at a little more than 100 Mbps in the best scenarios.) But, for almost all the uses we can think of now (with the possible exception of high-definition video), this rate is plenty fast. Your Internet connection probably doesn't exceed a few Mbps in speed (though those lucky folks who get fiber optic lines run to their homes may exceed this rate by a big margin!), so your wireless connection should be more than fast enough.
- ✓ **Radio signal range:** Wireless signals fade when you move away from the source. Some homes, especially older homes, may be built from materials that tend to block the radio signals used by wireless networking equipment, which causes even faster signal degradation. If your home has plaster walls that contain a wire mesh, the wireless networking equipment's radio signal may not reach all points in your home. Most modern construction, however, uses drywall materials that reduce the radio signal only slightly. As a result, most homeowners can reach all points in their home with one centralized wireless *access point* (also called a *base station*) and one wireless device in or attached to each personal computer. And, if you need better coverage, you can just add another access point — we show you how in Chapter 18 — or you can upgrade to a newer technology, like 802.11n (when available), which promises farther coverage within your home.
- ✓ **Radio signal interference:** The most common type of wireless networking technology uses a radio frequency that's also used by other home devices, such as microwave ovens and portable telephones. Some wireless home network users, as a consequence, experience network problems (the network slows down or the signal is dropped) caused by radio signal interference.
- ✓ **Security:** The radio signal from a wireless network doesn't stop at the outside wall of your home. A neighbor or even a total stranger could access your network from an adjoining property or from the street unless you implement some type of security technology to prevent unauthorized access. To prevent unauthorized access, you can safeguard yourself with security technology that comes standard with the most popular wireless home networking technology. However, it's not bulletproof, and it certainly doesn't work if you don't turn it on. For more information on wireless security, go to Chapter 10.

For our money, wireless networks compare favorably with wired networks for most homeowners who didn't have network wiring installed when their houses were built. As we mention earlier in this chapter, even if you do have network wires in your walls, you probably want wireless just to provide the "untethered" access it brings to laptops and handheld computers.

## *Picking a Wireless Standard*

The good news about wireless networks is that they come in multiple flavors, each with its own advantages and disadvantages. The bad news is that trying to decide which version to get when buying a system can get confusing. The good news is that, very rapidly, the dropping prices of the wireless systems and fast-paced development is creating dual- and tri-mode systems on the market that can speak many different wireless languages.

Here are the three major wireless systems now on the market:

- ✓ **802.11a:** Wireless networks that use the Institute of Electrical and Electronics Engineers (IEEE) 802.11a standard use the 5 GHz radio frequency band. Equipment of this type is among the fastest wireless networking equipment widely available to consumers.
- ✓ **802.11b:** Wireless home networks that use the 802.11b standard use the 2.4 GHz radio band. This standard is the most popular in terms of numbers of installed networks and numbers of users.
- ✓ **802.11g:** The latest member of the 802.11 wireless family to hit the mainstream, 802.11g has rapidly taken over the market. In many ways, 802.11g offers the best of both worlds — backward compatibility with 802.11b networks (it too operates over the 2.4 GHz radio frequency band) and the speed of 802.11a networks. And, the cost of 802.11g has dropped so precipitously that it's hardly more expensive than 802.11b, when you take into account rebates and incentive programs. For this reason, 802.11g has become the de facto solution that most users now buy.

A new standard, 802.11n, just being developed as this book goes to press. The first Pre-N units are on the streets, and they're fabulous in terms of speed, coverage, and ease of setup (we love the Belkin Wireless Pre-N Router [[www.belkin.com](http://www.belkin.com)]). There's still much to be determined about 802.11n as we write — including whether it will operate in the 2.4 or 5GHz range. Still, as this information becomes available, we expect it to be very popular with many wireless applications — and it will most likely support backward compatibility with 802.11b/g networks too.



Equipment that's based on the 802.11a standard doesn't interoperate with equipment based on the 802.11b/g standards. Several manufacturers sell equipment, however, that supports *both* approaches — the best of all worlds. And, if you really want to make sure that you're covered, check out dual-mode, tri-standard 802.11a/b/g wireless networking equipment that's on the streets. It's more expensive, but you maximize your options as well.



Equipment supporting all three finalized standards — 802.11a, 802.11b, and 802.11g — can carry the Wi-Fi logo — a trademark that's short for *wireless fidelity* — that's licensed for use by the Wi-Fi Alliance trade group, based on equipment that passes interoperability testing.



The terms surrounding wireless networking can get complex. First, the order of lettering isn't really right because 802.11b was approved and hit the market before 802.11a. Also, you see the term *Wi-Fi* used frequently. (In fact, we thought about calling this book *Wi-Fi For Dummies* because the term is used so much.) Wi-Fi refers to the collective group of 802.11 specifications: 802.11a, b, and g. You may sometimes see this group also named *802.11x* networking, where x can equal a, b, or g. To make matters more confusing, a higher-level parent standard named 802.11 predates 802.11a, b, and g and is also used to talk about the group of the three standards. Technically, it's a standards group over several other emerging specifications as well. For simplicity in this book, we use 802.11 and Wi-Fi synonymously to talk about the three standards as a group. We could have used 802.11x, but we want to save a number of xs (for our wives).



For the most part, 802.11b equipment is being phased out. If you're buying all new gear, 802.11g or 802.11a (plus some “prestandard” 802.11n stuff) are your real choices). You can still find a few bits of 802.11b gear, but it's mostly sold to fit into older 802.11b networks. If you already have some gear that's 802.11b, don't despair — it still works fine in most cases, and you can upgrade your network to 802.11g bit by bit (pun intended!) without worrying about compatibility. In this section, we still discuss 802.11b, even though it's increasingly not something you're likely to consider.

The differences between these three standards fall into five main categories:

- ✓ **Data speed:** 802.11a and 802.11g networks are almost five times faster than the older 802.11b networks. However, 802.11b networks are faster than most broadband Internet connection. If all you're doing is sharing a 2 or 3 Mbps Internet connection, you can probably get by with 802.11b. If you're doing more with your network (like sharing files), you may want to go with a faster technology like 802.11g or a. (By comparison, the new 802.11n standard is expected to provide speeds even faster than 802.11a/g — perhaps as fast as 100 or 200 Mbps!)
- ✓ **Price:** 802.11a and g networking equipment is typically more expensive than similar 802.11b equipment, but the price differential is minimal.

802.11b equipment has been on the market longer than 802.11a and g with hundreds of products in the marketplace. As a result, 802.11b will probably remain the least expensive version of Wi-Fi for some time. As we mention earlier in this chapter, 802.11g products cost barely more than comparable 802.11b products and will soon replace almost all 802.11b products in vendors' line-ups.

- ✔ **Radio signal range:** 802.11a wireless networks tend to have a shorter maximum signal range than 802.11b and g networks. The actual distances vary depending on the size and construction of your home. In most modern homes, however, all three of the competing standards should provide adequate range.
- ✔ **Radio signal interference:** The radio frequency band used by both 802.11b and 802.11g equipment is also used by other home devices, such as microwave ovens and portable telephones, resulting sometimes in network problems caused by radio signal interference. Few other types of devices now use the radio frequency band employed by the 802.11a standard.
- ✔ **Interoperability:** Because 802.11a and 802.11b/g use different frequency bands, they can't communicate over the same radio. Several manufacturers, however, have products that can operate with both 802.11a and IEEE 802.11b/g equipment simultaneously. By contrast, 802.11g equipment is designed to be backward compatible with 802.11b equipment — both operating on the same frequency band. The forthcoming 802.11n products will interoperate with each other after the standards are finalized, but will support backward compatibility to 802.11b/g if the standard falls in the 2.4GHz range as expected.



Think of dual-mode, multistandard devices as being in the same vein as AM/FM radios. AM and FM stations transmit their signals in different ways, but hardly anyone any more buys a radio that's only AM because almost all the receiving units are AM/FM. The user selects which band she wants to listen to at any particular time. With an 802.11a/b/g device, you can also pick the band that you want to transmit and receive in.

We expect that 802.11g products will be, at minimum, the standard device deployed in most home networks. Adding 802.11a to the mix hasn't been necessary to this point, but having an 802.11 a/b/g device will enable the home network to be able to communicate with the protocols it senses. We would be tempted to tell you not to worry about 802.11a at all — given how much 802.11g has dominated the market — but there are lots of outstanding efforts in the 5GHz range and involving 802.11a for delivering video around the house by set-top manufacturers that it's hard to make a blanket Tony Soprano “fuggettaboutit” statement.



For most home networks, 802.11g wireless networks are the best choice because they're relatively inexpensive, offer the best data speed, and provide more than adequate range for most homes. It's a great way to get started, and you don't need to worry about upgrading from 802.11b to g later on. However, keep an eye on the 802.11n products and their compatibility and

price differential with 802.11g — that could be likewise attractive. If you find after reading more about these technologies in this book that 802.11b or a is best for you, that's okay too. The reality is, however, that the combined 802.11a/b/g units “future-proof” you the best if you want to go in that direction. So, you can take either fork in the wireless road. Buy low-cost 802.11g units now and upgrade to a nice 802.11n unit in a few years when costs have come down and all the kinks are worked out. Or, buy one of the 802.11n products that are available now and upgrade that product as needed.

## *Planning Your Wireless Home Network*

Installing and setting up a wireless home network can be ridiculously easy. In some cases, after you unpack and install the equipment, you're up and running in a matter of minutes. To ensure that you don't have a negative experience, however, you should do a little planning. The issues you need to consider during the planning stage include the ones in this list:

- ✓ Which of your computers will you connect to the network (and will you be connecting Macs and PCs or just one or the other)?
- ✓ Will all the computers be connected via wireless connections, or will one or more computers be connected by a network cable to the network?
- ✓ Which wireless technology — 802.11a, 802.11b, or 802.11g — will you use? (Or will you use all of them? Or, will you use 802.11n when it's standardized and available?)
- ✓ Which type of wireless adapter will you use to connect each computer to the network?
- ✓ How many printers will you connect to the network?
- ✓ How will each printer be connected to the network — by connecting it to a computer on the network or by connecting it to a print server?
- ✓ Will you connect the network to the Internet through a broadband connection (cable or DSL) or dial-up? If so, will you share the Internet connection through a cable/DSL/satellite/dial-up router or by using Internet connection-sharing software?
- ✓ What other devices might you want to include in your initial wireless network? Do you plan on listening to MP3s on your stereo? How about downloading movies from the Internet (instead of running out in the rain to the movie rental store!)? Will you be using VoIP with your network?
- ✓ How much money should you budget for your wireless network?
- ✓ What do you need to do to plan for adequate security to ensure the privacy of the information stored on the computers connected to your network?

We discuss all these issues and the entire planning process in more detail in Chapter 4.

## Choosing Wireless Networking Equipment

For those of us big kids who are enamored with technology, shopping for high-tech toys can be therapeutic. Whether you're a closet geek or (cough) normal, a critical step in building a useful wireless home network is choosing the proper equipment.

Before you can decide which equipment to buy, take a look at Chapter 4 for more information about planning a wireless home network. Read Chapter 5 for a more detailed discussion of the different types of wireless networking equipment. Here's a quick list of what you need:

- ✓ **Access point:** At the top of the list is at least one wireless *access point* (AP), also sometimes called a *base station*. An AP acts like a wireless switchboard that connects wireless devices on the network to each other and to the rest of the network. You gotta have one of these to create a wireless home network. They range from about \$30 to \$300, with prices continually coming down (prices predominantly are in the \$40–\$60 range). You can get APs from many leading vendors in the marketplace, including Apple ([www.apple.com](http://www.apple.com)), D-Link ([www.d-link.com](http://www.d-link.com)), Linksys ([www.linksys.com](http://www.linksys.com)), NETGEAR ([www.netgear.com](http://www.netgear.com)), and Belkin ([www.belkin.com](http://www.belkin.com)). We give you a long list of vendors in Chapter 20, so check that out when you go to buy your AP.

For wireless home networks, the best AP value is often an AP that's bundled with other features. The most popular APs for home use also come with one or more of these features:

- **Network hub or switch:** A *hub* connects wired PCs to the network. A *switch* is a “smarter” version of a hub that speeds up network traffic. (We talk more about the differences between hubs and switches in Chapter 2.)
- **DHCP server:** A *Dynamic Host Configuration Protocol* (DHCP) server assigns network addresses to each computer on the network; these addresses are required for the computers to communicate.
- **Network router:** A *router* enables multiple computers to share a single Internet connection. The network connects each computer to the router, and the router is connected to the Internet through a broadband modem.
- **Print server:** Use a *print server* to add printers directly to the network rather than attach a printer to each computer on the network.

In Figure 1-3, you can see an AP that also bundles in a network router, switch, and DHCP server. You may increasingly see more features added that include support for VoIP routing as well. We talk about more features for your AP in Chapter 5.





## The Intel Centrino chip

You may start hearing the term *Centrino* with respect to wireless products. No, it isn't a new atomic particle, but, rather, the new Intel wireless-enabled chip — the chip that will bring wireless connectivity to most laptops on the planet. Representing Intel's best technology for mobile PCs, the Intel Centrino mobile technology includes a new mobile processor, related chipsets, and 802.11 wireless network functions that have been optimized, tested, and validated

to work together. If you're in the market for a laptop, you're confronted with a flood of advertising regarding the Centrino chipset. With Intel Inside and wireless at that, you can expect that when your children's friends come to your home for a sleepover, they can wirelessly connect their laptops back to their own homes so that they can say good-night to Mommy.

**Figure 1-3:**  
Look for an AP that bundles a network router, switch, and DHCP server.



✓ **Network interface adapters:** As we mention earlier in this chapter, home networks use a communication method (*protocol*) known as *Ethernet*. The communication that takes place between the components of your computer, however, doesn't use the Ethernet protocol. As a result, for computers on the network to communicate through the Ethernet protocol, each of the computers must translate between their

## Connecting to your wireless home network via your PDA or cell phone

One of the few areas of personal computing where Microsoft Windows has not been the dominant software is the area of handheld computers. The PDA devices from Palm became the first big success story in handheld computers in the early 1990s and have maintained their leadership position ever since. Handhelds from Hewlett-Packard (formerly Compaq) and other manufacturers based on the Microsoft Windows Mobile Operating System are finally giving Palm a run for its money. Even though Pocket PCs are still (on the average) more expensive than Palm PDAs, they boast computing power more akin to a full-size PC, running scaled-down versions of the most popular Windows-based application software.

Handheld computers running the Windows Mobile operating system are perfect candidates for wireless network connectivity. By definition, handheld computers are highly portable.

Here are a couple of reasons that going wireless with Windows Mobile may be worth the trouble. You can

- ✓ **Wirelessly synchronize** your address book, calendar, inbox, and other applications on your Pocket PC with your desktop computer from anywhere in your house without needing to plug into the docking station.
- ✓ **Access the Internet** from your Pocket PC, both over your wireless home network and

at wireless hot spots, such as in Starbucks coffee shops and in many airports and hotels.

- ✓ **Connect to other Pocket PC devices.** For example, mobile businesspeople can exchange files or even electronic business cards via a wireless connection.
- ✓ **Download MP3 files** to play on your Pocket PC.

The thought of being able to access your e-mail or browse the Internet on your handheld while sipping a latté in Starbucks is compelling. After you get your handheld set up with a wireless connection, synchronizing your calendar and phone list becomes a snap. But, you need a Secure Digital Input/Output (SDIO) card in order to do it. See Chapter 2 for more details about this new category of wireless network adapter. Chapter 7 walks you through the process of installing wireless network adapters and getting your PDA ready for Internet access.

More and more cell phones are coming out with Bluetooth embedded as well as Wi-Fi on board. You can do everything you can do with a PDA on some of these phones, which makes them your music-playing, phone talking, Internet browsing, photo-sharing iPod/cell phone/PDAs all-in-one devices (and it doesn't weigh a ton!).



internal communications protocol and Ethernet. The device that handles this translation is a *network interface adapter*, and each computer on the network needs one. Prices for network interface adapters are typically much less than \$30, and most new computers come with one at no additional cost.

A network interface adapter that's installed inside a computer is usually called a *network interface card* (NIC). Many computer manufacturers

now include as a standard feature an Ethernet NIC with each personal computer.

- ✓ **Wireless network interface adapter:** To wirelessly connect a computer to the network, you must obtain a wireless network interface adapter for each computer. Prices range between \$50 and \$150. A few portable computers now even come with a wireless network interface built in. They're very easy to use; most are adapters that just plug in.

The four most common types of wireless network interface adapters are

- **PC Card:** This type of adapter is often used in laptop computers because most laptops have one or two PC Card slots. Figure 1-4 shows a PC Card wireless network interface adapter.

**Figure 1-4:**  
A PC Card  
wireless  
network  
interface  
adapter.



- **SDIO card:** A *Secure Digital Input Output* (SDIO) card adapter is smaller than a PC Card adapter and enables you to link a Pocket PC or other palm-size computer to your network. Many high-end personal digital assistants (PDAs) now even come with wireless capability built-in, obviating the need for a wireless adapter.
- **USB:** A *Universal Serial Bus* (USB) adapter connects to one of your computer's USB ports; these USB ports have been available in most computers built in the past four or five years.
- **ISA or PCI adapter:** If your computer doesn't have a PC Card slot, SDIO card slot, or USB port, you have to either install a network interface card or a USB card (for a USB wireless network interface adapter) in one of the computer's internal peripheral expansion receptacles (slots). The expansion slots in older PCs are Industry Standard Architecture (ISA) slots. The internal expansion slots in newer PCs and Apple Macintosh computers follow the Peripheral Component Interconnect (PCI) standard.



More and more PDAs, laptops, and other devices are shipping with wireless already onboard, so you don't need an adapter of any sort. It just comes with the wireless installed in the device. We tell you how to get your wireless-enabled devices onto your wireless backbone in Part II of this book.

