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!
- Deciding which wireless standard meets your needs
- Planning for your wireless home network
- Choosing the right wireless equipment

Welcome to the wireless age! Nope, we're not talking about your grandfather's radio — we're talking about almost everything under the sun. What's not going wireless? Wanna say your refrigerator? Wrong — it is. How about your stereo? Yup, that too. Watches, key chains, baby video monitors, high-end projectors — even your thermostat is going wireless and 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 sharing peripherals (such as printers and scanners), and by using your wireless network to drive other applications around your home, such as your home entertainment center. This book makes it easier for you to spend your money wisely by helping you decide what you need to buy and then helping you choose between the vast array of products on the market. Wireless networks are not only less expensive than more traditional wired networks but also much easier to install (no drilling and no pulling wires through the wall!). An important goal of this book is to give you "the skinny" on how to install a wireless network in your home.

Whether you have 1 computer or 20 (like Danny), you have several good reasons to want a personal computer network. 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 and including wireless networking in all sorts of products.

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 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 security cameras, connect your mobile phone to your wireless network, or even enjoy your MP3s from your home stereo system while you're at work — really!

Reading *Wireless Home Networking For Dummies,* 4th Edition, helps you understand how to create a whole-home wireless network to reach all the nooks and crannies of your house. Of course, the primary reason that people have wanted to put wireless networks in their homes has been to "unwire" their PCs, especially laptops (which, these days, come with wireless standard), 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 — you can find home theater receivers, Blu-ray disc players, gaming consoles, music players, and even flat-panel TVs with wireless capabilities built right in.

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 Quicken from Intuit, 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 up the same document on his or her computer over the network. With the right programs, you can even view the same documents at the same time! And that's

not even getting into online services like Dropbox (www.dropbox.com) that let you store your shared files on a computer *in the cloud* (in other words, on the Internet) so you can access these files whenever and wherever you have an Internet connection.

But here's where we 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. What's more is that all these devices 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 (or, nowadays, a USB *thumb drive*) 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).

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. For example, Microsoft's Zune portable media player (www.zune.net) is in many ways similar to Apple's iPod, with one big exception: Zune's wireless capabilities. Whenever you put your Zune in its charger base, it connects to your wireless network and automatically syncs new content (music, audiobooks, podcasts, and videos) from your PC. This means you always have that new content at your fingertips — literally — without having to lift a finger.

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 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.

Other peripherals, such as extra hard drive storage for backing up 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 that has a network port (we talk about these in great detail throughout the book) can be shared anywhere on your wireless network.

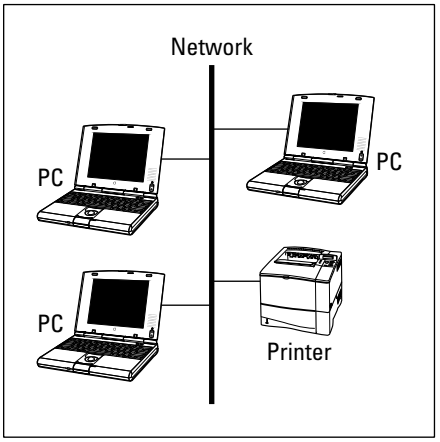

Figure 1-1: Share and share alike: Share one printer via your home network.

Internet connection sharing

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

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, you can create a wireless home network. Here's a rundown of the different types of modems:

- **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.

  Fewer and fewer wireless networking equipment manufacturers support a dial-up connection on their equipment, because the majority of homes (and the *vast majority* of networked homes) use broadband these days. We mention dial-up here only for completeness; not because we recommend that you use it.

- **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 24/7.
- **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 network, in a similar fashion as DSL and cable modems.
- **Satellite modem:** Satellite modems tie into 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 in the midst of the fiber-fed revolution as the telephone and cable companies push to outdo each other by installing extremely high-capacity lines in homes to allow all sorts of cool applications. (The biggest example of this in the U.S. is Verizon's FiOS system — `www.verizon.com` — which connects tens of millions of homes to the Internet by using fiber-optic connections.) Until now, the broadband access link has been the limiting bottleneck when wireless networks communicate with the Internet. With fiber optics, you could see broadband access capacity equal to that of your wireless network.

Network (very!) basics

When configuring your PCs on a network, you can buy equipment that lets you connect multiple computers to an Internet modem using radio waves with no wires (our focus here, obviously); through special network cables; or even through regular phone lines, the coaxial wiring (cable TV wires), 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 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 5e/6 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 (gigabit Ethernet) 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. (This network model works the same for a satellite or fiber-optic connection.)

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

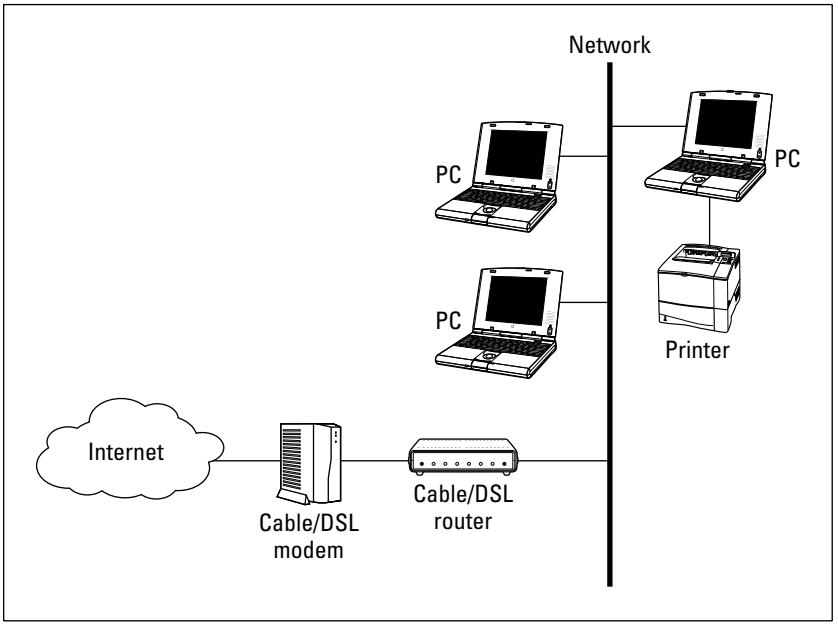

Figure 1-2: Internet for all: Set up a network that enables many PCs to connect to the Internet through a DSL or cable modem.

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 (Voice over IP, or VoIP). 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 such as Vonage (`www.vonage.com`) and Skype (`www.skype.com`) allow you to use your regular phones to call over the Internet for free or for a low monthly cost.
- **Add-ons to popular software programs are available.** Internet calling and even videoconferencing have been added to instant messaging programs such as AOL Instant Messenger (AIM) so that you can talk to the people you used to only IM.

- **New devices make it simple.** New devices, such as the Olympia DualPhone (`http://dualphone.net`), ease access to these Internet calling services — so you don't have to don a headset every time you want to make a phone call.

The best part is that VoIP services are 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 you have access to.

The convergence of wireless and Voice over IP is one of the major mega-trends 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 may change your mind. Check them out:

- **Multiuser games over the network:** If you're into video games, multiplayer card games, or role-playing games, you may find multiuser games over the network or even over the Internet fascinating. Chapter 11 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 12 for more info on how to use your wireless network to send audio and video signals around the house.
- **Home wireless cam accessibility:** You can check out your house from anywhere in the house — or 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"; our kids 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 to connect to the Internet (for a small fee, of course) via hot spots. See Chapter 16 for more about using wireless networking when you're 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. Most 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 by using radio waves rather than Category 5e/6 cables.

Installing wired home networks

Even though we're talking mostly about wireless networks 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 20 Mbps to 300 Mbps range. Both wireless and wired technologies are getting faster and faster, but for as far as our crystal balls can see, 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/6 voice and data cabling and RG-6 coaxial cabling into your house — over a 30-year mortgage — will be almost nothing each month. That is, as long as you're building or remodeling your home — when your walls aren't open, getting network cables inside of them is a lot more difficult and expensive.
- **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 structured 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 is 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 working 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 under a 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 — your computers don't care whether they're talking over a wire or over a wireless system.

Now for the fine print. We would be remiss if we weren't candid and didn't 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 theoretical situations) top out at 300 Mbps. (The real-world top speed you can expect will probably be under 100 Mbps.) But, for almost all the uses we can think of now, this rate is plenty fast. Your Internet connection probably doesn't exceed 20 Mbps (though lucky folks who have fiber-optic lines running 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.

  

  If you need better coverage, you can just add another access point — we show you how in Chapter 18 — or you can upgrade an older wireless network to a newer technology, such as 802.11n, which provides 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. Consequently, some wireless home network users 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. 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 9.

Wireless networks compare favorably with wired networks for most homeowners who didn't have network wiring installed when their houses were built or remodeled. 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.

Choosing 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 even better news is that the dropping prices of wireless systems and fast-paced development are creating dual- and tri-mode systems on the market that can speak many different wireless languages.

Introducing the 802.11s: a, b, g, and n

You may run into gear using one of two older standards: 802.11 a and b. For the most part, manufacturers aren't making gear using these systems anymore (at least not for the home — some industrial and commercial network gear still on the market use these systems), but you will still hear about these systems as you explore wireless networking:

- **802.11a:** Wireless networks that use the Institute for 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 number of installed networks and number of users.

Following are the two major wireless systems that have pretty much replaced 802.11b and 802.11a:

- **802.11g:** The outgoing default version of the 802.11 wireless family, 802.11g was the primary form of wireless networking from 2003 until 2009. In many ways, 802.11g offered the best of both worlds — backward compatibility with the older 802.11b networks we just mentioned (they too operate over the 2.4 GHz radio frequency band) and the speed of the older 802.11a networks also discussed in that section. And the cost of 802.11g has dropped precipitously, so it's now less expensive than the older and slower 802.11b. (You can buy an 802.11g network adapter for less than $20 and a home router for less than $40.)
- **802.11n:** In late 2009, the IEEE finalized and ratified a newer and faster system called 802.11n. The 802.11n system (like 802.11g before it) is backward compatible, which means that older 802.11b and 802.11g systems can work just fine on an 802.11n network. 802.11n systems can also support the 5 GHz frequencies (though not all do; more on this in Chapter 3), and may therefore be backward compatible with 802.11a as well. A lot of new technology in 802.11n extends the range of the network and increases the speed as well — 802.11n can be as much as *five times* faster than 802.11g or 802.11a networks. Draft versions of 802.11n gear have been on sale since 2007; now that the final version is being sold, 802.11n should be your default choice for a new wireless network.

Equipment supporting all four of these finalized standards — 802.11a, 802.11b, 802.11g, and 802.11n — can carry the Wi-Fi logo that's licensed for use by the Wi-Fi Alliance trade group based on equipment that passes interoperability testing. You absolutely want to buy only equipment that has been Wi-Fi certified, regardless of which 802.11 standard you're choosing.

The terms surrounding wireless networking can get complex. First, the order of lettering isn't really easily understandable because 802.11*b* was approved and hit the market before 802.11*a.* 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, g, and n. You may sometimes see this group also named *802.11x* networking, where *x* can equal a, b, g, or n. To make matters more confusing, a higher-level parent standard named 802.11 predates 802.11a, b, g, and n and is also used to talk about the group of the four standards. Technically, IEEE 802.11 is a standards group responsible for several other networking specifications as well. For simplicity in this book, we use 802.11 and Wi-Fi synonymously to talk about the four standards as a group. We could have used 802.11x, but we want to save a lot of *x*s (for our wives).

For the most part, 802.11a and 802.11b equipment is being phased out. If you're buying all-new gear, 802.11g or 802.11n are your real choices — and we're already starting to see 802.11g gear discontinued in favor of 802.11n. You can still find a few bits of 802.11a or b gear, but it's mostly sold to fit into older 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 or 802.11n bit by bit (pun intended!) without worrying about compatibility. In this section, we still discuss 802.11a and b, even though they're increasingly not something you're likely to consider.

Comparing the standards

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

- **Data speed:** 802.11a and 802.11g networks are almost five times faster than the original 802.11b networks — 802.11n is five times faster still! For the most part, any current Wi-Fi gear (whether it be 802.11g or 802.11n) will be faster than the Internet connection into your house, but the extra speed of 802.11n may be worthwhile if you're trying to do things such as transfer real-time video signals around your home wirelessly.
- **Price:** 802.11g networking gear (the standard system today) has been on the market since the mid-2000s — accordingly, the price for this gear is quite low (less than $20 for an adapter). The new 802.11n adapters can cost about twice as much.
- **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 older standards should provide adequate range. Because it uses a new technology called MIMO, 802.11n can have two or more times the range in your home, so if you have a big house, you might gravitate toward 802.11n.
- **Radio signal interference:** The radio frequency band used by both 802.11b and 802.11g equipment is used also 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. 802.11n gear can use either frequency band (though not all gear does — some uses only the more crowded 2.4 GHz frequency range).
- **Interoperability:** Because 802.11a and 802.11b/g use different frequency bands, they can't communicate over the same radio frequency band. 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. 802.11n is backward compatible with all three previous standards, though the 802.11a backward compatibility is available only on 802.11n gear that operates in the 5 GHz frequency range.

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 buys a radio that's only AM because almost all the receiving units are AM/FM. Users select which band they want to listen to at any particular time. With an 802.11a/b/g (or 2.4/5 GHz 802.11n) device, you can also choose the band that you want to transmit and receive in.

For a long time, wireless networks operating at the 2.4 GHz frequency range were most popular in the home, but the advent of 5 GHz capable 802.11n devices (such as Apple's popular AirPort Extreme with Gigabit Ethernet) have finally brought 5 GHz networks into lots of homes.

If you're starting your home wireless network from scratch, there's no compelling reason *not* to go with 802.11n. 802.11n gear doesn't cost that much more than the older 802.11g gear, and it provides a lot more networking capability. That said, if you have an existing 802.11g network in place, there's no reason to throw it away and move to 802.11n right away — unless you have some high bandwidth requirements like video.

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 — 802.11n or 802.11g — will you use?
- Which type of wireless adapter will you use to connect each computer to the network? And which of your computers already have one built-in?
- 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 you're sharing an Internet connection, will you do so with a cable/DSL/satellite/dial-up router or with 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!)?
- 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. Chapter 5 provides a more detailed discussion of the different types of wireless networking equipment.

The following sections give you a quick rundown of what equipment you need, including an access point, network interface adapters, and wireless network interface adapters.

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 in price from about $30 to $200, with prices continually coming down. (Prices predominantly are in the $40–$60 range for 802.11g and in the $50–$175 range for 802.11n.) You can get APs from many leading vendors in the marketplace, including Apple (`www.apple.com`), D-Link (`www.d-link.com`), Cisco (`http://home.cisco.com/en-us/wireless/`), NETGEAR (`www.netgear.com`), and Belkin (`www.belkin.com`). We give you a long list of vendors in Chapter 20, so check that out when you 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.

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 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). Virtually all computer manufacturers now include Ethernet capabilities, built right onto the PC motherboard as a standard feature with each personal computer.

Wireless network interface adapters

To wirelessly connect a computer to the network, you must obtain a wireless network interface adapter for each computer. Prices range between $10 and $100. Most portable computers (laptops, netbooks, iPads, and so on) now come with a wireless network interface built in, as do many (but not all!) desktop computers. If your computer doesn't have a wireless NIC, don't worry. They're easy to install; most are adapters that just plug in.

The three most common types of wireless network interface adapters are

- **PC or Express 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.
- **USB:** A Universal Serial Bus (USB) adapter connects to one of your computer's USB ports; these USB ports have been standard in just about every PC built since the turn of the millennium.
- **ISA or PCI adapter:** If your computer doesn't have a PC Card slot, or USB port, you have to install either 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 internal expansion slots in modern PCs and Apple Macintosh computers follow the Peripheral Component Interconnect (PCI) standard.

Almost all smartphones, netbooks, laptops, and other portable devices are shipping with wireless already onboard, so you don't need an adapter of any sort. These devices just come with the wireless installed in them. We tell you how to get your wireless-enabled devices onto your wireless backbone in Part II.

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