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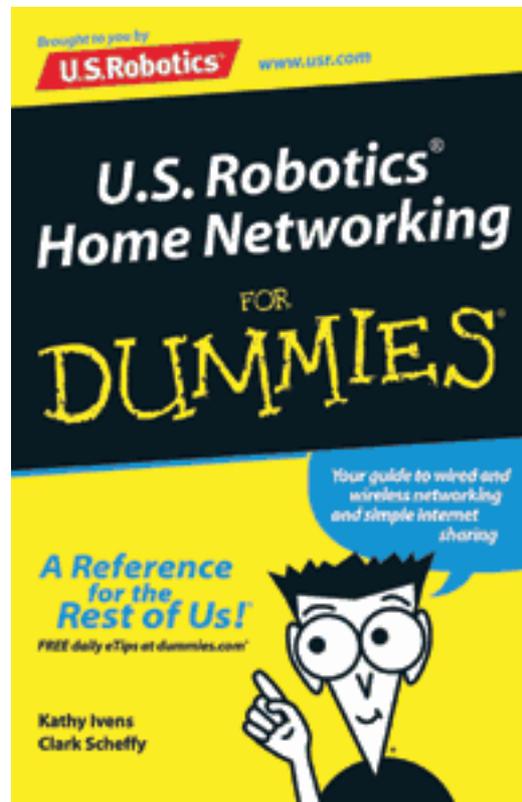**Home Networking For Dummies** *(printer-friendly)*

Close Window

Continue to Introduction | Continue to Contents List

Close Window

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Home Networking For Dummies *(printer-friendly)*

Close Window

Introduction

Part I
Chapter 1: Understanding Your Networking Options

- **Deciding to create a home network**
- **Honing in on the right operating system**
- **Understanding how networks work**
- **Figuring out what hardware you need**
- **Choosing between wireless or cable**
- **Purchasing kits or individual components**

Chapter 2: Configuring Your Network

- **Showing your computer how to find your network adapter**
- **Installing network components**
- **Naming your computer and giving it a workgroup**
- **Setting up your network for file and printer sharing**
- **Creating a username and password**

Part II
Chapter 3: Sharing the Internet

- **Taking a look at Internet connection hardware options**
- **Configuring dial-up networking connections**
- **Sharing Internet connections**
- **Examining hardware devices that provide connection sharing**

Chapter 4: Sharing Printers and Peripherals

- **Setting up shared printers**
- **Installing a network printer**
- **Sharing CD-ROM, removable, and other drives**

Chapter 5: Other Networking Techniques

- **Adding Windows NT 4.0 to your network**
- **Networking a laptop computer**

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- **Getting a Mac to communicate with your PC network**

Part III

About the Authors

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Home Networking For Dummies *(printer-friendly)*

Close Window

Contents List

Chapter 1

Understanding Your Networking Options

In This Chapter

- Deciding to create a home network
- Honing in on the right operating system
- Understanding how networks work
- Figuring out what hardware you need
- Choosing between wireless or cable
- Purchasing kits or individual components

Simply defined, a network is a system of two or more connected computers such that each computer has access to the files and peripheral equipment (such as printers or modems) on another computer. You create those connections with the following elements:

- Hardware in each computer that permits the computer to communicate
- A cable or a wireless connection that sends data between the computers (using the hardware you installed)
- Software (called a driver) that operates the hardware

If you have more than one computer in your home, you will definitely benefit by having a network. Besides being generally lazy and miserly, we believe everyone should do everything in the easiest and cheapest way possible. With a network, you can work anywhere in your home and access files from any other computer in your home (even from your bed). You can also save a heap of money on things like printers and external disk drives because you can share these types of devices across your network rather than buying separate such devices for each computer in your home.

In this chapter, we explain some reasons for setting up a network in your home, explain your software and hardware alternatives, and tell you more about how different networks work. We also discuss some of the technology that's available for putting your network together.

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You don't have to start creating your network with computers that already contain the hardware and software required for networking because you can easily install that stuff yourself. However, you must have an operating system that can participate in a network environment. Any flavor of Windows except the old Windows 3.1 will work. That includes Windows 95, 98, 98 Second Edition (SE), 2000, NT, Me, and XP.

Sharing the Internet

One of the most compelling reasons to set up a home network is to share an Internet connection. If you share an Internet connection on your network, then anyone on your network can check e-mail or use the Web without having to connect independently with multiple phone lines and modems.

You have two ways of sharing the Internet on your home network. You can use either the Windows built-in Internet connection-sharing feature, or preferably, a U. S. Robotics broadband router. The following sections explain these options.

Windows built-in Internet connection sharing

The most recent versions of Windows (Windows 98 SE, Windows Me, Windows 2000, and Windows XP) include the Internet connection-sharing feature. Though this method works, it can be clunky and demands that the computer sharing the Internet connection act as an Internet server (that is, it must "serve" the other computers with a connection to the Internet). This task is something the computer wasn't specifically designed to do, and providing this service will take its attention away from whatever else the computer is doing.

This method also requires that the computer sharing the Internet connection be turned on, which can be a major hassle if you actually want to browse the Web from a different computer on your network.

U.S. Robotics router with Internet sharing

U.S. Robotics offers an Internet-sharing solution, which comes built in to the Model 9003 ADSL Ethernet/USB and the Model 8000 Broadband Routers. This solution is preferable for three big reasons.

First, sharing an Internet connection with a router doesn't burden any computer with the duties of Internet sharing, as with the Windows Internet connection-sharing feature. The advantage of router-based Internet sharing becomes even more apparent with a high-speed connection to the Internet such as ADSL (we discuss ADSL further in Chapter 3).

Second, the U.S. Robotics Broadband routers include something called VPN passthrough. The "VPN" stands for Virtual Private Network. The specifics of this technology are hardly worth worrying about. The important thing is that VPN

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passthrough is required to connect to many corporate networks, because it allows a corporate network to extend itself to a home network via a dial-up or broadband connection. So, if you want to connect to your office network from a computer on your home network, with a U.S. Robotics Broadband router, you're all set.

Finally, the U.S. Robotics Broadband routers include some pretty high-level security, including a firewall. A firewall is a piece of software or hardware that protects your network from the Internet at large. You can still access everything on the Internet you want, but other people on the Internet can't sneak into your network to rummage around. The U.S. Robotics Model 9003 includes excellent firewall features, which we further describe in Chapter 3.

Peer-to-Peer Networking

You can configure networks to operate in any of several modes, or configuration types. Like personality types, some network configuration types are interested in controlling computer users; other network types are more relaxed about controls. The basic hardware and configuration stuff that goes into creating a network doesn't change much among the network types, so your choices mostly depend on how you want to communicate among computers.

For nearly all home and small-business networking situations, peer-to-peer networking is the way to go. A peer-to-peer network permits all the computers on the network to communicate with each other. In Figure 1-1, you see a typical peer-to-peer network communication structure.

Client A

Client B

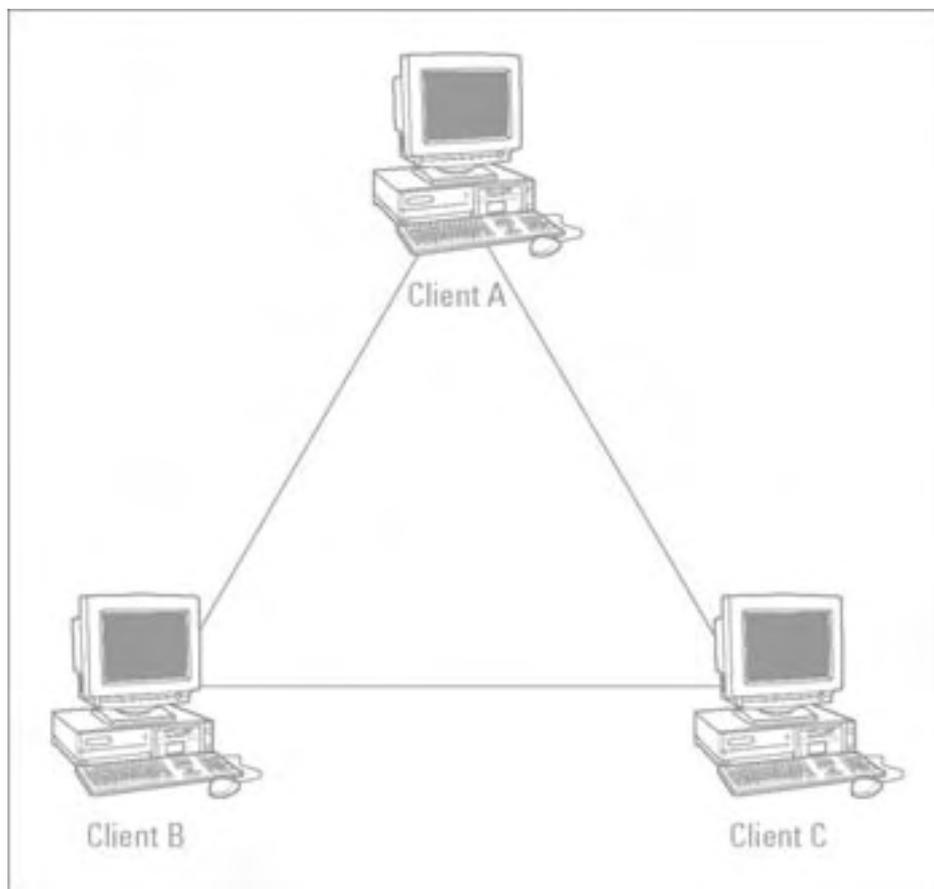Client C

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Figure 1-1: Everybody talks to everybody in a peer-to-peer network.

If you have computers running Windows (95/98/Me/NT/2000/XP), you can easily build a peer-to-peer network because the support for this type of network is built in to the operating system. In fact, this book is about creating a peer-to-peer network in your home, so we assume that you have one of these Windows operating systems on every PC in your house. It's worth noting that you don't actually need to have the same version of Windows on every computer in your network, just as long as every computer has one or another of these versions.

With a peer-to-peer network, you can impose security on some resources, such as files, but the security levels don't come close to the security of a client/server network. A client/server network is a type often used in large business situations where one master computer (the server) typically controls all data transfer with very strict password controls for all the other computers on the network (the clients).

Though a client/server network is really burdensome and unnecessary for the typical home network, elements of client/server mentality can be useful in a peer-to-peer network. As an example, you may want to take that old computer sitting in your closet, install a large hard drive in it, and designate it as a "data server" for your network. You can then use your data server as a place for anyone to store large files that need to be backed up. Then all you need to do is back up data on that one designated data-server computer rather than going around to each computer in your network and backing them up individually.

The Nuts and Bolts of Hardware

In most networks, the list of basic hardware you need is as follows:

- A network adapter in each computer you want to include in your network.
- Sufficient cable (for a cabled Ethernet network).
- An access point (for a wireless network).
- A router or switch where all your network cables connect to one another. In the case of a wireless network, the router is where your access point(s) connect to one another and where other devices, such as printers or an Internet connection, tie in to your network.

The following sections explain these hardware pieces.

More on network adapters

Traditionally, network adapters come in the form of a network interface card, or NIC for short (say "Nick") and use a cable to connect the computer to the network. The standard NIC goes inside the computer and provides a jack at the back where the network cable connects. Figure 1-2 shows an example.

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Figure 1-2: U.S. Robotics PCI network card.

We say traditionally because wireless solutions are also available for small networks, and you may prefer to take that route. In fact, wireless is at a point now where the network speed is comparable to traditional wired networks while offering the flexibility of moving your computers just about anywhere in your home and being able to connect. Think about how a cordless phone lets you talk anywhere in your house without running cables everywhere — it's basically the same idea.

Not all network adapters are cards anymore either. Today, many network adapters connect to a Universal Serial Bus (USB), which comes standard on pretty much every new computer. An example of this type of network adapter is shown in Figure 1-3. This is a nice way to go if you don't want to fuss with the inner workings of your computers.

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Figure 1-3: U.S. Robotics 1120 Wireless USB adapter.

The only consistent rule for creating a network is that you must have an adapter installed on each computer. Beyond that, network adapters come in lots of flavors, and when you buy network adapters, you must match them to two important elements:

- The type of network adapter that your computer accepts.
- The type of network cabling (or lack thereof, if you go wireless) that you want to use. (See the section, "Connections: Cables, wires, and thin air," in this chapter.)

TIP Many new computers these days can be configured to come with a network adapter already installed. This option is a good one if you're planning to build a wired network. Just make sure the network adapter is compatible with the cable type you plan to use (typically Category 5 or Ethernet cable).

TECHNICAL STUFF We discuss internal (PCI slot), USB (Universal Serial Bus), and PC Card network adapters in the following sections. Although other types of adapters are available that connect to the parallel port, which is the same port where your printer connects, these types are fraught with problems because they often interfere with your printer. So, we stick to the types that we know work well.

Getting your network adapter on the right bus

Forget public transportation. Bus means something else in computer jargon. A bus is a slot on your computer's motherboard into which you insert cards. Technically,

the name of the slot is expansion slot, and the bus is the data path along which information flows to the card. However, bus is the common term in computerese.

Each card (sometimes called a controller card) that you insert in a bus has a specific use. Your computers may have video cards, sound cards, hard drive controller cards, or other assorted cards.

Instead of using cards, some computers have one or more of these devices built right in to a chip on the motherboard. These built-in devices are called embedded cards or embedded controllers.

The network adapter you purchase must go into an empty bus, and you must make sure that the adapter is manufactured for the bus type that's available on your motherboard. The common bus types are:

- ISA (Industry Standard Architecture): ISA is a standard bus that's been used for a number of years, though it's quickly disappearing from newer computers. An ISA is a 16-bit card, which means that it sends 16 bits of data at a time between the motherboard and the card (and any device attached to the card). Unless you've decided to dust off an old computer and put it back into service on your network, you probably won't be dealing with an ISA bus.
- PCI (Peripheral Component Interconnect): The PCI bus is built for speed. Most new computers contain a PCI bus, which comes in two configurations: 32-bit and 64-bit. Its technology is far more advanced (and complicated) than the technology of the ISA bus. Most, if not all, internal network adapters are designed for a PCI bus.

The internal network adapters available from U.S. Robotics are all PCI types. Even older computers that have an ISA bus also have at least one PCI bus, so in most cases, installing a network adapter in an older computer is easy.

You can read the documentation that comes with your computer to find out what kind of cards you must buy. However, if you have mixed bus types on the motherboard, the documentation doesn't tell you which slots are already occupied. You have to open your computer to find out what type of network adapter you need to buy.

Follow these safety tips when you open your computer:

- Don't use a magnetic screwdriver. Magnets and disk drives do not peacefully coexist — the magnetic field from the screwdriver can delete data.
- Make sure that the computer is turned off and unplugged. Either pull the plug from the wall or pull the plug from the back of the computer.
- Discharge any static electricity in your body before you touch anything inside the computer. Static electricity has the power to zap chips. Discharge yourself by touching something metal (other than your computer).
- Remove any metal jewelry, especially rings. Gold is a particularly efficient conductor of electricity, including static electricity.

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You can tell at a glance what type of bus is available if you know what to look for. An ISA bus is usually black, with metal pins or teeth in the center and a small crossbar about two-thirds of the way down the slot. Check out an ISA bus in Figure 1-4.
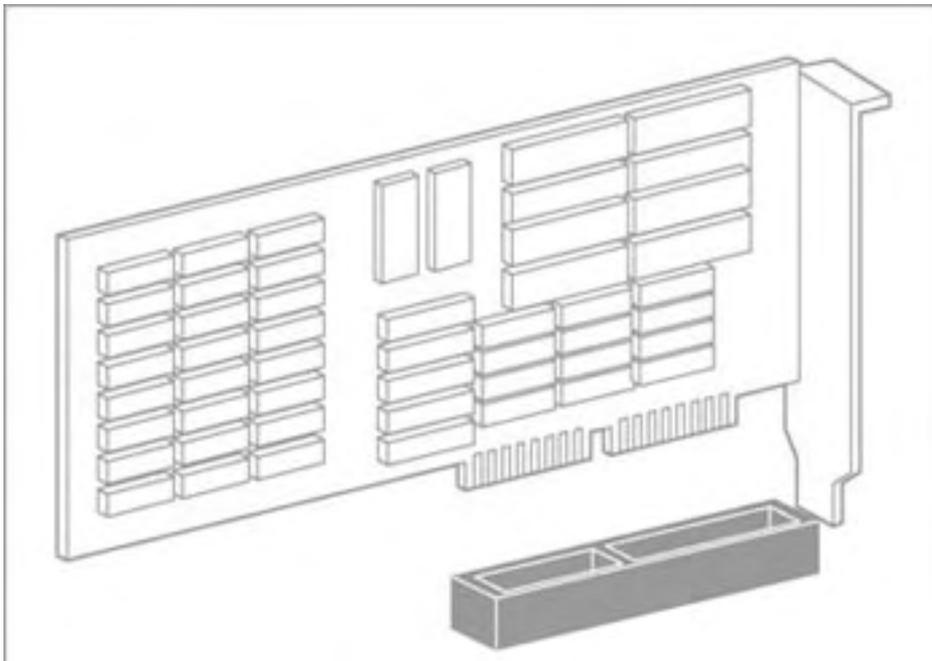

Figure 1-4: If it's black and long, it's an ISA bus.

A PCI bus is usually white, and it's shorter than an ISA bus, as shown in Figure 1-5. A PCI bus has a crossbar about three-quarters of the way down its length.
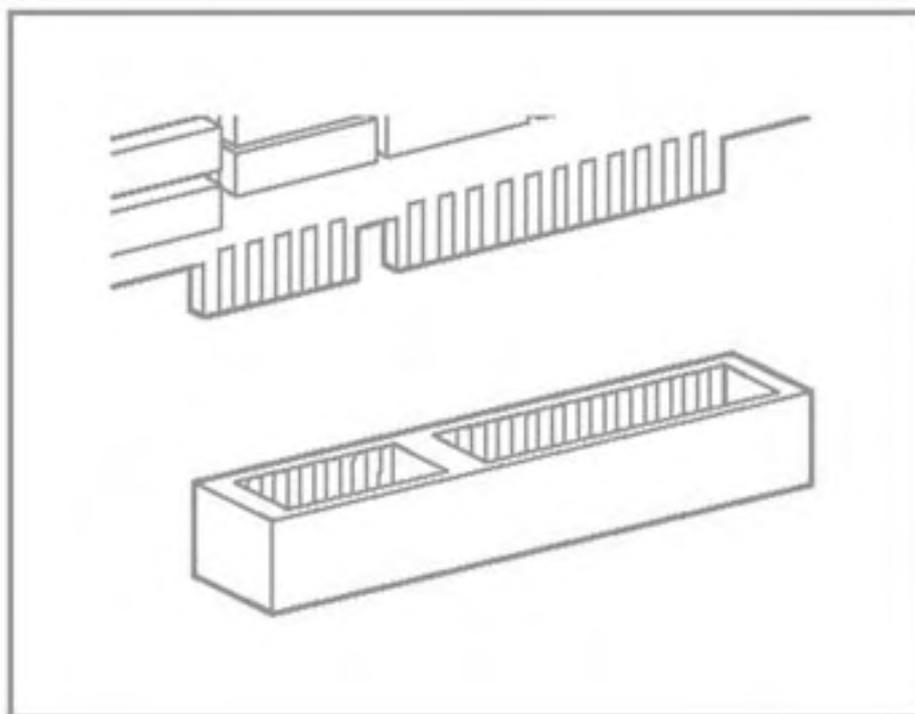

Figure 1-5: A PCI bus.

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For specific installation instructions for your adapter card, take a look at the Installation Guide that came with your U.S. Robotics product.

Avoiding the bus with some network adapters

Although internal network adapters are the most common type, you have several other options available.

USB connectors

Most of today's computers come with at least one USB port, and you can buy network adapters that plug into a USB port. You don't have to worry about the bus type because all USB ports are identical. In fact, you don't even have to open your computer because USB ports are external. Look at the back of your computer to find port connectors that look like those shown in Figure 1-6.

PC card connector

For laptop computers that don't have a built-in network adapter, the way to connect is with a PC card connector. This type of connector is a card that is roughly the size of a credit card, only a little thicker, as shown in Figure 1-7. The PC card installs in the side of a laptop computer.
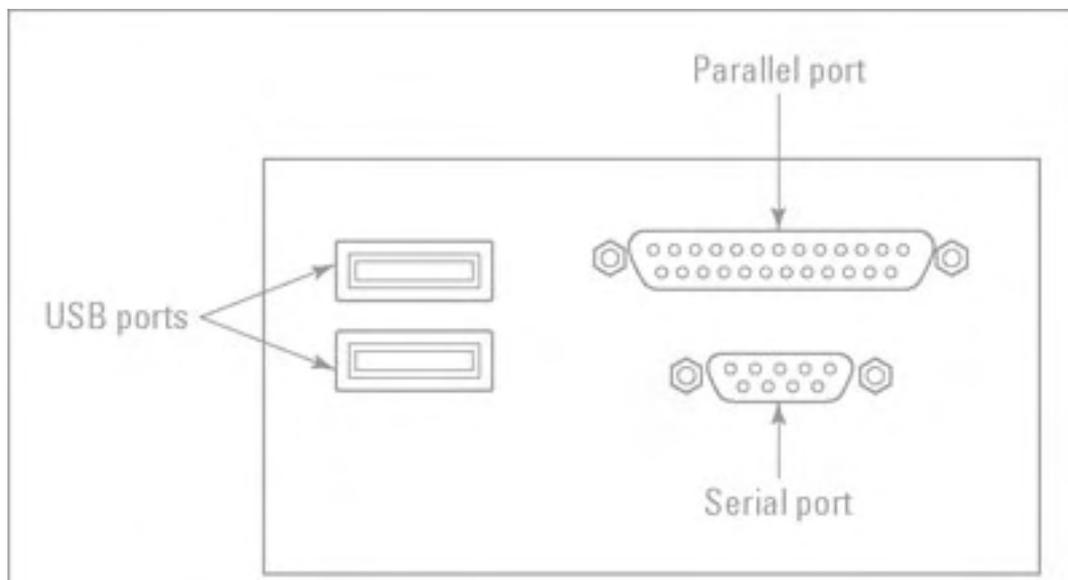

Figure 1-6: USB ports are identical in every computer.

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*Not available in all regions.

Figure 1-7: PC card is your best laptop option.

PC card network adapters are available for both cabled and wireless networks.

Specific installation instructions for your U.S. Robotics network hardware are included with your U.S. Robotics product.

Connections: Cables or thin air?

You have one more decision to make before you go shopping for your hardware — how your computers are going to pass data among each other. Your decision affects not only the type of cable you buy (or don't buy), but also the network adapters you need.

You have two real choices for connecting your computers into your network:

- Wired connection (typically Ethernet, or Category 5 cable)
- No cable (wireless connection)

Although some other types of network connections are available on the market, such as telephone line networking and electrical line networking, these types of networks suffer from slow speed, plus security and compatibility issues.

Network speeds are rated in megabits per second (Mbps). A megabit is a million binary pulses, and the best way to put that into perspective is to think about a modem. The fastest telephone modems transmit data at the rate of 56,000 bits per second (56 kilobits, or 56 Kbps), which is pretty slow. Networks transmit data much faster, as the following sections explain.

Ethernet cable

Ethernet is fast, accurate, and pretty much trouble-free. The current version of

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Ethernet can transfer data across the network at 100 Mbps, depending on the rated speed of the network adapters and routers in your network. Some older Ethernet equipment can send data only at 10 Mbps, but that's still ten times faster than most of the other cabling technologies.

Most of today's Ethernet equipment can determine the speed of individual devices on the network and automatically drop or raise the speed to match the device's capabilities.

Ethernet is the cable that you find in business networks. Today, Ethernet cable is purchased in the form of 100Base-T cable, which is also called twisted-pair cable or Category 5 UTP cable. Although Ethernet cable looks like telephone wire, it's not the same thing. Using 100Base-T requires the purchase of something called a switch or a router. A switch and a router basically do the same thing — they make sure that data moves around your network efficiently and without conflicts. This setup is shown in Figure 1-8.
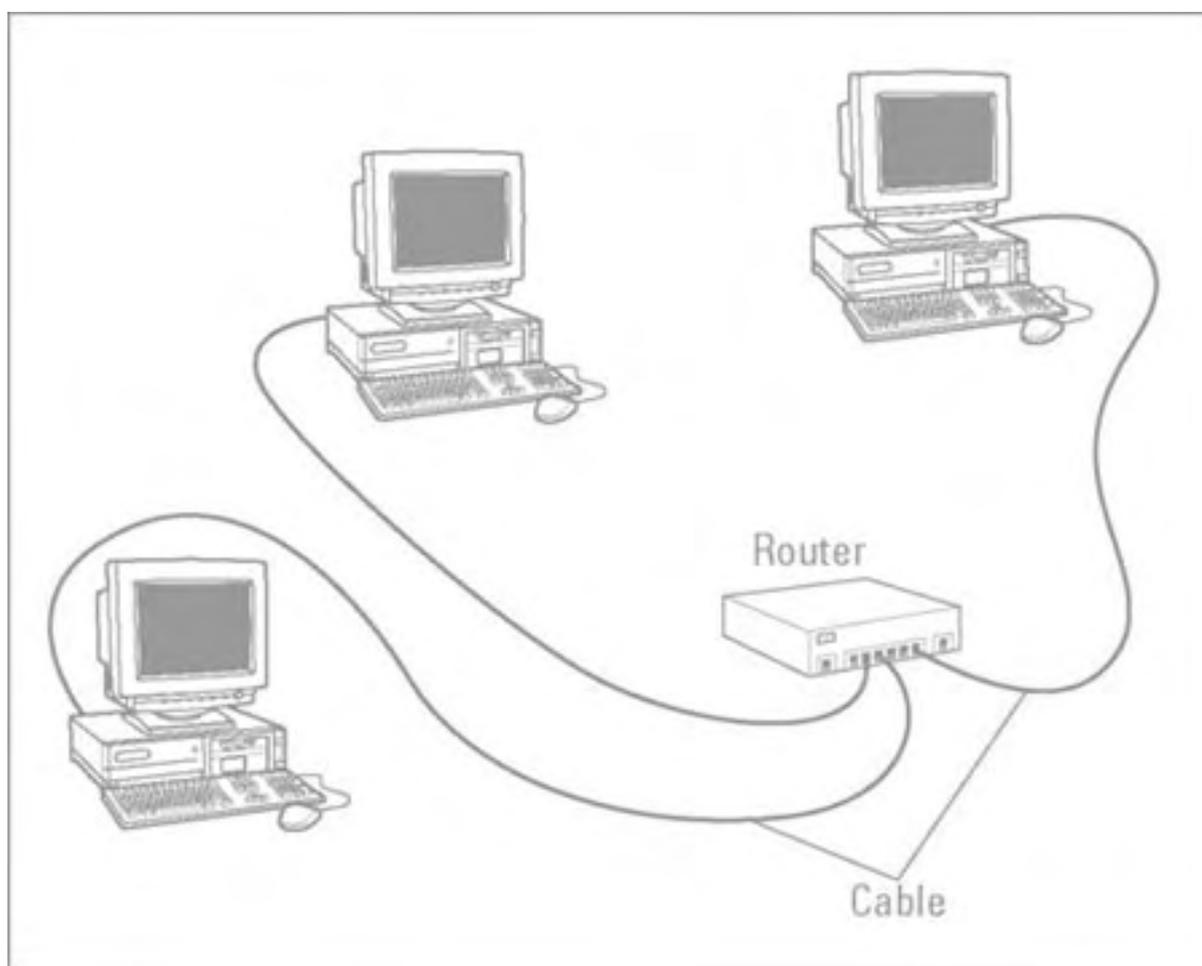

Figure 1-8: Each computer is connected to its own port in the router or hub.

The connector at the end of the cable looks like the connector at the end of your telephone cable, but it's actually slightly bigger. 100Base-T cable connectors are RJ-45 connectors — telephone connectors are RJ-11 connectors.

Ethernet networks require the following hardware components:

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- A network adapter for each computer you want to connect
- A switch or a router

Wireless connections for the cable-phobic

Wireless technology has helped to simplify networking by enabling you to connect your computers without having to run cable or wire all over your house. With a wireless network, you can achieve all the benefits of, and comparable speed to, an Ethernet network without the physical installation hassle.

Wireless also has the advantage of letting you move computers around without having to worry about the physical location of a network wall jack or other connection. This feature is especially cool if you want to connect a laptop computer to your network and work while you laze around in bed.

If you opt for wireless technology, you have two choices: radio frequency (RF) communication and infrared (IR) communication. Each has its own set of pros and cons.

Radio frequency wireless connections

Radio frequency wireless (or RF for short) is the best way to go in our opinion. RF is the most flexible and fastest of the wireless networking types.

RF wireless comes in several flavors, all beginning with the number 802.11. In short, here's the breakdown of these RF networking standards:

- 802.11. This standard was the original for RF networking and provided 1 to 2 Mbps (about one-tenth as fast as traditional Ethernet) and operated in the 2.4 GHz range. This technology had some radio frequency interference problems that have been corrected by the later, faster standards.
- 802.11a. This standard is commonly available in 6, 12, and 24 Mbps ranges, though it is capable of 54 Mbps. It uses frequencies in the 5 GHz range. This standard also built in some resistance to radio frequency interference.
- 802.11b. Improving upon 802.11a, this standard operates in the 2.4GHz range and can work with earlier 802.11 equipment (that is, it's backwards compatible with 802.11). The difference between 802.11b and 802.11 is that 802.11b has some improvements to avoid signal interference and can achieve a faster 11Mbps data rate.
- U.S. Robotics 22Mbps 802.11b. These products are compatible with older, standard 802.11b, as well as newer 802.11g products (see next bullet). These products provide up to twice the data rate of 802.11b, greater coverage (you can have your computers farther apart and still connect them), and improved security over standard 802.11b.
- 802.11g. The next standard operates in the 2.4GHz frequency range and can achieve up to a 54 Mbps data rate over a limited distance. It is backwards compatible with 802.11b and will work with both 11 and 22 Mbps U.S. Robotics wireless products. 802.11g is sort of a "greatest hits" of the 802.11 standards, offering all the best features of 802.11a and 802.11b.

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U.S. Robotics wireless networks require the following hardware components to set up a complete network:

- A network adapter for each computer you want to connect.
- A switch or a router.
- At least one wireless access point. This component is basically the antenna that picks up the signal from the wireless network adapters and feeds it into the switch or router.

Bluetooth wireless technology

One technology you may hear about, Bluetooth, is a new industry standard initially developed by Ericsson, the Swedish communications technology company. The standard aims to make all sorts of devices connect wirelessly. The idea behind Bluetooth is to allow cellular phones, computers, handheld devices, headphones, digital cameras, and just about anything that uses data to connect to just about anything else. The two latest Bluetooth standards support data rates of 2 Mbps and 10 Mbps, but they're not yet on the market.

So, although Bluetooth is not yet quite ready for prime time, the concept is very strong. Imagine having your digital camera simply "know" when it's near your computer and make itself and its images available to your network? Or what if you could bring your handheld device with some driving directions along on a trip, and your car's navigation assistant can grab the appropriate map from your handheld? The possibilities of Bluetooth are really exciting — it's definitely something to keep an eye out for.

For more information, check out www.bluetooth.org.

Here are some things to consider about RF network connections:

- They require a network adapter that's specific to RF technology, which means the adapter has to be equipped with the devices necessary to transmit and receive RF signals.
- Metal and large bodies of water can diminish the signal and cause connection difficulties. Putting the computer (with its RF technology device attached) under a metal desk or near a wall that has a lot of metal plumbing pipes can keep computers from communicating. Unless you're trying to communicate between two submarines, the large body of water issue shouldn't "surface."
- The specific frequencies and methods of security used for RF networking products vary somewhat from country to country. Be wary of purchasing RF devices cheaply overseas and expecting that they'll work with a product you bought in your own country, even if they are from the same manufacturer.

Infrared wireless connections

Infrared (IR) technology works by creating a direct signal between computers via a light beam. The connection is not as fast as RF wireless and much slower than Ethernet. IR technology is the same type of technology your television remote control uses to transmit your channel-surfing choices to your television.

Infrared connectors must "see" each other, which limits IR networks. IR technology doesn't travel through walls or around corners and works only in a straight line, which means it's suitable for networks only if all the computers are in the same room. Because one computer can't make a straight-line connection with two other computers at the same time, IR devices are available that collect and bounce the IR signals around the room. This feature enables you to build a network of multiple computers.

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Most laptops have an IR connector built in — look for a small glass square on the back of the computer. The same thing is true for many printers, especially laser printers, which are equipped with that same glass square on the front of the unit. For desktop computers, which usually don't have IR ports built in, you can buy IR network interface devices, most of which attach to your USB port.

One problem we've encountered during our tests of IR connections is that bright sunlight interferes with the signal. You need opaque window coverings if you want to go with IR connections.

Saving Time, Trouble, and Money on Hardware

If you're putting together a network from scratch, you may want to consider buying a kit or "bundle" that contains the necessary hardware to hook up a few computers. Most manufacturers offer such bundles, and the cost savings can be substantial over buying the necessary pieces separately. Here are some things to keep in mind before you buy a kit:

- Most kits are designed for a two-computer network. If you have a third computer, you may need to buy the additional components individually.
- Kits work only if every computer on your network needs the same hardware. For example, if you've decided to install an Ethernet network, the kit has two network adapters, two pieces of Ethernet cable, and one switch or router. However, both network adapters in the kit are the same bus type. If one computer only has an empty ISA bus and the other computer has an empty PCI bus, or you want to use a USB network adapter on one computer, you probably can't buy a kit for your situation.
- Kits aren't necessary if your computers have pre-installed network adapters. Many computer manufacturers sell computers already set up with network hardware for cabled Ethernet networks.

Even if you buy a kit, you may also have to buy some individual components. Perhaps you have three computers, or perhaps one of the Ethernet cables in the kit isn't long enough to reach the computer on the second floor. After you measure the distances, figure out where the available ports are, and do all the rest of your research, you may find that individual components are your only solution. Most people find that buying individual components costs about the same as a kit.

Every retail computer store sells individual hardware components for all types of network connections. Many large office-supply retail outlets also carry these products.

Planning an Ethernet Network

If you choose to set up a standard Ethernet network, you have to consider several planning issues.

Ethernet requires cable to run between all of your computers and your switch or router. For this reason, you need to centrally locate your router or switch so that

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you can conveniently run cable to it from every computer on your network.

In addition, unless you plan to have all of your networked computers in one room, you need to run cable between rooms in your house. The results can be either somewhat unsightly if you choose to keep your cables exposed, or a somewhat serious exploration into your carpentry skills if you plan to run your cables inside the walls of your home.

If you do plan to run your cables inside your walls, you may want to just plan your network, being sure to consider where you want wall jacks in every room, and then hire a contractor to do the actual cable runs. The tools for the installation and testing of wall jacks are actually fairly specialized and are probably best left to a professional. A professional network cable installer can also help you map out and plan your network.

In terms of planning where to put wall jacks and a hub or router, consider these issues:

- Install wall jacks near plugs so that you can connect your computer to your network and the electrical outlet.
- Consider placing your hub or router location in a closet or some other hidden place. A hub or router will have several cables connecting to it, and you'll want to keep foot traffic, pets, garbage, and splatters of pasta sauce away from these devices.
- Consider installing jacks in every room in which you think you may want to eventually use a computer. Having a contractor visit your home twice is always more expensive than doing a larger job once.

Planning a Wireless Network

Planning a wireless network is really easy.

As with an Ethernet network, it's a good idea to place your hub or router out of harm's way, such as in a closet or other low-traffic area. With wireless, you don't have any wall jacks to worry about and no contractor to hire for cable installation.

Your main issue is where to place your access points. The access points are the "antennas" for your network that pick up the signal from the wireless network adapters on your computers and transmit that signal via a short Ethernet cable to your router or hub. Figure 1-9 shows an access point.

Figure 1-9: U.S. Robotics Model 2249 access point.

You'll need to run a short length of Ethernet cable from the access point to your router or hub, so positioning these devices close to one another is good housekeeping.

Your next issue is picking up a good signal. U.S. Robotics wireless products come with software that shows you the strength of the signal between your access point and your network computer, as shown in Figure 1-10. Your only planning issue here is to make sure that your computer and access point are positioned relative to one another in such a way that your Link Quality is 100%. Looks like the computer we're writing this book with is just fine!
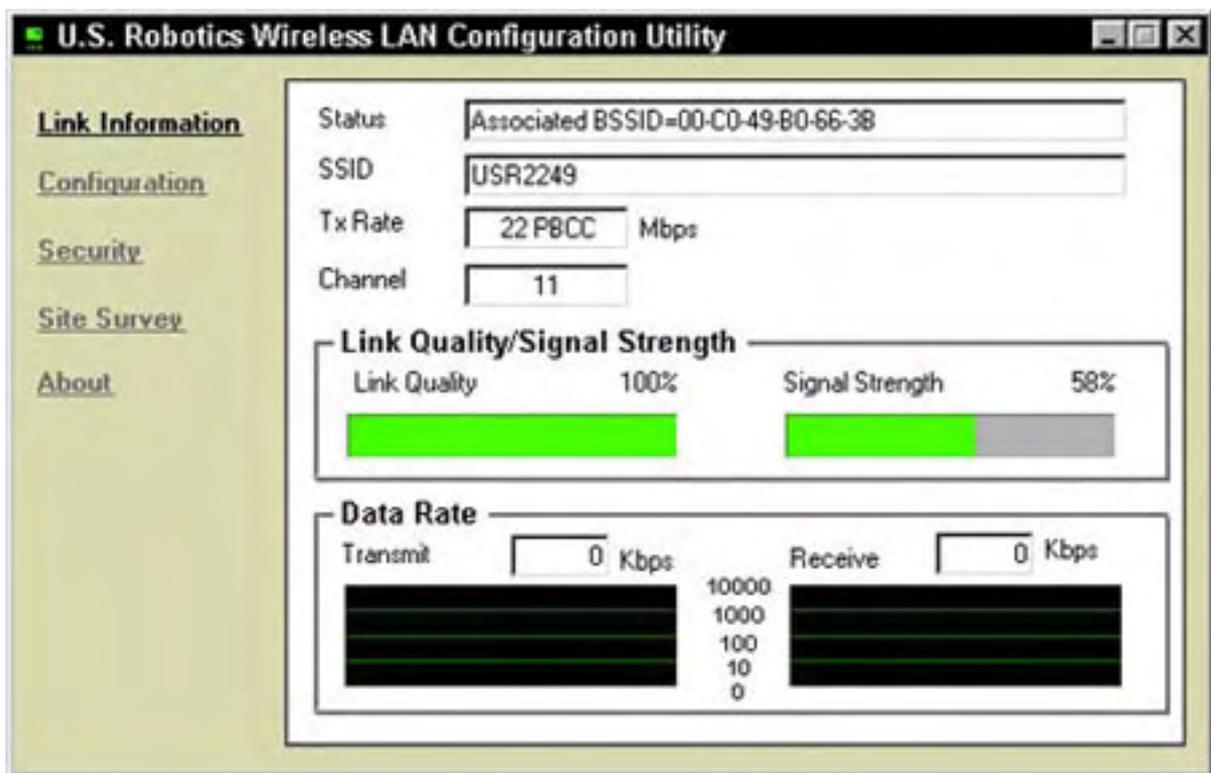
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Figure 1-10: U.S. Robotics Wireless LAN Configuration Utility.

Continue to Chapter 2 | Back to Contents List

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Home Networking For Dummies *(printer-friendly)*

Close Window

Contents List

Chapter 2

Configuring Your Network

In This Chapter

- Showing your computer how to find your network adapter
- Installing network components
- Naming your computer and giving it a workgroup
- Setting up your network for file and printer sharing
- Creating a username and password

After you have the hardware for your network in place, you're ready to configure it and install the software components that make it work.

REMEMBER In this chapter, we cavalierly assume that you already have your networking hardware successfully installed in all of the computers you want to include in your network. Whether that means you opened up computers and installed PCI network adapters (see Chapter 1 for more on that), simply plugged an appropriate network adapter into the USB ports of the computers you want to include, or popped a PC card into a laptop is up to you. In either case, you need to have your physical and software installation complete.

TIP Refer to the Installation Guide that came with your U.S. Robotics product for specific installation instructions.

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What is a network protocol?

You may notice a few acronyms and abbreviations in this book — things like NETBEUI, IPX/SPX, and TCP/IP. Take our advice: Don't bother learning what these things mean. The short story is that they are all network protocols, which are analogous to "languages" that computers can use to communicate with one another across a network.

The important thing to understand is that all devices on a given network must use the same language. For example, if you see NETBEUI installed on one computer and not the other, they won't communicate using the NETBEUI protocol. If you see TCP/IP installed on one computer but not the other, they won't communicate using the TCP/IP protocol.

Internet sharing requires TCP/IP. TCP/IP is the protocol of the Internet at large, as well as the most common and easy-to-deal-with protocol for local networks, such as the one you're building. For the sake of keeping things simple, we suggest you use TCP/IP. In fact, the U.S. Robotics networking software that comes with the U.S. Robotics wireless PC Cards uses TCP/IP automatically.

Adding File and Printer Sharing Services

One of the best things about having a network is that it enables you to share files and devices, such as printers. We discuss how to set up a shared printer in Chapter 4. However, before you can make use of the information in that chapter, you need to add something called File and Printer Sharing Services. The following numbered steps enable this important feature of your network.

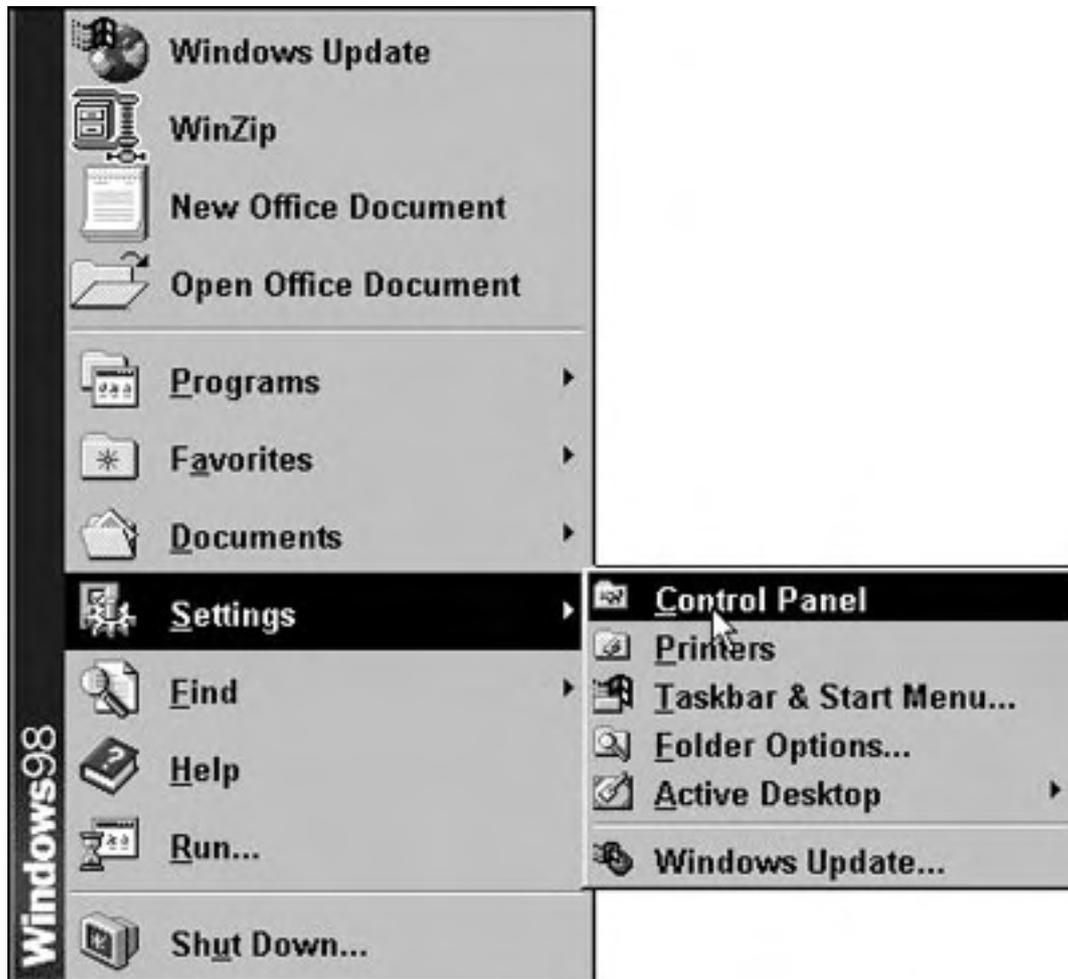**1. Click the Start → Settings → Control Panel, as shown in Figure 2-1.**

Figure 2-1: Selecting the Control Panel.

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The Control Panel appears, as shown in Figure 2-2.

Figure 2-2: The Control Panel.

2. Double-click the Network icon to view the network properties.

The Network dialog box appears, as shown in Figure 2-3.
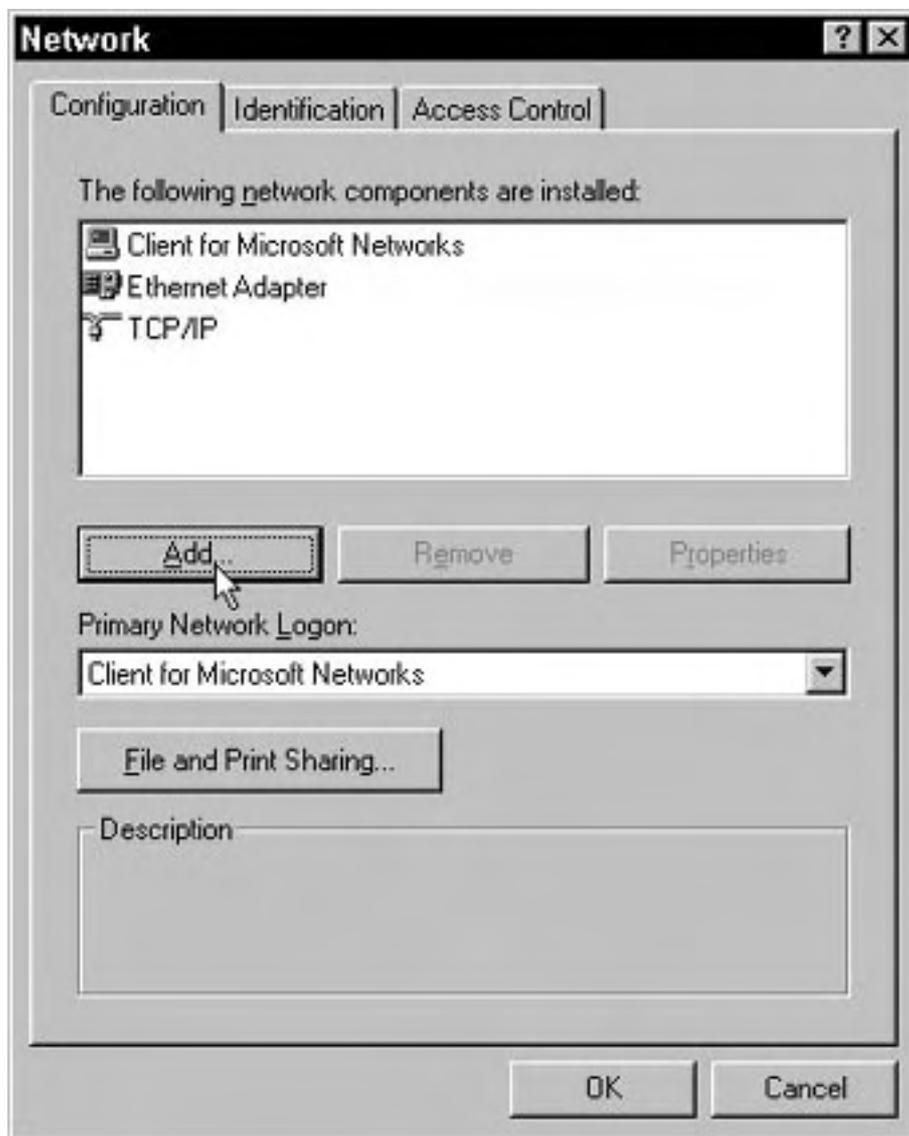
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Figure 2-3: The Network dialog box.

3. Click the Configuration tab.

4. Click the Add... button.

The Select Network Component Type dialog box appears, as shown in Figure 2-4.
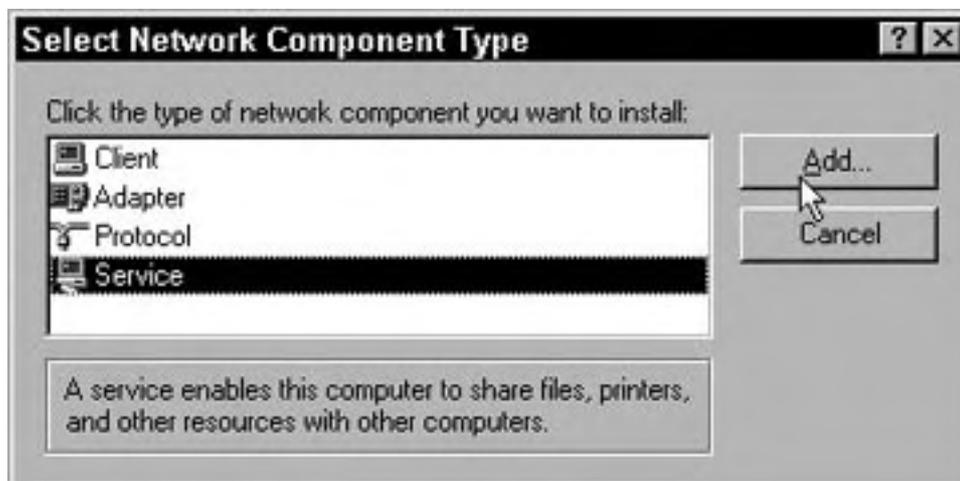
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Figure 2-4: The Select Network Type dialog box.

5. Select Service.

6. Click the Add... button.

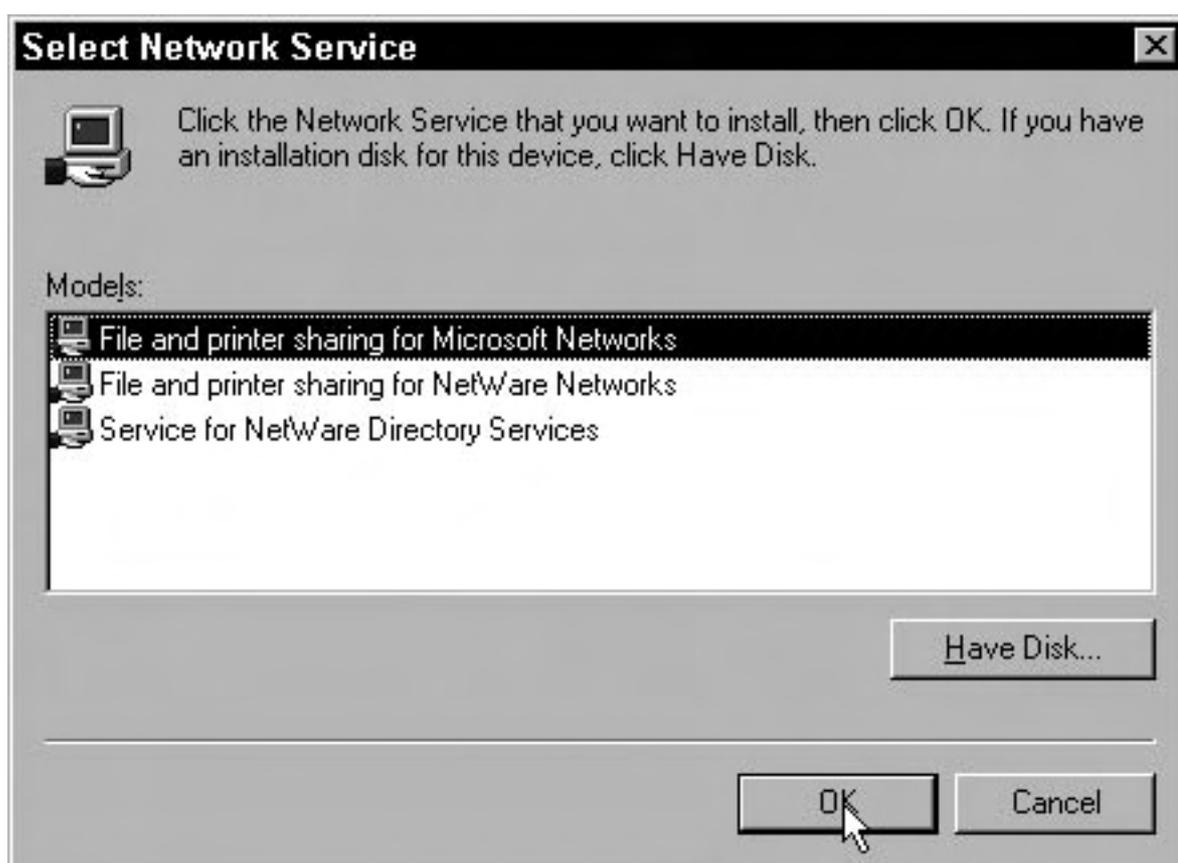The Select Network Service dialog box appears, as shown in Figure 2-5.

Figure 2-5: The Select Network Service dialog box.

7. Select File and printer sharing for Microsoft Networks.

8. Click OK.

Windows may prompt you for additional files that need to be copied in order to update the configuration changes you made. Make sure you have your Windows CD-ROM available to insert as the installation requires.

You return to the Network dialog box.

9. Click OK to close the Network dialog box.

You are prompted to restart your computer.

10. Click Yes to restart your computer.

You're almost there — just one more set of steps.

Naming Your Computer and Putting It in a Workgroup

You may already have a name for your computer — Fred, Nimby, or maybe *&@ $^ depending on how well it's been behaving. In this section, we show you how to teach your computer its name.

Naming each computer in your network is what allows other computers in your network, or more specifically, their users, to identify the location of resources (for example, files, a printer, or a CD-ROM drive) in the network. We explain in Chapter 4 how to share a drive on a computer in your network, thereby giving other computers in the network access to that drive. This concept is much easier if each computer has a name — the computer named Dad can access a shared resource on the computer named Mike and so on.

We suggest that you name the computers in your network after their users. Or, maybe by the room they're in (kitchen, office, garage, and so on). Any way you do it is fine, just remember that the name should be short, one word, and contain no funny characters (like / or *).

Here's how to name them:

1. In the Network dialog box (you should still have it open from the previous set of numbered steps in this chapter), click the Identification tab, as shown in Figure 2-6.

2. Enter a name and workgroup for your computer.

For instance, you may want to name the computer you're working on "Mike" and put it in the workgroup called "Home."

You must remember two important things when creating computer and workgroup names: First, you need to give each computer in your network a unique name. Second, you need to put all of your computers in the same workgroup — they must all have the same workgroup name down to the exact spelling.

That's it. Remember to perform these steps for all the computers in your network.

Figure 2-6: The Network dialog box with the Identification tab selected.

Entering Your Network Password

After you restart your computer, Windows prompts you for a Username and a Password. This process is called a login. Your username and password may consist of any combination of letters and/or numbers except for a few of the punctuation symbols — Windows tells you to try a different password if you enter one of the "forbidden" symbols. When entering a password, choose one that you will remember. You'll be prompted for the password each time you turn on your computer.

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You can also choose not to enter anything (simply click OK when the login appears). Doing so will mean that anyone who turns on your computer can gain access to your network. However, if you're in an environment where network security is not an issue (for example, at home with kids you trust), you may not want to bother with a password.

If this is your first time logging in, Windows asks you to verify the password you entered. Re-type the password in the pop-up window and click OK.

You will not have access to the network if you press <ESC> or click Cancel, but you will be able to use Windows.

Installing Network Protocols and Services for Windows Me

If you're running Windows Me on any computer, you can automate all the steps in this section for every computer on the network as well as set up a shared Internet connection. This magic is accomplished with the Windows Me Home Networking Wizard.

Note: The Windows Me Home Networking Wizard will not work to connect a computer running Windows 2000 Professional. If you find yourself in this situation, you need to manually install network protocols and services (similar to the numbered steps earlier in this chapter). Remember to consult the guide that came with your networking products for specific instructions.

You can connect your network either through an Internet device connected to your Broadband router, or via an Internet device connected to one of your networked computers. As we cover in Chapter 3, connecting through an Internet device connected to your Broadband router is the preferred method. Be sure to determine which method you plan to use before launching the Home Networking Wizard.

To launch the wizard, double-click the My Network Places icon on your desktop and then double-click the Home Networking Wizard icon. The first wizard window is a welcoming message that requires no action on your part, except clicking Next to get started on the real work.

The Home Networking Wizard may prompt you to enter some information regarding protocols, identifying your network hardware (type of network adapters and so on), and whether to start file and printer sharing services. You can find the information you need to enter in the first part of this chapter or in the installation guide that came with your network hardware.

Installing Network Protocols and Services for Windows XP

If you're running Windows XP on any computer, you can set up your home network using the cleverly named Network Setup Wizard. To get to the Wizard,

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click Start → My Network Places and then double-click the Network Setup Wizard.

You can connect your network to the Internet in one of two basic ways: Through an Internet device connected to your Broadband router, or via an Internet device connected to one of your networked computers. For reasons we explain in Chapter 3, connecting through an Internet device connected to your Broadband router is the preferred method. The Network Setup Wizard asks you a question on the third screen about how you connect to the Internet, as shown in Figure 2-7.

Figure 2-7: The Network Setup Wizard asking how you connect to the Internet.

We've selected the option to connect via a residential gateway (that's the Network Setup Wizard's term for connecting through a router) because we have a DSL modem connected to our U.S. Robotics Broadband router.

If you're using the Windows Internet Connection Sharing feature to connect to the Internet, you need to specify whether you are

- Connecting all of your networked computers via the computer you are currently setting up (the first option in Figure 2-7), or
- Connecting the computer you are currently configuring to the Internet via another computer's Internet connection (the second option in Figure 2-7).

As you go through the steps in the Home Networking Wizard, you may need to enter some information regarding protocols, your network hardware (type of network adapters and so on), and whether you want to start file and printer sharing services. You can find this information in the numbered steps in the first part of this chapter or in the installation guide that came with your network hardware.

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Continue to Chapter 3 | Back to Contents List

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Close Window

Contents List

Chapter 3

Sharing the Internet

In This Chapter

- Taking a look at Internet connection hardware options
- Configuring dial-up networking connections
- Sharing Internet connections
- Examining hardware devices that provide connection sharing

Sharing the Internet is a fantastic way to take advantage of your network. For starters, using a single Internet connection for all the computers on your network means that everyone can access the Internet at the same time without having to tie up multiple phone lines.

However, the real fun begins when you share a broadband connection, such as DSL, ISDN, or a cable modem. We cover these technologies later in this chapter, but for now, the important thing is to understand that broadband is a catch-all phrase for fast Internet access. With a broadband Internet connection and a network, you can get blazing fast access to the Internet for all your computers.

Figuring Out What You Need

To use the Internet, including e-mail and Web surfing, you need a few basic elements:

- A hardware device that can connect to an Internet service provider (ISP), such as a modem, cable modem, DSL device, or ISDN device
- Software that drives the connection to the ISP (this software is either included in Windows or included with the hardware device)
- E-mail software
- A Web browser

Web browser software is free — Microsoft Internet Explorer comes with Windows, or you can use Internet Explorer to download Netscape Communicator (www.netscape.com). E-

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mail software is also included with Windows (Microsoft Outlook), or comes with Netscape Communicator, or you can purchase a program such as Eudora (www.eudora. com).

As for the hardware device used to connect to an Internet service, most computers come with a standard telephone modem. And with a standard modem, you can use the built-in Windows Internet connection-sharing feature to make a modem on one computer in your network available to all the other computers in your network.

Although this method works, you probably want to consider something faster, especially since the cost of the device and the service can be shared across all the computers in your network. By connecting via a hardware connection, that is, connecting your Internet device directly to your network, you gain many advantages over Windows Internet connection sharing. The next few sections lay out all the details.

Sharing the Best Way

You can share an Internet connection in one of two ways:

- By using a software solution, such as the Windows Internet connection-sharing feature
- By using a hardware solution, such as a U.S. Robotics Broadband router

Although both of these methods work to share an Internet connection, they have some significant differences. Your choice will affect the type of hardware you need.

Sharing the Internet with the Windows Internet connection-sharing feature

The good news is that Windows 98 and later (2000, Me, and XP) include an Internet connection-sharing feature. However, while the Internet connection-sharing feature included in Windows does work, it isn't the ideal solution for sharing the Internet for several reasons.

The difficulty with this method is that it requires one computer to function as an Internet server, that is, a computer that "serves" as an Internet connection to the other computers in your network (also known as the "clients"). The Internet server computer must also be turned on if another computer on the network needs to use the Internet. Turning on two computers just to connect one to the Internet isn't terribly efficient. Simply put, this duty wasn't in the job description.

In addition, to obtain adequate security for your shared network connection, you would need to purchase additional firewall software to safeguard your network from tampering via the Internet.

Finally, because Windows Internet connection sharing doesn't allow something called VPN passthrough, you may have difficulty connecting to other networks. Without VPN

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passthrough, you may not be able to connect properly to your corporate network in order to work at home.

VPN passthrough stands for Virtual Private Network passthrough and refers to the ability for a large network to "extend" itself to another network through an Internet connection.

For some users, Windows Internet connection sharing may be adequate. Consult the documentation that came with your version of Windows for how to configure this feature.

If you choose to go with Windows Internet connection sharing, your choice of Internet connection hardware (such as a telephone modem, DSL, or cable modem) is pretty open. The device can be internally installed in one computer, externally installed via a USB port, or connected via some other method. As long as one computer in your network can gain access to the Internet, it can then be set up as the Internet server (or host) and share its connection with the other computers in your network.

Sharing the Internet with a hardware connection

For our money, sharing the Internet via a hardware connection is the best option.

Using a router that's capable of sharing an Internet connection, such as the U.S. Robotics Model 8000A or Model 9003 Broadband Routers, gives your network the ability to take full advantage of an always-on broadband Internet connection, such as DSL, ISDN, or a cable modem.

With a hardware Internet connection, any computer on your network can connect at any time, regardless of whether any other computers are turned on and without burdening any other computers. This feature is great because it saves on electricity and on the hassle of turning on multiple computers in order to connect to the Internet.

If you choose to use the hardware Internet sharing method, the best type of Internet device is one that can connect to your broadband router directly. For most broadband routers, this will be an Internet device with an Ethernet connection — you then simply run a short piece of cable between the Internet device and the router. See Chapter 1 for a description of Ethernet and the type of cable it uses.

In the case of routers, broadband means that the router is capable of taking a broadband (high-speed) Internet connection offered by a broadband Internet device and sharing it across your network. U.S. Robotics broadband routers, such as the Model 8000A, 8011, 8022, and 9003 have this capability built in. Figure 3-1 shows an example.
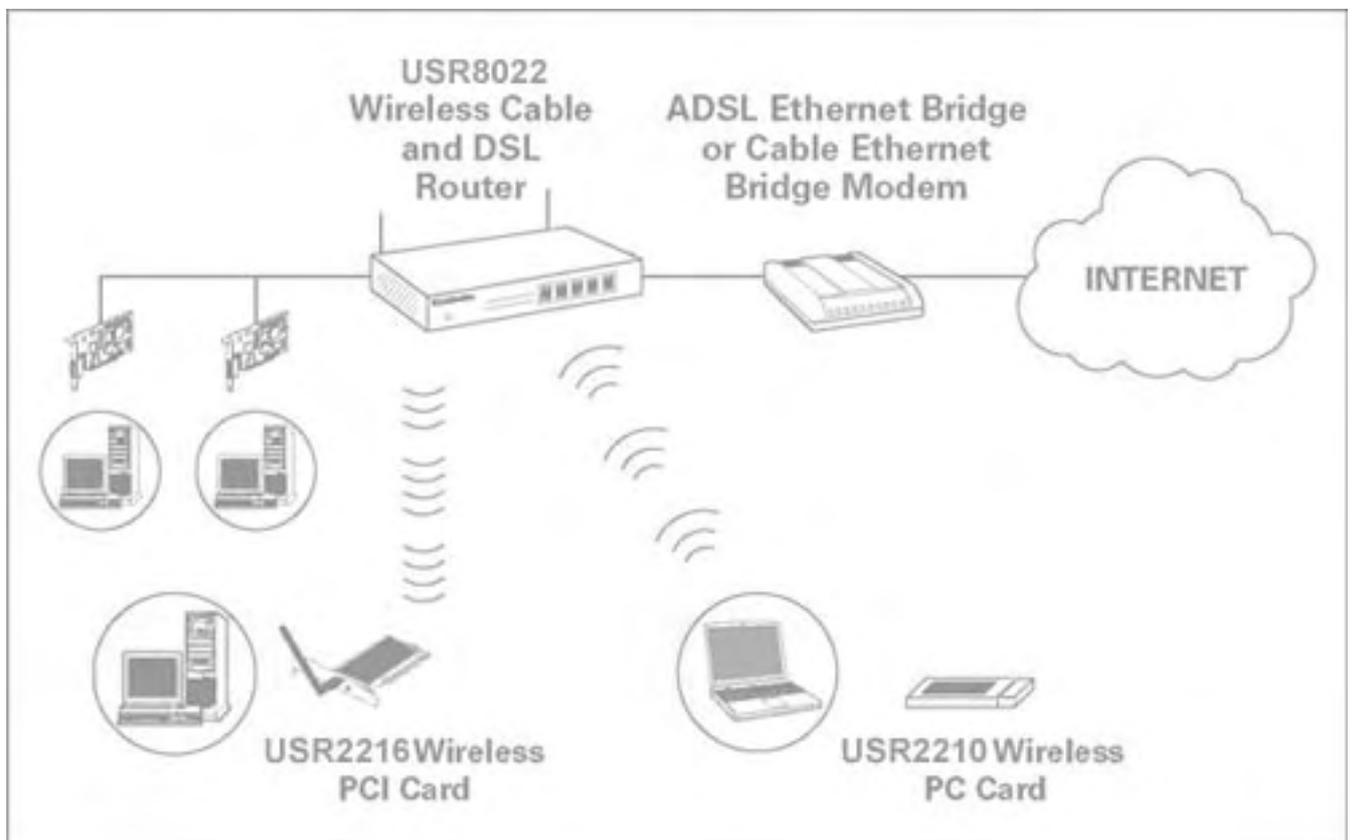
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Figure 3-1: How a U.S. Robotics Model 8022 broadband router and an Internet connection all work together.

In addition, the current line of U.S. Robotics Broadband routers offer robust firewall protection to keep your network safe from unwanted visitors.

Choosing the Right Internet Connection Hardware

To reach the Internet from your home computer, you need a hardware device that can communicate with an Internet server at your ISP. Depending on where you live, you have some choices about the type of hardware you can use. Your options may include

- A modem
- An ISDN device
- A cable modem
- A DSL (Digital Subscriber Line) device

Each of these options has its individual pros and cons — and some options aren't as widely available. Read on for more information that can help you determine which connection is the right one for you.

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What's behind a firewall?

The term firewall is often heard in the company of network professionals. A firewall is important technology for keeping your network safe from intrusion if your network is connected to the Internet.

U.S. Robotics Broadband routers include several firewall technologies to keep your network safe. These technologies include NAT (Network Address Translation), Packet Filtering, and SPI (Stateful Packet Inspection), among others.

NAT works to keep your network invisible to would-be intruders on the Internet by making it appear as one IP address. As far as the rest of the world is concerned, your network stops at your Internet connection (that is, your cable modem, DSL device, or ISDN device) without revealing the fact that multiple computers are connected to the Internet through that one IP (Internet Protocol) address.

Packet filtering works by inspecting data to make sure it is acceptable as it enters your network from the Internet. Basically, data is sent around a network and across the Internet in small chunks called packets. Each packet has a header, which briefly identifies the data. Packet filtering looks at the header of all data entering your network and matches it to the data that left the network to request it. For example, if you visit a Web page, some data goes to the Web server where that Web page resides to ask to see the Web page. The Web server then responds with the page — packet filtering makes sure these two pieces of data match up so that you get what you ask for. Any unrequested data could be an attack on your network.

Stateful packet inspection goes one step further than packet filtering by examining not just the header of the data packets, but some of the contents as well.

The more time you spend on the Internet, the more you realize how much speed counts. Make speed a priority — go for the fastest solution you can afford.

Telephone modems

A standard telephone modem works by taking computer data (digital data) and translating it into a form that the telephone line can handle (analog data). The maximum speed you can attain with a modem is 56K. In fact, today you can probably only buy 56K modems — don't even accept a slower modem as a gift.

When you use a modem to access the Internet, you dial out to your ISP, and the ISP's servers provide you with access to the World Wide Web and e-mail.

A modem is the least expensive Internet connection and dial-up access is available everywhere. Most new computers come with a 56K modem built in. It's nothing to get too excited about — a 56K modem is really a slow connection compared to the other possibilities. Also, with a modem, you have to dial out each time you want to use the Internet, which ties up your phone line. If you want a dedicated modem line to avoid missing incoming phone calls, you have the added cost of paying for a second line.

ISDN

ISDN stands for Integrated Services Digital Network. ISDN is basically a type of phone line that uses a digital signal instead of the traditional analog signal. ISDN connections are typically available at 128Kbps (twice that of a standard telephone modem) and make a good alternative to a standard telephone modem if you don't want to spend a bundle.

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Another advantage of ISDN is that in most cases, you can still use your telephone (although ISDN is a type of phone line) to make voice calls while connected to the Internet. Check with your ISDN provider to make sure that they offer this feature.

ISDN (as with the other broadband options discussed in the following sections) is not available everywhere. Check with your local phone company or search the Web to see if ISDN service is available in your area. Often, ISDN is available in urban and semi-urban areas, but not in rural locales.

If ISDN is available in your area, you can typically purchase the necessary hardware (called a terminal adapter) from the phone company or another company that offers the ISDN connection.

Make sure to read the section, "Sharing the Best Way" earlier in this chapter before choosing an ISDN terminal adapter. Your adapter needs to be able to connect to your network, which means that your adapter must have an Ethernet connection if you want to connect it to a broadband router.

Cable modems

Cable modems send data over your cable-television company's line. Some cable modems are stand-alone devices that can then be connected to your network while others are internal or Universal Serial Bus (USB) devices that must be installed in one computer, which can then share the Internet connection via the Windows Internet connection-sharing feature.

For the reasons we describe in Chapter 1, connecting your cable modem directly to a broadband router is the way to go. To do this, the cable modem you buy needs to have an Ethernet connection so that you can connect it directly to your router. Building your network Internet connection this way gives all the computers in your network solid Internet access without tying down one computer with the task of sharing its Internet connection.

One great, good thing about cable modems (and DSL devices, as we discuss in the next section) is that you're always connected to the Internet — no need to dial out each time you want to use the Internet. (This type of connection is sometimes called an always-on connection.)

Plus, cable modems download data really fast — up to 1 million bits per second (1 Mbps). In practice, you won't likely get 1 Mbps, but the speed will still handily outpace ordinary phone modems and ISDN. Finally, you don't have to perform any configuration chores to get your cable modem to connect to an ISP. The installation process the cable company performs hooks you up with its ISP automatically.

The main downside to cable modems is that they work by connecting you to a network of other cable-modem users. So, as this network of cable-modem users grows (more people use the service in your area), each of you loses some speed because everyone is trying to use a portion of the same network bandwidth.

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In addition, you will almost certainly have to use your local cable company as both your cable modem service and your ISP. This can be a good thing or a bad thing, depending on the service record of your local cable company.

In contrast to how a telephone modem completely ties up your phone line, a cable modem doesn't interfere with your ability to watch television.

Digital Subscriber Line (DSL and ADSL) devices

A DSL device is like a digital modem (modems are analog) that hooks into your telephone line. DSL uses a separate frequency range (one that can handle digital transmissions) in your telephone wires so that you can continue to use your telephone for voice and fax while simultaneously connecting to the Internet.

DSL devices typically connect via an Ethernet cable or a USB connection. If you've cabled your network with Ethernet or have a U.S. Robotics wireless network, you can connect the DSL device directly to a U.S. Robotics broadband router (8000A, 8011, 8022, or 9003) and make the Internet available to all the computers on your network.

For your home network, you're probably going to want ADSL, which stands for Asymmetric Digital Subscriber Line. Because ADSL is the most common form of DSL service, most people ignore the A, and when they talk about DSL, they usually mean ADSL.

Technically, ADSL can support download speeds of 8 Mbps and upload speeds of 1.5 Mbps. That's beyond blazing fast. But don't get excited — in practice, ADSL runs slower than its maximum speed, but still much faster than a telephone modem.

DSL devices have several advantages over other devices. They don't tie up your phone line (you can use your telephone and fax at the same time as DSL). Also, like a cable modem, DSL provides an always-on connection with the Internet, and unlike a cable modem, with DSL, your connection is private — you're not competing for part of a shared network with other users.

Setting up your DSL connection is easy and is performed in one of two ways. Either a technician from your DSL service provider will visit you and install and configure your connection, or you can use a software program such as SureConnect, shown in Figure 3-2.

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Figure 3-2: The U.S. Robotics SureConnect software in action.

The downside to DSL is that (just like sports cars), fast speeds command high prices — the higher the speed you want, the higher the monthly fee.

Also, the service must be available for the physical location of your home. Before you can rush to order DSL services, your telephone company must provide the technology that DSL requires, and you must live within about 3.5 miles (5.5 km) of a telephone company central switching office (CO), or local telephone exchange as its known in Europe. You don't have to get out your tape measure and walk from your house to the CO — any DSL service provider can tell you if you qualify.

Before you sign up with a DSL provider, do some research on the Web, read the fine print, and make sure that the company you're considering has a good repair record if things go awry.

Continue to Chapter 4 | Back to Contents List

Close Window

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Contents List

Chapter 4

Sharing Printers and Peripherals

In This Chapter

- Setting up shared printers
- Installing a network printer
- Sharing CD-ROM, removable, and other drives

One terrific side effect of installing a computer network in your home is the ability to easily share printers and drives. Network-deficient households (that seems to be a politically correct term, don't you think?) have had to rely on some pretty kludgy solutions for printing and moving files around.

Just as with sharing an Internet connection, as we discuss in Chapter 3, you have two basic options for sharing printers and drives: through Windows, or through a hardware solution.

The current U.S. Robotics routers come with a printer connection so that you can connect your printer directly to your network. With a printer "hanging" off your network directly, each computer in your network has equal access to the printer.

In contrast, if you connect the printer to a single computer on your network and then share the printer through Windows, the computer with the printer has to start doing double duty as a print server, performing an additional function it wasn't exactly designed to do. You may also notice the computer with the printer attached slowing down when other users try to print from other computers on your network.

Sharing CD-ROM, hard disk, or other drives is a little bit different because people usually share drives in order to move files from one computer to another. But, drives are also available that can connect directly to a network via an Ethernet connection.

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To share files or printers, you need to enable file and printer sharing in your network options. Chapter 2 explains how.

Understanding Your Printer Options

Many network-ready printers are available. Most of these printers have an Ethernet connection and can be connected directly to your network at the hub or switch. Network-ready printers also usually come with software that tells you what the printer is doing at any given moment — does it need paper? Is it jammed? This feature can be pretty useful if your printer is in another room and you want to keep an eye on it.

On the other hand, U.S. Robotics routers come with a standard parallel-port printer connection that connects nearly any printer directly to your network, as shown in Figure 4-1. You may not get all the fancy software that a network-ready printer offers, but you do get all of the convenience and speed of network printing.

Figure 4-1: The printer connection on the back of a U.S. Robotics Model 8011 Wireless Cable and DSL Router.

The U.S. Robotics routers have a built-in print server. Notice we mention that term in the beginning of this chapter as well. We do so because the term print server can refer to any piece of hardware or software that makes a printer available to multiple users.

If you have a printer connected to your network along with an always-on connection to the Internet, such as DSL or a cable modem, you need to have a firewall or at the very least to password-protect your printers. The U.S. Robotics routers come with a firewall, so you're in good hands there.

Installing Your Printer

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Before you can share a printer on your network, you have to install it. The installation process simply involves setting up the files that Windows needs to communicate with the printer. These files are called printer drivers. You then must tell Windows that this printer is going to be shared with other users on the network. Well, of course, installing also means the physical installation of the printer. If you plan to install your printer on a single computer, the documentation that comes with your printer explains all the steps. If you plan to connect your printer to your router, take a look at your U.S. Robotics guide for the steps.

If you've already installed a printer for this computer, you can skip this task and move ahead to the section "Sharing the Printer," later in this chapter.

When you first connect a printer to your computer or network, Windows may automatically search for the driver files within the Windows driver database. It is, however, much better to use the installation files supplied with most printers to perform the installation. Doing so is better because the drivers and software that come with the printer are going to be the most up-to-date and offer the complete set of software to help manage your printer.

We show you how to install a printer by using either method in the following two sections — just keep in mind that the first method (using the manufacturer disks) is the best way to go.

Using manufacturer disks to install a printer

The preferred method of installing a printer is to use the drivers supplied by the manufacturer. Those drivers probably came with the printer (either on a CD or floppy disk), but if not, you can call the company or visit its Web site to get the files. In addition, some printers come with software that works with the manufacturer's drivers to enhance your ability to control and manipulate the printer's features.

To install a printer by using the manufacturer software, you need to consult the installation guide that came with the printer. Typically, you will need to insert a CD-ROM, which will start a Wizard installation program, reboot, and you're ready to go.

Be sure to consult the Web site for the manufacturer of your printer to find out if updates to the drivers are available for your particular printer model.

Using Windows files to install a printer

Though this isn't the preferred method for installing a printer, in some cases it works just fine. If your printer came with installation software, your best bet is to install it by using that software, as we explain in the previous section, "Using

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manufacturer disks to install a printer."

If you choose to install your printer by using the Windows files, you may need your Windows CD to install a printer because the printer driver files are on the disk. Often, new computers have the entire contents of the Windows CD stored on the hard drive, and your printer installation will occur nearly automatically. It's a good idea, however, to have the Windows CD handy anyway.

Put the Windows CD in the CD-ROM drive. Hold down the Shift key so the CD doesn't open automatically. If it does open, just click the X in the upper-right corner of the window to close it. Then follow these steps to install your printer:

1. Double-click the My Computer icon.

The My Computer window appears.

2. Double-click the Printers folder in the My Computer window.

The Printers window opens. If this is the first printer you're installing on this computer, the only icon in the folder is the one named Add Printer. (If you installed faxing services, you also have an icon for Microsoft Fax.)

3. Double-click the Add Printer icon.

The Add Printer Wizard window opens. The first window explains that the wizard helps install a printer. Click Next.

4. Select Local Printer.

The wizard wants to know whether this printer is a local printer (attached to the computer) or a network printer (attached to another computer). (Information on installing a network printer is in the section "Installing a Network Printer," later in this chapter.)

Click Next after you make your selection.

5. Select the manufacturer and model for the printer.

Scroll through the Manufacturers list in the left pane (see Figure 4-2) to find the company that made your printer. When you select it, the Printers pane on the right displays all the printers from that manufacturer. Scroll through the list to find the right printer model. Then click Next.
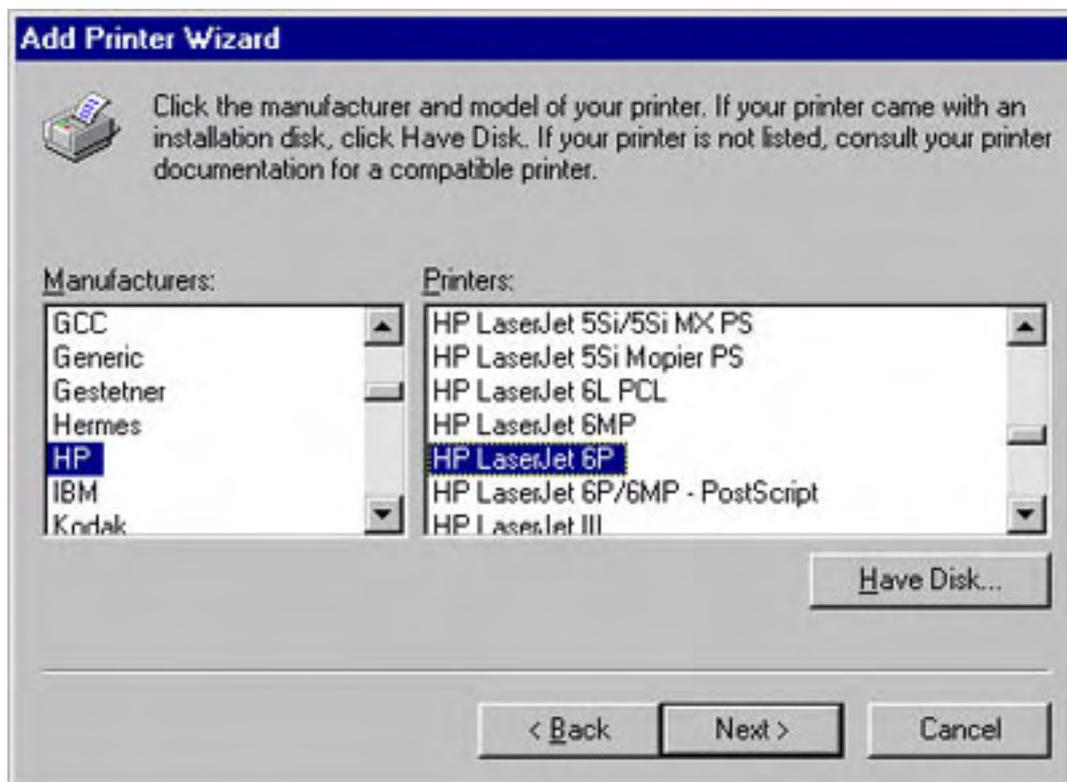
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If you can't find the exact printer model, read the documentation that came with your printer. Look for the section on printer emulation and see which model matches your printer.

6. Select the port to which you've attached your printer.

The port is probably LPT1, but if this is the second printer you're attaching to this computer and you've installed another printer port, choose LPT2. Click Next after you select the port.

7. Name the printer and specify whether it is the default printer. See Figure 4-3.

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Enter a name for this printer in the Printer Name text box. By default, the wizard inserts the model name for the printer, which is usually perfectly acceptable.

You also have to tell Windows whether or not this is the default printer for Windows software. Select Yes if this is the printer you expect to use when you print from your software programs. Of course, if this printer is the first one you're installing, it has to be the default printer.

The default printer is the printer that is automatically selected when you print from software. If you have other printers, you can use the software Print dialog box to change to another printer.

Click Next to move on.

8. Select Yes to print a test page.

Click Finish because this is the last wizard window, although you're not quite done.

The files that Windows needs are transferred from the CD to your hard drive. Then the test page is sent to the printer. Look at the test page and see if it printed correctly.

9. Tell Windows whether the test page printed correctly.

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If the test page printed successfully, you're finished. If not, Windows opens a Print Troubleshooter.

Select the appropriate choices, and the troubleshooter will make suggestions. Keep going until you solve the problem. If the problem can't be solved using the troubleshooter, you're advised to call the printer manufacturer for more help.

Sharing Your Printer

After your printer is installed, you can begin using it on your computer.

You need to have File and Print Sharing services started for the following steps to work. Chapter 2 explains how.

Follow these steps to share the printer with the rest of the network:

1. Choose Start → Settings → Printers.

The Printers folder opens, displaying an icon for the printer you installed on this computer.

2. Right-click the icon for the printer you want to share and choose Sharing from the shortcut menu that appears.

The printer's Properties dialog box opens, and the Sharing tab appears in the foreground. The Not Shared option is selected, and all the other fields on the dialog box are grayed out.

3. Select Shared As.

The text boxes on the dialog box are now accessible. (See Figure 4-4.)
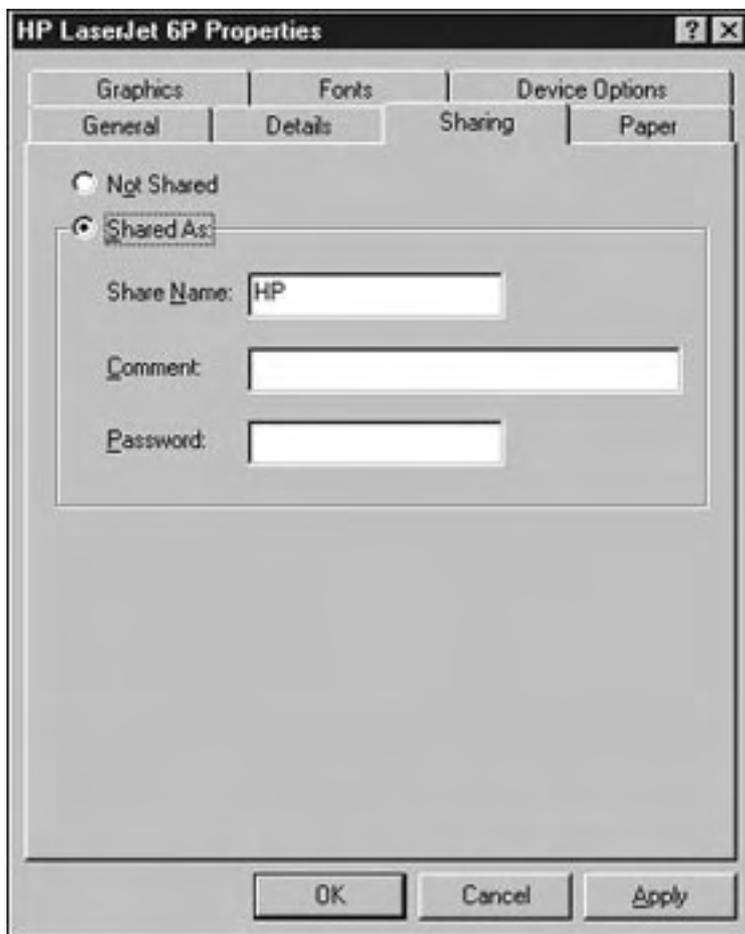
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Figure 4-4: Configure this printer for sharing so that everybody else in the household can use it.

4. Enter a name for the printer in the Share Name text box.

You can accept the name Windows automatically enters, which is usually a shortened form of the printer model. Or you can use a name of your own choice.

5. Optionally, enter a description in the Comment text box.

You can use the Comments text box to help identify a printer. For example, "Den printer" may work well for home use. Users only see the comment text if they select the Details view in Network Neighborhood when they double-click the icon for the computer that is directly connected to the printer.

6. Optionally, enter a password for the printer.

If you choose to require a password, users who don't have the password won't be able to use the printer. On a home network, there's rarely a reason to use this option. Companies with printers that hold checks use passwords for those printers. If you do enter a password, you're asked to confirm the password by entering it again. You won't see the actual password as you're typing because Windows substitutes asterisks for your characters.

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Password protecting a printer does provide an added measure of security if your network has an always-on connection to the Internet, of the type we discuss in Chapter 3.

7. Click OK.

You return to the Printers folder, and your printer icon has a hand under it, indicating that this printer is a shared resource.

Accessing a Network Printer

Put on your running shoes! After you configure a printer for sharing, you need to run to the other computers on the network and install that same printer. Of course, you're not going to perform a physical installation; the printer is staying right where it is. Installing a printer on a computer that has no physically attached printer means you're installing a network printer.

Choosing a method to connect

Two approaches are available to you for installing a network printer:

- Use Network Neighborhood. Double-click the Network Neighborhood icon. In the Network Neighborhood window, double-click the icon for the computer that has the printer. Right-click the printer icon and choose Install from the shortcut menu that appears.
- Use the Printers Folder. Double-click the Printers folder and then double-click the Add Printer icon.

Either method launches the Add Printer wizard. Both methods require the installation of software drivers for the printer, so you need to have the disks from the printer manufacturer or your Windows CD.

Adding the printer

For this example, we use the Add Printer icon in the Printers folder. This method makes the example slightly longer, but it provides a complete explanation for installing network printers. If you use the printer icon in Network Neighborhood, you can jump to Step 4, where you can find the information about the printer location already filled in.

Be sure that the printer software CD or disk is in the appropriate drive and then follow these steps:

1. Choose Start → Settings → Printers.

The Printers folder opens.

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2. Double-click the Add Printer icon.

The Add Printer wizard opens with a welcoming message. Click Next to get started.

3. Select Network Printer and click Next.

4. Click the Browse button to search the network for shared printers.

This wizard window has two parts: the location of the network printer and a question about printing from MS-DOS software.

5. When the Browse for Printer dialog box opens (see Figure 4-5), click the plus sign next to the computer that has the printer.

The listing in the Browse for Printer dialog box expands to display any shared printers that are connected to that computer.
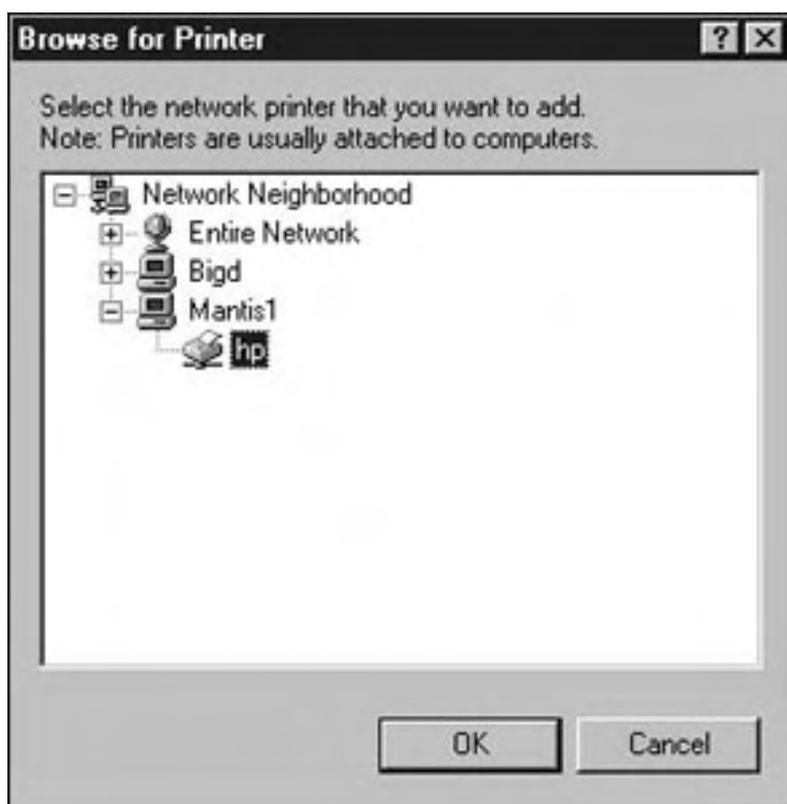

Figure 4-5: Click a network computer's icon to see the printer attached to that computer.

6. Select the printer and click OK.

The printer's location (in the form of \\computername\printername) is entered in the Network Path or Queue Name text box.

7. Specify whether you print from MS-DOS-based programs. Then choose

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Next.

Only select this option if you know you will need it. If you say Yes to MS-DOS printing, the next window explains that your software needs to have a port associated with the printer. Click the Capture Printer Port button, select LPT1 as the device, and click OK. You return to the previous wizard window.

Click Next.

8. Select Yes to send a test page to the remote printer and then click Finish.

The printer files are copied to your hard drive, and a test page is sent to the printer. If the test page prints correctly, select Yes in the dialog box that asks about the test. If the test page does not print properly or doesn't print at all, select No. Then use the printer troubleshooter to try to resolve the problem. See the section "Installing a printer," earlier in this chapter, for information about the Print Troubleshooter.

An icon for the printer appears in your Printers folder. Whenever you print, the print job is sent to this remote printer.

Renaming network printers

After you install a network printer, you can change its name to something that reminds you where it is or what it does. This changes the printer name on only your computer; it doesn't change anything on the computer to which the printer is attached. Follow these steps to give the network printer its own personalized name:

1. Choose Start → Settings → Printers.

The Printers folder opens.

2. Right-click the icon for the network printer and choose Rename from the shortcut menu that appears.

The icon title is selected (highlighted), which means that you're in edit mode.

3. Enter a new name and press Enter.

Choose a name that describes the printer for you. For example, "HP in Den" is a good descriptive name.

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Using both local and network printers

If you have two printers in the house, you can attach them to separate computers, have one connected directly to your network and the other to a computer, or have both connected to your network. Just follow the steps explained earlier in this chapter for installing local printers and then follow the steps to install each printer as a remote printer on the computers that will use the printer(s) through your network.

You can switch between printers in nearly all Windows software when you want to print. When you want to print from a Windows program, simply click File → Print and select the printer you want to use in the printer Name text box, as shown in Figure 4-6.
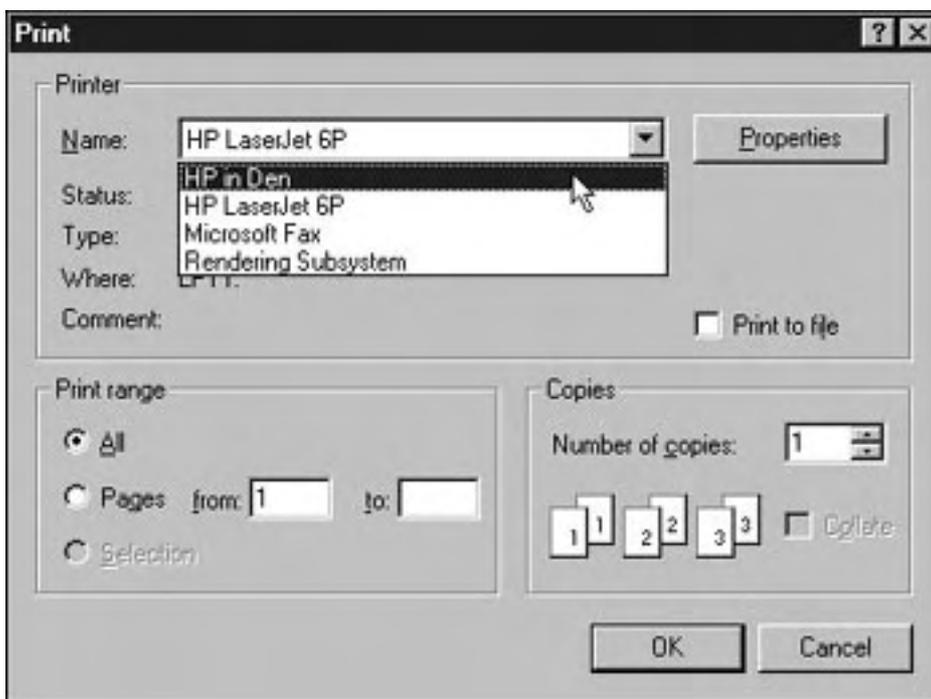

Figure 4-6: A Print dialog box with a drop-down list of installed printers.

Managing print jobs

You can control individual print jobs that are sent to the printer, but you have to move fast, because everything happens very rapidly. You can open the printer controls with these steps:

1. Choose Start → Settings → Printers.

The Printers folder opens.

2. Double-click the icon for the printer.

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The printer's dialog box opens, displaying any print jobs that are currently in the queue.

You can pause, delete, and move the print jobs that are in the queue.

Troubleshooting remote printing

Sometimes when you're printing to a remote printer, you see an error message telling you that there was a problem printing to the port (the port is the path to the remote computer that has the printer attached). Before you panic, thinking that something awful has happened to your network printing services, check the condition of all the hardware.

If your printer is connected to a computer

If your printer is connected to a computer rather than directly to your network, that computer has to be turned on if you want to print from a remote computer. If the computer is turned off, turn it on.

You don't need to know the login password for the computer. Nobody has to be logged in to the print server to use its shared printer — the Windows operating system simply must be started. That's a really nifty way to design network printing!

Check the printer

If the computer is turned on and you still get error messages when you try to print, check the printer to make sure that it's turned on. Most printers have a "ready light," a button that lights up to say that everything is cool and the printer is ready to do your bidding. If the ready light isn't on, follow the instructions in the printer manual to investigate the problem. The most common problems are that the printer is out of paper, the paper is jammed, or the cartridge is out of toner (or ink).

Check the cable

Cable that isn't connected properly can't send data. Make sure your printer is properly connected to a computer (if you're sharing the printer via a computer) or to your network hub or router (if you're connecting your printer directly to your network). In either case, the cable needs to be properly connected.

Sharing Drives

Nobody could call a CD-ROM drive anything but a necessity given that nearly all software comes on CDs. However, many home networks link a new PC with one or more older PCs. The new machine probably has a CD-ROM drive, and networking means that you don't have to upgrade the older machine.

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CD-R (CD-Recorder, or CD burner, if you want to sound cool) and CD-RW (CD-Rewritable) drives are also incredibly useful, but often on the more expensive side. DVD drives are even more costly. Network sharing is a great way to get the benefit of these types of drives for all the computers in your network without having to buy separate drives for each computer.

Similarly, removable drives that give you additional storage space are extremely popular, and their prices are getting lower. The most popular are Jaz and Zip drives, which are made by a number of companies, and a variety of drives from SyQuest. You insert cartridges into the drives, and the cartridges act like additional hard drives. Capacities vary from 100MB all the way up to 4.7GB.

Some of the advantages of sharing drives include

- Being able to move files around easily — no more shuttling files around on floppy disks.
- Centralizing certain types of media, like an encyclopedia CD or collection of photos on a shared CD-ROM drive.
- Putting an old computer back to work. If you have an older computer lying around with some decent hard disk space, you can put that computer on your network, share the drive, and use the computer as a file server.
- A file server simply stores data for use by other computers on a network. Incidentally, a file server is another nice way to perform short-term backups — it can just be a place where you store a second copy of important files.
- Performing backups of data from all of your networked computers to a single removable media drive or CD-RW drive.

If you want to get really serious, you can also find network-ready drives that are specifically designed to store multiple CDs for access to a network. These devices can store hundreds of "CD images," that is, they don't house the actual CD like a stereo CD-changer, they just load the data from the CD and store it on a hard drive. The CD data is then available to any computer on your network. These drives aren't cheap, but it's nice to dream!

Setting up shared drives

You can share a CD-ROM, removable, or any other drive with all the other computers on your network. However, you have to configure the drive to enable sharing before the other computers can access the drive. Here's how:

1. Double-click the My Computer icon.

The My Computer window opens.

2. Right-click the icon for your CD-ROM or other drive and choose Sharing from the shortcut menu that appears.

The Properties dialog box for the drive opens, with the Sharing tab in the foreground. The Not Shared option is selected by default, which means that all the other fields in the dialog box are grayed out and inaccessible.

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3. Select Shared As to make all the sections of the dialog box accessible (see Figure 4-7).

4. Enter a name for the drive in the Share Name text box.

By default, Windows inserts the drive letter assigned to the drive. You should change that name to something a bit more descriptive, such as KitchenCD or MomRemovable.

5. Optionally, enter a descriptive phrase in the Comment text box.

6. Select an access type by clicking the appropriate option button.

The access type that you select determines what network users can do when they access this shared resource. By default, Read-Only is selected, which is just fine for a CD-ROM drive (most CDs are read-only anyway).

You may want to consider whether you want others to have full access to a removable or other drive — enabling full access lets other people on your network delete or alter files on the drive. You can specify passwords for different levels of access to the drive, as we explain in the next step.

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7. If you want to restrict access to the drive, enter a password in the Read-Only Password text box, the Full Access Password box, or both.

If you enter passwords in these boxes, only those users who know the respective passwords can read or have full access to the drive.

8. Click OK.

You're returned to the My Computer window, and the icon for the drive has a hand under it, indicating that it's a shared resource.

If you entered a password, the Password Confirmation dialog box opens. Enter the same password again to confirm it (asterisks replace your characters again). Then click OK.

Accessing a shared drive

In order to access a remote drive, the computer that has the drive must be turned on, and Windows must be running. You don't have to worry if nobody has logged on (the logon dialog box is sitting on the screen waiting for a user to log on); you can still access the shared drive.

Finding the drive

An icon for the shared drive appears in Network Neighborhood or Windows Explorer when you double-click the icon for the computer to which it is attached (see Figure 4-8).
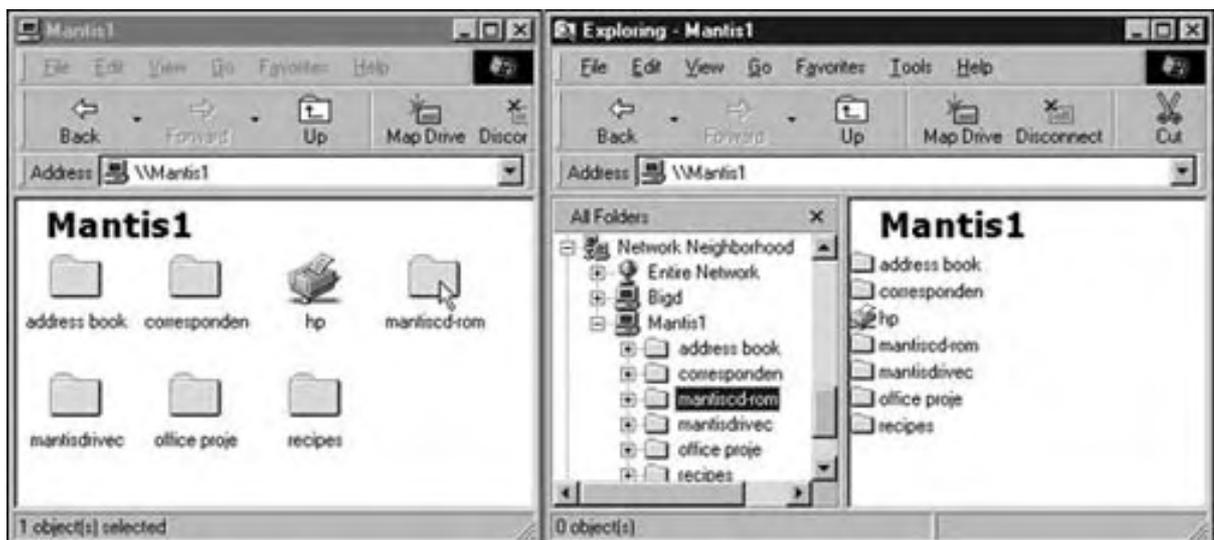

Figure 4-8: Use Network Neighborhood or Windows Explorer to locate a shared drive on another computer.

Incidentally, when you look for a remote drive, you understand why naming the

shared resource correctly helps you keep track of your network. Looking at a device named "D" isn't a clear indication of the type of device — it could be any type of drive.

When accessing a CD-ROM or removable drive remotely, you can't tell whether a disc or cartridge is in the drive until you double-click the icon for the drive. If there's no disc or cartridge, you see an error message telling you that the drive is not ready.

The problem with a remote CD-ROM or removable drive is that you have to walk to the computer that contains the drive to insert the disc or cartridge you want to use. Of course, if you are accessing a hard drive remotely, you don't need to worry about any cartridge or disc.

Using a remote drive

You can access a remote drive by following these steps:

1. Double-click the Network Neighborhood icon.

The Network Neighborhood window opens.

2. Double-click the icon for the computer that has the shared drive that you want to use.

A window opens, displaying the shared resources attached to that remote computer.

3. Double-click the icon for the shared drive you want to use.

A window opens, displaying the contents of the drive (see Figure 4-9).
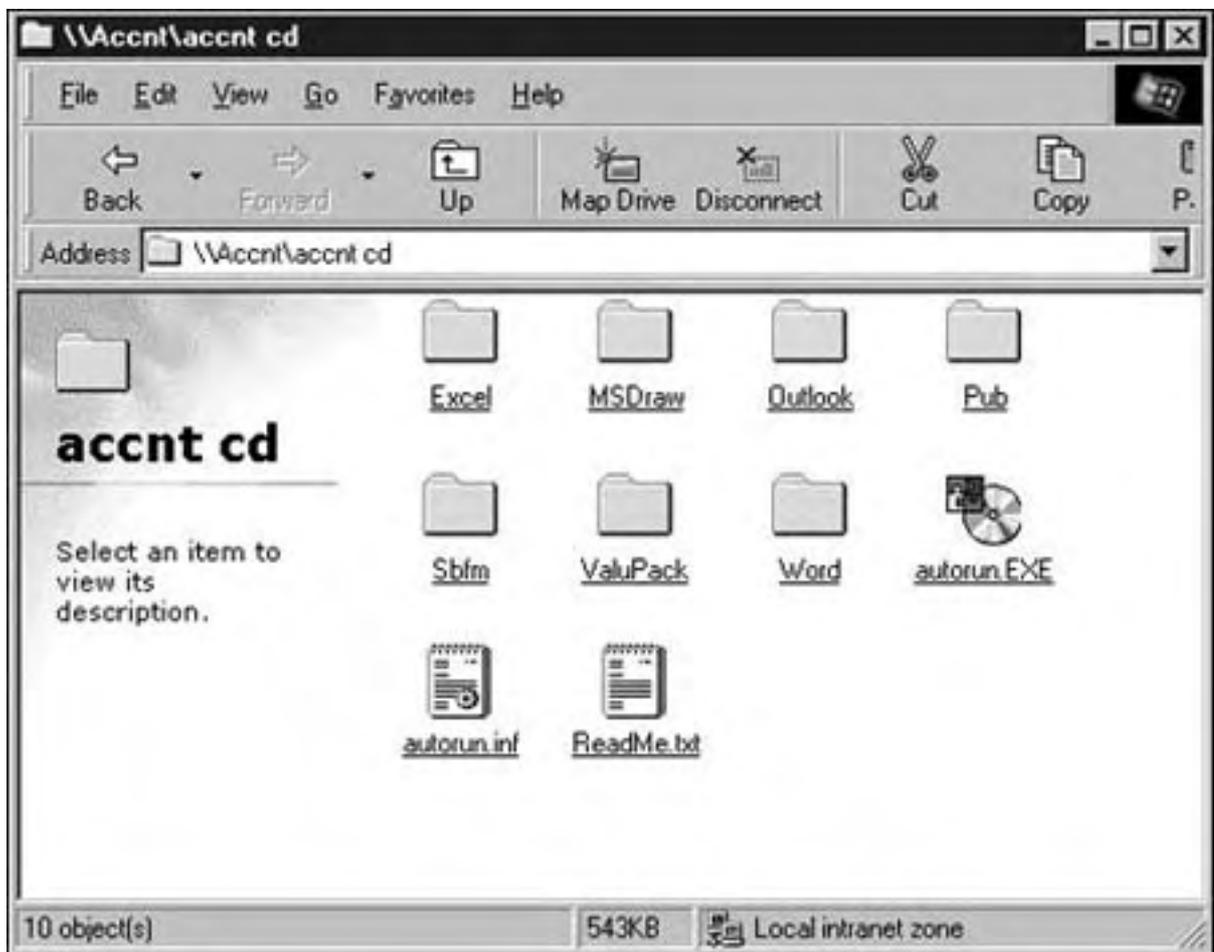
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Figure 4-9: The window for a remote CD-ROM drive looks the same as the window for any drive.

4. Open the file or directory you want to access, just as if you were accessing a local drive.

In the case of a software CD, the file you want is probably called autorun.exe. If this file doesn't exist, refer to the documentation that came with the disc to find out which file you should open. Follow the instructions in the documentation or on the screen (or both) to complete the task you needed the disk for.

You can use Windows Explorer to copy, create, and move files and directories between the remote drive and your local hard drive just as if it were a local drive.

Using a password-protected drive

If the drive has been protected by a password, you're asked to supply the password when you try to access the drive. Enter the password in the dialog box that appears and click OK.

Tricks and tips for using remote CD-ROM drives

If you're using a remote CD-ROM, you should know about some important "gotchas."

- Playing CD-ROM games that have large, complicated graphics or viewing animated video files can be annoying. Sending the data over network cable can slow everything down even more.
- Don't forget that many CD-ROM games, reference discs such as encyclopedias, and software require you to go through an installation process. Some files (not all the files) are transferred to your hard drive, and the software is put on your Programs menu. When you select the software from your Programs menu or decide to install additional components, Windows knows where to look for the CD-ROM drive to find the files you need. If two remote CD-ROM drives are available on your network, be sure you always use the one you originally used when you installed the software.

Tricks and tips for using removable drives

Here are some suggestions for using cartridges:

- Give each user his own cartridge. Put a label on the cartridge and keep all the cartridges near the computer that has the removable drive.
- Purchase extra cartridges — you'll use them.
- Create a cartridge for specific file types. You may want to have a cartridge for correspondence, another for work you bring home from the office, and so on.

Speaking of backups, one excellent use of cartridges is for system backups. You can devise lots of backup plans and use removable cartridges as the target media (rather than tape drives or garage-fulls of floppy disks).

[Continue to Chapter 5](#) | [Back to Contents List](#)

Close Window

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Chapter 5

Other Networking Techniques

In This Chapter

- Adding Windows NT 4.0 to your network
- Networking a laptop computer
- Getting a Mac to communicate with your PC network

You may need to use some additional networking schemes in order to connect all the computers in your household. For example, you may want to transfer files between your Windows PC and a Macintosh. Or you may find the notion of running network cable through your house daunting and would like an alternative.

In this chapter, we explain how to tackle these networking challenges and provide suggestions for where you can look for more information.

Networking with Windows NT 4.0

If you run Windows NT 4.0 on one or more of your computers, don't feel left out as you read this book. You can still do everything we discuss: You can participate in a home network; share printers, folders, and files; and access any computer you see in the Network Neighborhood window.

Some of the steps you follow to accomplish the tasks explained in this book may be slightly different if you're using Windows NT 4.0 rather than Windows 95, 98, 2000, ME, or XP, but the Help files and dialog boxes in your operating system should clear up any confusion.

You can find out more about networking with Windows NT 4.0 in Windows NT 4.0 Connectivity Guide, written by Richard Grace and published by IDG Books Worldwide.

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Adding a Mac to the Mix

If you have a Mac in addition to a PC (or multiple PCs), you can add the Mac to your home network with very little work. How much work depends on what version of the MacOS you use. One good thing to remember is that U.S. Robotics routers are Apple Macintosh compatible.

Adding a Mac running MacOSX or later

If you're using MacOSX or later, you're in luck! TCP/IP networking is built in to MacOSX and is the Apple preferred networking technology over the older AppleTalk networking scheme. Incidentally, TCP/IP is the protocol used by the Internet as well as the great majority of home and office networks (including the one that you're building). We discuss protocols a little bit further in Chapter 2.

You need to check your Macintosh for the proper ports for connecting to your network. You may need to purchase additional hardware to create an Ethernet port on your Mac, or an Ethernet adapter that connects to your Mac's USB port. The specifics will depend on the specific Macintosh model you have.

Adding a Mac running an earlier version of MacOS

Adding a Mac that's running an earlier version of the MacOS to your home PC network isn't as simple as plug and play, but it's not brain surgery either. Don't be daunted by the extra work.

The people we know who have accomplished the feat of adding an older Mac to a small network without suffering a nervous breakdown all used the same software program to do so. You may find other programs out there (Dave, from Thursby Systems, is quite popular — see the company's Web site at www.thursby.com), but we took our colleagues' advice and used PC MACLAN from Miramar Systems. For more information about PC MACLAN, point your browser to www.miramarsys. com, where you can also download a demo version of the software.

Here's the surprise — you install the software that enables you to add Macs to your network on the PC, not on the Mac (unless you're using Dave, discussed in the previous section — that program installs on the Mac). That's because Macs come from the factory in network-ready condition; they're "network eager." (But they're network eager for their own type of network, and not for the type you're building for your PCs).

Macs automatically talk to PCs across a network as soon as a PC can communicate with a Mac, and the PC needs software to do this. (PCs aren't built with networking capabilities installed and configured.)

Adding a Laptop to the Network

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If you have a laptop computer, you can add it to your home network. Almost everything about a laptop computer on a network is the same as a standard desktop PC on a network, except that the network adapter is different.

Choosing a PC card

Unless you're lucky enough to have a laptop that has a built-in Ethernet connection, you'll need to purchase a network adapter. Laptop network adapters are called PCMCIA cards or PC cards for short. (PCMCIA stands for Personal Computer Memory Card International Association.)

You must purchase a PC card that matches the type of network you're using, either 10BaseT (Ethernet) or wireless. The U.S. Robotics Model 2210 is just such a PC card for the wireless network, as shown in Figure 5-1.

Figure 5-1: The U.S. Robotics 22 Mbps Wireless PC Card, Model 2210.

You can also get external network adapters for laptops that connect to the parallel port of the laptop.

Installing a PC card

A PC card network adapter is about the size of a credit card except a bit thicker. If you're using a standard Ethernet PC card, like the U.S. Robotics 7901, then one end of the card has a device that provides a connection for the cable and the other end has a row of holes. An arrow indicates which way to plug the card into the PC slot on your laptop so that the holes meet the pins inside the slot.

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The U.S. Robotics 22 Mbps wireless PC card (refer to Figure 5-1) has an antenna that sticks out from the computer rather than a connector for the Ethernet cable.

To install the card, you need to install some driver software provided by the manufacturer of the card so that your computer recognizes it. Although Windows may recognize and install the card on its own with its plug-and-play features, we highly recommend using the software and drivers provided with the card you have.

For specific installation instructions, take a look at the guide that comes with the specific PC card you want to install.

Continue to Chapter 6 | Back to Contents List

Close Window

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Chapter 6

Ten Good Reasons to Set Up a Home PC Network

Okay, we know that you're interested in creating a network for your home computers — otherwise, you probably wouldn't have this book. But perhaps you're having second thoughts about diving into this project (don't worry, it's easy). This chapter gives you plenty of reasons to set aside the excuses and set up your network right away.

Build the Networked Home of the Future

Computer industry pundits are spending a lot of time talking about the "connected home." In fact, this idea is much more than concept.

The idea is basically that with a networked home, you will one day be able to monitor nearly everything in your house from any computer on your network. Did you forget to turn out the lights downstairs? Just control them from software on the nearest computer. Is the refrigerator door ajar? You know by the alarm that's sounding on your computer.

Bluetooth technology is a big part of this concept of household appliances and other electronic devices communicating seamlessly with a network. You can read more about Bluetooth in Chapter 1.

Avoid Cyberspace Squabbles

We bet that if therapists did some research on family arguments, they'd create a special category for households that share one computer and one modem. When you have multiple family members who want to get on the Internet at the same time, you have arguments.

Technology now permits multiple users working at separate computers to go

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online at the same time. The two rules for creating this environment are (1) the computers must be connected by a network, and (2) you must have software that supports simultaneous multiple-user Internet access.

Share a Printer

A network makes printing easy, even if there's no printer attached to your computer. Click the print button, and the network takes care of sending the document to the printer that's connected to another computer. Using one printer for all the computers in your house will save you time and money.

Share a CD-ROM Drive

Even if every computer in your household has a CD-ROM drive, there are real advantages to having a network that lets each computer access every CD-ROM drive. Put a game in the CD-ROM drive of the computer in the den and put a CD filled with graphics in another computer. Then just access the CD-ROM drive that holds the CD you need — which computer the drive is attached to doesn't matter.

Work Anywhere with Wireless

With a wireless network, you can literally work anywhere in your home as long as you can get a sufficient signal strength (see Chapter 1). If you want to work in bed on the laptop computer you brought home from work, go ahead. If you want to work outside in the hammock, go ahead.

If you find that you really do want to work outside and your signal strength isn't sufficient, you can always set up an additional access point closer to where you want to connect your computer.

Use All of That Ethernet Cable You Have Lying Around

You can't wrap presents with it — it's too, well ... wiry. Stretch it between two trees in the backyard and use it as a clothesline. Give the cable to the kids to use as a jump rope, but remove the connectors first as a safety measure. If enough cable is left after you tie tree seedlings to sticks and rig up a festive maypole, why not set up a home PC network, just for the fun of it? Doing so will give you a good reason to read this book rather than using it as a doorstop, too.

Play Games across the Network

Lots of games can be played across the network so that your opponent is no longer a computer, but a living breathing human on another computer. According to some game afficionados, particularly players of "first person shooters" like Diablo (Blizzard Entertainment), there's no other way to play. Playing against, or

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cooperating with other people on your network, adds a whole new dimension to computer gaming.

For the more pedestrian gamer, the latest versions of Windows also comes with some network card games. Playing cards over your network means that:

- You don't have to search the house for a deck of cards.
- You don't have to clean off the kitchen table to make room for playing cards.
- You don't have to search for a pencil and paper to keep score.
- You don't argue about the score because computers don't make math errors.
- You don't have to argue about who should put the cards away.

Simplify File Backups

Everybody knows that backing up computer files is important. Everybody knows that if you don't back up your important files regularly, you'll regret it. Everybody knows that not having a recent backup is crazy. But everybody still fails to back up.

The truth is, people inadvertently delete important files, hard drives develop bad spots just where important files are stored, hard drives die, computers die, and all sorts of other horrible things happen.

A network makes backing up easier. You can split the task, assigning individuals responsibility for certain days. (If anyone complains, make him take out the trash for the next month.) With a network, you can back up every household member's documents to one computer and then back up that computer using a Zip, Jaz, or CD-Rewritable (CD-RW) drive.

Amaze Your Friends

Imagine going to dinner parties and throwing around terms like Ethernet, TCP/IP, and U.S. Robotics 22 Mbps 802.11b. People will think you're one of those crazy technical people and will have new respect for your brain. They'll look at you and think, "Wow, now there's a person on the cutting edge of technology."

Start a Whole New Career

Do you have any idea how many two-computer households are out there? Lots and lots. You can start installing home networks as a part-time endeavor. And with U.S. Robotics wireless networking hardware being so easy to install, you'll soon have a booming business.

Close Window

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Contents List

Chapter 7

Ten Ways to Keep Your Network Healthy

As you assume the role of network administrator, remember that you need to care for your network as well as for each individual computer. Following are ten ways to keep your network healthy.

Protecting against Electrical Surges

An electrical surge is a sudden spate of very high voltage that travels from the electric lines to your house, and ultimately to your computer. Surges are usually caused by lightning or a return to power after a blackout. A real surge can fry your computer.

You can safeguard against spikes by plugging your computer and any attached devices such as drives, scanners, monitors, speakers, and so on, into a surge protector. The only devices you don't want plugged into a surge protector with your computer are printers (see the section "Protecting printers" in this chapter for why).

Read the specifications before you buy a surge protector to make sure that it's rated for effective surge protection. (Voltage can rise by 10 volts or hundreds of volts, so make sure that the surge protector you buy can handle these extreme surges.)

In addition, because any surge received by a single computer can travel over the network cable to the other computers on your network, make sure that all the connected equipment for each of your computers is plugged into surge protectors.

Protecting against Lightning

We've seen several large networks destroyed during a lightning storm, and in each case, the surge came through the telephone lines, not the electrical lines. Telephone lines are typically not protected against lightning.

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The only sure protection against lightning strikes is to unplug your computers and connected equipment from both the electrical outlets and the phone jacks. Stop working. Then walk around the house and unplug other equipment with chips that could fry during a lightning storm (like your microwave oven).

Saving Your Computer when Power Fails

When you're running Windows, you can't just turn off your computer. You must initiate a shutdown procedure to shut down all your files in an orderly manner.

You can keep your computers running long enough to complete an orderly shutdown of all your software and the operating system if you have an uninterruptible power supply (UPS). A UPS is a mega-battery that you plug into the wall, and you then use the UPS outlets to connect your computer and monitor. If your power fails, your computer draws power from the battery, giving you enough time to shut down everything.

For many home users, a UPS may be overkill. But if you live in an area that has reasonably regular power cuts due to foul weather or lousy power service, a UPS may be a good idea. If you work at home all or part of the time, a UPS is arguably essential.

Fixing Low-Voltage Problems

Sometimes, the electrical voltage drops, which is called a brownout. Computers — especially their hard drives — are extremely sensitive to brownouts. Well before you see the lights flicker, your hard drive can be damaged by a brownout.

Here are some of the causes of low voltage, along with possible fixes:

- Too many appliances are plugged into the same circuit as your computer.
- An appliance that's a voltage pig (central air conditioning, electric heating systems) kicks on, disrupting voltage throughout the house.
- Your laser printer (or powerful inkjet color printer) is plugged into the same circuit as your computer. See the section "Protecting Printers," later in this chapter.
- The electric company is sending low voltage into your home.

You can prevent most of these problems by moving things around to different outlets. You can overcome those that you can't prevent by purchasing a voltage regulator. A voltage regulator constantly measures the voltage coming out of the wall and brings it up to an acceptable minimum. Some uninterruptible power supplies (see the preceding section) have voltage regulation built in.

Preventing Static-Electricity Damage

Static electricity is responsible for more damaged computers than most people realize. One day, when some hardware component mysteriously dies, you may not

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realize that you zapped it yourself.

You must discharge the electricity from your body before you touch the computer or any connected devices. Touch anything metal (except an electric appliance, such as a computer or a lamp). A filing cabinet is good if one is handy. If nothing metal is within reach, attach a metal bar to the desk or table that your computer sits on.

Checking Cables and Connectors

Make sure that the cables aren't pinched or bent to the point that they can't handle data. Have you ever sharply bent a water hose? The water stops flowing. The same thing can happen to cable. If you have excess cable, gently roll it into a circle and use a twist tie to keep it together. (Don't tie it tightly.)

This precaution is true for all the cables in an Ethernet network, as well as for the cables between access points and your router or hub in a wireless network.

Cable connectors are the weakest link in the network hardware chain. Because of this, you should check the connectors first when your computers can't communicate. Here's what to check if you wired your network with 100BaseT or Category 5 (twisted-pair) cable:

- Make sure that the connectors are properly inserted in the NICs.
- Make sure that the connectors are properly inserted in the router.
- Make sure that the router is plugged in. (A router usually doesn't have an on/off switch — if it's plugged in, it should be working.)

Here's what to check if you're using wireless:

- If you're using a splitter (see Chapter 1), make sure that the splitter is firmly positioned in the jack.

Checking Network Adapters

A network adapter rarely gives up, rolls over, and dies (unless you've had a power surge or done something dumb like stick a bobby pin in the connector). However, it's not unheard of.

Checking Ethernet adapters

If your network adapter has a light on the back panel near the connector, the light should glow green.

If you're using Ethernet and no light is glowing and you've checked the connectors and the cable, the only way to check the network adapter is to replace it. If the new device works, the old one was bad. If the new device doesn't work, recheck your connectors and cable. Take the new device back to the store and get a credit.

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If your network adapter has two little light bulbs and the red one is glowing, it's working but isn't receiving or sending data. You can be fairly sure that you have a connector or cable problem.

Checking wireless adapters

If you have a wireless network, run your signal strength utility (Programs → USR WLAN → USR Adapter → Wireless LAN Configuration Utility) and see if you're getting a signal and if the adapter is functioning properly.

If you suddenly have problems with signal strength, or your network just ceases to function and you can't figure out why, ask yourself whether you have any large appliances running at the same time you're trying to use your network. Items like microwave ovens, washing machines, and especially anything with a large electrical motor, can cause interference. Usually, for these appliances to cause trouble with your network, they have to be physically very close to an access point or adapter.

Other possible causes may include other 802.11 type wireless devices (see Chapter 1 for an explanation of 802.11). If you have multiple 802.11 devices from different companies all trying to work in the same area, you could experience signal problems.

Using the U.S. Robotics Wireless LAN Configuration Utility to help reposition your access point, computer, or the offending electrical appliance should get you network functioning again. Just move things around a bit (usually a few feet will do the trick) until the signal looks good again. We think it's pretty cool that the wireless networking hardware comes with its own built-in test bench!

Monitoring Monitors

Monitors require some special attention, and too many people maul and mishandle them. By no coincidence at all, those same people are the ones who have to buy new monitors more frequently than should be necessary.

A monitor's screen attracts and collects dust — it actually sucks dust out of the air. You can't avoid monitor dust. Remove the dust by wiping the screen with a soft, dry cloth. You're best to do this with the monitor turned off. (Static electricity, which is responsible for attracting the dust, can build up to damaging levels when you rub the screen.)

If you want to use the bottle of window cleaner that you keep around the house, spray it on a cloth, not on the monitor; the monitor isn't sealed properly to avoid leaks. Then wipe the moistened cloth across the screen.

Protecting Printers

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You should perform a few maintenance chores regularly to make sure that your printed documents look terrific and your printers perform without errors:

- Don't overfill paper trays — doing so results in printer jams. If you have to clean up a printer jam, unplug the printer. Never yank on the jammed paper. Pull it steadily and gently.
- Always clean a laser printer when you change toner cartridges, following the directions that come with the cartridge.
- Keep printers covered when they aren't in use. Dust is their biggest enemy.
- Use paper that's compatible with your printer. (Check the documentation that came with your printer.)

Besides protecting your printer, you also need to protect your computer from your printer, especially if you use a laser printer or a powerful color inkjet printer. These printers use a lot of power. If they're on the same circuit as your computer, you're probably causing minor brownouts for the computer, which can harm your hard drive and your data.

Using Antivirus Software

You know if one kid in kindergarten gets the chicken pox, nearly every other kid will too? Computer networks are similar. If one computer has a virus, other computers in your network probably will too. The very nature of a network — allowing easy sharing of files and folders — means that one infected computer can easily infect others. Viruses can cause no damage at all, or can be devastating, causing complete loss of all data on a hard drive.

Fortunately, preventing such mishaps is easy. Antivirus software is essential for your network. Each computer on your network needs to have antivirus software installed and regularly updated. With antivirus software installed, you can keep all the computers on your network happy and healthy.

Backing Up

Loss of data can occur because of, among other things, a virus, a power surge, or plain old hardware failure. Of course, with antivirus software installed and surge protectors on your computers, the chances of data loss are small. However, backing up your data means that you're protected if the unthinkable should happen.

You can purchase backup programs with sophisticated server features, enabling you to specify a location, such as a shared removable drive on your network (see Chapter 4) for all your computers to back up to.

[Back to Contents List](#)

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Contents List

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Back to Contents List

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