Chapter 3

Building an Ad Hoc Network

In non-technical language, *ad hoc* refers to something created (such as an ad hoc committee) for a temporary period of time and without concern for its broader or more long-lasting implications. In computer networking language, an ad hoc wireless network is put together for a specific and usually temporary purpose, much like any ad hoc gathering. You start an ad hoc network by enabling a wireless network adapter on one PC, and you add PCs as you like by enabling wireless adapters in each of them and configuring all the adapters to the same wireless channel. Turn the PCs off, and the network disappears, hence its ad hoc nature.

In simpler terms, ad hoc wireless networks have one primary characteristic: They operate without access points (APs). The lack of an AP means that the computers can connect to one another, but they can't work in conjunction with a wired network. As a result, they have significantly less capability as a network, but they can still be quite useful. In particular, they operate well in a small home network or as an independent small network in an office where connecting to the larger network is difficult in certain situations. Think of ad hoc networks as their name suggests — temporary networks created for a specific purpose — and the possibilities multiply.

Note

Ad hoc networking also goes by the name *Independent Basic Service Set*, or IBSS. This name contrasts with the related term *Infrastructure Basic Service Set*, or BSS, from which the term *infrastructure network* derives.

Ad Hoc Topology

In computer networking terms, each network has a specific *topology*, or shape. Each computer or other device on the network is a *node* on that network, and the connections between the nodes are known as *links*. The topology describes the manner in which the nodes and the links interconnect. Although numerous topologies are possible, you'll find the following most frequently:

- **Bus:** All nodes on the network connect to a single central cable, called a *bus* (or back-bone). The bus handles all traffic to and from the nodes.

- **Star:** A central computer (hub) controls all network traffic, with nodes communicating with each other through this hub.

- **Ring:** The network has the shape of a ring or circle, with each node connected to the two nodes on either side. Traffic moves around the ring to its appropriate destination.

- **Tree:** The core of the network is a bus topology, to which one or more star networks are attached.

- **Mesh:** All nodes are connected directly to all other nodes. In some meshes, not all inter-connections exist, but the principle remains the same.

Ad hoc networks operate with a mesh topology. All PCs on the network connect to each other directly. All appear in the Network Neighborhood or My Network Places folders on each PC, and anyone can send data to — and receive data from — any node at any time. Looked at another way, ad hoc networks are *peer-to-peer* networks, so named in computer circles because all nodes are peers, all on the same hierarchical level with one another. No central computer (hub or server) controls the network and the traffic; each machine is as important as the next.

Tip

For your mesh network to work effectively, you should configure each PC to contain a shared folder, and then have each user save or copy files to be shared inside that folder. If you password-protect the shared resources, make sure that each user knows how to access them.

Setting Up an Ad Hoc Network

Getting an ad hoc network up and running requires three main steps: installing the wireless LAN adapters in your computers, configuring the adapters so they can find and connect to one another, and establishing the network on your PCs so they can share resources. With all three steps completed, your ad hoc network is ready for use.

Before going any further, however, let us warn you that wireless networks, for all their advances over the past few years, can still provide some of the most frustrating moments in computing. Actually, that statement applies to computer networking in general, which can be filled with problem after problem, but wireless networking seems especially susceptible to difficulties in configuration and sustained connectivity. Despite the best efforts of Microsoft, the Linux initiative, and all the network equipment vendors, it remains safe to say, as it did ten years ago, that networking is the black hole of computing. Nor should this come as much of a surprise: given the trouble many people have keeping *one* computer working properly, it makes sense that getting two or more computers talking to each other is simply asking for problems.

That said, Windows helps, especially Windows XP, the most network-savvy version of Windows yet released. Its Network Setup Wizard, covered in this chapter, can create a functioning network quickly and, for the most part, reliably. The problem with setting up networks is this: What do you do if it *doesn't* work? And that's where the frustrations lie.

Here's an example. While writing this chapter, we needed to set up our own ad hoc network and connect the entire thing to the Internet. We don't usually work with ad hoc networks because — as you'll discover in Chapter 4 — infrastructure networks are both more common and more useful. But we've installed and configured numerous ad hoc networks in the past, so this should have been the proverbial piece of cake. Take apart the infrastructure network, install the WLAN adapters in all the PCs, tell everybody where to find each other, and presto. Instant network.

Well, not so much. After many frustrating hours, we discovered that one of the USB adapters was slightly malfunctioning. Slightly, not fully. If something doesn't work at all, it's easy to deal with. But when something *almost* works, it simply frustrates, because you don't know where to look. The adapter appeared to be working, so we spent a great deal of time digging through Properties dialog boxes, reconnecting and reconfiguring adapters, and generally rebuilding the entire network structure. By the time we eventually discovered the true culprit, we had reconfigured everything on all the PCs so completely that we essentially had to start over.

Why are we telling you this? Simply to demonstrate that although setting up a network *can* be quick, easy, and painless, don't be surprised, upset, or discouraged if it proves otherwise. Networking problems can happen to anyone, no matter how experienced. Just ask any IT professional.

Installing the Wireless Adapters

Every PC on your wireless network needs a WLAN adapter to connect to the network's other devices. While you can choose from several different types of adapters, including Compact Flash versions for the growing number of laptop PCs that contain Compact Flash ports, this chapter covers only the two primary types, USB and, in particular, PCMCIA (PC Card/CardBus). Configuring any of these cards requires stepping through the same basic process.

Installing your WLAN adapter is much like installing any other piece of hardware on a PC, period. Believe it or not — and many users frequently do not — reading the installation guide that came with your hardware actually matters. Primarily it matters for only one reason: to determine whether or not to install the drivers first or to plug the card in first.

When you install any hardware on a PC, ultimately you need both the hardware and its drivers in place to have the PC recognize the hardware and for the hardware to operate correctly. In some cases, Windows already stores the drivers — this is especially true of Windows XP, and even more true if you install the drivers first — and in that case your driver concerns are over, or at least put on hold, because Windows installs the drivers as soon as it recognizes the device. If Windows does not install its own drivers, then you need to use the drivers included on the CD-ROM that shipped with the hardware. But even if Windows does install its own drivers, you should install (eventually if not immediately) the latest drivers for your adapter, available from the manufacturer's Web site.

As mentioned previously, the order of installation can matter. For whatever reasons, order is more important for USB devices, but it can matter for PC Card and PCI adapters as well. Indeed, this is one of the long-standing bugaboos of USB equipment in particular: sometimes it's simply better to install the drivers first, and there seems to be no consistency about the requirement.

One thing is certain. Although you might be wrong to install the device before the drivers, the reverse is never true. So you might as well just install the drivers first. Insert the CD (or floppy disk, if you have a much older adapter) into your PC's drive and either wait for Autorun to launch the installation utility or, if the installation utility doesn't launch, locate the Setup file on the CD (often in a folder called drivers, but sometimes in the CD's root folder) and launch it from there. You'll be greeted with one of the standard Windows installation programs, and you need only follow the defaults or, if you wish, change elements such as the drive location to suit your needs.

With the drivers installed, you may or may not be asked to restart the PC. If you are, restart. This allows the drivers to load into system memory, ready for you to insert the PC Card or USB cable. Once Windows has restarted — give it enough time to perform its usual automatic software loads — plug in the USB adapter or insert the PC Card adapter, and watch as Windows XP recognizes the hardware and associates its drivers. In the case of a PCI adapter, you can shut down the PC instead of restarting it, open the desktop case, and install the adapter before booting it back up.

Note

Surely, very little about a PC is as annoying as the requirement for rebooting after installing something. Software developers have reasons for doing it this way — drivers need to load into memory, for example — but it almost always seems a disruptive procedure. You're in the middle of doing a number of other things on your PC when you realize you have to install that new USB device (for instance), so you pop the CD in the drive and let Autorun perform its duties. Two or three clicks later and everything's ready to go, except for that window telling you the PC needs rebooting to complete the installation. Sometimes you don't actually have to do so, but it's almost impossible to tell. So you close everything down and go along with the process, disrupting the flow of thought, energy, and time. All of this said (and thanks for listening), do yourself a favor and close all open programs before installing *anything* on your computer; in addition, run the System Restore utility from Windows' System Tools folder (Start → All Folders → Accessories) immediately before the install, so that if anything goes wrong you can turn back the clock to Windows as it was before you installed.

If you choose to install the adapter before the drivers, Windows steps you through the installation process. In the case of Windows XP Service Pack 2 (SP2), you begin with the dialog box shown in Figure 3-1. The Windows Update component of Windows XP (and other Windows versions) has always had a certain number of device drivers available for download, but SP2 represents the first time the initial driver installation has prompted for an immediate search of the site.

If you know your equipment is brand new, with little likelihood of the latest drivers being on the Update site, choose "No, not this time." But it never hurts to check, so you might as well start the installation process with "Yes, this time only" and see what transpires. If Windows can't locate a driver, click the Back button on the subsequent dialog box and proceed with the installation from there, choosing to "Install from a list or specific location" as shown in Figure 3-2.

Figure 3-1: Giving permission to search Windows Update for drivers.
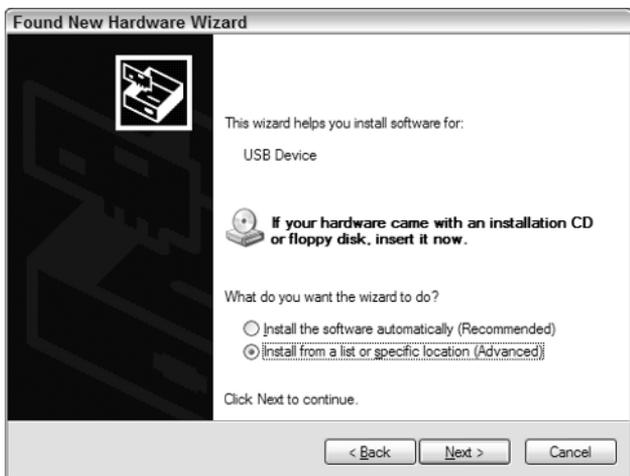
Figure 3-2: Specifying the location of the WLAN adapter driver.

The default radio button for this screen is for Windows to install the software automatically, a selection that works perfectly if you install the drivers before the hardware. But in this case, Windows doesn't know where to find the driver, so you need to specify. Actually, it's not even that difficult because if you put the CD-ROM in the CD/DVD drive and then choose automatic installation, Windows will almost certainly find the appropriate driver files.

After installing the driver, you might well come across the dialog box shown in Figure 3-3, in which you instruct Windows to use the driver even though it has not been "signed." To place the Windows logo on their products, hardware vendors must pass a set of tests designed by Microsoft, ensuring that the driver will function in Windows without danger of upsetting any of the delicate Windows apple carts. You'll see this dialog box in particular with new hardware, because nobody waits for Microsoft to complete the logo testing before releasing the product. When you see the dialog box shown in Figure 3-3, click Continue Anyway to finish the driver installation.

Figure 3-3: Just say yes. No major vendor is going to release a dangerous driver.

Once the drivers are installed and the WLAN adapter is in place — in not just one but in *all* the PCs you want to join together in an ad hoc network — you can proceed to the configuration of the network itself.

Configuring Your Wireless Network

Configuring a WLAN means getting the WLAN adapters to communicate with one another, and getting them to work together as a Windows-based network. Think of the two procedures like a phone call: the telephone provides the technology for communication, so you can simply dial the number and the other person will answer, but actual communication, in the sense of meaningful sharing of information, is a completely different proposition. Drawing the analogy further, if you've ever made a phone call where the connection goes awry (static, long delays, or even a disconnection), you've experienced what in wireless networking terms would be an inability for the adapters to perform their technical function. On the other hand, if your phone call consists of the two of you fuming at each other in silence and not actually saying anything, then the connection works but the communication doesn't.

Letting Windows Handle Everything

As with everything else network-related, Windows XP can handle all the details if you wish. Support for wireless networking is built directly into the operating system, which is obviously a help when it comes to establishing WLANs. If all your PCs operate under Windows XP, by all means start with this option and see if your ad hoc network pops up on its own, fully functional and ready to roll.

To do so, simply install the WLAN adapters and turn on your PCs. Windows automatically creates a network called "default" that all adapters can locate and connect to. However, Windows XP is also security-conscious, and by default it does not automatically connect to networks on which WEP or WPA encryption is disabled. You can see the wireless networks that you can connect to by right-clicking the wireless network icon in the icon tray or in the Network Connections folder and selecting View Available Wireless Networks from the context menu. Figure 3-4 shows the Wireless Network Connection dialog box from Windows XP with the Connect button grayed out. To make this button available for use (and thus connect to the network), click the checkbox labeled "Allow me to connect to the selected wireless network, even though it is not secure."

Figure 3-4: Connecting to a specific wireless network.

Figure 3-5 shows a significantly different dialog box. This item appears when you select View Available Wireless Networks in Windows XP SP2. Click the network name and then the Connect button, or, if you prefer, choose Change Advanced Settings from the Related Tasks menu, an action that takes you to the dialog box shown in Figure 3-4.
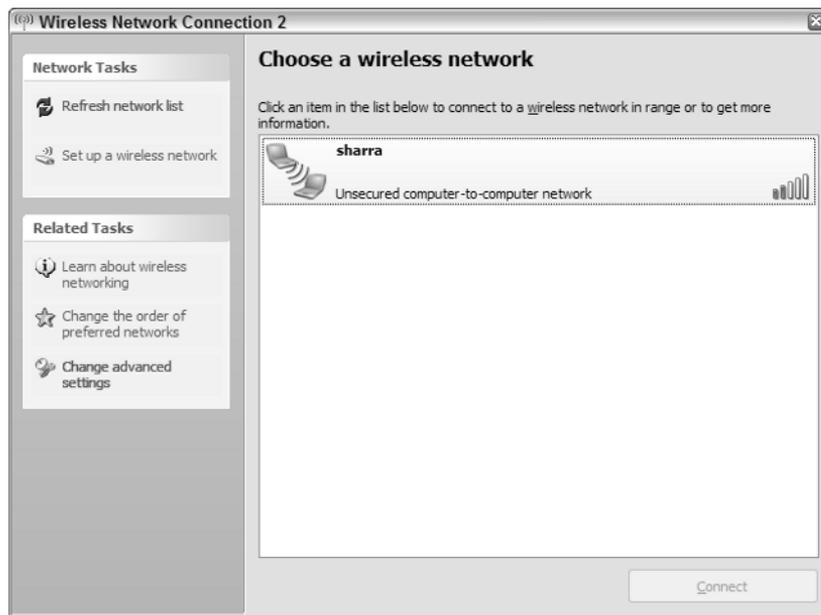
Figure 3-5: Connecting to a wireless network in Windows XP Service Pack 2.

If you know a wireless network exists, but you don't see it in the list, you can add it manually. In fact, this is the way to create a new network from scratch as well. To do so, follow these steps:

1. Open the Wireless Network Connection Properties dialog box and click the Wireless Networks tab.

2. In the Preferred Networks region of the dialog box, click Add. See Figure 3-6 for the result.

3. In the Network Name (SSID) field, type the name of the network you know exists (or a new name if you wish to create a new connection). The name is freeform; you can call it whatever you wish.

4. For the time being, select Disabled on the Data Encryption drop-down menu. It is *always* better to set up and troubleshoot a wireless network first and then add encryption afterward. Otherwise, if you have difficulty connecting, you'll have trouble determining if the network itself or the encryption is causing the problem.

5. If you want to restrict connections to an ad hoc network (as is the case for this chapter), be sure to check the box at the bottom of the dialog box, "This is a computer-to-computer (ad hoc) network; wireless access points are not used." You can use this feature to prevent the network from connecting to an AP-based network if one of these exists as well.

6. Click OK to close the box and choose the network you just added.
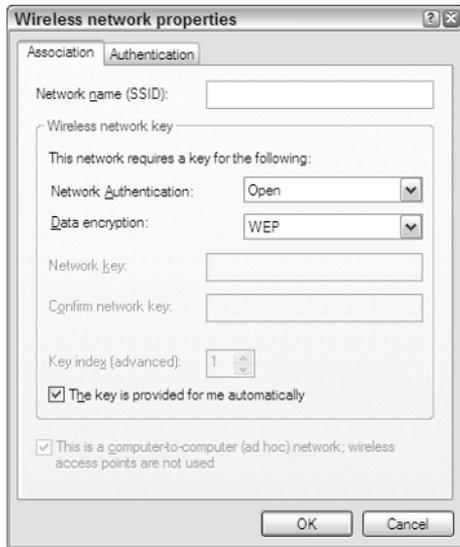
Figure 3-6: Adding a network to the available networks list.

Configuring the Network Yourself

If you prefer to configure the network yourself, use the configuration utility that (in all likelihood) installed with your drivers. Actually, this is one reason to install the drivers using the installation utility on the CD instead of locating them using the hardware installation procedure in Windows; not only do you get the drivers, but you install any supporting programs as well. You can typically launch the configuration utility from the All Programs menu in Windows XP, but usually it loads automatically with Windows and its icon appears in the icon tray in the bottom-right corner of the screen.

Figures 3-7 and 3-8 show two screens from the configuration utility for the D-Link AirPlus XtremeG PCI wireless adapter. Your utility will almost certainly offer similar configuration options. As you can see, the options here closely resemble those on the Wireless Network Properties dialog box for Windows XP. You give the network a name (SSID), choose the mode — ad hoc or infrastructure — and enable or disable encryption. If you enable encryption, you choose a key length and either have the keys automatically generated or type them yourself. See Part II for a full discussion on configuring WLAN security. You can leave the network unencrypted until you reach that point.

Figure 3-8 shows the Advanced screen of the D-Link utility. Here, several choices present themselves. The most significant option is the Channel: you can choose any channel from 1 through 11. For the ad hoc network to function, you must set all WLAN adapters to the same channel. Otherwise, they have no way of communicating with one another.
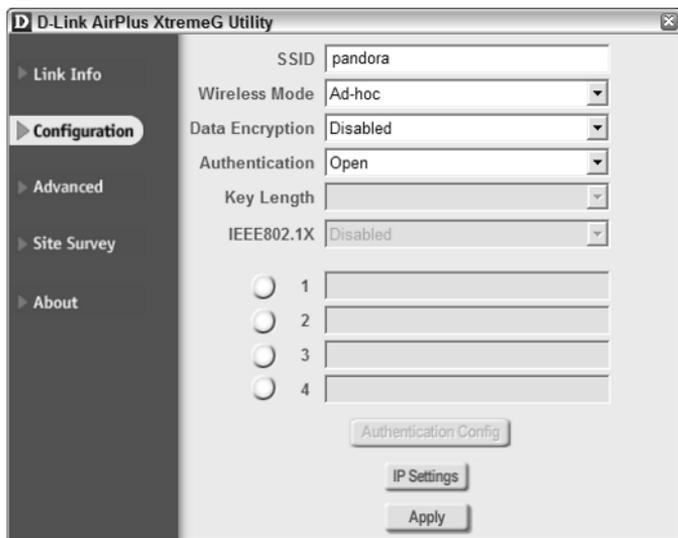
Figure 3-7: The Configuration dialog box for a D-Link WLAN adapter.
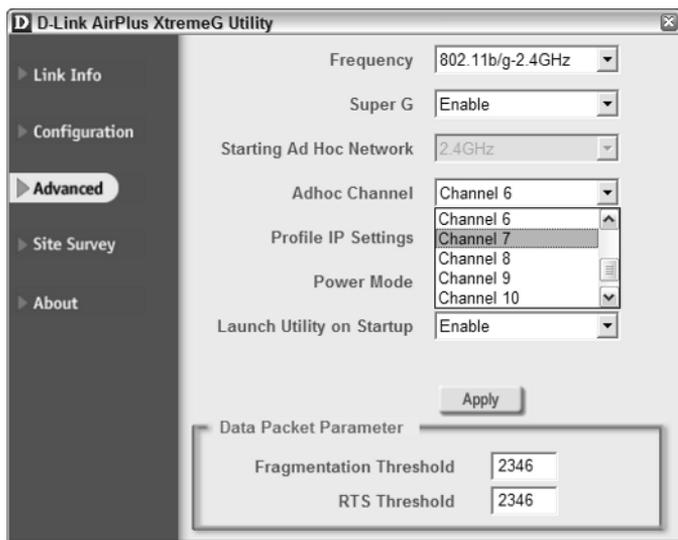
Figure 3-8: Advanced configuration options.

Tip

If you have trouble with sporadic loss of connectivity for your WLAN, try changing the channel on which it operates. You might be experiencing interference from another radio-based device in your house or office. Be sure to change the channel setting on *all* WLANs on the network.

In this particular case, D-Link offers a variety of additional options. You can choose support for both 802.11b and 802.11g protocols, or, if you wish to ensure connectivity with older WLAN adapters, 802.11b only. You also can choose D-Link's Super G mode from here, or disable it. Super G is D-Link's technology for enhancing the 802.11g connection, and it works best only when all WLANs on the network operate with it. Several WLAN adapter vendors have a similar proprietary technology for offering enhancements to their wireless equipment.

Cross-Ref

To learn about setting the security options for your WLAN, see Part II.

At this point, you've finished the majority of work needed to get a fully functioning wireless LAN up and running. In fact, you *have* a wireless LAN up and running, and without going any further you can start sending files back and forth between your PCs, share the printer that's connected to one of those machines, play games across the LAN, and even control one PC from another using Windows XP Professional's Remote Desktop feature.

The only thing missing from your network is the ability to share an Internet connection, one of the primary reasons behind creating a LAN in the first place, especially in homes and small offices. So let's turn to that task now, after which you'll be ready to take full advantage of the network you've built.

Sharing an Internet Connection

You don't need an Internet connection to have an ad hoc network. For that matter, you don't need an Internet connection to have *any* computer network. Computer networks existed long before widely available Internet connectivity, indeed long before the Internet itself. And remember that the Internet is simply another network, special only in the fact that it operates as a network of networks (hence the *inter* portion of its name), and the fact that the world has adopted it. But many networks continue to exist that offer full connectivity internally without external Internet access.

That said, in the case of pretty much all non-business LANs, Internet connectivity has become the norm. In fact, you could argue that it's become the entire purpose for creating the LAN in the first place. In homes and many small offices, particularly homes, users rarely need their PCs to connect to one another; instead they need them — or at least want them — to connect to the Internet. E-mail and the Web, for these users, are far more important than sharing files, printers, or other resources, or even playing networked games.

If you want to share an Internet connection most reliably and conveniently with your wirelessly-connected PCs, buy an access point and build an infrastructure network (for details, see Chapter 4). However, you can most certainly share an Internet connection among the PCs on an ad hoc network. You simply need to designate one of those PCs the sharing computer, connect it to the Internet, and use the Internet Connection Sharing (ICS) feature of Windows to make the Internet available to all the other networked PCs.

Internet Connection Sharing works by fooling the Internet into thinking that only one computer is performing Internet requests, uploads, and downloads. The sharing machine acts as a focal point for the entire LAN, with all incoming and outgoing data passing through it. In effect, the sharing computer acts as a proxy server, and in fact Windows ICS is a kind of simplified proxy server. Full proxy servers control, secure, and cache all incoming and outgoing data, and offer control over individual machines on the LAN, whereas Windows ICS just routes data and offers minimal security.

With Windows ICS, each computer on the LAN is given its own unique IP (Internet Protocol) address, just like all other computers on the Internet. However, the LAN's IP addresses are private to that LAN, and do not provide direct Internet access. The only computer with a public Internet IP address is the sharing machine, and it has two IP addresses: one private, one public. The public IP number is assigned by the Internet service provider at the time of connection, while the private IP number is assigned through the Network applet in Windows Control Panel, either manually or via the ICS wizard.

For the remainder of this discussion, let's give the computers names to avoid confusion. We'll call the sharing machine Computer A and the other PCs on the LAN Computer X, Y, and Z (as needed).

The private IP address for Computer A is 192.168.0.1 — the 192 series is restricted to private LAN use (the Internet doesn't recognize the 192 numbers). The ICS wizard sets this IP automatically, or you can set it yourself using Control Panel's Network app. Computers X, Y, and Z (and all others on the LAN) require IP numbers in the range 192.168.0.2 through 192.168.0.253. You can assign these numbers through the Network app, or you can have the sharing computer assign them through its built-in DHCP (Dynamic Host Configuration Protocol) routine. The latter is easier, simply because it eliminates the need to dig into each machine's Network app manually. Indeed, nearly all cable/DSL routers and other Internet sharing devices, including server computers, use DHCP as the basis for address assigning, although not all begin the counting with 192.168.0.1 as Windows itself does. The Microsoft Wireless Base Station, for example, takes the address 192.168.2.1 and assigns from there, and other routers use other private-range addresses.

When Computer X makes a request to the Internet, such as sending e-mail to an Internet address or clicking an external hyperlink in a browser, Computer X's private IP address is sent to Computer A. There, the private IP address is translated to Computer A's public IP address — with Computer X's IP address retained in conjunction with the request by the sharing computer — so that the requested Internet server can respond. The response from the Internet comes back to Computer A's public IP address, and Computer A recalls the original IP address and sends the response to Computer X.

Computer A works the same way as all other machines on the LAN, translating all interactions from the 192.168.0.1 address to the public IP address. But because the data doesn't need to flow between machines in this case, the process is faster than one in which the data traverses the LAN wires. Computer A *will* be affected by network slowdowns, however, just like any other computer on the LAN.

▬▬▬▬

Caution

To share an Internet connection with a PC acting as the ICS host, you must leave the host machine powered on if you want other PCs on the network to access the Internet. Because the host receives and transmits all incoming and outgoing Internet traffic, as soon as you power it down, you remove the point of connection with the Internet.

This fact provides one of the two primary reasons for choosing an access point or a router/switch combination for providing Internet access: you can leave the AP or router powered on while consuming very little electrical power, allowing you to power down other computers on the network as you wish. The other reason is even more important. With the AP or router providing the initial access to the LAN, it appears to anyone on the Internet as the *only* node on your network. Automatically, you have a built-in safeguard against intrusion from the Net.

Although ICS setups typically use a router or switch, with or without the access point, for the sake of establishing a more purely ad hoc network, we dispense with the AP/router/switch here to work solely with one PC acting as an ICS host, and however many node PCs as you wish forming an ad hoc network with one another and receiving an Internet connection from the ICS host. What you get in the end is a network with each node wirelessly connected to each other node, and each one capable of accessing the Internet as well. Call it ad hoc–plus, if you will.

Configuring the ICS Host

The network in this demonstration (a typical such network) has a desktop PC as a host PC and three notebook PCs constituting the ad hoc WLAN. Certainly you could start with a notebook PC instead, but we've chosen a desktop for the simple reason that it will be the only node on the WLAN without a PC Card wireless adapter. Instead, it can use either a PCI or a USB adapter, and the example here uses the latter.

To share a broadband connection, the ICS host needs an Ethernet LAN adapter, typically a PCI card inside the computer or an adapter build right onto the mainboard. In either case, you connect the ICS host to the Internet by running an Ethernet cable from a cable or DSL modem (typically) into the Ethernet card. You then set up the Internet connection according to the instructions you receive from your Internet provider. In the case of virtually all cable and DSL providers, this means first configuring the Network Properties dialog box to obtain an IP address automatically and to obtain the DNS (Domain Name System) server addresses automatically, as shown in Figure 3-9.

DSL customers need to create a login script as well, a process you can perform either via the New Connection Wizard or the Network Setup Wizard. This login script consists only of the username and password your ISP has assigned to you, and the wizard not only gives you a screen with fields for both of the entries, it also stores the entries for future logins. To sign into your DSL account, you launch the Connect dialog box from the desktop or from the Network Connections dialog box, and on this box you'll see the username in the appropriate field, along with a password field that says, "*[To change the saved password, click here.]*." The password you typed in the wizard is the one already in force, so there's no need to change it unless you do so with your ISP.

Figure 3-9: Configuring the TCP/IP settings.

Note

You don't actually need a high-speed Internet connection for Windows ICS. Instead, you can share a dial-up connection with full reliability. But if more than two nodes start using a dial-up connection simultaneously, you'll notice some very definite slowdown. For that reason, this example uses a broadband connection.

Unless you've used the Network Setup Wizard, during which Windows configures your PC to share the Internet connection, you must tell Windows that you wish to do so. Open the Network Connections folder by first opening My Network Places and then clicking the View Network Connections link in the Network Tasks pane. Right-click the icon for the network resource (LAN or Internet connection) you are using to connect to the Internet and choose Properties. Under the Advanced tab you'll find the check-box, "Allow other network users to connect through this computer's Internet connection." Check this box, and unless you have a specific reason to uncheck the other boxes — "Establish a dial-up connection whenever a computer on my network attempts to access the Internet" and "Allow other network users to control or disable the shared Internet connection" — leave them selected. If you're using DSL or cable, feel free to uncheck the former, and if you want to ensure nobody else disconnects, uncheck the latter, but typically neither option presents any problem.

If you want to use the Network Setup Wizard to configure ICS instead of doing so manually, launch it from the Network Tasks pane, by clicking the "Set up a home or small office network" link, and follow these steps:

1. Step through the wizard to the question, "Do you want to share an Internet connection?" With your cable/DSL connection already established, the appropriate response is "Yes." If you have more than one possible connection and you don't want to use the default suggestion, click "No, let me choose another way to connect to the Internet."

2. On the "Select a connection method" screen, choose "This computer connects directly to the Internet. The other computers on my network connect to the Internet through this computer." Note that if you have already established a LAN with the Internet connection shared through a cable/DSL router or a separate router, choose the second option, "This computer connects to the Internet through a residential gateway or through another computer on my intranet." If you do so, however, your PC no longer acts as host; the router does. For this example, therefore, the first choice is correct.

Note

Other options are available from the "Select a connection method" screen as well, depending on your current setup. Click the Other radio button, and then Next, to see these choices. One option is, "This computer connects to the Internet directly or through a network hub. Other computers on my network also connect to the Internet directly or through a hub." If you have an Internet connection but no network, or the reverse, you will see either "This computer connects directly to the Internet. I do not have a network yet" or "This computer belongs to a network that does not have an Internet connection." Obviously this last possibility is irrelevant for this particular section of this chapter — which expressly discusses connecting to the Internet — but keep in mind its availability in case you wish to create a network without Internet access.

3. Choose the Internet connection you wish to share. Windows takes its best guess at it for the sake of automation, and this guess is usually right. You want to share the broadband connection, which in turn provides Internet access to all machines. See Figure 3-10.
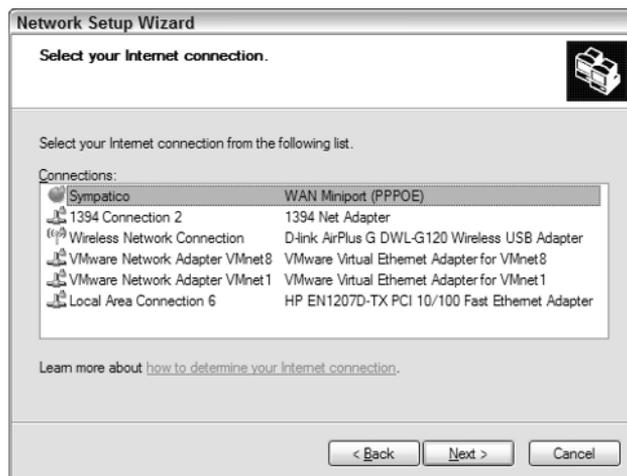
Figure 3-10: Choosing the source of the Internet connection.

4. On the next screen, "Select your private connection" (see Figure 3-11), you choose the connection that will provide Internet connectivity for the ad hoc WLAN (refer to Figure 3-10). Here's where difficulties can result. The answer, in our sample case, is the Local Area Connection belonging to the Ethernet card in your PC — not the Wireless Network Connection option, if it appears in this list. In other words, Steps 3 and 4 have you establish the broadband connection as sharing the Internet connection, and the Ethernet card (Local Area Connection) as acting as the hub for the WLAN.
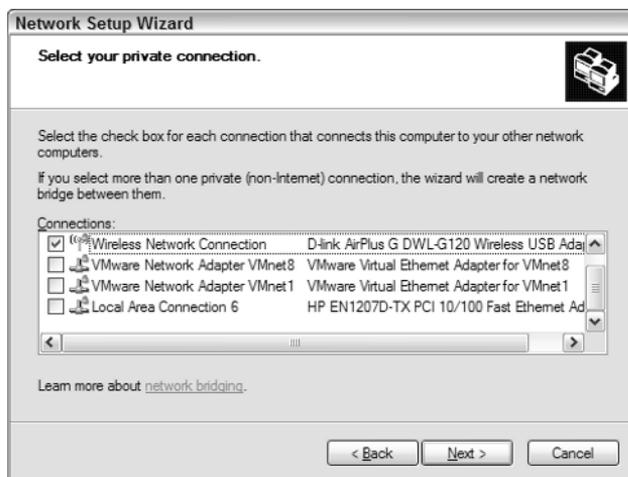
Figure 3-11: Choosing the network for distribution of the Internet connection.

5. The next screen has you giving the ICS host computer a name and an optional description, and naming the workgroup whatever you choose. Windows standardizes on MSHOME for the network name, but not only can you change it, you should. Anyone looking to break into your network has an easier time if you opt for the default name, so personalize it and simultaneously get rid of some casual hacking.

6. On the "File and printer sharing" screen, you can choose whether to turn on the file and print sharing option. If you do turn on file or print sharing, you risk allowing intruders easier access to your files. In fact, if you don't have a firewall program, don't even consider turning this option on. The default is to turn it off, and that's a good idea for now. You can always reverse your decision later by reconfiguring the network.

7. After clicking Next twice (the first time to confirm your choices), Windows sets up your network. The first time it does so can take several minutes, but if you re-run the wizard later it takes significantly less time. After finishing, the wizard presents you with the choice of creating a network setup floppy disk for use on the other nodes on the network, using an already created network setup floppy, setting up the nodes by using the Windows XP installation CD, or finishing the wizard without creating media to run on the other nodes.

If all your nodes are running Windows XP, as this chapter assumes, you don't need to do anything. For PCs with any other version of Windows, create the setup floppy as assurance of getting the network up and running on all your machines.

Tip

To make changes at any time to your Windows XP network, you don't need to fiddle with the network connections settings. Instead, simply relaunch the Network Setup Wizard and choose different options. If you've made numerous specific changes to your network settings, this wizard will probably reset most of them, in which case running the wizard might be the wrong idea, but for most users the wizard provides the easiest and most foolproof method of ensuring a functioning, correctly configured network.

Providing Internet Connectivity to the Ad Hoc WLAN

At this stage, you have an ICS host ready to roll, but you have no way for the other nodes on the network to connect to it. For this, you need to install a WLAN adapter into the host. If your host PC contains a PC Card adapter (most desktop PCs do not), you can simply use an adapter identical to those in your notebook PCs. In the vast majority of cases, however, you need a PCI or USB adapter. This example uses USB, simply because it's easier to install and set up, although we've become aware through testing a variety of products that both PCI adapters and PC Card adapters tend to connect — and maintain the wireless connection — on a more consistently reliable basis. If you intend to share your Internet connection with a WLAN in the manner described in this chapter, you should consider using a PCI WLAN adapter if your ICS host is a desktop PC or a PC Card WLAN adapter if your host PC is a laptop.

Note

As you've undoubtedly noticed by now, the machine that hosts the Internet connection needs two separate network adapters — one for the host to connect to the Internet, and the other to allow the other network devices to connect to the host. If you were to set up ICS for wired access only, you would need two Ethernet LAN adapters inside the PC, but that would provide a connection for only one external device. To split the signal, you would need a switch or a hub, with a cable connecting each PC to that switch or hub. For this reason alone, a wireless setup is often more convenient. A single wireless adapter can accommodate as many WLAN nodes as you wish.

Here, too, the Network Setup Wizard can help you. Install the drivers for your WLAN adapter on the desktop, plug in the adapter itself (PCI slot or USB port), and connect the adapter to the ad hoc network you've already created. With the ad hoc network fully in place, run the Network Setup Wizard once more. This time, Windows will bridge the Ethernet connection to the Internet with the wireless connection to the other nodes on the WLAN, while simultaneously configuring the ICS

host's WLAN adapter to provide IP and DNS addresses to those nodes. The node PCs require this addressing information to connect to the Internet and receive and send traffic beyond the ad hoc network.

If you don't want to use the Network Setup Wizard, you can configure the ICS host's WLAN adapter manually to perform the same addressing function. To do so, configure all WLAN adapters, including the one installed in the ICS host, to obtain IP and DNS server addresses automatically. Open the Network Connections folder, right-click the icon for that connection, and, on the General tab of the resulting Properties dialog box, select the Internet Protocol (TCP/IP) item in the list of items and then click the Properties button. On the General tab of the Internet Protocol (TCP/IP) Properties dialog box, choose the top radio button in each section — "Obtain an IP address automatically" and "Obtain DNS server address automatically" — and then click OK until you've closed all the dialog boxes. Because the ICS host is configured to share an Internet connection, and because the host's WLAN adapter receives its IP and DNS addresses automatically and communicates with the rest of the ad hoc network, the nodes on the WLAN will also receive Internet connectivity information.

Again, if you have difficulties with the manual setup, run the Network Setup Wizard and let Windows do the job for you. Indeed, often this is the most efficient method to use.

Summary

This chapter has taken you through the steps needed to create an ad hoc wireless network. You've installed your wireless LAN adapters on your desktop and notebook PCs, you've configured them to communicate through one specific Wi-Fi channel, and you've used them to share resources (files and printers, for example) across the ad hoc LAN. You've also seen how to configure one of your PCs to act as an Internet host, sharing a single Internet connection among all your PCs through the seeming magic of DHCP. You have a fully functional WLAN up and running, and if it serves your needs, you can leave it at that.

More likely, though, you've already begun to notice one of the major limitations of ad hoc networking. To keep the Internet connection available for all your machines, you have to keep the host PC running. As soon as you shut it off, its connection to the Internet disappears, so obviously it can no longer share it. Less noticeable, but equally important, is a second limitation: security. Ad hoc WLANs don't offer much security against Internet intruders at all.

Chapter 4 introduces you to the standard form of Wi-Fi connectivity, the infrastructure LAN. You'll learn how to use a wireless access point (AP), in combination with a router/switch device, to create a wireless network that shares the Internet connection without leaving one of your PCs powered on, and that provides at least some degree of security through the built-in firewall capabilities of the router/AP itself.