TROUBLESHOOTING YOUR INTERNET CONNECTION

It’s Great When It Works, but...

Browsing the Internet is great fun and very useful. In fact, watch as I instantly transfer millions of dollars from my secret Swiss bank account to... wait a minute, what’s a “404 Server Not Found Error”? What’s going on? Did the modem disconnect? Is the IRS closing in on me? Help! Where’s my money? If you’ve used the Internet for any length of time, this scene might seem all too familiar—except for the bit about the Swiss bank account. (A guy can dream, can’t he?) Connecting to the Internet and using the Web is an amazingly user-friendly experience, yet we can’t escape that it’s a staggeringly complex system. If something goes wrong at any step along the way between your fingertips and a server in cyberspace, the whole system comes to a crashing halt. Where do you begin to find and fix the problem? In this chapter, I’ll show you the basic strategies to use when tracking down Internet problems, and I’ll briefly discuss some of the diagnostic tools available to help you pinpoint the trouble.

Experiment with the diagnostic tools that we’ll be discussing in this chapter when your network and Internet connection are operating correctly, to learn how the programs work and what output you should expect. This way, if you run into trouble later, you can compare the results to what you saw when things were working.
Before You Run into Trouble

The best tool to have on hand when you're diagnosing Internet problems is information about what you should expect when your connection is working. If you collect this information in advance of running into trouble, you'll save yourself a lot of time, trouble, and grief.

For starters, gather the information that your ISP provided when you set up your Internet connection. This might include the following information:

- The customer support telephone number for your ISP.
- The type of service you're using: dial-up modem, DSL, cable modem, satellite, or other type of service.
- For dial-up service, the dial-in telephone number(s) for your area and the URL of the web page that you can use to find other dial-up numbers in other areas.
- For DSL or cable service, the make and model of the DSL or cable modem that you were given.
- The login name and password used to connect to the service. (This usually does not apply to cable Internet service; your provider will tell you if it does.)
- The usernames and passwords used to access the email accounts you have with your ISP.
- The names or IP addresses of any servers provided by your ISP, including outgoing mail (SMTP server), incoming mail (POP3 server), and news reader (NNTP server).
- If your service provides you with a static IP address, you need to know your IP address, your network mask, your gateway address, and two or more DNS server addresses.

I suggest that you collect, type, and print all this information and store the printout in a handy place near your computer. You can use WordPad (click Start, All Programs, Accessories, WordPad) or your favorite word processor. The important part is to print the information so it's available even if your computer is acting up. Keep the printout in a manila file folder labeled “Internet Connection Information.”

It's also helpful to collect the correct output of the TCP/IP diagnostic programs (whose use I'll describe later in the chapter) and store copies of the output in your file folder for reference. You can use the PrntScrn key to take snapshots of the output and setup windows, and then paste the pictures into a word processing document so you can print it. Again, it really helps to have this information available when trouble occurs—but you have to prepare it in advance.

Here are some things to record:

- The output of the tracert command-line program showing the results for a sample website. The tracert tool records all the intermediate steps that Internet data passes through between your computer and a site on the Internet. Knowing what the route looks like when things are working can later help you determine whether a problem is in your computer or out on the Internet, beyond your control.
To record this output, open a Command Prompt window (click Start, All Programs, Accessories, Command Prompt) and type this command:

```
tracert www.sonic.net
```

This command might take about 30 seconds to display several lines of text, ending with “Trace complete.” If it does run successfully, type this command:

```
tracert www.sonic.net > goodtrace.txt
```

This time, you will not see any output but the command is running. After the same 30 seconds, the command prompt returns. Now type this:

```
notepad goodtrace.txt
```

This is the saved output of the successful `tracert` command, which you can now print and put into your Internet Connection Information folder.

- The output of `ipconfig /all`, run on each of your computers while you’re successfully connected to the Internet. `ipconfig` lists all your networking settings, so you can check for mistakes.

To record this output, type these commands:

```
ipconfig /all > ipconfig.txt
notepad ipconfig.txt
```

As before, you should print and file the results.

- The Network Hardware and Protocol Configuration dialog boxes in Network Connections, as pictures snapped with PrntScrn. If you have a network or a network adapter that you use for a broadband cable or DSL Internet connection, it’s handy to record the setup information in case you need to reenter it later. For example, you might need to do that if you replace your network adapter. To document these settings, follow these steps:

1. Open WordPad (click Start, All Programs, Accessories, WordPad) or your favorite word processor.

2. Open the Network Connections window (click Start, Control Panel, View Network Status and Tasks [under Network and Internet], Change Adapter Settings).

3. Right-click the icon that corresponds to your Internet connection (a dial-up, broadband, or LAN connection, depending on your Internet connection type) and select Properties.

4. Select the first tab. Press Alt+PrtScrn. Click the cursor in the word processor window, and press Ctrl+V to paste in the picture.
5. Return to the Properties dialog box and select the next tab. Again, press Alt+PrtScrn to capture a picture of the dialog box; then select the word processor and press Ctrl+V to paste in the picture. Repeat this process for every tab in the dialog box.

If the dialog box has a Networking tab that has a list labeled This Connection Uses the Following Items, select each of the items in this list in turn. For each one, if the Properties button is enabled, click it, and if a subsidiary Properties dialog box appears, take pictures of every tab on that box, too. Press Cancel to close it.

6. Close the Connection Properties dialog box. Repeat steps 3 through 5 for any other connection icons in the Network Connections window.

7. Print the word processing document and store it in your file folder.

- The configuration of any routers or network connection equipment. If you have an Internet connection sharing router, it’s a very good idea to record its correct settings, in case they are accidentally changed or you update or replace the device. You can do this by printing each of its setup screens from your web browser.

- The settings for any dial-up connections used. Many ISPs talk you through their setup process or provide you with “wizard” software that does the work for you, and it’s important to record the setup information in case you need to reconstruct it someday. The information you need is the telephone number, login name, and password.

- Diagrams showing network cabling, hubs, routers, and computers. If your 3-year-old is a budding network installer and rewires your computer, it’s handy to have a diagram of the correct setup to help you get all the wiring spaghetti back in order.

With this documentation at hand, you’ll be armed with supportive information if a problem does occur.

**Troubleshooting Step by Step**

A functioning Internet connection depends on an entire chain of hardware and software components that reaches all the way from your keyboard to a computer that might be halfway around the world. Troubleshooting is a real detective’s art, and it’s based more on methodical tracking down of potential suspect problems than intuition. If something goes wrong, you have to go through each component, asking “Is this the one that’s causing the problem?”

Windows 7 comes with network-troubleshooting capabilities that, in some cases, can identify and repair problems automatically. If you encounter Internet connection problems—especially problems using high-speed broadband Internet service—try these steps:
1. Click Start, Control Panel, View Network Status and Tasks (under Network and Internet). This displays the Network and Sharing Center. If there is a problem with your Internet connection, Windows displays a red X, as shown in Figure 16.1.

![Figure 16.1](image)

**Figure 16.1**
Windows displays a red X on the map, showing that your Internet connection is not working.

2. Double-click the red X.

3. If Windows displays a message indicating that it might be able to repair the problem, click Repair.

4. If that does not solve the problem, go back to the Network and Sharing Center. At the bottom of the page, click Troubleshoot Problems, and then click Internet Connections. Click Advanced, Run As Administrator, and then click Next. Follow the troubleshooting wizard's prompts from there.

If the wizard's diagnosis is "The DNS server isn't responding," and if you connect to the Internet through a shared connection using a router, this most likely means that your connection sharing router can't connect to the Internet. The problem is either with the router, your cable or DSL modem, or its connection to the Internet. Use Internet Explorer to connect to your sharing router, as described later in the chapter under "Identifying Network Hardware Problems." If you can bring up the router's setup web page, the router is working, so your best bet is to contact your ISP for further assistance.
5. If this does not fix the problem, and if your computer connects to the Internet through a wireless or wired Ethernet connection, go back to the Network and Sharing Center. Click Troubleshoot Problems, and select Network Adapter. Again, click Advanced, Run As Administrator, and then click Next.

If the problem occurred because your computer failed to obtain its network settings from a router, this procedure will often work. In many cases, though, you'll need to locate the problem yourself, using good, old-fashioned Sherlock Holmes–style deductive reasoning. Here's how it goes. Let's assume that you are having trouble using a certain website. It could be that

- You can view some of its pages but not others, or you see text displayed but not the streaming video or sound.

  In this case, you know that your Internet connection itself is fine because something does appear. The problem, then, is that the video or sound application isn't working. You might want to check the index to see whether we discuss the application in this book. You might also check the application’s built-in help pages. If the application was one that you downloaded or purchased, check the manufacturer’s website for support information or an updated software version.

- Nothing on this particular site is responding. In this case, see if you can view any other website. Try www.google.com, www.quepublishing.com, your ISP’s website, or your local newspaper’s website.

  If you get a response from even one other website, again, your Internet connection is fine. The problem is most likely with the site you’re trying to use or with your ISP. Check to be sure that Internet Explorer isn’t set up to block access to the site you’re interested in. (See Chapter 14, “Using Internet Explorer 8,” for more help on this topic.)

- You can’t view any web pages on any site. If this is the case, you know that your Internet connection itself is at fault. This chapter can help you find out what’s wrong.

To that end, Figures 16.2 and 16.3 show flowcharts to help direct you to the source of the problem. The first chart is for dial-up connections to an ISP; the second is for broadband or LAN connections. If you’re having Internet connection trouble, follow the appropriate flowchart for your type of connection. The endpoints in each flowchart suggest places to look for trouble. I discuss these in the sections that follow.
Troubleshooting Step by Step

Figure 16.2
Flowchart for diagnosing dial-up Internet connection problems

1. **Start**
   - Check Event Viewer. Does it show network or dial-up errors?
     - Yes → Resolve these before continuing.
     - No
       - Does your modem connect to your ISP's modem?
         - Yes
           - Does the progress indicator get past "Verifying user name & password"?
             - Yes → Go to start of LAN Flowchart (Figure 14.2).
             - No
               - Did you hear it dial?
                 - Yes
                   - Did your modem answer?
                     - Yes
                       - See "Identifying Modem Hardware Problems" in the text.
                     - No
                       - See "Identifying Modem Connectivity Problems" in the text.
                 - No
                   - Check for correct or updated modem driver. Might be time for a new modem.
         - No
           - See "Identifying Modem Hardware Problems" in the text.
   - Yes
     - See "Identifying Modem Hardware Problems" in the text.

2. **Yes**
   - Check phone number and dialing properties in Internet Options.
     - Yes
       - Does their modem answer if you dial the same number on a regular telephone?
         - Yes → Call your ISP.
         - No
           - Check Caps Lock key, and see "Identifying Modem Connectivity Problems" in text.
     - No
       - Did ISP's modem answer?
         - Yes → Check Caps Lock key, and see "Identifying Modem Connectivity Problems" in text.
         - No
           - Did you get an invalid password error?
             - Yes
               - Check Caps Lock key, and see "Identifying Modem Connectivity Problems" in text.
             - No
               - Did you hear it dial?
                 - Yes
                   - Did your modem answer?
                     - Yes
                       - See "Identifying Modem Hardware Problems" in the text.
                     - No
                       - See "Identifying Modem Connectivity Problems" in the text.
                 - No
                   - Check phone number and dialing properties in Internet Options.
Troubleshooting Your Internet Connection

Figure 16.3
Flowchart for diagnosing broadband or LAN-based Internet connection problems

Start
Check Event Viewer. Does it show network errors?
Yes
Resolve these before continuing.
No
Does command "ping 127.0.0.1" get replies?
No
Uninstall all network components, reinstall, reconfigure, and try again.
Yes
Does command "ipconfig/all" display valid IP and DNS addresses?
No
See "Identifying Software Configuration Problems" in text.
Yes
Can you ping other computers on the LAN by their IP addresses?
No
See "Identifying Network Hardware Problems" in text.
Yes
Can you ping the IP address shown as the Gateway Address?
No
Problem is with the gateway. Repair problem there.
Yes
Does command "nslookup www.quepublishing.com" work?
No
DNS configuration error. See "Identifying Software Configuration Problems" in text.
Yes
Can you ping address 63.240.93.132 or other valid outside IP address?
No
Problem is with the gateway's connection to the Internet. Repair problem there.
Yes
Use command "traceroute desired.host." Do packets get outside your LAN onto the Internet?
No
Bummer. The problem's on the Internet.
Yes
Identifying Software Configuration Problems

Software configuration problems can easily be the cause of Internet connection problems, and it’s fairly simple to determine that this is the problem—you can’t make any Internet connection whatsoever, although the Device Manager says your network card or modem seems to be working correctly. The potential problems depend on the type of Internet connection you use.

Troubleshooting a Dial-Up Connection

If your modem appears to connect to your ISP but you still can’t access any web pages or Internet services, here are some steps you can take:

1. In Internet Explorer, select Tools, Internet Options. Select the Connections tab. Be sure you have selected the correct dial-up connection. Select the dial-up connection entry and click Settings. Be sure that Use a Proxy Server for This Connection is not checked. (The exception to this rule is if you are using a third-party connection speed-enhancement program; in this case, the software manufacturer might specify proxy settings.) Close all the Settings dialog boxes.

2. Click the network icon at the bottom-right corner of your screen to display the connection list, as shown in Figure 16.4. Right-click the entry for your dial-up connection and select Properties. Alternatively, click Start, Control Panel, View Network Status and Tasks (under Network and Internet), click Change Adapter Settings, and then right-click the entry for your dial-up connection and select Properties.

View the Networking tab. Under Components Used by This Connection, only the Internet Protocol Version 4 and Version 6 entries, and possibly QoS Packet Scheduler, should be checked.

3. On the Security tab, look at the Authentication settings. This should be set to Allow These Protocols, with at least the Unencrypted Password and Challenge Handshake Authentication Protocol (CHAP) boxes checked if you’re connecting to an ISP, and the Microsoft CHAP box checked as well if you’re connecting to your office LAN.

If none of these steps identifies a problem, it’s time to call your ISP for assistance. You might have to spend a half hour on hold listening to really bad music, but at this point, it’s their job to help you get online, and they should help you cheerfully and expertly. (Otherwise, you should get a new ISP.)
Troubleshooting a Cable or DSL Modem Connection

If your computer connects directly to a cable or DSL modem, you might have one or two network cards installed in your computer, depending on whether you’re sharing the high-speed connection on your LAN.

To check for the proper settings, follow these steps:

1. In a Command Prompt window (click Start, All Programs, Accessories, Command Prompt), type `ipconfig /all` and press Enter. Be sure that the IP address and DNS information for the network card that connects to your high-speed modem is accurate. Your ISP’s tech support people can help you confirm this.

2. If your DSL provider requires you to “sign on” before using the Internet, you’ll be using a sort of “dial-up” connection, except that the connection is made digitally over the DSL network. (This is called Point-to-Point Protocol over Ethernet, or PPoE.) You set up this connection using the Broadband (PPPoE) option, as described in Chapter 13, “Getting Connected.”

\[\text{note}\]

If you have DSL or cable service but your computer connects to a connection sharing router and the router connects to the DSL or cable modem, don’t follow these instructions. Instead, see “Identifying Network Hardware Problems” later in this chapter.
Identifying Software Configuration Problems

If this is the case, and if you use a LAN adapter to connect to your DSL modem, the IP address displayed for the LAN adapter itself will have an IP address that is used only to communicate with your DSL modem. Be sure to check with your ISP to be certain that this computer-to-modem connection is configured correctly; if it’s not, you won’t be able to make the connection to your ISP.

Use the Connection icon to connect to your ISP. You can get to it quickly by clicking the network icon in the taskbar (as shown in Figure 16.4). Select the name of the connection for your Internet service, and click Connect.

When the logon process has completed, `ipconfig /all` should show a dial-up connection with a different IP address. This is your real, public Internet address for the duration of the connection.

3. If you’re sharing your computer’s high-speed connection with your home or office LAN using two network cards in your computer, be sure you’ve enabled sharing on the correct connection. The connection to check as “shared” is the one that connects to your high-speed DSL or cable modem. The LAN-side connection is not the shared connection and should have an IP address of 192.168.0.1. Internet connection sharing is described in Chapter 19, “Connecting Your Network to the Internet.”

### Troubleshooting a LAN Connection

If you connect to the Internet via a wired or wireless connection on your LAN, the first question is, can you communicate with other computers on your LAN? To test this, you should use the `ping` command.

Open a Command Prompt window (click Start, All Programs, Accessories, Command Prompt) and type the command `ipconfig`. The output of `ipconfig` lists a number called a gateway address. To test the connection to your gateway, type `ping` followed by the gateway address, and then press Enter. For example:

```
ping 192.168.0.1
```

This tests the connection to the computer or router that is sharing its Internet connection. If `ping` says “Request timed out” or “Transmit failed” instead of listing four successful replies, you have a LAN problem that you need to fix first.

If you are using a wireless network connection, be sure your wireless connection is working correctly, that you are connected to the correct wireless network, and that you have the correct network key entered. Chapter 21, “Troubleshooting Your Network,” is devoted to LAN troubleshooting.

If you can communicate with other computers on the LAN but not the Internet, can anyone else on your LAN access the

### tip

Windows has a diagnostic and repair function that resets all the software components of a LAN connection, including the DHCP address assignment. This often solves LAN problems. To use it, open the Network Connections page, find your LAN or wireless connection, right-click it, and select Diagnose. If a problem is identified, follow the instructions or select the Reset option.

A quicker path to the Diagnose function is through the network icon on your taskbar (see Figure 16.4). Click the network icon, right-click your connection name, select Status, then click Diagnose.
Troubleshooting Your Internet Connection

Internet? If no one can, the problem is in your LAN’s connection to the Internet. If your LAN uses Windows’ built-in Internet Connection Sharing (ICS), go to the sharing computer and start diagnosing the problem there. Otherwise, follow these steps:

1. Open a Command Prompt window and type `ipconfig /all` to view your TCP/IP settings. The output appears similar to that shown in Listing 16.1. (The Tunnel Adapter entries are not important here and are not shown.)

**Listing 16.1 Output from the `ipconfig /all` Command**

```plaintext
Windows IP Configuration
  Host Name . . . . . . . . . . . . .: MyComputer
  Primary Dns Suffix . . . . . . . .:
  Node Type . . . . . . . . . . . . .: Hybrid
  IP Routing Enabled. . . . . . . . .: No
  WINS Proxy Enabled. . . . . . . . .: No

Ethernet adapter Local Area Connection:
  Connection-specific DNS Suffix . .:
  Description . . . . . . . . . . . .: Intel PCI Fast Ethernet Adapter
  Physical Address. . . . . . . . . .: 00-03-FF-D0-CA-5F
  DHCP Enabled. . . . . . . . . . . .: Yes
  Autoconfiguration Enabled . . . . .: Yes
  Link-local IPv6 Address . . . . . .: fe80::8014:cfc7:9a98:cdfe%10(Preferred)
  IPv4 Address. . . . . . . . . . . .: 192.168.1.106(Preferred)
  Subnet Mask . . . . . . . . . . . .: 255.255.255.0
  Lease Obtained. . . . . . . . . . .: Sunday, July 5, 2009 7:22:23 PM
  Lease Expires . . . . . . . . . . .: Sunday, July 5, 2009 7:22:22 PM
  Default Gateway . . . . . . . . . .: 192.168.1.1
  DHCP Server . . . . . . . . . . . .: 192.168.1.1
  DHCPv6 IAID . . . . . . . . . . . .: 167773183
  DNS Servers . . . . . . . . . . . .: 192.168.1.1
  NetBIOS over Tcpip. . . . . . . . .: Enabled
```

Within the output, check the following:

- The DNS suffix search list and the connection-specific DNS suffix should be set correctly for your ISP’s domain name or your company’s domain name. (This is helpful but not crucial.) It can also be left blank.

- The IP address should be appropriate for your LAN. If you’re using ICS, the number will be 192.168.0.xxx. If you’re using a hardware connection-sharing device, the number might be different.

- If your IP address appears to be 169.254.xxx.yyy, the sharing computer or router was not running when you booted up your computer, or it is no longer set up to share its connection. Get the sharing computer or router restarted and then skip to step 2.

- The default gateway address should be the IP address of your router or sharing computer, usually something similar to 192.168.0.1 or 192.168.1.1.
Identifying Network Hardware Problems

- The default gateway address and your IP address should be identical for the first few sets of numbers, corresponding to those parts of the subnet mask that are set to 255. That is, both might start with 192.168.0 or 192.168.1.

- If your computer gets its IP address information automatically, DHCP Enabled should be set to Yes. If your computer has its IP address information entered manually, no DHCP server should be listed.

- If you’re using connection sharing, the DNS server address will be 192.168.0.1. Otherwise, the DNS server numbers should be those provided by your ISP or network administrator.

- If your computer gets its settings automatically or uses a shared connection, continue with the next two steps.

2. Be sure the master router or sharing computer is running. Then, in the Network Connections window, right-click your Local Area Connection icon and select Diagnose. This might lead you through solving the problem. Alternatively, view the Network and Sharing Center, and select Troubleshoot Problems from the task list. Select Internet Connections, then repeat the process selecting Network Adapter.

3. Repeat the `ipconfig` command and see whether the correct information appears now. If it does, you’re all set. If not, the master computer or the router is not supplying the information described previously and needs to be set correctly before you can proceed.

These steps should take care of any software configuration problems. If none of these steps indicates or solves the problem, check that your network or modem hardware is functioning correctly.

Identifying Network Hardware Problems

If you suspect hardware as the source of your Internet connection problems, check the following:

- Log on using an account with Administrator privileges. On the Start menu, right-click Computer and select Manage to open Computer Management. Select Device Manager. Look for any yellow exclamation point (!) icons in the device list. If your network adapter is marked with this trouble indicator, you must solve the hardware problem before continuing. If the device needs an updated driver, see “Updating Drivers” in Chapter 27, “Installing and Replacing Hardware,” for more information.

- Also within Computer Management, check the Event Viewer for any potentially informative error messages that might indicate a hardware problem.

- Use `ipconfig` on each of your computers to check that all the computers on your LAN have the same gateway and network mask values, and similar but distinct IP addresses.

- If your LAN has indicator lights on the network cards and hubs, open a Command Prompt window and type

  ```
  ping -t x.x.x.x
  ```
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where x.x.x.x is your network's default gateway address. (This might be something similar to
192.168.0.1.) This forces your computer to transmit data once per second. Confirm that the in-
dicator lights blink on your LAN adapter and the hub, if you have one. This test might point out a
cabling problem.

- If your hub or LAN card’s indicator doesn’t flash, you might have a bad LAN adapter, the wrong
driver might be installed, or you might have configured the card incorrectly. You can stop the
ping test by pressing Ctrl+C when you’re finished checking.

If you use a hardware connection-sharing router for a broadband (DSL or cable) connection, your
router might provide further assistance. To access the router, follow these steps:

1. Open a Command Prompt window (click Start, All Programs, Accessories, Command Prompt).
2. Type the command **ipconfig** and press Enter.
3. Note the gateway address. It will be something along the lines of 192.168.0.1.
4. Open Internet Explorer. In the Address bar, type the URL **//192.168.0.1** , but enter the gate-
way address that you noted in the previous step.
5. You are prompted to enter the administrative username and password for your router. Each
manufacturer has a default name and password, which you can find in the router’s user’s man-
ual. You might also have changed it when you installed it.
6. Most routers have a Status menu item that displays the status of the router’s Internet connec-
tion. If it says that it can’t connect, you might have an incorrect PPPoE username or password
entered. Or it might have dropped the connection. In this case, there might be a Connect button
you can click, or you might want to just power off and then power on the router.

If you use a dial-up Internet connection, the next section can help you diagnose modem problems.

**Identifying Modem Hardware Problems**

Modems can have a greater variety of problems than network adapters. You can take a few steps to
determine what the problem might be:

1. Before getting too frustrated, check the obvious one more time: Is a functioning telephone line
connected to the right socket on the modem? Unless you’re using an ISDN modem, it also
doesn’t hurt to plug in an extension phone and listen as the modem dials and your ISP answers.
You must somehow put the extension on the “line” side of the modem, though, because most
modems disable the “telephone” jack when dialing. A duplex telephone jack can help with this.

If dialing was actually taking place but you couldn’t hear it, run the Phone and Modem Options
(open the Control Panel and click Hardware and Sound; then, click Phone and Modem Options).
Select the Modems tab, highlight the modem, and click Properties. Click Change Settings, and
then click Continue. Select the Modem tab and move the volume slider up to its rightmost posi-
tion. Click OK to save the change.
Identifying Network Hardware Problems

If you have a voicemail system that uses a stutter dial tone to indicate that you have messages waiting, your modem might not dial when the stutter is active. If this is the case, open the Control Panel. In the Search box, type `modem`, then click Phone and Modem. Select the Modems tab. Select your modem and click Properties. Select the Modem tab and disable the Wait for Dial Tone Before Dialing option, as shown in Figure 16.5.

![Figure 16.5](image)

Uncheck the Wait for Dial Tone Before Dialing option if your voicemail notification interferes with dialing.

2. If you have an external analog or ISDN modem, be sure that it’s plugged in and turned on. When you attempt to make a connection, watch for flickering in the Send Data LEDs. If you don’t see flickering, your modem cable might not be installed correctly.

3. Check the Event Viewer for informative error messages that might indicate a hardware problem.

4. In the Start menu, right-click Computer, select Manage, and select Device Manager. Look for any yellow exclamation point (!) icons in the device list; if a modem or port is marked with this trouble indicator, you need to solve the hardware problem before continuing. Double-click the line that’s marked with the exclamation point and read the explanation of the problem. If the device needs an updated driver, see “Updating Drivers” in Chapter 27 for more information.

5. On the Options tab of the Dial-Up Connection Properties dialog box, check Prompt for Phone Number and try to make the connection. This shows you the actual number being dialed. Verify that the call-waiting code, outside line-access codes, and area code are correct. These are set on the connection’s General tab and in the Phone and Modem Options Control Panel applet (in the Dialing Rules dialog box, select the proper location and click Edit).

---

**note**

If you’d like to learn more about troubleshooting hardware and resolving device conflicts, pick up the latest edition of Scott Mueller’s *Upgrading and Repairing PCs*, published by Que.
6. If you have an analog or ISDN modem and dialing is taking place but no connection is made, open Control Panel and type \texttt{modem} into the Search box. Click Phone and Modem. Select your modem and click Properties. Click Change Settings. Select the Diagnostics tab and check Append to Log. Close the dialog box and try to make the connection again. Go back to the Properties dialog box and select View Log. This log might indicate what is happening with the modem. Be sure to uncheck Append to Log when you’re finished, or the file that stores this information could grow to enormous proportions.

**Identifying Modem Connectivity Problems**

Modem problems are usually due to incompatibility with your ISP’s equipment or to poor telephone line quality. If your modem fails to make a connection or disconnects by itself, you need to look for a few things:

- If the ISP’s modem answers but you don’t establish a connection, your modem might be incompatible; call your ISP for assistance.

- If your modem disconnects and you are told that there was a problem with your username or password, try to connect again and check these entries carefully. If you try two or three times and still can’t connect, contact your ISP for help. Sometimes, ISPs get bought by other companies, and the format of the required sign-on username can change as a result.

- Create and view a log file of modem activity and look for error messages indicating a protocol-negotiation error. Your ISP can assist with this as well.

- If your modem makes screeching sounds for approximately 15 seconds and hangs up, your modem is probably incompatible with the equipment used at your ISP, and you need an updated modem. Before you buy a new one, note that some modems can be updated via software. Check the manufacturer’s website for information.

- If your connection works but the modem disconnects after a certain amount of time, there are two possible causes. If your connection was sitting idle, you might have run into the Windows inactivity timer. Click the network icon in the taskbar, right-click the name of your dial-up connection, and select Properties. View the Options tab. Check the entry Idle Time Before Hanging Up. Increase the time or select Never. If this problem recurs, you might enable the modem log and see whether it provides an explanation. Your ISP might also have set up its equipment to disconnect after a certain period of inactivity.

- If you don’t think that idle time was the cause, your connection might have been interrupted by call waiting. On the connection’s General tab, check Use Dialing Rules, click the Dialing Rules button, and then click Edit. Verify that To Disable Call Waiting is checked, and that the proper call-waiting turn-off setting is selected (for example, 	exttt{*70}). Some newer modems can cope with call waiting and even alert you to a call coming in. If you rely on call waiting, it might be time for an upgrade. In this case, however, you’re probably better suited switching to a cable or DSL connection, if one is available to you.

- If none of these is the cause, you might simply have a scratchy telephone line or a flagging older modem. This is an annoying problem that is difficult to diagnose. Try changing modems.
If your modem is making contact with your ISP but, despite a solid modem connection, you still can’t use the Internet, see the next section for tips on diagnosing Internet connectivity problems.

**Troubleshooting Internet Problems with Windows TCP/IP Utilities**

If you think you are connected to your ISP but you still can’t communicate, you can use some of the command-line tools provided with Windows to trace TCP/IP problems. (TCP/IP is the network language or protocol used by the Internet.)

To run the command-line utilities, open a Command Prompt window with Start, All Programs, Accessories, Command Prompt. Then, type in the commands as I describe them later. If you’re not familiar with a particular command-line utility, type the command name followed by `/?`, as in this example:

`ping /?`

Now, let’s go through some of the TCP/IP diagnostic and command-line utilities provided with Windows.

**ipconfig**

`ipconfig` is one of the most useful command-line utilities provided with Windows because it displays the current IP address information for each of your computer’s network adapters and active dial-up connections. On networks that assign addresses automatically, `ipconfig` can tell you what your computer’s IP address is, if you ever need to know it.

After opening a Command Prompt window, the command `ipconfig` prints the following information (of course the IP, subnet, and gateway information `ipconfig` provides will be different for your computer, and you might see a dial-up connection listed instead of a LAN adapter):

**Windows IP Configuration**

**Ethernet adapter Local Area Connection:**

- Connection-specific DNS Suffix
- Link-local IPv6 Address: `fe80::8014:cfc7:9a98:cdfe%10`
- IPv4 Address: `192.168.15.106`
- Subnet Mask: `255.255.255.0`
- Default Gateway: `192.168.15.1`

(You can ignore the Tunnel Adapter information; this is part of the Version 6 Internet Protocol system, which is used only on large, managed corporate networks.)

If you type the command

`ipconfig /all`

Windows displays additional information about your network settings, including the information shown in Table 16.1.
### Table 16.1 Information Displayed by `ipconfig/all`

<table>
<thead>
<tr>
<th>Setting</th>
<th>What It Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host Name</td>
<td>The name you gave your computer.</td>
</tr>
<tr>
<td>Primary DNS Suffix</td>
<td>The Internet domain to which your computer belongs. (You might temporarily belong to others as well while using a dial-up connection.) This might be blank; it is not a problem.</td>
</tr>
<tr>
<td>Node Type</td>
<td>The method that Windows uses to locate other computers on your LAN when you use Windows Networking. This usually is Hybrid or Broadcast.</td>
</tr>
<tr>
<td>DNS Suffix Search List</td>
<td>Alternative domain names used if you type just part of a hostname and the default domain does not provide a match.</td>
</tr>
<tr>
<td>Connection-specific DNS Suffix</td>
<td>The domain name for this particular connection. This is most applicable to dial-up connections.</td>
</tr>
<tr>
<td>DHCP Enabled</td>
<td>If set to Yes, this adapter is set to receive its IP address automatically. If set to No, the address was set manually.</td>
</tr>
<tr>
<td>DNS Servers</td>
<td>IP addresses of domain name servers.</td>
</tr>
</tbody>
</table>

`ipconfig` displays most of the information that can be set in the Network and Dial-Up Connection Properties dialog box, but it shows their real-world values. This makes it an invaluable “first stop” when troubleshooting any network problem. If you determine that an Internet connection problem lies in your equipment somewhere (because you cannot access any Internet destinations), typing `ipconfig /all` can tell you whether your network setup is correct. You need this information at hand before calling your ISP for assistance.

**ping**

If you try to browse the Internet or share files with other computers on your LAN and get no response, it could be because the other computer isn’t receiving your data or isn’t responding. After `ipconfig`, `ping` is the most useful tool to determine where your Internet connection or your network has stopped working.

Here’s how it works:

1. The `ping` command sends a few packets of data to any computer you specify.
2. The other computer should immediately send these packets back to you.
3. `ping` lets you know whether the packets come back.

Therefore, `ping` tests the low-level communication between two computers. If `ping` works, you know that your network wiring, TCP/IP software, and any routers in between you and the other computer are working. `ping`
Troubleshooting Internet Problems with Windows TCP/IP Utilities

Chapter 16

It's not uncommon for one packet of the four to be lost; when the Internet gets congested, sometimes ping packets are discarded as unimportant. If any come back, the intervening networks are working. It's also not unusual for the name that appears after “Pinging” to be different from what you typed. Some computers have alternative names.

ping is a great quick test of connectivity to any location. If the ping test fails, use tracert or pathping to tell you where the problem is. ping is a good, quick tool to use to discover whether an Internet site is alive. (However, some large companies have made their servers not respond to ping tests. For example, ping www.microsoft.com doesn’t work ever, even with a good Internet connection. It’s not just that Microsoft got tired of being the first site everyone thought of to test their Internet connections; malicious people also can use ping to suck up all of a company’s Internet bandwidth.)

tracert

tracert is similar to ping: It sends packets to a remote host and sees whether packets return. However, tracert adds a wrinkle: It checks the connectivity to each individual router in the path between you and the remote host. (Routers are the devices that connect one network to another. The Internet itself is the conglomeration of a few million networks all connected by routers.) If your computer and Internet connection are working but you still can’t reach some or all Internet sites, tracert can help you find the blockage.

In the output of tracert, the address it tests first is your local network’s gateway (if you connect to the Internet via a high-speed connection or a LAN) or the modem-answering equipment at your
Troubleshooting Your Internet Connection

ISP's office (if you're using a dial-up connection). If this first address responds, you know that your modem, LAN, or broadband connection is working. If the connection stops after two or three routers, the problem is in your ISP's network. If the problem occurs farther out, there might be an Internet outage somewhere else in the country.

Here's an example that shows the route between my network and the fictitious web server www.fictitious.net. Typing

C:\> tracert www.fictitious.net
returns the following:

Tracing route to www.fictitious.com [204.179.107.3]
over a maximum of 30 hops:
1  <10 ms  <10 ms  <10 ms  190.mycompany.com [202.201.200.190]
2  <10 ms  <10 ms  10 ms  129.mycompany.com [202.201.200.129]
3  20 ms  20 ms  20 ms  w001.z216112073.sjc-ca.dsl.cnc.net [216.112.73.1]
4  10 ms  10 ms  10 ms  206.83.66.153
5  10 ms  10 ms  10 ms  rt001f0001.sjc-ca.concentric.net [206.83.90.161]
6  10 ms  20 ms  20 ms  us-ca-sjc-core2-f5-0.rtr.concentric.net [205.158.11.133]
7  10 ms  20 ms  10 ms  us-ca-sjc-core1-g4-0-0.rtr.concentric.net [205.158.10.2]
8  10 ms  20 ms  20 ms  us-ca-pa-core1-a9-0d1.rtr.concentric.net [205.158.11.14]
9  10 ms  20 ms  20 ms  ATM2-0-0.br2.pao1.ALTER.NET [137.39.23.189]
10 10 ms  20 ms  20 ms  125.ATM3-0.XR1.PAO1.ALTER.NET [152.63.49.170]
11 10 ms  20 ms  20 ms  289.at-1-0-0.Xr3.SCL1.ALTER.NET [152.63.49.98]
12 20 ms  20 ms  20 ms  295.ATM8-0-0.GW2.SCL1.ALTER.NET [152.63.48.113]
13 20 ms  20 ms  20 ms  2250-gw.customer.ALTER.NET [157.130.193.14]
14 41 ms  30 ms  20 ms  www.fictitious.com [204.179.107.3]
Trace complete.

You can see that between my computer and this web server, data passes through 13 intermediate routers owned by two ISPs.

I should point out a couple of tracert oddities. First, notice in the example that on the command line I typed www.fictitious.net, but tracert printed www.fictitious.com. That's not unusual. Web servers sometimes have alternative names. tracert starts with a reverse name lookup to find the canonical (primary) name for a given IP address.

You might run into another glitch as well. For security reasons, many organizations use firewall software or devices, which block tracert packets at the firewall between their LAN and the Internet. In these instances, tracert will never reach its intended destination, even when regular communications are working correctly. Instead, you'll see an endless list that looks similar to this:

14    *    *    *    Request timed out.
15    *    *    *    Request timed out.
16    *    *    *    Request timed out.

As I mentioned at the start of the chapter, when your Internet connection is working, run tracert to trace the path between your computer and a few Internet hosts. Print and save the listings. Someday when you're having Internet problems, you can use these listings as a baseline reference. It's very helpful to know whether packets are stopping in your LAN, in your ISP's network, or beyond when you pick up the phone to yell about it.
This continues up to the `tracert` limit of 30 probes. If this happens, just press Ctrl+C to cancel the test. If `tracert` could reach routers outside your own LAN or PC, your equipment and Internet connection are fine—and that’s all you can directly control.

**pathping**

`pathping` provides the function of `tracert` and adds a more intensive network traffic test. `pathping` performs the route-tracing function faster than `tracert` because it sends only one test packet per hop, compared to `tracert`’s three.

After determining the route, `pathping` does a punishing test of network traffic at each router by sending 100 `ping` packets to each router in the path between you and the host you’re testing. It measures the number of lost packets and the average round-trip time for each hop, and it displays the results in a table.

The results tell you which routers are experiencing congestion because they cannot return every echo packet they’re sent, and they might take some time to do it. Performing the `pathping` test can take quite awhile. Fortunately, you can cancel the test by pressing Ctrl+C, or you can specify command-line options to shorten the test. A reasonably quick test of the path to a site—say, `www.quepublishing.com`—can be performed using just 10 queries, instead of the default 100, by using this command:

```
pathping -q 10 www.quepublishing.com
```

You can type

```
pathping /?
```

to get a full description of the command-line options.

**route**

Most of us have no more than one modem or one LAN adapter through which we make our Internet and other network connections, but Windows networking components are sophisticated enough to handle multiple LAN and dial-up adapters in one computer. When multiple connections are made, Windows has to know which connections to use to speak with another remote computer. For the TCP/IP or Internet Protocol (IP) data, this information comes from the routing table. This table stores lists of IP addresses and subnets (blocks of IP addresses) and also indicates which adapter (or interface) Windows used to reach each of them.

Now, this is getting into some hardcore networking that only a few readers will be interested in. Please don’t think that you need to know about this tool; there will be no quiz next Friday. I’m discussing this only to cover the details for those few people who have a complex network setup and need to know how to go to this information. You don’t have to worry about routing unless one of the following scenarios is true:

- You use a dial-up connection and a LAN adapter simultaneously.
- You use multiple LAN adapters.
- You use virtual private networking (VPN) connections, as discussed in Chapter 35, “Hitting the Road.”
If you have trouble reaching an Internet destination and fall into any of these three categories, type `route print` at the command line. You’re shown a table that looks similar to this:

```
===========================================================================
Interface List
10 ...00 03 ff d0 ca 5f ...... Intel 21140-Based PCI Fast Ethernet Adapter
1 ........................... Software Loopback Interface 1
13 ...00 00 00 00 00 00 e0 isatap.{3C3E0C23-191B-4E11-9713-970239EA2995}
11 ...02 00 54 55 4e 01 ...... Teredo Tunneling Pseudo-Interface
===========================================================================
IPv4 Route Table
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
0.0.0.0          0.0.0.0     192.168.15.1   192.168.15.106    20
127.0.0.0        255.0.0.0         On-link         127.0.0.1    306
127.0.0.1  255.255.255.255         On-link         127.0.0.1    306
127.255.255.255  255.255.255.255         On-link         127.0.0.1    306
192.168.15.0    255.255.255.0         On-link    192.168.15.106    276
192.168.15.106  255.255.255.255         On-link    192.168.15.106    276
192.168.15.255  255.255.255.255         On-link    192.168.15.106    276
224.0.0.0        240.0.0.0         On-link         127.0.0.1    306
224.0.0.0        240.0.0.0         On-link    192.168.15.106    276
255.255.255.255  255.255.255.255         On-link    192.168.15.106    276
===========================================================================
Persistent Routes:
None
IPv6 Route Table
...
```

(You can ignore the IPv6 section for now.)

There's a lot of information here, but for our purpose, we can boil it down to this: The entry for network destination 0.0.0.0 is the effective gateway address for general Internet destinations. This can be different from your LAN’s specified default gateway, especially while a dial-up or VPN connection is active. That, in turn, might mean that you can’t get to the Internet. If you have multiple LAN adapters, the issues are more complicated. Contact your network administrator for assistance.

⚠️ If the gateway address is incorrect after you’ve made a dial-up connection, see “Routing Issues,” p. xxx. (Chapter 35)
Third-Party Utilities

In addition to the utilities provided with Windows, you can use some third-party tools to help diagnose your connection and gather Internet information. I describe three web-based utilities and one commercial software package.

Speed Check

Ever wondered how to find the real-world transfer rate of your Internet connection? Intel Corporation has a nifty web-based program to measure transfer speeds using an Adobe (formerly Shockwave) Flash applet. Check out www.intel.com/Consumer/Game/broadband-speed-test.htm. (Every time I put this URL into print, Intel seems to feel the need to change it. If you get a “Page not found” error, search the Intel site for “broadband speed test.”)

You can find other speed test sites at www.dslreports.com. Click Tools and then Speed Tests.

whois Database

Anyone registering an Internet domain name is required to file contact information with a domain registry. This is public information, and you can use it to find out how to contact the owners of a domain whose customers have sent spam mail or with whom you have other concerns.

Finding the registrar for a given domain name can be cumbersome. You can find the registrar information for any .aero, .arpa, .biz, .com, .coop, .edu, .info, .int, .museum, .net, or .org domain via the following web page: www.internic.net/whois.html.

The search results from this page indicate the URL of the whois lookup page for the associated domain registrar. Enter the domain name again on that page, and you should see the contact information.

It’s a bit harder to find the registrar associated with two-letter country code domains ending in, for example, .au, .de, .it, and so on. The InterNIC site recommends searching through www.uwhois.com.

You can find the owner of an IP address through a similar lookup at www.arin.net/whois. Enter an IP address to find the owner of the block of IP addresses from which the specific address was allocated. This is usually an ISP or, in some cases, an organization that has had IP addresses assigned to it directly. You might have to visit www.apnic.net or another registry.

Reverse tracert

As I discussed earlier, the tracert program investigates the path that data you send through the Internet takes to reach another location. Interestingly, data coming back to you can take a different path, depending on the way your ISP has set up its own internal network.

It’s handy to know the path data takes coming to you. If you record this information while your Internet connection is working and subsequently run into trouble, you can have a friend perform a tracert to you. (You need to give him your IP address, which you can find using the ipconfig
Troubleshooting Your Internet Connection

command.) If the results differ, you might be able to tell whether the problem is with your computer, your ISP, or the Internet.

You can visit www.traceroute.org for a list of hundreds of web servers that can perform a traceroute test from their site to you. Don’t be surprised if the test results take a while to appear; these tests typically take a minute or longer.

**WS_Ping Pro Pack**

If you want to be well equipped to handle Internet and general networking problems, you can buy third-party utilities that are much easier to use than the standard ones built into Windows. I like WS_Ping ProPack from Ipswitch Software (www.ipswitch.com). This one utility packs almost all the TCP/IP tools into one graphical interface and adds other features such as whois for domain-registration lookups, SNMP probing, and network scanning. The program can be used for free for 30 days, after which the registration fee is $44.95 for a single-user license. I rarely use third-party add-ons such as this, but this particular program is on my “must have” list.