Discovering the Internet

Brief Concepts and Techniques
Third Edition

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COURSE TECHNOLOGY
CENGAGE Learning™

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Introduction

Internet. E-mail. Web. Twitter. RSS. Facebook. Whether you are an experienced Internet user or you have never accessed the Internet, you most likely have heard these terms. Over the past decade, such language has rocketed into common use, as new technologies change the way people communicate and collaborate with others, access information, or purchase products and services.

In this chapter, you will learn the precise meaning of these and several other Internet-related terms and discover the many ways the Internet is used. You also will review the history of the Internet and learn how the Internet is managed today. Finally, you will learn how individuals and businesses connect to the Internet.

Objectives

After completing this chapter, you will be able to:

1. Define the Internet

2. Describe how the Internet is used

3. Discuss the history of the Internet and the World Wide Web

4. Describe how individuals and businesses connect to the Internet

Figure 1-1   The Internet is a worldwide network of computers that allows individual and business users around the world to share information and other resources and to conduct business transactions.

Defining the Internet

The **Internet** is a worldwide network of computers that allows individual and business users of computers around the world to share information and other resources and to conduct business transactions. More specifically, the Internet is an interconnected network of networks, where each **host** — a computer directly connected to the Internet — has a number of other computers connected to it (Figure 1-1). When an Internet user connects to the Internet to access information and services, the user is considered to be **online**.

The Internet works because different types of computers and mobile devices — from personal computers used at home and in the office to supercomputers used by government and researchers to smartphones used by students — share a common method of communicating known as a protocol. A **protocol** is a standard or set of rules that computer network devices follow when transmitting and receiving data. Every computer connected to the Internet uses the **Transmission Control Protocol/Internet Protocol** (**TCP/IP**). TCP/IP makes it possible for different types of computers using a variety of operating systems to communicate. Wireless devices, such as smartphones, use wireless protocols that work in conjunction with TCP/IP. You will learn more about TCP/IP and other Internet technologies in later chapters.

Internet communications are transmitted across high-speed fiber-optic networks that connect other networks around the world. These high-speed networks, which
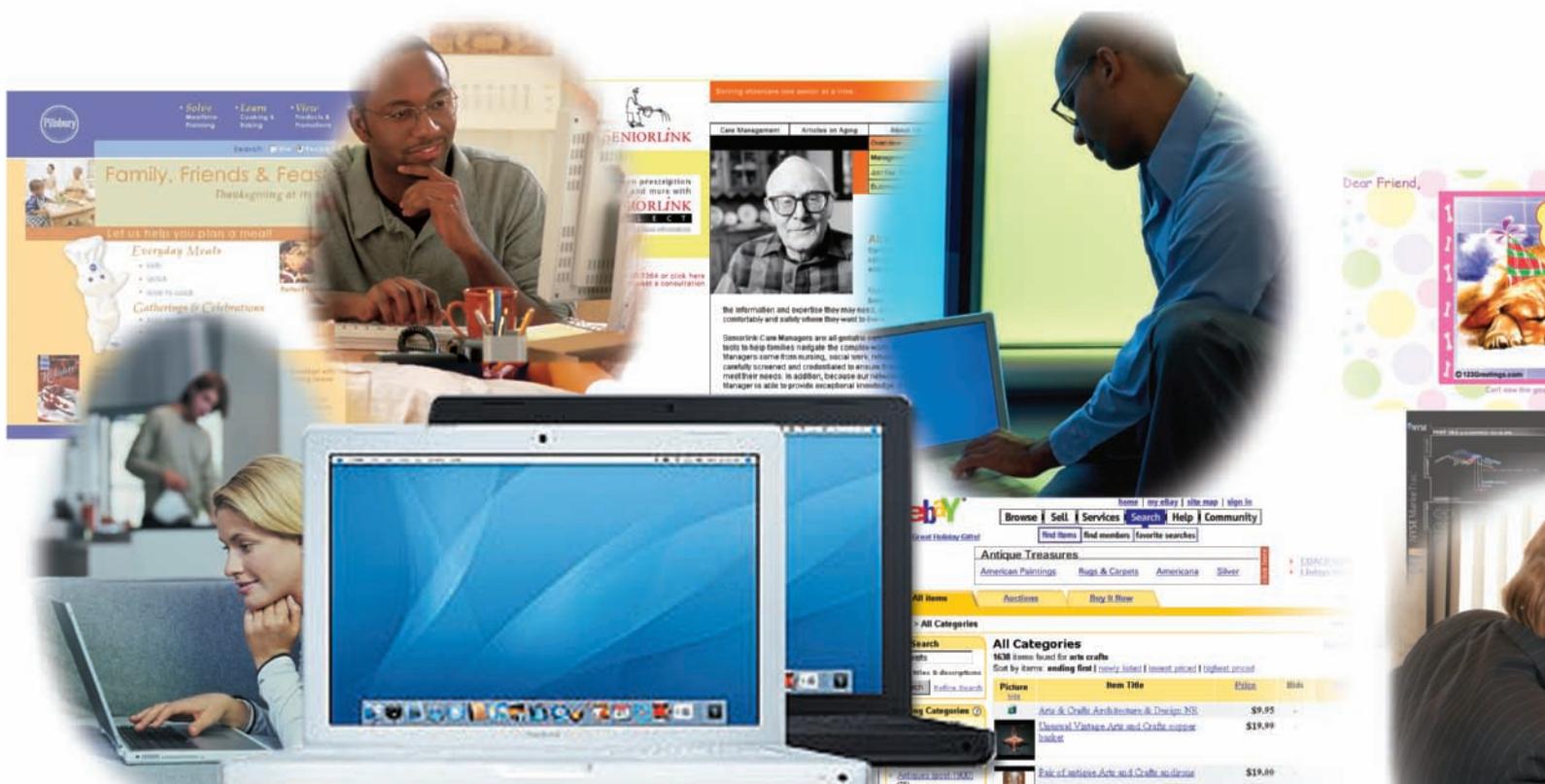
provide the Internet framework, are operated by a number of communication carriers, including AT&T, Verizon, XO Communications, and Qwest in the United States; Global TeleSystems and British Telecommunications (BT) in Europe; and Telstra and CERNET in Asia.

Although these communication carriers play an important role, they do not control the Internet. In fact, no single organization owns or controls the Internet. Several groups, such as the Internet Corporation for Assigned Names and Numbers (ICANN), Internet Assigned Numbers Authority (IANA), and the Internet Society (ISOC), work to oversee and standardize the development of Internet technologies and manage some Internet processes.

Using the Internet

Without a doubt, the Internet has profoundly changed nearly every aspect of life. For example, the Internet has revolutionized the way people access information for personal or business use; the way individual shoppers or commercial buyers purchase products and services; the way students do their school work; and the way people communicate with friends, family, colleagues, and others. Additionally, the Internet also overwhelmingly has changed the way businesses interact with their customers, vendors, and business partners (Figure 1-2).

Who Uses the Internet?

Students, businesspeople, professionals, homemakers, retirees — people in all occupations and stages of life — find that using the Internet enhances their world. For example, students often rush home from school to play online games or interact with

Figure 1-2 People use the Internet for many different purposes.

their friends at social networking sites. Colleges and universities use the Internet to host online classes, and instructors use the Internet to find scholarly articles and data for their research, make instructional material available outside class time, post grades, and publish electronic class announcements.

Individuals of all ages use the Internet to search for information on almost any topic — entertainment, sports, politics, science, art, history, and so forth. For example, medical professionals use the Internet to research new drugs, current treatments, and trends in medical practice. Students use the Internet to find information on assigned topics.

> **FACTS @HAND**
>
> Data gathered by Nielsen//NetRatings and reported at Internetworldstats.com indicate there are more than 220 million U.S. Internet users.

@SOURCE

For more information about blogging and microblogging, visit the *Discovering the Internet, Third Edition* @Source Web page (**scsite.com/internet3e/ source**) and click a link below Chapter 1, Blogging and Microblogging. (Note: you will learn the skills to access these Web pages in Chapter 2.)

Adults with similar interests or hobbies interact and exchange information by participating in online discussions. Consumers shop online, pay bills, reconcile bank statements, and even complete and submit their taxes online. Senior citizens use the Internet to keep in contact with family and friends. People also use the Internet to publish their résumés, photos, or travel journals. Some enjoy publishing an online diary, known as a **weblog** or **blog**, or post their comments to blogs published by others, such as news organizations. Some members of the U.S. Congress and Senate keep their constituents updated by **microblogging**, sending brief text messages throughout the day to interested subscribers.

Businesspeople and professionals use the Internet to communicate with clients and colleagues whether at home or on the road, work on office computers from their laptops while traveling, view up-to-the-minute business news, and check stock prices. New uses of the Internet are evolving continually, making the Internet increasingly valuable to individuals and businesses.

Internet Activities

The Internet supports a wide range of activities, including:

• Browsing and searching for information on the World Wide Web

• Communicating with others through e-mail, chat, instant messaging, Web-based discussion groups, newsgroups, mailing lists, blogs, and other social media

• Downloading and uploading files

• Logging on to remote computers

• Conducting business activities

The following sections define and describe each of these activities.

THE WORLD WIDE WEB   The **World Wide Web**, commonly called the **Web**, is a subset of the Internet that supports a vast collection of documents that combine text with pictures, sound, and even animation and video. These documents, called **Web pages**, are grouped in Web sites all over the world. A **Web site**, or **site**, is a collection of related Web pages

managed by an individual or organization. Web site examples (Figure 1-3) include college and university Web sites, such as the Rice University site; corporate Web sites, such as the Cengage site; Web sites that sell products or services, such as the Avon site; Web sites for nonprofit organizations, such as the United Way site; and personal Web sites.

Figure 1-3   Web sites include college and university, corporate, retail, nonprofit, and personal sites.

Web pages are created using codes or tags that define the layout and/or content of the pages; the codes or tags are often part of the **Hypertext Markup Language** (**HTML**) or the **Extensible Hypertext Markup Language** (**XHTML**). A Web page can be created by typing HTML or XHTML tags and other related information in a simple text editor program, such as Notepad. Today, however, most Web pages are created with **Web authoring software**, such as Adobe Systems Dreamweaver or Microsoft Expression Web 2, which automatically generate the appropriate HTML or XHTML tags as the user creates the page using a familiar user interface containing menus and toolbar buttons. After a Web page is created, it must be uploaded, or **published**, to a Web server so that others may access it. A **Web server** is a computer on which Web pages are stored.

To access and view Web pages, you use a software program called a **Web browser**, or **browser**. Popular browsers include Internet Explorer, Firefox, Opera, Flock, Avant,

Google Chrome, and Safari. The illustrations in this book use the Windows Internet Explorer v. 8.0 browser. You can learn more about other browsers in Appendix A.

A Web page is connected to other Web pages by hyperlinks. A **hyperlink**, or **link**, is text or a picture on a Web page that you click with the mouse pointer to view a different location in the same Web page, another Web page at the same Web site, or a Web page at a different Web site (Figure 1-4).
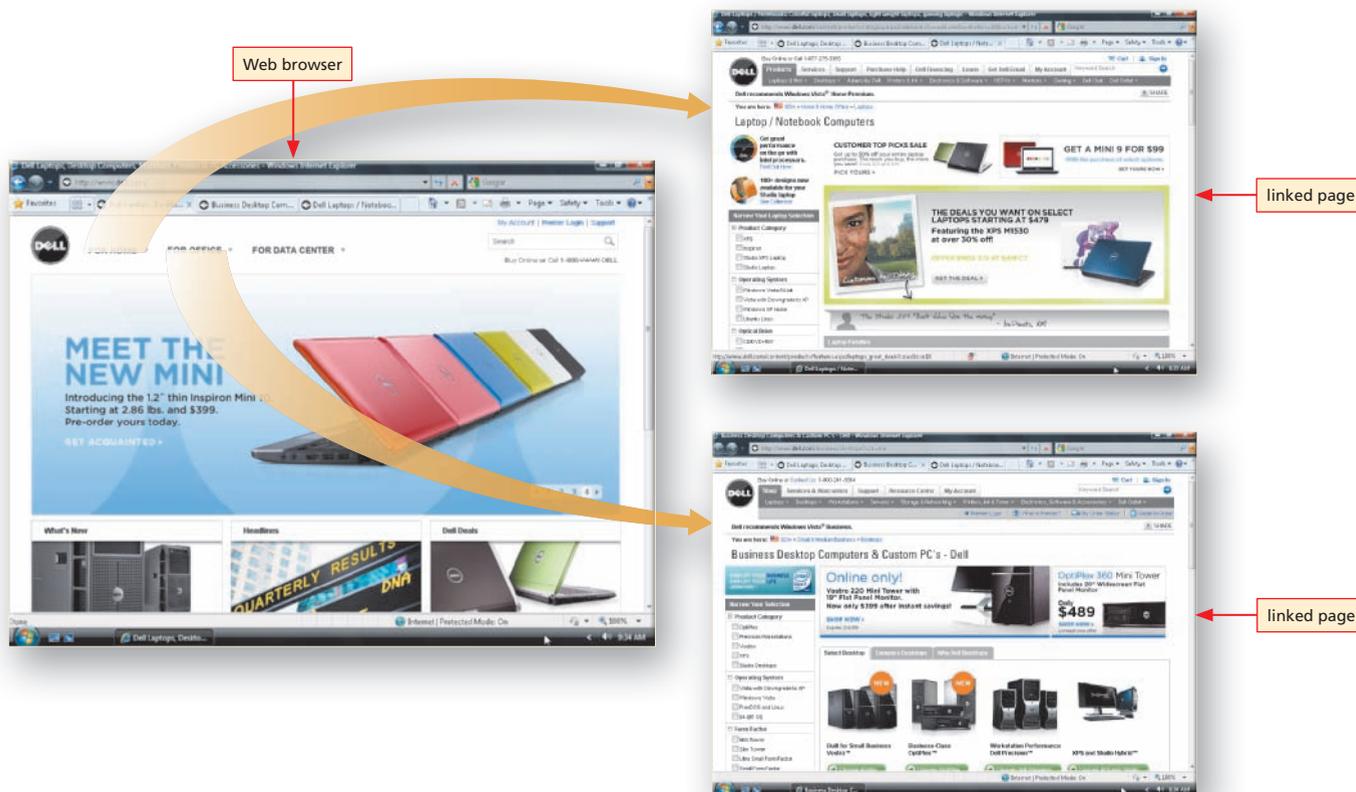
Figure 1-4   A hyperlink is Web page text or a picture that you click with the mouse pointer to view a different location in the same Web page, another Web page at the same Web site, or a Web page at a different Web site.

Exploring the Web by clicking links from one Web page to another sometimes is called **browsing** or **surfing** the Web. For example, when planning a trip, you might first visit an airline Web page and book a flight; then click a link on the airline page to visit a hotel Web page and book your accommodations; and, finally, click a link on the hotel page to view a page containing yet more links to restaurants and entertainment venues near the hotel. In other circumstances, you might simply click from page to page in a more undirected way to learn what kind of information is available at different Web sites. With little effort, you can spend a great deal of time browsing the Web. In Chapter 2, Browsing the Web, you will learn how to use a Web browser to access Web pages and how to click hyperlinks to view other Web pages.

A **search tool** is a Web-based resource that helps you find specific information on the Web. One type of search tool is a search engine, such as Google, which is used to search for Web pages that contain specific keywords or phrases. Another type of search tool is a directory, such as DMOZ Open Directory Project, which maintains a searchable index by category. Figure 1-5 illustrates a Google search results page and a DMOZ directory page. You will learn how to use Google, DMOZ Open Directory Project, and other search tools in Chapter 3, Searching the Web.
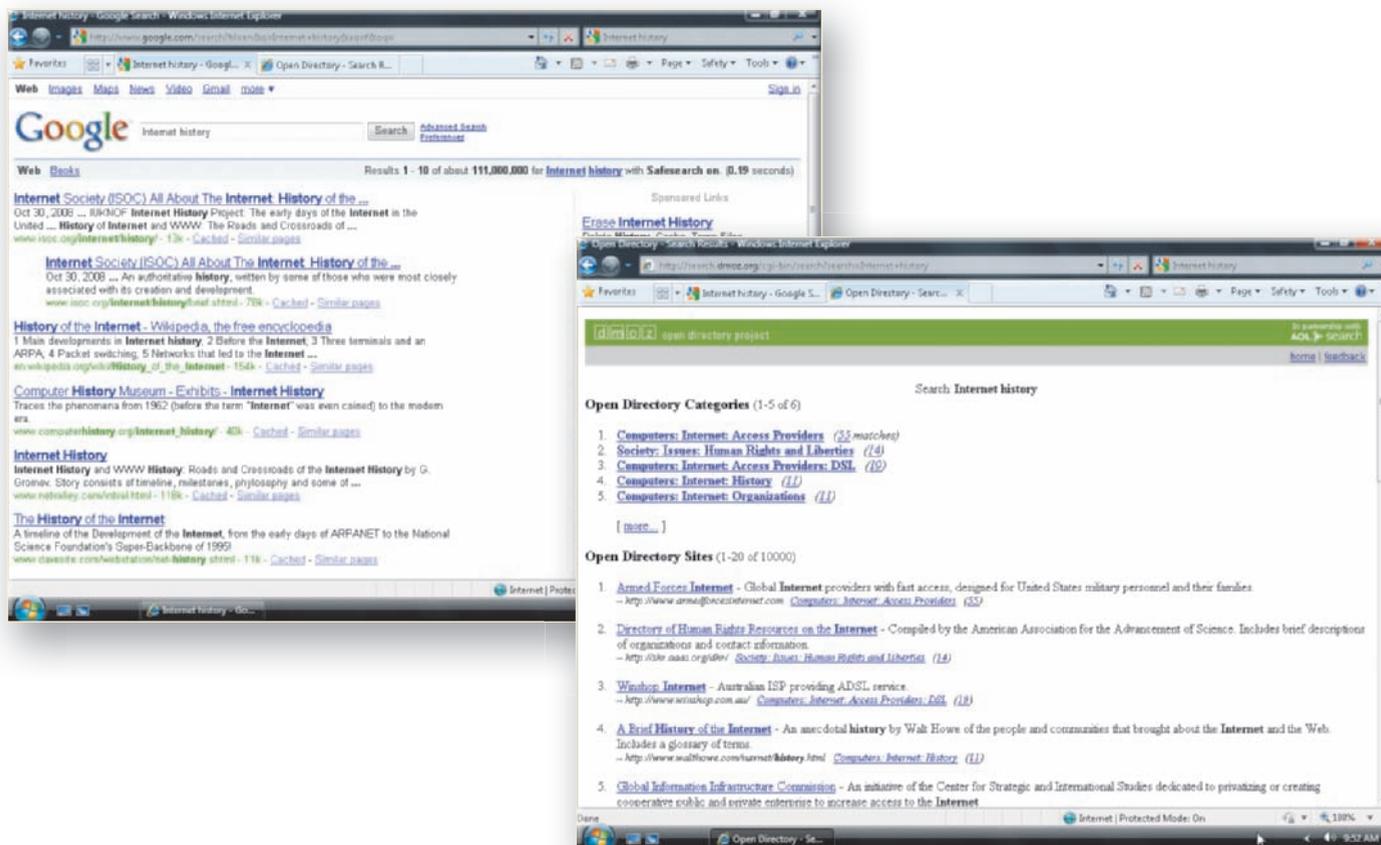
Figure 1-5 Search tools allow users to find information on the Web.

Just as no single entity controls the Internet, no single entity controls the Web, although some organizations, such as the **World Wide Web Consortium** (**W3C**), support the Web by developing and promoting Web technologies and standards.

E-MAIL AND OTHER COMMUNICATIONS TOOLS **E-mail**, short for **electronic mail**, allows Internet users to send and receive messages and files over a local computer network or the Internet. One of the most popular Internet activities, e-mail offers several advantages over other means of communication, such as sending letters or making telephone calls. Sending an e-mail message is less expensive and faster than regular mail or express delivery services, such as UPS and FedEx. E-mail also can be more convenient than making a telephone call, especially to others in different time zones around the world. You can send e-mail when it is convenient for you, and the recipient can read it and respond when it is convenient for him or her. You use an **e-mail program**, such as Windows Mail, Microsoft Outlook, or Mozilla Thunderbird, or Web-based e-mail, such as Gmail or Yahoo! Mail, to create, send, receive, and manage e-mail.

In addition to e-mail, the Internet offers several other ways for individuals and groups to communicate (Figure 1-6 on the next page). These communications tools allow

Internet users to connect with others online to converse about a topic or activity of interest, share information, conduct business, and play. You will learn more about e-mail and other online communications tools, including various online tools categorized as social media, in Chapter 4, Communicating Online.

Internet Communication Methods		
Online Communication	**Description**	**Must users be online at the same time?**
E-mail	Users send and receive text with or without attached files	No
Instant messaging (IM)	Two or more users take turns exchanging brief messages	Yes
Internet Relay Chat (IRC) or chatting	Users type text into a chat window; all users can see what other users type	Yes
Newsgroups and mailing lists	Users subscribe to a newsgroup discussion or mailing list on a certain topic and receive messages about that topic	No
Social media	Users share information, photos, links, and personal commentary using a variety of online tools	No

Figure 1-6   The Internet offers several ways for people to communicate.

FACTS @HAND   Perhaps the first person to send an e-mail message who was not a computer scientist was Queen Elizabeth II, who sent an e-mail message on March 26, 1976 from an Army base.

Figure 1-7   FTP is used to download and upload files.
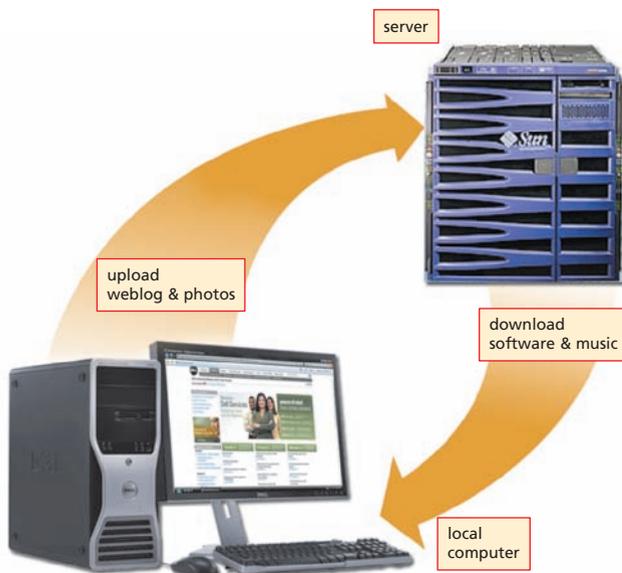
DOWNLOADING AND UPLOADING FILES   One of the most useful Internet activities is downloading files from a server or uploading files to a server. A **server** is a computer on a network used to store files. As you learned earlier, a Web server stores Web pages. Other server examples are a mail server that stores e-mail messages and a file server that stores electronic files. To **download** is to copy or transfer files from a server to your computer; to **upload** is to copy, post, or transfer files from your computer to a server (Figure 1-7). The Internet standard or protocol that allows you to download from or upload files to a server connected to the Internet is the **File Transfer Protocol** (**FTP**). Music, software, word processing, picture, and other files can be downloaded or uploaded using FTP.

LOGGING ON TO A REMOTE COMPUTER

Telnet is the standard or protocol that allows users to log in and to use the processing power of a remote computer. While the public typically does not use Telnet, it still has many valuable uses. Computer system administrators, for example, can use Telnet to log in to a remote computer to troubleshoot problems, and researchers use Telnet to employ the computing power of supercomputers at distant institutions.

CONDUCTING BUSINESS ACTIVITIES

Businesses and organizations that use the Internet to generate a profit or to maintain goodwill with their partners, members, or customers are engaged in **e-business**. E-business, also called **e-commerce**, can take the form of electronically transmitting financial transactions, such as placing orders, sending invoices, or paying by credit card online. E-business also includes the functions of supporting and enhancing business relationships by sharing information with customers, suppliers, and employees.

E-business can take a variety of forms or models (Figure 1-8). When a consumer uses the Internet to interact with an online business, the e-business model being followed is **business-to-consumer** (**B2C**). Customers checking airfares on Southwest Airlines' Web site or tracking packages on the UPS Web site are examples of B2C e-business in action. When one business uses the Internet to purchase goods and services or complete other transactions with another business, the e-business model being followed is **business-to-business** (**B2B**). An example of a B2B activity is when a company's purchasing manager goes online to

Figure 1-8 E-business models can be classified by the parties involved in the transaction.

buy materials using a vendor's Web site. An organization might also use the Internet for **business-to-employee** (**B2E**) functions, such as connecting its employees to its Human Resources system. Finally, when a consumer uses the Internet to conduct business with another consumer, the e-business model being followed is **consumer-to-consumer** (**C2C**). A collector purchasing a collectible item from another individual through an auction site is an example of C2C e-business activity.

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The Dark Side of the Internet

In addition to its many valuable uses, the Internet also has a dark side. The qualities that make the Internet and the Web so powerful also make them vulnerable to misuse. Because anyone can publish Web pages and make his or her page content appear credible, even ideas that may be illegitimate, biased, or unfounded may garner a huge audience.

The vast informational resources of the Web also include adult-oriented Web sites and hate sites. Adults and children may stumble across them or other Web pages with objectionable material. The ease of communicating over the Internet also makes it easy for destructive computer programs to spread quickly and widely. The anonymity provided by the Internet makes it possible for criminals to steal credit card numbers, break into computers, engage in identity theft, or frighten others by **cyberstalking**, which is using threatening or harassing behavior over the Internet.

For more information on the dark side of the Internet, visit the *Discovering the Internet, Third Edition* @Issue Web page (scsite.com/internet3e/issue) and click a link below Chapter 1, The Dark Side of the Internet.

History of the Internet

Although the Internet and the Web are based on relatively new technologies, millions of people now consider both to be indispensable. In this section, you will learn about the origins of the Internet and the Web and the factors that spurred their growth.

Origins in ARPANET

The Internet traces its origins to the early 1960s, when several seemingly unrelated circumstances led to the development of the world's first computer network. The development of this network resulted from a collaboration among academia, industry, and government.

In the early 1960s, computers had been used for only a few years, and not by the general public. Roughly 10,000 computers existed, many of which were mainframes used by the U.S. government to perform specific, mission-critical work for the Census Bureau, the Pentagon, and other government agencies.

The Soviet Union's 1958 success in launching Sputnik, the first space satellite, fueled concerns that the United States was falling behind its Cold War competitors in the realm of science and technology. Furthermore, the U.S. government was concerned that existing computer systems were vulnerable to nuclear attack. The government decided that, for the sake of national security, it was important to connect computers so they could distribute computing power and data to more than one location, rather than having them centralized and thus vulnerable to attack.

The U.S. government initiated a push for scientific advances and charged the Department of Defense (DoD) with creating the **Advanced Research Projects Agency** (**ARPA**). In 1962, J.C.R. Licklider, formerly of the Massachusetts Institute of Technology (MIT), was appointed to head up ARPA's computer and information processing research efforts. Licklider wrote a series of memos outlining his vision of a Galactic Network of interconnected computers, wherein users could share data and resources from around the world. His memos were the first published references to the idea of the Internet as it is now known.

In the early 1960s, the telephone system's vast network of cabling covered all parts of the United States. Telephone systems work by using a technology known as circuit switching. **Circuit switching** allows a caller to dial a number to establish and maintain a private circuit across the wires from the time the receiver is lifted until one of the parties hangs up. At the time, circuit switching seemed to be the only method to connect two or more remote computers and exchange data.

In 1961, Leonard Kleinrock (Figure 1-9), a scholar at the University of California, Los Angeles (UCLA), wrote his doctoral dissertation and outlined the idea of data networking and packet switching, in contrast to circuit switching. Instead of sending data in a continuous stream over a dedicated circuit like a telephone company does, **packet switching** involves separating data from a sending computer into small units known as **packets**, sending each packet independently over cables, and then reassembling the packets on the receiving computer. Each packet can even follow different routes to its destination. According to Kleinrock, packet switching would make the network more robust and less vulnerable to attack because the data would move in individual packets over different routes, rather than over a single dedicated connection.

Figure 1-9 Leonard Kleinrock, shown here with the first ARPANET node, helped to develop packet switching technology.

A brief experiment in 1965 connected a computer in Massachusetts to a computer in California. The experiment demonstrated two things: (1) that running programs and sharing data on a remote computer was feasible, and (2) that telephone circuits were too slow and unreliable to support data and resource sharing. Kleinrock convinced ARPA to use packet switching instead, and, in 1966, the effort to create the new network of computers, based on a plan developed by Lawrence G. Roberts at ARPA, was launched. The new network was named **ARPANET**.

With government funding, the ARPANET team began work in earnest. Because of Kleinrock's research, the team chose the computer at UCLA to be the first computer on ARPANET. The team then selected the computer at the Stanford Research Institute (SRI) in Menlo Park, California, headed by Douglas Engelbart, as the second. Next, the government awarded a contract to Bolt Beranek and Newman (BBN), a company in Cambridge, Massachusetts, to create the programming, design, and hardware for the refrigerator-sized switches called IMPs (Interface Message Processors) that would be used to send the packets of data.

@SOURCE

To learn more about Leonard Kleinrock and Douglas Engelbart, visit the *Discovering the Internet, Third Edition* @Source Web page (**scsite.com/internet3e/source**) and click a link below Chapter 1, Kleinrock and Engelbart.

On September 2, 1969, representatives from BBN delivered the first IMP to the UCLA lab. Too large to fit into the elevator, the IMP had to be hoisted through a window to the third-floor computer room. About 20 people from the government, the telephone company, and the university watched as a gray cable connected the mainframe to the IMP, and the packets flowed perfectly. Kleinrock said later, "We didn't think of this as a key event in any historical sense. We didn't even have a camera."

On October 29 of the same year, the second IMP was delivered to SRI and the connection was initiated over telephone lines. At UCLA, a student named Charley Kline began to log on, as Kleinrock watched. Kline typed the letters, L-O-G — and then the new network crashed. After a quick fix, the first packets were flowing from computer to computer.

By December 1969, the University of California Santa Barbara and the University of Utah joined the ARPANET network, making these four university connections the foundation of the global network known today as the Internet.

Growth and Development of ARPANET

As quickly as BBN could create the necessary hardware, more computers, or hosts, were connected to ARPANET. Thirteen research centers had joined ARPANET by the end of 1970. It grew steadily over the next 15 years, roughly doubling in size every year. The first international connections were made to England and Norway in 1973, and other nations came online in the late 1980s and early 1990s.

During those early years, programmers had to make constant changes to programs and hosts on the new network because no common communications protocol was in use. In 1972, Robert Kahn and Vinton Cerf (Figure 1-10) developed two new protocols for ARPANET, TCP and IP, which solved these and other problems. **Transmission Control Protocol (TCP)** provided flow control over the network and error checking for lost packets; **Internet Protocol (IP)** addressed and sent the packets. In 1983, DARPA mandated the use of this suite of communications protocols, referred to as TCP/IP. Since then, every computer and device connected to the Internet has been required to use TCP/IP to communicate.

Figure 1-10   Internet pioneers (from left) Vinton Cerf, Lawrence Roberts, Robert Kahn, and Tim Berners-Lee

Originally, researchers used ARPANET to log in to and use the computing power of remote computers and to share files. It was not long, however, before the network was used more significantly for interpersonal communication. In 1971, the first live computer-to-computer chat took place between Stanford University in California and BBN in Massachusetts. Late in 1971, Ray Tomlinson, a scientist at BBN (Figure 1-11), developed the first e-mail program that could send and receive messages to and from remote computers. He also devised the use of the @ symbol in e-mail addresses. E-mail instantly became popular among researchers as it allowed them to collaborate on the continual development of ARPANET. By 1973, e-mail composed 75 percent of the data traffic over ARPANET.

In 1975, the first mailing list, titled SF-Lovers, for science fiction fans, was created. A **mailing list** allows participants to send a single message to the list, which then automatically routes the message to every other participant.

Figure 1-11   Ray Tomlinson developed the first e-mail program.

Beyond Research, to the Public

Several factors led to the burgeoning growth of the new network. The academic community established networks, such as Usenet (1979) and BITNET (1981), that were open to all members of the academic community and were not restricted just to the computer science researchers involved in the Internet. Furthermore, with the introduction of the Apple II, Macintosh, and IBM PC computers, many more members of the general public began to use computers daily. Most people had no access to the Internet until 1979, when CompuServe first offered a subscription service for sending electronic mail (as it then was called). The following year, CompuServe also made real-time chat available to subscribers.

In 1985, the National Science Foundation (NSF) established a new network called NSFnet. NSFnet connected five regional supercomputer centers, at Princeton University; University of Pittsburgh; University of California, San Diego; University of Illinois; and Cornell University, using high-speed connections. In 1987, then-Senator Al Gore called for a national computer network for research, and sponsored a bill to fund the Internet to enhance the speed of the Internet **backbone**, the main long-distance lines and the hardware that connect computers to the Internet. By 1990, NSFnet superseded ARPANET as the main network linking universities and research facilities, and the military portion became a separate network called MILNET. When the NSFnet was opened to the entire academic community, the number of universities, K–12 schools, and community colleges connected to the Internet increased significantly.

Commercial activity on the NSFnet was prohibited by law until 1992, when the U.S. Congress changed the law to allow commercial activity over the network. From that point, commercial activity over the network exploded. In 1995, the NSF moved the connections from the original NSFnet backbone to a commercial Internet backbone supported by commercial network providers, such as MCI and AT&T. In the mid-1990s, the Internet became easier for people to use when the long series of numbers originally used to identify computer hosts were replaced with English-language names, such as scsite.com.

@SOURCE To learn more about the first network e-mail message, visit the *Discovering the Internet, Third Edition* @Source Web page (**scsite.com/internet3e/source**) and click a link below Chapter 1, The First E-Mail Message.

@SOURCE To learn more about the history of the Internet, visit the *Discovering the Internet, Third Edition* @Source Web page (**scsite.com/internet3e/source**) and click a link below Chapter 1, Internet History.

The Beginnings and Rise of the Web

Two additional events that occurred in the early 1990s were pivotal in the commercial explosion of the Internet. Paul Lindner and Mark McCahill, graduate students at the University of Minnesota, invented a new protocol to form a hierarchical directory-based system to deliver information across the Internet. They named the system **Gopher** after the university's mascot. For the first time, users could navigate easily through online text resources by clicking directory links to open folders and access files stored in those folders (Figure 1-12). Many universities quickly followed suit and created Gopher systems to catalog their online resources. A search engine soon was developed for finding documents stored on the numerous Gopher servers.
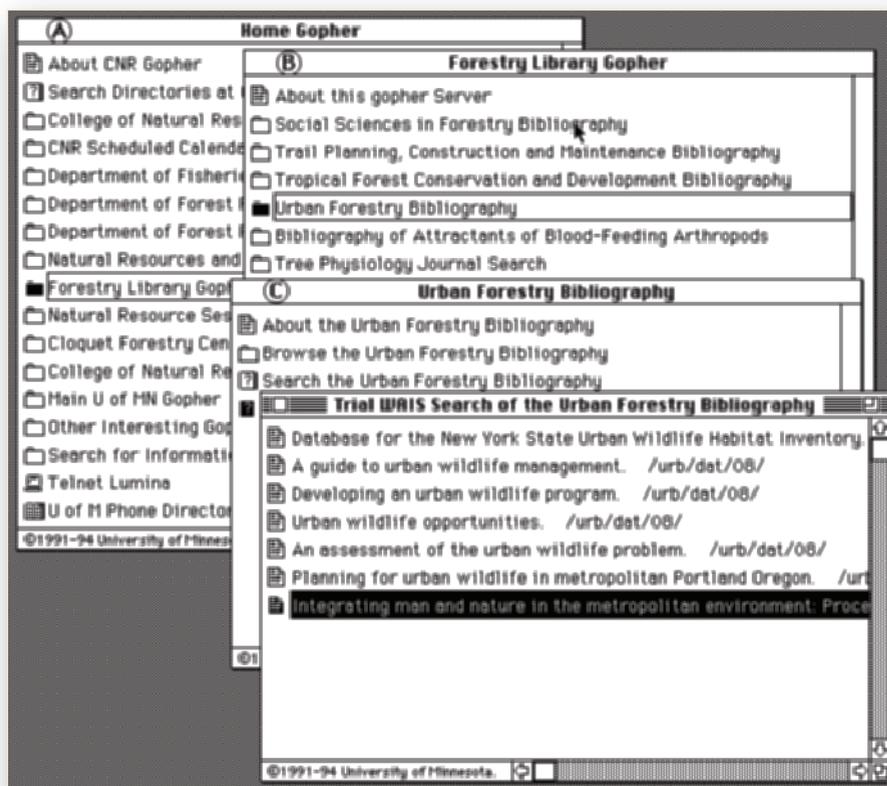
Figure 1-12   Gopher, a directory-based system, made it easier to find documents on servers connected to the Internet.
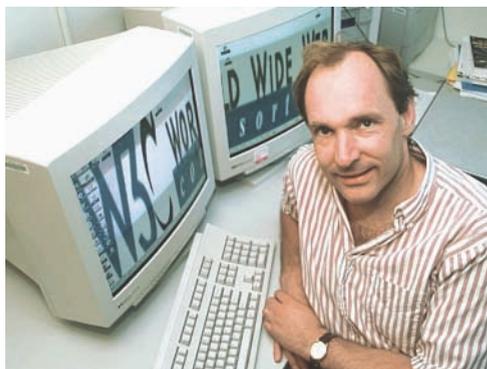
Figure 1-13   Tim Berners-Lee originated the World Wide Web.

During that same period, Tim Berners-Lee (Figure 1-13), who was working at CERN in Switzerland, envisioned the use of hyperlinks to make connections between related ideas in separate documents. **Hypertext**, which is a system of hyperlinks that allows users to click on a word to jump to another location within the same file, was already in use. Hypertext also allowed users to link to different files in the same location, but only when an index of the links was kept in a central database. Frustrated with these limitations, Berners-Lee visualized a system in which all of the various projects at CERN could cross-reference each other easily. He wrote a proposal outlining his vision, suggesting that hyperlinked resources not be restricted to text, but could include graphics, video, or other document elements.

With the help of his CERN colleague Robert Cailliau, Berners-Lee created three technologies to make his ideas about hyperlinked documents a reality. First, he created the Hypertext Markup Language (HTML), which is a markup language that is used to create a document whose layout and content — text, graphics, and links — can be read by a special software program. Berners-Lee then created the special software program, the first browser known as WorldWideWeb (spelled with no spaces), to provide a way to view the HTML documents. Finally, because document links had to refer to a specific server where the linked documents were stored, Berners-Lee devised a Web addressing system and the **Hypertext Transfer Protocol** (**HTTP**), a protocol that defines how HTML documents are transmitted to a browser. Figure 1-14 shows an early version of Berners-Lee's WorldWideWeb browser and HTML documents.

@SOURCE
To learn more about Tim Berners-Lee and the early development of the Web, visit the *Discovering the Internet, Third Edition* @Source Web page (**scsite.com/internet3e/ source**) and click a link below Chapter 1, Tim Berners-Lee.
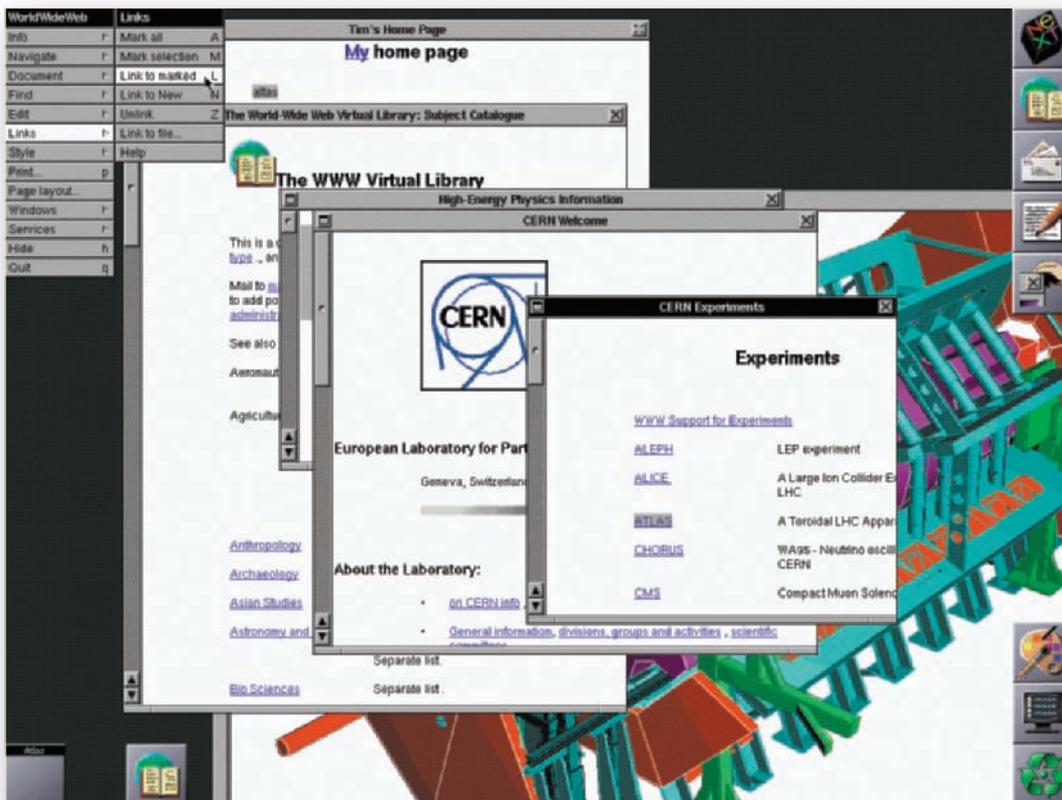
Figure 1-14   Berners-Lee's original WorldWideWeb browser and HTML documents.

Programmers began developing other browsers, but the most widely used at universities and colleges was Mosaic. The Mosaic browser was created in March 1993 by Marc Andreessen and Eric Bina, two University of Illinois graduate students employed at the university's National Center for Supercomputing Applications (NCSA). Mosaic was easy to install and use, and free to university faculty and students, so it instantly became popular.

The next year, with businesses clamoring for a browser to use, Andreessen broke ties with the University of Illinois, which claimed ownership of the Mosaic browser. He joined with Silicon Valley entrepreneur Jim Clark to found a new company, Netscape Communications. Over the summer of 1994 the company created the first commercial browser, called Netscape Navigator.

@SOURCE
To learn more about Marc Andreessen and his role in the early development of commercial Web browsers, visit the *Discovering the Internet, Third Edition* @Source Web page (**scsite.com/internet3e/ source**) and click a link below Chapter 1, Marc Andreessen.

By 1994, the Internet was growing exponentially. The growth largely was fueled by increased usage of the new World Wide Web. Commercial and individual Web sites proliferated, radio stations began broadcasting over the Internet, and companies posted the first banner ads and sent the first bulk advertising by e-mail, now called **spam**. By the end of 1994, the Web had approximately 10 million users. Today, there are almost two billion worldwide Internet users with access to the Web.

As commercial use of the Internet continued to grow, universities wanted to regain a high-speed network reserved specifically for research and education, much like the original Internet. In 1996, a new initiative called **Internet2 (I2)** was born. I2 is a collaboration among universities, government, and industry to develop advanced network technologies and new uses for the Internet. I2 and its Canadian counterpart, **CANARIE** (Figure 1-15), now have enlisted more than 200 universities to join with industry organizations and government agencies to collaborate on developing several new technologies: an ultra high-speed network, new streaming video technologies, an infrastructure for distributing the storage of Web resources closer to the user, and standardized software to enhance security and operation of the I2 network. While I2 is not available for general use, the results of its research eventually will affect the general population of Internet users.

@SOURCE

To learn more about Internet2 and CANARIE and the roles they play in the ongoing development of the Internet, visit the *Discovering the Internet, Third Edition* @Source Web page (**scsite.com/internet3e/source**) and click a link below Chapter 1, Internet2 and CANARIE.

Figure 1-15   Internet2 (I2) and its Canadian counterpart, CANARIE, are collaborations by universities, government, and industry to develop high-speed networking technologies.

Connecting to the Internet

To enjoy all the benefits that the Internet and the Web have to offer, individuals and businesses must first connect their computers to the Internet. Some individuals rely on organizations, such as libraries, schools, and businesses, to provide access to the Internet.

For example, most public libraries have Internet-connected computers that anyone can use. Most businesses of any size now provide an Internet connection so their employees can use e-mail and the Web to complete their tasks. College and university students generally have access to the Internet through campus networks and computer labs.

Libraries, schools, businesses, and other organizations typically connect their computers by cables into a **local area network** (**LAN**). A LAN connects computers within a building or campus so users can share data and resources, such as printers. When an organization connects its local area network directly to the Internet, all the computers on the local area network have access to the Internet. Increasingly, users can connect to the Internet wireless connections provided at airports, train stations, hotels, coffee shops, bookstores, and other businesses.

Internet Service Providers (ISPs)

A company that provides Internet access for homes and businesses is called an **Internet Service Provider** (**ISP**). Thousands of local, regional, and national ISPs (Figure 1-16) offer a wide variety of services. An individual or a business must weigh several considerations when choosing an ISP, including:

- The speed or bandwidth of the connection
- The type of connection and cost of service
- Availability of customer service and technical support

The speed of an Internet connection depends on **bandwidth**, which is the capacity of the communications channel. Just as the speed of travel depends on the capacity of a road — for example, whether the road is a multilane freeway or an unpaved road — the bandwidth of an Internet connection defines the amount of data that can be transmitted in a fixed amount of time.

@SOURCE To review various ISPs and learn more about Internet connection speeds, visit the *Discovering the Internet, Third Edition* @Source Web page (**scsite.com/internet3e/source**) and click a link below Chapter 1, Internet Connections.
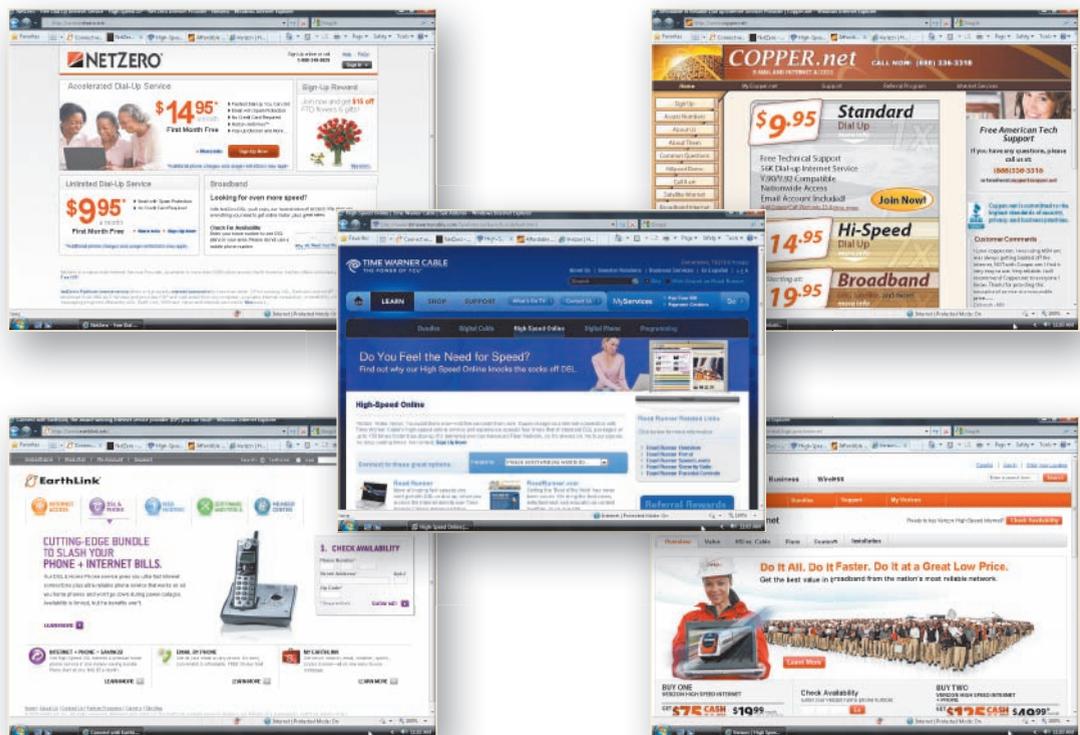
Figure 1-16 Thousands of local, regional, and national ISPs offer a variety of services.

The bandwidth of an Internet connection is measured in **bits per second** (**bps**). A **bit**, short for binary digit, is the smallest unit of electronic data. A bit is represented as the digit one (1) or zero (0), which is why computer processess are described using the term "digital." Thousands of bits flow each second, even over the slowest connection. Connection speeds can range from a thousand bits per second, called **kilobits per second** (**Kbps**), to a million bits per second, called **megabits per second** (**Mbps**), to a billion bits per second, called **gigabits per second** (**Gbps**).

As noted above, the speed of the transmission is just one factor to consider when choosing an ISP. You also need to consider how you will physically connect your computer to the Internet, whether through dial-up, DSL, cable, or wireless connections. Each of these Internet connection methods has advantages and disadvantages related to speed, cost, features, and convenience.

Many ISPs offer premium services, including a custom interface, exclusive content, e-mail, instant messaging, and space to store Web pages or photographs online. By contrast, a free ISP offers free Internet access with basic features, but requires users to view on-screen advertisements as they use the service. Between these two extremes are many other ISPs that offer simple packages with e-mail and Web page hosting services for a monthly fee.

Customer service and technical support offered by an ISP are always important factors and should be available 24 hours a day, seven days a week.

Connection Methods

Generally, local area networks are connected to an ISP through high-speed telephone lines or cable. A home computer is generally connected to an ISP using a telephone line or cable connection. Other connection methods include satellite, microwave, and wireless connections. In the following sections, you learn about different ways to connect to the Internet.

DIAL-UP   The method for connecting to an ISP using a regular telephone line is known as **dial-up access**. Dial-up access works just like a standard phone connection, except that the call connects computer devices rather than people. To use a dial-up connection, a computer must have a **modem**, which is a card or device that converts a computer's digital data to an analog signal that can be sent over telephone lines. The U.S. telephone system supports digital data, except for the short distance between the switching station and a customer's home, which often is called the last mile. Because the last mile is analog, a modem (Figure 1-17) still is required for dial-up access.

Dial-up comes in two types — regular dial-up and high-speed dial-up. Regular dial-up access is the slowest connection option. Its maximum speed is 56.6 Kbps, but connection speeds typically range from 33 to 45 Kbps. An ISP that offers **high-speed dial-up** services speeds up the authentication process between the user's computer and the ISP and then routes the user's request for services through an acceleration server. An **acceleration server** uses broadband connections out to Web servers and other technologies to more quickly "serve up" Web pages to the user's browser. High-speed dial-up services are relatively inexpensive and are advertised as connecting at five to six times faster than regular dial-up.

internal modem

notebook phone jack
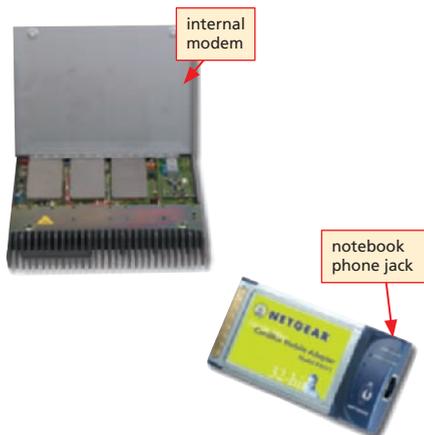
Figure 1-17   A modem is required for dial-up Internet access.

Another disadvantage to dial-up access is that you cannot use the telephone while the computer remains connected to the Internet. To get around this problem, you can install an additional telephone line so that you have a separate line designated for the computer. An alternative to a second line is Internet call management software that notifies you of an incoming call and offers several ways to handle the call, such as dropping the Internet connection or transferring the call to a different number. Also, it is possible to get a busy signal when trying to connect to the dial-up ISP if a significant number of customers are trying to connect during peak hours. A dial-up connection is considered a temporary connection because you must reconnect to the ISP each time you access the Internet. In the past, dial-up access was a common means of connecting to the Internet but has seen its popularity diminish as other methods become less expensive and more widely available.

DIGITAL SUBSCRIBER LINE (DSL)   A high-speed alternative to dial-up access is a **Digital Subscriber Line** (**DSL**). DSL is a sophisticated technology that condenses digital data and then sends it at high speeds over standard telephone wires. Just like dial-up, DSL uses existing telephone lines but requires a special type of modem, called a DSL modem. DSL comes in several variations; however, the DSL type used in most homes is ADSL, or asymmetric DSL, so called because it allows for faster data downloading than uploading.

The main advantage of ADSL is its fast speed, which is significantly faster than that of a dial-up connection. Using ADSL at download speeds ranging from 768 Kbps to 8 Mbps, Web pages appear quickly, and downloading music, software, and video is much faster than with a dial-up connection. ADSL uses **broadband** transmission, which means it divides the telephone wire into separate channels for sending data, receiving data, and transmitting voice calls. Because it is broadband, you can talk on the telephone while the computer is online. In contrast, **baseband** transmission, like dial-up access, allows only one channel to function at a time.

Another advantage to using ADSL is its dedicated connection. With a **dedicated connection**, the computer is always connected to the ISP and the Internet. Unlike dial-up access, there is no waiting while the computer dials up and there is no risk of getting a busy signal. A dedicated connection, however, also makes a computer more vulnerable to online intruders. For this reason, many ADSL services include a **firewall**, which is a security system that uses hardware and/or software to protect the computer from online intruders.

One ADSL disadvantage is lack of availability in some areas. ADSL is available only in areas close to the telephone company's local exchange, called the central office (CO). ADSL also is more costly than dial-up.

CABLE   Another high-speed Internet connection option is cable, which connects to the Internet using the same cable connection used by a cable television service. Cable access is a popular Internet connection option with many consumers who already have a cable television service in their homes. Cable access, like ADSL, provides a dedicated connection to achieve maximum speeds of about 5 Mbps.

Cable Internet connections require a coaxial cable, a **line splitter** that divides the television signals from the data signals, a cable modem, and a network expansion card inside the computer (Figure 1-18 on the next page). A **cable modem** is a particular type of modem used for high-speed cable connections.

Like ADSL, cable is asymmetric, meaning that it offers faster download speed than upload speed. Unlike ADSL, however, the Internet connection is made over a cable shared with others in the neighborhood. As more people get online, the shared connection has

Figure 1-18   Cable Internet access requires a line splitter and cable modem.

less bandwidth available and becomes slower for everyone. Two major companies providing cable Internet service are Time Warner and Comcast, although other local cable TV providers also might provide cable Internet service. Home service costs around $45 each month and might require an installation fee.

FACTS @HAND

According to research by the Pew Internet & American Life Project, more than 50 percent of all U.S. adults have broadband Internet access at home.

FIXED WIRELESS People who live in a rural area where neither ADSL nor cable service is offered must use a wireless connection to get high-speed Internet access. Wireless Internet access offers the additional benefit of having access to bandwidth that may not be limited by the capacity of the wires or cabling.

In a home or office, wireless Internet access is probably a **fixed wireless connection**, that is, a connection from a permanent, stationary location. Fixed wireless connections use microwaves to transmit data and require specialized outside equipment: an antenna and a small dish or receiver. Transceivers called **repeaters** relay data from the user to the service provider, called a **Wireless Internet Service Provider** (**WISP**). Microwave access depends on a rotating frequency of radio waves, and its speed ranges from 128 Kbps to 2 Mbps, depending on the traffic. While it is available in rural areas, microwave access is limited because the user's location must be within 35 miles of the microwave tower. Furthermore, the Internet user's location must have a clear line of sight to the microwave tower because mountains or tall buildings will interfere with the microwave signal (Figure 1-19).

Figure 1-19   Microwave Internet access must be within line of sight to prevent signal interference.

Satellite Internet access comes in two varieties: one-way and two-way (Figure 1-20). One-way satellite access uses the satellite to download data and a slow, regular telephone line and modem for uploading data. A better alternative is two-way satellite access, which uses the faster satellite connection for both uploading and downloading data. The speed for a two-way satellite transmission is around 1 Mbps. Satellite Internet access can be expensive both in monthly access fees and equipment costs, but satellite access may be the only alternative in rural areas.

one way

two way

Figure 1-20   Satellite Internet access can be one-way or two-way.

Like other types of Internet connections, digital satellite has some disadvantages. Snow, rain, wind, or even clouds may affect the clarity of the signal. Furthermore, the lengthy distance to the orbiting satellites can create a significant lag in the response time. The lag is not noticeable while browsing Web pages, but for communications such as instant messaging or chat, which take place simultaneously, or in **real time**, the lag may be noticeable.

MOBILE WIRELESS As you have learned, individuals access the Internet in other places besides at home or in the office. Public libraries often make Internet-connected computers available for the public to use. Travelers can gain access to the Internet by using Wi-Fi Internet connections at airports and other public places around the world for a per-minute or per-KB charge (although access might be free to customers who purchase a beverage or snack). Today, many people access the Internet using mobile broadband connections and laptop computers or handheld devices, such as cell phones, smartphones, and personal digital assistants (PDAs).

According to a survey of Internet leaders by the Pew Internet & American Life Project, most people will access the Internet using mobile devices in 2020.

FACTS @HAND

One way to connect a notebook computer while on the road is to rely on one of the wireless networks that use Wi-Fi technologies. **Wi-Fi** is a family of wireless networking standards that uses radio waves to allow a computer to communicate with other computers on a local area network or the Internet.

A **hotspot** is a specific geographic location in which a wireless access point provides public Internet access. Hotspots can be found in hotels, airports, restaurants, coffee shops, convention centers, and other venues where people with notebook computers or handheld wireless devices are likely to need Internet access. A hotspot typically covers a 100-foot range from the wireless access point, although some may provide a greater range. A **wireless access point** is a hardware device with an antenna that is connected to a wired network and is used to send and receive radio waves to and from notebook computers or other wireless devices.

To connect to a wireless access point in a hotspot, a notebook computer must have a Wi-Fi card or other wireless connectivity technology, such as a USB adapter, installed (Figure 1-21). After the computer is turned on, the software searches for a hotspot, and, if it finds one, connects to the Internet at speeds from 1 to 54 Mbps or higher. Wi-Fi connections can suffer interference from nearby microwave ovens or other devices using the same radio frequency.

notebook computer with wireless USB network adapter

notebook computer with wireless PC Card

notebook computer with built-in wireless Centrino mobile technology
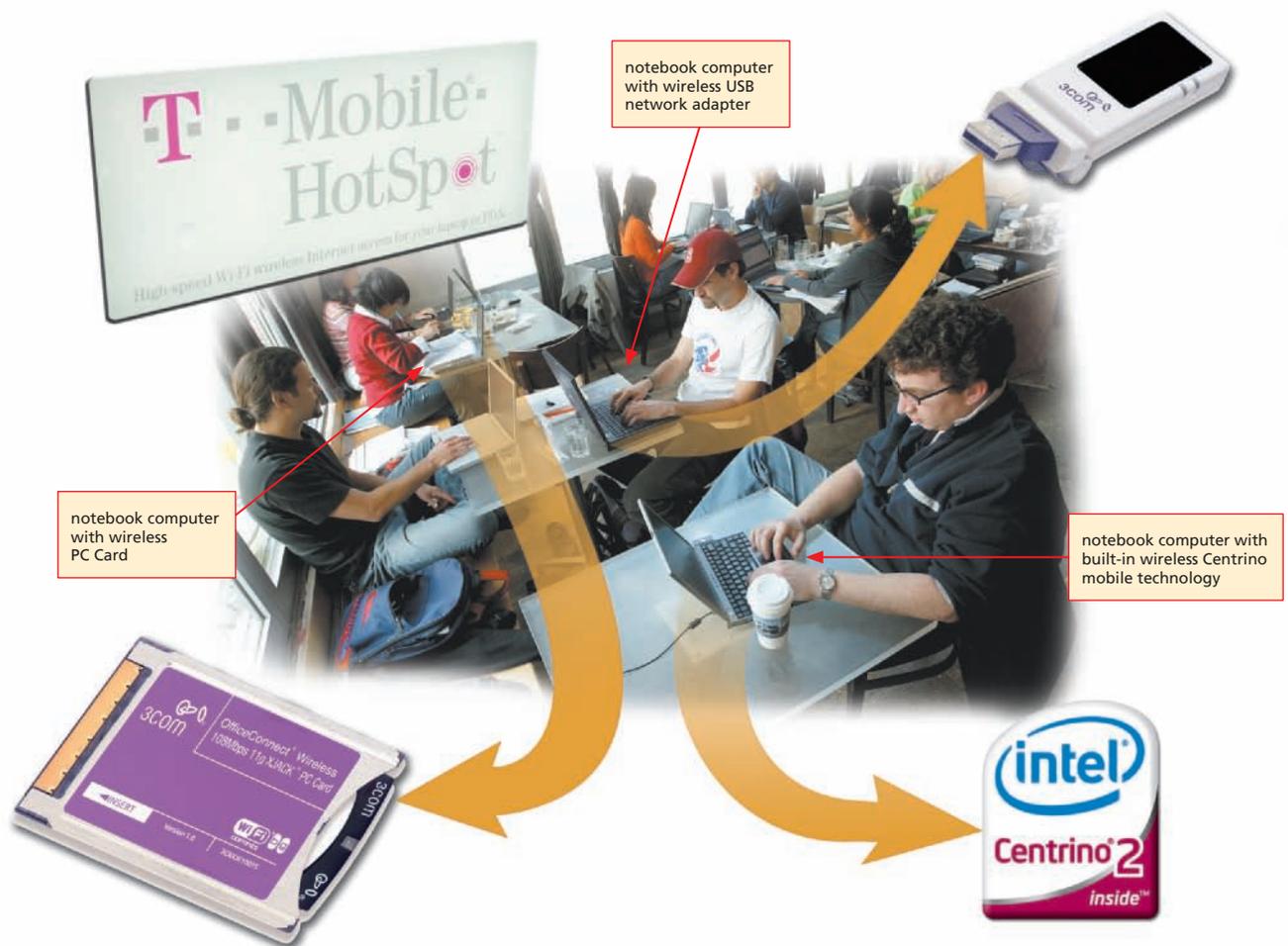
Figure 1-21   A notebook computer with a Wi-Fi card or other wireless connectivity technology can connect to a wireless access point at a hotspot.

Cellular wireless providers, such as AT&T, Verizon, and Sprint, also offer **mobile broadband** Internet access. Users of mobile broadband can use a laptop equipped with a mobile data card or modem (Figure 1-22), a cell phone, a smartphone, or personal digital assistant (PDA) (Figure 1-23) to connect to the Internet and browse the Web. The primary advantage of mobile broadband Internet access is mobility — you can access the Internet anywhere in the cellular broadband wireless provider's access area. The disadvantages of mobile broadband include the risk of poor or no reception in some areas, some restrictions on bandwidth usage, and slightly higher cost when compared to other access methods.

wireless modem communicates with wireless Internet access provider

wireless modem inserted in notebook computer

Figure 1-22   Computers can access the Internet using mobile broadband services offered by cellular wireless providers, such as AT&T, Verizon, and Sprint.

stylus

Figure 1-23   Cell phones, PDAs, and smartphones can connect to the Internet using a wireless Internet connection.

HIGH-SPEED BUSINESS CONNECTIONS   As more people use a single connection, the more bandwidth is required. For this reason, businesses, even small businesses, generally need higher-speed connections than individuals and thus typically choose a high-speed Internet connection, such as DSL or cable. Business DSL or cable connections typically offer higher-speed connections than those for individuals and are more expensive. Figure 1-24 summarizes ISP and Internet connections including advantages, disadvantages, typical connection speeds, and typical costs per month.

As businesses grow and their demand for bandwidth increases, the technology requirements also increase. Typical medium to large businesses might lease or install a fiber-optic loop directly into their building. A **fiber-optic loop** is a dedicated, high-speed telephone line that uses fiber-optic cable with T1 or other fiber-optic technology. A leased **T1 line** is a type of fiber-optic line that supports data transfer rates of 1.5 Mbps for hundreds of users simultaneously and costs in the range of $350 to $1,200 per month. A faster option is a T3 line, which offers about 45 Mbps in the range of $3,000 to $12,000 per month. The largest firms requiring the highest capacity and speed use high-speed fiber-optic networks that cost many thousands of dollars a month.

Internet Access Method Comparison				
Method	**Advantages**	**Disadvantages**	**Approximate Transmission Speeds**	**Approximate Cost Per Month**
Dial-up	• Least expensive • Available wherever there is a telephone connection	• Slowest • Cannot make telephone calls while connected • Might encounter busy signals • Might be disconnected after set amount of time	Up to 56.6 Kbps	$10–$25
High-speed dial-up	• Inexpensive • Available wherever there is a telephone connection	• See dial-up	advertised at 5–7 times faster than standard dial-up; uses faster authentication process and other techniques to improve performance over standard dial-up	$10–$25
ADSL	• High speed • Dedicated connection, so no busy signals • Always connected • No need for extra line for voice telephone calls	• Available only near telephone company central office	768 Kbps–8 Kbps downstream, 64 Kbps–1 Mbps upstream	$20–$80, plus activation fee
Cable	• High speed • Dedicated connection so no busy signals • Always connected	• Available only where cable TV is offered • Slows down when too many neighbors are online	5 Mbps downstream, 256 Kbps upstream	$45, plus installation
Satellite	• High speed • Available everywhere	• Expensive equipment needed • Weather can interfere with signal • Potential lag time	1–1.5 Mbps downstream, 256 Kbps–1 Mbps upstream	$60–$350, plus equipment and installation
Microwave	• High speed	• Line of sight to tower required • Only available locally • Range must be within 35 miles of tower	128 Kbps to 2 Mbps downstream, 128 Kbps upstream	$50–$100, plus equipment
Wi-Fi	• High speed • Wireless • Mobile use	• Limited availability • Must remain within 300 feet of receiver • Might experience interference from cordless phone or microwave oven • Requires Wi-Fi card	11–60 Mbps	$10–$80
Mobile wireless	• High speed • Mobility	• Risk of poor or no connectivity in some areas • Bandwidth usage restrictions • Cost	600 Kbps–1.5 Mbps download 500–800 Kbps upload	$40–$60 plus additional charges per KB of data Data limits vary

Figure 1-24   Comparison of major Internet connection methods

Chapter Review

The Internet is a worldwide network of networks that individuals, institutions, and businesses use to communicate, share information, and conduct business transactions. People of all ages and stations in life find that using the Internet enriches their lives by allowing them to find useful information, send and receive e-mail, exchange instant messages, participate in online chats, exchange thoughts, photos, files, and links with others, and subscribe to mailing lists and newsgroups. Businesses conduct business transactions with their customers, vendors, and employees over the Internet.

The Web is a subset of the Internet that supports Web pages, which can include text, graphics, animation, sound, or video. Related Web pages are part of a Web site. Web pages are interconnected by hyperlinks, which enable a user to move from one page to another, on the same or another site. A browser, such as Internet Explorer or Firefox, allows users to access and view Web pages, while a search tool allows users to find specific Web-based resources.

The Internet has its roots in ARPANET, a research and defense initiative of the U.S. government in collaboration with technology firms and universities. In 1990, the NSFnet superseded ARPANET as the main government network linking universities and research facilities. The U.S. Congress opened the Internet to commercial use in 1992. Tim Berners-Lee's development of the Web in 1991 caused Internet usage to explode. Berners-Lee developed the use of hyperlinks between different files, HTML to create Web documents, the addressing scheme, and the WorldWideWeb browser. In 1994, the first commercial Web browser allowed businesses and individuals to discover the possibilities available online, and the use of the Internet expanded rapidly.

Individuals and businesses use telephone lines, cable broadband, or wireless connections to access the Internet.

TERMS TO KNOW

After reading this chapter, you should know each of these Key Terms.

acceleration server (20)
Advanced Research Projects
   Agency (ARPA) (12)
ARPANET (13)
backbone (15)
bandwidth (19)
baseband (21)
bit (20)
bits per second (bps) (20)
blog (6)
broadband (21)
browser (7)
browsing (8)
business-to-business (B2B) (11)
business-to-consumer (B2C) (11)
business-to-employee (B2E) (11)
cable modem (21)
CANARIE (18)
circuit switching (12)
consumer-to-consumer (C2C) (11)
cyberstalking (12)
dedicated connection (21)
dial-up access (20)
Digital Subscriber Line (DSL) (21)
download (10)
e-business (11)
e-commerce (11)
electronic mail (9)
e-mail (9)
e-mail program (9)
Extensible Hypertext Markup Language
   (XHTML) (7)
fiber-optic loop (25)
File Transfer Protocol (FTP) (10)
firewall (21)
fixed wireless connection (22)
gigabits per second (Gbps) (20)
Gopher (16)
high-speed dial-up (20)
host (4)
hotspot (24)
hyperlink (8)
hypertext (16)
Hypertext Markup Language (HTML) (7)

Hypertext Transfer Protocol (HTTP) (17)
Internet (4)
Internet Protocol (IP) (14)
Internet Service Provider (ISP) (19)
Internet2 (I2) (18)
kilobits per second (Kbps) (20)
line splitter (21)
link (8)
local area network (LAN) (19)
mailing list (15)
megabits per second (Mbps) (20)
microblogging (6)
mobile broadband (25)
modem (20)
online (4)
packet switching (13)
packets (13)
protocol (5)
published (7)
real time (23)
repeaters (22)
search tool (8)
server (10)
site (7)
spam (18)
surfing (8)
T1 line (25)
Telnet (11)
Transmission Control Protocol (TCP) (14)
Transmission Control Protocol/Internet
   Protocol (TCP/IP) (5)
upload (10)
Web (6)
Web authoring software (7)
Web browser (7)
Web pages (7)
Web server (7)
Web site (7)
weblog (6)
Wi-Fi (24)
wireless access point (24)
Wireless Internet Service Provider (WISP) (22)
World Wide Web (6)
World Wide Web Consortium (W3C) (9)

Complete the Test Your Knowledge exercises to solidify what you have learned in the chapter.

True or False

Mark T for True and F for False. (Answers are found on page numbers in parentheses.)

_____ 1. While Internet usage is very popular among teenagers and young adults, it is not used by senior citizens. (6)

_____ 2. ADSL Internet connections allow downloading and uploading of data at the same speeds. (21)

_____ 3. The terms "World Wide Web," "Web," and "Internet" are interchangeable and refer to the same thing. (6)

_____ 4. E-mail is one of the most popular Internet activities. (9)

_____ 5. Telnet is used to log in to remote computers. (11)

_____ 6. The term e-commerce specifically refers to buying and selling goods over the Internet. (11)

_____ 7. The person who first outlined the idea of packet switching was Leonard Kleinrock. (13)

_____ 8. Telecommunications firms own the Internet. (5)

_____ 9. The bandwidth of an Internet connection typically is measured in bits per second. (20)

_____ 10. Most large businesses connect to the Internet using mobile broadband connections. (25)

Multiple Choice

Select the best answer. (Answers are found on page numbers in parentheses.)

1. People use the Internet for _____. (6)
   a. researching for school and personal interests
   b. shopping and conducting other business transactions
   c. communicating with friends, clients, and colleagues
   d. all of the above

2. Different types of computers can communicate across the Internet because they follow the same set of rules or standards, called _____. (5)
   a. FTP
   b. hosts
   c. TCP/IP
   d. Telnet

3. A(n) _____ is a software program used to view Web pages. (7)
   a. browser
   b. FTP client
   c. search engine
   d. Web authoring package

4. FTP is used for _____. (10)
   a. e-mail
   b. chatting and instant messaging
   c. Web conferencing
   d. none of the above

TEST YOUR KNOWLEDGE

5. Web pages can be created using _____ codes or tags. (17)
   a. backbone
   b. surfing
   c. HTML
   d. Wi-Fi

6. E-business takes a number of forms, including _____. (11)
   a. B2C, in which businesses stay in contact with consultants
   b. B2B, in which firms do business online with other firms and businesses
   c. B2E, which connects businesses in North America with those in Europe
   d. all of the above

7. In what year did ARPANET become a network linking four major universities and creating the foundation for the Internet as we know it today? _____. (14)
   a. 1951
   b. 1969
   c. 1975
   d. 1991

8. The person who is credited with inventing the Web is _____. (16)
   a. Marc Andreessen
   b. Tim Berners-Lee
   c. Vinton Cerf
   d. Leonard Kleinrock

9. A telephone Internet connection that provides a high-speed, dedicated, and always-on connection to the Internet is _____. (21)
   a. cable
   b. regular dial-up
   c. ADSL
   d. high-speed dial-up

10. When choosing an ISP, you should consider _____. (20)
    a. how you will physically connect your computer to the ISP
    b. access to technical support
    c. whether you prefer low cost or high-speed connectivity
    d. all of the above

LEARN IT ONLINE

Test your knowledge of chapter content and key terms.

Instructions: To complete the Learn It Online exercises, start your browser, click the Address bar, and then enter the Web address **scsite.com/internet3e/learn.** When the *Discovering the Internet, Third Edition* Learn It Online page is displayed, click the link for the exercise you want to complete and then read the instructions.

Chapter Reinforcement TF, MC, and SA

A series of true/false, multiple choice, and short answer questions that test your knowledge of the chapter content.

Flash Cards

An interactive learning environment where you identify chapter key terms associated with displayed definitions.

Practice Test

A series of multiple choice questions that test your knowledge of chapter content and key terms.

Who Wants To Be a Computer Genius?

An interactive game that challenges your knowledge of chapter content in the style of a television quiz show.

Wheel of Terms

An interactive game that challenges your knowledge of chapter key terms in the style of the television show Wheel of Fortune.

Crossword Puzzle Challenge

A crossword puzzle that challenges your knowledge of the key terms presented in the chapter.

Use the Exercises to gain hands-on experience working with the Internet and the Web.

EXERCISES

1 | Survey of Internet Usage by Students

1. According to a study by the Pew Internet & American Life Project, many students rely on the Internet to help them in their academic work. Survey five students to find out how they use the Internet for their studies. Listen for their answers to see if they mention items a through e, as outlined in Step 2.

2. Tabulate how many of the five students use the Internet for each of the following purposes:
   a. To look up information, to act as a reference library, or to get sources for reports, presentations, and projects
   b. To plagiarize content or cheat
   c. To collaborate with classmates on projects, or to study or share class notes with classmates
   d. To keep track of class schedules, assignments, and syllabi
   e. To choose a university, major, or future career path

3. Ask the students whether they have access to the Internet during class time under teacher direction or only outside of class or during lab time. As a follow-up question, ask how effective they think that approach is.

4. Find out whether they feel there are differences between students who have Internet access at home and those who do not. Write a paragraph explaining what those differences are and how they might impact academic work.

5. Summarize the importance of the Internet to students, according to the results of your survey.

(continued)

EXERCISES

2 | Survey of Internet Usage at Home

1. Survey five people who have Internet access in their homes. Try to survey both men and women and people of all ages; but avoid surveying students.

2. Ask them to define the Internet and tell what year they first began to use the Internet.

3. Ask them to estimate how much time each week they spend online for each of the following purposes:
   a. To browse the Web for work or school
   b. To browse the Web for entertainment or leisure
   c. To send e-mail
   d. To chat or send instant messages
   e. To play games
   f. To download music, software, or other files
   g. To create and publish their own Web pages
   h. To compare prices and look for product information
   i. To buy or sell items
   j. To share information, photos, links, and thoughts with others online

4. Ask them what browser they use. After you have completed the survey, calculate the total number for each browser.

5. Ask them how they access the Internet: dialup, high-speed dialup, cable broadband, mobile broadband, DSL, or other method.

6. Ask them if the time they spend using the Internet has affected the time spent on other activities, such as watching television, reading books, shopping in stores, socializing, and so on.

7. Summarize the differences in how various age groups and genders use the Internet.

3 | ISP Survey

1. Survey five people who use various ISPs, asking the questions below to determine their level of satisfaction.
   a. How satisfied are you with the speed of your connection?
   b. Was the connection easy to set up?
   c. Have you ever had to contact technical support or billing services? Did you contact them by telephone or e-mail? Was your problem answered promptly and solved to your satisfaction?
   d. Have you had any billing troubles? How much effort did it take for them to be resolved?
   e. With what aspects of your ISP are you most satisfied? Most dissatisfied?

2. Compare the results. Determine where ISP users seem to experience the most problems and where they have the best experience.

3. Summarize whether these users are satisfied with their ISPs overall or would prefer to change to another ISP.

4. Write a paragraph analyzing which ISP seems to give the best customer service and satisfaction.

4 | Internet History Research

1. Use written resources to learn more about the Internet's history. If you prefer, you can use links to online resources located on this book's companion Web site. To do so, follow this optional step: visit the *Discovering the Internet, Third Edition*, Exercises Web page (**scsite.com/internet3e/exercises**) and click a link below Chapter 1, Exercise 4.

2. Find the names and accomplishments of two individuals not mentioned in this chapter who played key roles in the development of the Internet and the Web.

3. Write a paragraph on the origin or development of one of the following elements of the Internet:
   a. Usenet
   b. LISTSERV or mailing lists
   c. BITNET
   d. IRC
   e. hypertext
   f. any computer hardware or device used to access the Internet

4. Make a set of five trivia questions about the history of the Internet from your reading, either in this book or from other research. Ask several friends the questions and record how many of them correctly answer each question.

5 | Internet Terminology

To perform the following exercise, you must be connected to the Internet and know how to browse. You also must have access to a printer and know how to print Web pages.

1. Visit the *Discovering the Internet, Third Edition* Exercises Web page (**scsite.com/ internet3e/exercises**) and click a link below Chapter 1, Exercise 5 to find definitions for following terms:
   a. Internet
   b. Web
   c. TCP/IP
   d. protocol
   e. host

2. Write down each term and its definition and note the Web source for that definition. Then write a paragraph to evaluate how effective the sites you used are as a resource for learning about the Internet.

6 | Internet and Web Usage Statistics

To perform the following exercise, you must be connected to the Internet and know how to browse and search the Web.

1. Visit the *Discovering the Internet, Third Edition* Exercises Web page (**scsite.com/ internet3e/exercises**) and click the Google link below Chapter 1, Exercise 6.
   a. Search for current Web usage articles and read at least three articles.
   b. Summarize what you learned about Web usage in a brief report.

(continued)

EXERCISES

2. Visit the *Discovering the Internet, Third Edition* Exercises Web page (**scsite.com/ internet3e/exercises**) and click the Internet World Stats link below Chapter 1, Exercise 6. Write down the total Internet usage and the percentage of Internet usage growth since 2000.

7 | ISP Research

To perform the following exercise, you must be connected to the Internet and know how to browse the Web.

1. Visit the *Discovering the Internet, Third Edition* Exercises Web page (**scsite.com/ internet3e/exercises**) and click The List: ISP Directory link below Chapter 1, Exercise 7 to access the Web site for an Internet services buyer's guide.

2. Click the link to display a list of ISPs by Location/Area Code. List four ISPs for your area that offer dial-up access. List one that offers a dedicated or high-speed connection. List one specializing in being a low-cost provider.

3. Click the link to display a list of nationwide U.S. ISPs. List an ISP for each of the following categories: dial-up and dedicated.

4. Click the link to display a list of ISPs by Country Code. Select a small country and examine the ISPs. Write down how many ISPs exist in that country, and describe what sort of connections are available.

8 | Connection Speed Test

To perform the following exercise, you must be connected to the Internet and know how to browse the Web.

1. Visit the *Discovering the Internet, Third Edition* Exercises Web page (**scsite.com/ internet3e/exercises**) and click the links below Chapter 1, Exercise 8 to view connection speed tests.

2. Try the bandwidth tests and record the results.

3. Summarize the results of the tests and explain whether the connection speeds are considered slow, average, or fast, according to the bandwidth speed test sites.

4. At the direction of your instructor, repeat the tests at different times of the day over several days. Write a brief paragraph explaining any variation in connection speeds over the different days and times of day.

9 | Survey of Local Wireless Hotspots

To perform the following exercise, you must be connected to the Internet and know how to search the Web.

1. Visit the *Discovering the Internet, Third Edition* Chapter 1 Web page (**scsite.com/ internet3e/exercises**) and click the Bing link below Exercise 9. Search for information you can use to:
   a. List the locations of hotspots closest to your home.
   b. Find a hotspot for a travel destination you might enjoy visiting.
   c. List three countries that offer hotspots for wireless access.

10 | Mobile Broadband Research

This activity requires outside research at the store of a cellular mobile broadband provider or at a consumer electronics store.

1. At the direction of your instructor, visit a cellular mobile broadband provider or consumer electronics store for a demonstration of how you can connect a laptop to a mobile broadband provider's broadband service.

2. Write a paragraph summarizing your visit and describing how easy or difficult it is to connect to the Internet using mobile broadband. Describe any additional hardware or software needed.

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Credits

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