

# Emerging Technology

*After completing this chapter, you will be able to:*

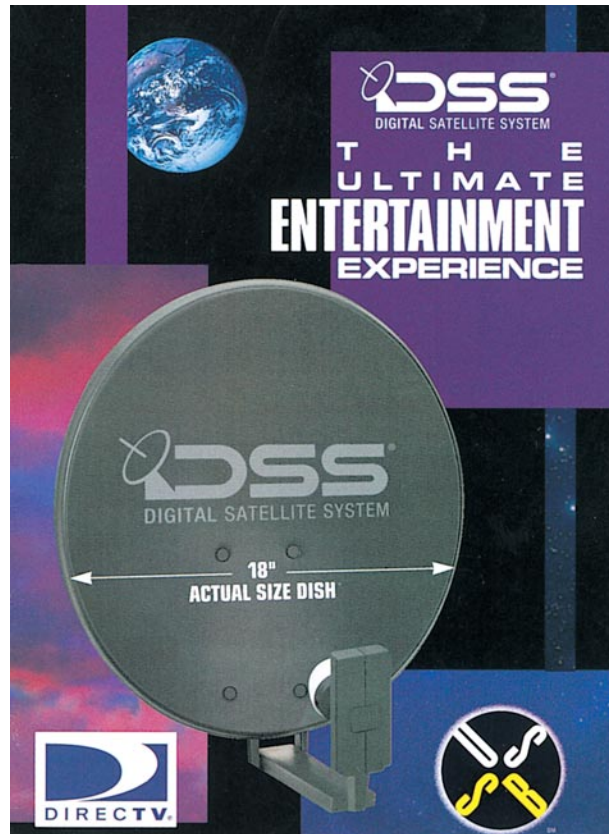
- Recognize emerging multimedia technologies
  - Understand the role that MPEG and HDTV will play in the future of digital video
  - See how Interacting is creating a new form of enhanced TV
  - Realize how holography promises to reduce substantially the size and increase the density of optical storage media
  - Consider the challenge of pen computing and the promise of speech recognition
  - Imagine how ubiquitous Teledesic will make the Internet when the wireless satellite network encircles the globe
  - Understand what knowbots can do for you on the Information Superhighway
  - Recognize the extent to which multimedia is an emerging technology, and question whether multimedia is just a fad or an important life skill
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- New technologies follow a cycle that includes invention, prototyping, proof of concept, productizing, and manufacture. Throughout this process the inventions are called **emerging technologies**. It often takes many years for an emerging technology to achieve widespread use in the marketplace.

This chapter discusses multimedia technologies that are in the process of emerging. Some of them could get canceled prior to manufacture, and others may fail in the marketplace. Only technologies that succeed really belong here, because inventions that fail to emerge are by definition not emerging.

## Digital Video

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There is little doubt that digital video will emerge as the primary way in which movies will be recorded and transmitted in the twenty-first century. As this book goes to press, for example, DVD has become one of the most popular mass-market consumer items, surpassing CD-ROM in its growth rate. Movies are stored on DVD in the MPEG format. MPEG stands for Motion Pictures Experts Group, the name of the ISO standards committee that created it. Endorsed by more than 70 companies including IBM, Apple, JVC, Philips, Sony, and Matsushita, MPEG compresses video by using a discrete cosine transform algorithm to eliminate redundant data in blocks of pixels on the screen.



**Figure 15-1** RCA DirecTV uses MPEG to deliver more than 175 channels of digital TV programming over the nation's first high-power direct broadcast satellite (DBS) service using 18-inch satellite dishes. For more information, go to <http://www.directv.com>.

MPEG compresses the video further by recording only changes from frame to frame; this is known as **delta-frame encoding**. MPEG is the digital video standard for high-definition television (HDTV) and direct satellite broadcast, such as the RCA DirecTV system advertised in Figure 15-1.

## HDTV

HDTV stands for high-definition television. It is being developed to replace NTSC as the television standard for the United States. HDTV is based on four technologies:

- MPEG digital video compression
- Transmission in packets that will permit any combination of video, audio, and data
- Progressive scanning for computer interoperability up to 60 frames per second at  $1920 \times 1080$  pixels
- CD-quality digital surround sound using Dolby AC-3 audio technology

During the 1990s, the major television studios began recording shows in HDTV so reruns can be broadcast in HDTV when the standard changes. To find out how many television stations are broadcasting in HDTV today, follow the *Multitit* Web site link to HDTV Group—Links—HDTV Stations.

## Intercasting in TV's Vertical-Blanking Interval

The vertical-blanking interval is the gap between the frames of a television picture. You see the vertical-blanking interval if your television is out of horizontal adjustment, causing the frames to scroll down the screen. Ever since the invention of television, the vertical-blanking interval has had the capability of carrying additional information, but no one has used it effectively. Until now. Intel has trademarked the term **Intercast**, which means to transmit Web pages and other digital information in the vertical-blanking interval. Partnering with Intel in the Intericast venture are NBC, CNN, Viacom, WGBH, QVC, Comcast, America Online, Asymetrix, En Technology, Netscape, Gateway, and Packard Bell. NBC did its first Intericast during the 1996 Summer Olympic Games. In 1998, Microsoft built Interasting into the operating system in the form of WebTV for Windows, which provides TV capabilities on the PC and supports a wide variety of services, including data broadcasting, an electronic program guide, and interactive TV programming. Television programming that has Intericast content is known as **enhanced TV**. For more information, follow the *Multilit* Web site link to Intericast.

## Holography

Most people think of holograms as 3-D photographs. But holograms can also store huge amounts of data. For example, IBM scientists predict that holographic technology will make it possible to store the entire *Encyclopaedia Britannica* in a space the size and thickness of a penny. Holographic memory systems can stack data 40 layers deep, as opposed to computer disk and magnetic tape, which line up data on flat, single-layer tracks. The deeper layers can be read by tilting the angle of the laser beam that reads the data (*Investor's Business Daily* 1/20/94: 4). Scientists believe that by 2004, 5 gigabytes of data will fit in 2 cubic centimeters at a cost of 4 cents per megabyte. For technical details, follow the *Multilit* Web site link to holographic memory design.

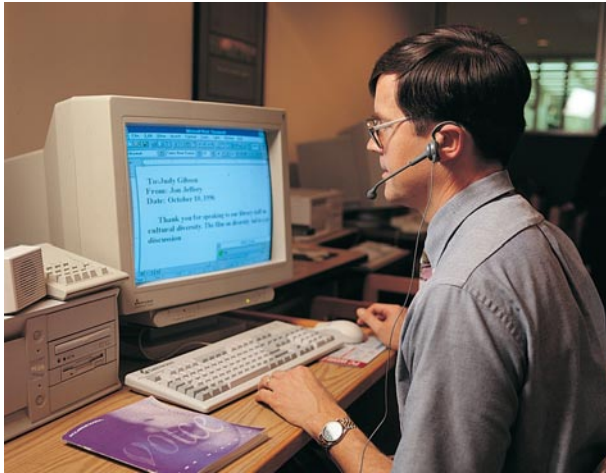
## Pen Computing



**Figure 15-2** Pen computers use a stylus instead of a keyboard to input characters.

Pen computing is an emerging technology that Apple's handheld Newton computer first brought to public attention back in the twentieth century. As depicted in Figure 15-2, the need for a bulky keyboard to input characters was avoided by writing on the screen with a pen. Apple claimed that Newton was trainable, that it could learn to recognize your handwriting. But in practice, Newton trained the user, who ended up learning how to write in a format Newton could understand. Research continues, as does the popularity of the pen. For news and reviews of the latest pen computers, follow the *Multilit* Web site link to Pen Computing.

## Speech Recognition



**Figure 15-3** Voice recognition software enables the user to speak words into a word-processor document.

With pen computers crying out for a better handwriting algorithm, **speech recognition** is rapidly emerging across a broad range of applications and platforms. The Macintosh, for example, now comes with Apple Speech Recognition built in. Microsoft offers a Direct Speech Recognition Control for Windows users. SoundBlaster boards from Creative Labs come with ViaVoice speech recognition and Prody Parrot, who can play games with you and obey your spoken commands. Dragon Systems offers a product called NaturallySpeaking in versions for teens, professionals, medical, legal, and mobile users. You talk to your PC, and your words appear on the screen and in your document, as shown in Figure 15-3. To learn more about these emerging speech recognition products, follow the *Multit* Web site links to Apple Speech Recognition, Microsoft Speech Research, Creative Labs, and Dragon Systems.

## Internet Phone Services

Anyone with an Internet connection, a full-duplex sound card, and a microphone can use one of the newly emerging Internet phone services. First to market were VocalTec's Internet Phone for Windows and Electric Magic's NetPhone for Macs. The obvious advantage is cost savings on long-distance phone calls. For example, you can talk with someone overseas without having to pay for a long-distance call; the calling parties connect to their local networks, and the Internet makes the long-distance connection for free. There are several disadvantages, however. If your Internet connection is slow, delays can be significant, leading to jerky, stuttering conversations. This is a problem especially during times of high Internet traffic. Also, if the person you are calling is not logged on to the Net with their phone software running, they cannot answer your call.

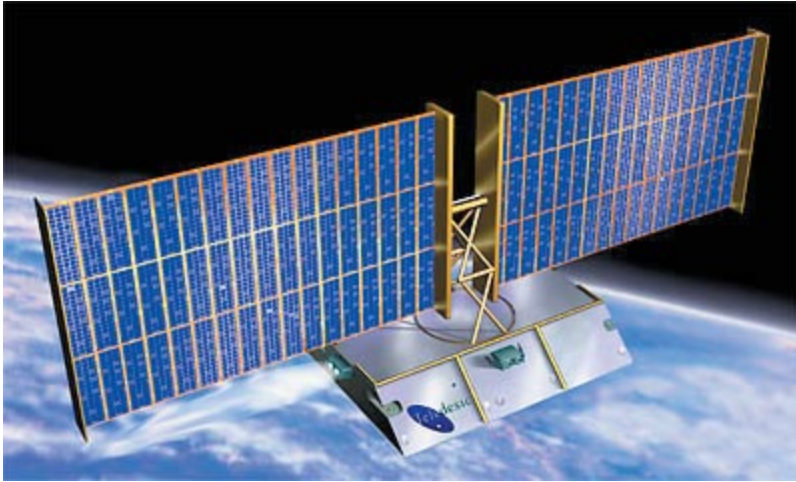
Not all sound boards have the full-duplex capability required for Internet phone services. For many years the SoundBlaster was available only in a half-duplex version. With a half-duplex sound card, only one party can talk at a time. Now the SoundBlaster comes in full-duplex versions. Almost all Macintoshes produced since 1990 have full-duplex audio. For more information, follow the *Multit* Web site link to Yahoo and search for Internet Phone.

## Wireless Communications

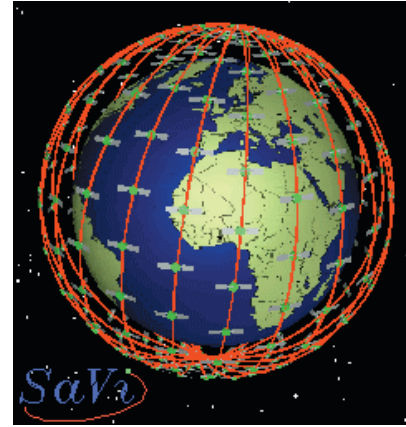
Wireless communication technologies are enabling users to access telecommunication systems from almost anywhere. No longer must your computer be tethered to the nearest telephone line.

Developing nations are using wireless technologies to avoid the high cost of wiring their countries physically. Cellular networks in Malaysia, Thailand, and the Philippines are expanding so fast that they may leapfrog traditional networks to become the most common form of telephone service. In South America, so many Venezuelans are carrying cellular phones that some restaurants require customers to check them at the door to control the noise level (*St. Petersburg Times* 5/16/94 Business: 2). In Brazil, cellular





**Figure 15-4** A computer rendering of a Teledesic satellite.



**Figure 15-5** The Teledesic Network will consist of 288 operational satellites, divided into 12 planes, each with 24 satellites.

phones have become such a highway safety hazard that it is illegal to talk on a handheld cellular phone and drive at the same time (*Miami Herald* 5/18/94: C1).

Technology prophet George Gilder envisions wireless systems that will eventually offer worldwide bandwidth on demand, buffering and transmitting information whenever there is room (*Forbes ASAP* 4/11/94: 98). Microsoft chairman Bill Gates is teaming up with Craig McCaw of McCaw Cellular Communications to create such a network, a \$9 billion wireless “global Internet.” Known as Teledesic, it will use low earth-orbit satellites to provide wireless interactive voice, data, and video services. The system will have 288 refrigerator-sized satellites to connect handheld phones and other electronic devices to telephone networks all over the world (*Wall Street Journal* 3/21/94: A3). Figure 15-4 shows one of the satellites, and Figure 15-5 shows how they will encompass the globe. For the latest information on the status of their deployment, follow the *Multilit* Web site link to Teledesic.

## Knowbots

**Knowbots** are software applications programmed to act as intelligent agents that go out on the network to find things for you. You tell a knowbot what you want, and it winds its way through the Internet, finding all the relevant information, digesting it, and reporting it to you succinctly.

Likening them to robotic librarians, Krol (1996: 418) refers to knowbots as “. . . software worms that crawl from source to source, looking for answers to your question. As a knowbot looks, it may discover more sources. If it does, it checks the new sources too. When it has exhausted all sources, it comes crawling home with whatever it found.”

The *Multilit* Web site links to several knowbot repositories. At FerretSoft, for example, you’ll find search utilities for locating Web pages, utilities, e-mail addresses, files, chatters’ channels, phone numbers, and news. At BotSpot you’ll find knowbots that can help you shop, invest, learn, research, and game. CompareNet, priceline, mySimon, and bottomdollar are online shopping sites that use agents to help you find the best prices. Also linked to the *Multilit* Web site are the Software Agents Group, the Multi-Agent Systems Laboratory, and the Agent Society.

## Multimedia

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In what sense is multimedia itself an emerging technology? Will the craze fade or evolve into something else, like when the term *multimedia* was invented and people began using it to describe preexisting technology?

The author believes that the ability to use multimedia will emerge as a life skill in the twenty-first century. Citizens who do not know how to use multimedia will become disenfranchised. Cut off from the Information Superhighway, they will end up watching life go by instead of living it fully.

## e x e r c i s e s

1. It seems like it is taking forever for HDTV to come on the market. Did you know about HDTV before you read this book? If so, how did you first find out about it? Have you ever seen an HDTV demonstration? If so, what was your impression of it? If you have never seen high-definition television, contact your local video store and ask where you can see an HDTV demo in your area.
2. Follow the *Multilit* Web site link to Teledesic and check on the deployment of the Teledesic satellite network. Have any of the satellites launched yet? What is the latest news about the network?
3. If you could program a knowbot to go out on the Internet and do your bidding, what would you want the knowbot to do?
4. Do you believe multimedia is just a fad, or is its use emerging as a life skill for the twenty-first century? Give reasons for your belief.