Chapter Eight

Communications and Networks

Living in a Digital World
Objectives Overview

- Discuss the purpose of the components required for successful communications
- Describe these uses of computer communications: wireless messaging services, wireless Internet access points, cybercafés, global positioning systems, collaboration, groupware, voice mail, and Web services
- Differentiate among types of networks: LANs, MANs, and WANs
- Explain the purpose of communications software

See Page 313 for Detailed Objectives
Objectives Overview

- Describe various types of lines for communications over the telephone network
- Describe commonly used communications devices
- Discuss different ways to set up a home network
- Describe various physical and wireless transmission media

See Page 313 for Detailed Objectives
Communications

- Computer **communications** describes a process in which two or more computers or devices transfer data, instructions, and information.
Communications
Uses of Computer Communications

- Blogs
- Chat rooms
- E-mail
- Fax
- FTP
- Instant messaging
- Internet
- Newsgroups
- RSS
- Video conferencing
- VoIP
- Web
- Web 2.0
- Web folders
- Wikis

Click to view Web Link, click Chapter 8, Click Web Link from left navigation, then click Wikis below Chapter 8
Uses of Computer Communications

- Users can send and receive wireless messages using wireless messaging services.
Uses of Computer Communications

Text messaging allows users to send and receive short text messages on a phone or other mobile device or computer.

Picture messaging allows users to send pictures and sound files.

Video messaging allows users to send short video clips.

Wireless instant messaging allows wireless users to exchange real-time messages with one or more other users.

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Uses of Computer Communications

- **Wireless Internet access points** allow people to connect wirelessly to the Internet from home, work, school, and in many public locations.
Uses of Computer Communications

- A **cybercafé** is a coffeehouse, restaurant, or other location that provides personal computers with Internet access to its customers.
Uses of Computer Communications

• A **global positioning system (GPS)** is a navigation system that consists of one or more earth-based receivers that accept and analyze signals sent by satellites in order to determine the GPS receiver’s geographic location.

• GPS receivers are:
  - Built into many mobile devices
  - Available as a handheld device
  - Available with new vehicles
Uses of Computer Communications

How a GPS Works

Step 1
GPS satellites orbit Earth. Every thousandth of a second, each satellite sends a signal that indicates its current position to the GPS receiver.

Step 2
A GPS receiver (such as in a car, a wearable device, a smart phone, a handheld device, or a collar) determines its location on Earth by analyzing at least 3 separate satellite signals from the 24 satellites in orbit.
Uses of Computer Communications

- **Collaboration software** includes tools that enable users to share documents via online meetings and communicate with other connected users.

  - Online meetings
  - Web conferences
  - Document management systems
Uses of Computer Communications

Yearly Sales Results

![Bar Chart](Image)
# Uses of Computer Communications

## Groupware

- Helps groups of people work together on projects and share information over a network
- Component of workgroup computing
- Major feature is group scheduling

## Voice mail

- Allows someone to leave a voice message for one or more people
- Computer in voice mail system converts an analog voice message into digital form
- A voice mailbox is a storage location on a hard disk in the voice mail system
Uses of Computer Communications

- **Web services** enable programmers to create applications that communicate with other remote computers over the Internet or on an internal business network.
- A **mashup** is a Web application that combines services from two or more sources.
Networks

• A **network** is a collection of computers and devices connected together via communications devices and transmission media
• Advantages of a network include:
  - Facilitating communications
  - Sharing hardware
  - Sharing data and information
  - Sharing software
Networks

- A **local area network (LAN)** is a network that connects computers and devices in a limited geographical area.
- A **wireless LAN (WLAN)** is a LAN that uses no physical wires.
Networks

- A **metropolitan area network (MAN)** connects LANs in a metropolitan area.
- A **wide area network (WAN)** is a network that covers a large geographical area.
Networks

- The design of computers, devices, and media on a network is sometimes called the network architecture.

**Client/server network**

**Peer-to-peer network**

Printer may be used by all computers on network.

Server operating system and application software installed on each computer.
Networks

• **P2P** describes an Internet network on which users access each other’s hard disks and exchange files directly over the Internet.
A **network topology** refers to the layout of the computers and devices in a communications network.

- **Star network**
- **Bus network**
- **Ring network**
An **intranet** is an internal network that uses Internet technologies.

An extranet allows customers or suppliers to access part of its intranet.
Network Communications Standards

- Ethernet
- Token ring
- TCP/IP
- Wi-Fi
- Bluetooth
- UWB
- IrDA
- RFID
- WiMAX
- WAP
Network Communications Standards

**Ethernet** is a network standard that specifies no computer controls when data can be transmitted.

The **token ring** standard specifies that computers and devices on the network share or pass a special signal (token).

**TCP/IP** is a network standard that defines how messages are routed from one end of a network to another.
Network Communications Standards

• **Wi-Fi** identifies any network based on the **802.11** standard that facilitates wireless communication

• Sometimes referred to as wireless Ethernet
Network Communications Standards

- **Bluetooth** defines how two Bluetooth devices use short-range radio waves to transmit data
- **UWB (ultra-wideband)** specifies how two UWB devices use short-range radio waves to communicate at high speeds
- **IrDA** transmits data wirelessly via infrared (IR) light waves
- **RFID** uses radio signals to communicate with a tag placed in or attached to an object, animal, or person
## Network Communications Standards

### WiMAX (802.16)
- Developed by IEEE
- Towers can cover a 30-mile radius
- Two types are fixed wireless and mobile wireless
- Provides wireless broadband Internet access

### Wireless Application Protocol (WAP)
- Specifies how some mobile devices can display the content of Internet services
  - Web
  - E-mail
  - Chat rooms
- Uses a client/server network
Communications Software

• **Communications software** consists of programs that:

  - Help users establish a connection to another computer or network
  - Manage the transmission of data, instructions, and information
  - Provide an interface for users to communicate with one another
Communications Over the Telephone Network

- The public switched telephone network (PSTN) is the worldwide telephone system.
Communications Over the Telephone Network

- Dial-up lines
- Dedicated line
- ISDN
- DSL
- FTTP
- T-carrier line
- ATM
## Communications Over the Telephone Network

### Speeds of Various Internet Connections

<table>
<thead>
<tr>
<th>Type of Line</th>
<th>Approximate Monthly Cost</th>
<th>Transfer Rates*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dial-up</td>
<td>Local or long-distance rates</td>
<td>Up to 56 Kbps</td>
</tr>
<tr>
<td>ISDN</td>
<td>$10 to $40</td>
<td>Up to 1.54 Mbps</td>
</tr>
<tr>
<td>DSL</td>
<td>$13 to $70</td>
<td>128 Kbps to 8.45 Mbps</td>
</tr>
<tr>
<td>Cable TV (CATV)</td>
<td>$20 to $50</td>
<td>128 Kbps to 52 Mbps</td>
</tr>
<tr>
<td>FTTP</td>
<td>$35 to $180</td>
<td>5 Mbps to 100 Mbps</td>
</tr>
<tr>
<td>Fixed Wireless</td>
<td>$35 to $80</td>
<td>256 Kbps to 10 Mbps</td>
</tr>
<tr>
<td>Fractional T1</td>
<td>$200 to $700</td>
<td>128 Kbps to 768 Kbps</td>
</tr>
<tr>
<td>T1</td>
<td>$400 to $1,600</td>
<td>1.544 Mbps</td>
</tr>
<tr>
<td>T3</td>
<td>$5,000 to $15,000</td>
<td>44.736 Mbps</td>
</tr>
<tr>
<td>ATM</td>
<td>$3,000 or more</td>
<td>155 Mbps to 622 Mbps, can reach 10 Gbps</td>
</tr>
</tbody>
</table>

*Kbps = thousand bits per second  
Mbps = million bits per second  
Gbps = billion bits per second
Communications Devices

- A *communications device* is any type of hardware capable of transmitting data, instructions, and information between a sending device and a receiving device.

- A *dial-up modem* converts signals between analog and digital.
Communications Devices

- A **digital modem** sends and receives data and information to and from a digital line.

  - ISDN modem
  - DSL modem
  - Cable modem
A **wireless modem** uses the cell phone network to connect to the Internet wirelessly from a notebook computer, a smart phone, or other mobile device.
Communications Devices

• A **network card** enables a computer or device to access a network
• Available in a variety of styles
• Wireless network cards often have an antenna
Communications Devices

• A **wireless access point** is a central communications device that allows computers and devices to transfer data wirelessly among themselves or to a wired network.

• A router connects multiple computers or other routers together and transmits data to its correct destination on a network.

• Many are protected by a hardware firewall.
Home Networks

- Home networks provide computers with the following capabilities:

  - Connect to the Internet at the same time
  - Share a single high-speed Internet connection
  - Access files and programs on other computers
  - Share peripherals
  - Play multiplayer games
  - Connect game consoles to the Internet
  - Subscribe to and use VoIP

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Home Networks

How to Set Up Hardware for a Wi-Fi Home Network

Step 1
Sign up for high-speed Internet service, such as through a cable or DSL modem.

Step 2
Using a cable, connect the network card in a desktop computer to the combination router/wireless access point.

Step 3
Using a cable, connect the combination router/wireless access point to the cable/DSL modem.

Step 4
Install a wireless network card or network adapter in other desktop computers in the home network.

Step 5
Insert a wireless USB network adapter, ExpressCard module, or PC Card in each notebook computer that will access the home network or purchase a notebook computer with built-in wireless networking capabilities.

Step 6
Purchase a smart phone with built-in wireless capabilities.
Communications Channel

- The amount of data that can travel over a communications channel sometimes is called the bandwidth
- Transmission media carries one or more signals
- Broadband media transmit multiple signals simultaneously
Physical Transmission Media
Wireless Transmission Media

- Infrared
- Broadcast radio
- Cellular radio
- Microwaves
- Communications Satellite
Summary

Overview of communications terminology and applications

How to join computers into a network

Various communications devices, media, and procedures