

**Discovering Computers**  
Concepts for a Digital World **2003** Chapter 9 Objectives  
Web and XP Enhanced

- Define the components required for successful communications
- Understand the various communications technologies
- Identify various sending and receiving devices
- Identify uses of intranets and extranets
- Explain communications applications
- Explain the purpose of communications software
- List advantages of using a network
- Understand the telephone network
- Differentiate between a local area network and a wide area network
- Describe commonly used communications devices
- Identify various physical and wireless transmission media

**Next**  
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**Discovering Computers**  
Concepts for a Digital World **2003** Communications  
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### What are computer communications?

- Process in which one computer transfers data, instructions, and information to another computer(s)

Communications system contains many types of devices

- (a) personal computers
- (b) notebook computers
- (c) Web-enabled cellular telephones
- (d) Web-enabled handheld computers
- (e) WebTV™
- (f) GPS receivers

**Next**  
p.92 Fig. 9-1

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### What is needed for successful communications?

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**Discovering Computers**  
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### What is the primary function of a communications device?

- To convert digital signals to analog signals or analog signals to digital signals

**analog signal**

Continuous electrical wave

**digital signal**

Distinct pulses that represent bits grouped together into bytes

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p.93 Fig. 9-2

**Discovering Computers**  
Concepts for a Digital World **2003** Sending and Receiving Devices  
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### What is a sending and receiving device?

- Initiates or accepts transmission of data, instructions, and information

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**Discovering Computers 2003** Uses of Communications Technologies  
 Concepts for a Digital World  
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What are some uses of communications technology?

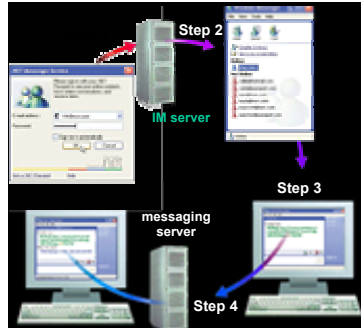


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What is instant messaging (IM)?

- 1: Login to the IM server
- 2: Server checks if any established friends, family, or co-workers, called buddies, are online
- 3: Send instant messages to online buddy
- 4: Instant message travels through messaging server and then to online buddy




**Next**  
p.86 Fig. 9-4

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What is a chat room?

- Permits users to converse in real time via the Internet
- Types of chat rooms
  - Voice chats
  - Video chats
  - Radio chats

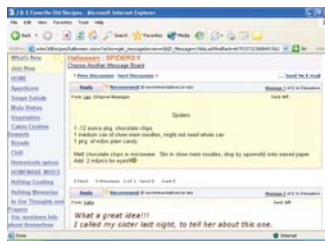


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p.86 Fig. 9-5

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What is a newsgroup?

- Area on the Web where users conduct written discussions about a particular subject
- Also called threaded discussion




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What is Internet telephony?

- Enables you to talk to other people over the Internet




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What is collaboration?

- Working with other users connected to a server
- You can conduct online meetings
  - Allows you to share documents with others in real time
- Microsoft's NetMeeting allows collaboration



**Next**  
p.89 Fig. 9-7

What is **groupware**?

- Software application that helps groups of people work together on projects and share information over a network
  - Lotus Notes
  - Microsoft Exchange

manage projects

schedule meetings

communicate

make group decisions

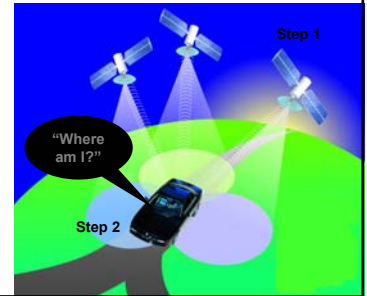
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What is a **global positioning system (GPS)**?

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

- 2: GPS receiver (such as in a car) determines its location on Earth by analyzing signals from the satellites.



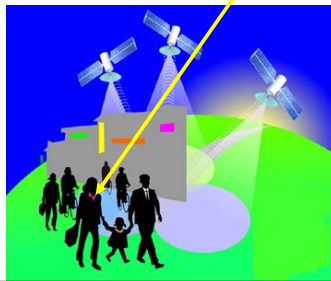
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p.9.10 Fig. 9-8

What is a **Digital Angel**?

- Necklace, bracelet, or receiver woven into fabric that communicates with another party using GPS satellite system
- Measures and sends biological information to satellite

necklace lets doctor's office keep tabs on you in real time



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What is a **site license**?

- Legal agreement that allows multiple users to run a software package simultaneously
- License fee usually based on number of users or number of computers attached to network



Next

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What is a **local area network (LAN)**?

- Network in limited geographical area such as home, school computer laboratory, or office building



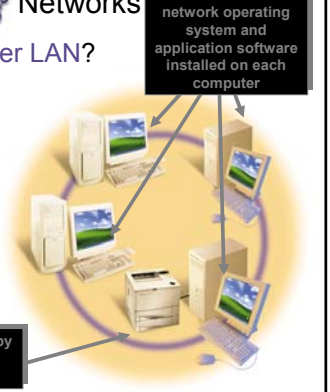
nodes in network

Next

p.9.12 Fig. 9-9

What is a **peer-to-peer LAN**?

- Small network that shares hardware, data, or information located on any other computer in network
- Each computer stores files on its own storage devices



Next

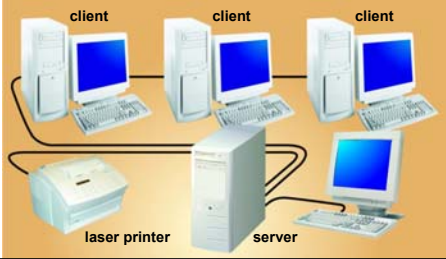
p.9.13 Fig. 9-11

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## Networks

### What is a client/server LAN?

- Network in which one or more computers act as a server and other computers on the network can request services from server



client client client  
 laser printer server

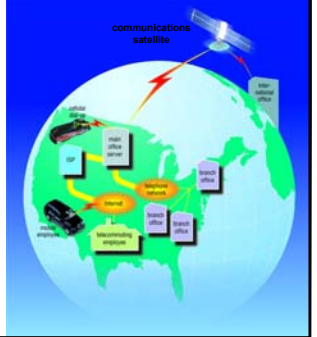
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 p.9.14 Fig. 9-12

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## Networks

### What is a wide area network (WAN)?

- Network that covers large geographic area
- Internet is world's largest WAN



communications satellite

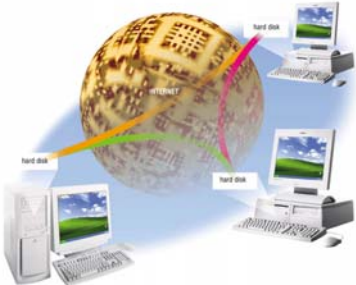
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 p.9.15 Fig. 9-13

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## Networks

### What is an Internet use of peer-to-peer (P2P)?

- Enables users with same networking software to connect to each other's hard disks and exchange files directly



hard disk hard disk hard disk

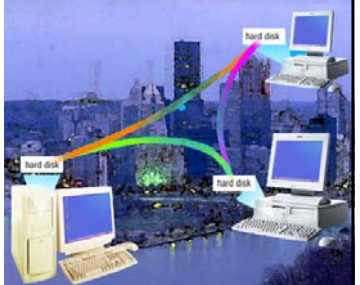
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 p.9.16 Fig. 9-14

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## Networks

### What is a metropolitan area network (MAN)?

- Backbone network that connects local area networks in a metropolitan area such as a city or town



hard disk hard disk hard disk

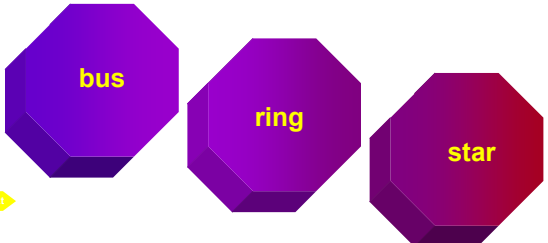
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## Networks

### What is a network topology?

- Configuration, or physical arrangement, of devices in a communications network
- Networks usually use combinations of three topologies



bus ring star

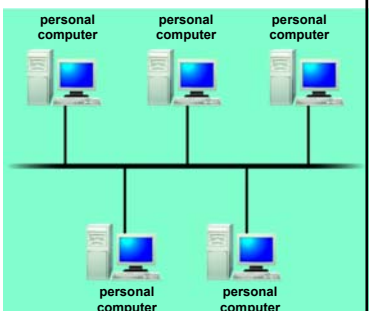
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## Networks

### What is a bus network?

- Consists of a single central cable, to which all computers and other devices connect
- Bus is physical cable or backbone
- Inexpensive and easy to install




personal computer personal computer personal computer  
 personal computer personal computer

Next  
 p.9.17 Fig. 9-15

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 Concepts for a Digital World  
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### What is a ring network?

- Cable forms closed ring, or loop, with all computers and devices arranged along ring
- Data travels from device to device around entire ring, in one direction

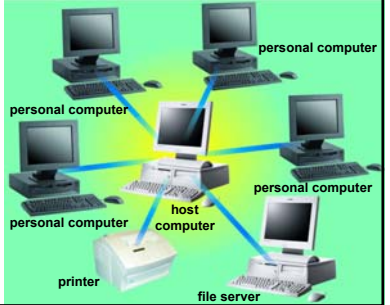


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 p.9.16 Fig. 9-16

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### What is a star network?

- All devices connect to a central computer, called the hub
- All data transferred from one computer to another passes through hub




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 p.9.18 Fig. 9-17

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### What are network communications technologies?

- Specific combinations of hardware and software that allow different devices on several types of networks to communicate

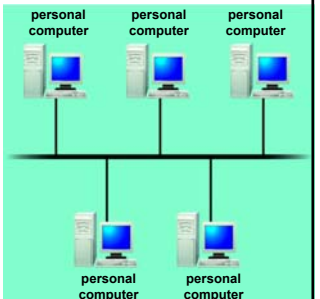


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### What is Ethernet?

- LAN technology that allows personal computers to contend for access to network
- Based on bus technology




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### What is token ring?

- LAN technology that controls access to network by requiring network devices to share or pass a special signal, called a token
- Device with token can transmit data over network
- Only one token exists per network
- Based on ring topology, although it can use star topology

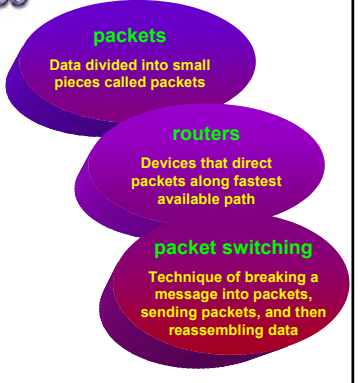


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### What is TCP/IP?

- Short for transmission control protocol/Internet protocol
- Transmits data by breaking it up into packets
- Commonly used for Internet transmissions



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## Discovering Computers 2003 Networks

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### What is the Wireless Applications Protocol (WAP)?

- Allows wireless mobile devices to access Internet and its services
- Wireless device contains client software, which connects to Internet service provider's server



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## Discovering Computers 2003 Networks

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### What is an intranet?

- Internal network that uses Internet technologies
- Lets company make information accessible to employees and facilitate working in groups
- Typically includes a connection to Internet

has a Web server

accessible via a Web browser

users can post and update information on intranet by creating and posting a Web page

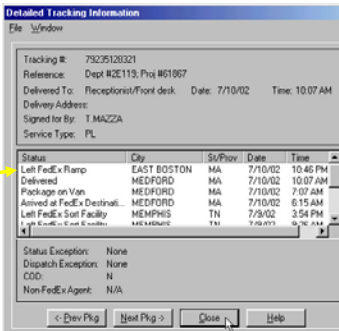
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## Discovering Computers 2003 Networks

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### What is an extranet?

- Allows customers or suppliers to access part of company's intranet



customer checking package on Fed Ex's intranet via the Internet

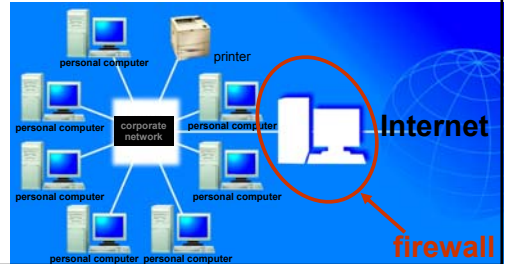
Next  
p.9.20 Fig. 9-18

## Discovering Computers 2003 Networks

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### What is a firewall?

- Hardware and/or software that restricts access to data and information on network



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p.9.21 Fig. 9-19

## Discovering Computers 2003 Networks

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### What is a home network?

- ❖ Multiple computers connected together in home

- Ways to connect
  - Ethernet – connect each computer via cable
  - HomePLC (powerline cable) – use electrical lines in house
  - Phoneline – use telephone lines
  - HomeRF (radio frequency) – wireless



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p.9.22 Fig. 9-20

## Discovering Computers 2003 Networks

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### What is an intelligent home network?

- Extends basic home network to include features such as lighting control, thermostat adjustment, and security system

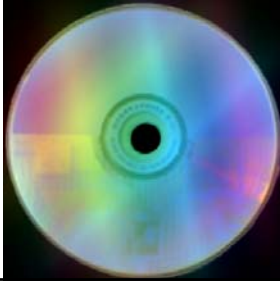


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## Discovering Computers 2003 Communications Software

What is communications software?

- Programs that help establish connection to another computer or network

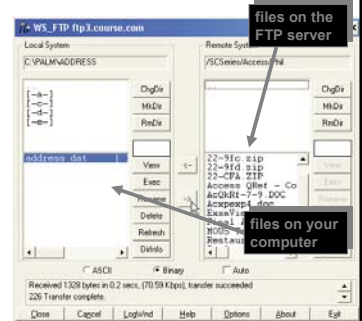


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## Discovering Computers 2003 Communications Software

What is file transfer protocol (FTP)?

- Internet standard that allows you to upload and download files to and from a Web server, called the FTP server



Next  
p.9.24 Fig. 9.23

## Discovering Computers 2003 The Telephone Network

What is the public switched telephone network (PSTN)?

- Worldwide telephone system that handles voice-oriented telephone calls



Next  
p.9.25 Fig. 9.24

## Discovering Computers 2003 The Telephone Network

What is a dial-up line and a dedicated line?

- Dial-up line is temporary connection using telephone line for communications
- Dedicated line is line always connected between two communications devices

### Advantages of dial-up line

1. Costs no more than making regular call
2. Computers at any two locations can establish a connection using modems and telephone network

### Advantages of dedicated line

1. Quality and consistency of connection are better
2. Computer locations are fixed
3. Can be digital or analog

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## Discovering Computers 2003 The Telephone Network

What is transfer rate?

- Speed at which a line carries data and information
- Faster the transfer rate, the faster you can send and receive data and information
- Usually expressed as a measure of bits per second

bits per second (bps)

kilobits per second (Kbps)

megabits per second (Mbps)

gigabits per second (Gbps)

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## Discovering Computers 2003 The Telephone Network

What are popular types of digital dedicated lines?

Type of Line	Transfer Rates	Approximate Monthly Cost
Dial-up	Up to 56 Kbps	Local or long-distance rates
ISDN (BRI)	Up to 128 Kbps	\$10 to \$40
ADSL	128 Kbps – 9 Mbps	\$40 to \$80
Cable TV (CATV)	128 Kbps – 2.5 Mbps	\$30 to \$50
T1	1.544 Mbps	\$1,000 or more
T3	44 Mbps	\$10,000 or more
ATM	155 Mbps to 622 Mbps	\$8,000 or more

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p.9.26 Fig. 9.25

**Discovering Computers 2003** Communications Devices  
 Concepts for a Digital World Web and XP Enhanced

**What is a communications device?**

- Any type of hardware capable of transmitting data, instructions, and information between sending device and receiving device

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**Discovering Computers 2003** Communications Devices  
 Concepts for a Digital World Web and XP Enhanced

**What is a dial-up modem?**

- Communications device that converts computer's digital signals to analog signals and analog signals to digital signals
- ISDN and DSL use digital modem with a digital telephone line

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**Discovering Computers 2003** Communications Devices  
 Concepts for a Digital World Web and XP Enhanced

**What is a cable modem?**

- Modem that sends and receives data over cable television network
- Much faster than modem or ISDN
- Usually attaches to network card

Next p.9.29 Fig. 9-28

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 Concepts for a Digital World Web and XP Enhanced

**What is a network interface card (NIC)?**

- Card inserted into expansion slot of personal computer or other device, enabling it to connect to a network

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**Discovering Computers 2003** Communications Devices  
 Concepts for a Digital World Web and XP Enhanced

**What is a hub?**

- Device that provides a central point for cables in a network

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**Discovering Computers 2003** Communications Channel  
 Concepts for a Digital World Web and XP Enhanced

**What is a channel?**

- Communications path between two devices

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**Discovering Computers 2003** Communications Channel  
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### Sending a request over the Internet

- 1: Sending device requests information
- 2: When request leaves the ISP, it travels over a variety of lines until it reaches Internet backbone
- 3: Request travels over T3 lines along Internet backbone
- 4: Request travels over T1 lines until it reaches destination network server

Next  
p.9.31 Fig. 9.31

**Discovering Computers 2003** Physical Transmission Media  
 Concepts for a Digital World Web and XP Enhanced

### What is physical transmission media?

- Wire, cable, and other tangible (touchable) materials used to send communications signals

Type of Cable and LAN	Transfer Rates
<b>Twisted Pair</b>	
• 10Base-T (Ethernet)	10 Mbps
• 100Base-T (Fast Ethernet)	100 Mbps
• 1000Base-T (Gigabit Ethernet)	1000 Mbps
• Token ring	4 - 16 Mbps
<b>Coaxial Cable</b>	
• 10Base2 (ThinWire Ethernet)	10 Mbps
• 10Base5 (ThickWire Ethernet)	10 Mbps
<b>Fiber-Optic Cable</b>	
• 10Base-F (Ethernet)	10 Mbps
• 100Base-FX (Fast Ethernet)	100 Mbps
• FDDI (Fiber Distributed-Data Interface) token ring	100 Mbps

Next  
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**Discovering Computers 2003** Physical Transmission Media  
 Concepts for a Digital World Web and XP Enhanced

### What is twisted-pair cable?

- Transmission media used by telephone system and network cabling

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p.9.33 Fig. 9.33

**Discovering Computers 2003** Physical Transmission Media  
 Concepts for a Digital World Web and XP Enhanced

### What is coaxial cable?

- Single copper wire surrounded by at least three layers
- Often used for cable television wiring

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p.9.33 Fig. 9.34

**Discovering Computers 2003** Physical Transmission Media  
 Concepts for a Digital World Web and XP Enhanced

### What is fiber-optic cable?

- Contains core of dozens or hundreds of thin strands of glass or plastic
- Uses light to transmit signals

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p.9.34 Fig. 9.35

**Discovering Computers 2003** Wireless Transmission Media  
 Concepts for a Digital World Web and XP Enhanced

### What is wireless transmission media?

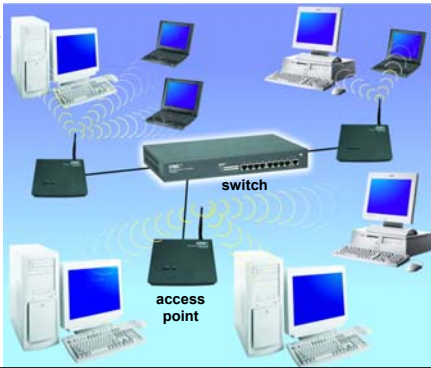
- Send communications signals through air or space
- Used when inconvenient, impractical, or impossible to install cables

Channel	Transfer Rates
Broadcast radio	Up to 2 Mbps
Microwave radio	45 Mbps
Communications satellite	50 Mbps
Cellular radio	9,600 bps to 14.4 Kbps
Infrared	1 to 4 Mbps

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p.9.34 Fig. 9.36

## Wireless Transmission Media

What is an example of a wireless local area network?



Next  
p.9.36 Fig. 9-38

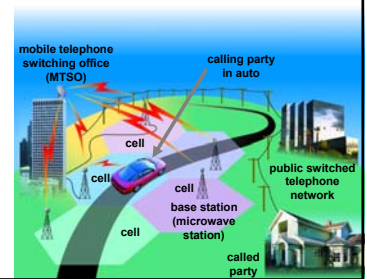
## Wireless Transmission Media

What is cellular radio?

- Form of broadcast radio used widely for mobile communications



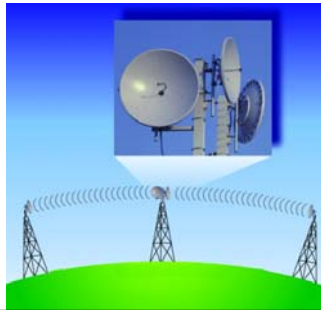
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p.9.36 Fig. 9-39



## Wireless Transmission Media

What is a microwave station?

- Earth-based reflective dish that contains antenna, transceivers, and other equipment necessary for microwave communications
- Uses line-of-sight transmission
  - Must transmit in straight line with no obstructions between microwave antennas



Next  
p.9.38 Fig. 9-40

## Wireless Transmission Media

What is a communications satellite?

- Space station that receives microwave signals from an earth based station, amplifies the signals, and then broadcasts the signals back over a wide area to any number of earth-based stations



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p.9.38 Fig. 9-41

## Wireless Transmission Media

What is infrared (IR)?

- Wireless transmission media that sends signals using infrared light waves
- Requires line-of-sight transmission
- Many computers and devices have an IrDA port that enables transfer of data using infrared light rays



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## Summary of Communications and Networks

- Communications
- Sending and receiving devices
- Uses of communications technologies
- Networks
- Communications software
- Telephone network
- Communications devices
- Communications channel
- Physical transmission media
- Wireless transmission media

**Chapter 9 Complete**