Chapter Nine

Communications and Networks

Discovering Computers 2011

Living in a Digital World

Objectives Overview

Discuss the purpose of the components required for successful communications and identify various sending and receiving devices

Describe the uses of computer communications

List advantages of using a network, and differentiate among LANs, MANs, and WANs

Differentiate between client/server and peer-to-peer networks, and describe how a P2P network works

Differentiate among a star network, bus network, and ring network

Describe the various network communications standards

See Page 459
for Detailed Objectives

Objectives Overview

Explain the purpose of communications software

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 459
for Detailed Objectives

Communications

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

Communications

Pages 460 – 461
Figure 9-1

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 9, Click Web Link from left navigation, then click Wikis below Chapter 9

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

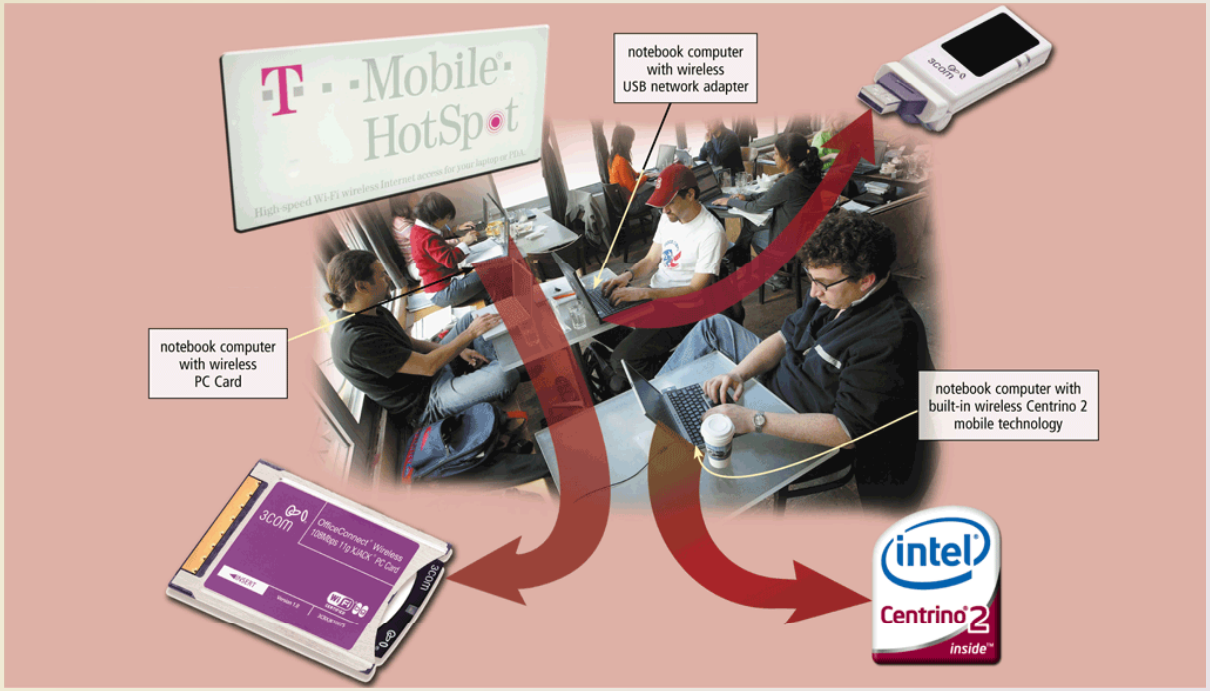
Video messaging allows users to send short video clips

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

Click to view Web Link, click Chapter 9, Click Web Link from left navigation, then click Video Messaging below Chapter 9

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



Pages 464 – 465
Figure 9-4

Uses of Computer Communications

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

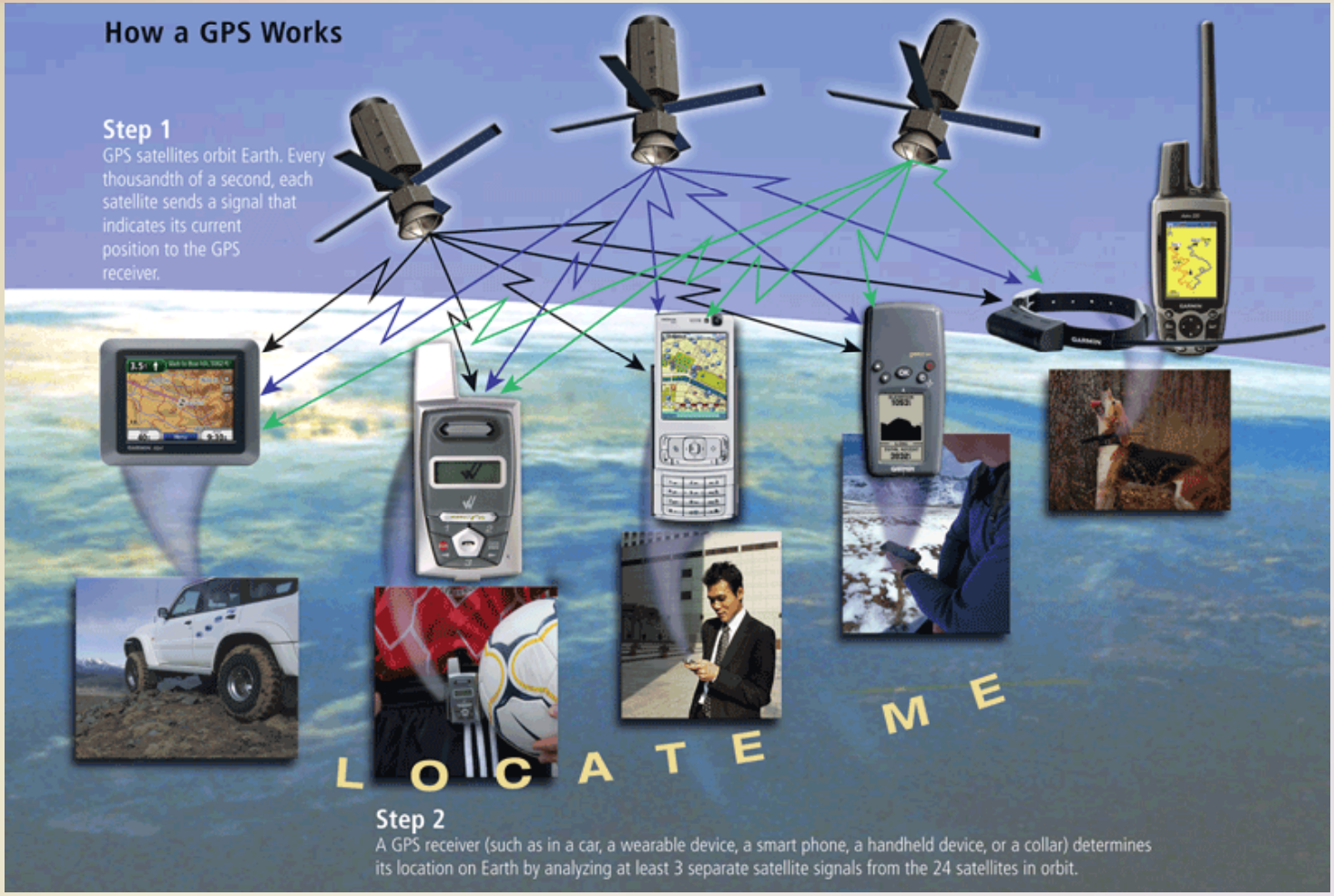
Uses of Computer Communications

- 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

Click to view Web Link, click Chapter 9, Click Web Link from left navigation, then click GPS below Chapter 9

Uses of Computer Communications



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

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

Online meetings

Web conferences

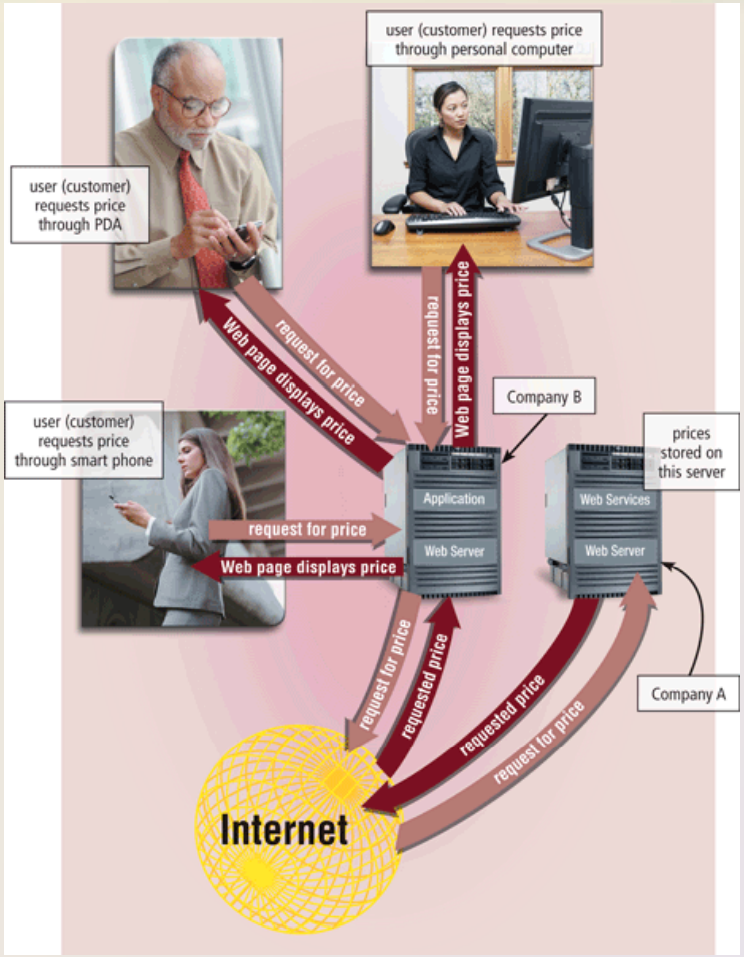
Document management systems

Click to view Web Link, click Chapter 9, Click Web Link from left navigation, then click Microsoft Groove below Chapter 9

Uses of Computer Communications

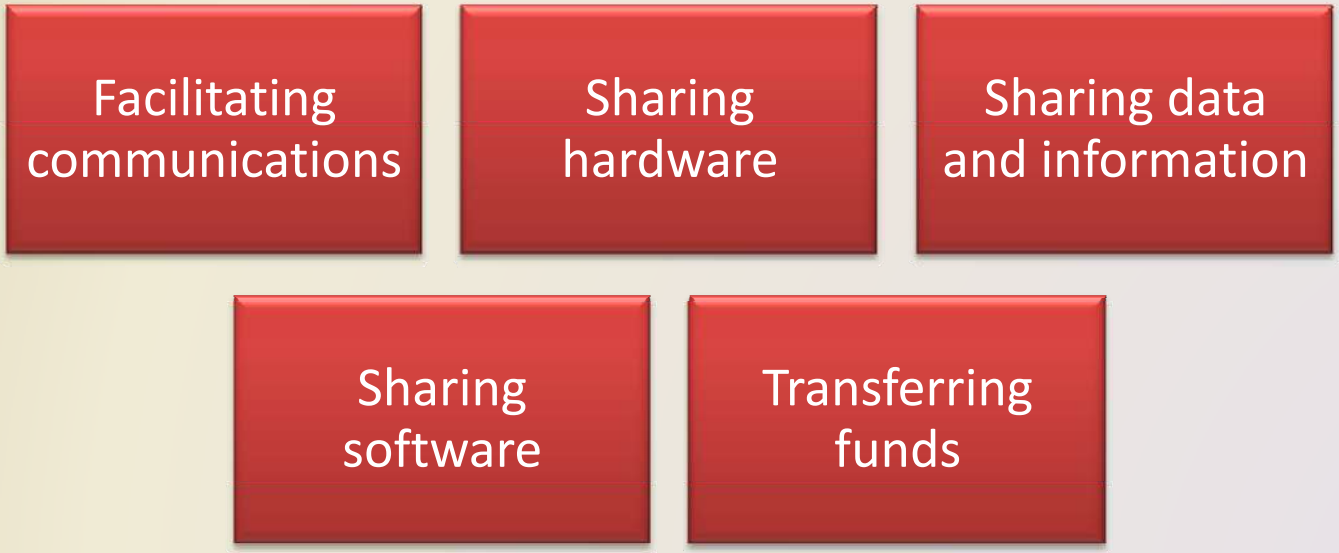
Uses of Computer Communications

- 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

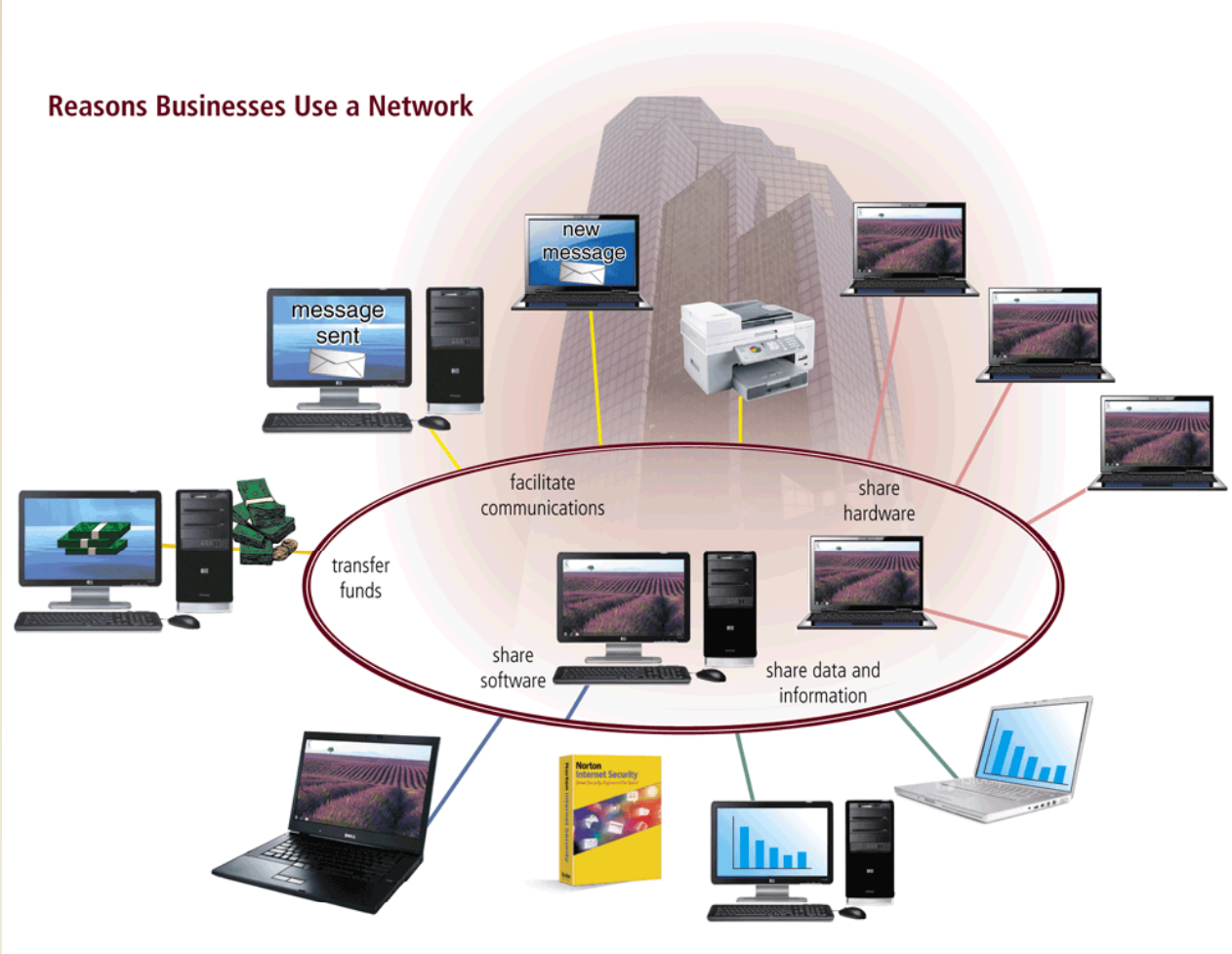


Networks

- A **network** is a collection of computers and devices connected together via communications devices and transmission media
- Advantages of a network include:

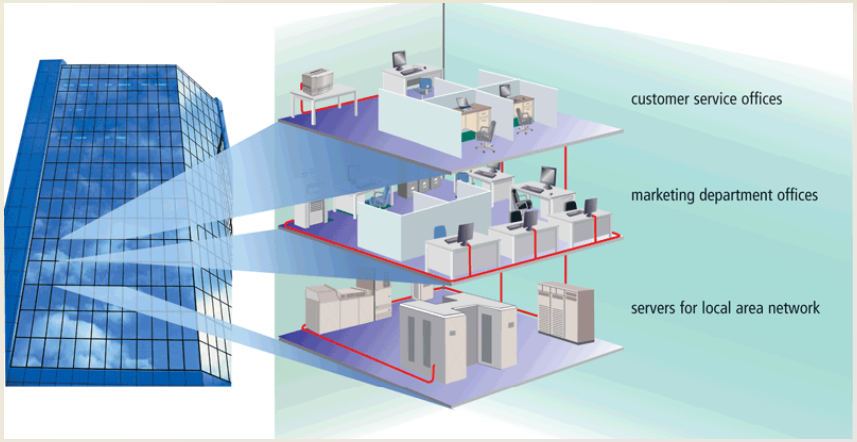


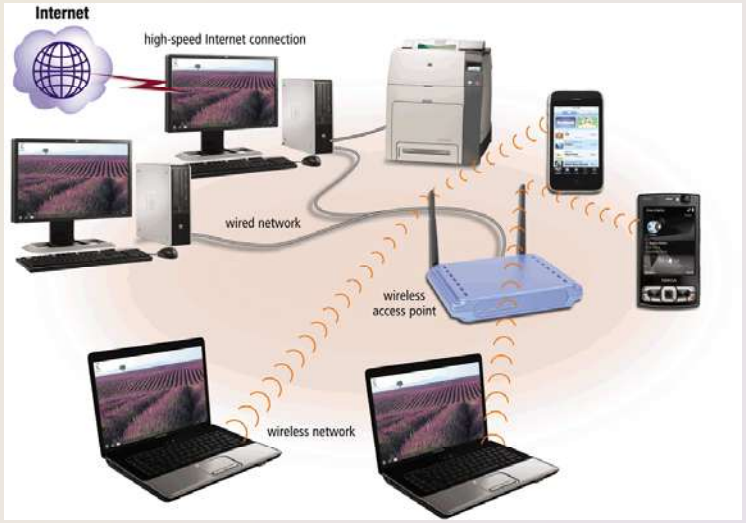
Networks


Reasons Businesses Use a Network
new message
message sent
facilitate communications
share hardware
transfer funds
share software
share data and information
Norton Internet Security

Networks

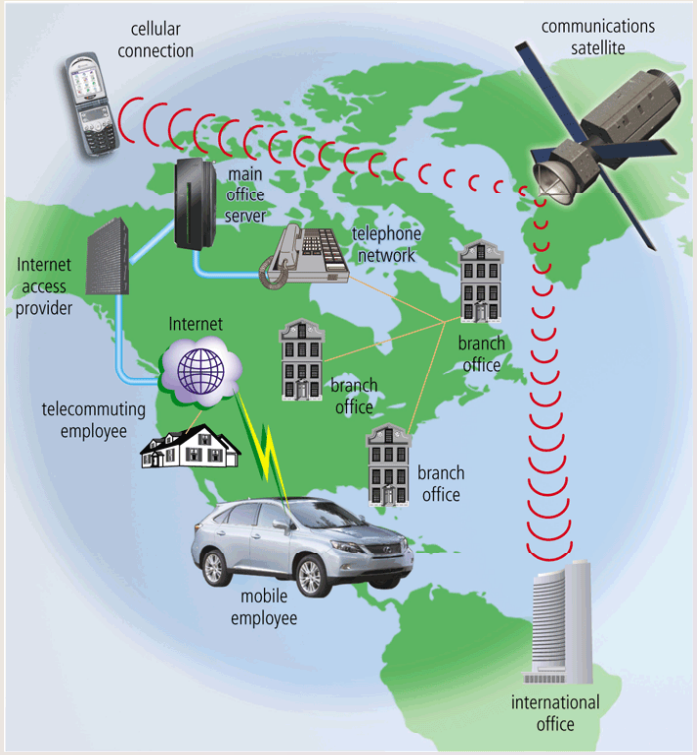
- A **local area network** (**LAN**) is a network that connects computers and devices in a limited geographical area
- A **wireless LAN** (**WLAN**) is a LAN that uses no physical wires





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

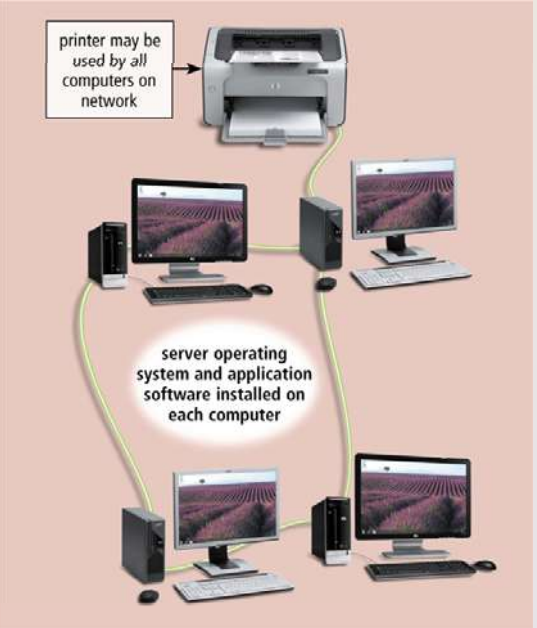


Networks

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

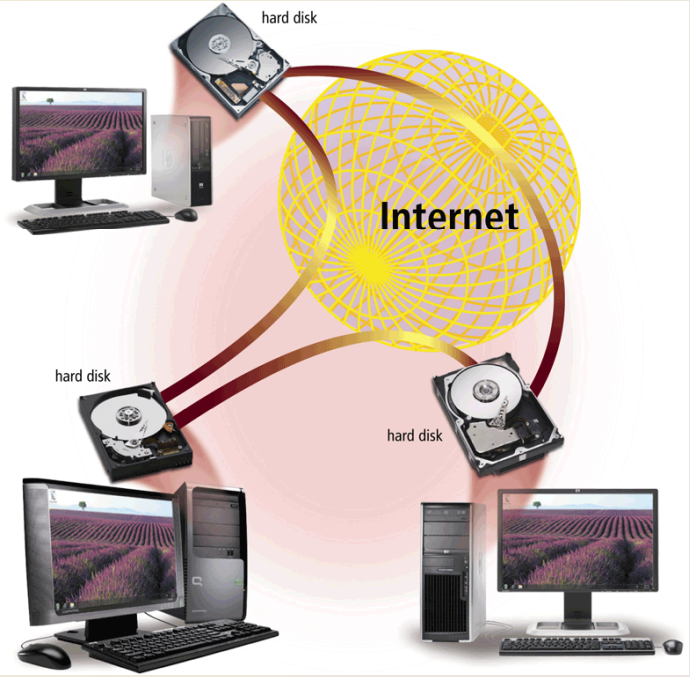
Client/server network

Peer-to-peer network



Networks

- P2P describes an Internet network on which users access each other's hard disks and exchange files directly over the Internet



Click to view Web Link, click Chapter 9, Click Web Link from left navigation, then click P2P below Chapter 9

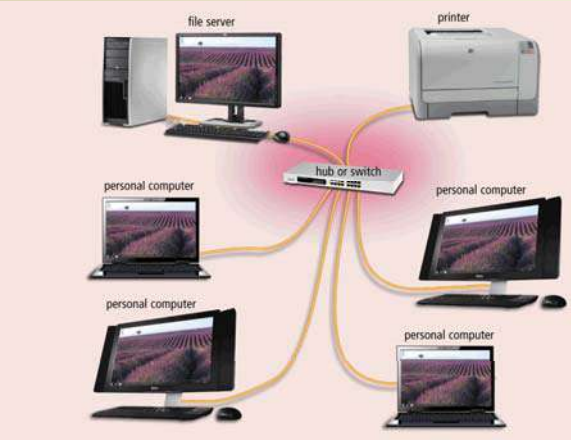
Page 475
Figure 9-15

Discovering Computers 2011: Living in a Digital World
Chapter 9

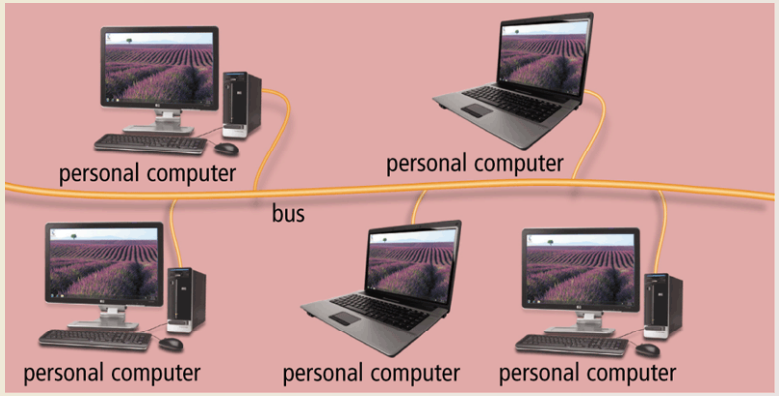
Networks

- A **network topology** refers to the layout of the computers and devices in a communications network

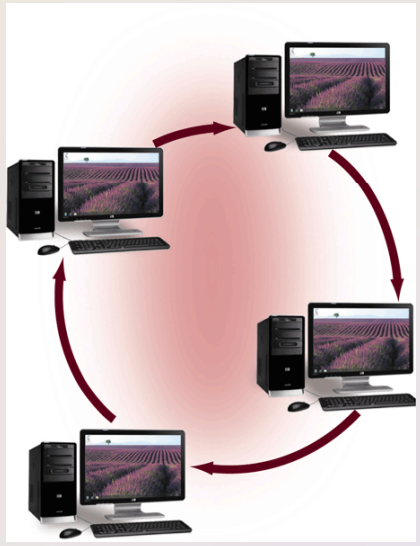
Star network



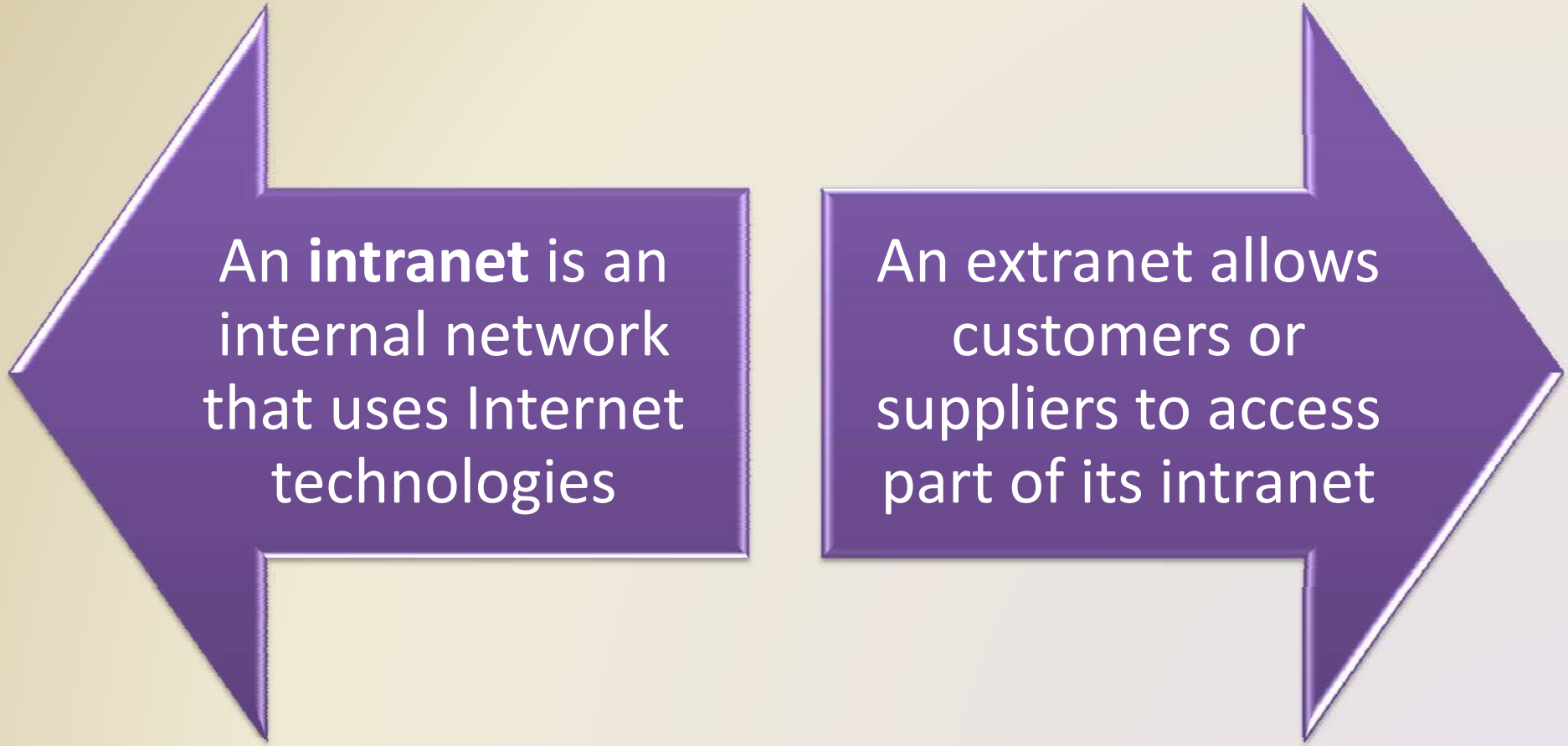
Bus network



Ring network



Networks


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

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

Click to view Web Link, click Chapter 9, Click Web Link from left navigation, then click Ethernet below Chapter 9

Network Communications Standards

Network Communications Standards

- **Wi-Fi** identifies any network based on the **802.11** standard that facilitates wireless communication
- Sometimes referred to as wireless Ethernet

802.11 Series of Standards

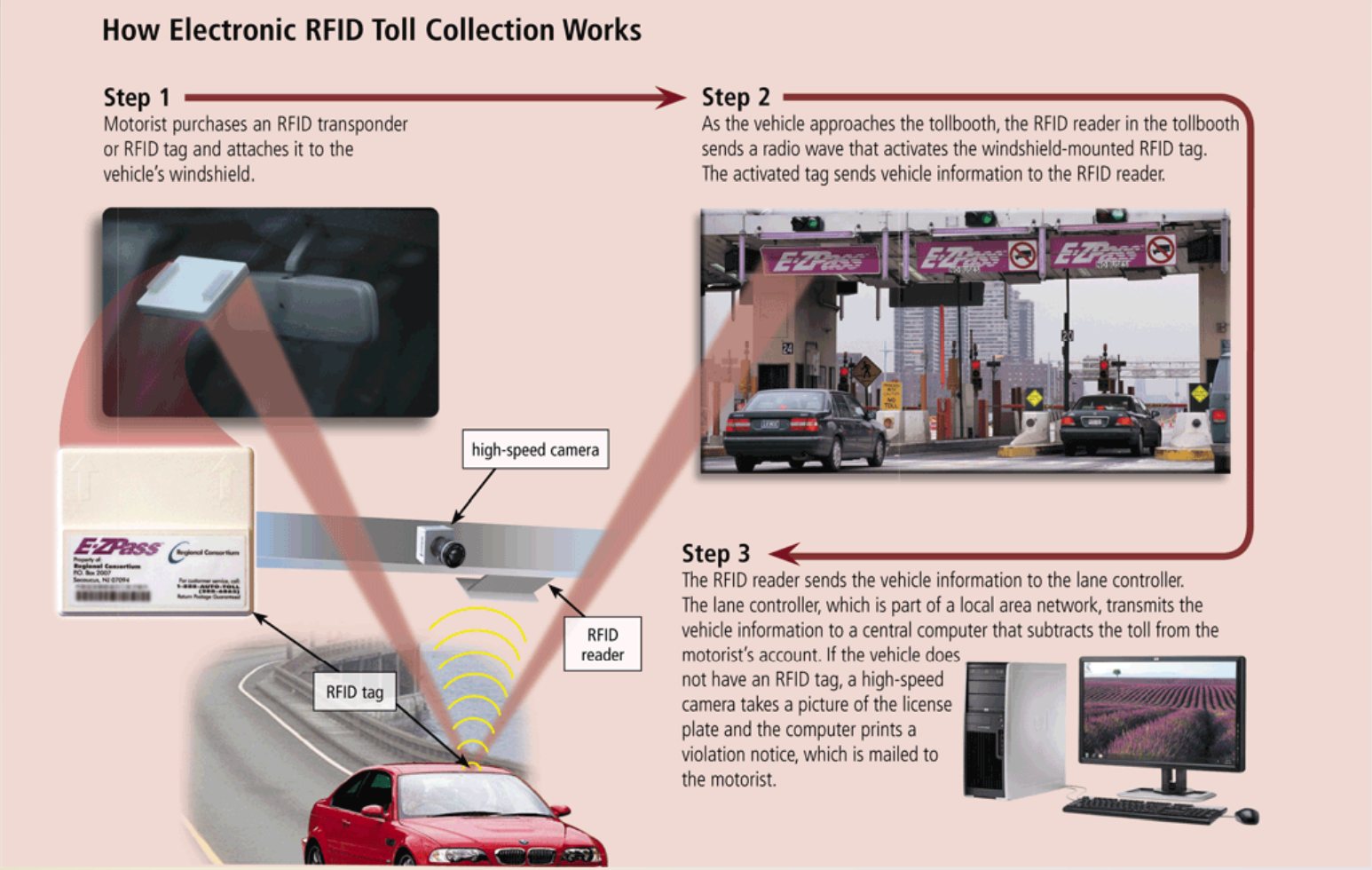
Standard	Transfer Rates
802.11	1 or 2 Mbps
802.11a	Up to 54 Mbps
802.11b	Up to 11 Mbps
802.11g	54 Mbps and higher
802.11n	108 Mbps and higher

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

Click to view Web Link, click Chapter 9, Click Web Link from left navigation, then click RFID below Chapter 9

Network Communications Standards



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:

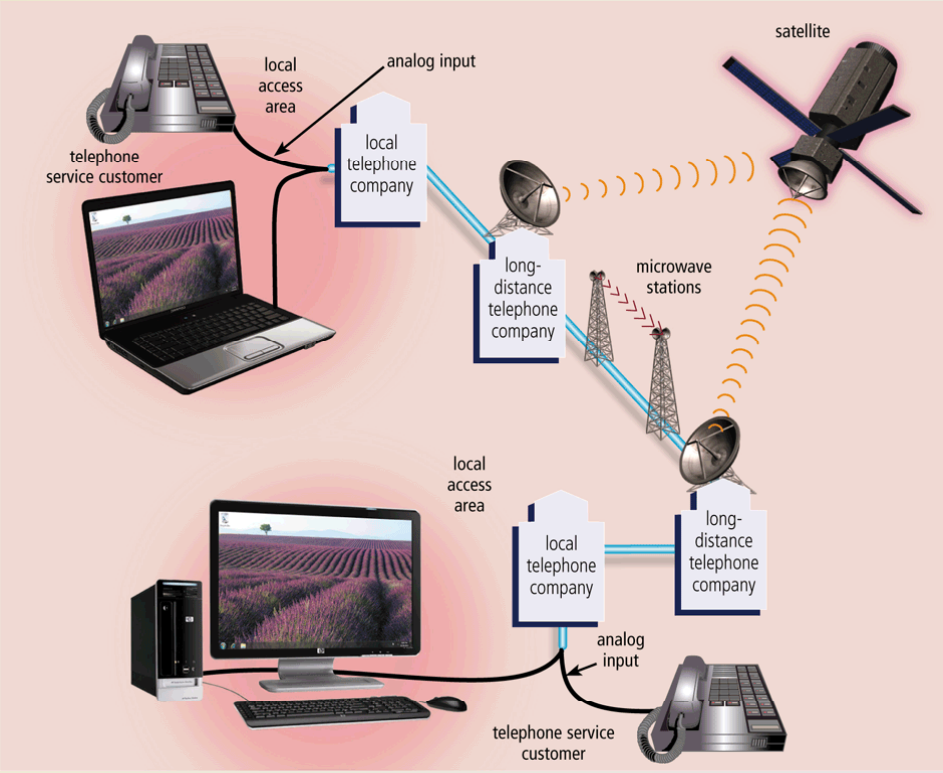
Help users establish a connection to another computer or network

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



Pages 482 – 483
Figure 9-23

Communications Over the Telephone Network

- Dial-up lines
- Dedicated line
- ISDN line
- DSL
- FTTP
- T-carrier line
- ATM

Click to view Web Link, click Chapter 9, Click Web Link from left navigation, then click DSL below Chapter 9

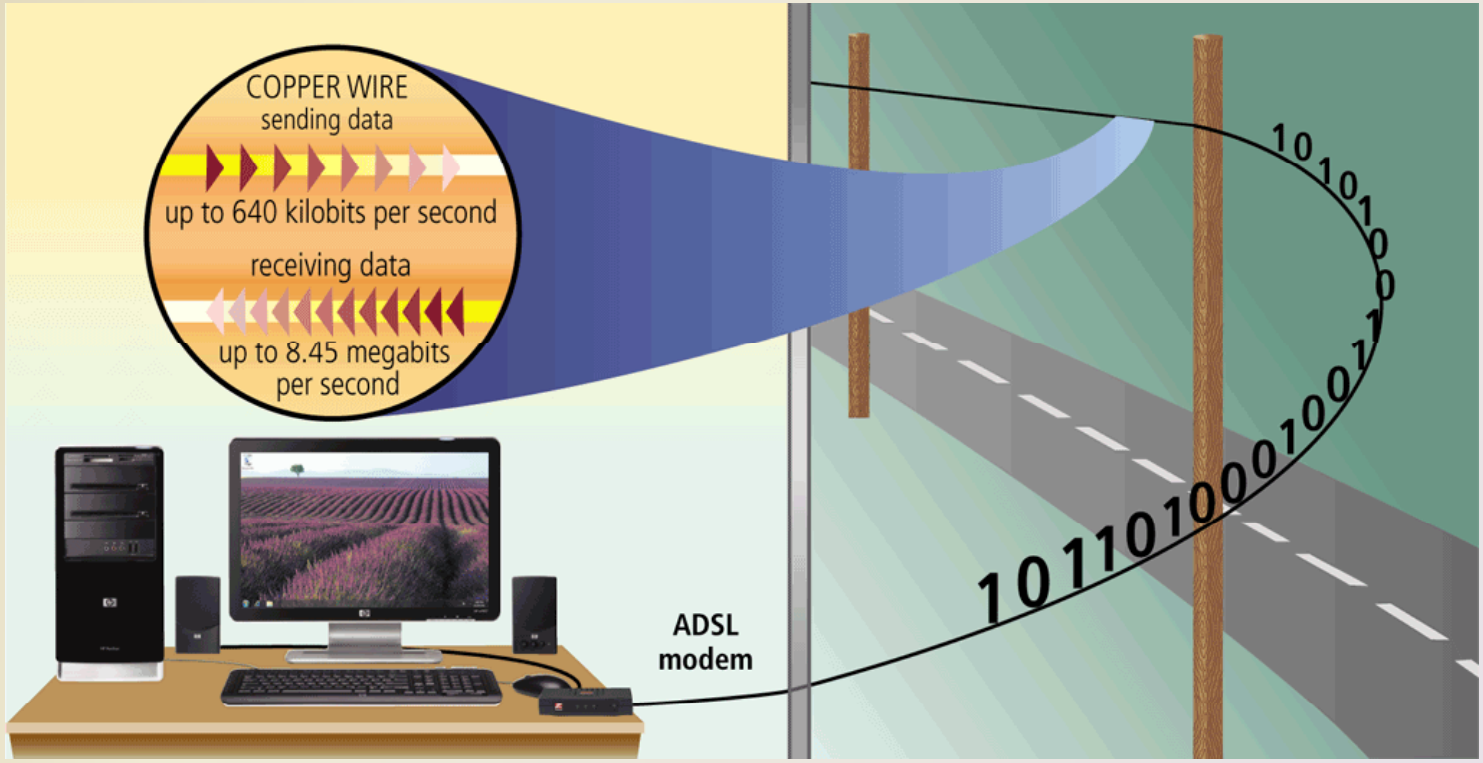
Communications Over the Telephone Network

Speeds of Various Internet Connections

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

Communications Over the Telephone Network

- ADSL connections transmit data downstream at a much faster rate than upstream

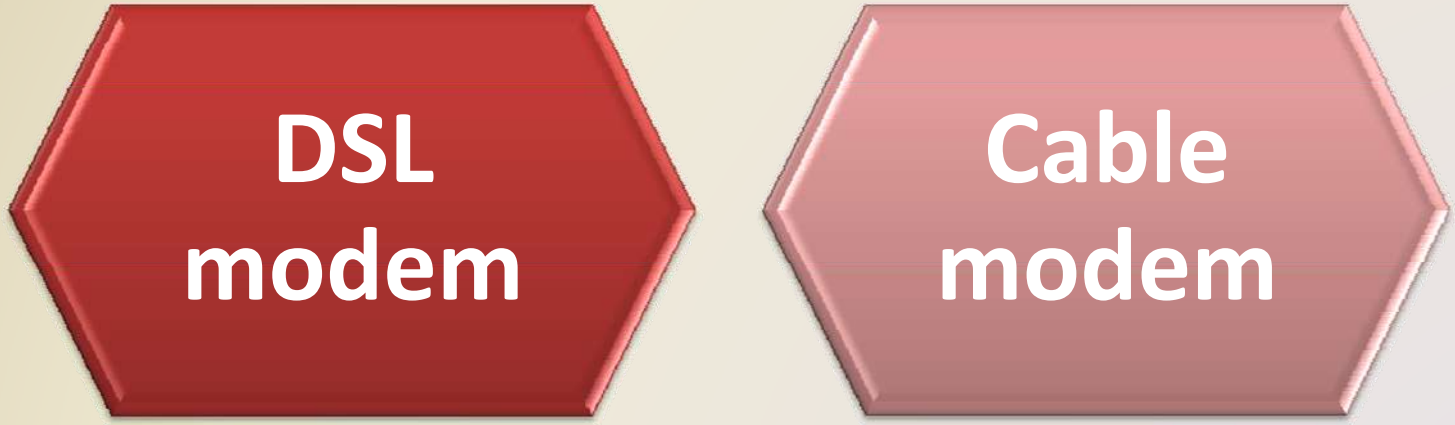


Communications Devices

- 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

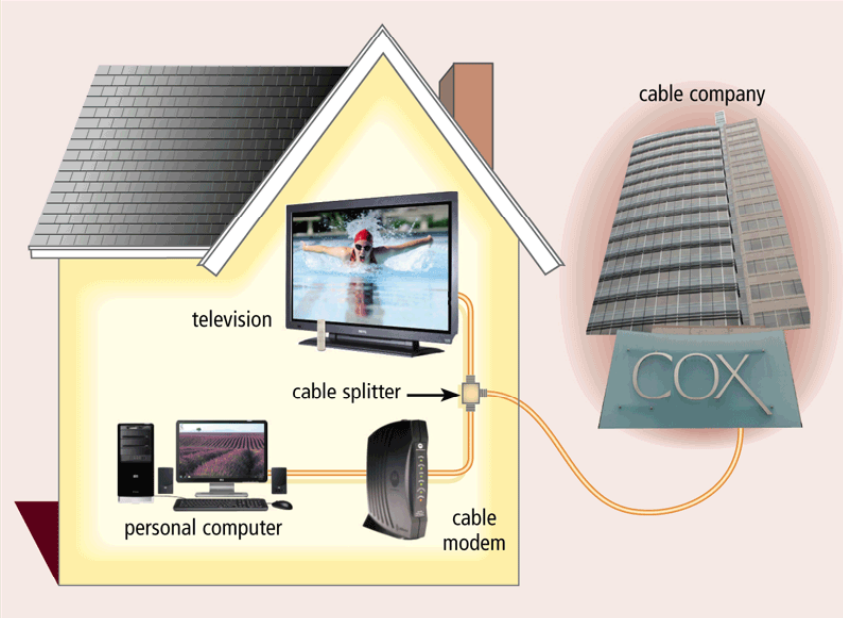
Communications Devices

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



Click to view Web Link, click Chapter 9, Click Web Link from left navigation, then click Cable Modems below Chapter 9

Communications Devices

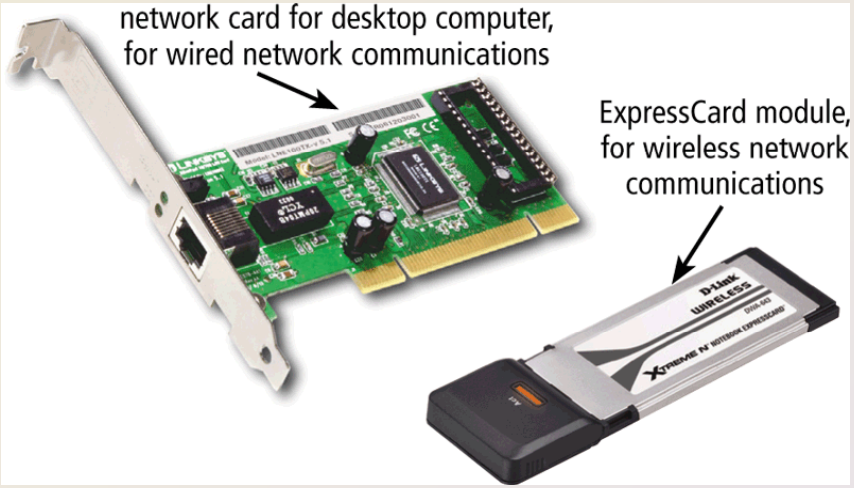


Communications Devices

- 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

Communications Devices

- 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

Click to view Web Link, click Chapter 9, Click Web Link from left navigation, then click Wireless Routers below Chapter 9

Page 488
Figure 9-31

Communications Devices

- A hub or switch connects several devices in a network together

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

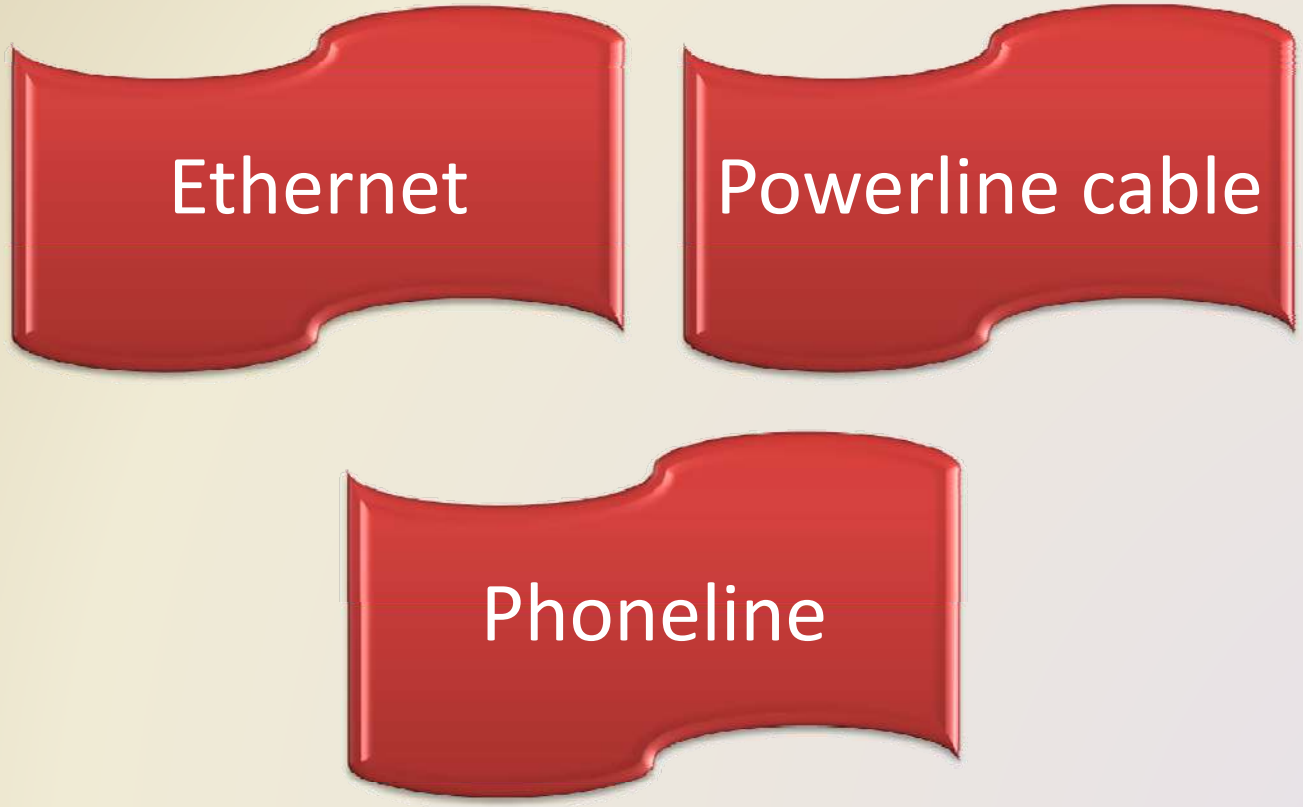
Connect game consoles to the Internet

Subscribe to and use VoIP

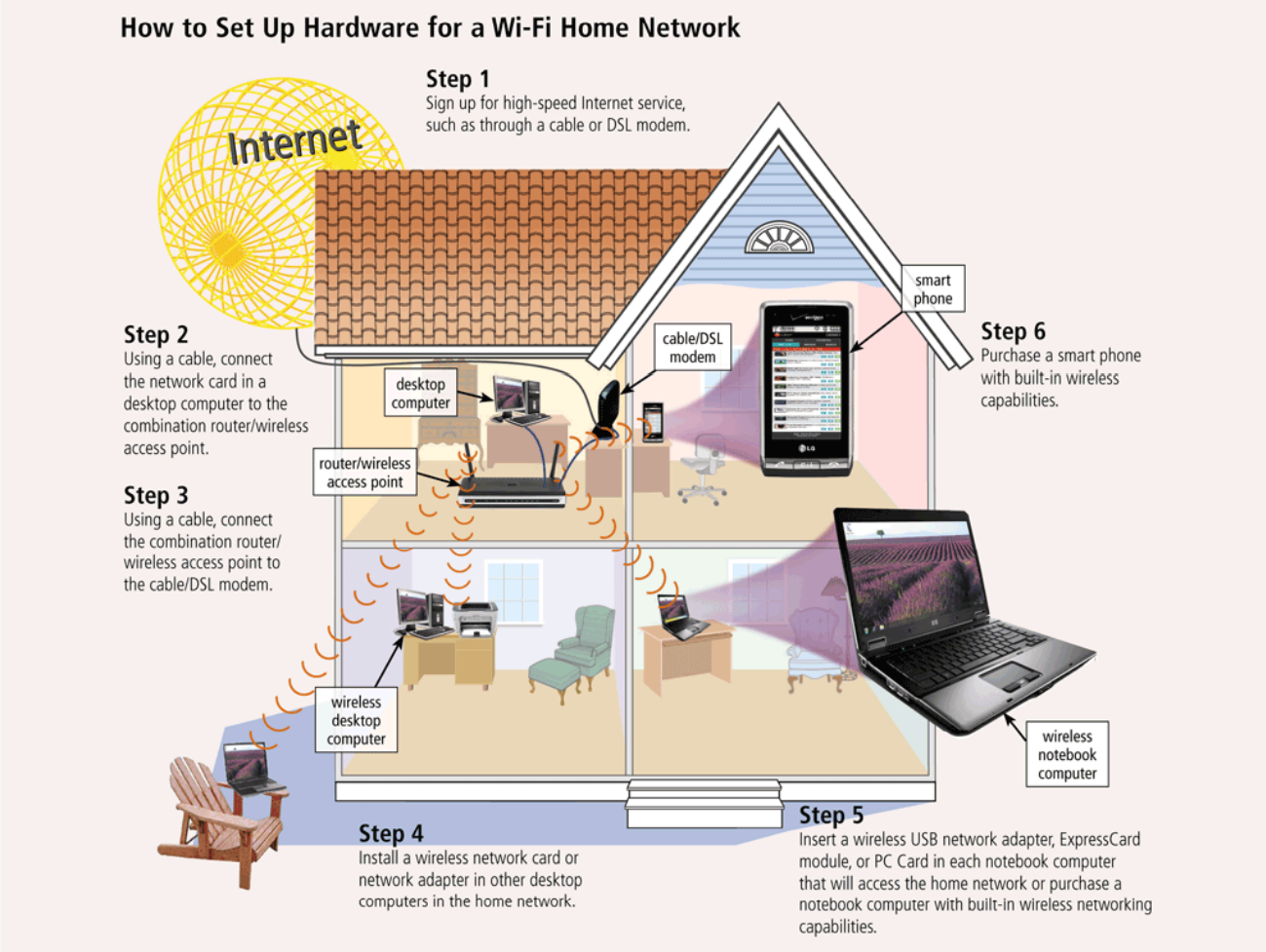
Click to view Web Link, click Chapter 9, Click Web Link from left navigation, then click Home Networks below Chapter 9

Home Networks

- Types of wired home networks:

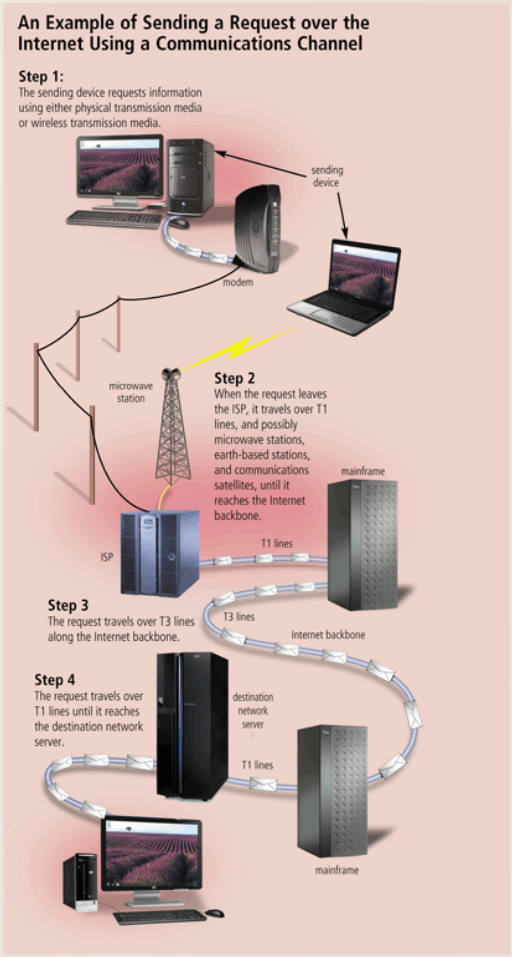


Home Networks



Communications Channel

- The amount of data that can travel over a communications channel sometimes is called the **bandwidth**
- **Latency** is the time it takes a signal to travel from one location to another on a network
- **Transmission media** carries one or more signals
- **Broadband** media transmit multiple signals simultaneously



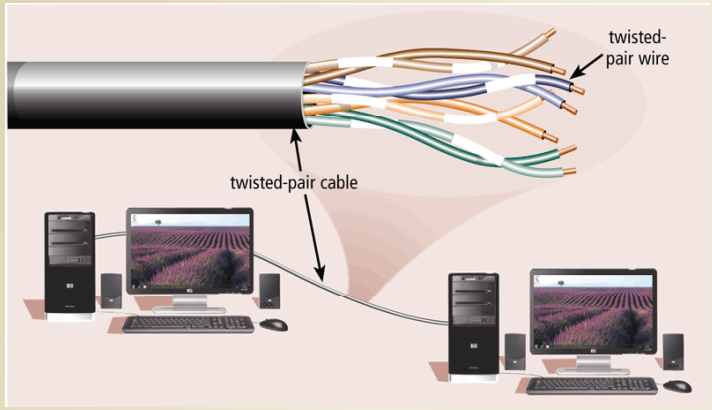
Physical Transmission Media

Transfer Rates for Various Types of LANs Using Physical Transmission Media

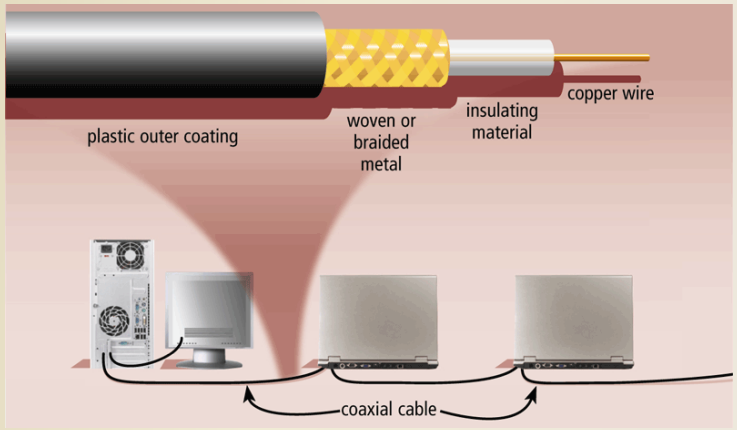
Type of Cable and LAN	Maximum Transfer Rate
Twisted-Pair Cable	
• 10Base-T (Ethernet)	10 Mbps
• 100Base-T (Fast Ethernet)	100 Mbps
• 1000Base-T (Gigabit Ethernet)	1 Gbps
• Token ring	4 Mbps to 16 Mbps
Coaxial Cable	
• 10Base2 (ThinWire Ethernet)	10 Mbps
• 10Base5 (ThickWire Ethernet)	10 Mbps
Fiber-Optic Cable	
• 10Base-F (Ethernet)	10 Mbps
• 100Base-FX (Fast Ethernet)	100 Mbps
• FDDI (Fiber Distributed Data Interface) token ring	100 Mbps
• Gigabit Ethernet	1 Gbps
• 10-Gigabit Ethernet	10 Gbps
• 40-Gigabit Ethernet	40 Gbps
• 100-Gigabit Ethernet	100 Gbps

Physical Transmission Media

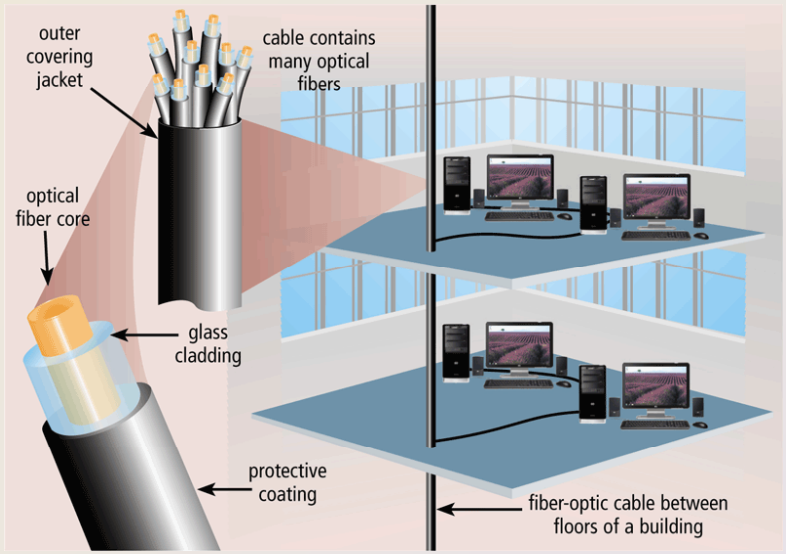
Twisted-pair cable



Coaxial cable



Fiber-optic cable



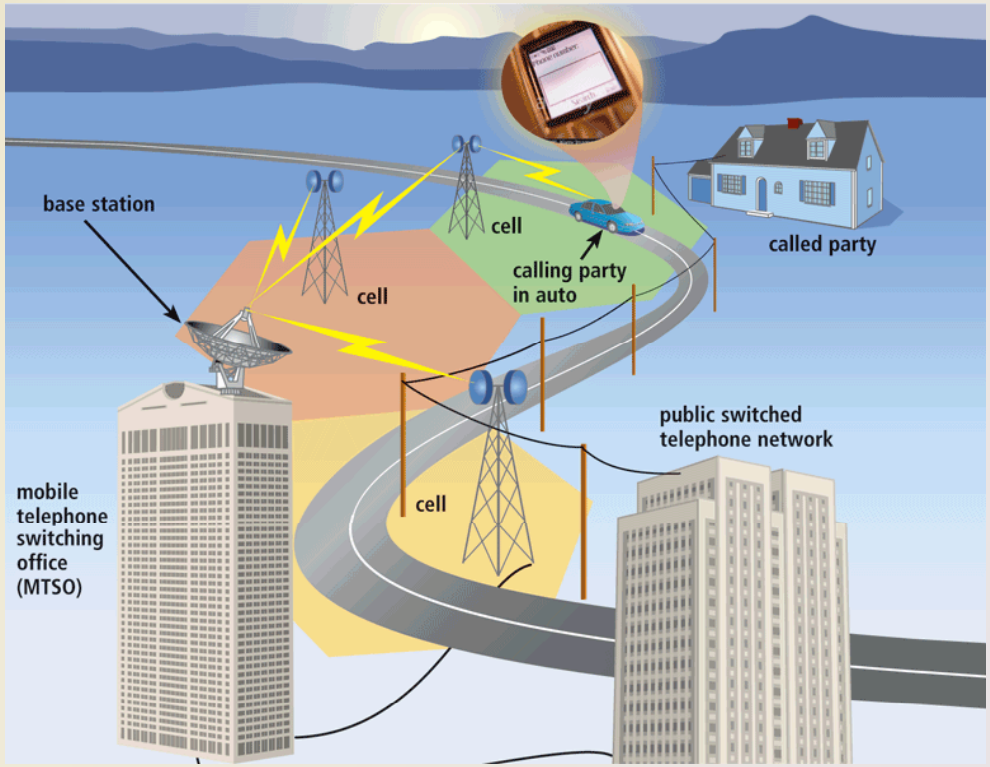
Wireless Transmission Media

Transfer Rates for Various Types of Wireless Transmission Media

Medium		Maximum Transfer Transmission Rate
Infrared		115 Kbps to 4 Mbps
Broadcast radio	• Bluetooth	1 Mbps to 2 Mbps
	• HomeRF	1.6 Mbps to 10 Mbps
	• 802.11b	11 Mbps
	• 802.11a	54 Mbps
	• 802.11g	54 Mbps
	• 802.11n	108 Mbps
	• UWB	110 Mbps to 480 Mbps
Cellular radio	• 2G	9.6 Kbps to 19.2 Kbps
	• 3G	144 Kbps to 2.4 Mbps
	• 4G	Up to 15 Mbps
Microwave radio		150 Mbps
Communications satellite		1 Gbps

Wireless Transmission Media

- **Cellular radio** is a form of broadcast radio that is used widely for mobile communications

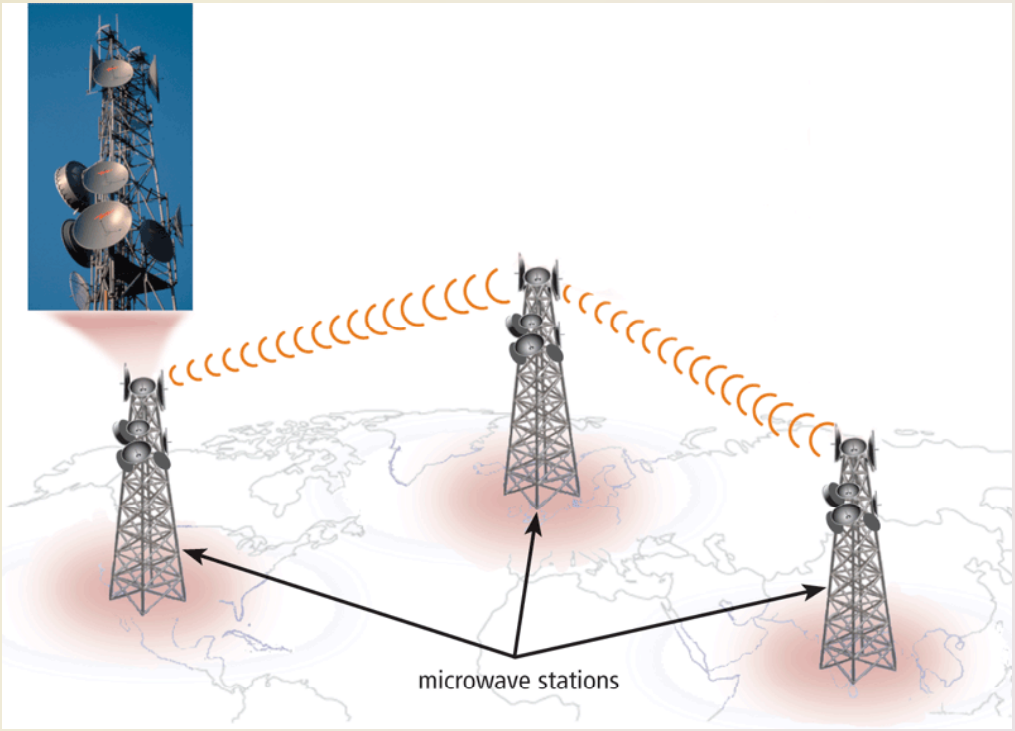


Click to view Web Link, click Chapter 9, Click Web Link from left navigation, then click Mobile TV below Chapter 9

Page 495
Figure 9-40

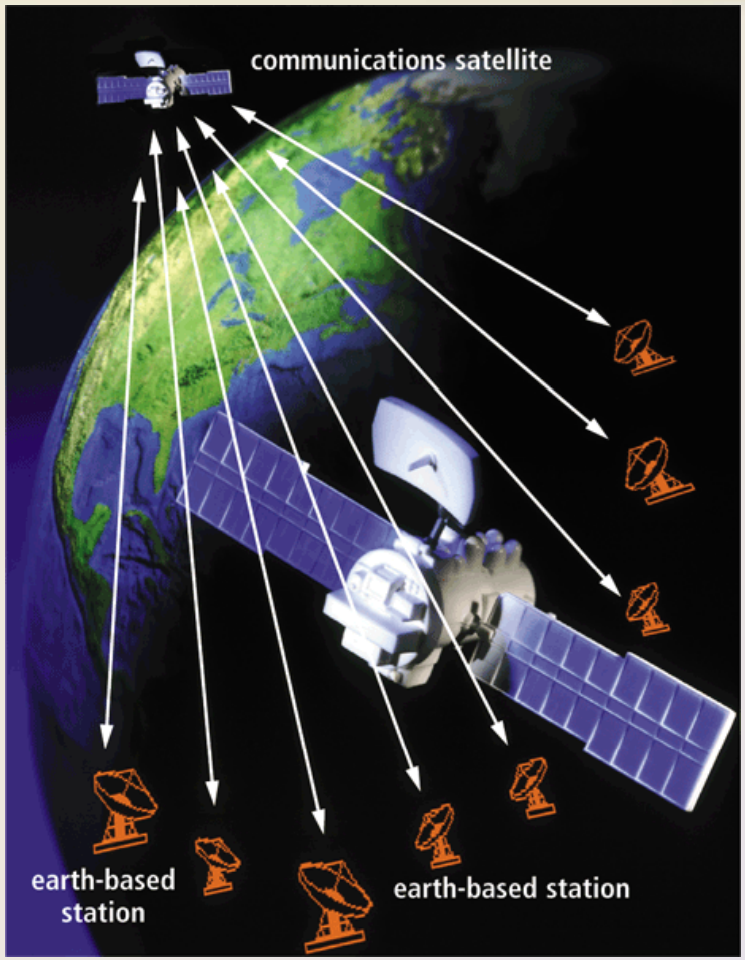
Wireless Transmission Media

- **Microwaves** are radio waves that provide a high-speed signal transmission



Wireless Transmission Media

- A **communications satellite** is a space station that receives microwave signals from an earth-based station, amplifies it, and broadcasts the signal over a wide area



Video: Got Your Video Right Here

CLICK TO START

Summary

Overview of communications terminology and applications

How to join computers into a network

Various communications devices, media, and procedures

Chapter Nine

Communications and Networks

Discovering Computers 2011

Living in a Digital World

Chapter 9 Complete