



Communications and Networks

Chapter 8

Computing
Essentials 2014

Competencies (Page 1 of 2)

- Discuss connectivity, the wireless revolution, and communication systems.
- Describe physical and wireless communications channels.
- Discuss connection devices and services, including dial-up, DSL, cable, satellite, and cellular.
- Describe data transmission factors, including bandwidth and protocols.

Competencies (Page 2 of 2)

- Discuss networks and key network terminology including network interface cards and network operating systems.
- Describe different types of networks, including local, home, wireless, personal, metropolitan, and wide area networks.
- Describe network architectures, including topologies and strategies.
- Discuss the organization issues related to Internet technologies and network security.

Introduction

- We live in a truly connected society.
- Increased connectivity potentially means increased productivity, especially in business.
- You will learn more about the concept of connectivity and the impact of the wireless revolution in this chapter.





Communications

- **Computer communications is the process of sharing data, programs, and information between two or more computers**
- **Numerous applications depend on communication systems, including**
 - E-mail
 - Instant messaging
 - Internet telephone
 - Electronic commerce

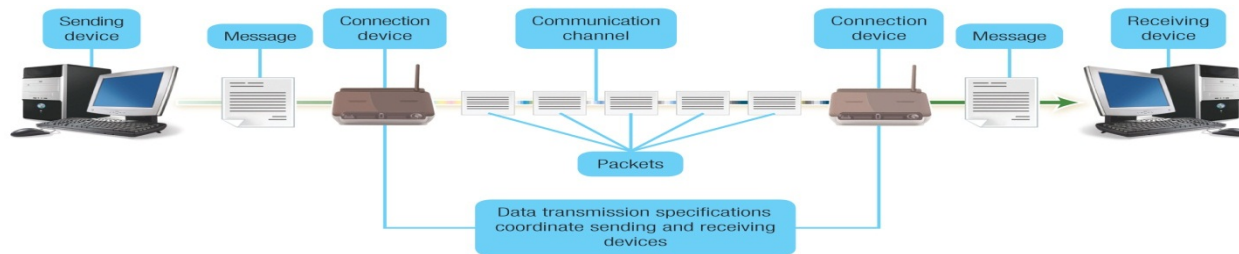
Communications Today

- Connectivity uses computer networks to link people and resources
- The Wireless Revolution
 - Single most dramatic change in connectivity and communications has been widespread use of mobile devices like smartphones and table PCs with wireless Internet connectivity



Communication Systems

- Four basic elements
 - Sending and receiving devices
 - Communication channel
 - Connection devices
 - Data transmission specifications



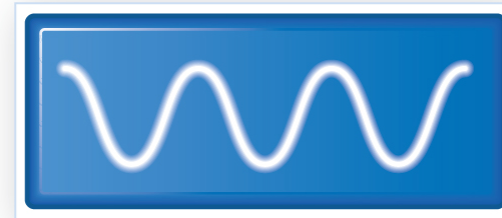
Communication Channels Summary

Channel	Description
Twisted pair	Twisted copper wire, used for standard telephone lines and Ethernet cables
Coaxial cable	Solid copper core, more than 80 times the capacity of twisted pair
Fiber-optic cable	Light carries data, more than 26,000 times the capacity of twisted pair
Radio frequency	Radio waves connect wireless devices including cell phones and computer components
Microwave	High-frequency radio waves, travels in straight line through the air
Satellite	Microwave relay station in the sky, used by GPS devices
Infrared	Infrared light travels in a straight line

Connection Device Signals

- Types of signals
 - Analog
 - Digital
- Transfer rate

Unit	Speed
Kbps	thousand bits per second
Mbps	million bits per second
Gbps	billion bits per second



Analog



Digital

Connection Devices

- Modem – *modulator-demodulator*
 - Modulation
 - Demodulation
- Transfer rate
 - Mbps
- Types of Modems
 - Telephone modem
 - DSL
 - Cable
 - Wireless



Connection Services

- **Leased lines**
 - T1 combined to form T3 and DS3
 - Replaced by optical carrier (OC) lines
- **Digital subscriber line (DSL)**
 - Uses phone lines
 - ADSL is most widely used type of DSL
- **Cable**
 - Uses existing TV cable
 - Faster than DSL
- **Satellite connection services**
 - Use almost anywhere
 - Slower than DSL and cable modem
- **Cellular Services**
 - 3G and 4G cellular network connectivity



Bandwidth

- Measurement of the width or capacity of the communication channel
- Categories
 - Voiceband (or low bandwidth)
 - Medium band
 - Broadband
 - Baseband

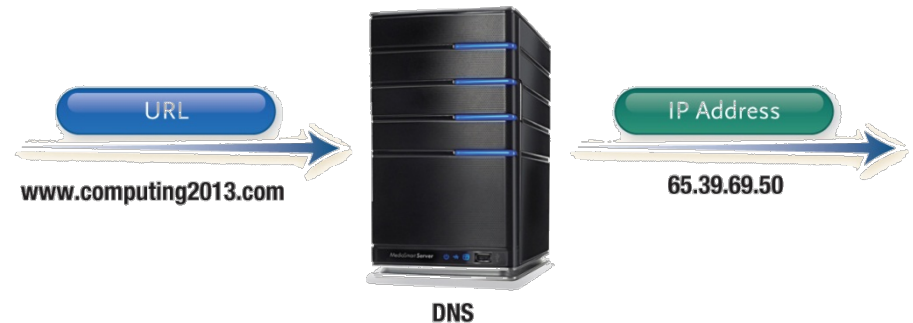
Making IT Work for You ~ Mobile Internet

- Have an “always-on” connection to access e-mail, websites, cloud services, and apps.



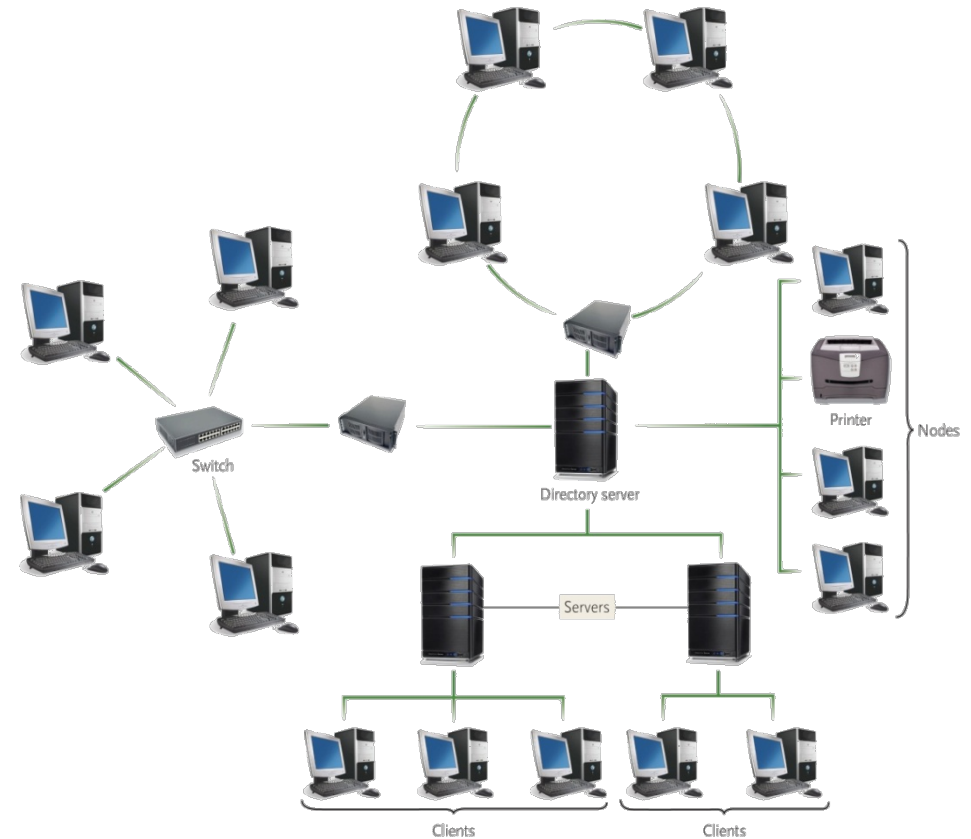
Protocols

- Communication rules for exchanging data between computers
- Internet standard: TCP/IP (Transmission control protocol/Internet protocol)
 - Identification – unique IP address
 - Packetization – information broken down into small parts (packets) and then reassembled



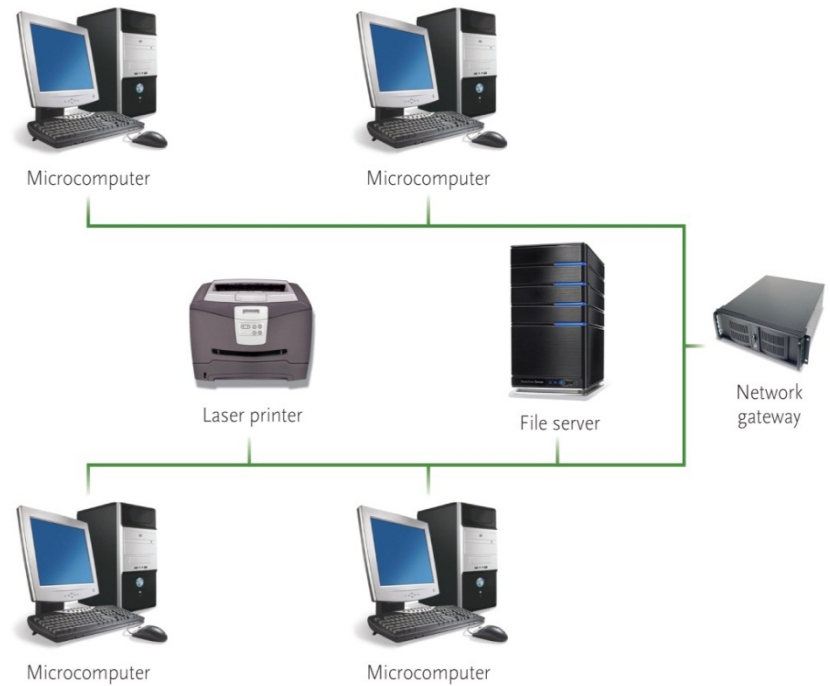
Networks

- A communication system that connects two or more computers
- Allows exchange of information and resources



Network Types

- Local area network (LAN)
- Home network
- Wireless LAN (WLAN)
- Personal area network (PAN)
- Metropolitan area network (MAN)
- Wide area network (WAN)





Organizational Networks

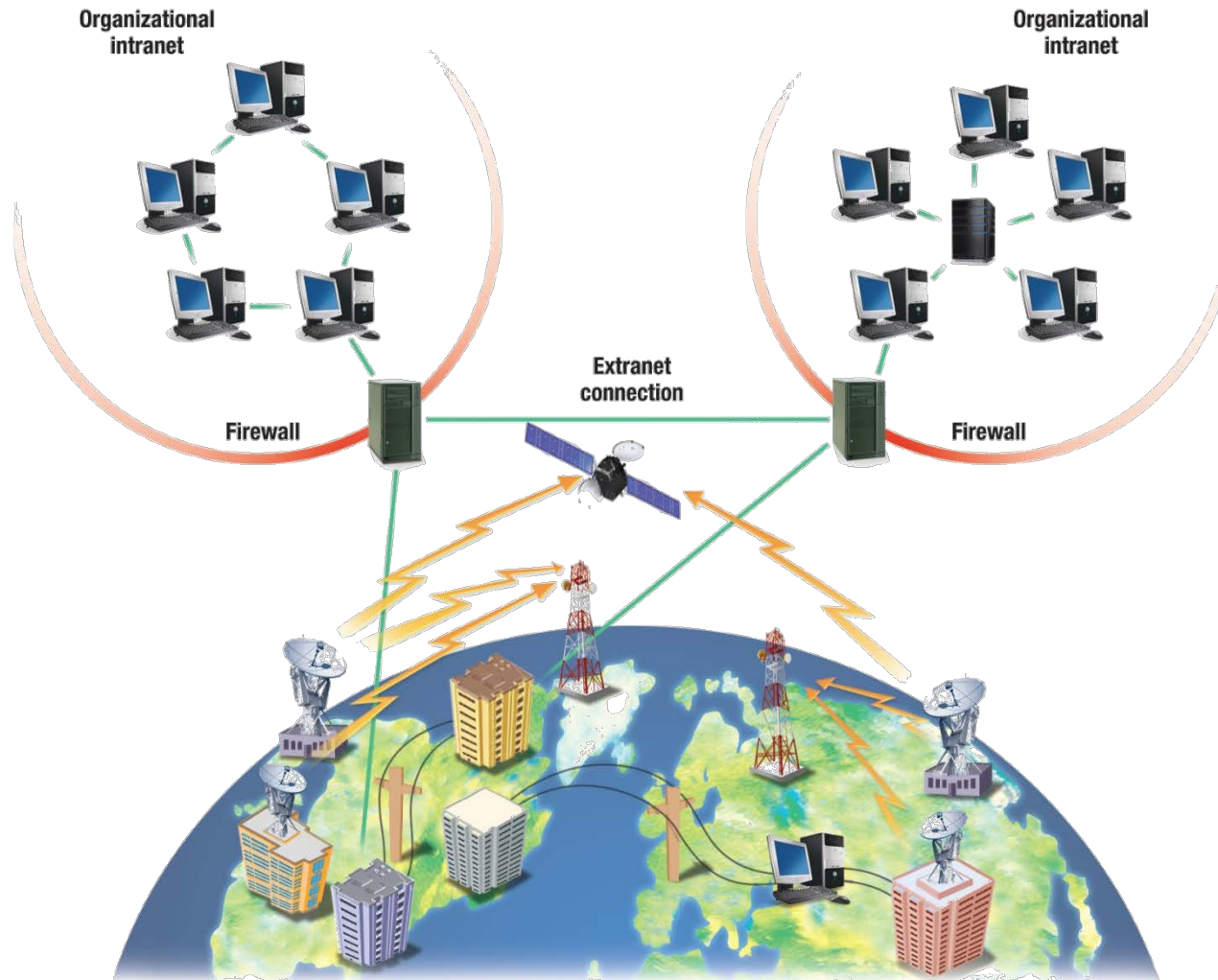
- **Intranet**
 - Private network within an organization
 - Works like the Internet, where employees use browsers to access Web sites and Web pages
- **Extranet**
 - Private network that connects organizations
 - Works like the Internet, but provides suppliers and other trusted partners with limited access to the organization's networks



Network Security

- **Firewall**
 - Hardware and software controls access to network
 - Proxy server provides pass-through access
 - Protects against external threats
- **Intrusion detection system (IDS)**
 - Works with firewall to protect organization's network
 - Analyzes all incoming and outgoing network traffic
- **Virtual private network (VPN)**
 - Creates a secure private network connection between your computer and the organization

Intranet, Extranet, Firewall, Proxy Server



Careers In IT

- **Network Administrator**
 - Manages a company's LAN and WAN networks
 - Maintains networking hardware and software, diagnosing and repairing problems that arise
 - Candidates usually have a bachelor's degree in computer science and practical experience
 - Annual salary is typically between \$46,000 and \$84,000



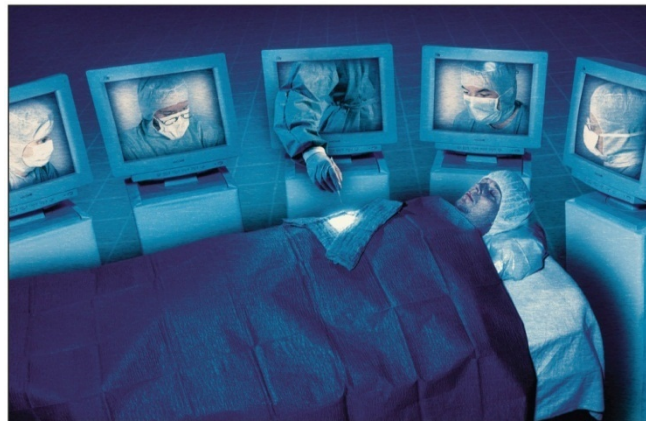
Making IT Work for You ~ Remote Access

- Use remote access to gain access to your computer when away from your home or office with LogMeIn
- Free service



A Look to the Future

- **Telepresence Lets You Be There without Actually Being There**
 - Seeks to create the illusion that you are actually at a remote location
 - Early implementations mainly focus on an extension of video-conferencing



Open-Ended Questions (1 of 3)

- Define communications including connectivity, the wireless revolution, and communication systems.
- Discuss communication channels including physical connections (twisted-pair, coaxial, and fiber-optic cable) and wireless communications (Bluetooth, Wi-Fi, microwave, WiMax, LTE, satellite, and infrared).
- Discuss connection devices including modems (telephone, DSL, cable, and wireless modems) and connection services (DSL, ADSL, cable, satellite and cellular connection services).

Open-Ended Questions (2 of 3)

- Discuss data transmission including bandwidths (voiceband, medium band, broadband, and baseband) as well as protocols (IP addresses, domain name servers, and packetization).
- Discuss networks by identifying and defining specialized terms that describe computer networks.
- Discuss network types including local area, home, wireless, personal, metropolitan, and wide area networks.

Open-Ended Questions (3 of 3)

- Define network architecture including topologies (bus, ring, star, tree, and mesh) and strategies (client/server and peer-to-peer).
- Discuss organization networks including Internet technologies (intranets and extranets) and network security (firewalls, proxy servers, intrusion detection systems, and virtual private networks).