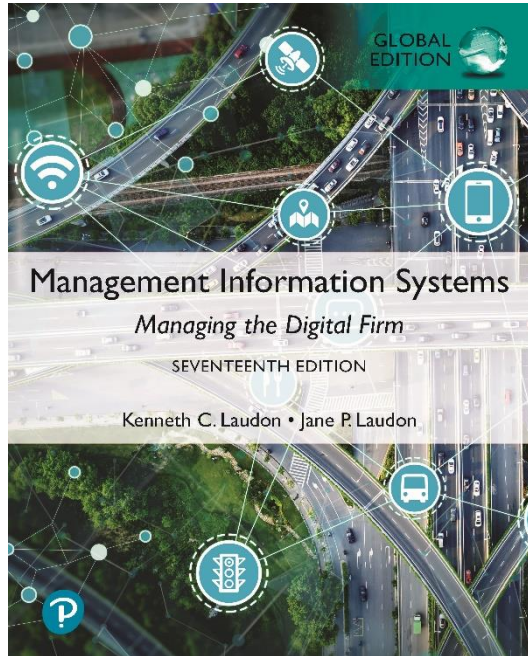


# Management Information Systems: Managing the Digital Firm

Seventeenth Edition, Global Edition



## Chapter 7

Telecommunications, the Internet,  
and Wireless Technology

# Learning Objectives

- 7.1** What are the principal components of telecommunications networks and key networking technologies?
- 7.2** What are the different types of networks?
- 7.3** How do the Internet and Internet technology work?
- 7.4** What are the principal technologies and standards for wireless networking, communication, and Internet access?

# Networking and Communication Trends

- Convergence
  - Telephone networks and computer networks converging into single digital network using Internet standards
- Broadband
  - Majority of U.S. households have high-speed broadband
- Broadband wireless
  - Voice, data communication are increasingly taking place over broadband wireless platforms

# What Is a Computer Network?

- Two or more connected computers
- Major components in simple network:
  1. Client and server computers: **Clients** are end-user devices that request resources or services from **Server** that are centralized computers that provide services like file storage and email hosting to clients.
  2. Network interfaces (NICs): Hardware component in every computer, enabling it to connect to the network.
  3. Connection medium: The physical or wireless channel through which data is transmitted.
  4. Network operating system (NOS): OS Software managing network resources and communication

# What Is a Computer Network? (cont.)

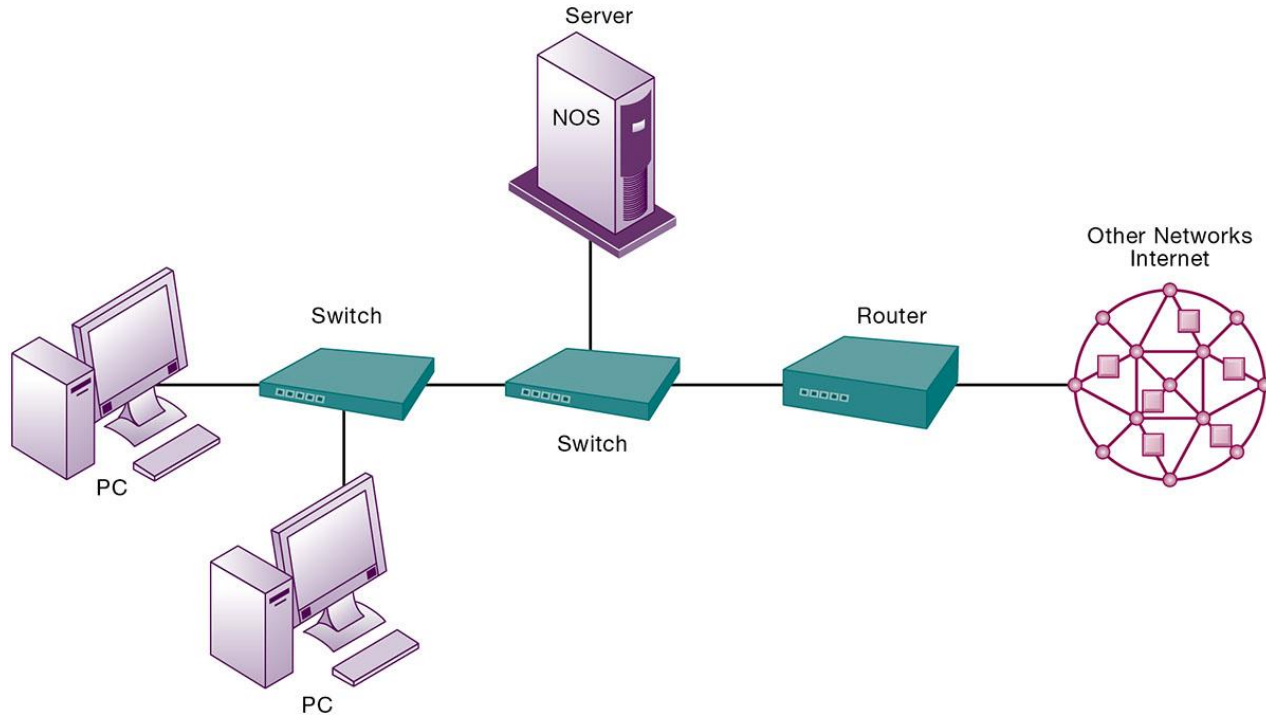
## 5. Hubs, switches, routers:

**Hubs:** Simple devices that broadcast data to all devices in the network.

**Switches:** Direct data to specific devices, improving network efficiency.

**Routers:** Connect different networks (e.g., local network to the internet) and manage data traffic between them

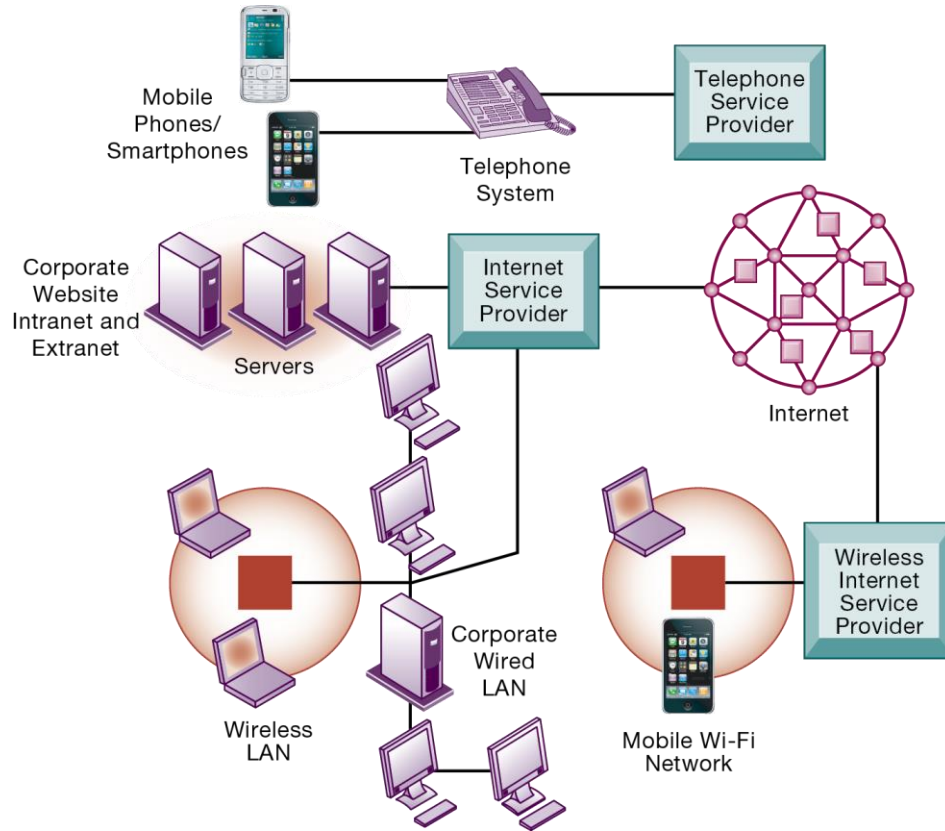
# Figure 7.1 Components of a Simple Computer Network



# Networks in Large Companies

- Large number of local area networks (LANs) linked to firmwide corporate networks
- Various powerful servers
  - Website, corporate intranet, extranet
  - Backend systems
- Mobile wireless LANs (Wi-Fi networks) Wireless LANs allow devices to connect to the network using Wi-Fi without cables.
- Videoconferencing system like teams that used for online meetings with video and audio.
- Telephone network, wireless cell phones

# Figure 7.2 Corporate Network Infrastructure



# Key Digital Networking Technologies

## (1 of 3)

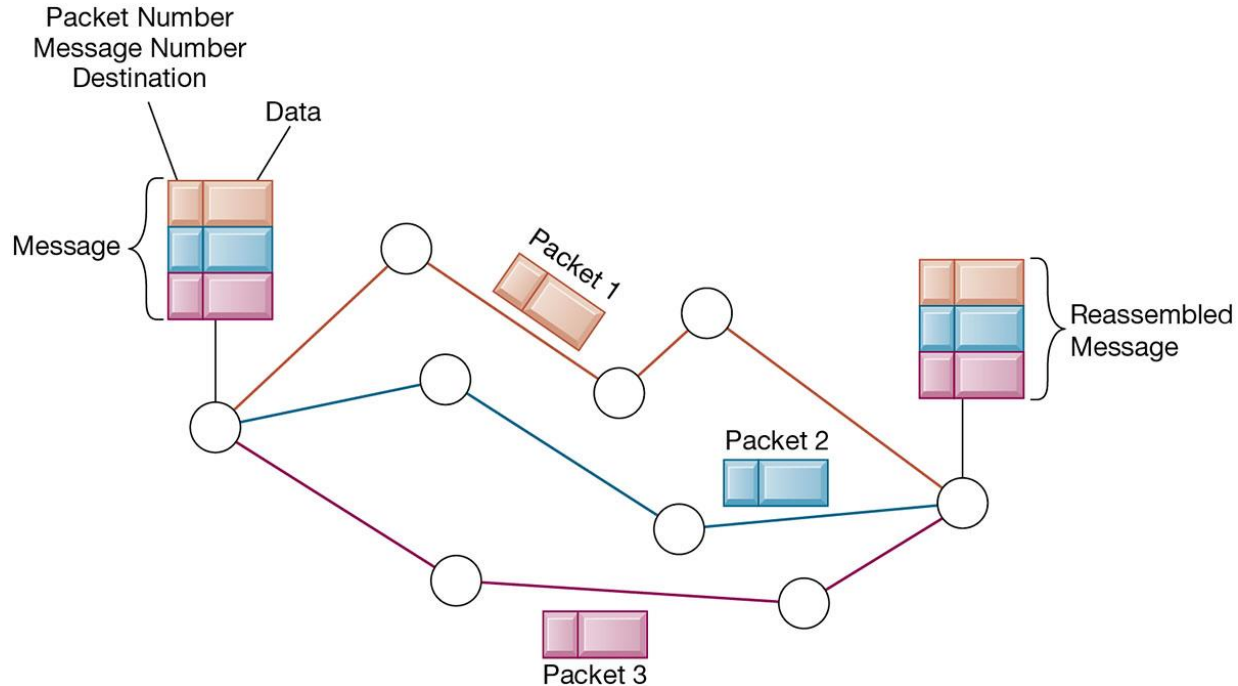
- Client/server computing
  - Distributed computing model
  - Clients linked through network controlled by network server computer
  - Server sets rules of communication for network and provides every client with an address so others can find it on the network
  - Has largely replaced centralized mainframe computing
  - The Internet: largest implementation of client/server computing

# Key Digital Networking Technologies

## (2 of 3)

- Packet switching
  - Method of slicing digital messages into parcels (packets), sending packets along different communication paths as they become available, and then reassembling packets at destination
  - Previous circuit-switched networks required assembly of complete point-to-point circuit
  - Packet switching more efficient use of network's communications capacity

# Figure 7.3 Packet-Switched Networks and Packet Communications



# Key Digital Networking Technologies

## (3 of 3)

- TCP/IP and connectivity
  - Protocols: rules that govern transmission of information between two points
  - Transmission Control Protocol/Internet Protocol (TCP/IP)
    - Common worldwide standard that is basis for the Internet

# Types of Networks

1. Local area networks (LANs): A network for devices within a small area, like a home or office. It uses Ethernet, a wired technology used to connect devices in a LAN.
2. Metropolitan area networks (MANs): A network that spans a city or town, connecting multiple LANs.
3. Wide area networks (WANs): A network that connects devices over large distances, like the internet.

# What Is the Internet?

- **The Internet:** The world's largest network, connecting billions of devices globally.
- **Largest WAN:** The Internet is the biggest Wide Area Network (WAN), linking networks across the globe.
- **Internet Service Providers (ISPs):** Companies that provide access to the Internet, like AT&T, Ogero, or Vodafone.

# Internet Addressing and Architecture

- IP Address: Every device on the Internet is given a unique Internet Protocol (IP) address to identify it.
- DNS (Domain Name System): A system that converts IP addresses into human-readable domain names, like turning 192.168.1.1 into [www.example.com](#).

# The Future Internet: IPv6 and Internet 2

- IPv6
  - New addressing scheme for IP numbers
  - Will provide more than a quadrillion new addresses
  - Not compatible with earlier IPv4 addressing
- Internet2
  - Advanced networking consortium
    - Universities, businesses, government agencies, other institutions
  - Developed high-capacity 100 Gbps testing network
  - Testing leading-edge new technologies for Internet

# The Web

- Hypertext: Text that contains links (hyperlinks) to other text or media on the Internet.
  1. HTML (Hypertext Markup Language): The standard language used to create and structure web pages.
  2. HTTP (Hypertext Transfer Protocol): The protocol used for transferring web pages and data over the Internet.
- URL (Uniform Resource Locator): The address used to access a specific resource or webpage on the Internet (e.g., [www.example.com](http://www.example.com)).
- Web servers: Software for locating and managing web pages

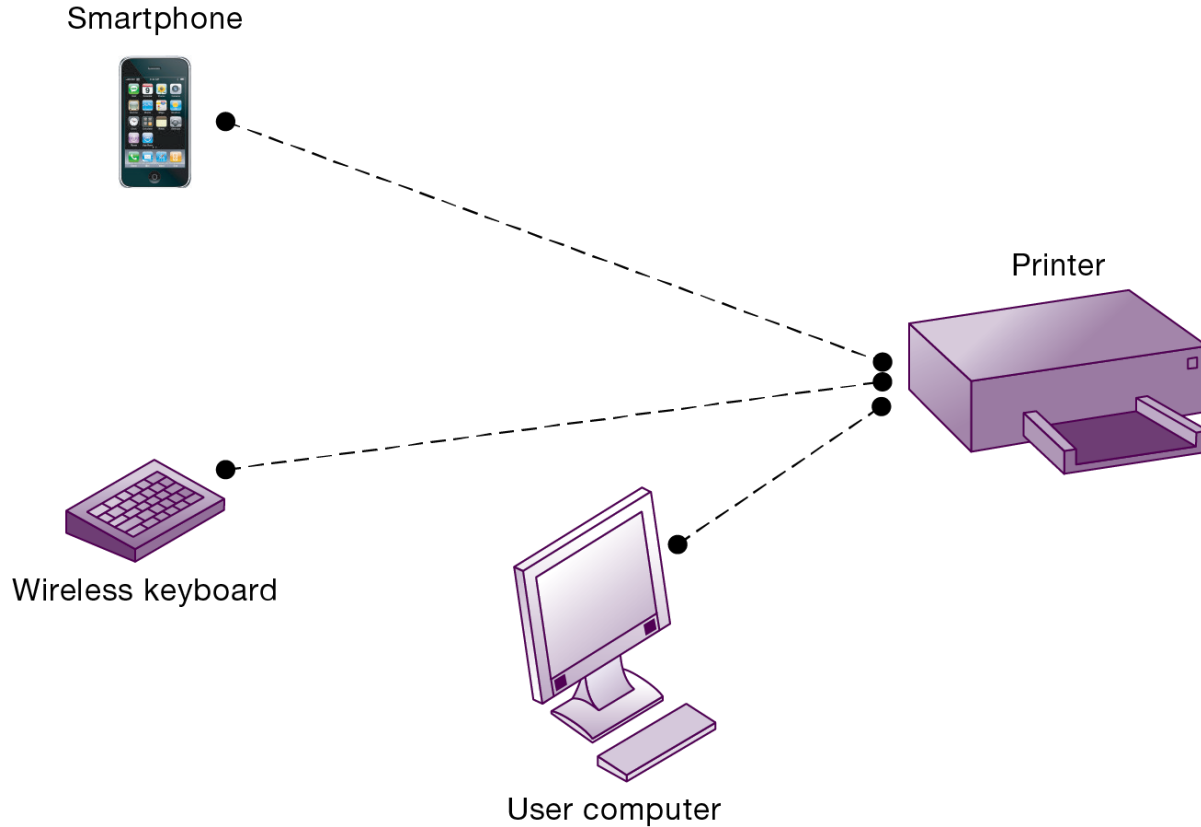
# Wireless Computer Networks and Internet Access (1 of 2)

- Bluetooth (802.15)
  - Links up to 8 devices in 10-m area using low-power, radio-based communication
  - Useful for personal networking (PANs)
- Wi-Fi (802.11)
  - Set of standards: 802.11
  - Used for wireless LAN and wireless Internet access
  - Use access points: device with radio receiver/transmitter for connecting wireless devices to a wired LAN

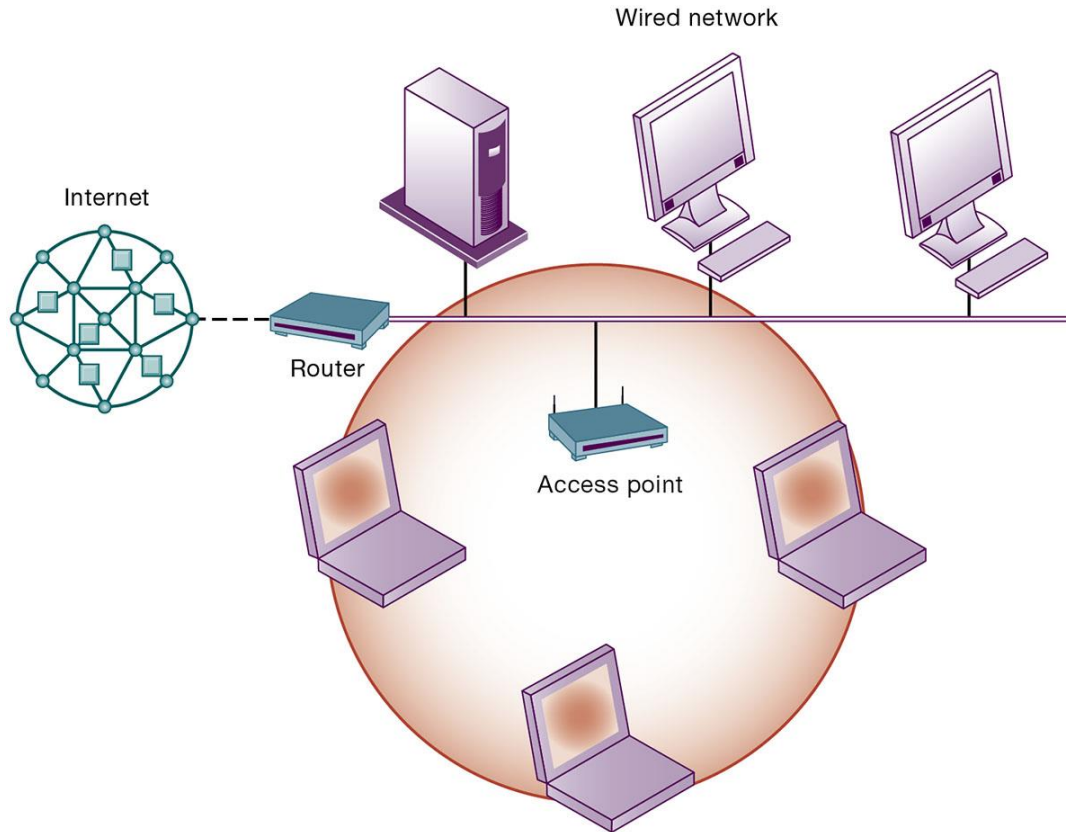
# Wireless Computer Networks and Internet Access (2 of 2)

- Hotspots: one or more access points in public place to provide maximum wireless coverage for a specific area
- Weak security features
- WiMax (802.16)
  - Wireless access range of 31 miles
  - Require WiMax antennas

# Figure 7.13 A Bluetooth Network (PAN)



# Figure 7.14 An 802.11 Wireless LAN

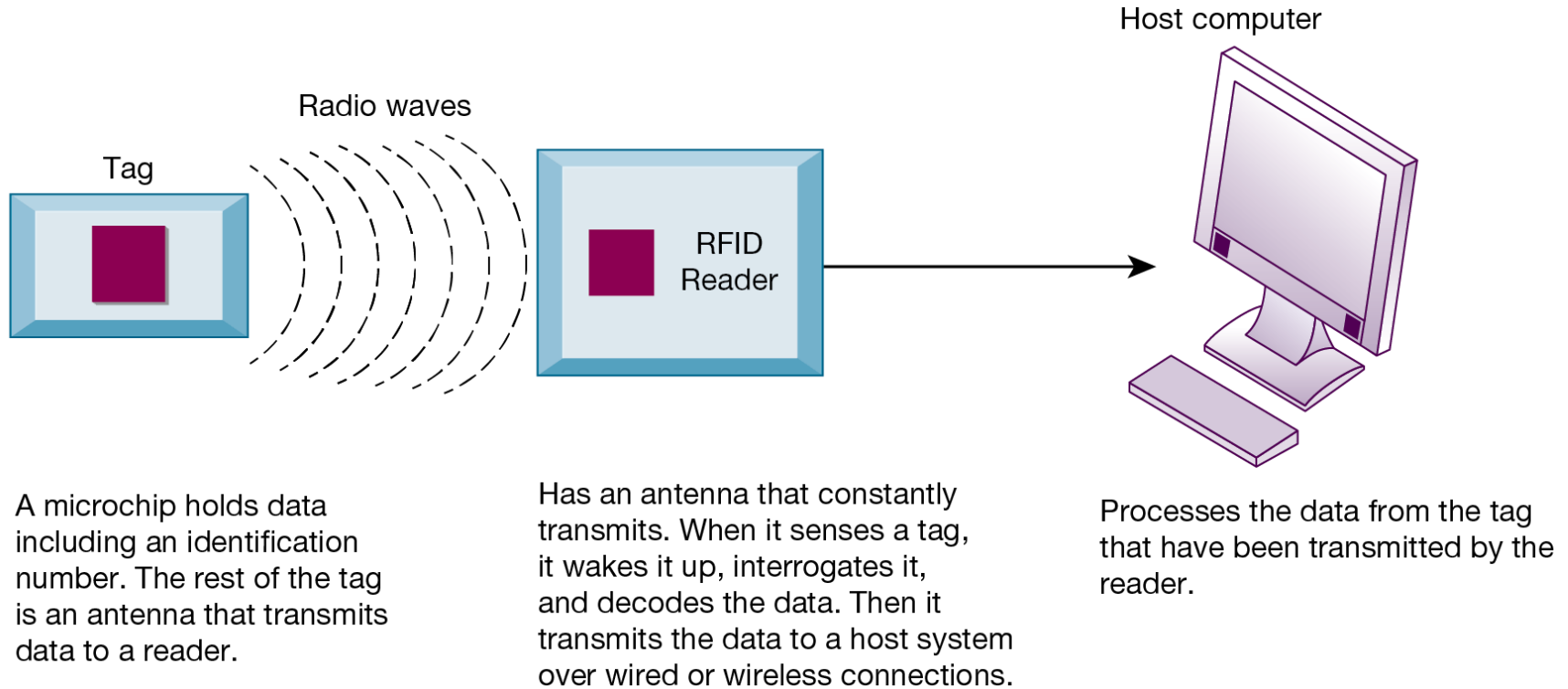


# RFID and Wireless Sensor Networks

## (1 of 3)

- Radio Frequency Identification (RFID)
  - Use tiny tags with microchips containing data about an item and location; tag antennas to transmit radio signals over short distances to special RFID readers
  - Common uses: Automated toll-collection; tracking goods in a supply chain
  - Reduction in cost of tags making RFID viable for many firms

# Figure 7.15 How RFID Works



# RFID and Wireless Sensor Networks

## (2 of 3)

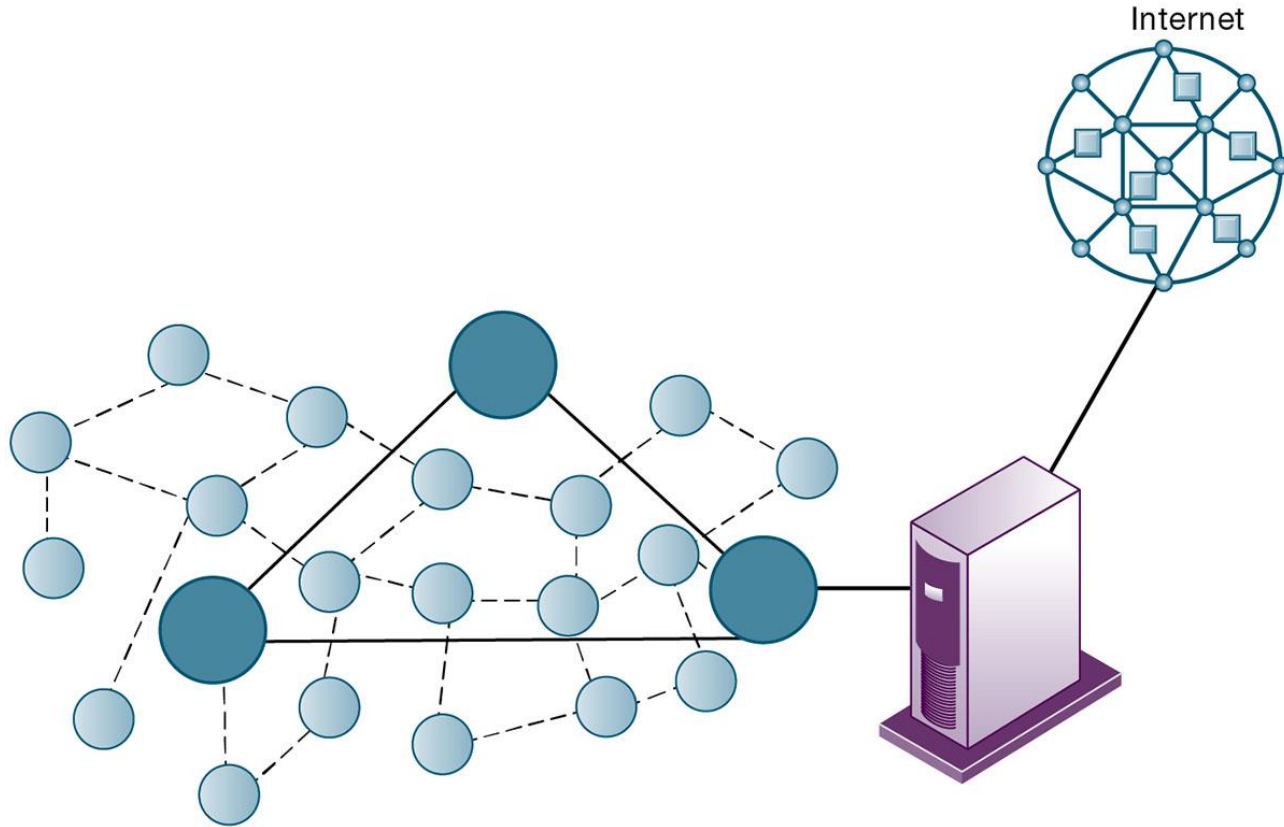
- Near field communication (NFC)
  - RFID-related technology that uses very short-range wireless connectivity standard
  - Used by tap-and-go services such as Apple Pay, Google Pay

# RFID and Wireless Sensor Networks

## (3 of 3)

- Wireless Sensor Networks (WSNs)
  - Networks of hundreds or thousands of interconnected wireless devices used to monitor building security, detect hazardous substances in air, monitor environmental changes, traffic, or military activity
  - Devices have built-in processing, storage, and radio frequency sensors and antennas
  - Require low-power, long-lasting batteries and ability to endure in the field without maintenance
  - Major sources of big data and fueling Internet of Things

# Figure 7.16 A Wireless Sensor Network



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