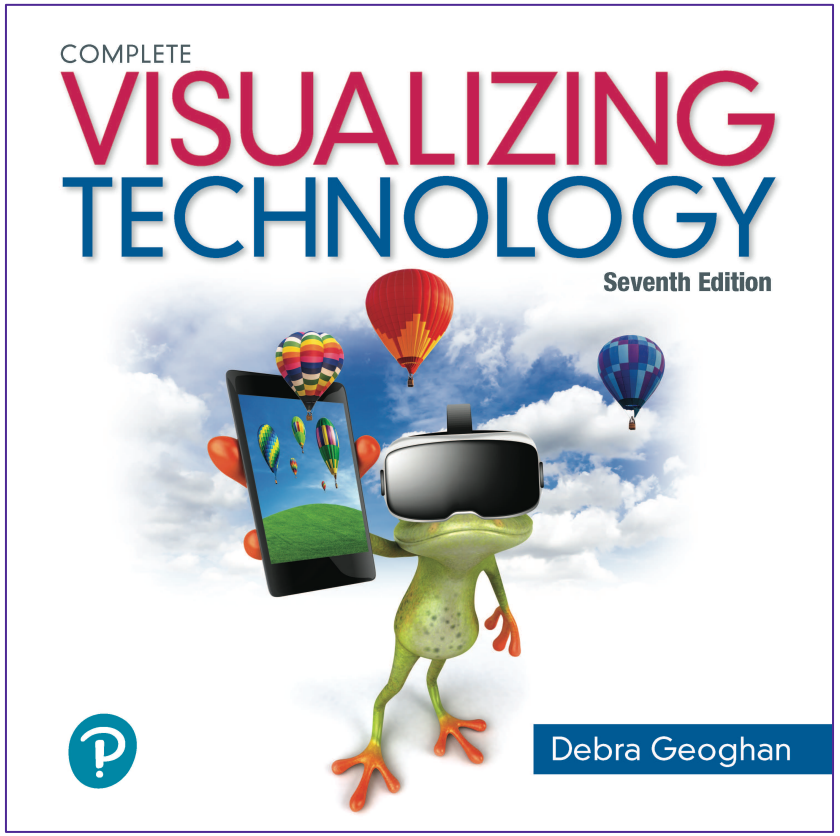
# Introductory Visualizing Technology

Seventh Edition




## Chapter 9

Networks and Communication

# Learning Objectives

**9.1** Discuss the Importance of Computer Networks

**9.2** Compare Different Types of LANs and WANs

**9.3** List and Describe the Hardware Used in Both Wired and Wireless Networks

**9.4** List and Describe Network Software and Protocols

**9.5** Explain How to Protect a Network

# Learning Objective 9.1

- Discuss the Importance of Computer Networks

# Discuss the Importance of Computer Networks

# From Sneakernet to Hotspots

- Computer network
  - Two or more computers that share resources
    - Network resources include software, hardware, and files
  - Can save money and time
  - Can increase productivity

# From Sneakernet to Hotspots—Peer-To-Peer Networks

- All computers are considered equal
  - Simplest network to set up
  - All computers in a P2P network belong to a workgroup
  - Homegroup is a Windows networking feature

# From Sneakernet to Hotspots—Client-Server Network (1 of 2)

- Has at least one server at its center
- Centralizes network management, resources, and security
- Users log in and are granted access based on that login

# From Sneakernet to Hotspots—Client-Server Network (2 of 2)

- Server
  - Multiuser computer system
  - Network operating system
- Clients
  - PCs
  - Other devices

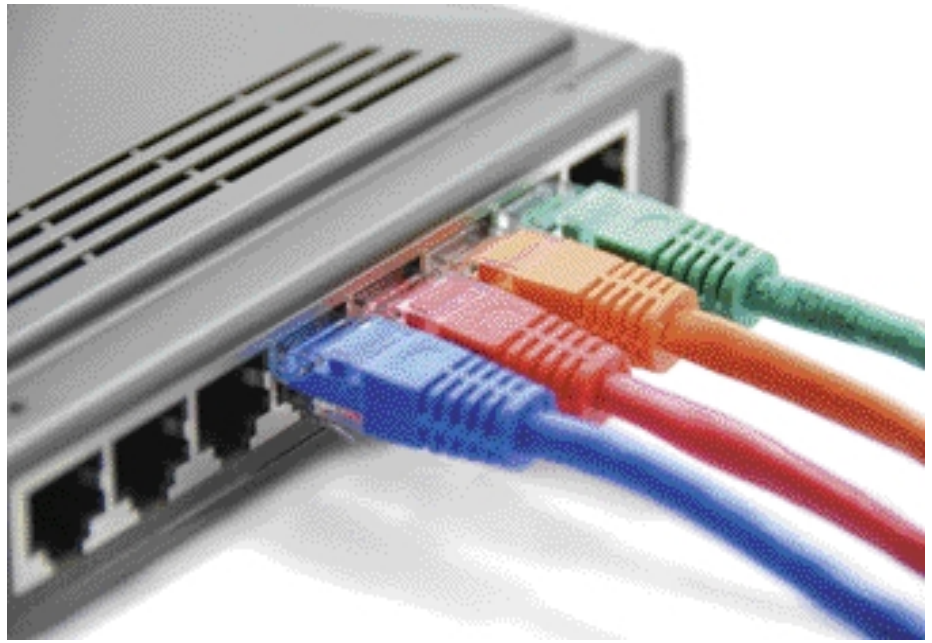
# Learning Objective 9.2

- Compare Different Types of LANs and WANs

# Compare Different Types of LANs and WANs

# LANs and WANs—Small Networks (1 of 2)

- LAN (local area network)
  - Connected devices or nodes in the same location
    - Home LAN is probably a P2P network
    - Business LAN is more likely a client-server network

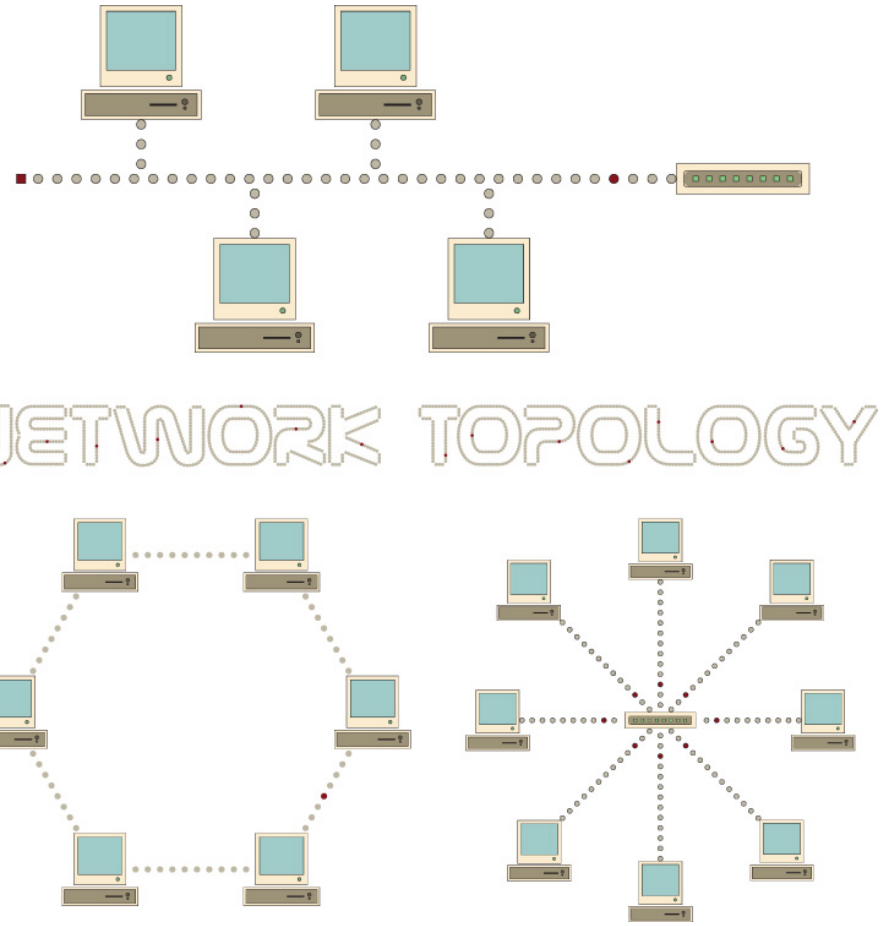


# LANs and WANs—Small Networks (2 of 2)

- PAN (personal area network)
  - Devices connected via Bluetooth
    - Bluetooth technology connects peripherals wirelessly at short ranges
- WLAN (wireless LAN)
  - Uses Wi-Fi to transmit data

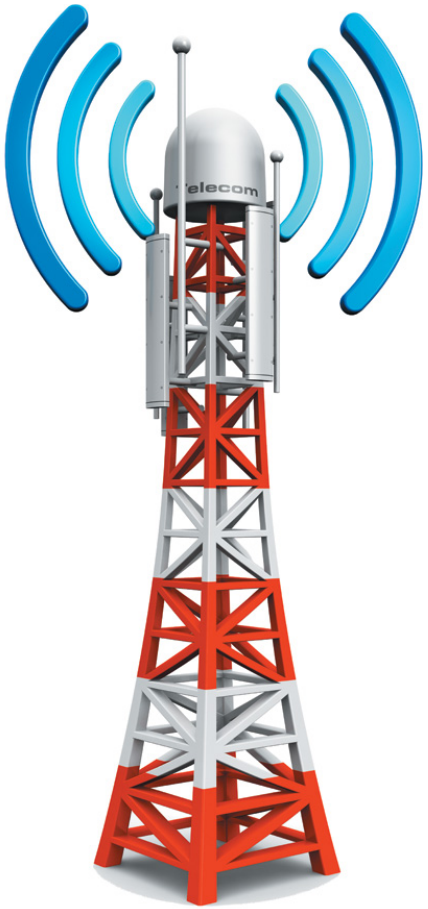
# LANs and WANs—LAN Topologies

- Physical layout of a LAN
  - Three common configurations
    - Bus
    - Ring
    - Star
- Modern LANs use star topology
  - Every node attached to central device
- Standards – ensure equipment made by different companies works together
  - Ethernet – standard defines how data is transmitted over a LAN



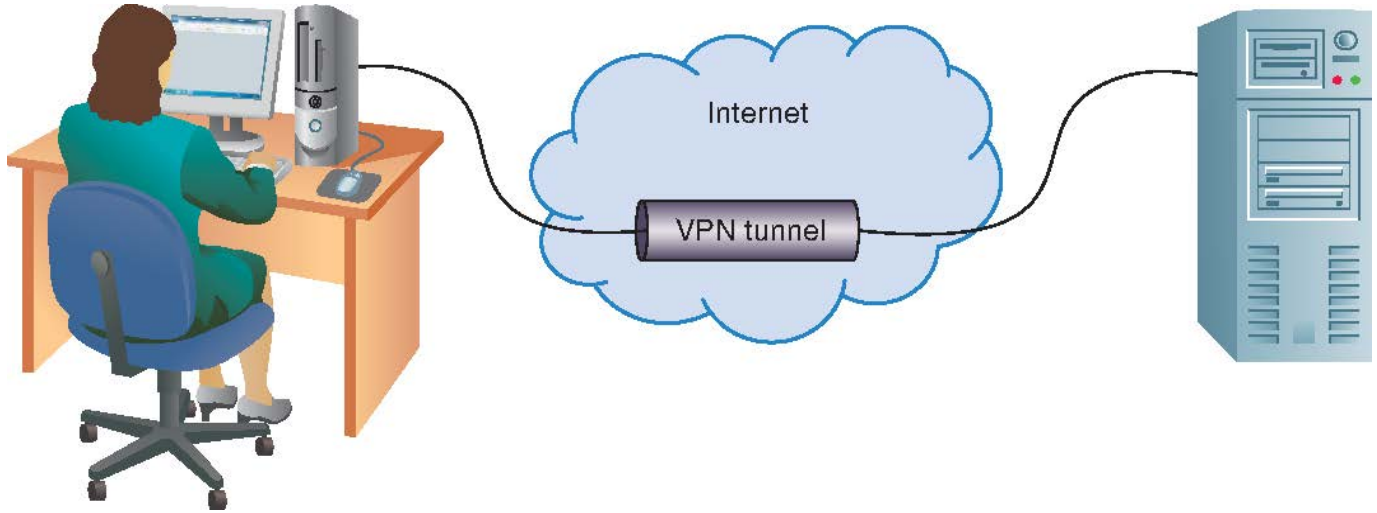
# LANs and WANs—Large Networks (1 of 3)

- WAN (wide area network)
  - Spans multiple locations
  - Connects multiple LANs over dedicated lines using routers
- VPN (virtual private network)
  - A private network through the public network (Internet)
  - Remote users access a LAN securely without dedicated lines
  - Uses encryption to ensure that the data is secure



# LANs and WANs—Large Networks (2 of 3)

- CAN (campus area network)
  - Hybrid of LANs and WANs
  - Connected using routers
- MAN (metropolitan area network)
  - Covers a single geographic area



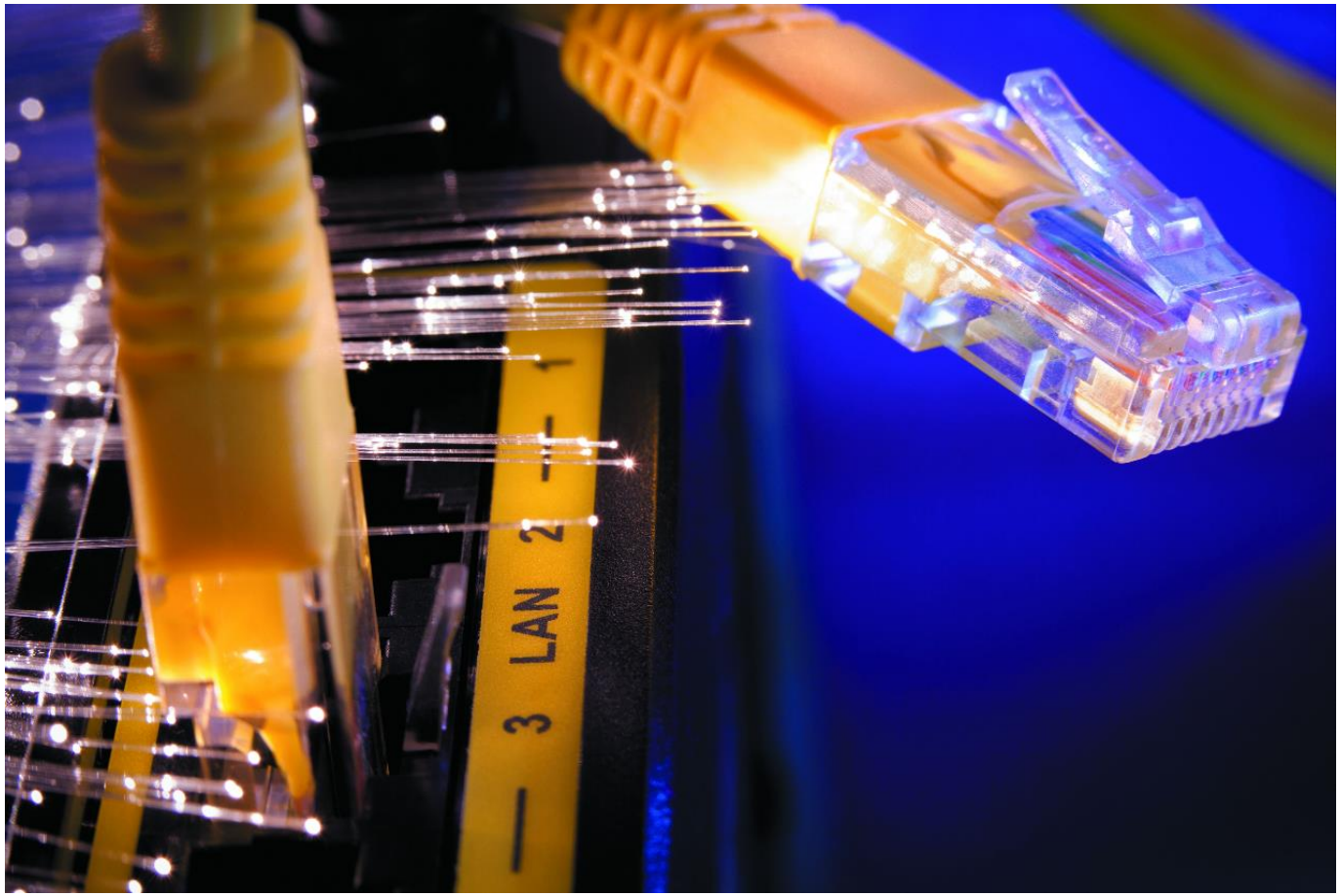
# LANs and WANs—Large Networks (3 of 3)

- SAN (storage area network)
  - Network connecting data storage devices and network servers
- Cellular networks
  - Use cell towers
  - Transmit voice and data over long distances

# Learning Objective 9.3

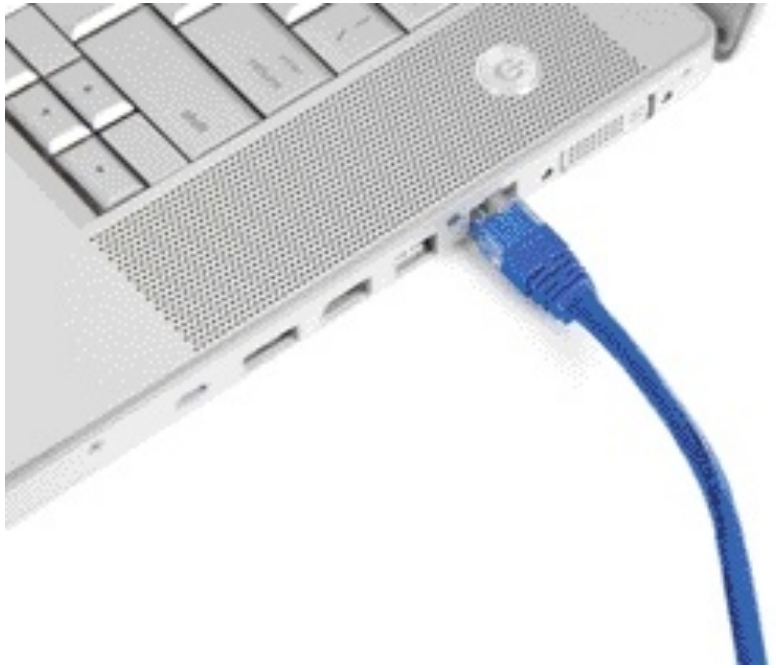
- List and Describe the Hardware Used in Both Wired and Wireless Networks

# List and Describe the Hardware Used in Both Wired and Wireless Networks



# Hardware—Network Adapters (1 of 2)

- Communications devices
- Establish connections with a network
- Each device on a network must have a network adapter
- Most PCs come with a built-in Ethernet adapter
  - RJ-45
  - Plugs into a wall jack, switch, router, or modem

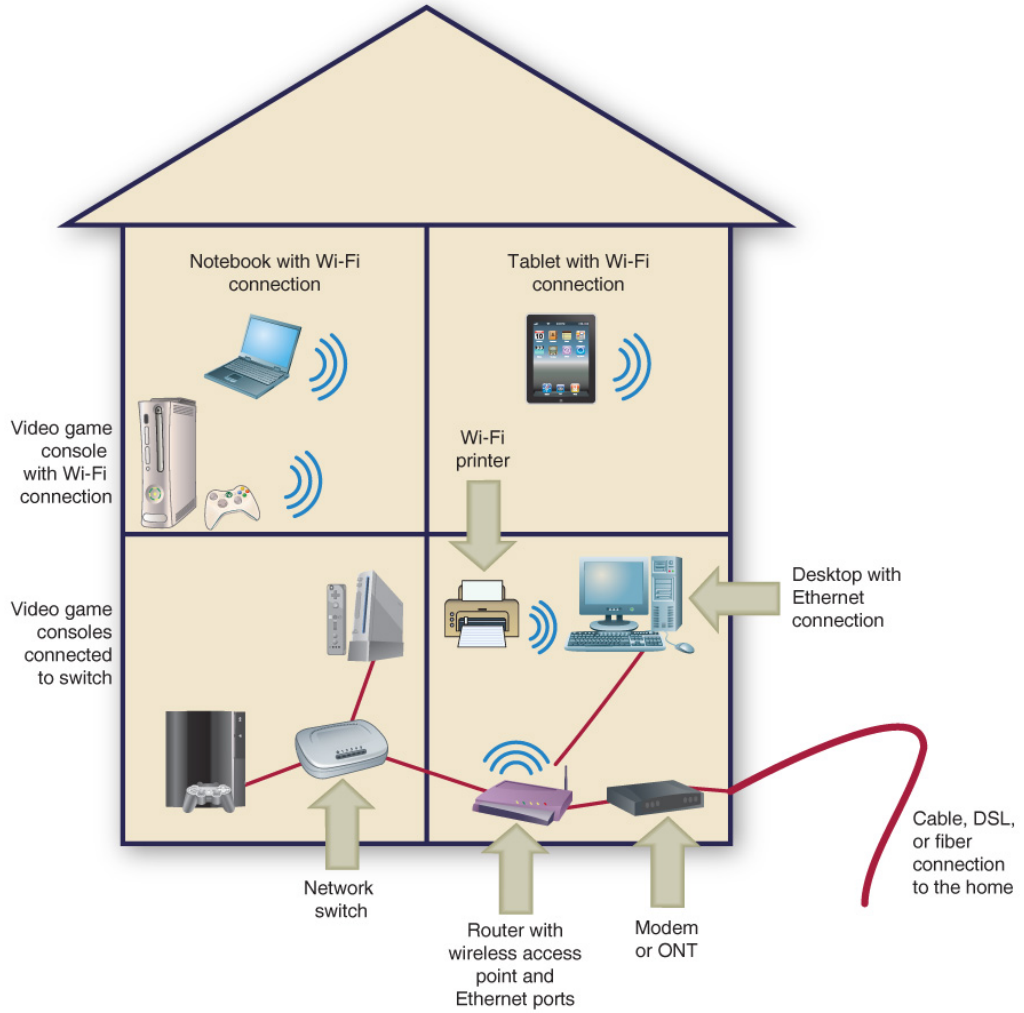


# Hardware—Network Adapters (2 of 2)

- Wi-Fi networks use IEEE 802.11 standards
- USB wireless adapters
  - Easy connection to devices without built-in adapter
  - Wi-Fi Alliance certifies wireless devices
- WLAN (wireless local area network)
  - Ad hoc network
  - Two wireless devices connect directly
  - Infrastructure wireless network
    - Devices connect through a wireless access point

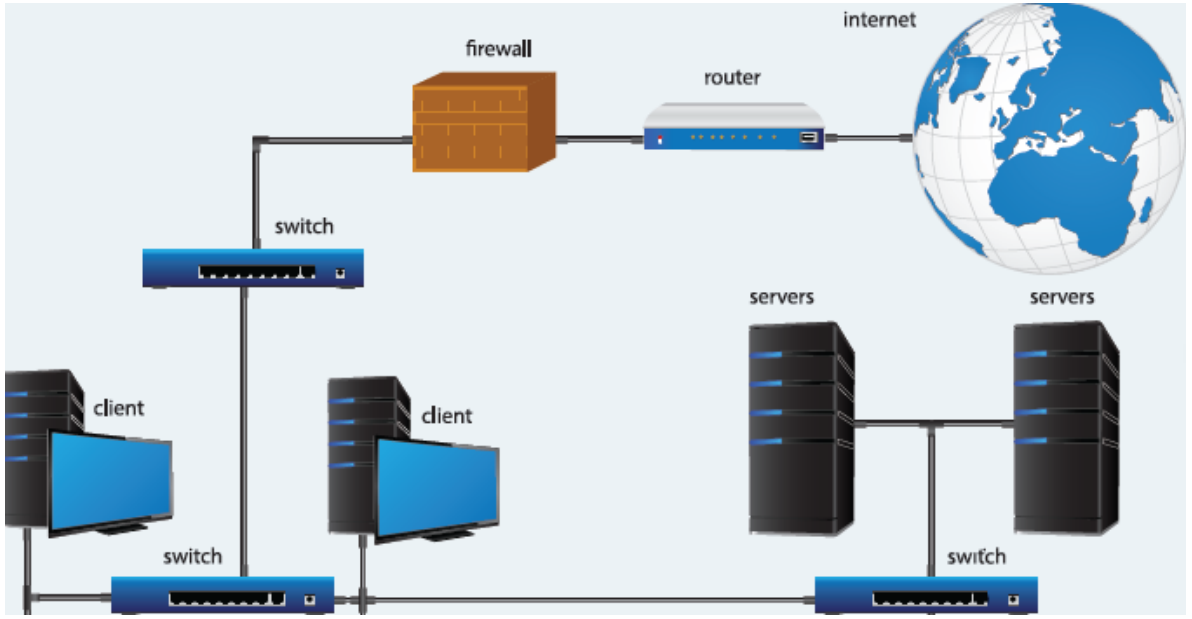
# Hardware—Network Connectivity Hardware (1 of 2)

- Modem
  - Traditional dial-up connection
- Digital modem
  - Cable and DSL
- ONT (optical network terminal)
  - Used by FTTH
- Router
  - Connects two or more networks



# Hardware—Network Connectivity Hardware (2 of 2)

- Switch
  - Connects multiple devices
- WAP (wireless access point)
  - Allows wireless devices to join network
- Firewall
  - Blocks unauthorized access to network
  - Both software and hardware



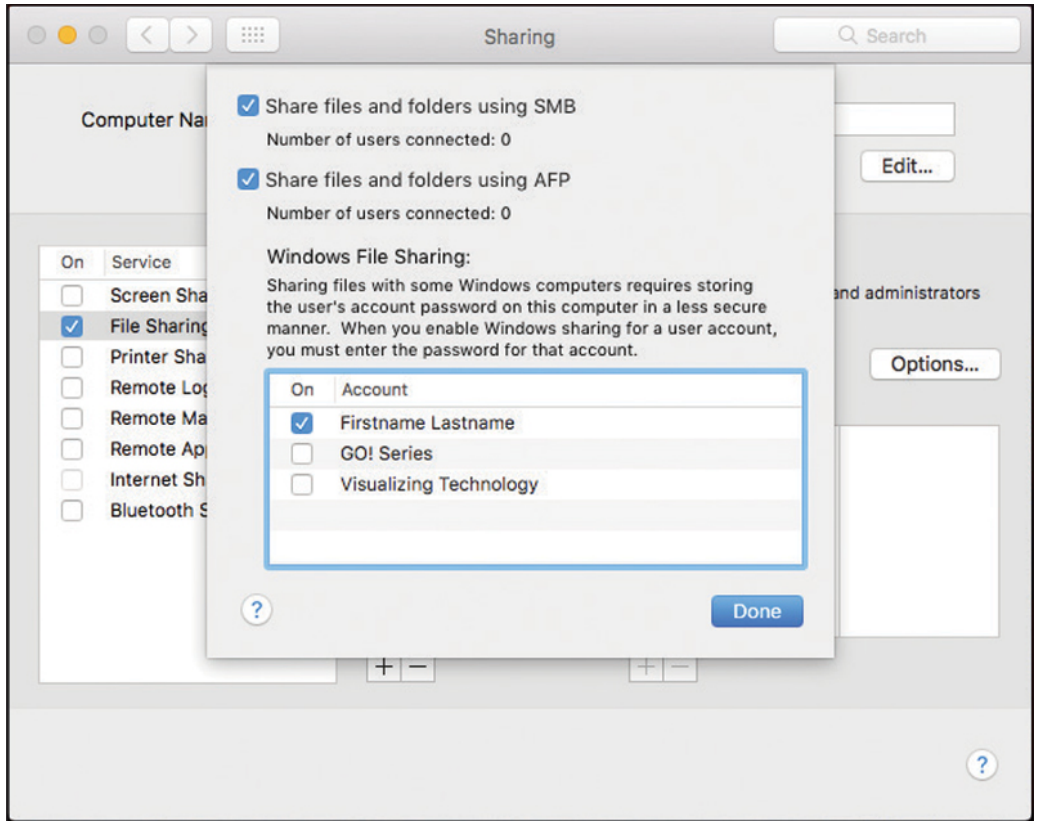
# Learning Objective 9.4

- List and Describe Network Software and Protocols

# List and Describe Network Software and Protocols

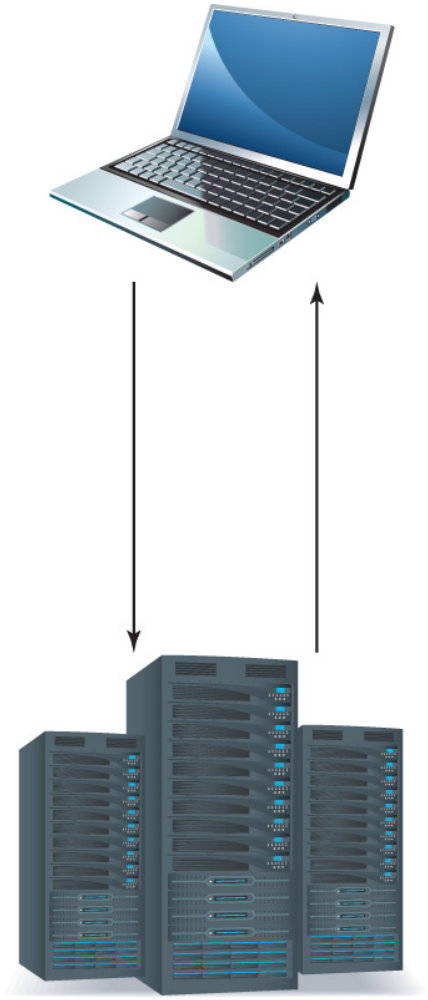
# Software and Protocols—Peer-to-Peer Network Software

- No special software required
- Operating systems have built-in networking capabilities
  - Client for Microsoft Networks
    - Allows remote access of files and printers on a Microsoft network



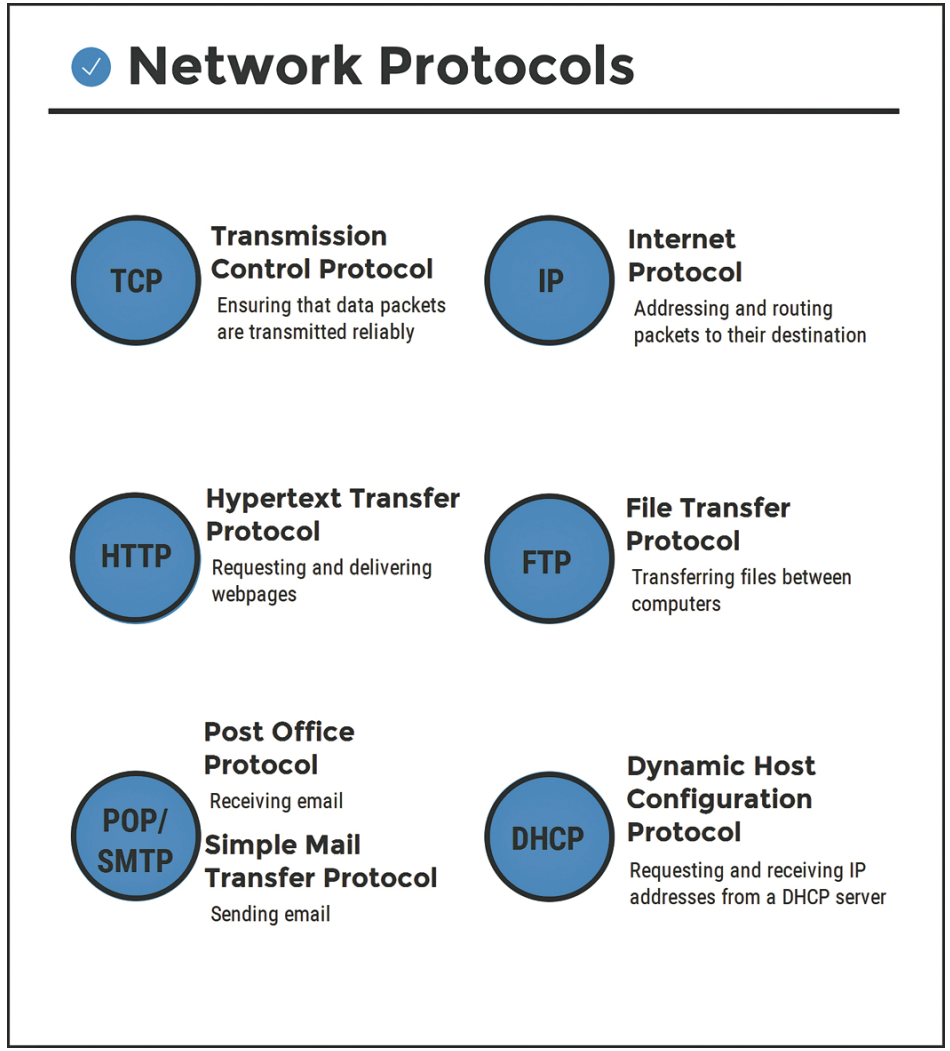
# Software and Protocols—Client-Server Network Software

- Both client software and server software needed on a client-server network
  - Client software makes requests
  - Server software fulfills them
- Microsoft Server OS
  - Windows clients do not need special client software for file and print services



# Software and Protocols—Network Protocols

- Protocols define the rules for communication between devices
- TCP/IP Stack
  - Transmission Control Protocol (TCP)
  - Internet Protocol (IP)
  - File Transfer Protocol (FTP)
  - Hypertext Transfer Protocol (HTTP)
  - Simple Mail Transfer Protocol (SMTP)
  - Post Office Protocol (POP)



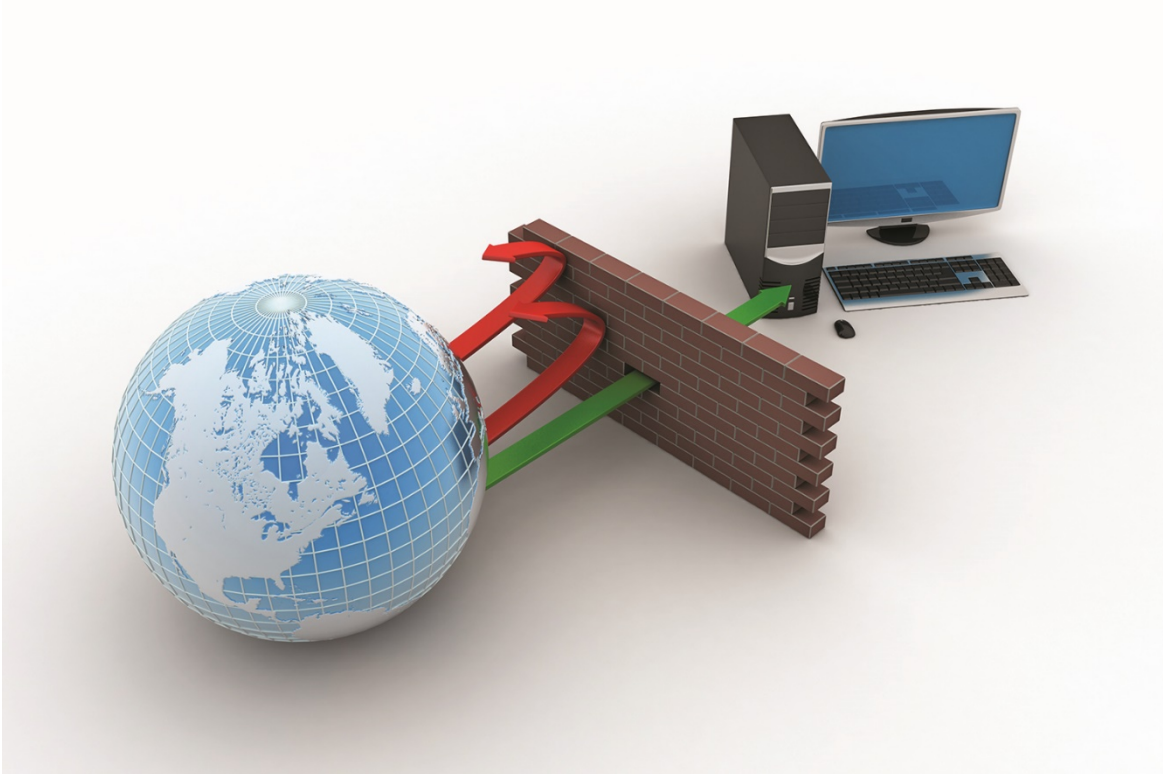
# Learning Objective 9.5

- Explain How to Protect a Network

# Explain How to Protect a Network

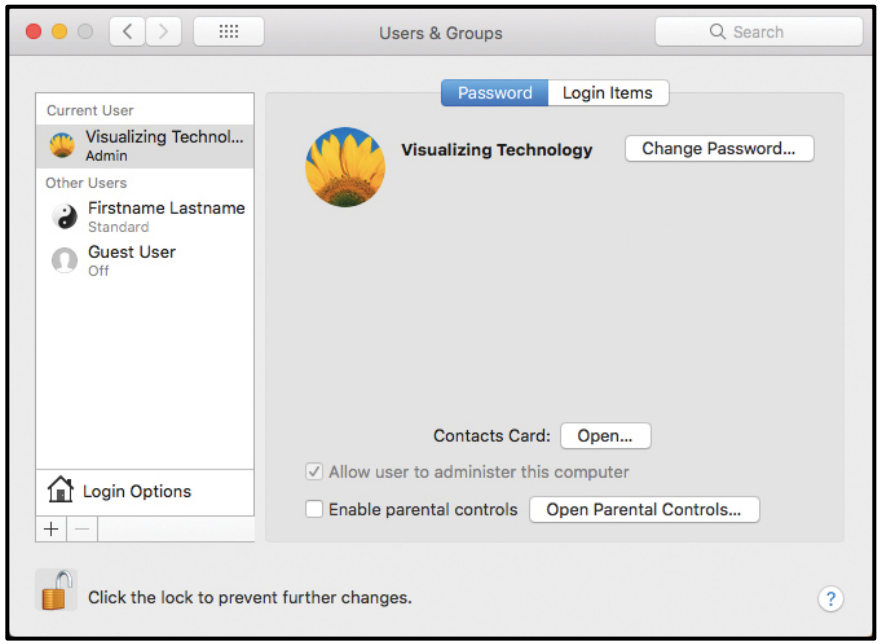
# Protecting Your Network—Layer 1: The Fence

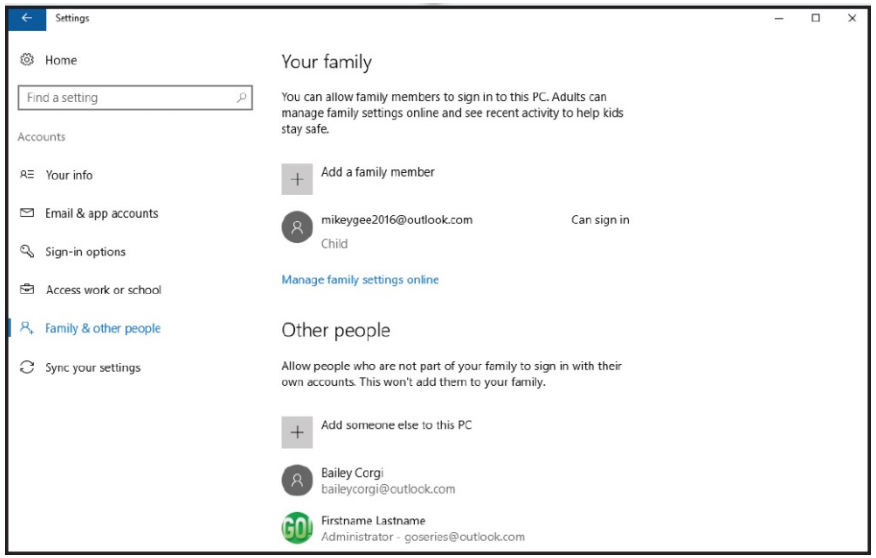
- Firewall
  - Examines data packets entering or leaving a network
  - Denies access to traffic based on rules the network administrator defines
- In a home network, the hardware firewall is usually part of the router
- In a business, the firewall is a stand-alone device



# Protecting Your Network—Layer 2: Door Locks

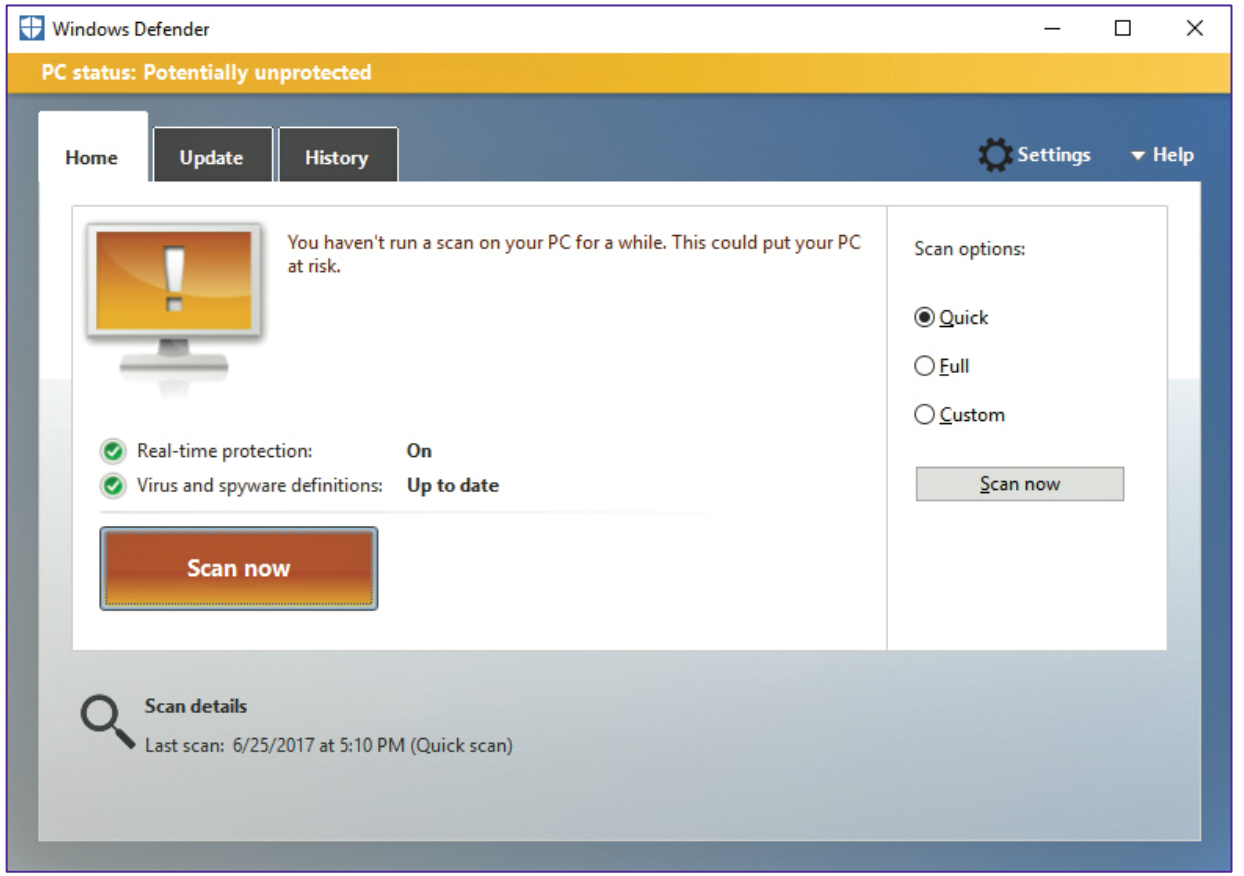
- Determined by:
  - What is shared
  - Who is granted access
- Passwords



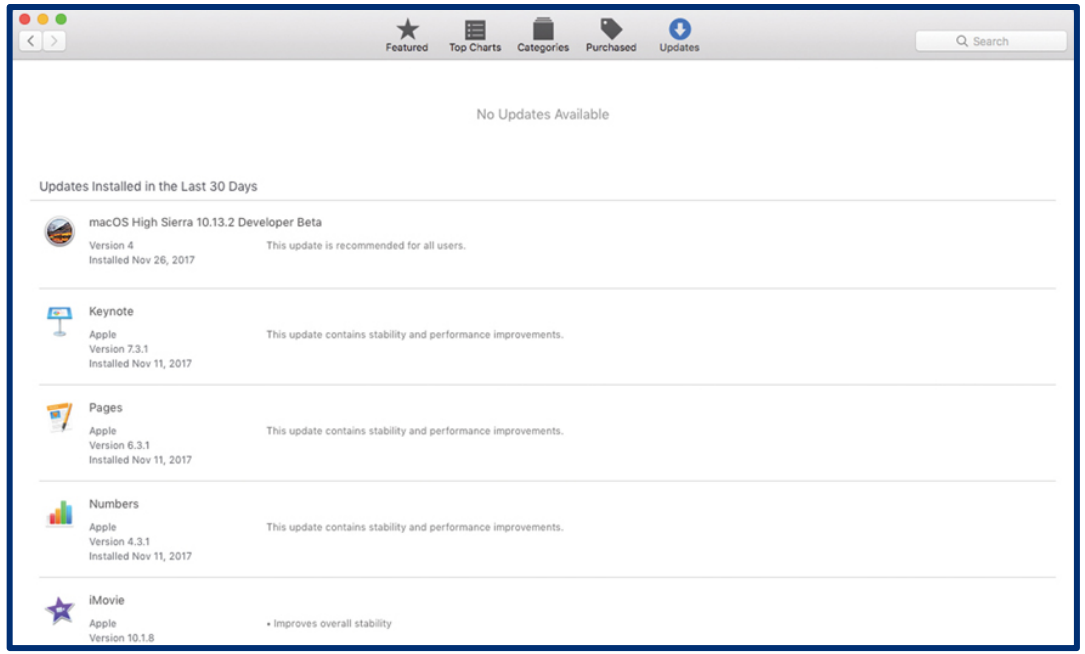
# Protecting Your Network—Layer 3: Alarm Systems

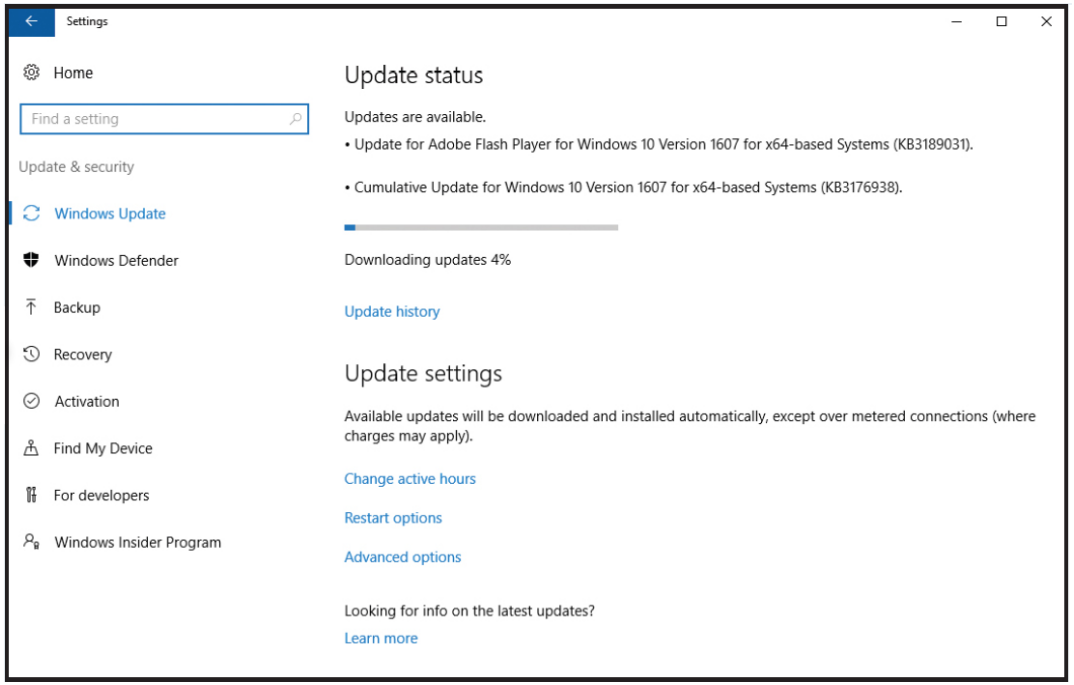
- Each computer on the network should have its own up-to-date security software installed



# Protecting Your Network—Layer 4: Guard Dogs

- Installing updates is a critical part of securing your systems



# Questions

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