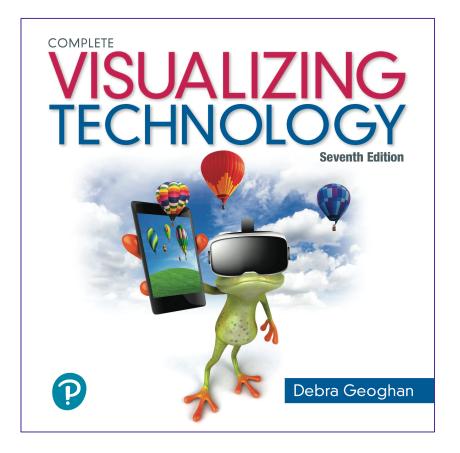
Introductory Visualizing Technology

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



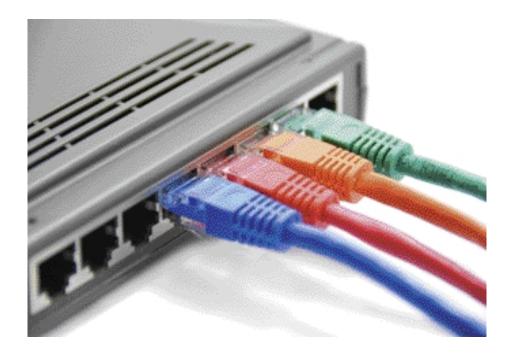
Compare Different Types of LANs and WANs





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 clientserver network





LANs and WANs—Small Networks (2 of 2)

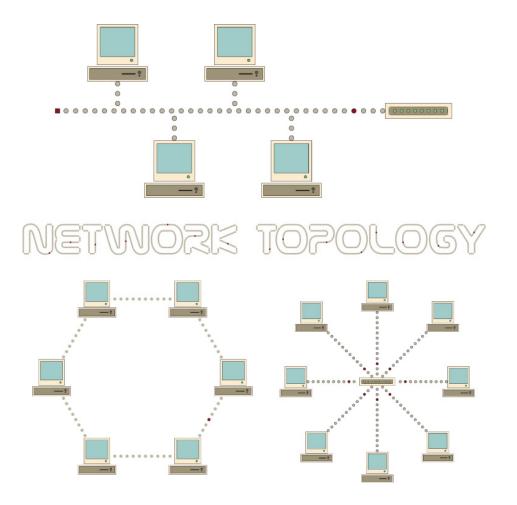
- PAN (personal area network)
 - Devices connected via Bluetooth
 - Bluetooth technology connects peripherals wirelessly at short ranges
- WLAN (wireless LAN)
 - Uses Wi-Fi to transmit data





LANs and WANs—LAN Topologies

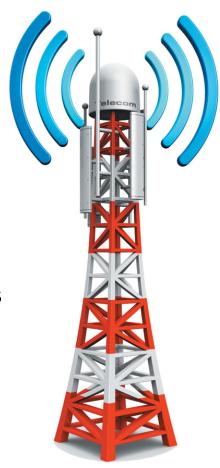
- Physical layout of a LAN
 - Three common configurations
 - Bus
 - Ring
 - Star
- Modern LANs use star topology
 - Every node attached to central device
- Standards ensure equipment made by different companies works together
 - Ethernet standard defines how data is transmitted over a LAN





LANs and WANs—Large Networks (1 of 3)

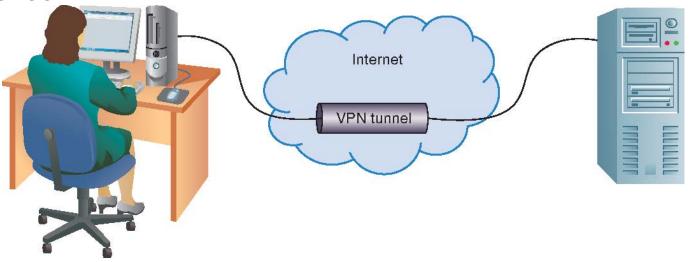
- WAN (wide area network)
 - Spans multiple locations
 - Connects multiple LANs over dedicated lines using routers
- VPN (virtual private network)
 - A private network through the public network (Internet)
 - Remote users access a LAN securely without dedicated lines
 - Uses encryption to ensure that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

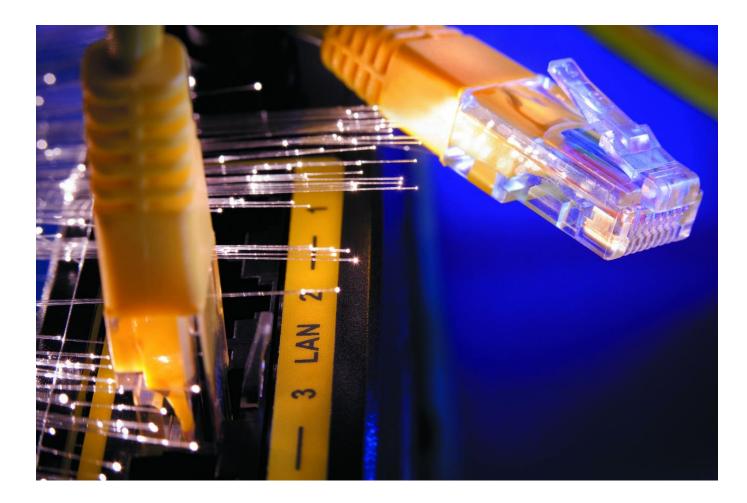


Learning Objective 9.3

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



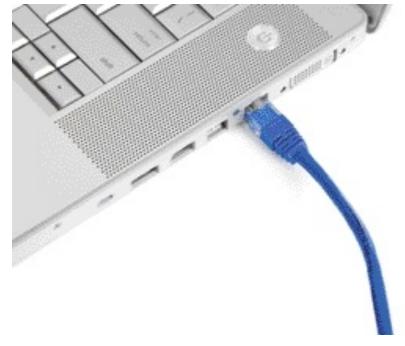
List and Describe the Hardware Used in Both Wired and Wireless Networks





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)

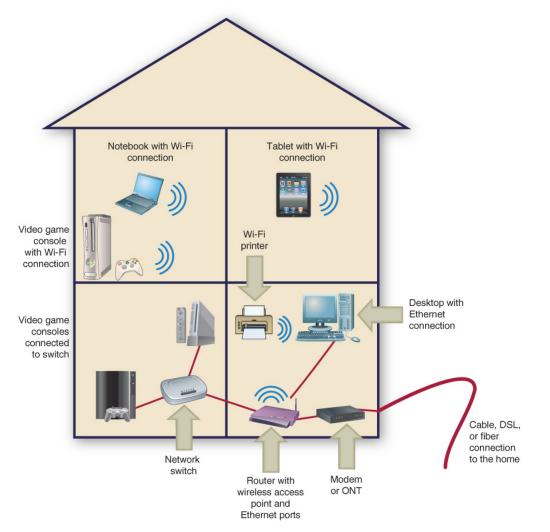
- Wi-Fi networks use IEEE 802.11 standards
- USB wireless adapters
 - Easy connection to devices without built-in adapter
 - Wi-Fi Alliance certifies wireless devices
- WLAN (wireless local area network)
 - Ad hoc network
 - Two wireless devices connect directly
 - Infrastructure wireless network
 -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

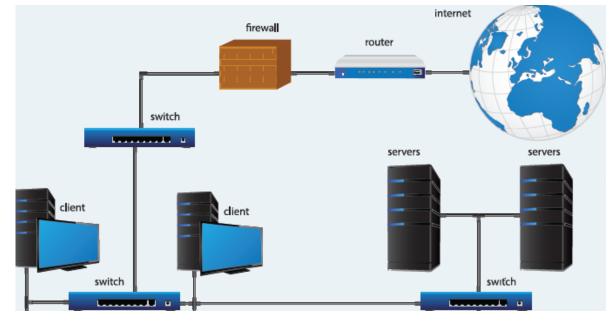




Hardware—Network Connectivity Hardware (2 of 2)

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

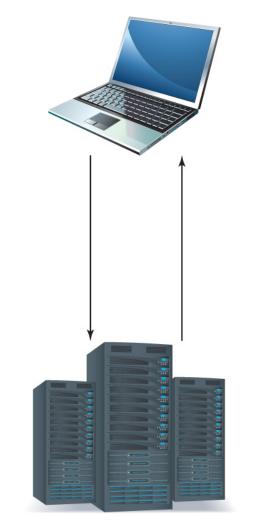
- No special software required
- Operating systems have built-in networking capabilities
 - Client for Microsoft Networks
 - Allows remote access of files and printers on a Microsoft network

Co	omputer Nai	 Share files and folders using SMB Number of users connected: 0 Share files and folders using AFP Number of users connected: 0 	Edit
On	Service Screen Sha File Sharing Printer Sha	Windows File Sharing: Sharing files with some Windows computers requires storing the user's account password on this computer in a less secure manner. When you enable Windows sharing for a user account, you must enter the password for that account.	and administrato
	Remote Los Remote Ma Remote Ap Internet Sh Bluetooth S	On Account Image: Second Se	
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Software and Protocols—Client-Server Network Software

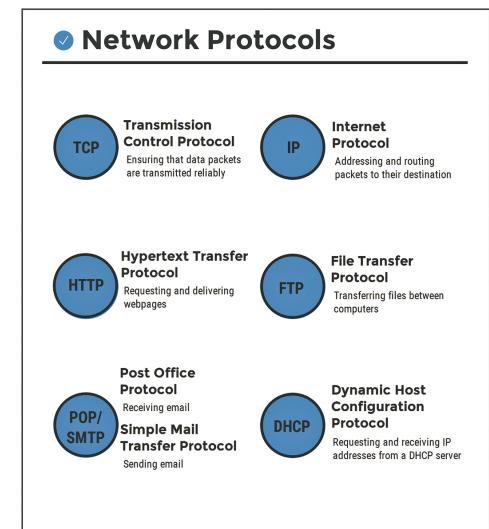
- Both client software and server software needed on a client-server network
 - Client software makes requests
 - Server software fulfills them
- Microsoft Server OS
 - Windows clients do not need special client software for file and print services





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 standalone device





Protecting Your Network—Layer 2: Door Locks

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

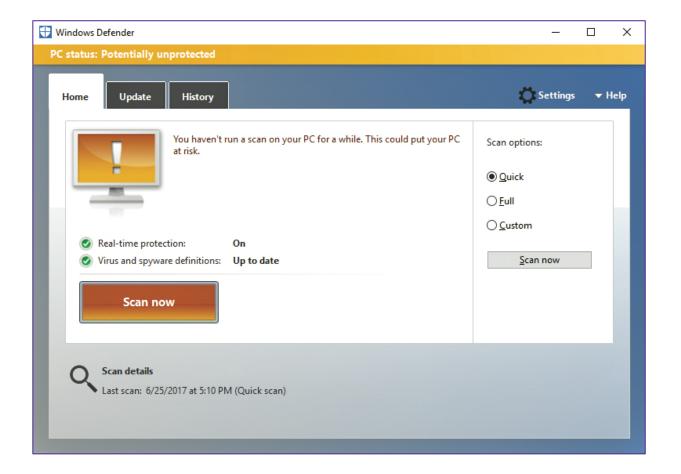
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🕲 Home	Your family		
Find a setting P	You can allow family members to sign in to this PC. Adults can manage family settings online and see recent activity to help kids stay safe.		
R≡ Your info	+ Add a family member		
Email & app accounts	mikeygee2016@outlook.com Can sign in		
🔍 Sign-in options	Child		
Access work or school	Manage family settings online		
R ₊ Family & other people	Other people		
C Sync your settings	Allow people who are not part of your family to sign in with their own accounts. This won't add them to your family.		
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	Bailey Corgi baileycorgi@cutlock.com		
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Other Users Firstname Lastname Standard Guest User Off		
Login Options	Contacts Card: Open	
Click the lock to prevent for	urther changes.	?



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

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		No Updates Available		
Update	es Installed in the Last 30 Da	ys		
	macOS High Sierra 10.13.2 D	Developer Beta		
۲	Version 4 Installed Nov 26, 2017	This update is recommended for all users.		
(e)	Keynote			
4	Apple Version 7.3.1 Installed Nov 11, 2017	This update contains stability and performance improvements.		
7	Pages Apple Version 6.3.1 Installed Nov 11, 2017	This update contains stability and performance improvements.		
	Numbers Apple Version 4.3.1 Installed Nov 11, 2017	This update contains stability and performance improvements.		
*	iMovie Apple Version 10.1.8	Improves overall stability		

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Update & security	Cumulative Update for Windows 10 Version 1607 for x64-based Systems (KB3176938).
Windows Defender	Downloading updates 4%
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 Recovery Activation Find My Device 	Update settings Available updates will be downloaded and installed automatically, except over metered connections (where charges may apply).
유 For developers 우 Windows Insider Program	Change active hours Restart options Advanced options
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Questions





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