

A+ Guide to Managing and Maintaining Your PC, 7e

Chapter 17 *Networking Essentials*

Objectives

- Learn about hardware devices used for networking
- Learn about the different types of networks
- Learn about the protocols and standards Windows uses for networking
- Learn how to connect a computer to a network
- Learn about troubleshooting tools and tips for network connections

Networking Technologies

- Computer network
 - Two or more computers communicating
- Categorized by size and physical area covered
 - PAN, LAN, Wireless LAN, MAN, WAN
- Bandwidth: data transmission rate
- Data throughput: actual network transmission speed
- Latency: delays in network transmissions

Networking Technologies (cont'd.)

- Internet Service Provider (ISP)
 - Required for Internet connection
 - Upload speed is slower than download speed
- Communicating devices require same protocol
 - Internet protocol: TCP/IP (group of protocols)
 - Data is broken into segments, segment are put into packets

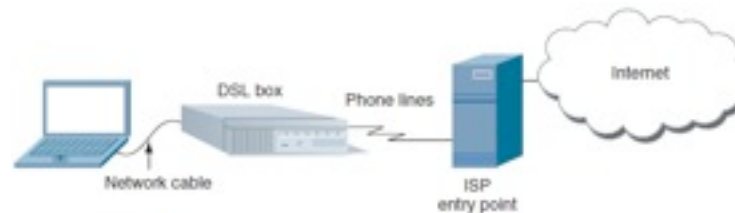


Figure 17-1 Use an ISP to connect to the Internet
Courtesy: Course Technology/Cengage Learning

Technology	Maximum Speeds	Common Uses
Wireless Networks		
Bluetooth 2.0 (BT2)	Up to 2 Mbps	Short-range wireless technology used for a PAN (personal area network).
GSM mobile phone service	Up to 3 Mbps	Cellular wireless technology used for voice and data transmissions over mobile phones; first became popular in Europe.
CDMA mobile phone service	Up to 3 Mbps	Cellular wireless technology used for mobile phones; losing popularity.
G3 mobile phone service	Up to 2.4 Mbps	Cellular mobile phone technology allows for transmitting data, video, and text.
Wi-Fi 802.11b wireless	Up to 11 Mbps	First 802.11 standard that was widely used, but is being replaced by 802.11g and n.
Bluetooth 3.0 (BT3)	Up to 24 Mbps	Latest Bluetooth standard just released that is not yet available in devices.
Wi-Fi 802.11a wireless	Up to 54 Mbps	Shorter range than 802.11b, but faster.
Wi-Fi 802.11g wireless	Up to 54 Mbps	Compatible with and replacing 802.11b.
802.16 wireless (WiMAX)	Up to 75 Mbps	Offers ranges up to 6 miles.
802.11n wireless	Up to 160 Mbps	Latest Wi-Fi technology.
Wired Networks		
Dial-up or regular telephone (POTS, for plain old telephone service)	Up to 56 Kbps	Slow access to an ISP using a modem and dial-up connection.
SDSL (Symmetric Digital Subscriber Line)	Up to 2.3 Mbps	Equal bandwidths in both directions. SDSL is a type of broadband technology. (Broadband refers to a networking technology that carries more than one type of signal, such as DSL and telephone.)

Table 17-1 Networking technologies

Technology	Maximum Speeds	Common Uses
ADSL (Asymmetric DSL)	640 Kbps upstream and up to 8 Mbps downstream	Most bandwidth is from ISP to user. Slower versions of ADSL are called ADSL Lite or DSL Lite. ISP customers pay according to a bandwidth scale.
Ethernet	10 Mbps	Slowest Ethernet network, replaced by Fast Ethernet. Variations of Ethernet are used for almost all local networks.
Cable modem	4 to 16 Mbps, depends on the type of cable used	Connects a home or small business to an ISP; is usually purchased with a cable television subscription. Cable modem is a type of broadband technology that is used in conjunction with television on the same cable. Fiber-optic cable gives highest speeds.
Dedicated line using fiber optic	Up to 20 Mbps upstream and 50 Mbps downstream	Dedicated line from ISP to business or home. Speeds vary with price.
T3	45 Mbps	Dedicated lines used by large companies that require a lot of bandwidth and transmit extensive amounts of data.
VDSL (very-high-bit-rate DSL)	Up to 52 Mbps	This latest version of DSL is asymmetric DSL that works only a short distance.
Fast Ethernet	100 Mbps	Used for local networks.
Gigabit Ethernet	1 Gbps	Fastest Ethernet standard for a local network.
10-gigabit Ethernet	10 Gbps	Newest Ethernet standard expected to largely replace SONET, OC, and ATM because of its speed, simplicity, and lower cost.
OC-1, OC-3, OC-24, up to OC-3072	52 Mbps, 155 Mbps, 1.23 Gbps, 160 Gbps	Optical Carrier levels (OCx) used for Internet backbones; they use fiber-optic cabling.
SONET (Synchronous Optical Network)	Up to 160 Gbps	Major backbones built using fiber-optic cabling make use of different OC levels.

Table 17-1 Networking technologies (continued)

Broadband Technologies

- Connect to the Internet
 - Cable modem, DSL, fiber-optic, satellite, ISDN (Integrated Services Digital Network)
- Cable modem communication
 - Uses existing cable lines
 - Always connected (always up)
 - TV signals and PC data signals share same coax cable
 - Cable modem converts PC's digital signals to analog

Broadband Technologies (cont'd.)

- DSL (Digital Subscriber Line)
 - Group of broadband technologies
 - Wide range of speeds
 - Uses ordinary copper phone lines and unused voice frequencies
 - Always connected
 - Some DSL services offer connect on demand
 - Asymmetric DSL (ADSL): one upload speed, faster download speed
 - Symmetric DSL (SDSL): equal bandwidths in both directions

Broadband Technologies (cont'd.)

- Cable modem and DSL
 - Sometimes purchased on a sliding scale
 - Cable modem shares TV cable infrastructure with neighbors
 - Service may become degraded
 - DSL uses dedicated phone line
 - Must filter phone line static
 - Similar setup for both
 - Installation completed by provider or user
 - Both use PC network port or USB port to connect cable modem or DSL box

Broadband Technologies (cont'd.)

- Satellite provides high-speed Internet connections in remote areas
 - Available everywhere (airplanes)
 - Disadvantage: latency when uploading



Figure 17-5 Communication by satellite can include television and Internet access
Courtesy: Course Technology/Cengage Learning

Broadband Technologies (cont'd.)

- Fiber optic dedicated point-to-point (PTP)
 - No line sharing
 - Broadband fiber-optic cable
 - Television, Internet data, voice communication
 - Verizon technology: Fiber Optic Service (FiOS)
 - Cabling endpoints: carrier dependent
 - Upstream and downstream speeds and prices vary

Wireless Technologies

- Use radio waves or infrared light
 - Useful in places where cables difficult to install
- 802.11 wireless (Wi-Fi or Wireless Fidelity)
 - 802.11g and 802.11b
 - 2.4 GHz frequency Range, 100m distance
 - 802.11n: Multiple input/multiple output (MIMO)
 - 2.4 GHz and 5 GHz range, 600 Mbps speed possible
 - 802.11a: no longer widely used
 - 802.11k and 802.11r
 - Manage connections between wireless devices and access points

Wireless Technologies (cont'd.)

- Security methods required
 - Encrypt data
 - WEP (Wired Equivalent Privacy), WPA (Wi-Fi Protected Access), WPA2 (Wi-Fi Protected Access 2)
 - Disable SSID broadcasting
 - SSID: name of the wireless access point
 - Filter MAC addresses
 - MAC (Media Access Control) address: 6-byte number uniquely identifying network adapter
 - Prevents uninvited guests from using wireless LAN
 - Does not prevent others from receiving data in the air

Wireless Technologies (cont'd.)

- WIMAX or 802.16 wireless
 - Used in public hot spots and as a last mile solution
- Cellular WAN covers a wide area
 - Made up cells created by base stations
 - Cellular WAN Competing technologies
 - GSM (Global System for Mobile Communications)
 - CDMA (Code Division Multiple Access)
 - TDMA (Time Division Multiple Access)
- 3G (Third Generation) technology: cell phones
- Bluetooth: short range standard

Dial-Up Technology

- POTS (Plain Old Telephone Service)
 - Least expensive, slowest Internet connection
 - Uses: travel, broadband down, saving money
 - Dial-up networking uses PPP (Point-to-Point Protocol)
 - Desktop computers modem cards provide two phone jacks (RJ-11 jacks)
 - Laptop computers use embedded modem capability
 - Single phone jack
 - Most recent modem standard: V.92

Internet Access When You Travel

- Cellular Internet card (air card)
 - Works like a cell phone to connect to cellular WAN
 - USB device
 - Inserted into laptop PC Card slot or ExpressCard slot
- Public Wi-Fi hot spot
 - May require a fee
- Mobile satellite broadband
 - Requires portable satellite dish

Hardware Used by Local Networks

- Hardware devices creating and connecting to networks
 - Desktop and laptop devices
 - Cables and their connectors
 - Hubs
 - Switches
 - Wireless access devices
 - Routers

Networking Adapters and Ports

- Ethernet network adapters and ports
 - Network adapter: direct connection to a network
 - Takes the form of a network interface card (NIC)
 - External devices connect using USB port
 - Provides RJ-45 port
 - Network cards provide status light indicators
 - Useful in troubleshooting
 - MAC (Media Access Control) address
 - Unique 48-bit (6-byte) number hard-coded on card by manufacturer
 - Identifies adapter on the network

Quiz #1

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- Answer: True
- 5. A major downside of wireless technology is _____.
- Answer: Security

Networking Adapters and Ports (cont'd.)

- WI-FI wireless adapters
 - 802.11b/g/n connections use a variety of devices
 - Laptops sold today have antenna embedded inside



Figure 17-16 Four different types of wireless network adapters: (a) wireless NIC that fits in a PCI slot; (b) onboard wireless with an antenna that can be moved; (c) PC Card wireless NIC with embedded antenna; and (d) wireless NIC that uses a USB port on a desktop or notebook computer. Courtesy: Course Technology/ Cengage Learning

Cables and Connectors

- Types of Ethernet cabling:
 - Twisted-pair
 - Unshielded (UTP) and shielded twisted pair (STP)
 - Coaxial cable: single copper wire with braided shield
 - Fiber-optic: glass strands inside protective tubing
- Ethernet types (categorized by speed):
 - 10-Mbps Ethernet
 - 100-Mbps or Fast Ethernet
 - 1000-Mbps or Gigabit Ethernet
 - 10-Gigabit Ethernet




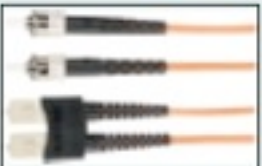
Cable System	Speed	Cables and Connectors	Example of Connectors	Maximum Cable Length
10Base2 (ThinNet)	10 Mbps	Coaxial uses a BNC connector.	 <p>Courtesy of Cables4Computer.com</p>	185 meters or 607 feet
10Base5 (ThickNet)	10 Mbps	Coaxial uses an AUI 15-pin D-shaped connector.	 <p>Courtesy of Black Box Corporation</p>	500 meters or 1,640 feet
10BaseT, 100BaseT (Twisted-pair), Gigabit Ethernet, and 10-Gigabit Ethernet	10 Mbps, 100 Mbps, 1 Gbps, or 10 Gbps	Twisted pair (UTP or STP) uses an RJ-45 connector.	 <p>Courtesy of Tyco Electronics</p>	100 meters or 328 feet
10BaseF, 10BaseFL, 100BaseFL, 100BaseFX, 1000BaseFX, or 1000BaseX (fiber optic)	10 Mbps, 100 Mbps, 1 Gbps, or 10 Gbps	Fiber-optic cable uses ST or SC connectors (shown to the right) or LC and MT-RJ connectors (not shown).	 <p>Courtesy of Black Box Corporation</p>	Up to 2 kilometers (6,562 feet)

Table 17-2 Variations of Ethernet and Ethernet cabling

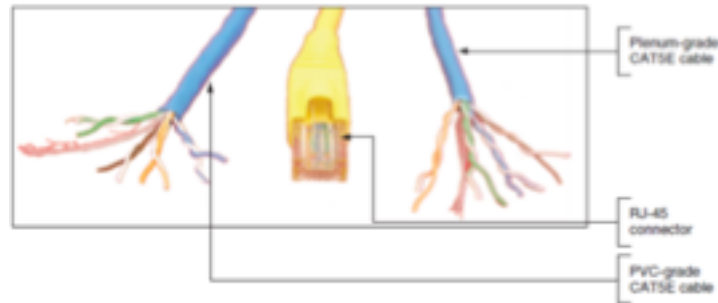


Figure 17-17 The most common networking cable for a local network is UTP cable using an RJ-45 connector. Courtesy: Course Technology/Cengage Learning



Figure 17-18 Coaxial cable and a BNC connector are used with ThinNet Ethernet. Courtesy: Course Technology/Cengage Learning

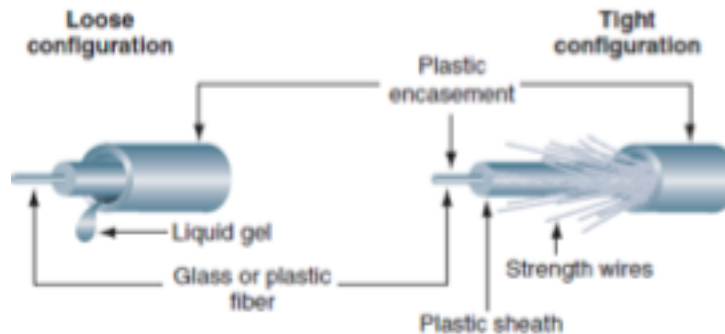


Figure 17-19 Fiber-optic cables contain a glass core for transmitting light. Courtesy: Course Technology/Cengage Learning

Hubs and Switches

- Star topology: nodes connected to a centralized hub or switch
- Hub: pass-through device
 - No regard for data
- Switch: keeps a table of all devices connected to it
 - Determines path when sending packets
- Network cables
 - Patch cable (straight-through cable): connects computer to hub or switch
 - Crossover cable: connects two like devices

Hubs and Switches (cont'd.)

- Some switches have uplink port for patch cable use
- Some switches use auto-uplinking

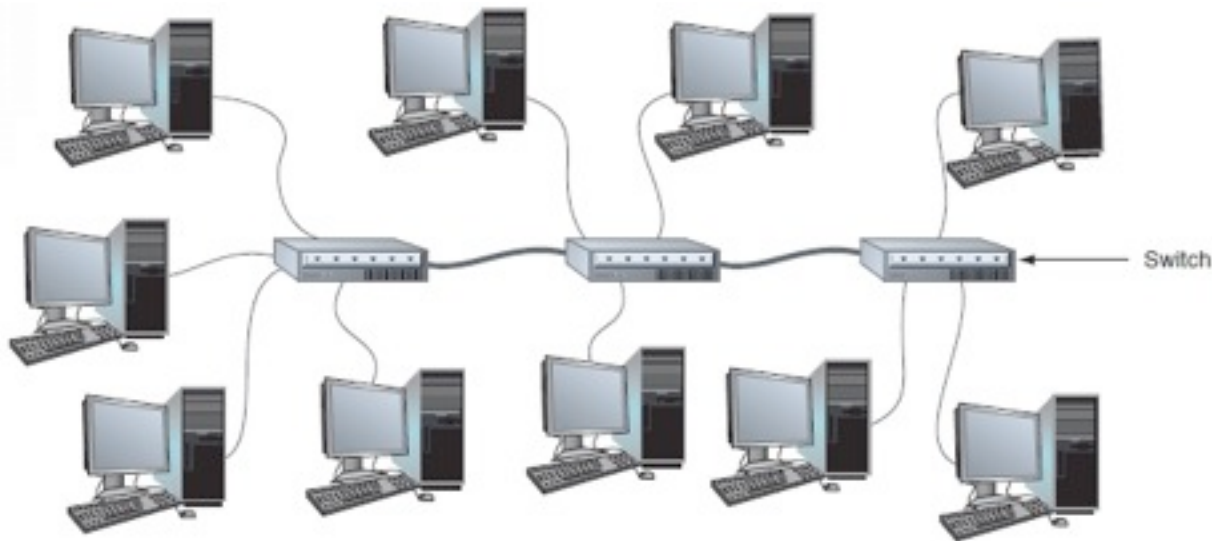


Figure 17-24 An Ethernet network with three switches
Courtesy: Course Technology/Cengage Learning

Wireless Access Points

- Allows wireless device connection to LAN
 - Devices communicate through access point
 - May double as a router

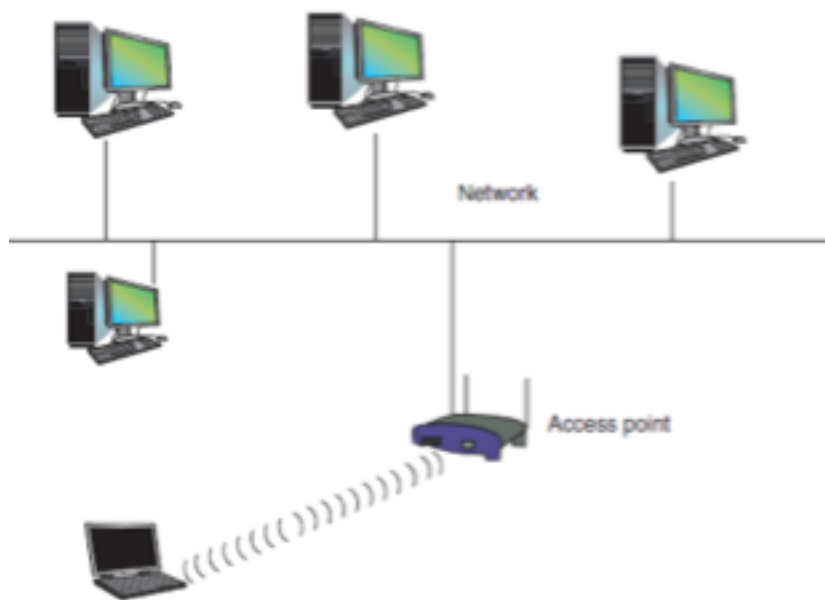


Figure 17-26 Nodes on a wireless LAN connect to a wired network by way of an access point. Courtesy: Course Technology/ Cengage Learning

Routers

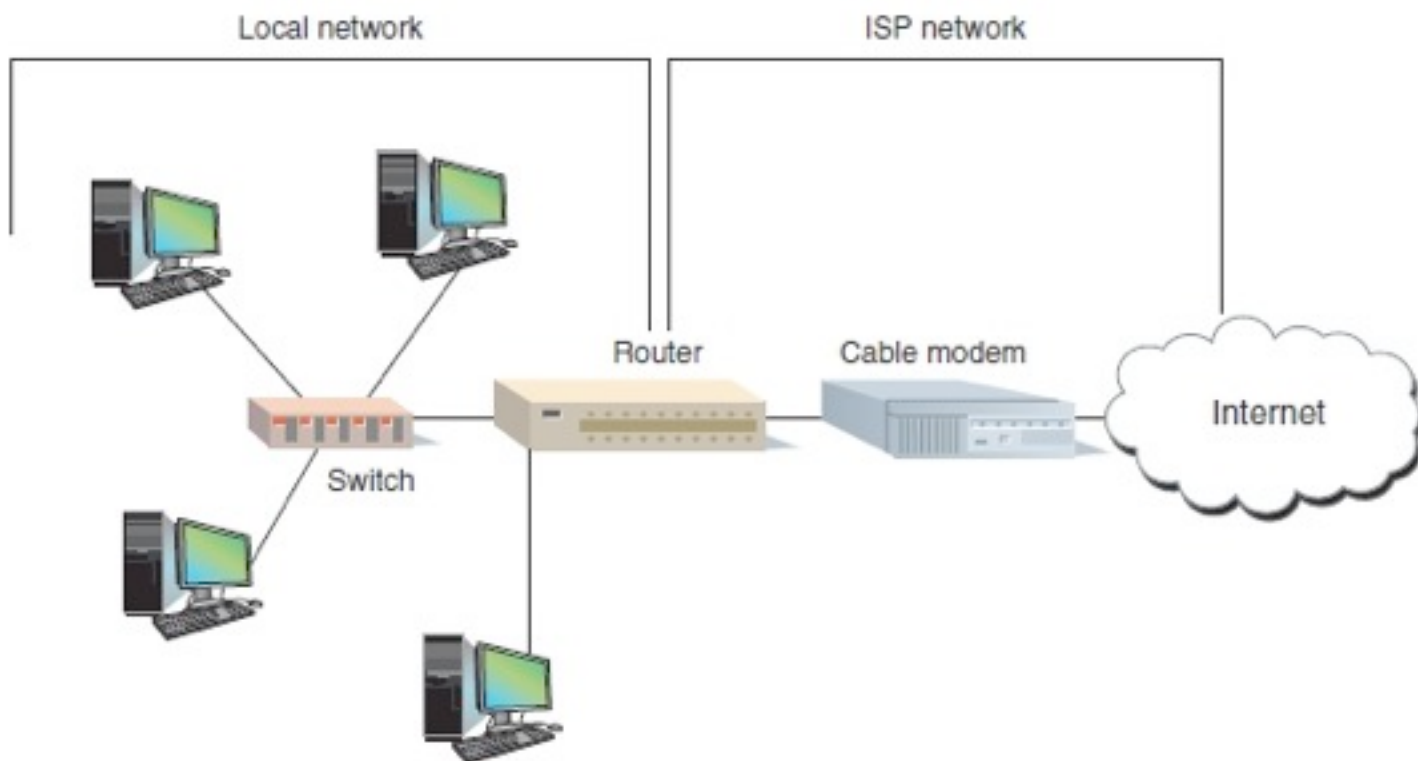


Figure 17-27 A router stands between a local network and the Internet and manages traffic between them. Courtesy: Course Technology/Cengage Learning

Routers (cont'd.)

- DHCP (dynamic host configuration protocol) server
 - Provides IP addresses to network computers
 - Dynamic IP addressing
 - No need to assign, keep up with unique IP addresses
- Router functions
 - Router
 - Switch
 - DHCP server
 - Wireless access point
 - Firewall with or without NAT redirection

Quick Quiz #2

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- 5. _____ Ethernet operates at 1000 Mbps.

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- Answer: False
- 5. _____ Ethernet operates at 1000 Mbps.
- Answer: Gigabit

Windows on a Network

- Client/server applications
 - Two computers and two applications involved
 - Communication occurs three levels
 - Hardware, operating system, application
 - Dependent on one computer addressing the other

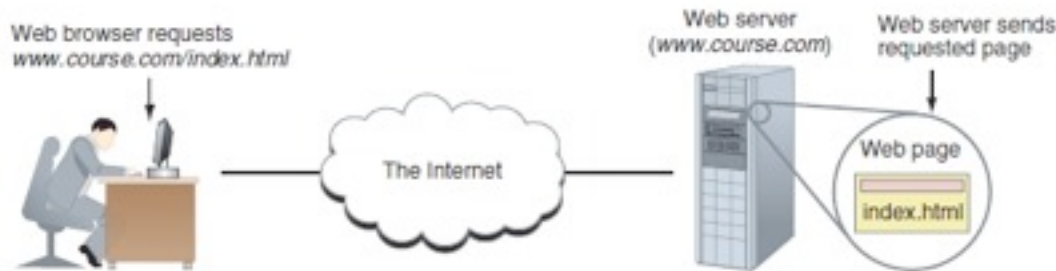


Figure 17-31 A Web browser (client software) requests a Web page from a Web server (server software); the Web server returns the requested data to the client
Courtesy: Course Technology/Cengage Learning

Layers of Network Communication

- Level 1: Hardware level
 - Root level of communication
 - Wireless or network cables
 - Phone lines or TV cable lines
 - Includes the network adapter and MAC address
 - Communication protocols used

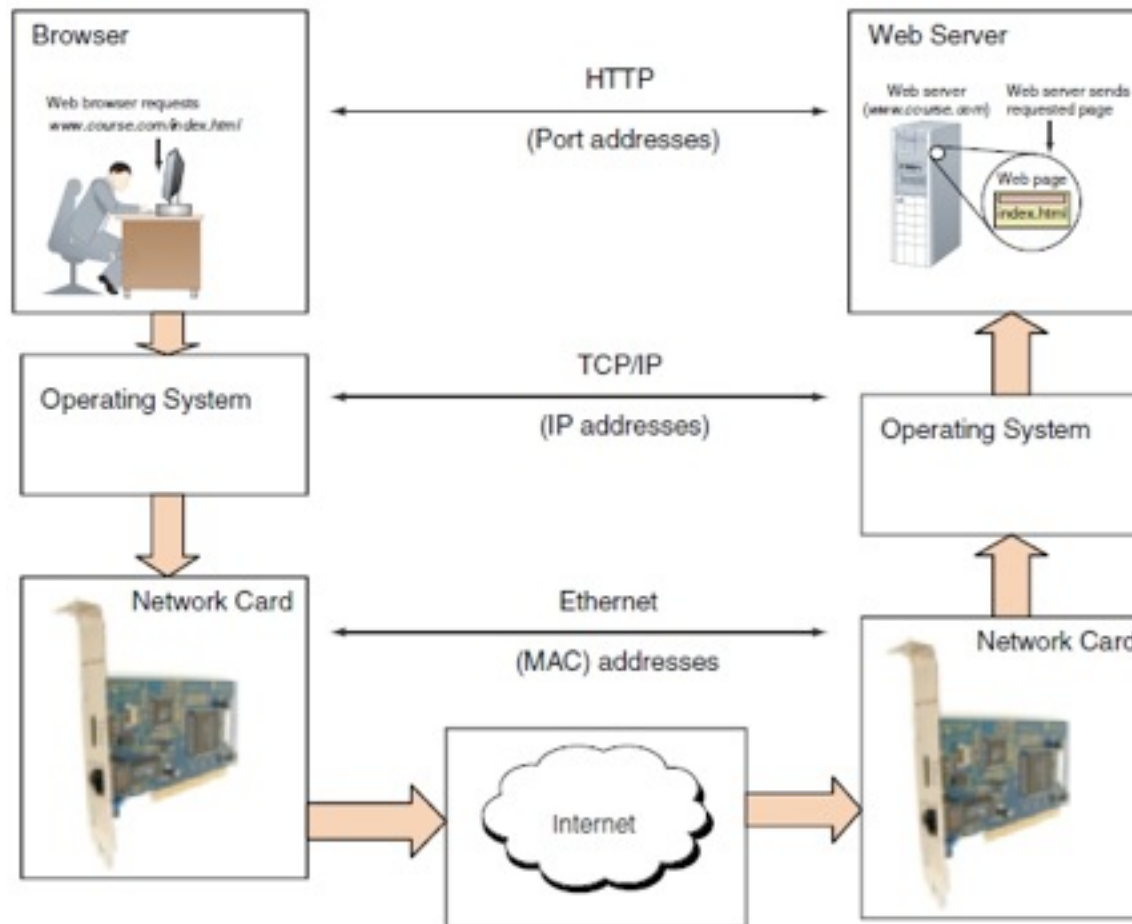


Figure 17-32 Network communication happens in layers
 Courtesy: Course Technology/Cengage Learning

Layers of Network Communication (cont'd.)

- Level 2: Operating system level
 - Manages communication between itself and another computer using TCP/IP
 - Uses IP addressing

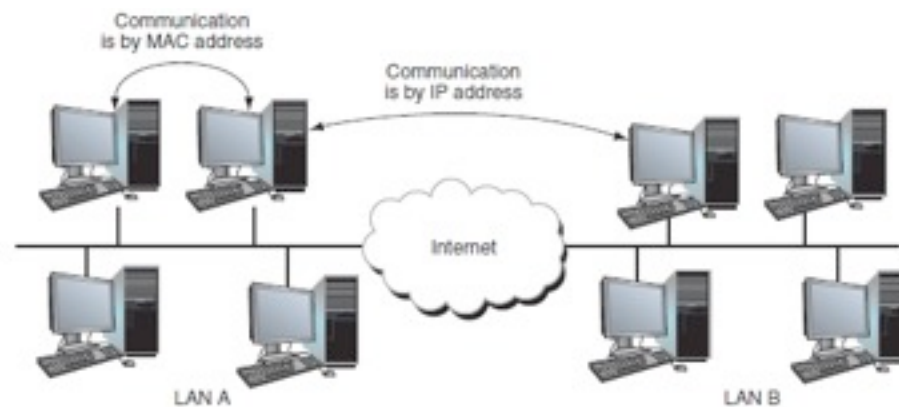


Figure 17-33 Computers on the same LAN use MAC addresses to communicate, but computers on different LANs use IP addresses to communicate over the Internet
Courtesy: Course Technology/Cengage Learning

Layers of Network Communication (cont'd.)

- Level 3: Application level
 - Client communicates with another Internet application
 - Port number
 - Uniquely identifies computer application
 - Socket
 - IP address followed by a colon and port number
 - E-mail example: 36.60.30.5:25
 - Web server example: 136.60.30.5:80

Port	Protocol	Service	Description
20	FTP	FTP	File transfer data.
21	FTP	FTP	File transfer control information.
22	SSH	Secure Shell	Remote control to a networked computer that includes encrypting transmitted login information and data.
23	Telnet	Telnet	Remote control to a networked computer from a command prompt that does not use encryption.
25	SMTP	Email	Simple Mail Transfer Protocol; used by a client to send e-mail.
53	DNS	DNS server	Domain Name Service; used to find an IP address when a computer's character-based name is known.
80	HTTP	Web server	World Wide Web protocol.
110	POP3	Email	Post Office Protocol, version 3; used by a client to receive e-mail.
143	IMAP	Email	Internet Message Access Protocol, a newer protocol used by clients to receive e-mail.
443	HTTPS	Web server	HTTP with added security that includes authentication and encryption.
3389	RDP	Remote Desktop	Remote Desktop Protocol used to connect to a computer. Transmissions are encrypted. Remote Desktop and Remote Assistance both use RDP.

Table 17-3 Common TCP/IP port assignments for client/server applications

Understanding IP Addresses and How They Are Used

- IP address: 32 bits long, made up of 4 bytes, each 8 bits long
 - Four decimal numbers separated by periods
 - 190.180.40.120
 - Largest possible 8-bit number
 - 11111111 (255 decimal)
 - Largest possible decimal IP address
 - 255.255.255.255
 - 11111111.11111111.11111111.11111111 binary
 - Octet: each of the four decimal numbers
 - 0 to 255, 4.3 billion potential IP addresses

Understanding IP Addresses and How They Are Used (cont'd.)

- IP address identifies network and host
 - Classes are based on the number of possible IP addresses in each network within each class

Class	Network Octets*	Total Number of Possible Networks or Licenses	Total Number of Possible IP Addresses in Each Network
A	1.x.y.z to 126.x.y.z	127	16 million
B	128.0.x.y to 191.255.x.y	16,000	65,000
C	192.0.0.x to 223.255.255.x	2 million	254

*An x, y, or z in the IP address stands for an octet used to identify hosts

Table 17-4 Classes of IP addresses

Understanding IP Addresses and How They Are Used (cont'd.)

- Class D addresses: octets 224 through 239
 - Multicasting
- Class E addresses: octets 240 through 254
 - Research

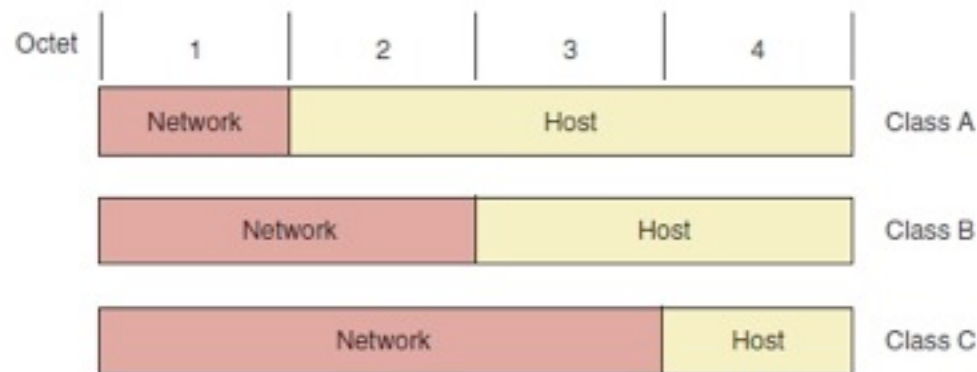


Figure 17-36 The network portion and host portion for each class of IP addresses
Courtesy: Course Technology/Cengage Learning

Understanding IP Addresses and How They Are Used (cont'd.)

- Subnet masks
 - Group of ones followed by a group of zeros
 - Classful subnet masks: all ones, all zeros in an octet
 - Classless subnet mask: mix of zeros and ones

Class	Subnet Mask	Address	Network ID	Host ID
Class A	11111111.00000000.00000000.00000000	89.100.13.78	89	100.13.78
Class B	11111111.11111111.00000000.00000000	190.78.13.250	190.78	13.250
Class C	11111111.11111111.11111111.00000000	201.18.20.208	201.18.20	208

Table 17-5 Default subnet masks for classes of IP addresses

Understanding IP Addresses and How They Are Used (cont'd.)

- Public IP addresses: available to the Internet
- Private IP addresses: used on private intranets
 - Use router with NAT redirection for Internet access
 - IEEE recommendations
 - 10.0.0.0 through 10.255.255.255
 - 172.16.0.0 through 172.31.255.255
 - 192.168.0.0 through 192.168.255.255

IP Address	How It Is Used
255.255.255.255	Broadcast messages
0.0.0.0	Currently unassigned IP address
127.0.0.1	Indicates your own workstation and is called the loop-back address

Table 17-6 Reserved IP addresses

Understanding IP Addresses and How They Are Used (cont'd.)

- Dynamic IP address
 - Assigned for current connection only (lease)
 - Managed by DHCP server
 - DHCP client: workstations working with DHCP server
 - DHCP software resides client and server
- Configuring a DHCP server
 - IP address ranges available for clients
- Automatic Private IP Address (APIPA) service
 - Used if attempt fails
 - Address range 169.254.x.y

The image shows a screenshot of a DHCP server configuration interface. The main window is titled "DHCP" and contains a "DHCP Server" section with the following settings:

- Enable:** Enable Disable
- Starting IP Address:** 192.168.1.100
- Number of DHCP Users:** 50

Below these settings is a "DHCP Active IP Table" window. It displays a table of IP addresses and their corresponding MAC addresses. The table has three columns: Client Hostname, IP Address, and MAC Address. The DHCP Server IP Address is highlighted in green as 192.168.1.1. The table lists several clients with their assigned IP addresses and MAC addresses.

Client Hostname	IP Address	MAC Address
	192.168.1.100	08-00-2B-24-8C-3E
DESKTOP	192.168.1.101	08-00-AA-9D-3E-AA
	192.168.1.102	08-00-43-7A-4F-34
	192.168.1.103	08-00-0C-69-8F-4E
Len	192.168.1.104	08-00-0C-39-3C-3C
LAD3	192.168.1.105	08-00-23-25-34-4E
Evex	192.168.1.106	08-00-0C-69-8F-4E
Trax	192.168.1.107	08-00-0C-69-8F-4E
MyoTee	192.168.1.108	08-00-0C-69-8F-4E

Annotations on the right side of the image point to specific elements:

- Beginning IP address:** Points to the "Starting IP Address" field (192.168.1.100).
- Router IP address:** Points to the "DHCP Server IP Address" (192.168.1.1).
- IP addresses currently assigned to MAC addresses:** Points to the "IP Address" column in the table.
- Number of addresses that can be assigned:** Points to the "Number of DHCP Users" field (50).

Figure 17-39 A DHCP server has a range of IP addresses it can assign to clients on the network. Courtesy: Course Technology/Cengage Learning

Character-based Names Identify Computers and Networks

- Character-based names: substitute for IP addresses
 - Host name: name of a computer
 - NetBIOS name: 15 character name used on legacy system
 - Workgroup name: identifies a workgroup
 - Domain name: identifies a network
 - Fully qualified domain name (FQDN): identifies computer and network to which it belongs
 - Uses name resolution
 - DNS server finds IP address when FQDN known
 - Windows uses a host file

TCP/IP Protocol Layers

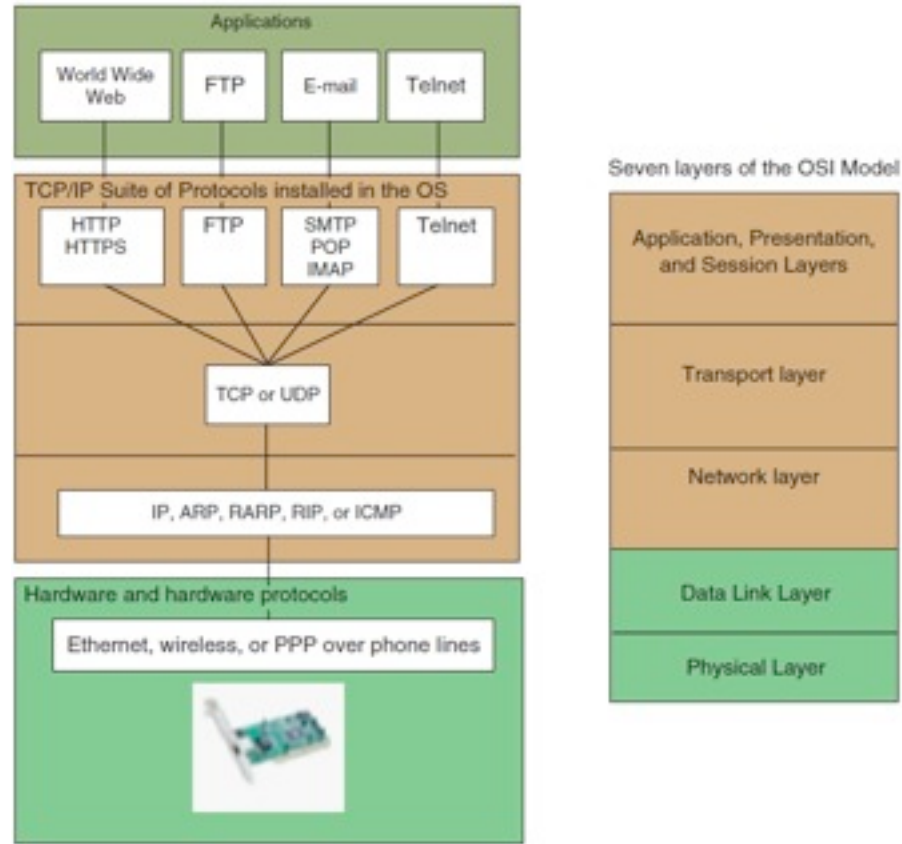


Figure 17-42 How software, protocols, and technology on a TCP/IP network relate to each other. Courtesy: Course Technology/Cengage Learning

TCP/IP Protocol Layers (cont'd.)

- HTTP (Hypertext Transfer Protocol)
 - HTTPS (HTTP secure) protocol
 - Encrypts and decrypts data before sent and processed
- FTP (File Transfer Protocol)
 - Transfer files between two computers
- SMTP (Simple Mail Transfer Protocol)
 - Used to send e-mail message
 - SMTP AUTH (SMTP Authentication)
- POP and IMAP
 - Delivery of email message

TCP/IP Protocol Layers (cont'd.)

- Telnet
 - Remotely control a computer
- TCP (Transmission Control Protocol)
 - Connection-oriented protocol
 - Used by Web browsers and e-mail
- UDP (User Datagram Protocol)
 - Connectionless protocol (best-effort)
 - Used for broadcasting and streaming video
- TCP uses IP to establish client/server session
 - Uses a series of acknowledgements

PING, IPCONFIG, and TELNET

- Ping (Packet InterNet Groper) command
 - Tests connectivity by sending echo request to a remote computer
- Ipconfig command
 - Displays TCP/IP configuration information and refreshes the IP address
- Telnet
 - Allows user connection to a remote computer
- Remote Assistance and Remote Desktop
 - Becoming more popular than Telnet

PING, IPCONFIG, and TELNET (cont'd.)

- Telnet Tips
 - Client/server application
 - User account must belong to TelnetClients group
 - Application must be running on remote computer
 - Telnet client and server applications installed on Windows XP by default (not on Vista)
- Telnet disadvantage: lack of security
- Better protocol: Secure Shell (SSH)
 - Supported by Windows
 - Requires third-party SSH applications

Virtual Private Networks

- Secures private data traveling over a public network
 - Encrypts data packets
 - Managed by client/server software
- VPN security
 - User accounts and passwords required for connection
 - One of four tunneling protocols used
 - Point-to-Point Tunneling Protocol (PPTP)
 - Layer Two Tunneling Protocol (L2TP)
 - SSL (Secure Sockets Layer)
 - IPsec (IP security)

How to Connect a Computer to a Network

- Connecting a computer to a network
 - Quick and easy in most situations
- Topics covered
 - Connecting using wired and wireless connections
 - Fixing connection problems

Connect to a Network Using an Ethernet Connection

- Steps
 - Install network adapter
 - Connect network cable to Ethernet RJ-45 port and network port (wall jack, router, switch)
 - Verify lights
 - Windows assumes dynamic IP addressing
 - Automatically configures the network connection
 - Check in Network places folder
 - Verify Internet connectivity

Connect to a Network Using an Ethernet Connection (cont'd.)

- Troubleshooting
 - Verify Device Manager recognizes adapter without errors
 - Verify network is listed in Start menu
 - Connect to a network
 - Network and Sharing Center window (Vista)
 - Network Connections window (XP)
 - Vista: click Diagnose why Windows can't find any networks
 - XP: repair connection using Local Area Connection icon

Connect to a Network Using an Ethernet Connection (cont'd.)

- Static IP addressing information:
 - Computer IP address
 - Subnet mask
 - Group of four dotted decimal numbers
 - Default gateway
 - Device allowing computer on one network to communicate with computer on another network
 - IP addresses of one or more DNS servers
 - Verify TCP/IP settings

Connect to a Network Using a Wireless Connection

- Wireless networks types
 - Public, unsecured hotspots or private, secured hotspots
- Public wireless hotspot connection steps
 - Install wireless adapter
 - Embedded wireless: turn on wireless device
 - Connect to network
 - Save network if comfortable with Vista configuration
 - Verify firewall settings and check for errors
 - Test the connection and be aware of rogue hotspots

Connect to a Network Using a Wireless Connection (cont'd.)

- Private wireless connection steps
 - Provide information proving right to use the network
 - Enter encryption key
 - Enter SSID name if necessary
 - Check for MAC address filtering
 - Provide MAC address if necessary
 - MAC address is found on the adapter, in documentation, or through Ipconfig command

Connect to a Network Using a Wireless Connection (cont'd.)

- Windows XP: connect to public or private hot spot
 - Within Network Connections window
 - Right-click the Wireless Network Connection icon
 - Select View Available Wireless Networks
 - Select an unsecured network and click Connect
 - Enter the key the resulting dialog box
 - Troubleshoot within Wireless Network Connection Properties dialog box
 - Click the Wireless Networks tab and Click Add
 - Enter SSID, ensure Network Authentication set to Open and Data encryption set to Disabled, and click OK

Quick Quiz #3

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- Applications in which there are two computers and two applications involved are called _____ applications.

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 - Answer: True
- A+ Guide to Managing and Maintaining Your PC, 7e

Summary

- A network is a system interconnecting two or more PCs
 - Basic network types
 - PAN, LAN, Wireless LAN, MAN, or WAN
- There are many broadband technologies
 - Cable and DSL popular
- Major issue for wireless networks is security
- Types of hardware
 - Adapters, routers, hubs, switches

Summary (cont'd.)

- Three layers of communication
 - Hardware, operating system, application
- An IP address is a 32-bit address identifying network node
- TCP/IP protocol suite uses protocols at the application level
- Connecting to a wired network
- Connecting to a wireless networks
 - Public, unsecured hotspots or private, secured hotspots