

## Chapter 7

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# Telecommunications, the Internet, and Wireless Technology

### True-False Questions

1. Telephone networks are fundamentally different from computer networks.  
**Answer: True**                      **Difficulty: Medium**                      **Reference: p. 263**
2. A NOS must reside on a dedicated server computer.  
**Answer: False**                      **Difficulty: Easy**                      **Reference: p. 265**
3. In a client/server network, a network server sets the rule of communication for a network and provides every connected client with an address so it can be found by others on the network.  
**Answer: True**                      **Difficulty: Easy**                      **Reference: p. 267**
4. Circuit switching makes much more efficient use of the communications capacity of a network than does packet switching  
**Answer: False**                      **Difficulty: Easy**                      **Reference: p. 267**
5. Two computers using TCP/IP can communicate even if they are based on different hardware and software platforms.  
**Answer: True**                      **Difficulty: Easy**                      **Reference: p. 269**
6. In a ring topology, one station transmits signals, which travel in both directions along a single transmission segment.  
**Answer: False**                      **Difficulty: Medium**                      **Reference: p. 271**
7. Twisted wire can be used to connect to the Internet at speeds up to 1 Mbps  
**Answer: False**                      **Difficulty: Easy**                      **Reference: p. 272**
8. Fiber-optic cable is more difficult to work with and harder to install than wire media.  
**Answer: True**                      **Difficulty: Easy**                      **Reference: p. 272**

9. The number of cycles per second that can be sent through any telecommunications medium is measured in kilobytes.
- Answer: False**                      **Difficulty: Hard**                      **Reference: p. 274**
10. Frame relay is less expensive than packet switching.
- Answer: True**                      **Difficulty: Medium**                      **Reference: p. 274**
11. Every computer on the Internet is assigned a unique Internet Protocol (IP) address.
- Answer: True**                      **Difficulty: Medium**                      **Reference: p. 277**
12. The success of the Internet is, in part, due to its design as an infinitely scalable network capable of handling millions of users.
- Answer: False**                      **Difficulty: Medium**                      **Reference: p. 280**
13. A new version of the IP addressing schema being developed is called Internet Protocol version 6 (IPv6) and contains 128-bit addresses.
- Answer: True**                      **Difficulty: Medium**                      **Reference: p. 280**
14. Internet2 is a research network with new protocols and transmission speeds that provides an infrastructure for supporting high-bandwidth Internet applications.
- Answer: True**                      **Difficulty: Medium**                      **Reference: p. 280**
15. VoIP technology uses the Internet Protocol to deliver voice information in digital form using packet switching.
- Answer: True**                      **Difficulty: Medium**                      **Reference: p. 289**
16. Digital cellular service uses several different competing standards that do not interoperate.
- Answer: True**                      **Difficulty: Medium**                      **Reference: p. 292**
17. Most Wi-Fi communication uses infrastructure mode.
- Answer: True**                      **Difficulty: Medium**                      **Reference: p. 295**
18. The 802.11 standard can be used to provide wireless access to the Internet using a broadband connection.
- Answer: True**                      **Difficulty: Medium**                      **Reference: p. 295**
19. RFID has been exceptionally popular because of its low implementation costs
- Answer: False**                      **Difficulty: Easy**                      **Reference: p. 299**

20. Sensor networks typically have a tiered architecture

**Answer: True**

**Difficulty: Medium**

**Reference: p. 299**

### Multiple-Choice Questions

21. A device that acts as a connection point between computers and can filter and forward data to a specified destination is called a:

- a. hub.
- b. switch.
- c. router.
- d. NIC.

**Answer: b**

**Difficulty: Easy**

**Reference: p. 265**

22. Which device sends data packets to all connected devices in a network?

- a. Network interface card
- b. Hub
- c. Router
- d. None of the above

**Answer: b**

**Difficulty: Medium**

**Reference: p. 265**

23. The Internet is based on the following three key technologies:

- a. TCP/IP, HTML, HTTP.
- b. TCP/IP, HTTP, and packet switching.
- c. client/server computing, packet switching, and the development of widely used communications standards for linking networks and computers.
- d. client/server computing, packet switching, and HTTP.

**Answer: c**

**Difficulty: Hard**

**Reference: p. 266**

24. The method of slicing digital messages into parcels, transmitting them along different communication paths, and reassembling them at their destinations is called:

- a. multiplexing.
- b. packet switching.
- c. packet routing.
- d. ATM.

**Answer: b**

**Difficulty: Easy**

**Reference: p. 267**

25. The most important communication standard today for linking disparate computers and networks is:
- a. Transmission Control Protocol/Internet Protocol (TCP/IP).
  - b. International Standards Organization (ISO).
  - c. Open Systems Interconnection (OSI).
  - d. File Transfer Protocol (FTP).

**Answer: a**                      **Difficulty: Medium**                      **Reference: p. 268**

26. In TCP/IP, IP is responsible for:
- a. disassembling and reassembling of packets during transmission.
  - b. establishing an Internet connection between two computers.
  - c. moving packets over the network.
  - d. sequencing the transfer of packets.

**Answer: a**                      **Difficulty: Easy**                      **Reference: p. 268**

27. These signals are represented by a continuous waveform:
- a. laser.
  - b. optical.
  - c. digital.
  - d. analog.

**Answer: d**                      **Difficulty: Hard**                      **Reference: p. 269**

28. A LAN:
- a. is a central switching system that handles a firm's voice and digital communications.
  - b. links all computers in a closed loop in a manner that passes data in one direction from one computer to another.
  - c. links all computers and other devices to a central host computer, through which all communications must pass.
  - d. connects computers and peripheral devices located close to each other, often in the same building.

**Answer: d**                      **Difficulty: Medium**                      **Reference: p. 270**

29. Which type of network would be most appropriate for a business that comprised three employees and a manager located in the same office space, whose primary need is to share documents?
- a. Wireless network in infrastructure mode
  - b. Domain-based LAN
  - c. Peer-to-peer network
  - d. Campus area network

**Answer: c**                      **Difficulty: Medium**                      **Reference: p. 270**

30. A peer-to-peer network architecture:
- gives equal power to all computers on the network and is used primarily in small networks.
  - spans a large geographical distance and may consist of a variety of media technologies.
  - is a private, multipath, data-only, third-party managed network that multiple organizations use on a subscription basis.
  - has the technology to enable voice and data to run over a single network.

**Answer: a**

**Difficulty: Medium**

**Reference: pp. 270–271**

31. All network components connect to a single hub in a:
- star network.
  - bus network.
  - domain network.
  - peer-to-peer network.

**Answer: a**

**Difficulty: Easy**

**Reference: p. 271**

32. In a bus network:
- signals are broadcast to the next station.
  - signals are broadcast in both directions to the entire network.
  - multiple hubs are organized in a hierarchy.
  - messages pass from computer to computer in a loop.

**Answer: b**

**Difficulty: Medium**

**Reference: p. 271**

33. A network that covers a large geographic area is most commonly referred to as a(n):
- local area network.
  - Intranet.
  - peer-to-peer.
  - wide area network.

**Answer: d**

**Difficulty: Medium**

**Reference: p. 272**

34. A communications medium that uses single copper wire surrounded by thick insulation is:
- twisted-pair cable.
  - a satellite.
  - optical fiber.
  - coaxial cable.

**Answer: d**

**Difficulty: Easy**

**Reference: p. 272**

35. Data is sent through the fiber-optic cable by a(n):
- a. router.
  - b. laser device.
  - c. optical device.
  - d. multiplexer.

**Answer: b**                      **Difficulty: Hard**                      **Reference: p. 272**

36. Which technology will enable communications service providers to add transmission capacity to an existing fiber-optic network without having to lay more fiber-optic cable?
- a. ATM
  - b. DWDM
  - c. CDMA
  - d. WAP

**Answer: b**                      **Difficulty: Hard**                      **Reference: p. 273**

37. Which type of signals follow a straight line and do not bend with the curve of the Earth?
- a. radio
  - b. satellite
  - c. microwave
  - d. fiber-optic

**Answer: c**                      **Difficulty: Medium**                      **Reference: p. 273**

38. \_\_\_\_\_ work by using radio waves to communicate with radio antennas placed within adjacent geographic areas.
- a. Cell phones
  - b. Microwaves
  - c. Satellites
  - d. Information appliances

**Answer: a**                      **Difficulty: Easy**                      **Reference: p. 273**

39. BP Amoco uses \_\_\_\_\_ for real-time data transfer of oil field exploration data gathered from searches of the ocean floor.
- a. fiber optics
  - b. bluetooth technology
  - c. Wi-Fi technology
  - d. satellites

**Answer: d**                      **Difficulty: Medium**                      **Reference: p. 274**

40. Bandwidth is:
- a. the number of frequencies that can be broadcast through a medium.
  - b. the number of cycles per second that can be sent through a medium.
  - c. the difference between the highest and lowest frequencies that can be accommodated on a single channel.
  - d. the total number of bytes that can be sent through a medium per second.

**Answer: c**                      **Difficulty: Easy**                      **Reference: p. 274**

41. The total amount of digital information that can be transmitted through any telecommunications medium is measured in:
- a. bps.
  - b. hertz.
  - c. baud.
  - d. gigaflops.

**Answer: a**                      **Difficulty: Medium**                      **Reference: p. 274**

42. Which transmission technology parcels information into fixed 53-byte cells?
- a. ISDN
  - b. ATM
  - c. Frame relay
  - d. DSL

**Answer: b**                      **Difficulty: Medium**                      **Reference: p. 275**

43. Digital subscriber lines:
- a. operate over existing telephone lines to carry voice, data, and video.
  - b. operate over coaxial lines to deliver Internet access.
  - c. are very high-speed data lines typically leased from long-distance telephone companies.
  - d. have up to twenty-four 64-Kbps channels.

**Answer: a**                      **Difficulty: Medium**                      **Reference: p. 275**

44. Which protocol is the Internet based on?
- a. TCP/IP
  - b. FTP
  - c. Packet-switching
  - d. Frame relay

**Answer: a**                      **Difficulty: Easy**                      **Reference: p. 277**

45. What service converts IP addresses into more recognizable alphanumeric names?
- HTML
  - DNS
  - FTP
  - HTTP

**Answer: b**                      **Difficulty: Easy**                      **Reference: p. 277**

46. In the domain name "http://myspace.blogging.com", what are the root, top-level, second-level, and third-level domains, respectively?
- "http://", myspace, blogging, com
  - "http://", com, blogging, myspace
  - (".", com, blogging, myspace
  - (".", myspace, blogging, com

**Answer: c**                      **Difficulty: Medium**                      **Reference: pp. 277–278**

47. IPv6 is being developed in order to:
- update the packet transmission protocols for higher bandwidth.
  - create more IP addresses.
  - allow for different levels of service.
  - support Internet2.

**Answer: b**                      **Difficulty: Medium**                      **Reference: p. 280**

48. The Internet is based on client/server technology in which:
- all the data resides on servers.
  - some data, such as e-mail messages, resides on client computers.
  - applications reside on servers and all data resides on client computers.
  - all data resides on servers and applications reside on client computers.

**Answer: a**                      **Difficulty: Medium**                      **Reference: p. 280**

49. Which of the following services enables logging on to one computer system and working on another?
- FTP
  - LISTSERV
  - Telnet
  - World Wide Web

**Answer: c**                      **Difficulty: Medium**                      **Reference: p. 281**



50. Web browser software requests Web pages from the Internet using which protocol?
- a. URL
  - b. HTTP
  - c. DNS
  - d. HTML

**Answer: b**                      **Difficulty: Easy**                      **Reference: p. 282**

51. Together, a protocol prefix, a domain name, a directory path, and a document name, are called a:
- a. uniform resource locator.
  - b. domain name.
  - c. third-level domain.
  - d. root domain.

**Answer: a**                      **Difficulty: Medium**                      **Reference: p. 282**

52. The open-source Web server that controls 70 percent of the market is:
- a. Microsoft IIS.
  - b. ASP.net.
  - c. Apache HTTP server.
  - d. Netscape.

**Answer: c**                      **Difficulty: Medium**                      **Reference: p. 282**

53. The paid sponsored links delivered with search results is a type of marketing referred to as:
- a. shopping bot marketing.
  - b. search engine marketing.
  - c. targeted marketing.
  - d. search results marketing.

**Answer: b**                      **Difficulty: Easy**                      **Reference: p. 284**

54. What technology allows people to have content pulled from Web sites and fed automatically to their computers?
- a. FTP
  - b. RSS
  - c. LISTSERV
  - d. Bluetooth

**Answer: b**                      **Difficulty: Easy**                      **Reference: p. 285**

55. What competitive force do intelligent agent shopping bots enhance?

- a. Traditional competitors
- b. Bargaining power of customers
- c. Product differentiation
- d. Substitute products

**Answer: b**                      **Difficulty: Medium**                      **Reference: p. 285**

56. What is a business value of RSS?

- a. Lowers costs and improves efficiency by minimizing Internet access
- b. Enables greater customer intimacy
- c. Enables Internet-based collaboration
- d. Enables company to focus on a market niche

**Answer: a**                      **Difficulty: Medium**                      **Reference: p. 285**

57. x Instant messaging is a type of:

- a. chat service.
- b. cellular service.
- c. Web service.
- d. wireless service.

**Answer: a**                      **Difficulty: Easy**                      **Reference: p. 287**

58. The need in some cases for employees to have access to sexually explicit material on the Internet, such as medical researchers, suggests that:

- a. companies cannot restrict Internet use.
- b. companies need specialized software to determine which types of material are acceptable.
- c. companies may need to maintain a database of acceptable Web sites.
- d. companies need to base their Internet use policies on the needs of the organization and culture.

**Answer: d**                      **Difficulty: Medium**                      **Reference: pp. 288–289**

59. Which technology uses the Internet Protocol to deliver voice information in digital form using packet switching?

- a. TCP/IP
- b. VPN
- c. VoIP
- d. None, voice information is digitally delivered using ATM

**Answer: c**                      **Difficulty: Easy**                      **Reference: p. 289**

60. A VPN:
- a. is an encrypted private network configured within the public Internet.
  - b. is more expensive than a dedicated network.
  - c. provides secure, encrypted communications using Telnet.
  - d. is an Internet-based service for delivering voice communications.

**Answer: a**                      **Difficulty: Easy**                      **Reference: p. 290**

61. Wireless cellular phone systems are entering this generation of networks:
- a. 2G.
  - b. 2.5G.
  - c. 3G.
  - d. 3.5 G.

**Answer: c**                      **Difficulty: Hard**                      **Reference: p. 292**

62. CDMA
- a. is the major European digital cellular standard.
  - b. is more expensive than GSM.
  - c. transmits over several frequencies.
  - d. uses the 1.9 GHz band.

**Answer: c**                      **Difficulty: Hard**                      **Reference: p. 292**

63. To deliver Internet content, I-mode uses:
- a. WAP.
  - b. WML.
  - c. Compact XML.
  - d. Compact HTML.

**Answer: d**                      **Difficulty: Medium**                      **Reference: p. 293**

64. Bluetooth is the popular name for this IEEE standard:
- a. IEEE 802.15.
  - b. IEEE 802.11.
  - c. IEEE 802.16.
  - d. IEEE 802.20.

**Answer: a**                      **Difficulty: Medium**                      **Reference: p. 294**

65. The Wi-Fi 802.11b standard can transmit up to:
- a. 54 Mbps in the unlicensed 5-GHz frequency range and has an effective distance of 10 to 30 meters.
  - b. 11 Mbps in the unlicensed 2.4-GHz band and has an effective distance of 30 to 50 meters.
  - c. 54 Mbps in the 2.4-GHz range.
  - d. 722 Kbps in the 2.4-GHz range.

**Answer: b**

**Difficulty: Hard**

**Reference: p. 295**

66. Ad-hoc mode is also known as:
- a. peer-to-peer mode.
  - b. infrastructure mode.
  - c. LAN mode.
  - d. PAN mode.

**Answer: a**

**Difficulty: Medium**

**Reference: p. 295**

67. Why are products built for 802.11b and 802.11g compatible?
- a. They have the same transmission capacity and ranges.
  - b. They are both based on WAP.
  - c. They are both part of the 802.11 family of standards.
  - d. They use the same frequency band.

**Answer: d**

**Difficulty: Hard**

**Reference: p. 295**

68. The WiMax standard can transmit up to a distance of:
- a. 300 feet
  - b. 500 meters
  - c. 31 miles
  - d. 50 miles

**Answer: c**

**Difficulty: Hard**

**Reference: p. 297**

69. In a RFID system, a(n) \_\_\_\_\_ is electronically programmed with information that can uniquely identify an item, such as an electronic code.
- a. reader
  - b. antenna
  - c. microchip
  - d. transponder

**Answer: d**

**Difficulty: Medium**

**Reference: p. 298**

70. Based on your reading of the examples in the chapter, what are the best business uses of RFID?
- Transaction processing
  - Supply chain management
  - Lowering network costs
  - Enabling client communication

**Answer: b**

**Difficulty: Medium**

**Reference: pp. 298–299**

### Fill In the Blanks

71. A(n) router is a device that forwards packets of data from one LAN or WAN to another.

**Difficulty: Medium**

**Reference: p. 265**

72. Prior to the development of packet switching, computer networks used leased, dedicated telephone circuits to communicate with other computers in remote locations.

**Difficulty: Hard**

**Reference: p. 267**

73. A(n) protocol is a set of rules and procedures governing transmissions between the components in a network.

**Difficulty: Easy**

**Reference: p. 268**

74. A(n) modem is a device for translating digital signals into analog signals and vice versa.

**Difficulty: Easy**

**Reference: p. 269**

75. Ethernet is the dominant LAN standard at the physical network level.

**Difficulty: Medium**

**Reference: p. 270**

76. The manner in which the components of a network are connected is referred to as its topology.

**Difficulty: Medium**

**Reference: p. 271**

77. A(n) backbone is that part of the network handling the major traffic and providing the primary path for traffic flowing to or from other networks.

**Difficulty: Easy**

**Reference: p. 272**

78. Lotus Notes is an example of software called groupware.

**Difficulty: Medium**

**Reference: p. 287**

79. A microbrowser is an Internet browser with a small file size that works with the low-memory constraints of handheld wireless devices and the low bandwidth of wireless networks.

**Difficulty: Medium**

**Reference: p. 293**

80. A network of interconnected wireless devices, embedded into the physical environment to provide measurements of many points over large areas, is called a(n) wireless sensor network /WSN.

**Difficulty: Easy**

**Reference: p. 299**

### Essay Questions

81. **Identify and briefly explain the four-layered Department of Defense reference model for TCP/IP.**

- **Application layer.** Enables client application programs to access the other layers and defines the protocols that applications use to exchange data. One of these application protocols is the Hypertext Transfer Protocol (HTTP) used to transfer Web page files.
- **Transport layer.** Responsible for providing the application layer with communication and packet services. This layer includes TCP and other protocols.
- **Internet layer.** Responsible for addressing, routing, and packaging data packets called IP datagrams. The Internet Protocol (IP) is one of the protocols used in this layer.
- **Network interface layer.** Responsible for placing packets on and receiving them from the network medium, which could be any networking technology.

**Difficulty: Medium**

**Reference: pp. 268–269**

82. **Define the following terms: ATM, ISDN, DSL, and T1.**

- **ATM (Asynchronous Transfer Mode).** Parcels information into uniform 53-byte cells, eliminating the need for protocol conversion. It can pass data between computers from different vendors and permits data to be transmitted at any speed the network handles.
- **ISDN (Integrated Services Digital Network).** An international standard for dial-up network access that integrates voice, data, image, and video services in a single link.
- **DSL (Digital Subscriber Line).** Operates over existing copper telephone lines to carry voice, data, and video, but has higher transmission capacities than ISDN.
- **T1.** A dedicated telephone connection comprising 24 channels that can support a data transmission rate of 1.544 Mbps. Each of the 64-Kb-per-second channels can be configured to carry voice or data traffic. These services are often used for high-capacity Internet connections.

**Difficulty: Medium**

**Reference: pp. 275–276**

83. **What are the business advantages of using voice over IP (VoIP) technology?**

- Lower costs by using the Internet to deliver voice information, avoiding the tolls charged by local and long-distance telephone networks.
- Lower costs from not having to create a separate telephone network.
- Enables communication by supporting Internet conference calls using video.
- Flexibility—phones can be added or moved to different offices without rewiring or reconfiguring the network.

**Difficulty: Medium**

**Reference: p. 290**

84. **Compare the uses of e-mail and groupware. Is e-mail a type of groupware? Why or why not?**

E-mail allows swift, inexpensive transmission of text messages and attachments to one person or to a list of persons. E-mail can go back and forth among the members of an organization much more quickly than written materials and hard copy. Groupware provides additional capabilities for supporting enterprise-wide communications and collaborative work. Individuals, teams, and workgroups at different locations in the organization can use groupware to participate in discussion forums and work on shared documents and projects.

Student answers as to whether e-mail is a type of groupware may vary. E-mail is not a type of groupware in that it is typically exchanged between two primary parties; however, it could be considered a type of groupware in that it can be sent to a group of people at once.

**Difficulty: Medium**

**Reference: p. 287**

85. **What is the difference between a virtual private network (VPN) and an extranet?**

A virtual private network (VPN) is a private network of computers linked using a secure “tunnel” connection over a public network such as the Internet. An extranet is a private intranet based on Internet and World Wide Web technology and standards that is accessible to authorized outsiders. A VPN is a method of securing a network, whereas an extranet describes a type of network in terms of its users, in this case, a firm and authorized vendors or partners.

**Difficulty: Medium**

**Reference: pp. 286, 290–291**

86. **You have been hired by a tax preparation firm to set up a network connecting several new branches in a metropolitan area. What type of network hardware and transmission media will you choose and why?**

Because of security issues, I wouldn't choose wireless transmission. The offices themselves can each have an Ethernet-based LAN, and they can connect to each other and to an Intranet via a secure, encrypted VPN over the Internet. Network hardware anticipated is: coaxial cable, network server, a switch. Because the LANs will be connected through a VPN, a router may not be needed. In anticipation of the need for a lot of data transmission, the connection to the Internet will be through cable modems. A firewall, or several, for security purposes is anticipated.

**Difficulty: Hard**

**Reference: pp. 265–266,  
269–273**

87. **You have been hired by a small new Web design firm to set up a network for its single office location. The network is primarily needed for exchanging files, accessing and managing beta Web sites on their Web server, and connecting to the Internet. The firm hires many freelancers who come into the office on an ad-hoc basis and it does not have a lot of money to spend on infrastructure. What type of network will you recommend?**

I would recommend a mixed Ethernet and wireless network. The Ethernet LAN would connect the Web servers and primary workstations and connect via cable service to the Internet. Freelancers could connect wirelessly via access points.

**Difficulty: Medium**

**Reference: pp. 265–266,  
269–273**

88. **A political think tank is being set up by a political action committee. The think tank members are located throughout the United States and they primarily need to collaborate on and discuss ideas and documents. What types of collaborative services or software are available to them? If money is no object, and security is a premium, which will you recommend to them and why?**

Recommend using Internet-based communications. They can use e-mail, instant messaging, chat rooms, FTP for sharing documents, Usenet newsgroups, LISTSERV, groupware, electronic and video conferencing.

I would recommend a VPN-based intranet and using groupware that combines all of their document sharing and collaboration needs into one interface.

**Difficulty: Hard**

**Reference: pp. 286–291**

89. **Which of the four generic strategies to counteract competitive forces does Google seem to be focusing on in its implementation of information systems, and what tactics, products, or services is it employing to this end?**

In its creation of new products and services, Google is employing the competitive strategy of product differentiation. New products it has created include: Google maps, Froogle, Adsense, and Google Labs.

**Difficulty: Medium**

**Reference: pp. 308–310**

90. **What types of capabilities does the Internet provide businesses and what Internet protocols or technologies support these? Which have proven the most valuable to businesses thus far?**

The Internet provides ways to transfer files (FTP), work on remote computers (Telnet), distribute information in the form of pages (The Web), have real-time text-based conversations (instant messaging, chat), collaborate (groupware, electronic conferencing), communicate and share data with suppliers (extranets, Web-based applications), conduct group discussions (LISTSERV, Usenet newsgroups), real-time voice conversations (chat, VOIP), send text messages (e-mail) and create lower cost networks (TCP/IP, extranets, intranets, VPN).

Probably the two most important effects the Internet has had are the effects on network costs and ease of setting up a network using TCP/IP and Internet-based technologies, and e-mail, allowing near-instant documented messaging. E-mail has been a valuable alternative to post office mail.

**Difficulty: Medium**

**Reference: pp. 280–291**