
CHAPTER 6

Computer Networks

Review Questions

1. A model is a specification set by a standards organization as a guideline for designing networks, such as the OSI (Open Systems Interconnection) model. A protocol is a set of rules that controls the interaction of different devices in a network or an internetwork, such as TCP/IP.
2. The seven layers of the OSI model are: physical, data link, network, transport, session, presentation, and application.
3. The layers of the TCP/IP protocol suite are: network, transport, and application.
4. The physical layer is responsible for transmitting a bit stream over a physical medium. It includes the mechanical and physical specifications for the physical devices. The data link layer organizes the bit stream into logical units called frames. It is responsible for node-to-node delivery of these individual frames. The network layer is responsible for the packet from the original source to the final destination. The transport layer is responsible for the source-to-destination delivery of the entire message. The session layer establishes, maintains, and synchronizes the dialog between communication systems. The presentation layer is responsible for the syntax and semantics of the information exchanged between two systems. The application layer enables the user to access the network.
5. There may be many nodes that a message must travel through in order to get from one place to another. Node-to-node delivery is the delivery of information from one node to the next node in this journey. Source-to-destination delivery is the delivery of information from the original source to the eventual destination and may involve many node-to-node deliveries.
6. The basic unit of data is called a frame in the data link layer. It includes a header, a trailer, and the entire packet from the network layer. The basic unit of data is called a packet in the network and transport layers and is the result of breaking the original message into sections that are more manageable for the network.
7. Synchronization points divide a long message into smaller ones so that if the network or connection fails, transmission can resume from the last known received data rather than having to do the entire transmission over again.

8. The three common topologies are the bus, the star, and the ring. The star topology is the most popular today.
9. Repeaters regenerate the signal and send it to the rest of the network. They do no filtering or routing and are active only at the physical layer. A bridge connects two or more segments of a network together and is used to filter traffic destined for each of the segments. They filter traffic based on the physical address and regenerate signals; bridges are active at the first two layers of the OSI model. Routers are used to connect LANs, MANs, and WANs. They use the logical (network) address to route traffic to the correct network and are active in the first three layers of the OSI model. Gateways are used to connect networks that are using different protocols and are active in all seven layers of the OSI model.
10. TCP (Transmission Control Protocol) supplies full transport layer services to applications. It establishes a dialog between two computers and assures the reliable transmission of data from source to destination. UDP (User Datagram Protocol) is an end-to-end transport level protocol that provides only the basic necessities needed for end-to-end delivery of a transmission.
11. Every computer on the Internet must have a unique address to identify it as a source or destination. Delivering information in a network without Internet addresses would be like trying to deliver mail without street numbers.
12. The application layer in TCP/IP combines the session, presentation, and application layers of the OSI model, and is therefore responsible for establishing and maintaining a network connection, the syntax and semantics of the information itself, and serves as a user interface to the network.
13. FTP is used for transferring files from one machine to another.
14. TELNET is used for remote login to other systems.
15. SMTP is the protocol used for delivering electronic mail.
16. Local login is the establishment of a session on a computer to which you have direct access. Remote login is the establishment of a session on another machine over a network.
17. A static document has fixed contents and is used to present information that does not change. Dynamic documents are programs run on the server. Active documents are programs that are run on the client.

Multiple-Choice Questions

18. b
19. c
20. b
21. c
22. d
23. d
24. a
25. c

- 26. a
- 27. b
- 28. b
- 29. d
- 30. b
- 31. c
- 32. a
- 33. b
- 34. c
- 35. a
- 36. a
- 37. d
- 38. b
- 39. b
- 40. b
- 41. d
- 42. c
- 43. c
- 44. d
- 45. a
- 46. b
- 47. d
- 48. a

Exercises

- 49.
 - a. Data link
 - b. Network
 - c. Transport
 - d. Application
 - e. Presentation
 - f. Presentation
- 50. All 200 stations.
- 51. Only the stations on the damaged portion of the network.
- 52. All 200 stations.
- 53. In a square room with each side of dimension X : a ring LAN would require $4X$ of cable, a bus would require $3X$ of cable, and a star would require $2 * \sqrt{2} * X$ or $2.828X$, so the answer is c: a star LAN with a hub at the center of the room.
- 54. A star LAN is more reliable. If any station in a ring LAN stops forwarding messages, the entire LAN stops working. If any part of the cable in a bus LAN is dam-

aged, the entire LAN stops working. In a star LAN, if any station or any segment of cable is damaged, the other computers can still communicate.

55. The problem is probably a bus that is too long. The bus can be divided into two segments connected by a repeater.
56. She can segment the bus into two or more segments using a bridge. The traffic on one side of the bridge only goes to the other side if the destination is on the other side. This reduces traffic on each segment of the LAN.
57. The advantage is that an application can use whichever protocol is appropriate for that application. If an application needs to establish a reliable connection between machines, it can use TCP. If it only needs to send small amounts of noncritical information, it can use UDP.
58. The advantages are that each application can determine its own way of establishing a dialog, data compression and encoding scheme, and user interface. The disadvantage is that this can lead to a lot of repeated code in the programs.
59.
 - a. 01110000 00100000 00000111 00011100
 - b. 10000001 00000100 00000110 00001000
 - c. 11010000 00000011 00110110 00001100
 - d. 00100110 00100010 00000010 00000001
 - e. 11111111 11111111 11111111 11111111
60.
 - a. 126.241.103.127
 - b. 191.220.224.5
 - c. 31.240.63.221
 - d. 143.245.195.29
 - e. 247.147.231.93
61. The client/server model is implemented in the application layer of TCP/IP. Server software runs all of the time and listens to the network for a request. When a request is received, the server spawns a child process to handle the request and continues to listen to the network. The client does everything it needs to do with the child process and when it's done, it closes the connection and the child dies. This is the basic model - there are variations. For instance, FTP spawns a child process that acts as a control connection. When a file is to be transferred, another connection is established between the machines, therefore never losing the connection.
62.
 - a. Local: madeline; Domain: belle.gov
 - b. Local: lindsey; Domain: jasmine.com
 - c. Local: wuteh Domain; hunan.int
 - d. Local: honoris Domain; queen.org

- 63. An e-mail address must uniquely identify a mail box on the internet while an IP address must uniquely identify a machine on the Internet. There is not a one-to-one relationship. One machine may have many mailboxes on it.
- 64. FTP is used to transfer files over a network. TELNET is used to establish a login session on a remote machine.
- 65. An active document
- 66. A static document
- 67. <http://www.hadb/user/general>

