CHAPTER 1

PRACTICE SET

Questions

Q1-1. A protocol defines what is communicated, in what way and when. This provides accurate and timely transfer of information between different devices on a network.

Q1-2. In half-duplex transmission, only one entity can send at a time; in a full-duplex transmission, both entities can send at the same time.

Q1-3. We can divide line configuration in two broad categories:

a. *Point-to-point*: mesh, star, and ring.

b. *Multipoint*: bus

Q1-4. A *required RFC* is one that needs to be implemented by all Internet systems. A *recommended RFC* does not have to be implemented by all Internet systems; it is recommended only for its usefulness.

Q1-5. Advantages of a multipoint over a point-to-point configuration (type of connection) include *ease of installation* and *low cost*.

Q1-6. To make the communication bidirectional, each layer needs to be able to provide two opposite tasks, one in each direction.

Q1-7. The five components of a data communication system are the *sender*, the *receiver*, the *transmission medium*, the *message*, and the *protocol*.

Q1-8. Line configurations (or types of connections) are *point-to-point* and *multipoint*.

Q1-9. The telephone company acts as an ISP. The connection from the resident to the telephone company is a *point-to-point* access WAN that connects the premises to the Internet. At the same time, the telephone company needs to provide the necessary services such as e-mail.

Q1-10. Local telephone communication is mostly a *circuit-switched* network. When the communication is established, the circuit is dedicated between the two parties.

Q1-11. We give an advantage for each of four network topologies:

a. *Mesh*: secure

b. *Bus*: easy installation

c. *Star*: robust

d. *Ring*: easy fault isolation

Q1-12. The number of cables for each type of network is:

a. *Mesh*: $n\ (n - 1) / 2$

b. *Star*: n

c. *Ring*: $n - 1$

d. *Bus*: one backbone and n drop lines

Q1-13. The general factors are *size*, *distances* (covered by the network), *structure*, and *ownership*.

Q1-14. The three criteria are *performance*, *reliability*, and *security*.

Q1-15. An *Internet draft* is a working document with no official status and a six-month lifetime; an Internet draft may become a *proposed standard* after six months if it has received enough attention in the Internet community.

Q1-16. A link-layer switch is designed not to broadcast messages. This means that it should have the link-layer address of each station to forward the packet to that particular station, not to others.

Q1-17. Each LAN should be connected to $(n - 1)$ LANs, which means that we will have $n \times (n - 1)$ connections. However, if each connection can be used in both directions, we need only $[n \times (n - 1)]/2$ connections.

Q1-18. An *internet* is an interconnection of networks. The *Internet* is the name of a specific worldwide network

Q1-19. The **IETF** is responsible for identifying operational problems and recommending solutions; the **IRTF** focuses on long-term research topics.

Problems

P1-1. In a bus topology, no station is in the path of the signal. Unplugging a station has no effect on the operation of the rest of the network.

P1-2. The telephone network was originally designed for voice communication; the Internet was originally designed for data communication. The two networks are similar in the fact that both are made of interconnections of small networks. The telephone network, as we will see in future chapters, is mostly a circuit-switched network; the Internet is mostly a packet-switched network.

P1-3. In this case, the communication is only between a caller and the callee. A dedicated line is established between them. The connection is point-to-point.

P1-4. With 24 bits, we can represent up to 2^{24} different colors.

P1-5. Unicode uses 32 bits to represent a symbol or a character. We can define 2^{32} different symbols or characters.

P1-6.

a. Mesh topology: If one connection fails, the other connections will still be working.

b. Star topology: The other devices will still be able to send data through the hub; there will be no access to the device which has the failed connection to the hub.

c. Bus Topology: All transmission stops if the failure is in the bus. If the drop-line fails, only the corresponding device cannot operate.

d. Ring Topology: The failed connection may disable the whole network unless it is a dual ring or there is a by-pass mechanism.

P1-7.

a. Cable links: $n\,(n-1)\,/\,2 = (8 \times 7)\,/\,2 = 28$

b. Number of ports: $(n-1) = 7$ ports needed per device

P1-8.

a. E-mail is not an interactive application. Even if it is delivered immediately, it may stay in the mail-box of the receiver for a while. It is not sensitive to delay.

b. We normally do not expect a file to be copied immediately. It is not very sensitive to delay.

c. Surfing the Internet is the an application very sensitive to delay. We except to get access to the site we are searching.

P1-9. This is a LAN. The Ethernet hub creates a LAN as we will see in Chapter 13.

P1-10. Theoretically, in a ring topology, unplugging one station, interrupts the ring. However, most ring networks use a mechanism that bypasses the station; the ring can continue its operation.