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# CHAPTER 1

## *Introduction*

### *Solutions to Odd-Numbered Review Questions and Exercises*

#### Review Questions

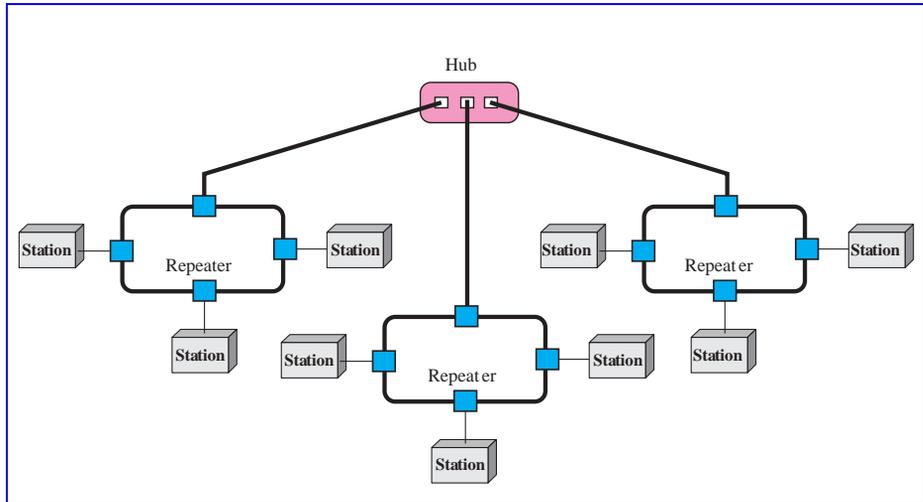
1. The five components of a data communication system are the *sender*, *receiver*, *transmission medium*, *message*, and *protocol*.
3. The three criteria are *performance*, *reliability*, and *security*.
5. Line configurations (or types of connections) are *point-to-point* and *multipoint*.
7. In *half-duplex transmission*, only one entity can send at a time; in a *full-duplex transmission*, both entities can send at the same time.
9. 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
11. An *internet* is an interconnection of networks. The *Internet* is the name of a specific worldwide network
13. *Standards* are needed to create and maintain an open and competitive market for manufacturers, to coordinate protocol rules, and thus guarantee compatibility of data communication technologies.

#### Exercises

15. With **16** bits, we can represent up to  $2^{16}$  different colors.
17.
  - 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.
19. 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.
21. See Figure 1.1

**Figure 1.1** Solution to Exercise 21



- 23.
- 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.
  - We normally do not expect a file to be copied immediately. It is not very sensitive to delay.
  - Surfing the Internet is the an application very sensitive to delay. We except to get access to the site we are searching.
25. 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.