

The **Answers** are as follows:

1. Identify the five components of a data communication system.

**Answer:**

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

2. What are the three criteria for an effective and efficient network?

**Answer:**

The three criteria are *performance, reliability, and security*.

3. For n devices in a network, what is the number of cable links required for a fully connected mesh, ring, bus and star topology?

**Answer:**

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

4. For each of the following four networks, discuss the consequences if a connection fails.
  - a. Five devices connected in a mesh topology?
  - b. Five devices connected in a bus topology?
  - c. Five devices connected in a ring topology?
  - d. Five devices connected in a star topology?

**Answer:**

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

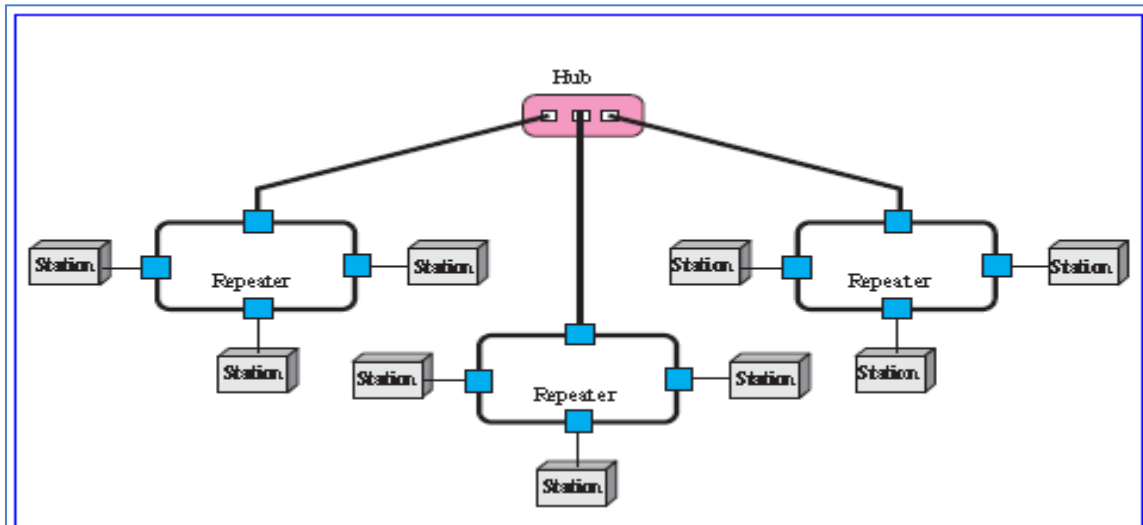
b. **Star topology**: The other devices will still be able to send data through the hub; there will be no access to the device which has the failed connection to the hub.

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.

5. Draw a hybrid topology with a star backbone and three ring networks.

**Answer:**



6. Performance is inversely related to delay. When you use the Internet, which of the following applications are more sensitive to delay?
- Sending an e-mail
  - Copying a file
  - Surfing the Internet

**Answer:**

- E-mail is not an interactive application. Even if it is delivered immediately, it may stay in the mailbox 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 an application that is very sensitive to delay. We expect to get access to the site we are searching.

7. Compare the Internet to a telephone network. What are the similarities? What are the differences?

**Answer:**

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.