DATA COMMUNICATIONS AND NETWORKING : QUESTIONS AND ANSWERS

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Identify the five components of a data communications system.

The five components of a data communications system are:

1. Message
2. Sender
3. Receiver
4. Protocol
5. Medium

What are the advantages of distributed processing?

The advantages of distributed processing include:

1. Reliability
2. Security
3. Collaboration via information sharing
4. Faster processing due to work being distributed among several systems.

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

The three criteria necessary for an effective and efficient network are:

1. Performance
2. Reliability
3. Security

What are the advantages of a multipoint connection over a point-to-point connection?

The advantages of a multipoint connection over a point-to-point connection are ease of installation, low cost, reliability. A point to point connection is used for connecting 2 devices, whereas in a multipoint connection more than 2 devices share the communication link. Therefore, multipoint connection provides more reliability.It is easier to add more users in a multipoint connection, than creating individual connections between all users separately. This also leads to low cabling cost and installation cost.

What are the two types of line configuration?

There are two types of line configurations: Multipoint and point to point. A multipoint line configuration connects multiple users, while a point to point connection maintains individual connection links between all pairs of users.

Categorize the four basic topologies in terms of line configuration.

There are four basic network topologies - bus, ring, mesh and star.

Multipoint : Bus, Ring. A bus topology consists of a single cable connecting all devices in the network. Same goes for a ring topology, where a single ring connection is used to connect all devices together. The devices communicate via the shared cable.

Point to point : Mesh, Star. A mesh topology consists of a network of devices all connected to each other individually. Same goes for a star topology. Each device is connected to almost every other device in this network.

What is the difference between half-duplex and full-duplex transmission modes?

In half duplex mode, both stations can transmit and receive, but only one at a time. When one station sends a message, it cannot receive messages. In full duplex mode, both stations can transmit and receive messages simultaneously.

Name the four basic network topologies, and cite an advantage of each type.

The four basic network topologies include bus, ring, star and mesh. The advantages of each topology are mentioned below:

Mesh : Robust, secure, privacy, reduced traffic
Star : Robust, less expensive than mesh
Bus : Easy to install, inexpensive, less cabling
Ring : Easy to install and reconfigure, fault isolation

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

The number of cable links required by each network topology are given below. **n** is the number of devices in the network.

Mesh : n * (n-1) / 2
Ring : n
Bus : n + 1 (n for cables, 1 for backbone)
Star : n

What are some of the factors that determine whether a communication system is a LAN or WAN?

Geographical area spanned by a network determines whether it is a LAN or a WAN. A LAN, or Local Area Network, spans a relatively smaller area, whereas a WAN, or Wide Area Network, covers a much larger area. Also, WANs have a higher propagation delay than LANs because of the large distance to be covered.

What is an internet? What is the Internet?

The internet is a general term for an interconnected network, while the Internet refers to a specific worldwide internetwork.

Why are protocols needed?

Protocols are set of rules and standards which are used to facilitate timely and accurate communication between multiple devices with different configurations.

Why are standards needed?

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.

What is the maximum number of characters or symbols that can be represented by Unicode?

Unicode uses 32 bits, so maximum number of characters or symbols is 2^32.

A color image uses 16 bits to represent a pixel. What is the maximum number of different colors that can be represented?

The maximum number of different colors that can be represented is 2^16.

Assume six devices are arranged in a mesh topology. How many cables are needed? How many ports are needed for each device?

Let **n** be the number of connected devices in the network. Now, for mesh topology, we know the equation is no. of cables = n * (n-1)/2 = 6 * 5 / 2 = 15 cables. Number of devices connected per device = n-1 = 5, so number of ports per device = 5.

For each of the following four networks, discuss the consequences if a connection fails.

a. Five devices arranged in a mesh topology

No major setback to the complete network, if one connection fails, others will continue to work.

b. Five devices arranged in a star topology (not counting the hub)

Connection to that particular device is lost, others can communicate.

c. Five devices arranged in a bus topology

If the backbone connection fails, then all communication is over.

d. Five devices arranged in a ring topology

One failed connection will disable the entire network

You have two computers connected by an Ethernet hub at home. Is this a LAN, a MAN, or a WAN? Explain your reason.

LAN, because the geographical area spanned by the network would be very small, connects two computers locally.

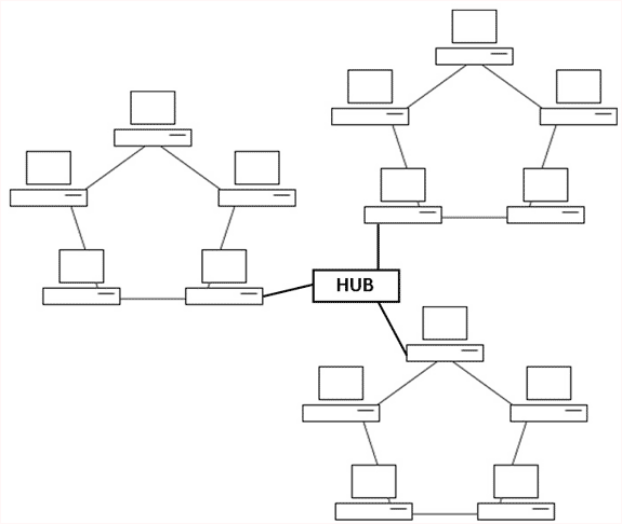
In the ring topology in Figure 1.8, what happens if one of the stations is unplugged?

If one station is unplugged, then the whole system would be disconnected (if no measures are in place to bypass a station).

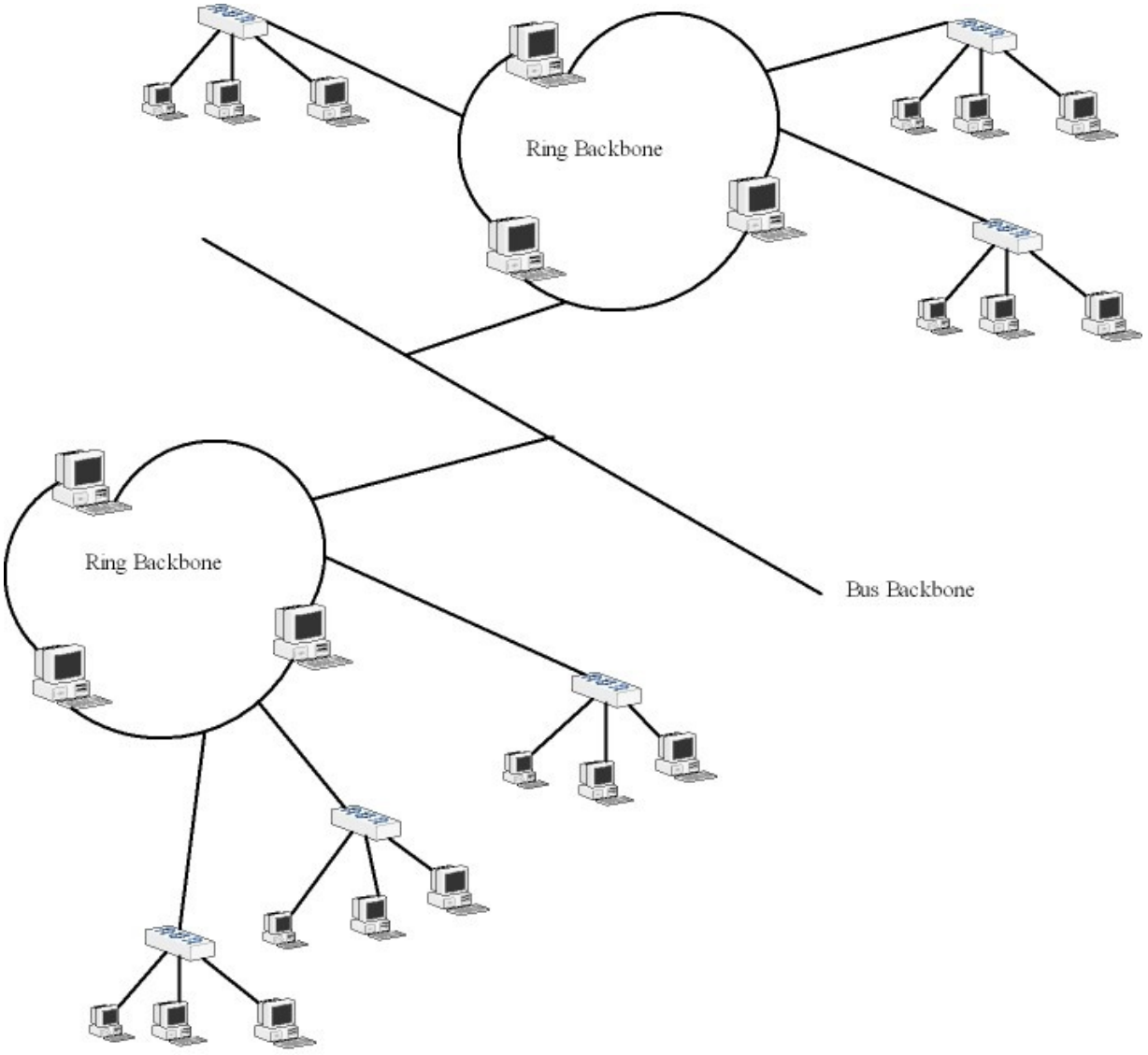
In the bus topology in Figure 1.7, what happens if one of the stations is unplugged?

If one of the stations is unplugged, connection to only that station will be affected.

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



Draw a hybrid topology with a ring backbone and two bus networks.



Performance is inversely related to delay. When you use the Internet, which of the following applications are more sensitive to delay?

a. Sending an e-mail : Not highly sensitive to delay, once a message is sent, it remains in the inbox for a while

b. Copying a file : Not very sensitive to delay either.

c. Surfing the Internet : It is sensitive to delay, as it is an interactive application and users demand immediate results.

When a party makes a local telephone call to another party, is this a point-to-point or multipoint connection? Explain your answer.

When a party makes a local telephone call to another party, it will be a point to point connection because it is a local call between only two parties.

Compare the telephone network and the Internet. What are the similarities? What are the differences?

Similarities : 2-way communication, wired/wireless capabilities.

Differences : Internet has file sharing system, voice and video chat, telephone enables only voice communication. Telephone-circuit switched network, Internet-packet switched network