# 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.

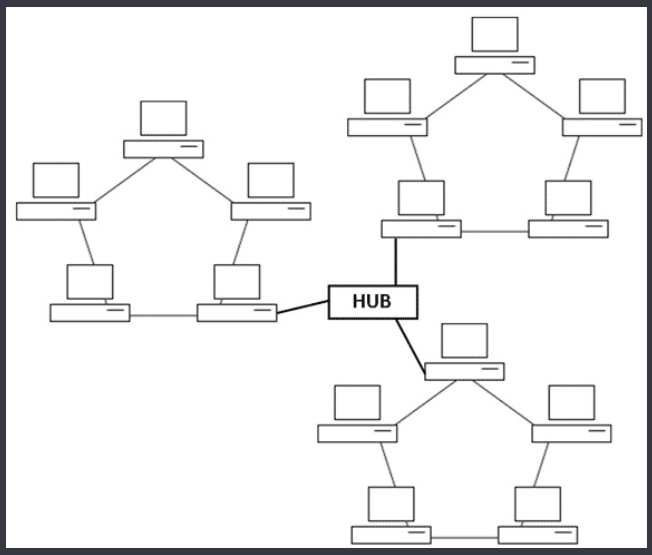
**d. Five devices arranged in a ring topology**
One failed connection will disable the entire network

**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.

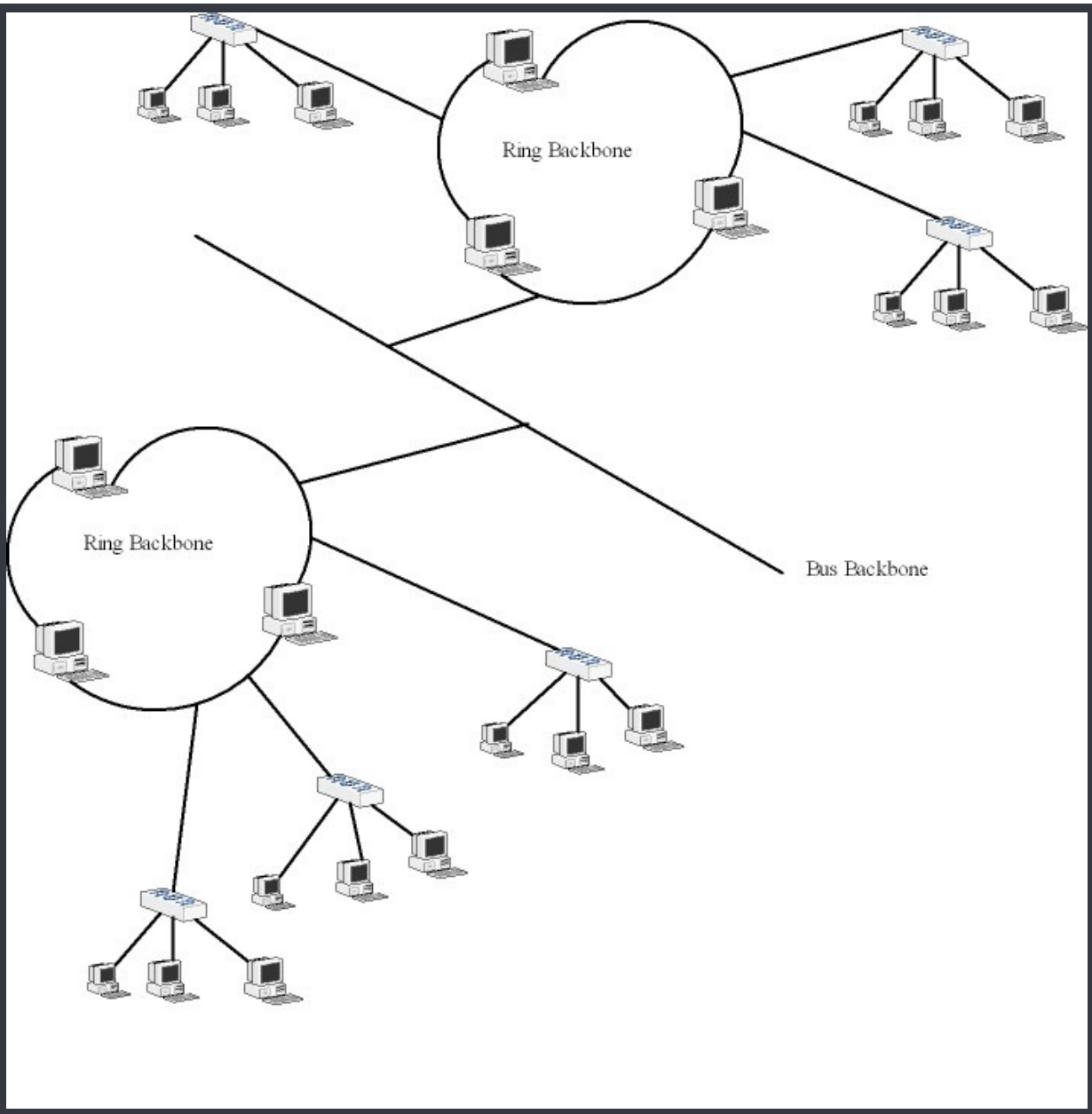
**In the ring topology in Figure 1.8, what happens if one of the stations is unplugged?**
If one station is unplugged, then the whole system would be disconnected (if no measures are in place to bypass a station).

**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