

# ASSIGNMENT-1

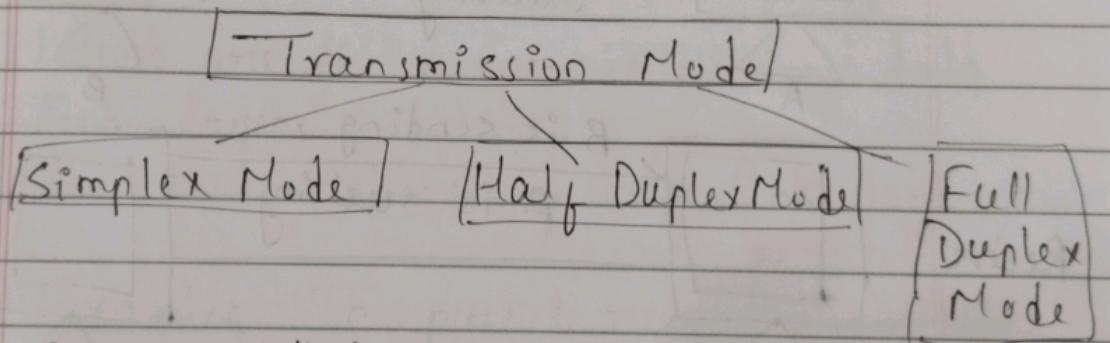
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Q1) How many types of modes are used in data transferring through networks?

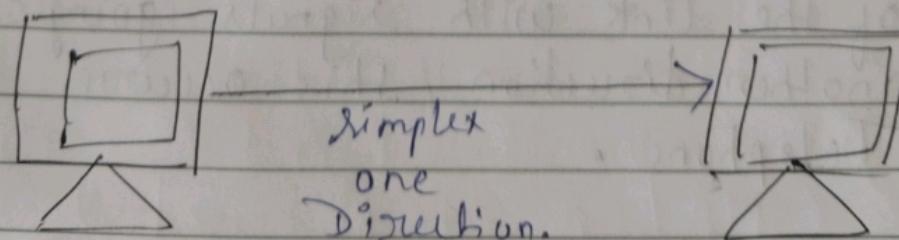
Ans:- Transmission Modes:- Transmission mode means transferring data between two devices. It is also known as a communication mode. Bus & networks are designed to allow communication to occur b/w individual devices that are interconnected to occur between individual devices that are interconnected. There are three types of transmission mode:-



1) Simplex Mode:-

→ In simplex mode, the communication is unidirectional, as on a one-way street. Only one of the two devices on a link can transmit, the other can only receive.

Ex:- Keyboard & traditional monitors.

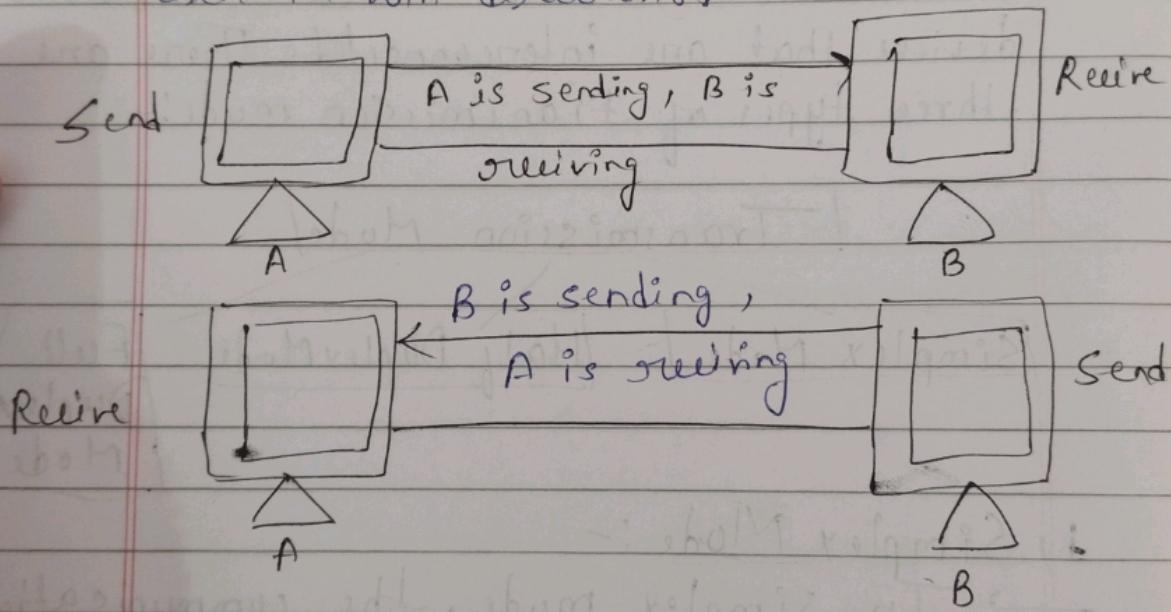


Simplex  
one  
direction.

**2. Half-Duplex Mode:-** In half-duplex mode, each station can both transmit & receive, but not at the same time.

When one device is sending, the other can only receive, & vice versa.

Ex. Walkie-Talkie in which message is sent one at a time & message are sent in both directions.



### 3. Full Duplex Mode:-

In full-duplex mode, both stations can transmit & receive simultaneously.

In full duplex mode, signals going in one direction share the capacity of the link with signals going in another direction. This occurs in Telephone.

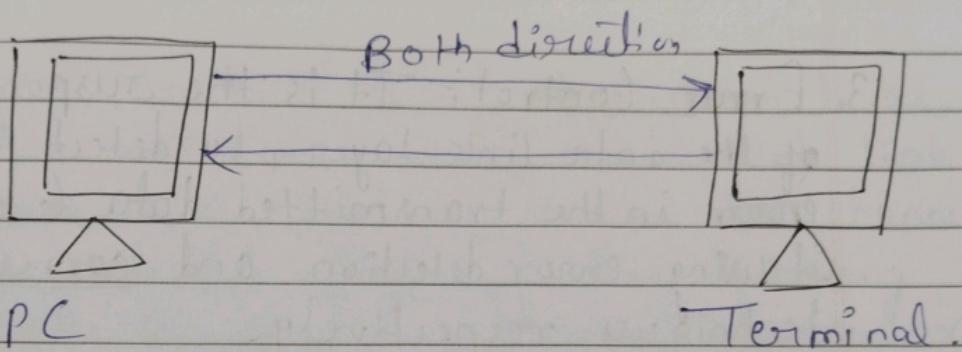
- duplex  
transmit  
time.  
versa.

usage  
are

Receive

Send

Ex. Telephone network in which there is communication between two persons by a telephone line, through which both can talk & listen at the same time.



Q2) What are the responsibilities of data link layer?

Ans - The responsibilities of data link layer are-

- I. Framing:- The packet received from the Network layer is known as a frame in the Data link layer. At the sender's side, DLL receives packets from the N/w layer & divides them into small frames, then, sends each frame bit - by - bit to the physical layer. At the receiver's end, DLL takes bits from the physical layer organize them into the frame, & sends them to the N/w layer.

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2. Physical Addressing:- The data link layer encapsulates the source & destination's MAC address (physical address) in the header of each frame to ensure node-to-node delivery.

3. Error Control:- It is the responsibility of the data link layer, to detect the error in the transmitted data & correct it using error detection and correction techniques respectively.

4. Flow Control:- If the receiver's receiving speed is lower than the sender's sending speed, then this can lead to an overflow in the receiver's buffer & some frames may get lost. So, it's the responsibility of DLL to synchronize the sender's & receiver's speeds & establish flow control between them.

5. Access Control:- When multiple devices share the same communication channel there is a high probability of collision so it's the responsibility of DLL to check which device has control over the channel & CSMA/CD & CSMA/CA can be used to avoid collisions & loss of frames in the channel.

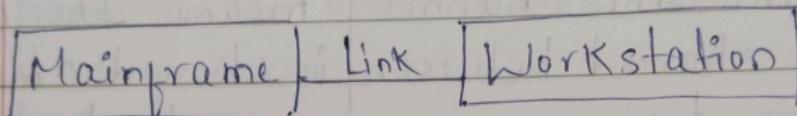
Q3 - Distinguish between point to point links & multipoint links. Give relevant diagrams.

Ans Difference between Point to Point links & Multipoint links:

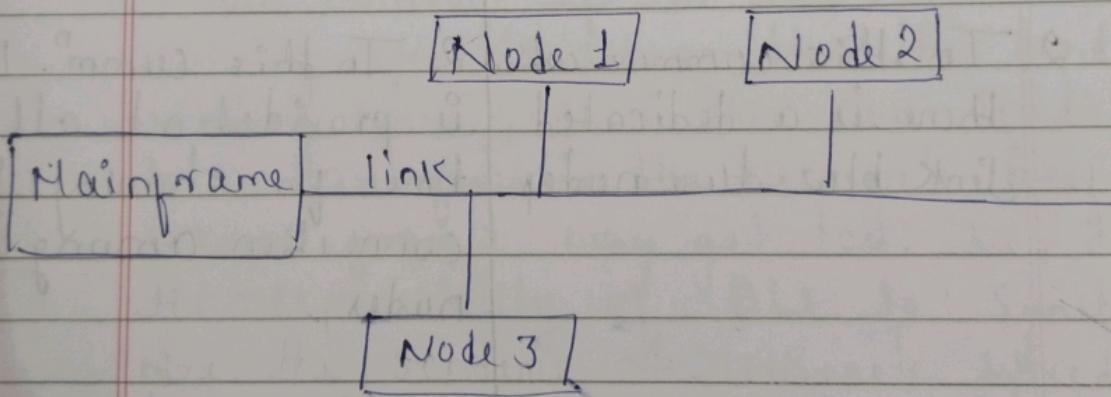
- | Point to Point links   | Multipoint links  |
|--|---|
| 1. Point to Point link means the channel is shared between two devices | 1. Multipoint link means the channel is shared among multiple devices or nodes. |
| 2. In this communication there is a dedicated link b/w two nodes.      | 2. In this comm. link time for sharing the connection among nodes.              |
| 3. There is one transmitter & one receiver.                            | 3. There is one transmitter and many receivers.                                 |
| 4. The smallest distance is most important to reach the receiver.      | 4. The smallest dist. is not important to reach the receiver.                   |

It provides security & It does not provide  
and privacy because security & privacy  
communication channel because communication  
is not shared. channel is shared.

Example:- frame Relay, 6, fx- Frame Relay,  
T - carrier, X.25 Token Ring, Ethernet  
ATM.



Point-to-Point links / Communication.



Multi-Point link / communication.

Q4. What is the principal difference between circuit switching & packet switching?

Ans Difference between circuit switching & packet switching :-

### Circuit Switching

1. Data is processed at the source system only.
2. The delay between data units is uniform.
3. It is more reliable.
4. Utilization of resources is more.
5. It is not a store and forward technique.
6. It is not convenient for handling bilateral traffic.
7. Recording of packets is never possible.
8. Call setup is required.

### Packet switching

1. Data is processed at all intermediate nodes including the source system.
2. The delay between data units is not uniform.
3. It is less reliable.
4. Less utilization of resources as compared to circuit switching.
5. It is a store and forward technique.
6. It is suitable for handling bilateral traffic.
7. Recording of packets is possible.
8. No call setup is required.

- |                                     |   |  |
|-------------------------------------|---|--|
| Li<br>th<br>TI<br>CI<br>E<br>p<br>p | 9. Each packet follows the same route.<br>10. It is implemented at the physical layer.<br>11. It requires simple protocol for delivery. | 9. Packets can follow any route<br>10. It is implemented at the datalink layer & network layer.<br>11. It requires complex protocols for delivery. |
|-------------------------------------|---|--|

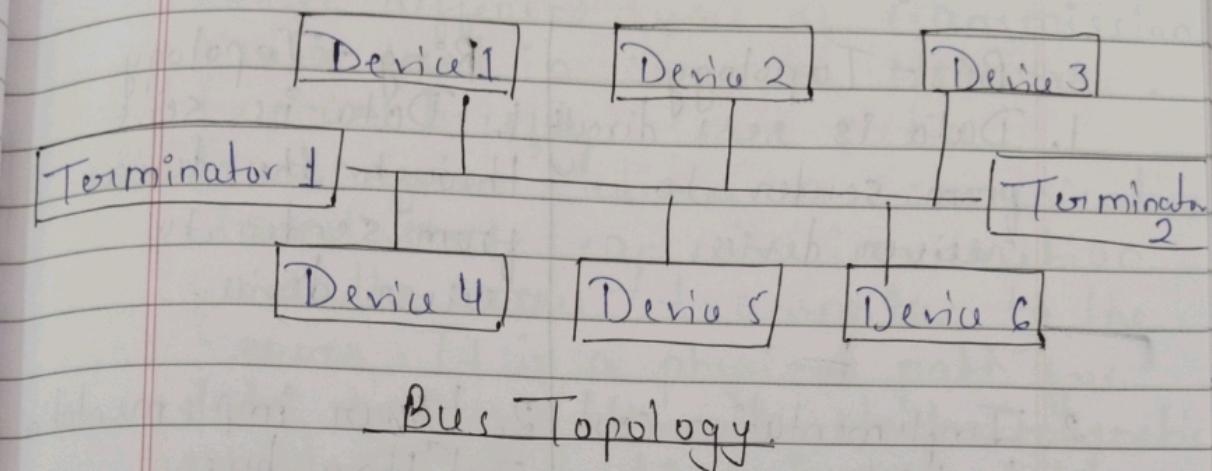
Q5. Explain the bus type topology & ring type topology networks. Compare their performance.

Ans :-

### Bus Type Topology Networks:-

Bus topology is a type of Network topology in which all the devices are connected to a single cable which is called the backbone of the Network. It consists of a terminator at each end of the cable. It is the easiest network topology when the devices are to be connected linearly. The network cable is responsible for the communication between the devices & when the data reaches the end of the cable it is removed by the

terminator from the data line.

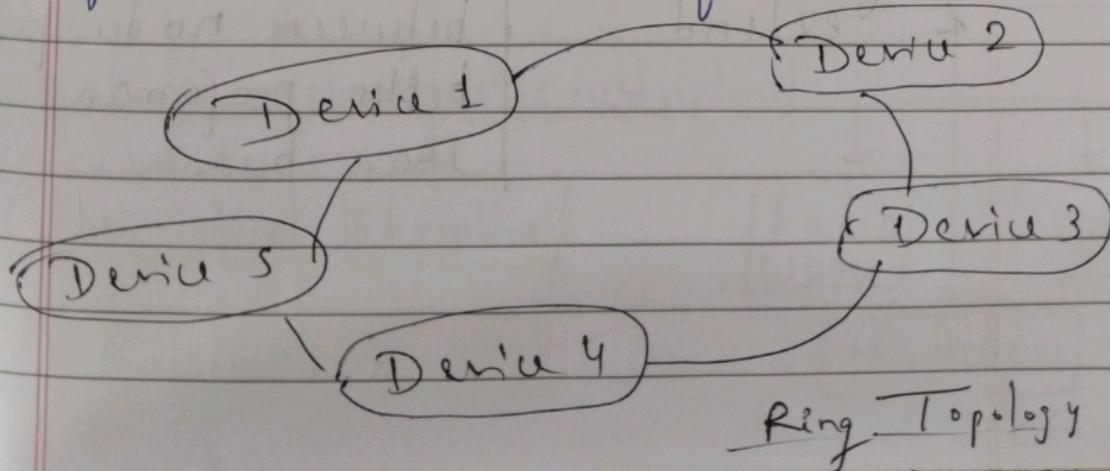


## Ring Type Topology Networks:-

In Ring topology, there is a circular data path. Each of the device is connected to two other devices in the network.

Data is transmitted from sender to receiver by passing it from one device to another until the receiver device is reached. If any of the connection is broken then the whole network.

Crashes because they are connected sequentially. This topology is used for the connection of LAN or WAN.



## Performance Comparison -

### Bus - Topology

1. Data is sent directly from sender to receiver device.
2. Implementation cost is higher.
3. More reliable.
4. More chances of data collisions.
5. Less secure because of the visibility of data transmission.
6. Easy to setup & extend.

### Ring - Topology

1. Data is sent through the devices from sender to receiver device.

2. Lower implementation cost than bus.

3. less reliable as failure of one device affects whole network.

4. less chance of data collisions.

5. More secure as compared to bus topology.

6. Tokens used between nodes for better performance than bus.

Q6. What is Transmission Media?

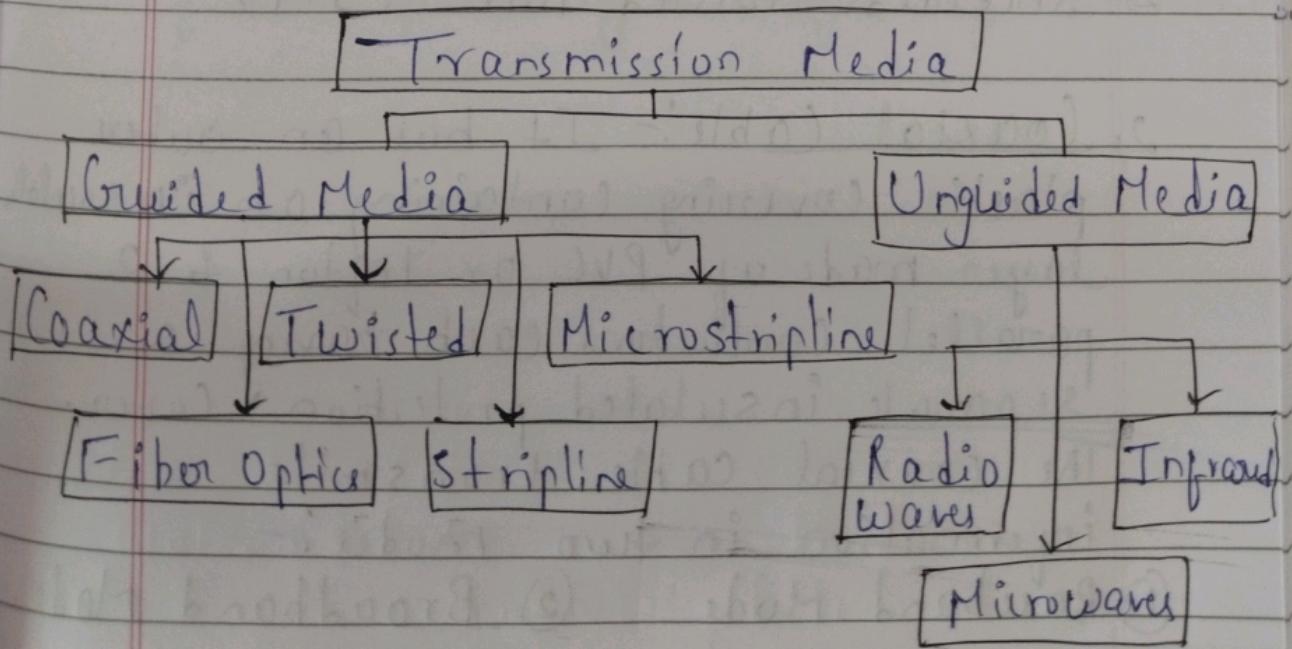
Write different types of Transmission Media used in Computer Networks.

Explain briefly Cable Media.

An Transmission Media is a communication channel that transmits information from the source / transmitter to the receiver. It is a physical path for data transfer through electromagnetic signals. Information is carried over in the form of bits through LAN.

Transmission media are located below the physical layer & are controlled by the physical layer. Transmission Media are also called communication channels.

Types of Transmission Media in Computer Networks :-



## Guided Transmission Media / Cable Media:

→ Guided Transmission Media are also called bounded media or wired media. They comprise cables or wires through which data is transmitted.

### Types of Guided Media:-

1. Twisted Pair Cable:- It consists of 2 separately insulated conductor wires wound about each other. Generally, several such pairs are bundled together in a protective sheath. They are the most widely used transmission media. Twisted pair is of two types:-

- ① Unshielded Twisted Pair (UTP)
- ② Shielded Twisted Pair (STP)

2. Coaxial Cable:- It has an outer plastic covering containing an insulating layer made of PVC or Teflon & 2 parallel conductors each having a separate insulated protection cover. The coaxial cable transmits information in two modes:-

- ① Baseband Mode
- ② Broadband Mode.

Media :-

3. Optical Fiber Cable:- It uses the concept of refraction of light through a core made up of glass or plastic. The core is surrounded by a less dense glass or plastic covering called the cladding. It is used for the transmission of large volumes of data.

4. stripline:- Stripline is a transverse electromagnetic (TEM) transmission line medium. It is the earliest form of the planar transmission line. It uses a conducting material to transmit high-frequency waves. It is also called a waveguide.

5. Microstripline:- In this, the conducting material is separated from the ground plane by a layer of dielectric.

# ASSIGNMENT-2

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Q1 - What is the use of two dimensional parity in error detection?

AN: Two Dimensional Parity can detect as well as correct one or more bit errors. In parity, check bits are computed for each row, which is equivalent to the single-parity check. It is also known as longitudinal Redundancy Check (LRC).

Use of Two Dimensional Parity in Error Detection:-

1. Performance can be improved by using Two-Dimensional Parity check which organizes the data in the form of a table.
2. Two-Dimensional Parity checking increases the likelihood of detecting burst errors.
3. Parity checks in two-dimensions permit the use of economical circuitry to indicate in what rows or columns errors are detected, & to correct the errors row by row & column by column.

4. If two bits are changed in exactly the same column then errors cannot be detected.

Q2 - Explain in detail the error detection & error corrections.

Ans:- Error Detection:- When a message is sent, it may be jumbled by noise or the data may be damaged.

To avoid this, we employ error-detecting codes, which are bits of extra data appended to a digital message to assist us detect whether an error occurred during transmission.

### Error Detection Techniques:-

#### 1. Simple Parity Check:-

→ One extra bit is transmitted in addition to the original bits to make the number of 1s even in the case of even parity or odd in the case of odd parity.

#### 2. Two-Dimensional Parity Check:-

→ For each row, parity check bits are calculated, which is identical to a basic parity check bit. For each column, parity check bits are

computed & transmitted together with the data. These are compared with the parity bits calculated on the received data at the receiving end.

### 3. Checksum:-

→ The data is split into K segment of m bit each in the checksum error detection technique. To obtain the checksum, a complement of the sum is taken. The checksum segment is sent with the data segments.

### 4. Cyclic Redundancy Check:-

→ CRC is an alternative method for determining whether or not a received frame includes valid data. The binary division of the data bits being delivered is used in this approach. Polynomials are used to generate the divisor.

Error Correction:- Error correction codes are used to detect & repair mistakes that occur during data transmission from the transmitter to the receiver. There are two approaches to error correction:-

1. Backward Error Correction:- When a backward mistake is detected, the receiver request that the sender retransmits the complete data unit.

2. Forward Error Correction:- In this scenario, the error - correcting code is used by the receiver, which automatically corrects the mistakes.

### Error Correction Techniques:-

#### 1. Hamming Code:-

Parity bits:- A bit that is added to the original binary data to make sure the total number of 1s is even or odd.

Even Parity:- To check for even parity, if the total number of 1s is even, the parity bit value is 0 & if 1s is odd, then 1.

Odd Parity:- To test for odd parity, if the total number of 1s, is even, the parity bit value is 1 & if 1s is odd, then 0.

Q3. Describe sliding window protocol using Go back n?

Ans- Go back N protocol is an implementation of a sliding window protocol.

In Go back N,

→ Sender window size = N.

→ Receiver window size is always 1 for any value of N.

→ Receiver maintains an acknowledgement timer.

→ Each time the receiver receives a new frame, it starts a new acknowledgement timer.

→ Go back N may use independent acknowledgements too if required.

→ Go back N does not accept the corrupted frames & silently discards them.

→ Receiver window size is 1 & therefore receiver cannot accept out of order frames.

→ Go back N leads to retransmission of entire window if for any frame, no ACK is received by the sender.

→ Go back N leads to retransmission of lost frames after expiry of time out timer.

## Efficiency of bio back N :-

Efficiency = Sender window size in Protocol /  $(1+2a)$ .

In bio back N protocol, sender window size =  $N$ .

Thus,

$$\text{Efficiency of bio back } N = N / (1+2a).$$

Max sender window size =  $2K - 1$ .

Q4 - What is the difference between port address, logical address & physical address?

Ans - Through logical address the system identify a network [source to destination]. After identifying the network physical address is used to identify the host on that network. The port address is used to identify the particular application running on the destination machine.

Logical Address:- An IP address of the system is called logical address.

This address is the combination of Net ID & Host ID. This address is used by network layer to identify a particular network among the network.

This address can be changed by changing the host position on the network, so it is called logical address.

Physical Address:- Each system having a NIC (Network Interface Card) through which two systems physically connected with each other with cables. The address of the NIC is called Physical address or mac address. This is specified by the manufacturer company of the card. This address is used by data link layer.

Port Address:- There are many applications running on the computer. Each application runs with a port no. (logically) on the computer. This port no. for application is decided by the Kernel of the Operating System. This port no. is called port address.

Q5 - The message 11001001 is to be transmitted using the CRC polynomial  $x^3 + 1$  to protect it from errors. The message that should be transmitted.

Ans - Message : 11001001

$$\text{CRC polynomial} : x^3 + 1 = 1 \cdot x^3 + 0 \cdot x^2$$

CRC generator = 1001

Since polynomial is of order 3 append 3 0's at the end of message.

Message = 11001001000

$$\begin{array}{r} 11001001011 \\ 1001 \quad | \quad 11001001000 \\ 1001 \downarrow \quad | \quad | \quad | \quad | \quad | \quad | \\ 1011 \quad | \quad | \quad | \quad | \quad | \quad | \\ 1001 \downarrow \quad \downarrow \quad | \quad | \quad | \quad | \\ 1000 \quad | \quad | \quad | \quad | \quad | \\ 1001 \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \\ 1100 \quad | \quad | \quad | \quad | \\ 1001 \quad | \quad | \quad | \quad | \\ 1010 \quad | \quad | \quad | \quad | \\ 100 \quad | \quad | \quad | \quad | \\ \hline 0011 \quad | \quad | \quad | \quad | \end{array}$$

← Remainder

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∴ The message to be sent is : 11001001011. 011 (CRC code)  
Ans