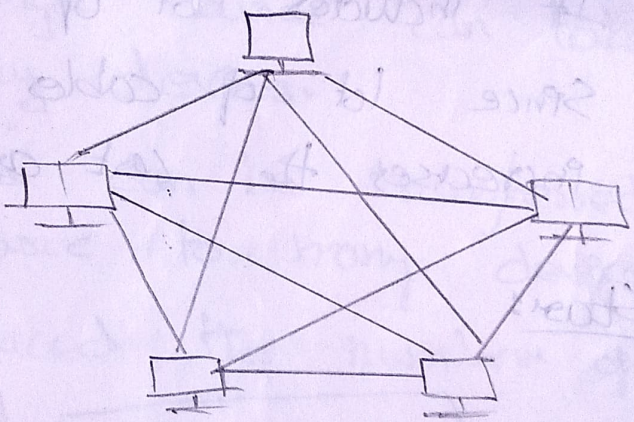
PART - C

(11) NETWORK TOPOLOGIES

⇒ There are 4 basic network topologies They are:

i) Mesh
ii) Bus
iii) Star
iv) Ring.

(i) Mesh:



⇒ In this network topology, all nodes (devices) are connected to each other which means each single node is connected with every other nodes.

Eg: Backbone in telephone offices.

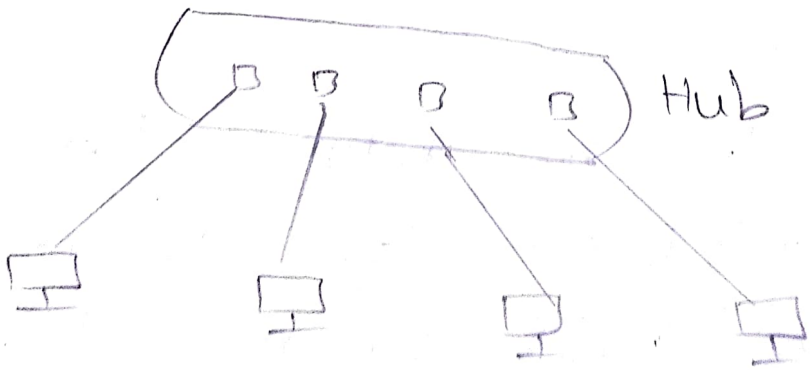
Advantages:

=> It helps in reducing the traffic.
=> Fault isolation can be easily implemented.
=> Data can be sent to other devices with reduced delay.

Disadvantages:

=> Installation and maintanence is difficult
=> It includes lot of cabling.
=> Since lot of cable are used, it increases the cost as well.

(ii) Star:



⇒ In this network topology, all devices are connected to ~~the~~ a single node or system.

⇒ The node which acts as the centre for connection among all ~~d~~systems is said to be called as hub.

Advantages:

⇒ Single source can take control of many devices.

⇒ Data can be transferred from one source to many devices.

⇒ Reduced the number of cables used.

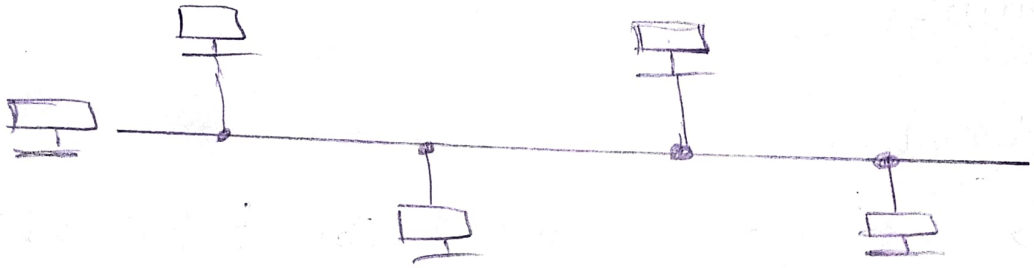
Disadvantage:

⇒ Fault isolation is difficult

⇒ If the hub gets faulty, then it is difficult to send data to other devices.

⇒ Network traffic may increase since single source takes control of other devices.

(iii) Bus:



⇒ In this network topology, all devices are connected to the single connection medium.

⇒ Data flow in this topology is bidirectional.

Eg: Highly used in LAN.

Advantages:

⇒ Fault isolation is easy.

⇒ Data flow is bidirectional.

⇒ Number of cables used is reduced.

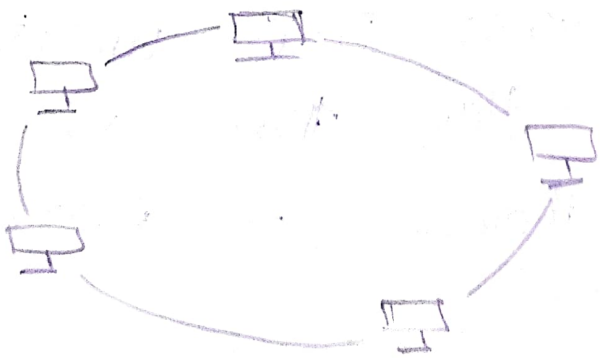
⇒ Easy installation and maintenance.

⇒ ~~Its~~ Network traffic is reduced.

Disadvantages:

⇒ Since data flow is bidirectional, there are chances of increase in delay time.

(iv) Ring:



⇒ In this type of topology, all devices are connected in the form of a ring structure.

⇒ Data flow in this network topology is unidirectional.

Advantages:

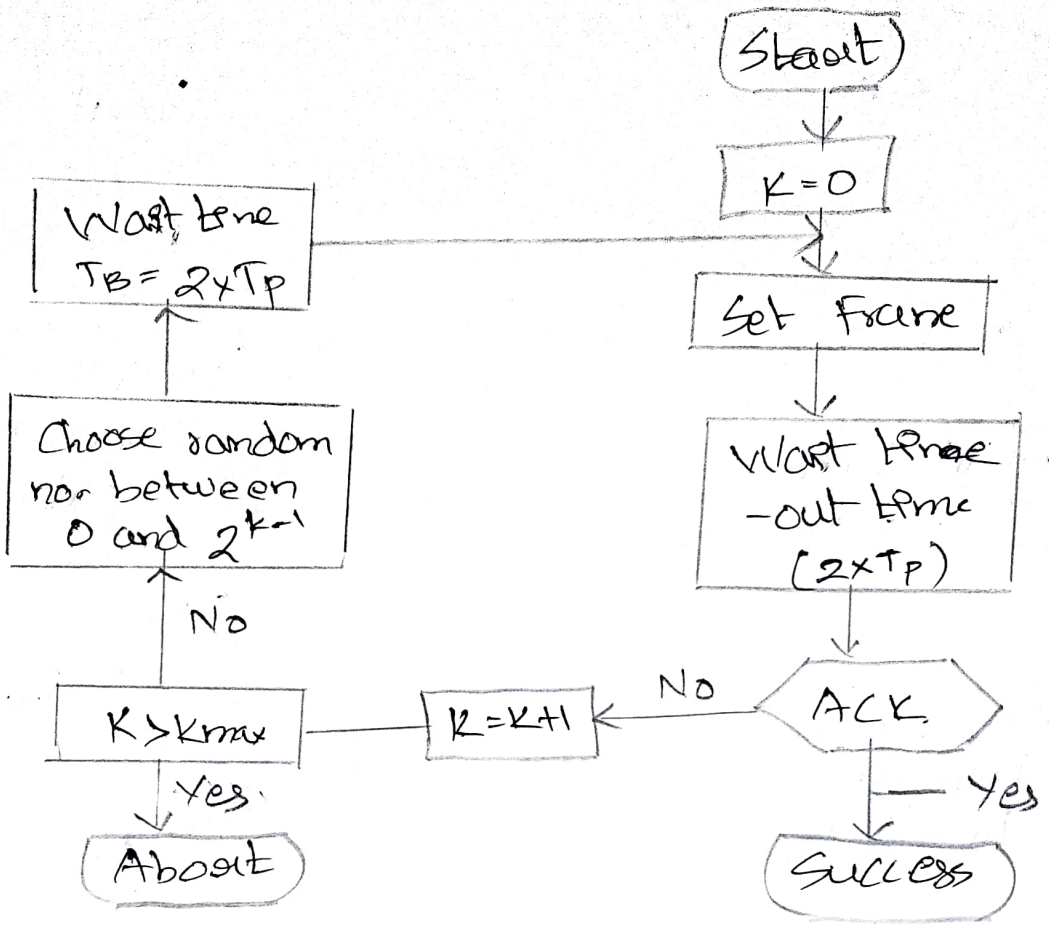
⇒ Easy installation and maintanence.
⇒ Reduced no. of cables used.
⇒ Network traffic is reduced.
⇒ Fault isolation is easy.

Disadvantages:

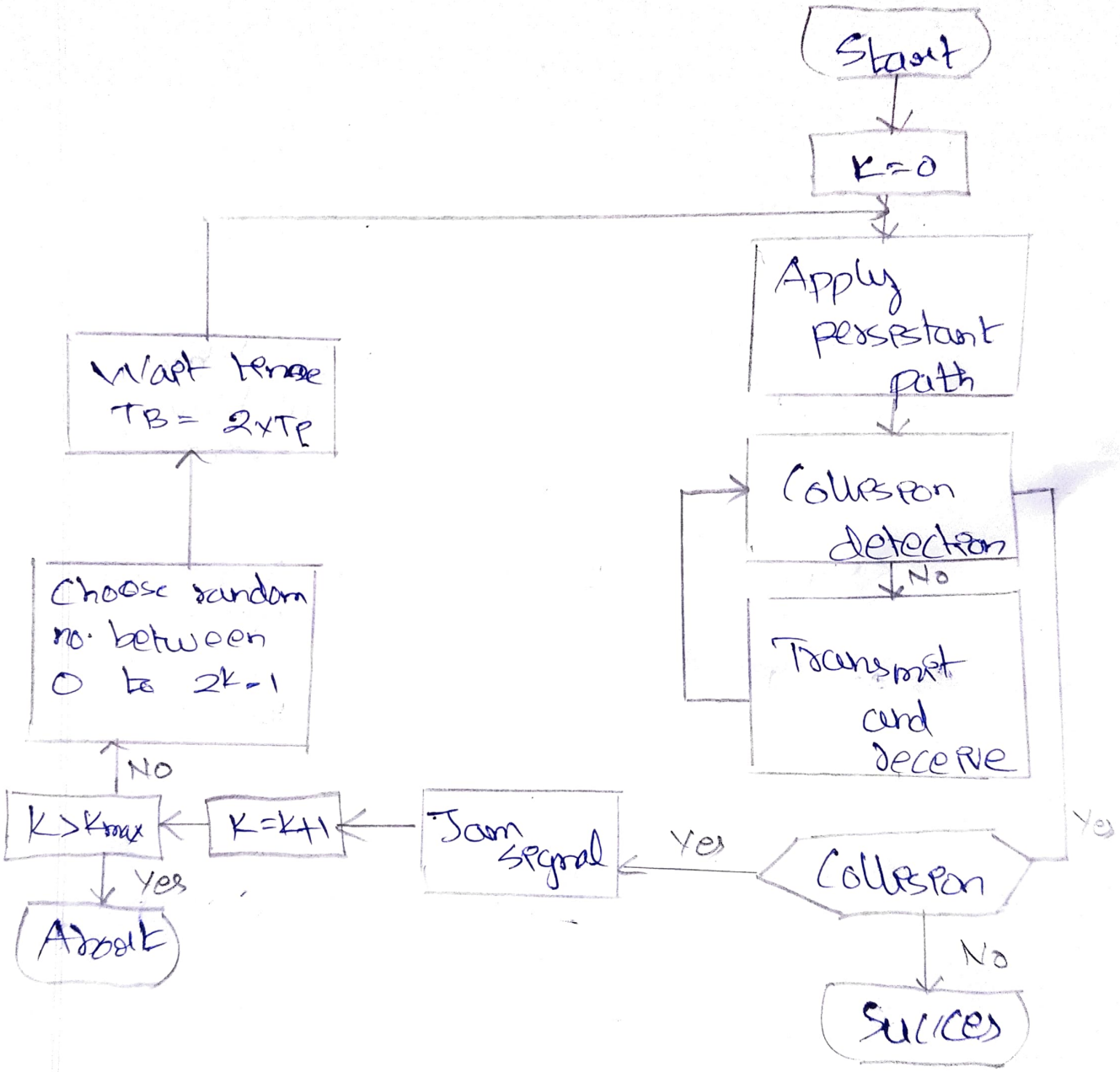
⇒ Since it is unidirectional data flow, there is a change of increase in message delay time.

⇒ To solve this issue, dual ring format can be created among the devices.

(13) FLOW DIAGRAM OF PURE ALOHA PROTOCAL



FLOW DIAGRAM OF SLOTTED ALOHA NETWORK



⇒ 500-bit frames on a shared channel of 500 kbps.

(500 / 500) ⇒ 1 mbps.

(1) Pure ALOHA network

⇒ 1000 frames per second.

⇓

1 frame per millisecond.

∴ G = 1

⇒ Throughput = $G \times e^{-2G}$

= e^{-2} = 0.135

= 13.5 percent

∴ 135 frames out of 1000 frames

(2) Slotted ALOHA network

∴ G = 1.

⇒ Throughput = $G \times e^{-G}$

= e^{-1} = 0.368

= 36.8 percent

∴ 368 frames out of 1000 frames

PART-B

(7)

Optical fibre:

⇒ Optical fibre is made up of either glass or plastic.

⇒ In the fibre, data is sent in the form of light signals.

⇒ Light signals are passed into the optical fibre with the help of critical angle and refraction.

⇒ If the angle of incidence of the light beam is greater than the critical angle, then the light beam gets bended and is travelled easily along the cable

⇒ Otherwise, the data won't be passed correctly.

Advantages:

⇒ It is light weight

⇒ Resistive against corrosive materials.

⇒ No need of electromagnetic interference.

⇒ Reduced propability of data loss

Disadvantages:

⇒ Installation and maintenance is high

⇒ Highly expensive to implement.

DIFFERENT MODES IN OPTICAL FIBRE

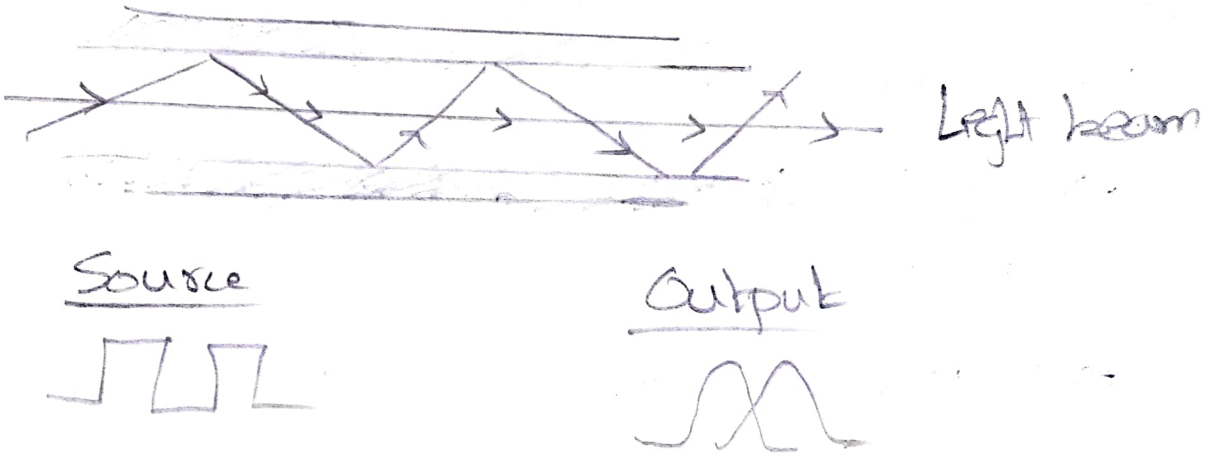
(i) Single mode:

Source

Output

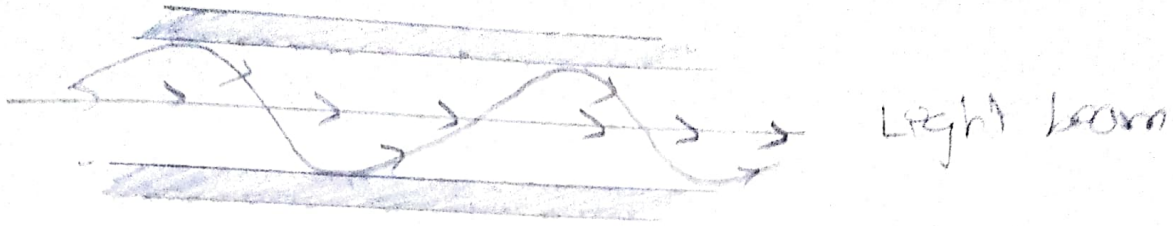
⇒ In this type of mode, the light gets bended for less than 90 degree, which results in moving in a straight line.

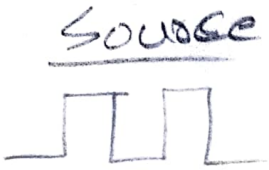
(ii) Multimode- Step Index

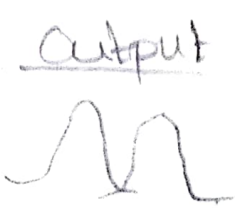


⇒ In this type of mode, light gets bended in straight lines due to varying densities which is present in the cable.

(iii) Multimode - Grid index







⇒ In this type of mode, light beams gets bended, but the density remains constant among different layers in the cable.

PART-A

(1) (i) Propagating time = Distance / Propagation speed

$= \frac{5000}{2 \times 10^{8}}$

$= 25 \times 10^{-6}$ seconds //

(ii) Transmission time = ~~Message~~ Frame size / Bandwidth

$= \frac{512}{10 \times 10^{6}}$

$= 51.2 \times 10^{-6}$ seconds //

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(2) Encapsulation:

⇒ Encapsulation can be seen in multiplexing of TCP/IP protocol.

⇒ It is defined as that the network packets can be encapsulated, so that they can be sent to different higher-level protocol layers.

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(3)

⇒ 400 bit frames on a channel of 400 kbps.

⇒ Requirement to make this frame collision-free

∴ (400/400) = 1kbps //

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(5)

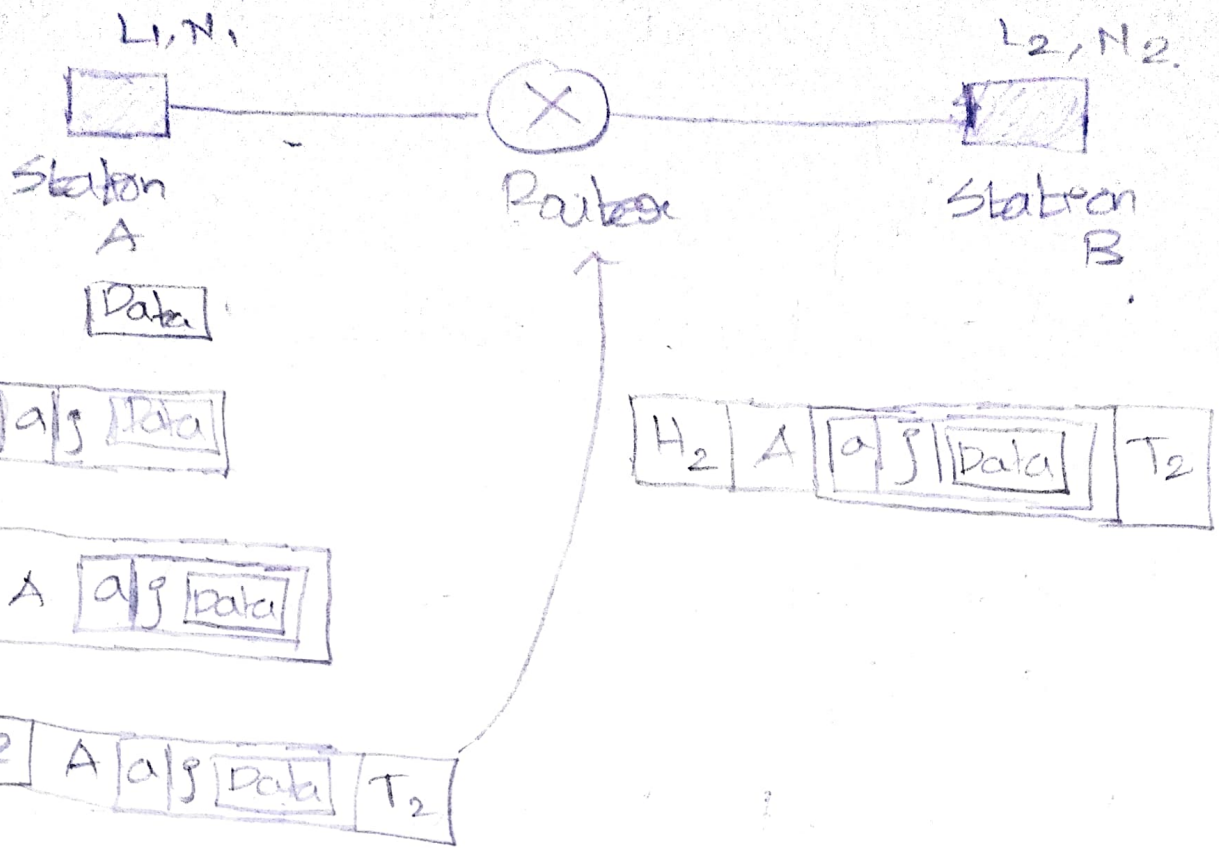
A3 : 34 : 45 : 11 : 92 : F1

Type of address: Broadcast address

Justification:

The LSB of Broadcast address is always 1.

(4)



(6)

Sender: 00111 0111 1110 1010 1011 1111 10

Receiver side: 0011 1011 1110 1010 1111 1100

→ Done using HDLC Stuffing.

PART-B

(8)

=> STOP Protocol of FSM:

- In this type of protocol, when the network packet is received, the STOP Protocol waits of the packet until a connection is established among the two devices.

=> WAIT Protocol of FSM:

In this type of protocol, the network packet is in waiting state until it receives the acknowledgement from the received side. While being in waiting state, the protocol checks whether the data is encapsulated with correct addressing link or not.