Ping google.com

IP config /a ← RARP <MAC>

↘ ARP <IP address of other sys>

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* Data link layer:

It is a combination of two control

① LLC - Logical link control
② MAC - Medium Access control.

→ LLC works as an error detection, error correction.

→ MAC works as to check which data is to access by which node.

ping: To check whether the link connected between two device is working or not.

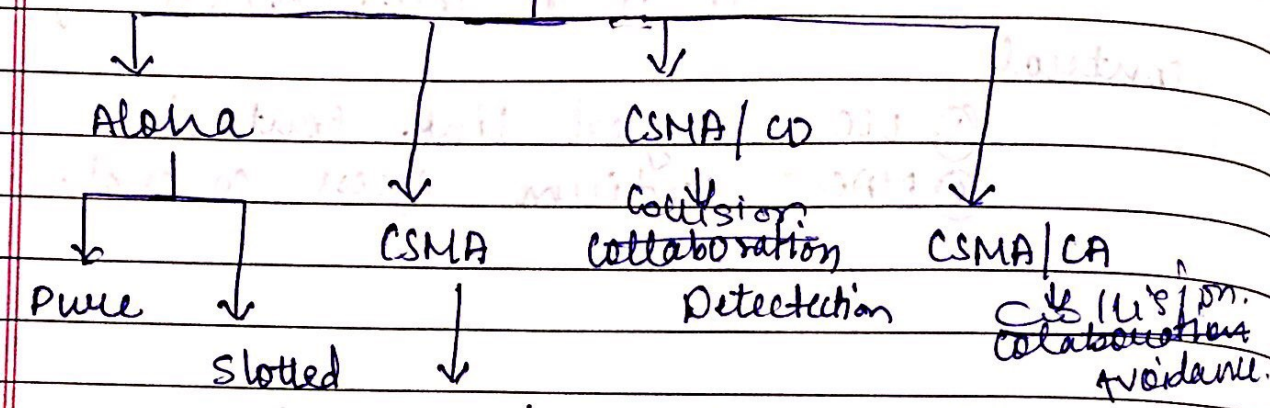
* Using C try to do bit stuffing and ~~byte~~ unstuffing.

* ~~Input in binary~~

~~RAM~~ :

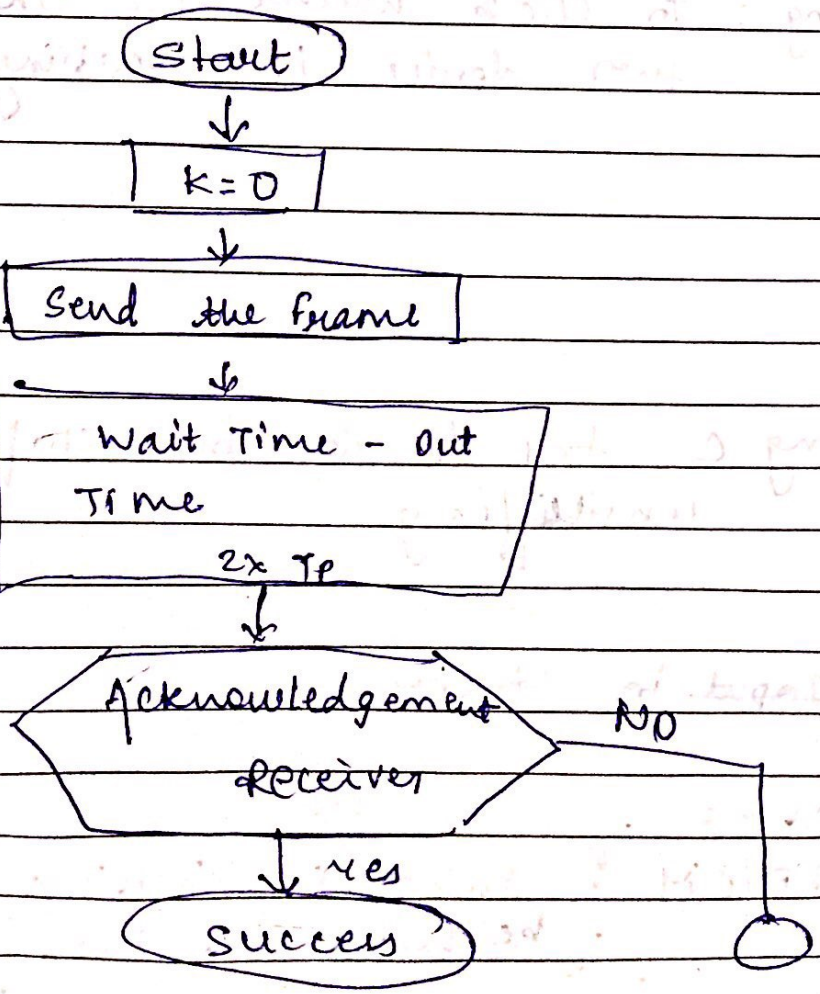
RA/CM: In this Each & Every node will be having Equal priority.

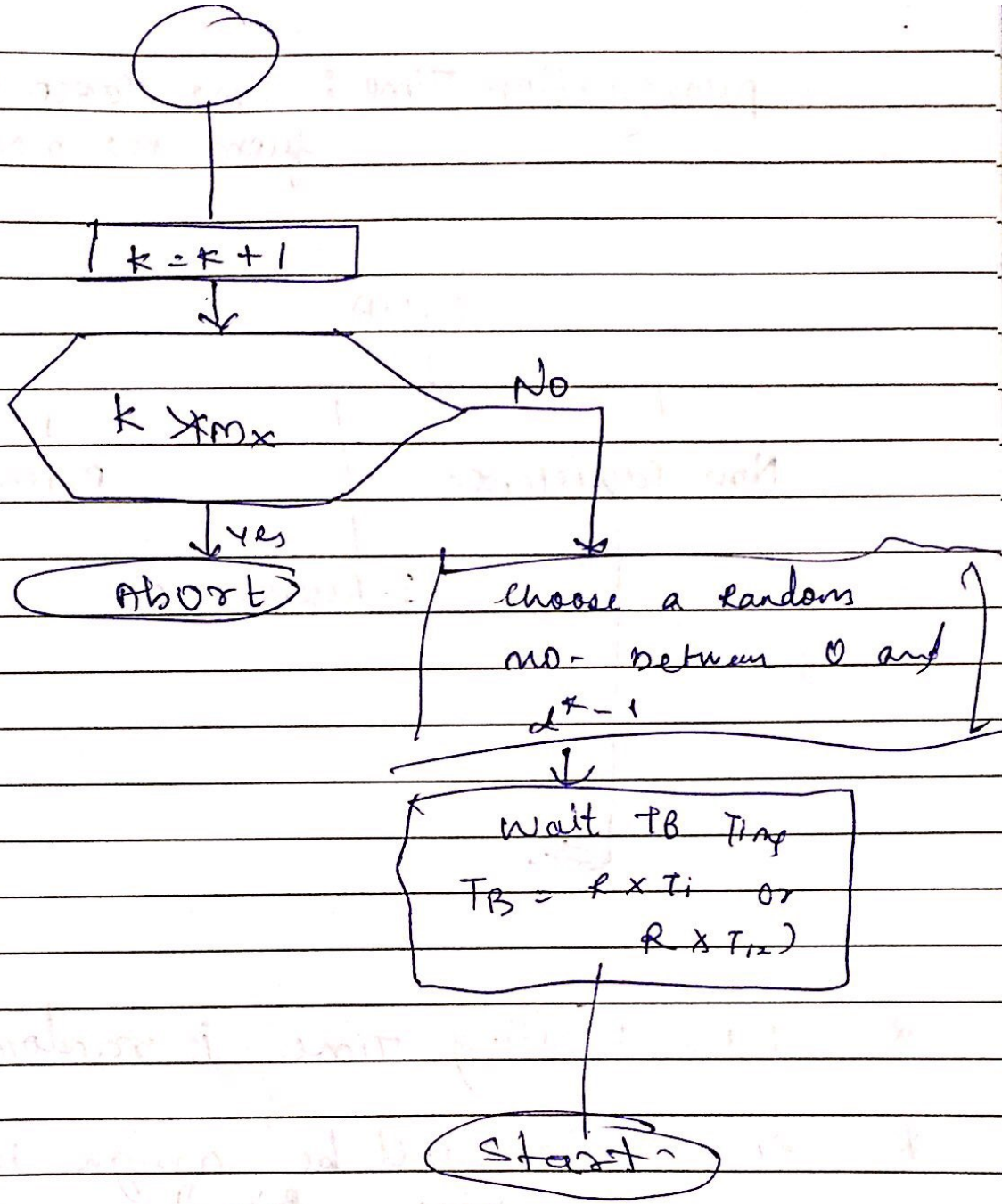
Random Access / contention Method.



→ Random Access

→ Pure Aloha. (1970, university of HI)

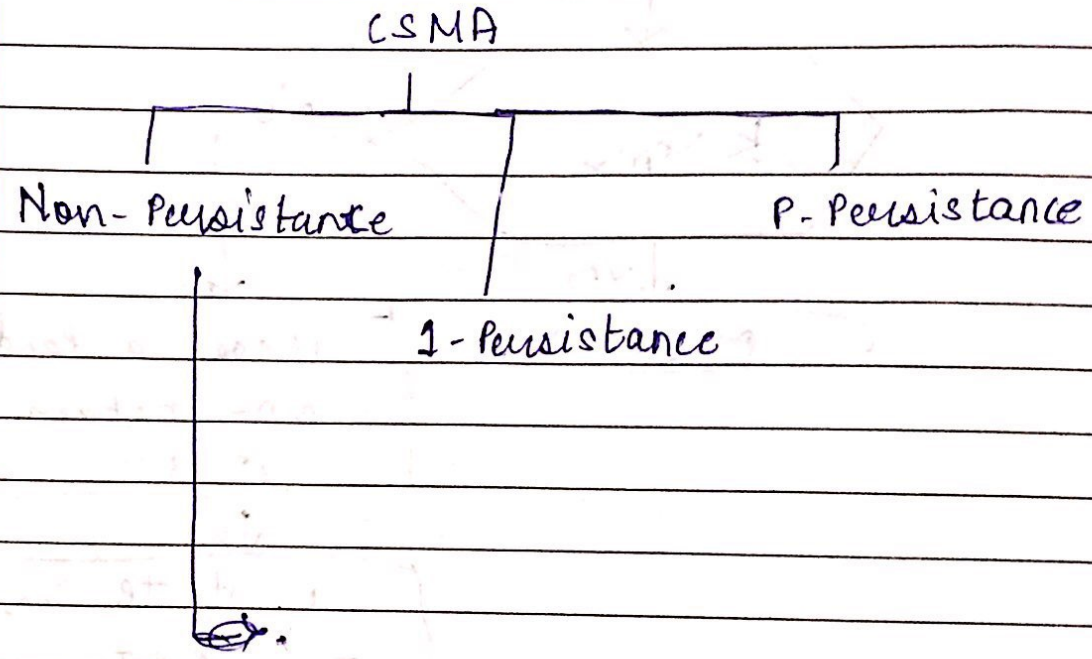




K = number of attemps
T_p = max. Propogation Time
T_{fr} = Avg. Transmission time for a frame
T_B = Back off time.

Kmax is normally 15.

propogation Time : Time Taken to send data from one node to another



* NP : Waiting Time is random.

* PP : node will be assign by Probability value. Priority.

* 1P : ~~Both can transfer the data.~~ one node can send ~~every~~ data.

Unit-3

Ethernet

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* **Defination:**

It is a system for connecting a number of computer system to form a local area network, with a protocol to control the passing of information and to avoid simultaneous transmission by two or more system.

It is a family of computer network technology, commonly used in LAN.

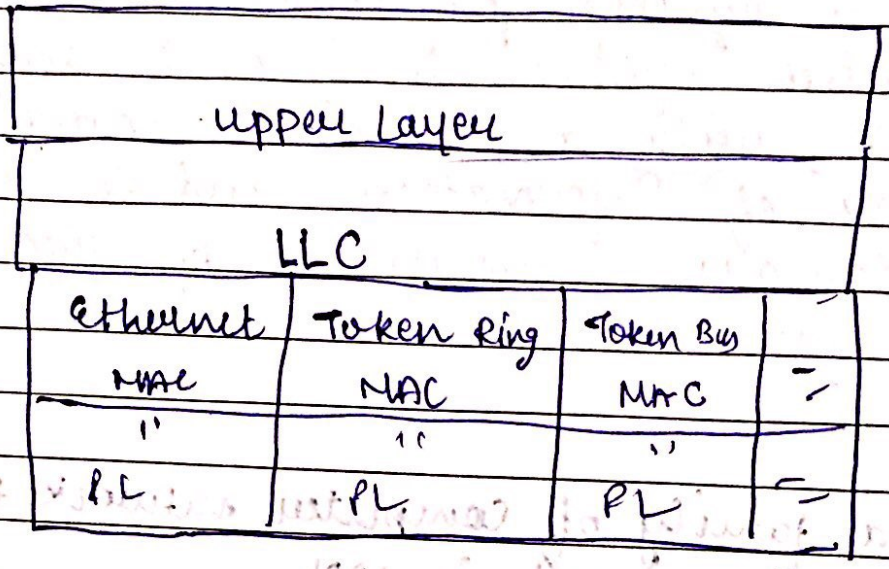
* **IEEE standards**

In 1995, Computer society of IEEE has started project called project 802, which is use to set standards to enable interconnection among equipment from a variety of manufacture

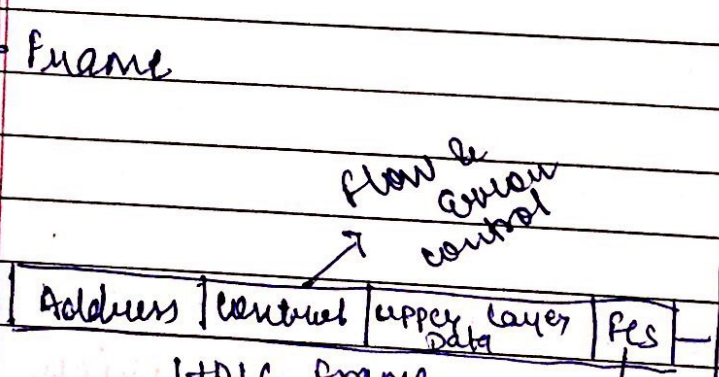
Project 802, is a way of specifying function of the physical layer and data link layer of major lan LAN protocol.

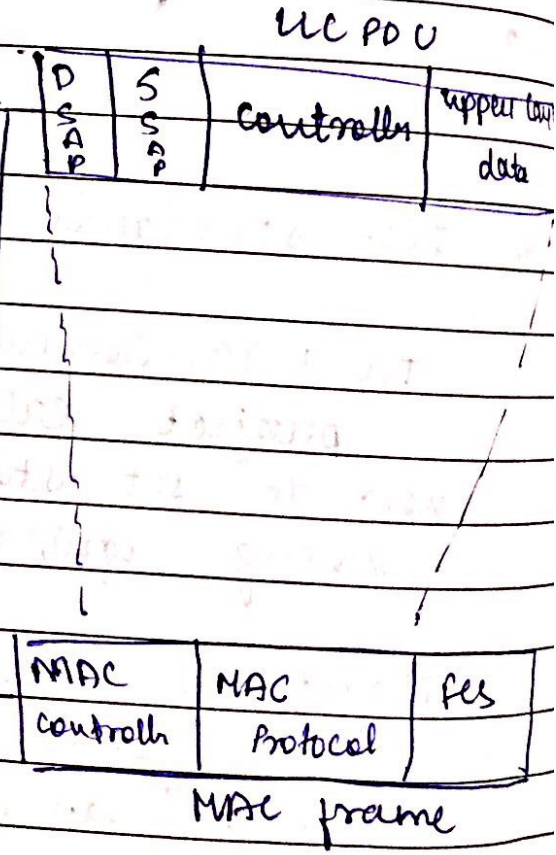
802.3 → ethernet
802.4 → Token Bus
802.5 → Token Ring

IEEE standards for LAN

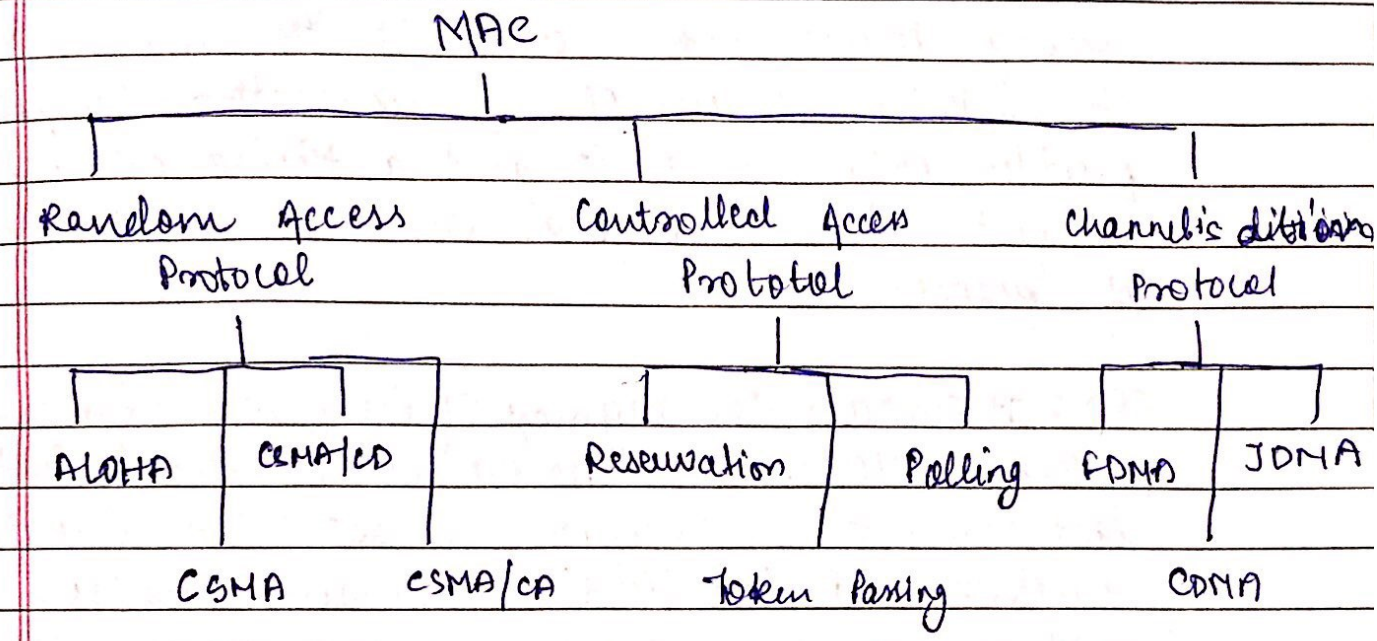


→ Frame





S/DSAP : Source/Destination Service Access Point



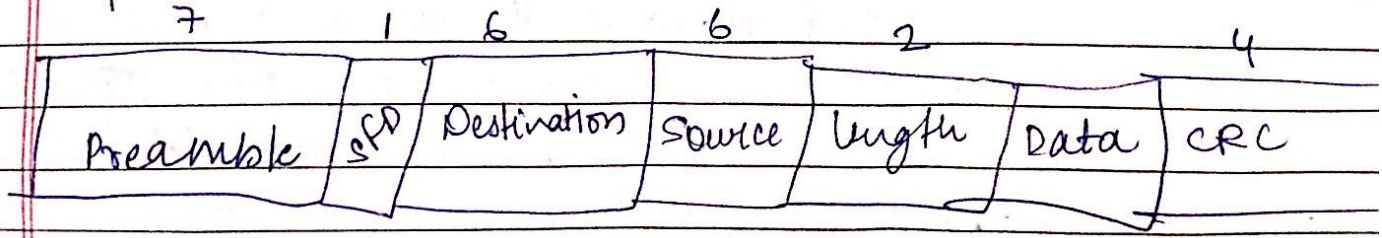
* Standard Ethernet

In 1975, Ethernet was deliver by PARC Xerox Palo Alto Research Center.

Evaluation after 1975

1. Standard
2. fast
3. Giga
4. 10 Giga

=> MAC Layer format frame:



Preamble: It alert the receiving system to the coming frame and enable it to synchronize its clock if its out of synchronization. The pattern provides only an alert and a timing pulse. It is just added to physical layer but not a part of frame.

SFD: It signals the begning of the frame with the pattern 10101011. It warns the station that it is the last chance to synchronize. The last 2 bits alert the receivers that next field is distination address. This field is flag which defines begning of frame. SFD is also a part of physical layer.

DA: It contains link layer address of station to recive the packet.

SA: It contains link layer address of station which has send the packet

Type: This field define the upper layer protocol whose packet is encapsulated in the frame.

Data: It carries data encapsulated from the upper layer protocol. Minimum of 46 & Maximum of 1500 bytes. If the data is more than 1500 then it must be fragmented and encapsulated in more than one data frame. If it is less than 46 it must be padded by 0.

CRC: This field contain ED information. It is calculated over addres, type & field. If receiver

calculate and find it is not zero, he/she will discard the frame.

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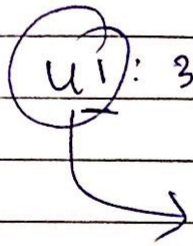
✱ Three types of Address.

Unicast : one sender one Receiver
Multicast : one sender multiple Receiver
Broad cast : Parallel data send to Receiver is LAN.



1 → Odd → Multicast
if even → unicast
if all the hexadecimal is 1 then, broadcast :

Slot time : A round trip time required to travel from one end of maximum length two network to the other plus the time needed to send reexamine signal.

Slot Time = Round trip time + Time required to reexamine signal

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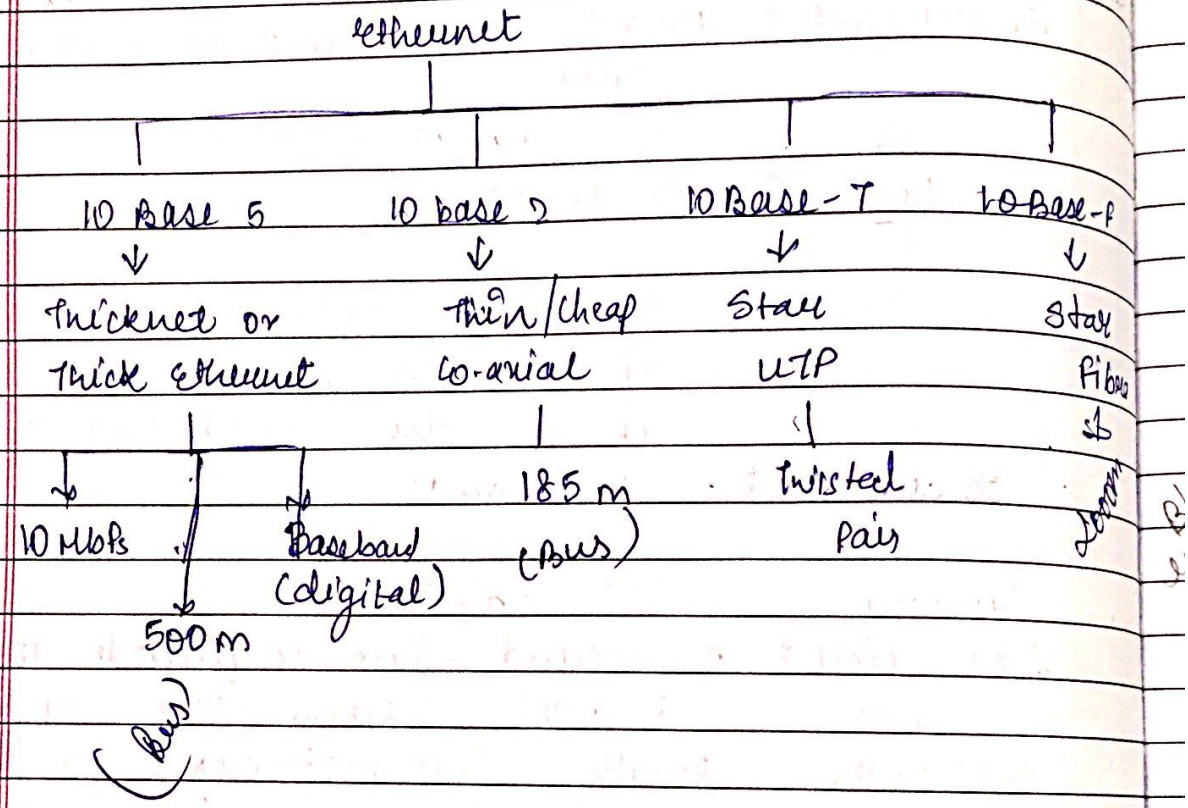
Implementation



fast Ethernet

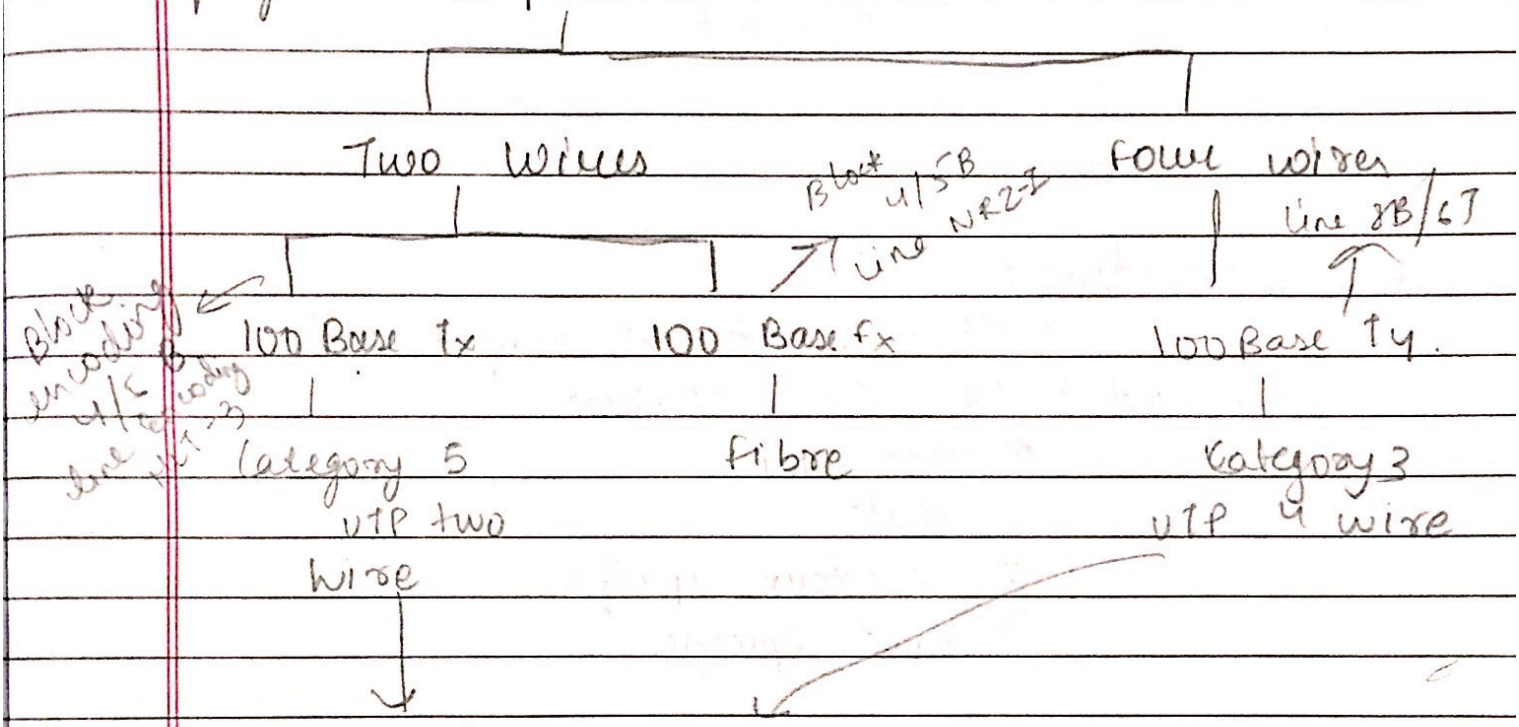
In star topology

- Half duplex
  - (Hub)
  - (CSMA/CD)
- full duplex
  - (switch)
  - (No access method)

→ Two device : Point to Point

→ More then two device : hub/switch → star topology

⇒ physical layer : (100 Mbps)



1 inch = 5 twisted, 3 twist.

* Delivery:

It refers to the way a packet is handled by the network under the control of network layer.

Types:

1. Direct
2. Indirect

* Forwarding:

It refers to the way a packet is delivered to the next station

1. next ~~hop~~
2. route
3. network specific
4. host specific

* Routing:

It refers to the way routing table are created to help in forwarding. Its protocols are used to continously update the table that are consulted for forwarding and routing.

⇒ Direct Delivery:

The final destination of the packet is a host

connected in the same physical network as deliver. It occurs when the source and destination packet are located on the same physical network or when the delivery is between the last router & destination node. Sender can easily determine if the delivery is direct. It can extract the network address of the destination and compare this address with the address of the network to which it is connected. If the match is found then the mode will be direct.

Indirect Delivery

If the destination host is not on the same network as the delivery the packet is delivered indirectly.

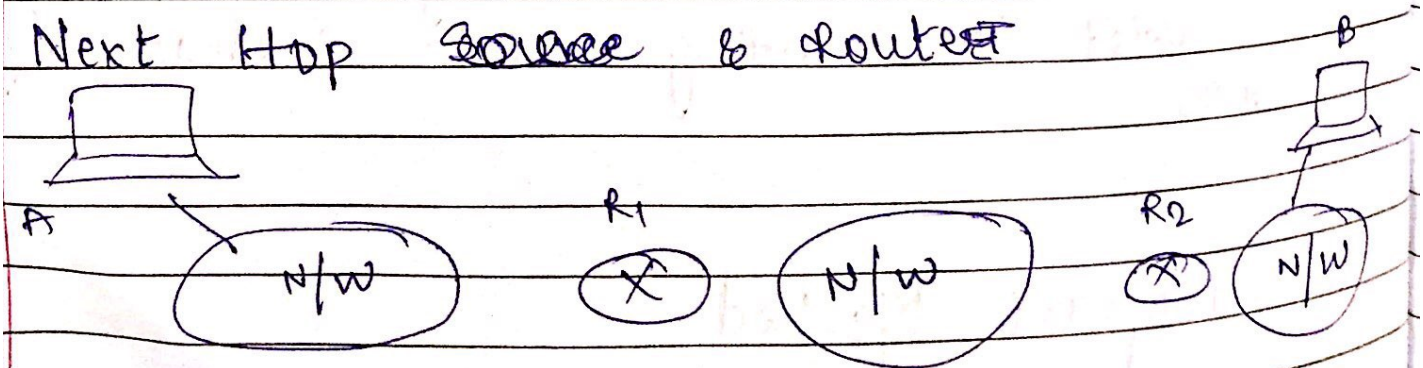
In this, the packet goes from router to router until it reaches to one connected to the same physical network as its final destination.

Delivery always involve one direct delivery but 0 or no indirect delivery. Last delivery is always a direct delivery.

Forwarding Technique

1. Next-Hop ~~Source~~
2. Routes
3. Network Specific
4. ~~Host~~ specific.

Next Hop ~~Source~~ & Routes



⇒ Indirect delivery Method.

⇒ Each device will have its routing table to get to know about route through which the packet can be pass.

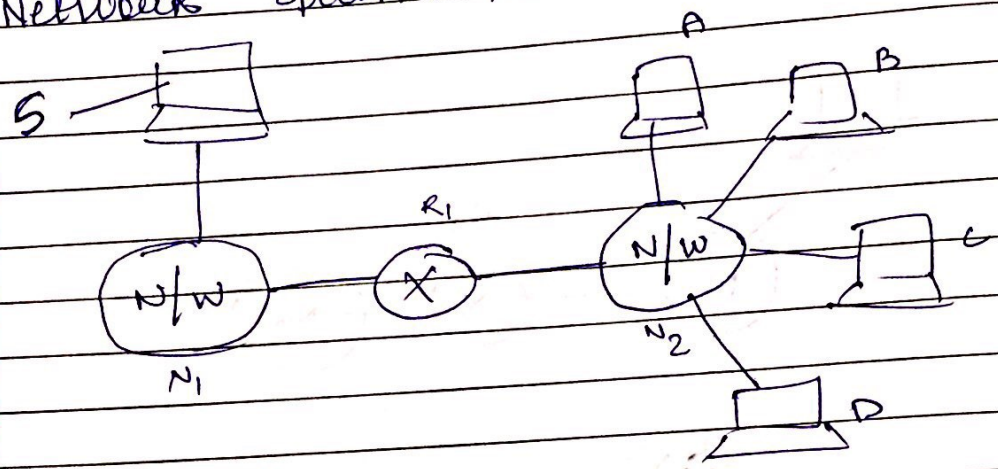
⇒ In Next Hop, Table will consider Destination and next hop.

⇒ In Router, Table will consider whole route from the packet.

Destination	Next Hope
B	R_1
B	R_2
B	

Route
A → R_1, R_2, B
R_1 → R_2, B
R_2 → B.

→ Network Specific / Host Specific



Host Specific

Destination	Next Hop
A	R_1
B	R_1
C	R_1
D	R_1

Network Specific

Destination	Next Hop
N_2	R_1
N_2	R_1
N_2	R_1
N_2	R_1

⇒ Next Hop V/s Route Method

One technique is use to reduce the content of routing table known as Next Hop method.
Routing table holds only the address of next Hop.

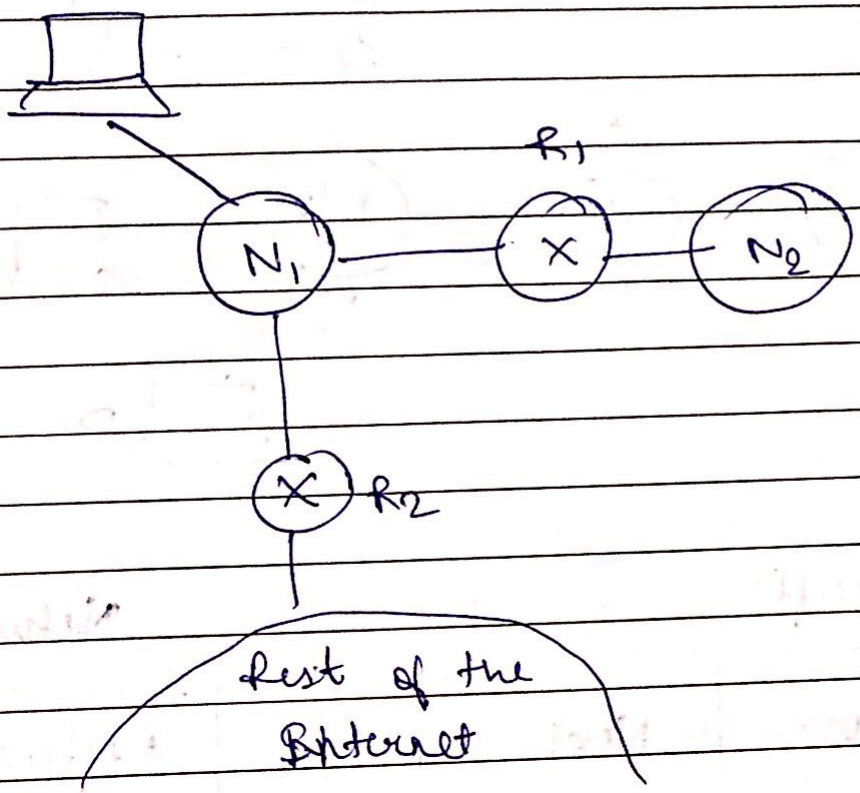
In route method, Routing Table holds information of complete route.
Entries of routing table must be consistant with one another.

Network v/s Host specific

Second technique to reduce routing table and simplify searching technique is known as Network specific.
In Host specific, Every destination Nodes connected to same Network.
Host specific, use for purpose such as checking the route & provide security.
In Network specific, only one entry that defines the address of the destination network itself.
In other word, Tree or host connected to the same network as one single Entry.
eg: If 1000 host are attached to the same network only one entry exist in routing table instead of 1000.

Default Method.

Default Method.



Destination	Next Hop
N_2	R_1
Anywhere	R_2