Karega then sense karta rahega tab tak karta rahaiga jab tak channel free na mile.

• Non-persistant:

Channel ko sense karega agar free nahi hai to wait for some time and then again start sensing the channel.

• Isme sabse kaam possibility hai colloision ki is protocol k version mein.

L- persistance :→

• Jaisehi channel free milegy waischi data transmit karega, data transmit karne ki probability one hai. Data transmit hoga hi

p- persistance :→

Channel free milne par data-transmit karne ki probability β hogi.

• If colloision occur system wait for som. random time then retransmit this. random time can be calculate or can be decided by binary - exponional back-off algorithm.

• Back-off algorithm kahati hai, agar kisi system k kisi ek packet ka i^{th} colloision hai toh we will choose a random

number between 0 to $2^i - 1$.

- Agar first colloision hai to number will be choose from 0 to $2^1 - 1$ i.e 0 to 1.

- Agar System ne Random number choose kiya hai 0 toh woh immedially data send kardega.

- If random number is 1, System will start Sinsing the channel after 1 Bit slot.

$$\boxed{1 \text{ Bit slot} = 2 \text{ tp}}$$

* If we apply 15 times this algorithm there is no problem after 15th colloision i.e at 16 colloision and onwards data-link Layer informs highur layer that data was unable to revieve.

- • Binary - expontional back-off algorithm hum sirf do hi System par apply karsakte hai isliye binary use kiya hai.
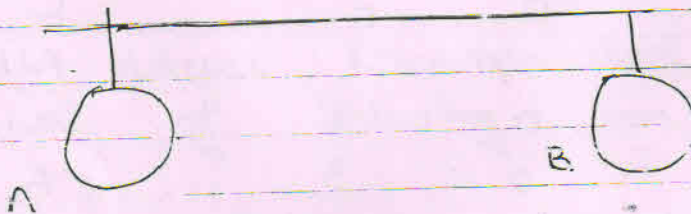
A ka pahale packet usko number diya n=1 aur B ka pahale packet n=1 dono colloide hogaye then, A kon-kon se number choose karega, 0 to 1 and B bhi 0 to 1.

A	B	Status
0	0	C
0	1	B A wins
1	0	B wins
1	1	C

probability of colloision $= \dfrac{2}{4} = \dfrac{1}{2}$

- Now suppose A first back-off race jeet gaya now, A. second packet transverse karna chahata hai:-

n = 2
i = 1
(0,1)

n = 1 → i = 2
(0, 1, 2, 3)
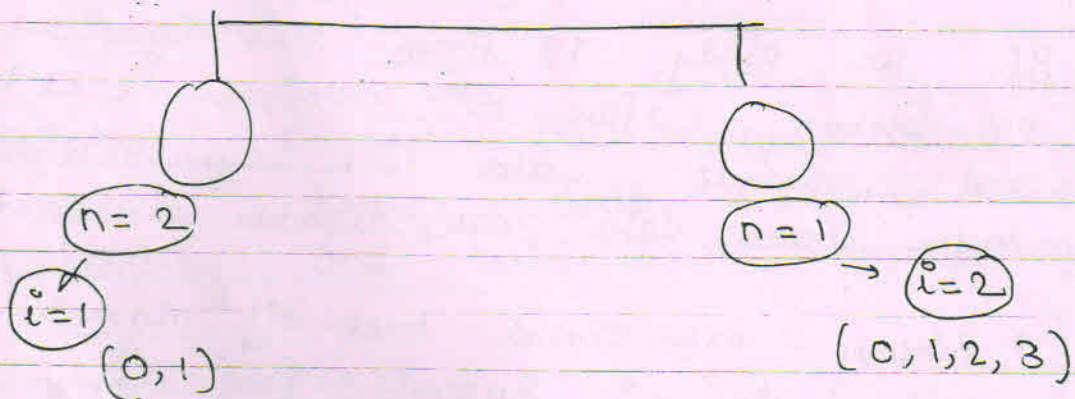
A	B	Status
0	0	C
0	1	A wins
0	2	A
0	3	A
1	0	B
1	1	C
1	2	A
1	3	A

probability of colloision $= \dfrac{2}{8} = \dfrac{1}{4}$

probability of A winning $= \dfrac{5}{8}$

> isko capture effect kahate hai
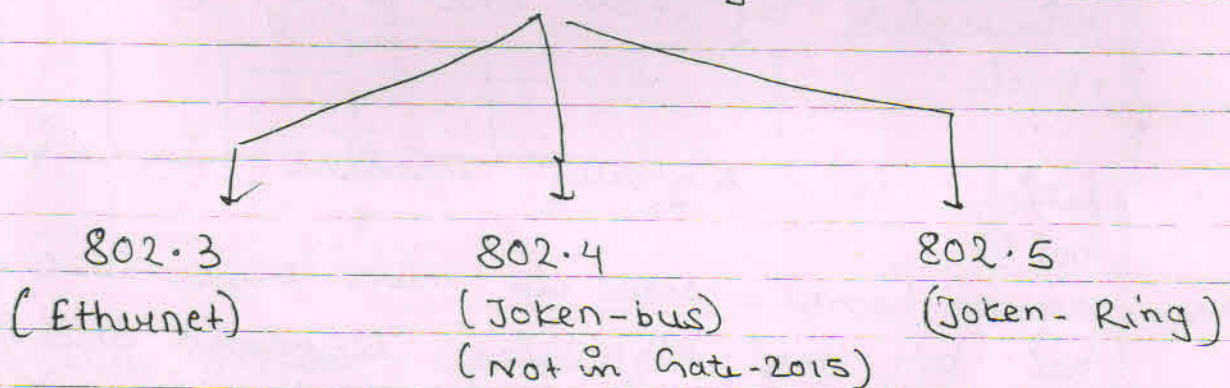
- Is back-off algorithm ka disadvantage hai agar kohi system first time win karleta hai aur next time uske jitane ki probability jada hota hai and next muin aur jada -- so on.

° Aur colloision ki probability exponential decrease hone lagti hai is liye Backoff exponential algorithm kahate hai.

- CSMA/CD protocol is a theorical protocol.

- Practically implemented protocol for delaying with collision (According to IEEE)

```
                802.3          802.4          802.5
             (Ethernet)     (Joken-bus)    (Joken-Ring)
                            (Not in Gate-2015)
```

- we will discuss Ethernet and token Ring on the basic of following four parameters --

1] Transmission Protocol :→
2] Signalling Standard :
3] Cabelling Standard :-
4] Frame format :-

Ethernet (802.3) protocol :-

Transmission Protocol :-

→ Transmission protocol hamne yeh batata hai ki, kaise decide hoga konsa system transmit karega.

*→ Ethernet is based on 1- persistant CSMA/CD protocol

→

Signalling Standard :→

• Normally hamne y pada hai ki 0 is represented by +0v and 1 is represented by +5 volt.

• Lekin is signally standard mein ek problem hai??

Ans→ Agar hamne data bit mein saare bit 0 rakhi hai toh yeh signalling standard distinguish nahi karpayega ki 0 data send kiya hai ki no data send kiya hai.

• Ethernet make use of Differentially Manchaster encoding.

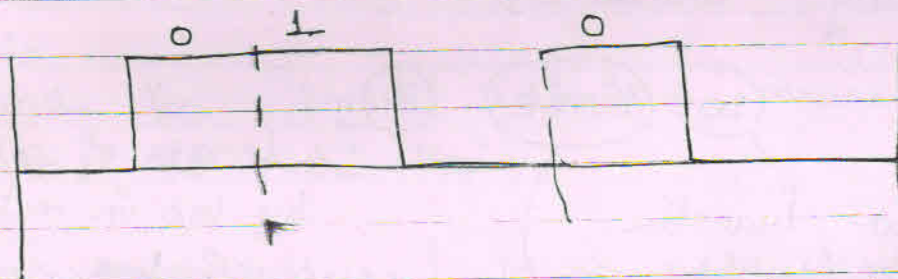# Manchaster Encoding :-

→ In Manchaster Encoding :→

　　　　　0 is represented by low to high
　　　　　1 is represented by high to low.

0   1   D   1
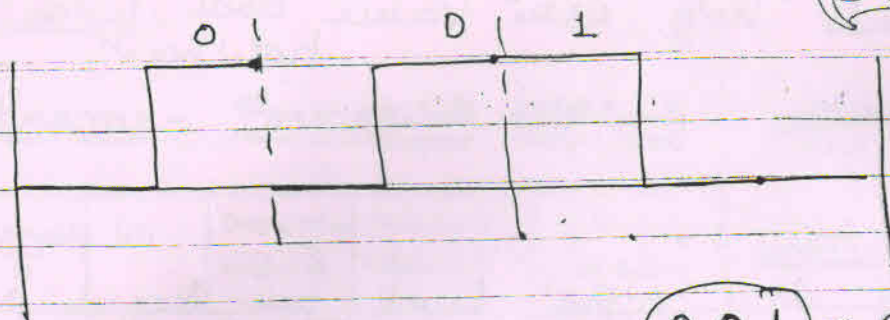
$(001) \to$ encoding

Diffrential Manchaster Encoding :-

- 1 is repusented by previous voltage-Level i.e previous signal continuous hoga.

- 0 is repusented by change in previous voltage -Level.

0   1   0

$010 \to$ data decoded.

↳ Here suppose starting bit is 0.

- 3rd Editions mein likha hai Ethernet make use of Manchaster Encoding while in 4thedition mein likha hai Ethernet make use of Manchaster encoding. Therefore we can conclude from that Ethernet make use of diffrential Manchaster Encoding.

- Spelling jiski badi woh bada hotg, uski value badi holi hai

- <u>Baud. Rate</u> <u>v/s</u> <u>Bit Rate</u>:

<u>Baud Rate</u> :→
Change in voltage Level per second is called Baud Rate.
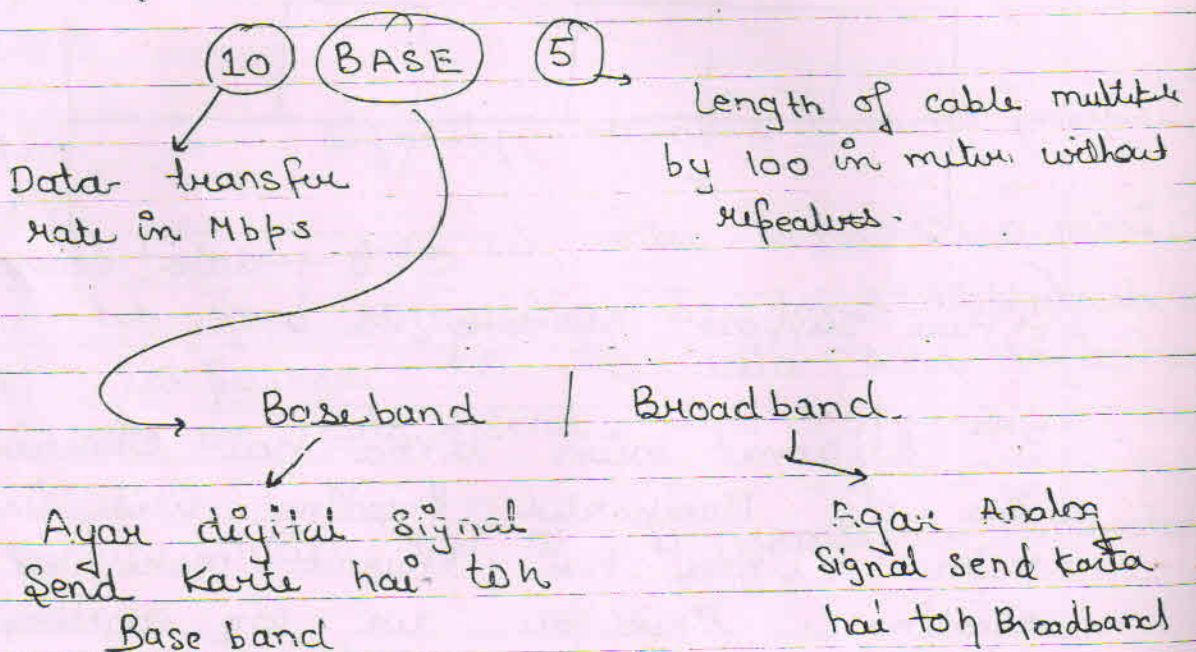
- <u>Bit Rate</u> :→
Change in Bits per second is called Bit Rate

Here, →

$$\boxed{\text{Baud Rate} = 2 \text{ Bit Rate}}$$

\# {Labelling Standard} :-

$$\textcircled{10} \quad \boxed{BASE} \quad \textcircled{5}$$

Data transfer rate in Mbps

Length of cable multiple by 100 in meter without repeaters.

Baseband / Broadband

Agar digital signal send karte hai toh Base band

Agar Analog signal send karta hai toh Broadband

10 BASE 5
10 BASE ⓣ
10 BASE ⓕ } → <u>Types of cable</u>

Fibre Optics

Frame - Format :→ (802.3) protocol :→

Preamble	SD	Destination address	Source address	///	Length of data	Data + padding	CRC	⊗	

←7 byte→ ←1 byte→ ←6 byte→ ←6 byte→ ←2 byte→ ←4 byte→ 1 byte

2 byte
(optional
Type field)

(Header)

(Trailer)
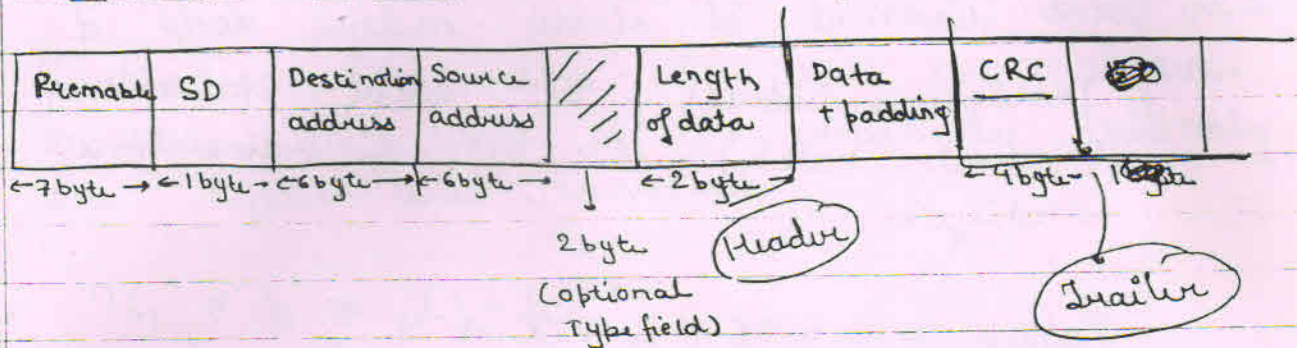
- **Preamble :→** (Minimum data length = 46 bytes &
Max = 1500, frame length 46+26 = 72
& Max = 1526 byte

→ Preamble is used to Synchronics the reciever Reciever ko ready karna data recieve karne k liye. (It is of 7 byte)

SD :-
Stands for Start delimiter, means yaha se frame start ho rahi hai.

Distination address | Source address (Mac address)

#. Type field (optional) :-

→ y indicate karte hai ki control frame hai Ki data frame hai.

- yeh field optional field hoti hai kisi frame format mein hoti hai aur kisi frame format min nahi hoti hai.

- Since Ethernet is based on 1-persistant CSMA/CD protocol, minimum size of frame par restrication hai.

* In 802.3 LAN Standard →

Destination address se lekar CRC tak (optional hatak) 64 byte ki frame hone chahiye.

Matlab = $6 + 6 + 2 + x + 4$

$64 = 18 + x$

$$\boxed{46 \text{ bytes} = x}$$

Minimum data = 46 byte agar nahi hai toh garbage value append karo.

* Theorically there is also restriction on maximum ~~frame~~ data size = 1500 bytes.
(frame length data ~~ko~~ hata k = 26 bytes)

Padding matlab hamara data chota hai, minimum frame se to hamne us data k saath kuch garbage data bhi append karna parega, that garbage data that garbage data ko add karne ko padding kahate hai.

‡ Drawback :-

√ → There is no concept of priority
→ There is no gaurantied dilivery of data. because there is no concept of ack.

* To overcome drawbacks of Ethernet a new Lan - Standard came into existance which is known as Token ring · 802.5 LAN Standard.

Ques If in an Ethernet LAN there is a probability p that system wants to transmit data in a particular time slot. If there are n station on your LAN. What is the probability that only one system will transmit

Ans- $^nC_1 * p * (1-p)^{n-1}$

· Probability that there will be a collosion

$$1 - \left[(1-p)^n + {}^nC_1 p * (1-p)^{n-1} \right].$$

TOKEN RING :- (802.5 IEEE Standard).

· Token ring is a physical unidirectional Ring in which systems are connected to ring through some interface.

· Directly connected nahi hai, iska yeh matlab hai ki agar ek bhi system fail bhi hoga toh koi problem nahi aayegi.

· In a token ring a special frame known as token always circulate on the ring.

· Data-transmission se pahale system should acquire Token.

· Only one system at a time acquire token so ek hi system transmit kar sakta at a time.