Assignment - 03

DC (18CS46)

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CSE 'A' sec
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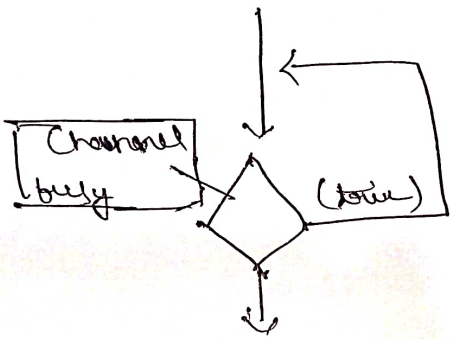
(1) What is persistance methods? Explain the behaviour of persistance methods with diagram.

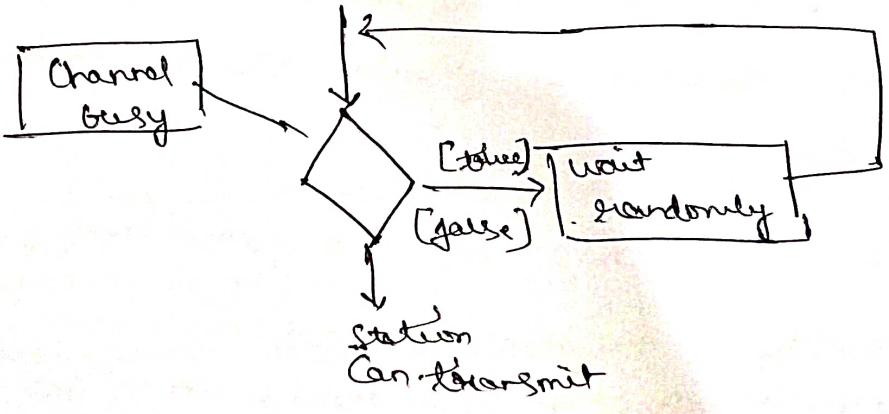
> what should a station do if the channel is busy or idle?. Three methods can be used to answer this questions.

① 1- persistent method



* Before sending a frame, a station senses the line. If the line is idle, the station send immediately. If the line is busy, the station continues sensing line.
* this method has the highest chances of collision because 2 or more station may find the line idle and send frames.

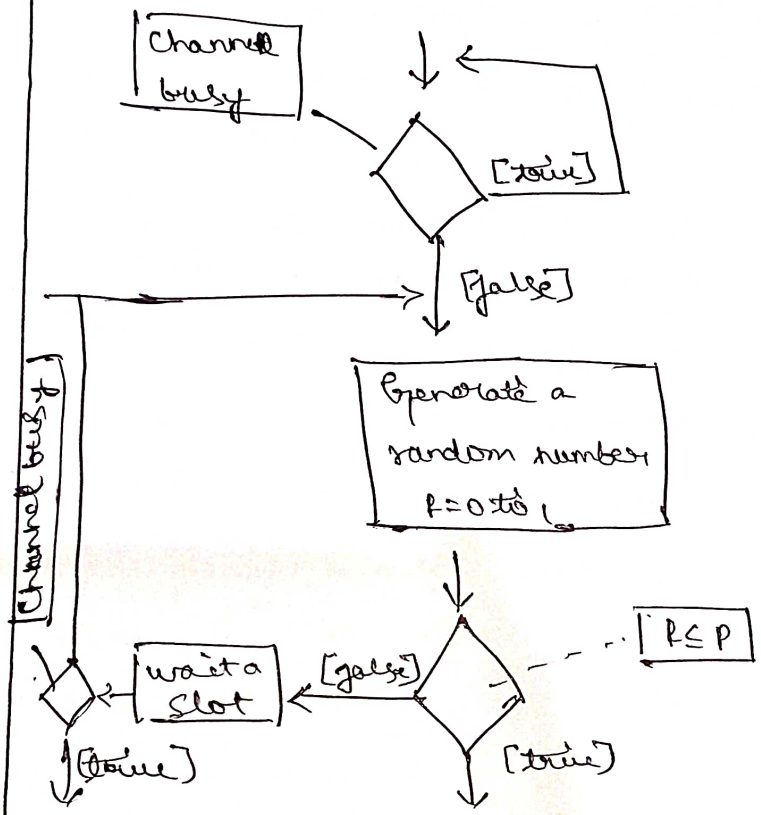
② Non - persistent method



* Before sending a frame, a station senses the line,
  (i) If the line is idle, the station sends immediately.
  (ii) If the line is busy, the station waits a random amount of time and then senses the line again.

* This method reduces the chances of collission.

(3) p-persistent method



use backoff process as though collision occured

* This method is used if the channel has time-slots with a slot-duration equal to or greater than the maximum propagation time.

* After the station finds line idle, it follows these steps.
  → with probability p, the station sends the frame.
  → with probability q = 1-p, the station waits for the

beginning of the next time slot and checks the line again.

(i) If line is idle, it goes to step 1.

(ii) If the line is busy. It assumes that collision has occured and uses the back off procedure.

(2) Analyze channelization, Explain CDMA with an example.

channelization is a multiple-access method. The available bandwidth of a link is shared b/w different station in time, frequency, or through code.

CDMA (code division multiple access)

* CDMA simply means communication with different codes.
* CDMA differs from FDMA because only one channel occupies the Entire bandwidth of the link.
* CDMA differs from FDMA because all stations can send data simultaneously, there is no timesharing.

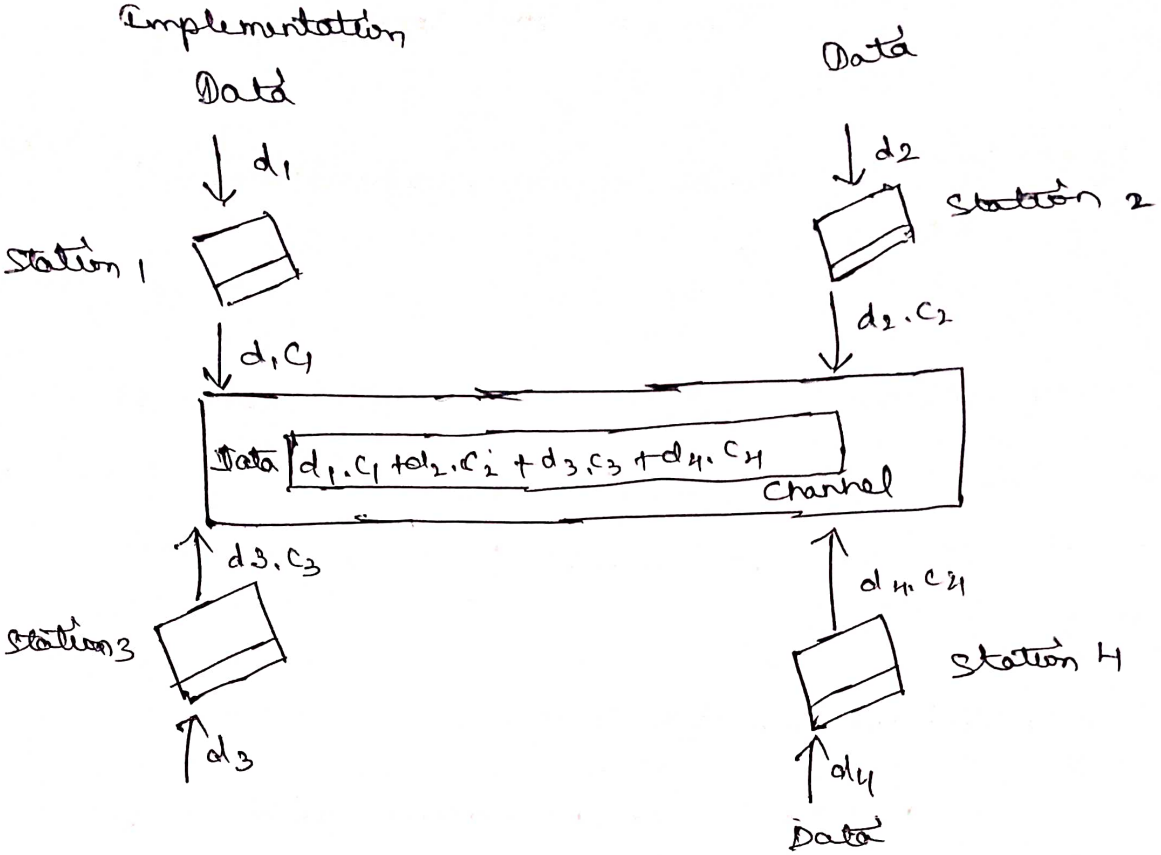
Eg:- In a large room with many people, 2 people can talk privately in English if nobody else understands english. Another 2 people can talk in chinese if they are the only ones who understand chinese and so on.

* CDMA is based on coding theory.
* Each station is assigned a code, which is a sequence of numbers called chips.

C_1	C_2	C_3	C_4
(+1 +1 +1 +1)	(+1 -1 +1 -1)	(+1 +1 -1 -1)	(+1 -1 -1 +1)

* These sequence were carefully selected and are called orthogonal sequences.

Implementation



For Example, Suppose station 1 and 2 are talking to each other

* Station 2 wants to hear what station 1 is saying.
* Station 2 multiplies the data on the channel by c_1 the code of station -1

$(c_1.c_1) = 4 \quad (c_2.c_1) = 0 \quad (c_3.c_1) = 0 \quad (c_4.c_1) = 0$

Therefore, station 2 divides the results by 4 to get the data from station -1.

$$\text{Data} = (d_1.c_1 + d_2.c_2 + d_3.c_3 + d_4.c_4)\, c_1$$

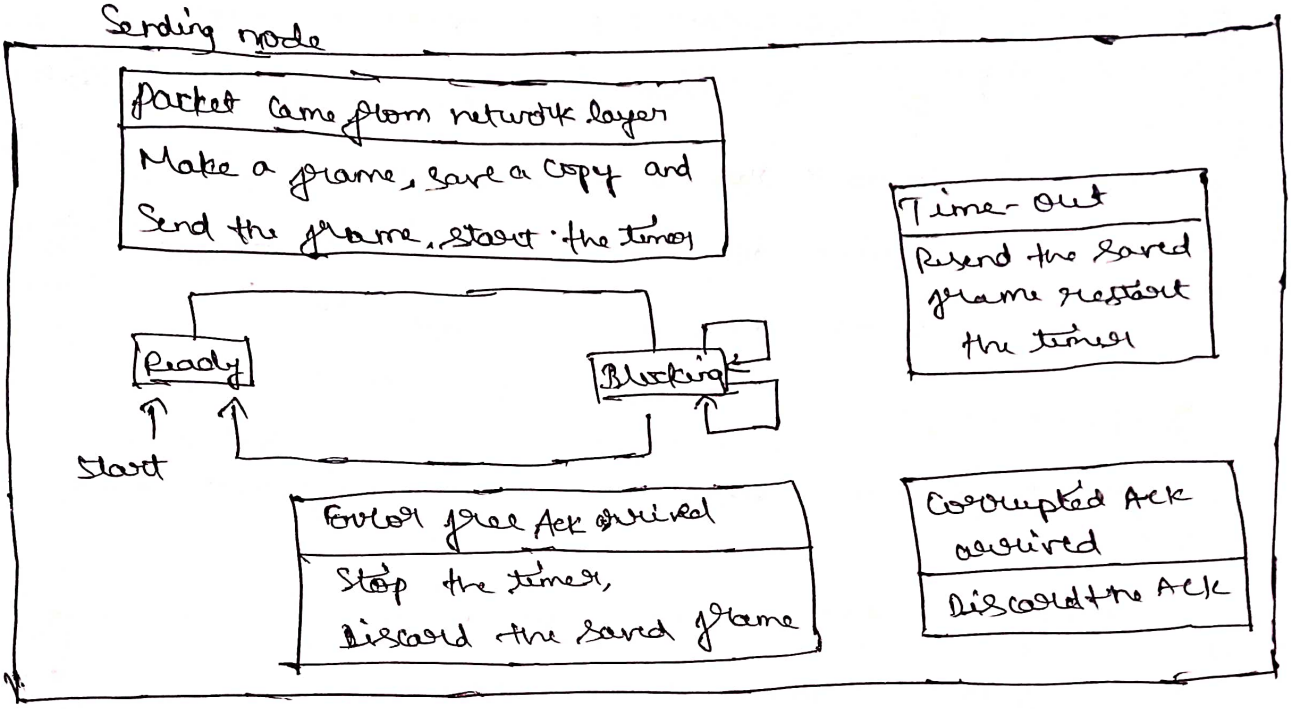
$$= d_1.c_1.c_1 + d_2.c_2.c_1 + d_3.c_3.c_1 + d_4.c_4.c_1$$

$$= 4d_1$$

Explain the working of stop-and-wait protocol for noiseless channels.

Stop and wait protocol uses both flow and error control

Normally, the receiver has limited storage - space. If the receiver is receiving data from many sources, the receiver may be overloaded with frames and discard the frames.



FSM for the stop and wait protocol

working :-

(1) Sender states :- Sender is initially in the ready state, but it can be more b/w the ready and blocking state.

(i) Ready state :- when the sender is in this state, it is only waiting for a packet from the network layer.

(ii) Blocking state:- when the Sender in this state, three Events can occur,

(a) If a time-out occurs, the sender resends the saved copy of the frame and restarts the timer.

(b) If a corrupted Ack arrives, it is discarded.

(c) If an error-free Ack arrives, the sender stops the timer and discards the saved copy of the frame.

It then moves to the ready state.

(2) Receiver:-

The receiver is always in the ready state. Two Events may occur.

(a) If an error-free frame arrives, The message in the frame is delivered to the network layer and an Ack is sent.

(b) if a corrupted frame arrives, the frame is discarded.

(4) What are Aloha protocols? Explain its different types with respect to channel multiple accesses.

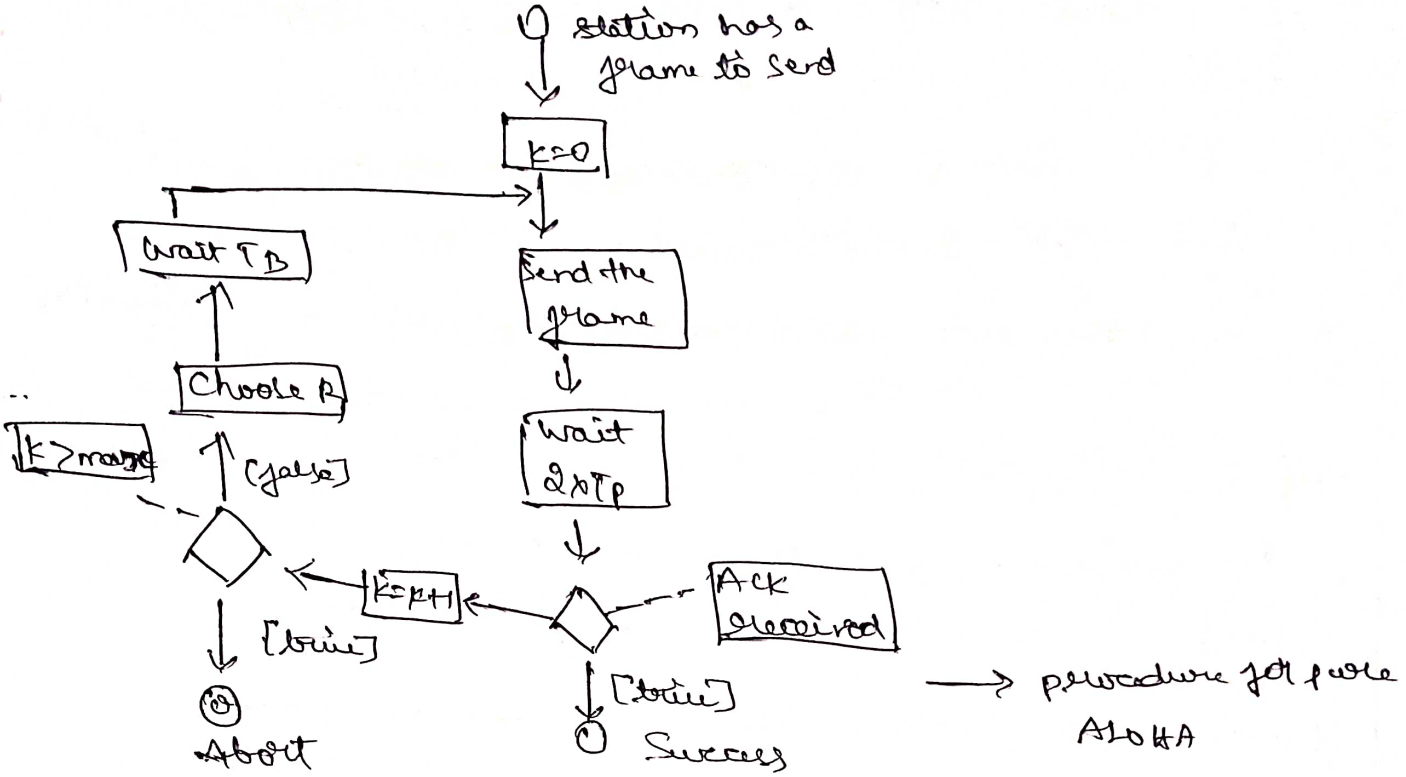
> * Aloha was designed for a wireless LAN, but it can be used on any shared medium.

(i) Pure Aloha

vulnerable time is defined as a time during which there is a possibility of collision.

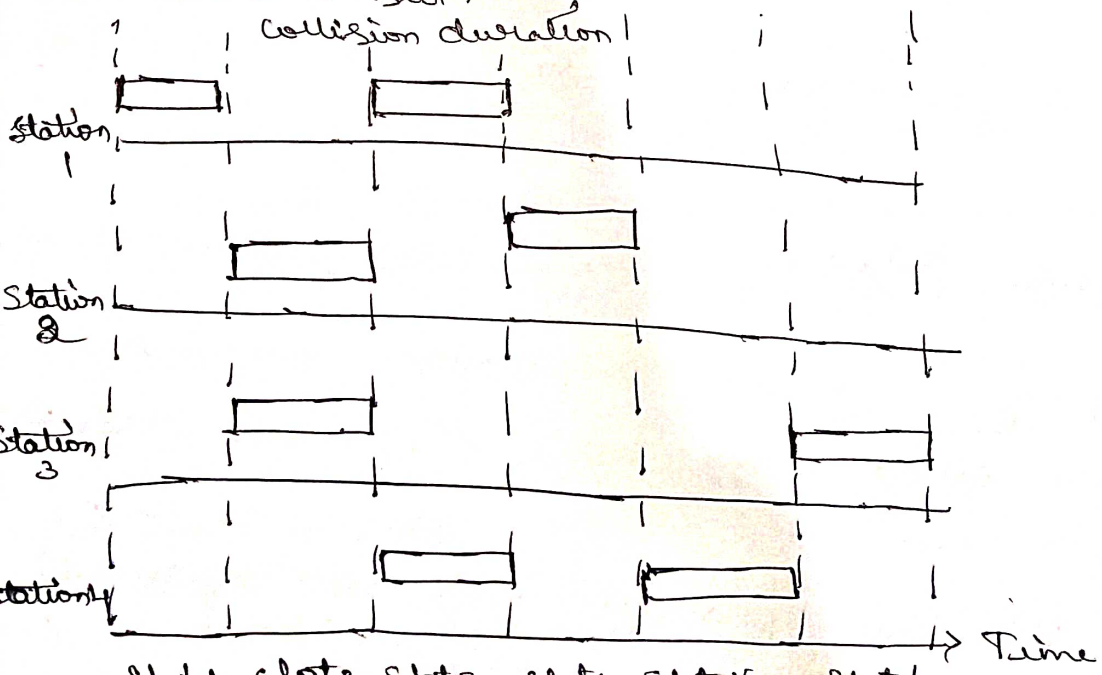
Pure ALOHA vulnerable time = $2 \times T_{fr}$

where T_{fr} = Frame transmission Time.



(ii) Slotted ALOHA

* Slotted ALOHA was invented to improve the efficiency of Pure ALOHA.
* The time is divided into time-slots of T_{fr} seconds.
* The stations are allowed to send only at the beginning of the time-slot.



Frames in a slotted ALOHA Network

* If a station misses the time-slot, the station must wait until the beginning of the next time slot.
* If 2 stations try to resend at beginning of the same time-slot, the frames will collide.
* The vulnerable time is given by vulnerable time = T_{fr}.

(5) Explain 10 Gigabit Ethernet implementation.

> It operates only in full duplex mode. This means there is no need for Contention; CSMA/CD is not used.

Four implementations are the most common.

1. 10GBase-SR
2. 10GBase-LR
3. 10GBase-EW
4. 10GBase-X_4

Implementation	Medium	medium length	No. of wires	Encoding
10GBase-SR	fiber 850nm	300m	2	64B66B
10GBase-LR	fiber 1310nm	10km	2	64B66B
10GBase-EW	Fiber 1350nm	40km	2	SONET
10GBase-X_4	Fiber 1310nm	300m to 10km	2	8B10B

(6) what is cellular telephony? Explain 3Gy of cellular telephony.

> Cellular telephony is designed to provide communication b/w two moving units called mobile station or b/w one stationary unit called a land unit.

3Gy cellular telephony provides both digital data and voice communication.

Eg:- using a Smartphone.

A person can talk to anyone else in the world. A person can download a movie, surf the internet or play games.

IMT - Internet mobile communication. Some objectives defined by the blue print. IMT-2000 voice quality comparable to that of the existing public telephone network. Data rate of 144Kbps for access in a moving vehicle. 384 Kbps for access as the user walks and 2 Mbps for the stationary user.

(7) What are the advantages of dividing Ethernet LAN with Bridge?

> (1) Prevents Bandwidth waste:- A bridge managed incoming traffic and reduces bandwidth waste by preventing all unnecessary flow of data b/w network segment.

(2) Increases Network length:- A Network bridge increases the functional length of a network by connecting individual LAN segments.

(3) Links dissimilar Network Transmission segments:- A bridge can connect both dissimilar and similar LAN segments. It can connect for instance an Ethernet segment with a Token ring segment, allowing both to behave as one. Eg:- have the same IP address.

(8) Define bluetooth and explain the architecture of bluetooth

> Bluetooth is a wireless LAN technology designed to connect devices of different functions such as telephones, notebooks

computers, cameras, printers, coffee makers and soon.

Architecture of bluetooth.

It has 2 types of networks.

① piconet and ② Scatternet

① piconet :

* A bluetooth Network is called a piconet or a small net A piconet can have upto 8 stations out of which
  (i) one of the station is called the primary
  (ii) The remaining stations are called secondaries.

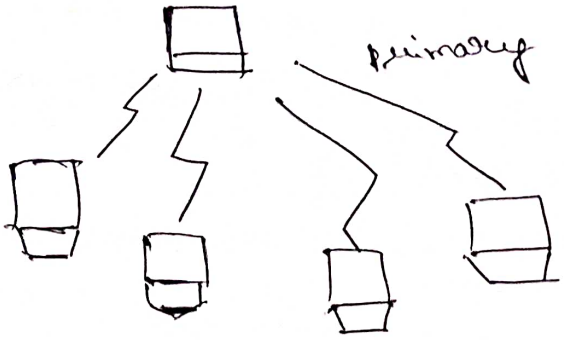
* All the secondary-stations synchronize their clocks and hopping sequence with the primary station.

* A piconet can have only one primary station.

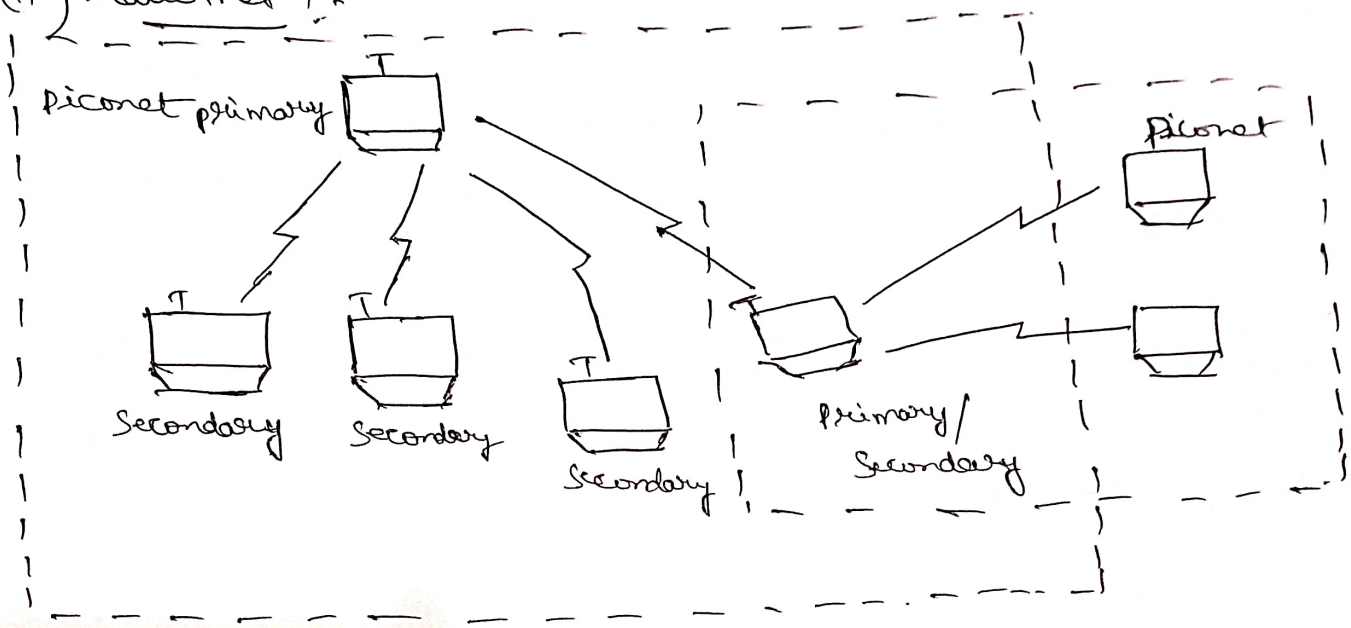
* The communication b/w the primary and the secondary can be one to one or one to many Although a piconet can have a maximum of 7 secondaries, an addition and secondaries can be in the parked state.

* A secondary is a parked state is synchronized with the primary but cannot take part in communication until it is moved from the parked state.

* Because only 8 stations can be active in a piconet, activating a station from the parked state means that an active station must go to the parked state.



(ii) Scatternet :-



* piconet can be combined to form a Scatternet
* A station can be member of 2 piconets.
* A secondary station in one piconet can be primary another piconet this is called mediator station.

(1) Acting as a secondary, mediator station can received messages from the primary in the first piconet.

(2) acting as a primary, mediator station can deliver the message to secondaries in the second piconet.

(9) A pure Aloha network transmits 200 bit frame on a shared channel of 200 Kbps. What is the throughput if the system produces 1000 frames per second.

> The frame transmission time is 200/200 Kbps or 1 ms.
If the system creates 1000 frames per second, or 1 frame per millisecond, then $G = 1$. In this case $S = G \times e^{-2G}$

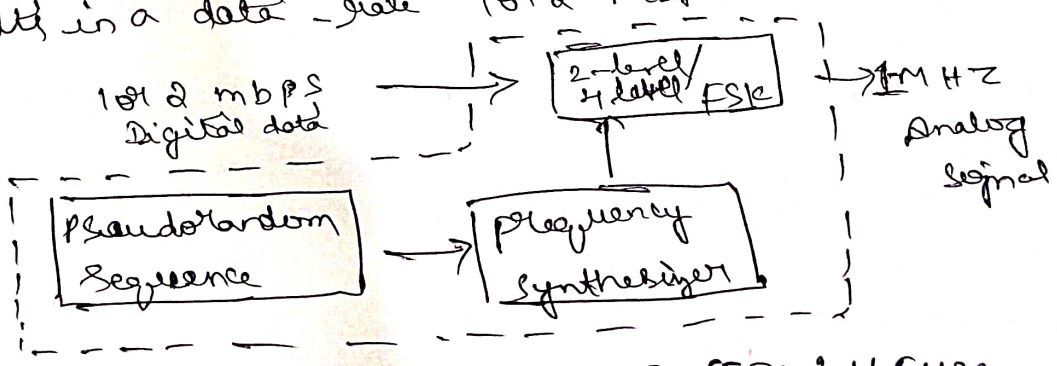
$= 0.135$ (13.5 percent).

This means that the throughput is $1000 \times 0.135 = 135$ frames. only 135 frames out of 1000 will probably survive.

(10) Explain the different types of addressing mechanism in IEEE 802.11.

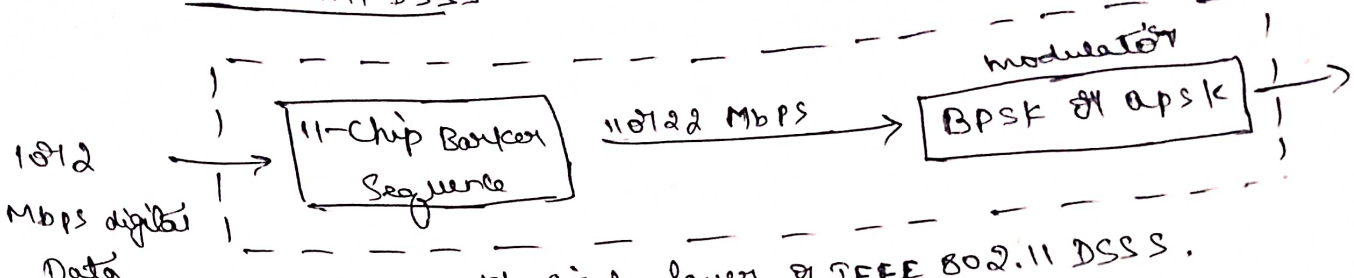
> (i) IEEE 802.11 FHSS.

* IEEE 802.11 FHSS uses the FHSS Method
* FHSS uses the 2.4 GHz ISM band
* The band is divided into 79 sub bands of 1 MHz
* A pseudorandom number generator selects the hopping sequence.
* The modulation technique is either two-level FSK or four level FSK with 1 or 2 bits/baud.
* This results in a data rate 1 or 2 Mbps.



physical layer of IEEE 802.11 FHSS.

(ii) IEEE 802.11 DSSS

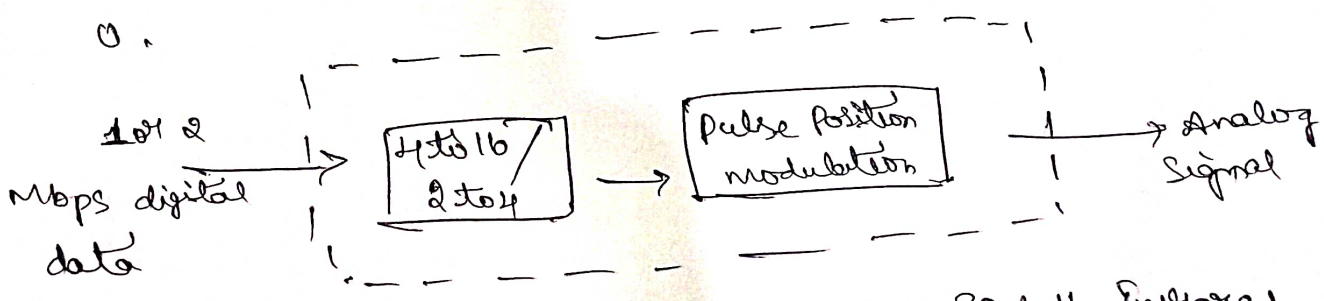


physical layer of IEEE 802.11 DSSS.

* DSSS uses the 2.4 GHz ISM band
* The modulation technique in this specification is PSK at 1 Mbaud/s.
* The system allows 1 or 2 bits/baud. resulting data rate of 1/2 Mbps.

(iii) IEEE 802.11 Infrared

* IEEE 802.11 infrared uses Infrared light in the range of 800 to 950 nm.
* The modulation technique is called pulse position modulation.
* For a 1-Mbps data-rate, a 4-bit sequence is first mapped into a 16 bit sequence in which only one bit is set to 1 and the rest are set to 0.
* For a 2-mbps data-rate, a 2bit sequence is first mapped into a 4-bit sequence in which only one bit is set to 1 and the rest one are set to 0.
* The mapped sequence are then converted to optical signals the presence of light specifies 1, the absence of light specifies 0.



physical layer of IEEE 802.11 Infrared.