

Internals - 03

De (18CS46)

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CSE 'A' Sec

4th Sem.

(Q) Channelization is a multiple access method. This available bandwidth of a link is shared between different stations in time, frequency, or through code.

CDMA (code division multiple access)

* CDMA differs from FDMA because only one channel occupies the entire bandwidth of the link.

* CDMA differs from TDMA because all stations can send data simultaneously, there is no time sharing.

* CDMA simply means communication with different codes.

Ex: * It is based on a coding theory.

* Each station is assigned a code, which is a sequence of numbers called chips.

C_1
 $[+1 +1 +1 +1]$

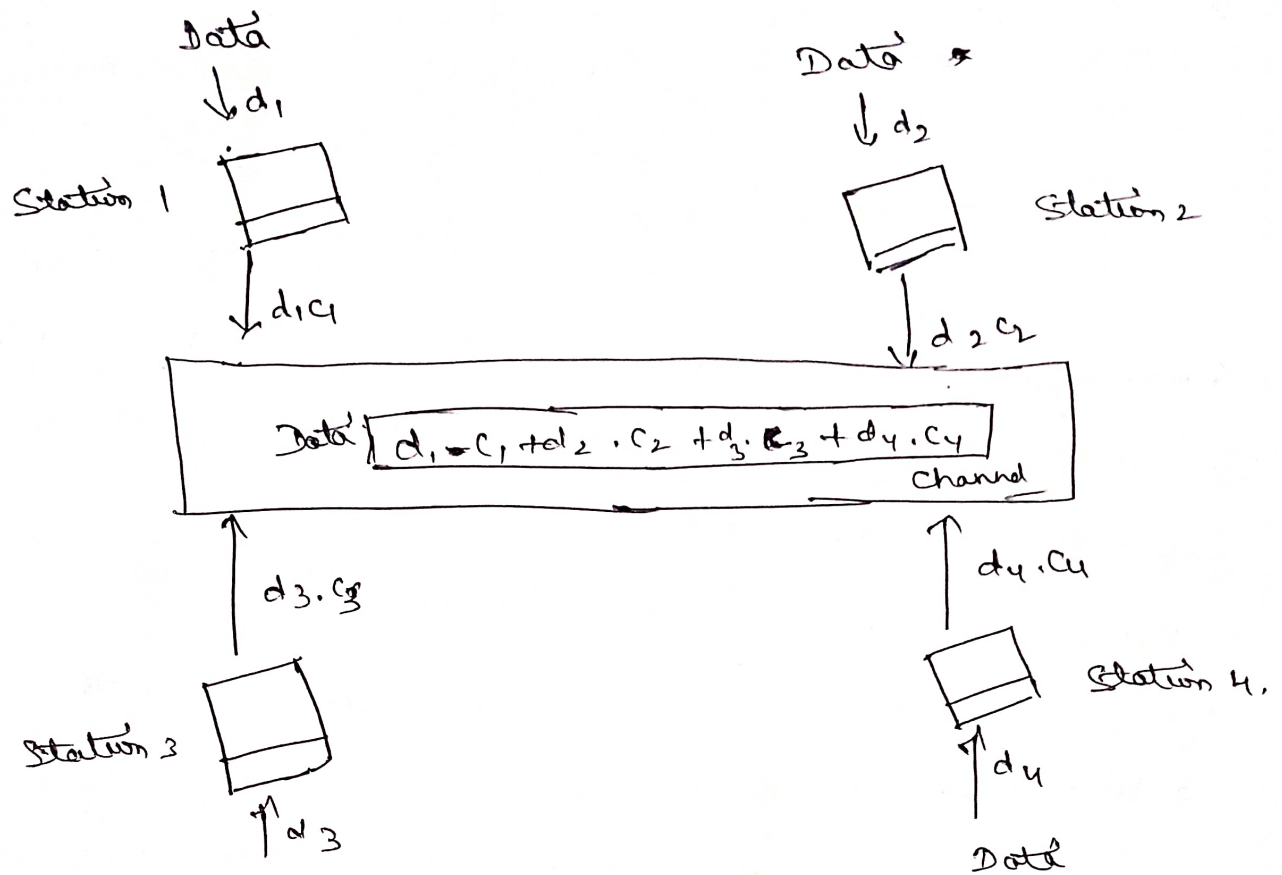
C_2
 $[+1 -1 +1 -1]$

C_3
 $[+1 +1 -1 -1]$

C_4
 $[+1 -1 +1 -1]$

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

Implementation



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 station 1.

$$(c_1, c_1) = 4, (c_2, c_1) = 0, (c_3, c_1) = 0 \text{ and } (c_4, c_1) = 0$$

Therefore station-2 divides the result by 4 to get the data from station-1

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

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

$$= 4d_1$$

(2b)

The frame transmission time is $200/200 \text{ Kbps}$ or 1 ms .

If, the system creates 1000 frames per second, this is 1 frame per millisecond. The load is 1. in this case $S = G \times e^{-G}$ or $S = 0.135$ (13.5 percent).

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

(4b)

Persistence methods

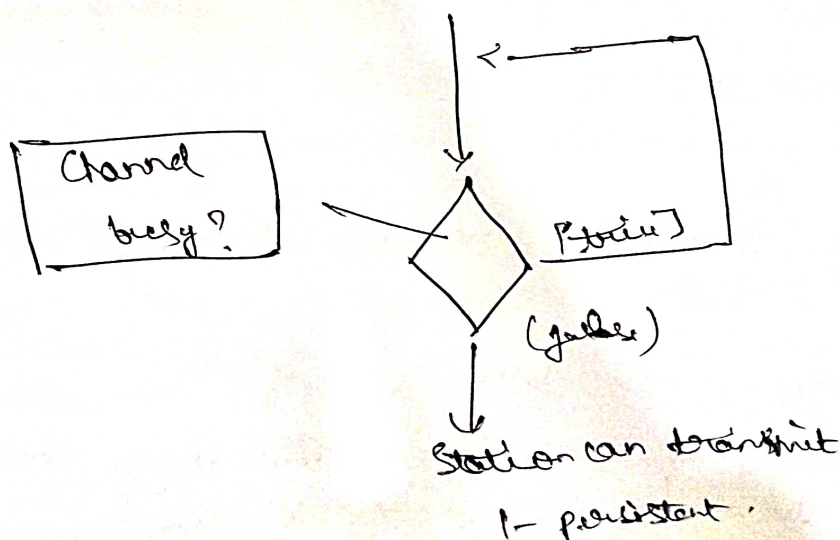
1- Persistent

Before sending a frame, a station senses the line.

→ If the line is idle, the station sends immediately.

→ If the line is busy, the station continues sensing the line.

This method has the highest chance of collision because of more stations → may find the line idle and send the frames immediately.



②. Non-persistent :

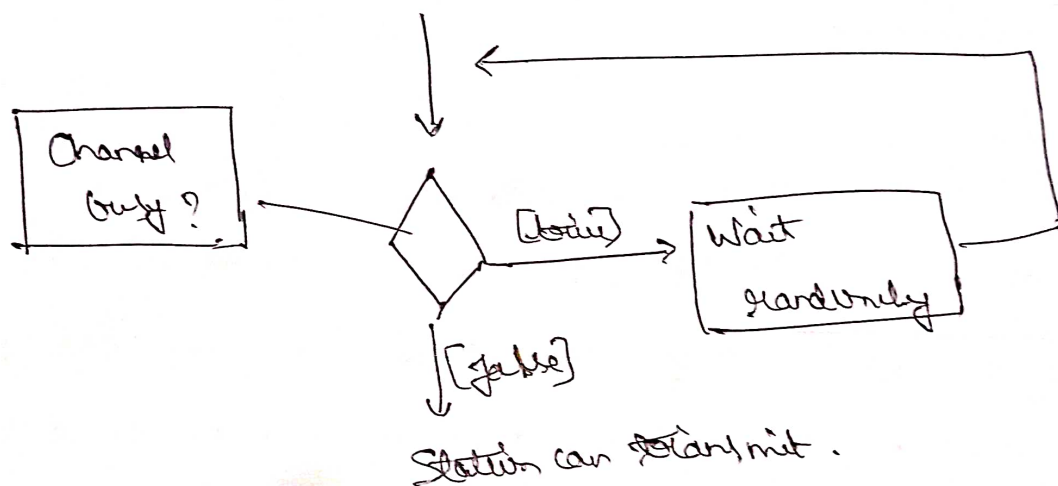
* Before sending the frame, the station senses the line.

→ if the line is idle, the station sends immediately.

→ if the line is busy, the station waits a random amount of time and senses the line again.

* This method reduces the chances of collision b/w more stations.

which will not wait for the same amount of time and will not start to send simultaneously.



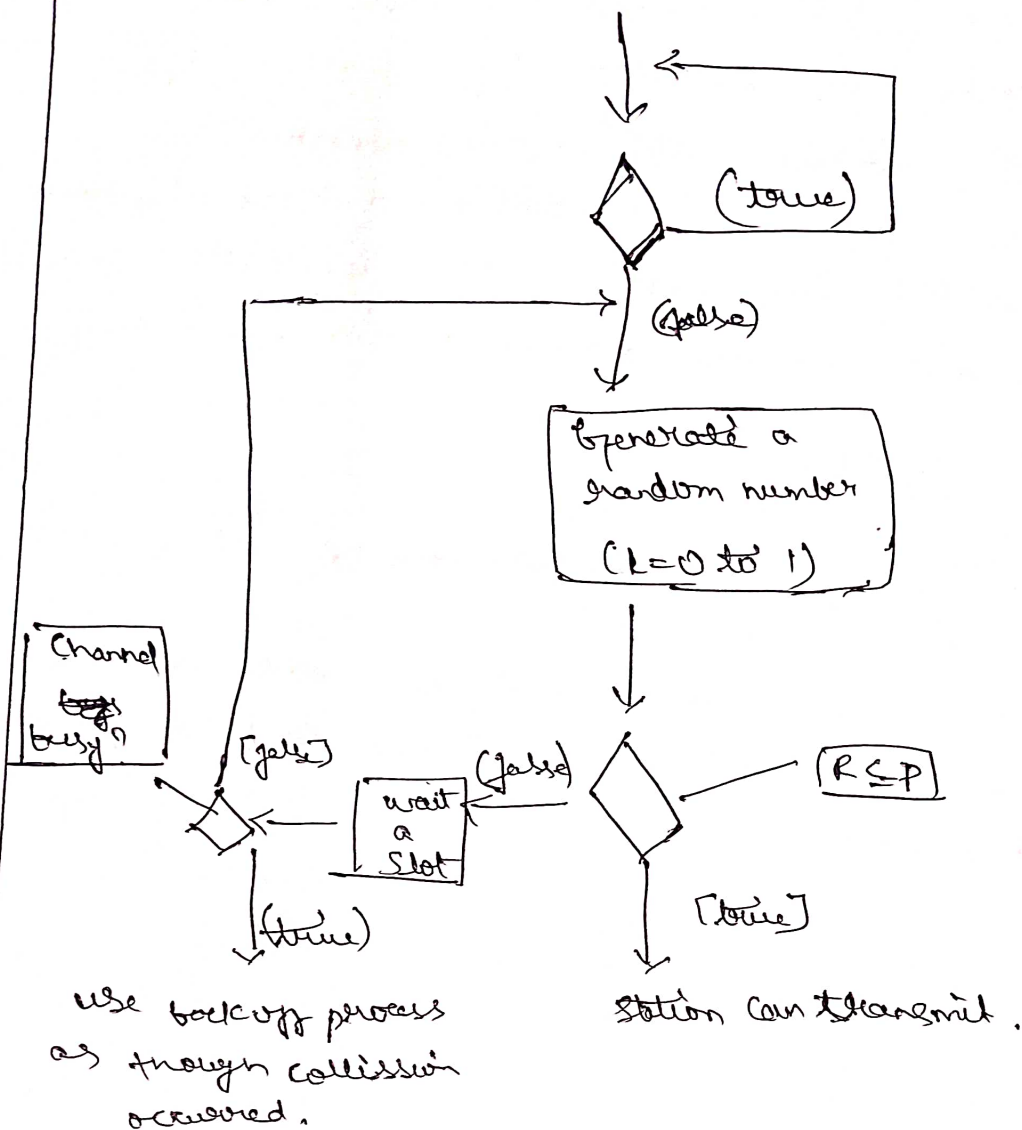
③ P-persistent :

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

After the station finds the line idle, it follows these following steps:

→ with probability P , the station sends frame,

→ with probability $q = 1 - P$, the station waits for the beginning of next time-slot and checks the line again.



10. Cellular telephony:

It is ~~des~~ designed to provide communication b/w two moving units called mobile stations, or b/w one mobile station and one stationary unit called a land unit.

A service provider is responsible for locating and tracking a caller assigning a channel to the call and transferring the channel from base station ~~to the~~ as the caller moves out-of-range.

Each cellular service area is divided into smaller regions called cells. Each cell contains antenna. Each cell is controlled by

AC powered network - station called the base station.
Each base station is controlled by switching office
called a mobile - switching - center. MSC coordinates
communication b/w all the base stations and the telephone
central office. MSC is a computerized center that is responsible
for connecting calls recording call information and billing.

Third Generation [3G]

3G cellular telephony provides both digital ^{data} and voice
communication. E.g., Smartphone.

A person can talk to anyone else in the world. The Smart
phone is always connected; we do not need to dial a number
to connect to the internet.