CS & IT ENGINEERING

COMPUTER NETWORKS

Medium Access Control

Lecture No-03

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TOPICS TO BE COVERED

Multiple Access Protocols-3

Random Access Protocols

1. ✓ Pure Aloha
2. ✓ Slotted Aloha
3. CSMA ⎫
4. CSMA/CD ⎬
5. CSMA/CA ⎭

CARRIER SENSE MULTIPLE ACCESS (CSMA)

CSMA (Carrier Sense Multiple Access)

- To minimize the chances of collision CSMA method was developed.

- Chances of collision can be reduced if station sense the medium or carrier before trying to use it.

- CSMA requires that each station , first sense the carrier before transmit the data

Hyd   Delhi

- Each station can sense the carrier only at its point of contact with carrier.

- It is not possible for any station to sense the entire carrier.

- Thus, there is a huge possibility that a station might sense the carrier free when it is actually not.

Collision

10:05 AM

30 min

←— 10min —→ ←— 10 min —→ ←— 10 min —→

(A)   (B)   (C)   (D)
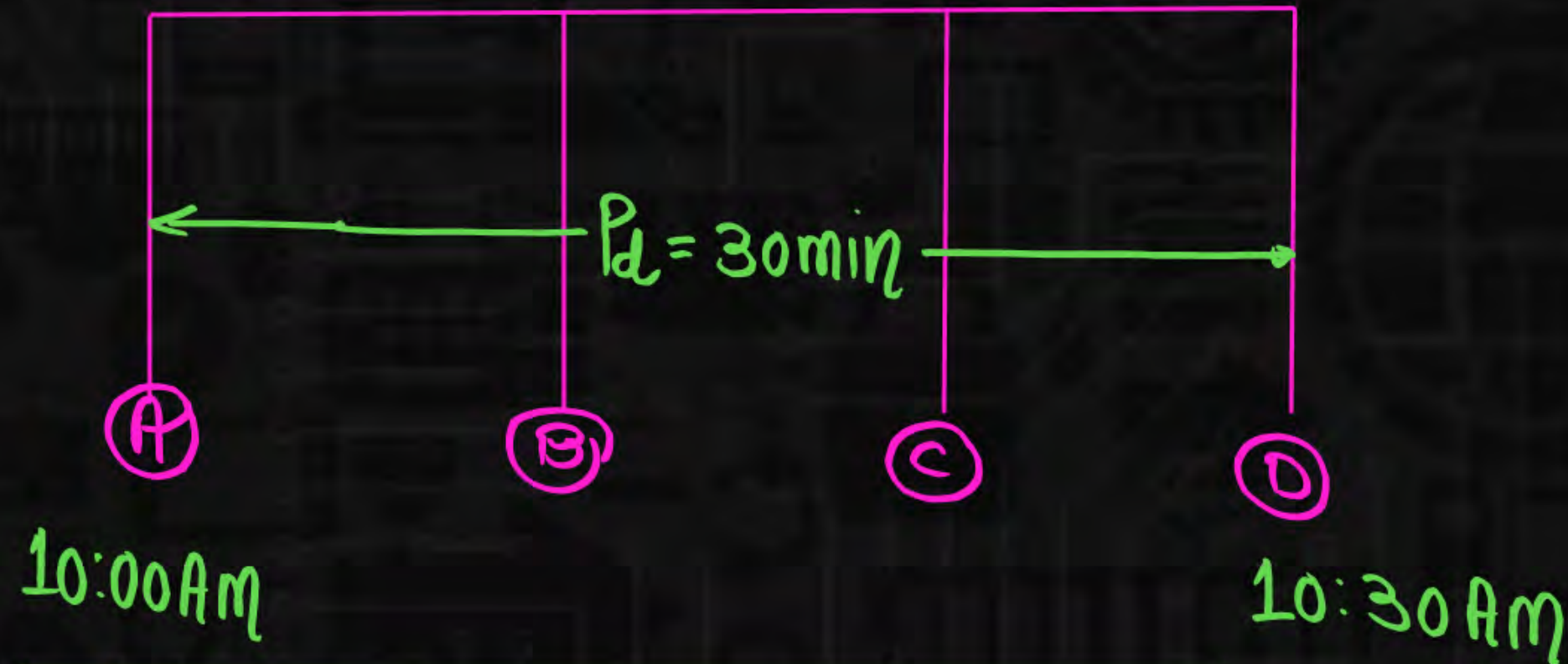
At: 10:00 AM

10:05 AM
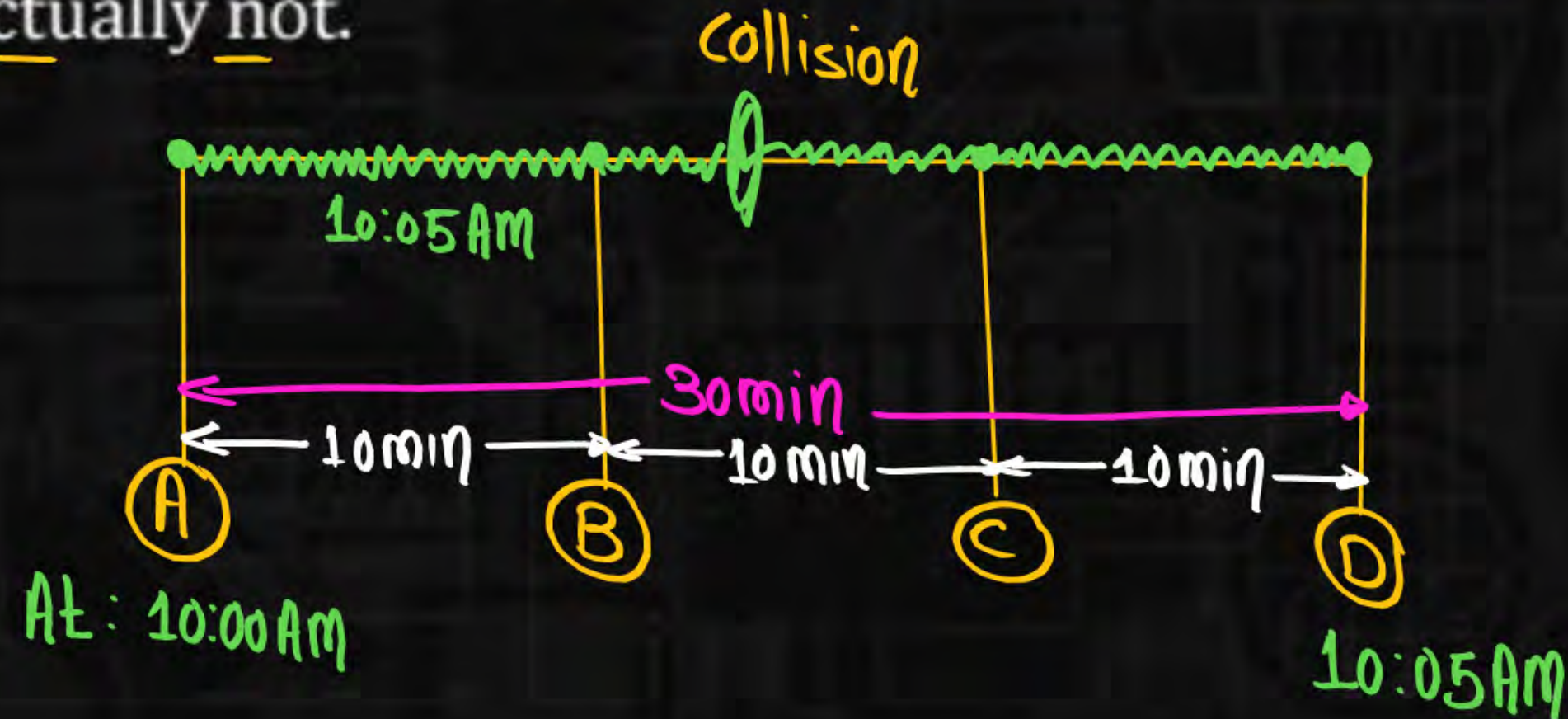
- The possibility of collision still exists because of propagation delay.

- When a station send a Frame, it still takes small amount of time for the 1st bit to reach every station so the station may sense the medium and find it idle.

Vulnerable time in CSMA

- Vulnerable time for CSMA = Propagation time

$P_d = 30\,min$

Ⓐ   Ⓑ   Ⓒ   Ⓓ

10:00 AM   10:30 AM

Vulnerable time For CSMA = P_d

- When a station send a frame and any other station try to send a frame during this time, a collision will result.

- But if the first bit of frame reaches the end of medium, every station will already have heard the bit then stations will understand that medium is busy.

Persistent methods
in CSMA

Persistent Methods in CSMA

- What should a station do if the channel is busy?
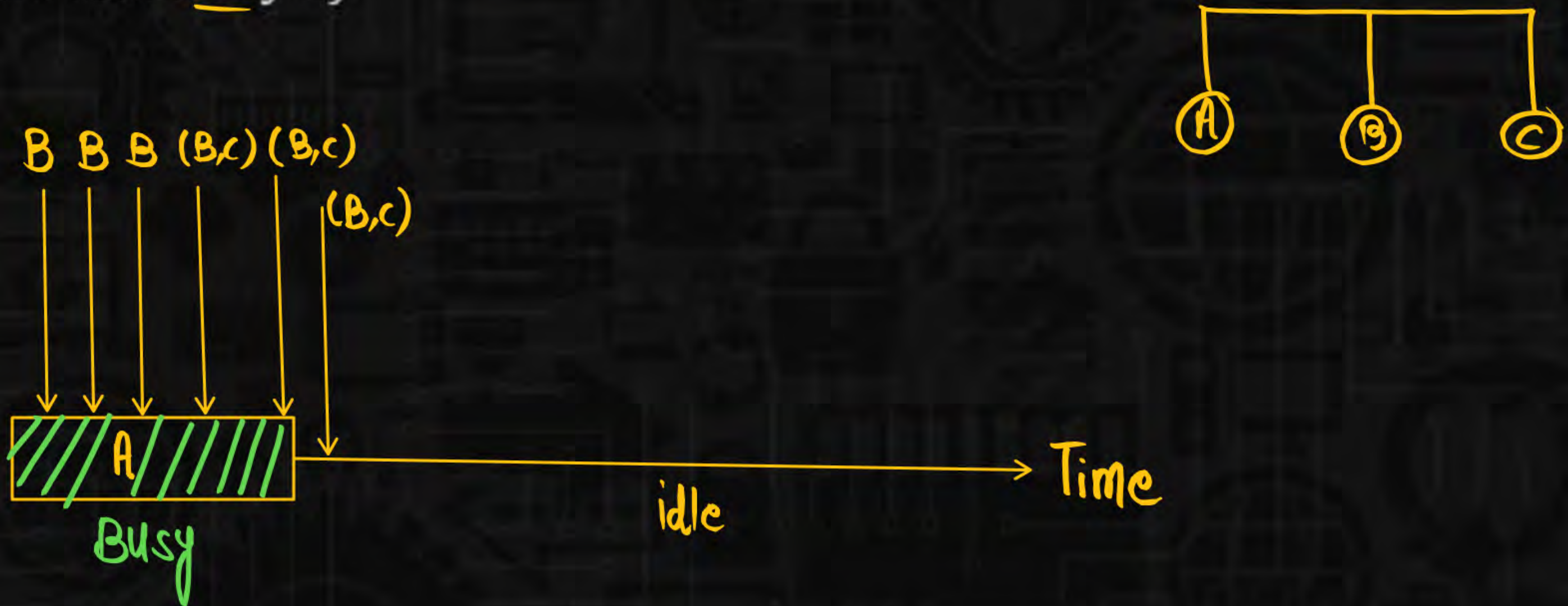
- What should a station do it the channel is idle?

3 Methods

1. Persistent

2. Non-persistent

3. P-persistent

1 Persistent CSMA

In the case of 1-persistent CSMA Station will continuously sense the channel and once the channel is idle. It send it's frame immediately (with Probability 1)

B B B (B,C) (B,C)

(B,C)

A

Busy

idle

Time

A   B   C

- Probability of collision is high for example, If two station become ready in the middle of third transmission, both will wait politely until the transmission ends, and then both will begin transmitting exactly simultaneously then collision will occur.

- Ethernet LAN uses 1- Persistent method

Non persistent CSMA:

- In non persistent CSMA, once the station is ready with the data it will sense the channel, if channel is busy then it will wait for random amount of time and again sense the channel.

- Once the channel is free then it immediately transmit the frame
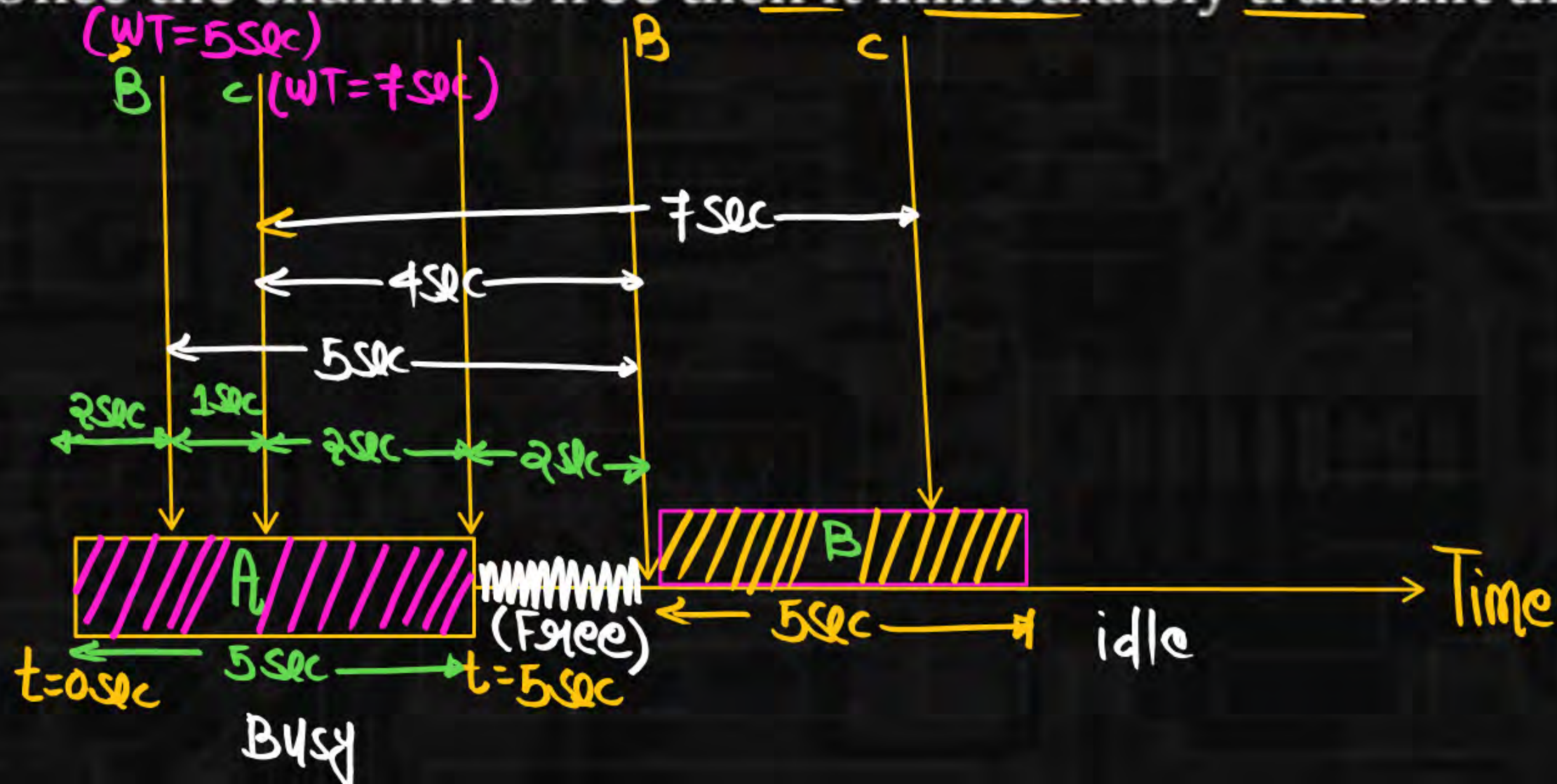
Note:-

- In non persistent CSMA finding the channel idle at the same time by different station is less. So collision are less compared to 1 persistent

- This method reduce the efficiency of the network because the medium remains idle when there may be stations with frame to send.

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

- It uses advantages of both 1 persistent and non persistent

- It reduce the chances of collision and improve efficiency

- In this method, after the station finds the channel idle it follow these steps:

    1. With probability p , the station send its frame.

    2. With the probability (1-p) the station wait for the beginning of the next time slot and check the line again