ALOHA

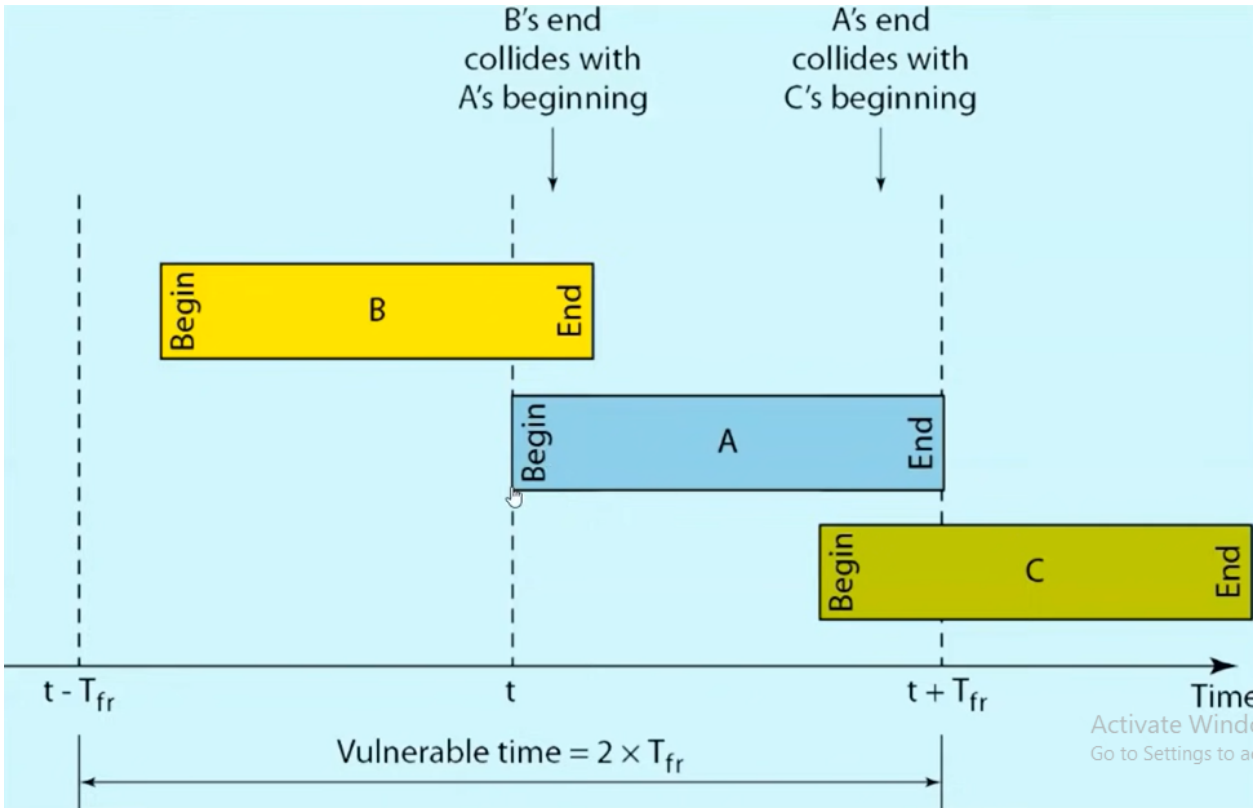
It was designed for wireless LAN but is also applicable for shared medium. In this, multiple stations can transmit data at the same time and can hence lead to collision and data being garbled.
In ALOHA, each node or station transmits a frame without trying to detect whether the transmission channel is idle or busy. If the channel is idle, then the frames will be successfully transmitted. If two frames attempt to occupy the channel simultaneously, collision of frames will occur and the frames will be discarded. These stations may choose to retransmit the corrupted frames repeatedly until successful transmission occurs.

Types:

Pure ALOHA

- Pure ALOHA allows stations to transmit whenever they have data to be sent.
- When a station sends data it waits for an acknowledgment.
- If the acknowledgment doesn't come within the allotted time then the stations wait for a random amount of time called Back-off time(Tb) and re-send the data.

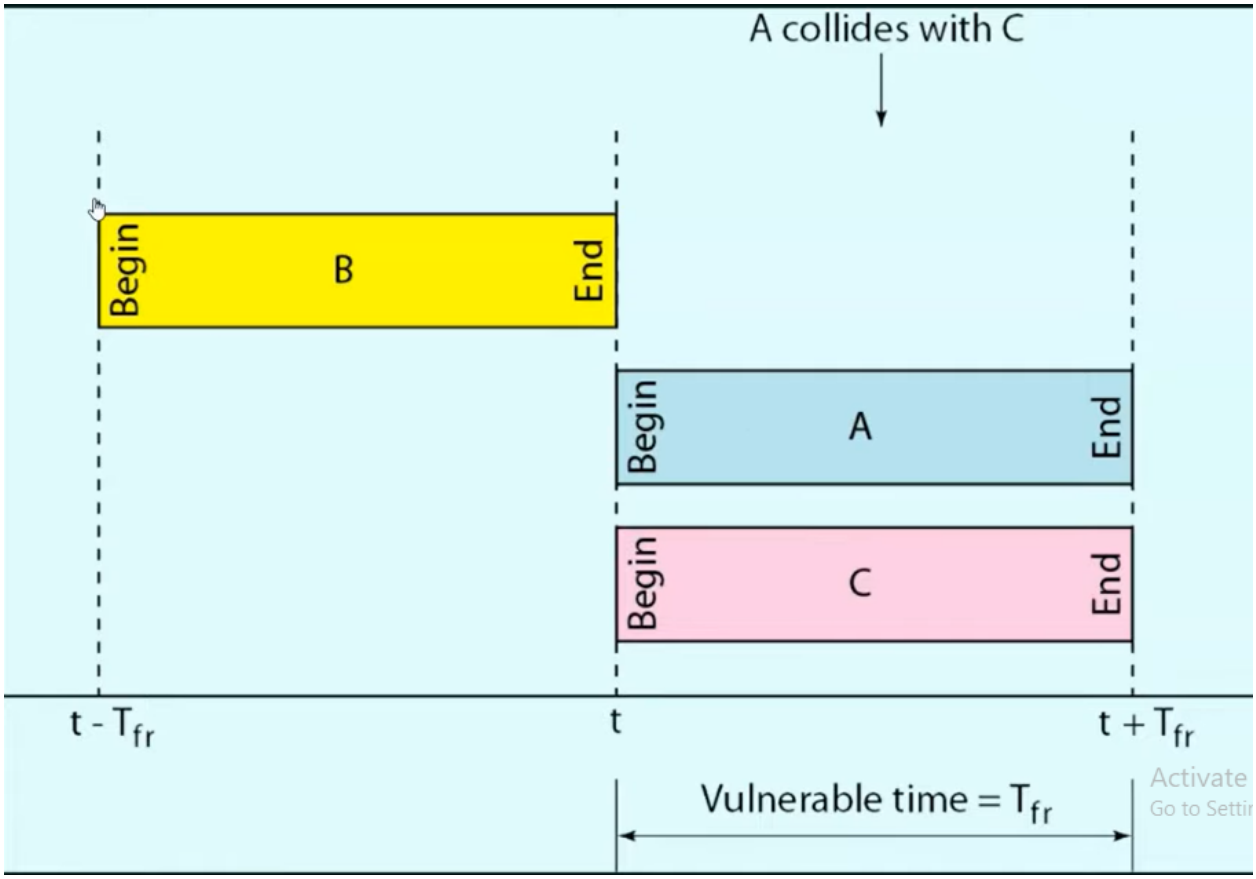
- Since different stations wait for a different amount of time, the probability of further collisions decreases.
- The Throughput of Pure ALOHA is maximized when frames are of uniform length.
- Whenever 2 frames try to occupy the channel at the same time, there will be a collision and both will be garbled.
- If the first bit of the new frame overlaps with just the last bit of a frame almost finished both frames will be totally destroyed and both will have to be retransmitted later.



Vulnerable Time = $2*T_{fr}$
Throughput = $G*e^{-2G}$

Slotted ALOHA

- It was developed just to improve the efficiency of Pure ALOHA as the chances for collision in Pure ALOHA are high.
- The time of the shared channel is divided into discrete time intervals called slots.
- Sending of data is allowed only at the beginning of these slots.
- If a station misses out the allowed time, it must wait for the next slot.This reduces the probability of collision.



Vulnerable Time = Frame Transmission Time
Throughput = $G*e^{-G}$

Differences between Pure and Slotted ALOHA

Pure Aloha	Slotted Aloha
In this Aloha, any station can transmit the data at any time.	In this, any station can transmit the data at the beginning of any time slot.
In this, The time is continuous and not globally synchronized.	In this, The time is discrete and globally synchronized.
Vulnerable time for Pure Aloha = 2 x Tt	Vulnerable time for Slotted Aloha = Tt
In Pure Aloha, Probability of successful transmission of the data packet = G x e-2Greduce	In Slotted Aloha, Probability of successful transmission of the data packet = G x e-G
Pure Aloha doesn't reduces the number of collisions to half.	Slotted Aloha reduces the number of collisions to half and doubles the efficiency of Pure Aloha.
In Pure Aloha, Maximum efficiency = 18.4%	In Slotted Aloha, Maximum efficiency = 36.8%