Course Name: A Level (2nd Sem)   Subject: DCN

Topic: Random Access Protocols contd.   Date: 28-04-20
[Slotted ALOHA]

Slotted ALOHA

- Pure ALOHA has a vulnerable time of 2 x T_{fr} . This is so because there is no rule that defines when the station can send. A station may send soon after another station has started or soon before another station has finished. Slotted ALOHA was invented to improve the efficiency of pure ALOHA.

- In slotted ALOHA we divide the time into slots of T_{fr} s and force the station to send only at the beginning of the time slot. Figure shows an example of frame collisions in slotted ALOHA.
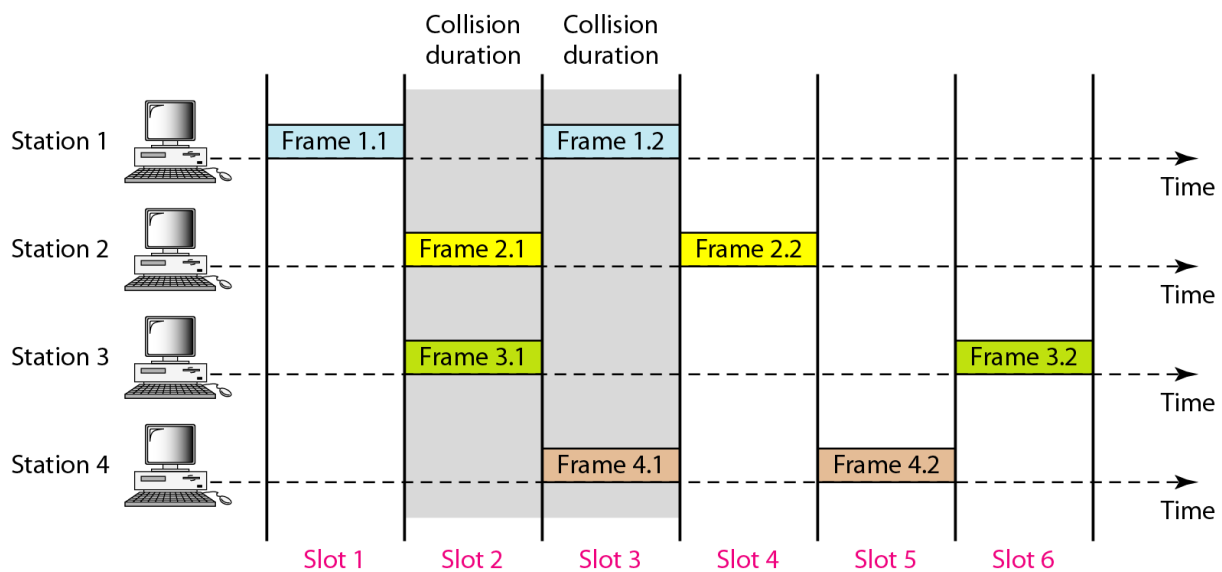
- Because a station is allowed to send only at the beginning of the synchronized time slot, if a station misses this moment, it must wait until the beginning of the next time slot. This means that the station which started at the beginning of this slot has already finished sending its frame.

- There is still the possibility of collision if two stations try to send at the beginning of the same time slot. However, the vulnerable time is now reduced to one-half, equal to T_{fr}. Figure shows the situation.

- Figure shows that the vulnerable time for slotted ALOHA is one-half that of pure ALOHA.

Slotted ALOHA vulnerable time = T_{fr}

- Throughput It can be proved that the average number of successful transmissions for slotted ALOHA is **S = G x e^{-G}**. The maximum throughput **S$_{max}$ is 0.368**, when G = 1.

- In other words, if a frame is generated during one frame transmission time, then 36.8 percent of these frames reach their destination successfully. This result can be expected because the vulnerable time is equal to the frame transmission time. Therefore, if a station generates only one frame in this vulnerable time (and no other station generates a frame during this time), the frame will reach its destination successfully.

The throughput for Slotted ALOHA is S = G x e^{-G}.

The maximum throughput S$_{max}$ = 0.368 when G=1.
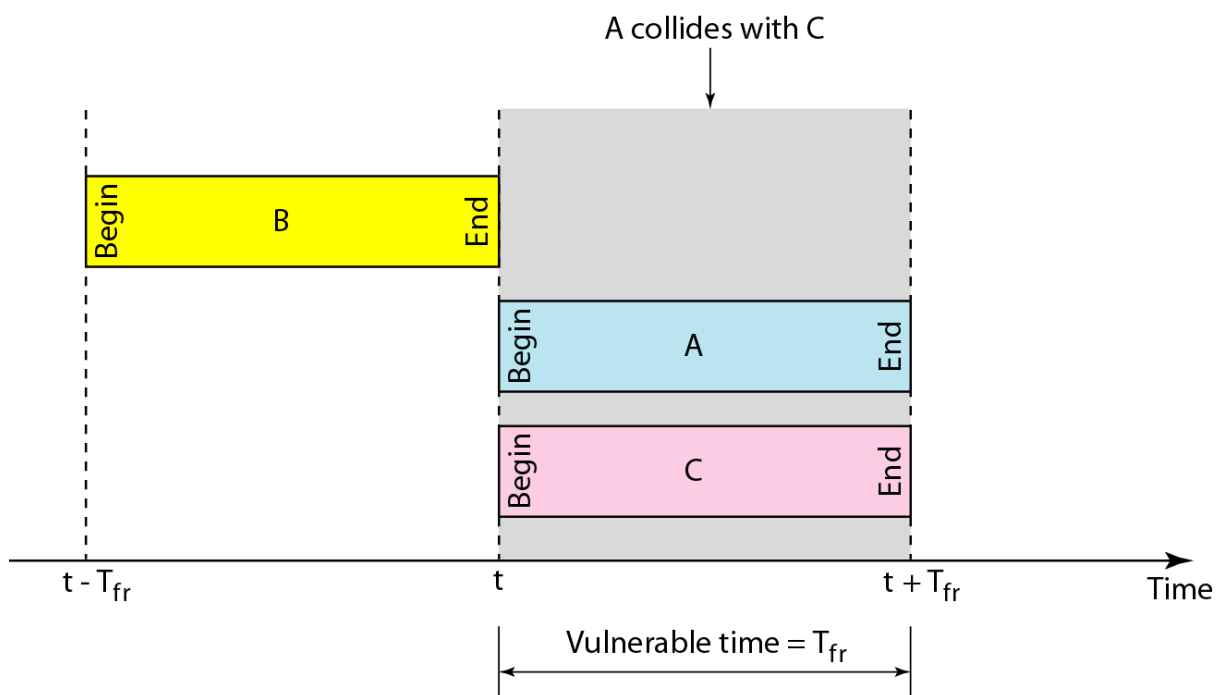
Exercises:

- **How does Slotted ALOHA improve the efficiency of Pure ALOHA? Compare Slotted ALOHA and Pure ALOHA on the basis of Vulnerable Time and Throughput.**