Random Assignment Schemes

Random Assignment Schemes

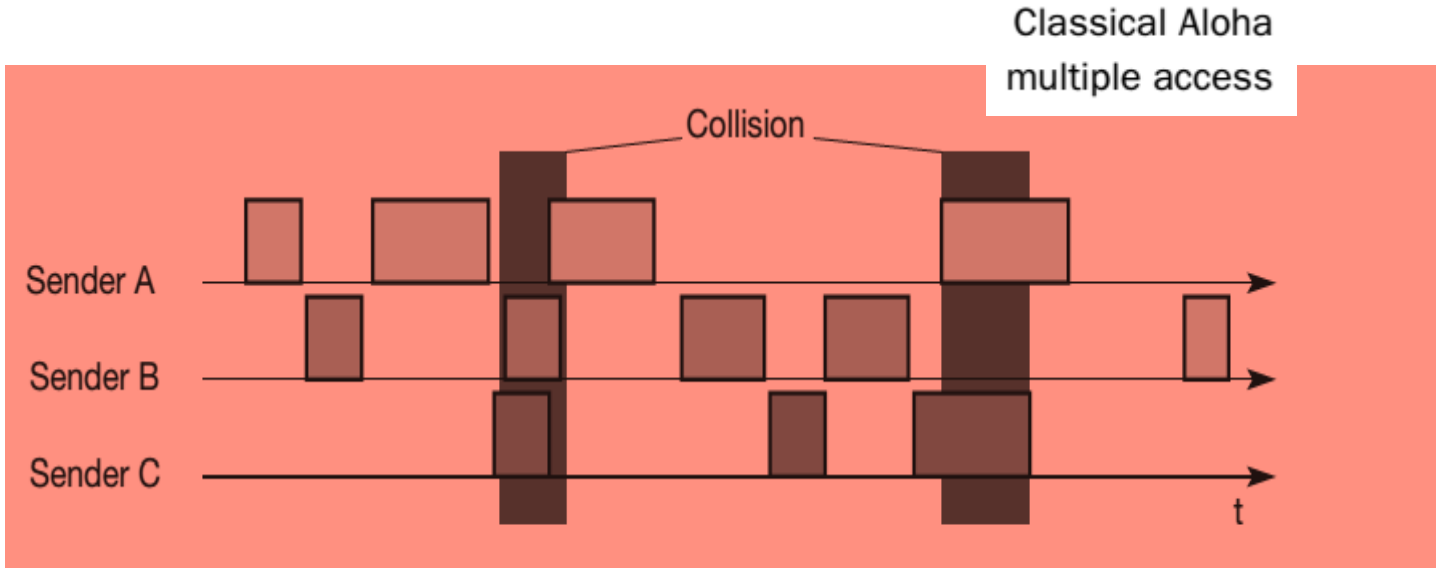
- Classified into

1. ALOHA
2. Slotted ALOHA
3. CSMA
4. CSMA / CD
5. CSMA /CA

Classical Aloha

- classical Aloha scheme -TDM is applied without controlling access
- invented at the University of Hawaii and was used in the ALOHANET for wireless connection of several stations.
- Aloha neither coordinates medium access nor does it resolve contention on the MAC layer.
- Instead, each station can access the medium at any time .
- Pure Aloha does not check whether the channel is busy before transmitting.
- This is a random access scheme, without a central arbiter controlling access and without coordination among the stations.
- If two or more stations access the medium at the same time, a collision occurs and the transmitted data is destroyed.
- Resolving this problem is left to higher layers (e.g., retransmission of data).

Classical Aloha

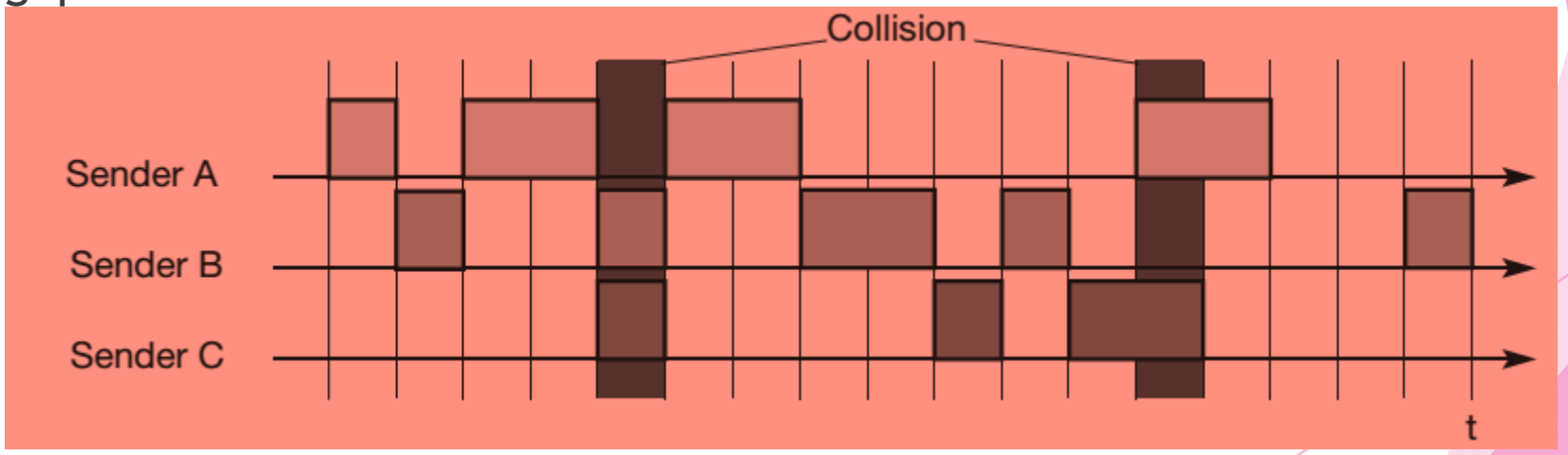


Disadvantages

- The simple Aloha works fine for a light load and does not require any complicated access mechanisms.
- Aloha schemes work acceptably, when the chances of contention are small (i.e. when a small number of senders send data infrequently)

Slotted Aloha

- The first refinement of the classical Aloha scheme is provided by the introduction of time slots (slotted Aloha).
- In this case, all senders have to be synchronized, transmission can only start at the beginning of a time slot
- Still, access is not coordinated.
- Under the assumption stated above, the introduction of slots raises the throughput from 18 per cent to 36 per cent, i.e., slotting doubles the throughput.



Slotted Aloha

Disadvantages

- This protocol does not work well if the number of stations contending to send data is high.
- In such cases, the CSMA schemes works better.

Carrier sense multiple access (CSMA)

- In this technique(CSMA), a node senses the channel(medium) before transmission,
- if it senses that some transmission is already underway ,it defers its transmission and repeat it.

- 2 extensions
  - CSMA / CD (Collision Détection)
  - CSMA / CA (Collision Avoidance)
- Difficult to implement CSMA / CD in wireless because

1) In receiver, received signal is feeble than its own signal, difficult to differentiate from noise
2) Transmitting node continues, until receiver detects collision after computing checksum

Carrier sense multiple access (CSMA)

- Collision Avoidance (CA) works better than Collision Detection (CD) in wireless
- CA prevents collision when there is a chance, when channel is released after a packet transmission

CA works as follows

- When channel free all waiting nodes transmit simultaneously, results in collision
- Before transmitting, all stations waits for random time, sense again
- If channel is idle it sends, otherwise defers
- This greatly reduces collision due to simultaneous transmission