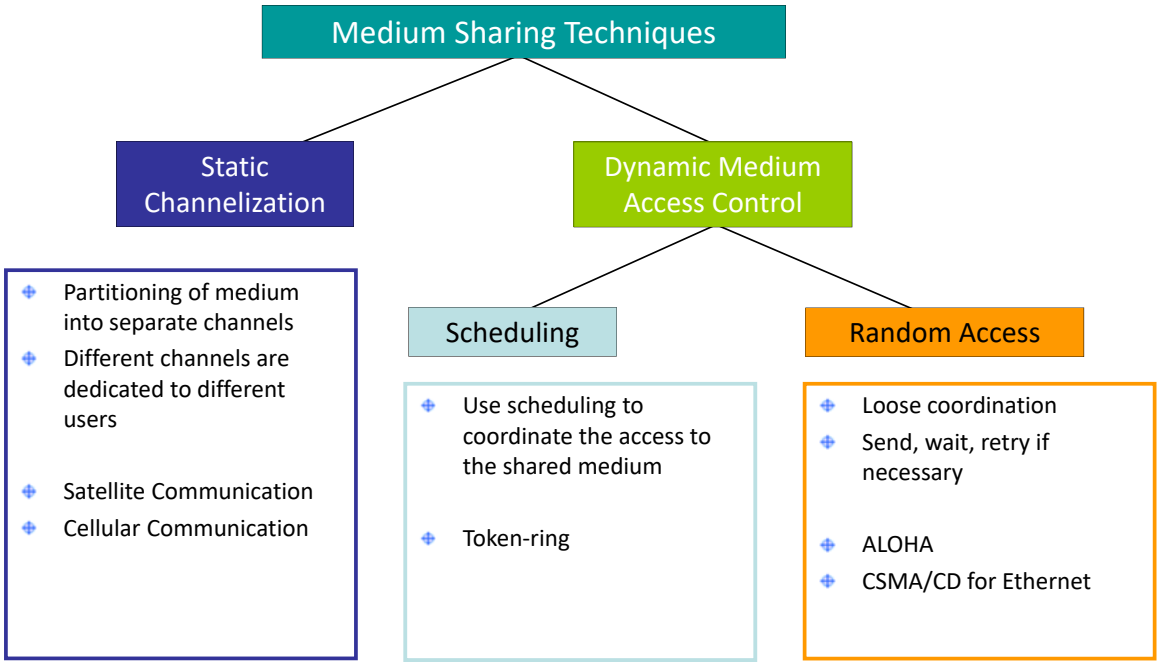
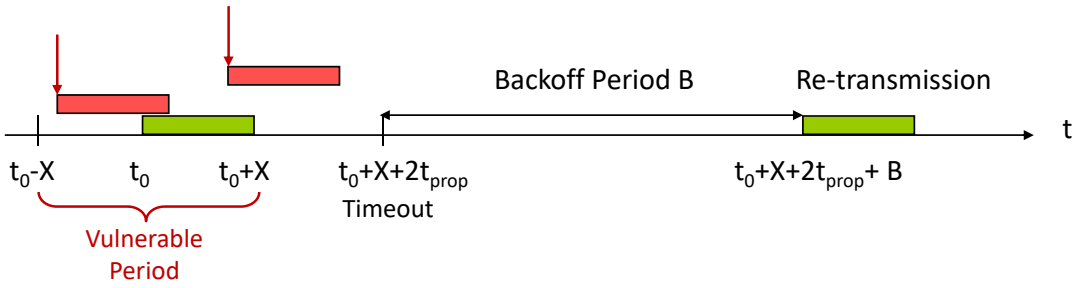
Topic 4: Data Link Layer

Schemes for Medium Sharing

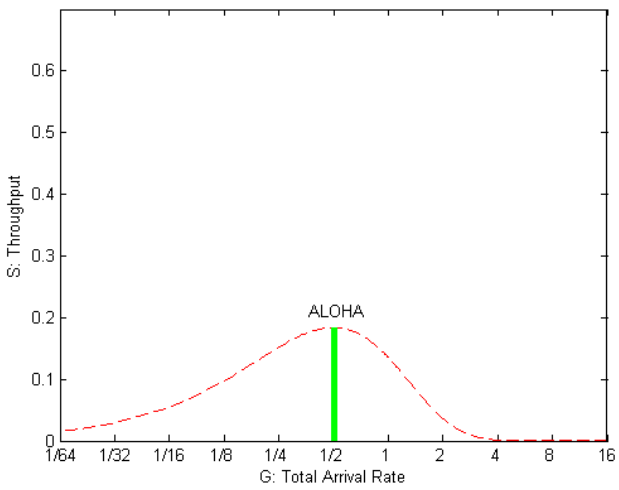


1. ALOHA

- Wireless data transfer between U. of Hawaii campuses (on different islands)
- Simplest solution: just do it!
  - Assume that all frames have the same size (transmission time: X sec)
  - A station transmits whenever it has data to transmit
  - If more than one stations transmit, their frames collide with each other and get lost
  - If ACK is not received within timeout, the station selects random backoff time (to avoid repeated collisions) and retransmits frame after backoff



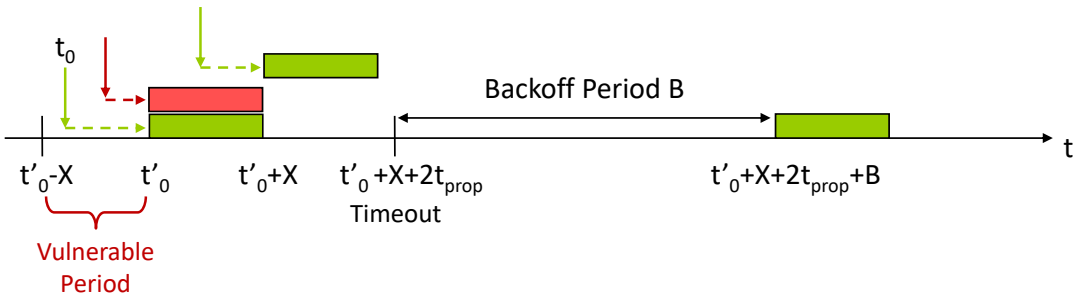
Throughput of ALOHA



- Max throughput is achieved when G = 0.5
- Bimodal behavior:
  - Small G, S ≈ G
  - Large G, S → 0

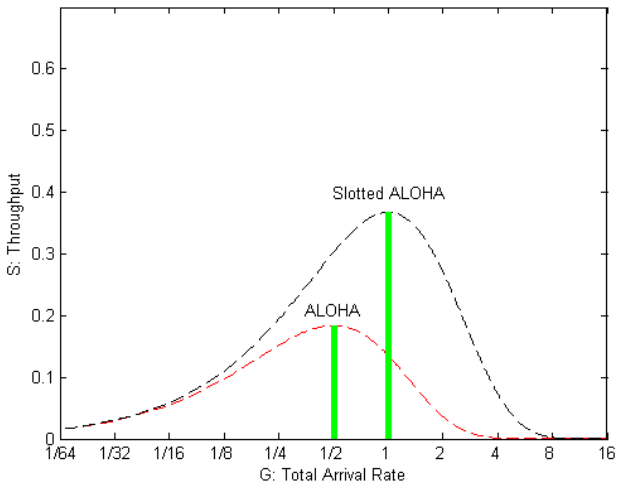
2. Slotted ALOHA

- Time is divided into X-second slots
  - Assume that all frames have the same size and occupy one time slot
  - All the stations keep track of transmission time slots and are allowed to initiate transmissions only at the beginning of a time slot
  - Backoff periods are in multiples of slots



Vulnerable period is now X seconds long

Throughput of Slotted ALOHA



- For Slotted ALOHA: max throughput is achieved when G = 1