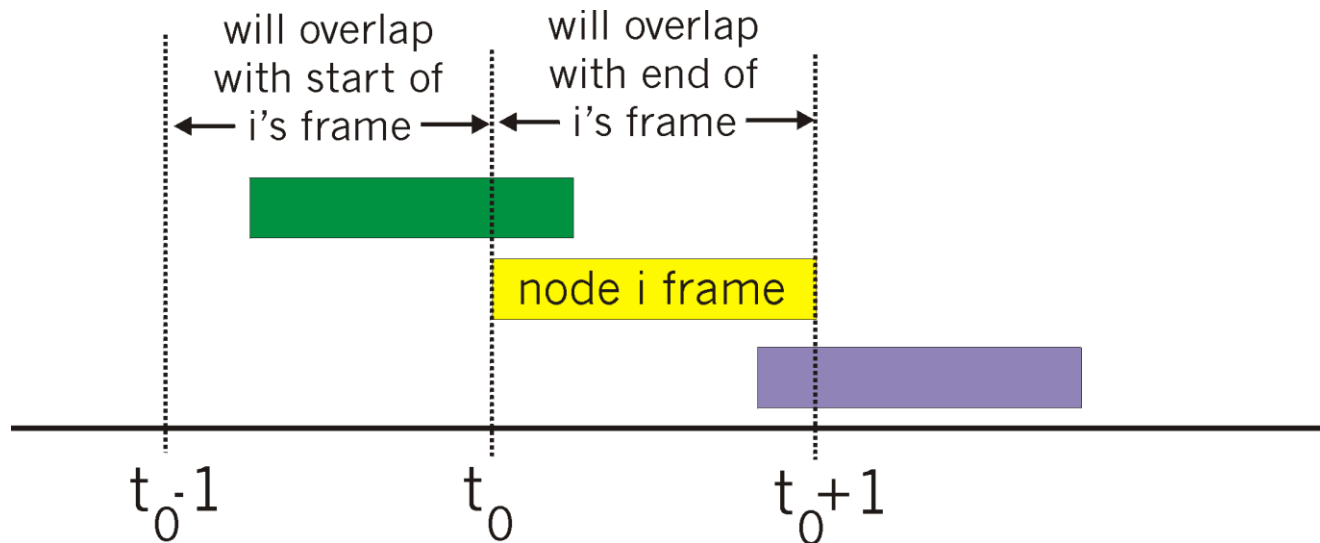# Media Access Control

Media access control, sometimes known as medium access control or just MAC, is a network data transfer policy. It governs how data is transmitted. The protocol exists to facilitate the transport of data between two computers and to prevent collisions or simultaneous data transit.

Pure (unslotted) ALOHA

❖ Unslotted Aloha: simpler, no synchronization
❖ when frame first arrives
  ▪ transmit immediately
❖ collision probability increases:
  ▪ frame sent at t_0 collides with other frames sent in $[t_0-1, t_0+1]$

will overlap
with start of
← i's frame →

will overlap
with end of
← i's frame →

node i frame

t_0-1 t_0 t_0+1
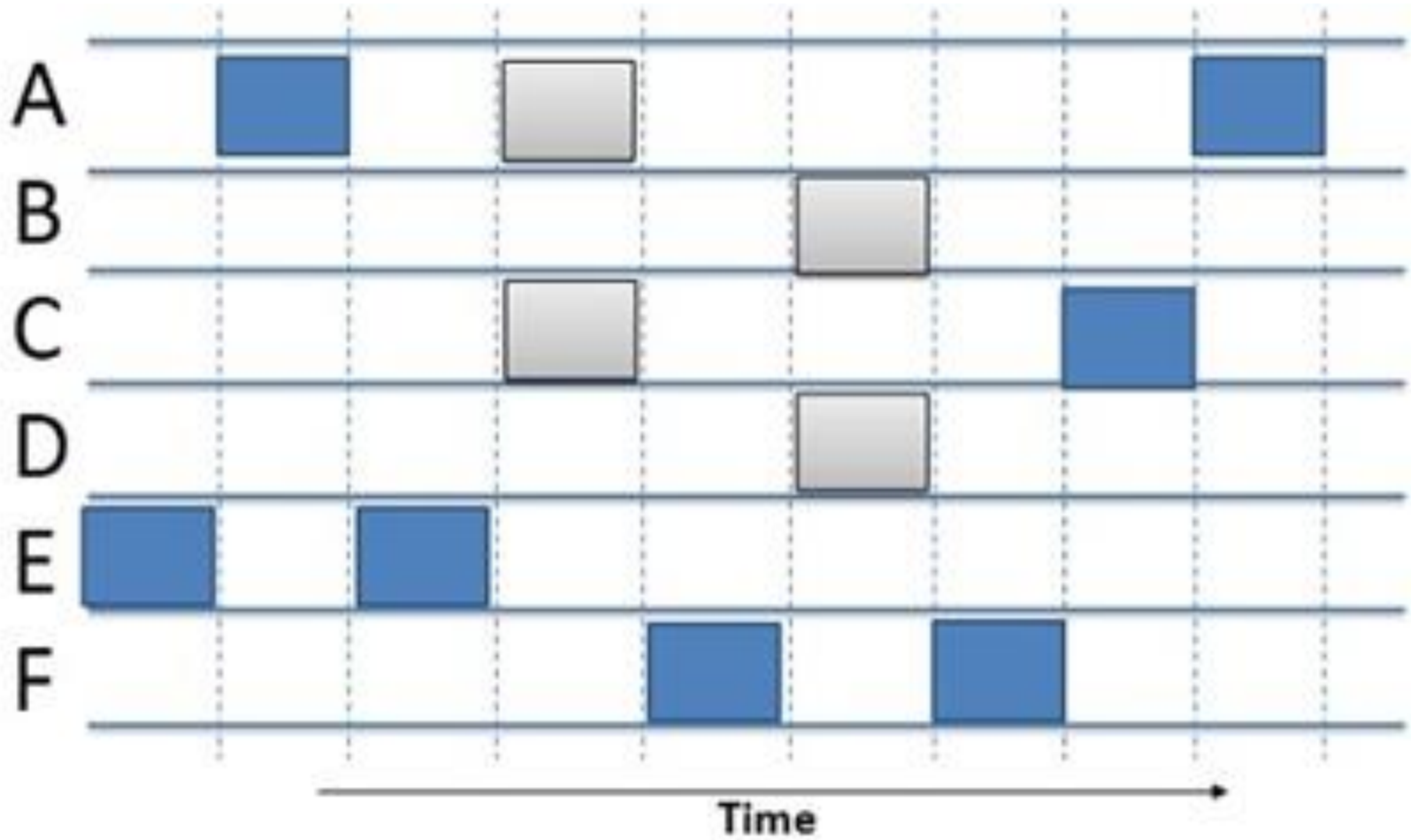
Slotted ALOHA

assumptions:

- ❖ all frames same size
- ❖ divided into equal size slots
- ❖ nodes start to transmit only slot beginning
- ❖ nodes are synchronized
- ❖ if 2 or more nodes transmit in slot, all nodes detect collision

operation:

- ❖ when node obtains fresh frame, transmits in next slot
  - ▪ if no collision: node can send new frame in next slot
  - ▪ if collision: node retransmits frame in each subsequent slot until success

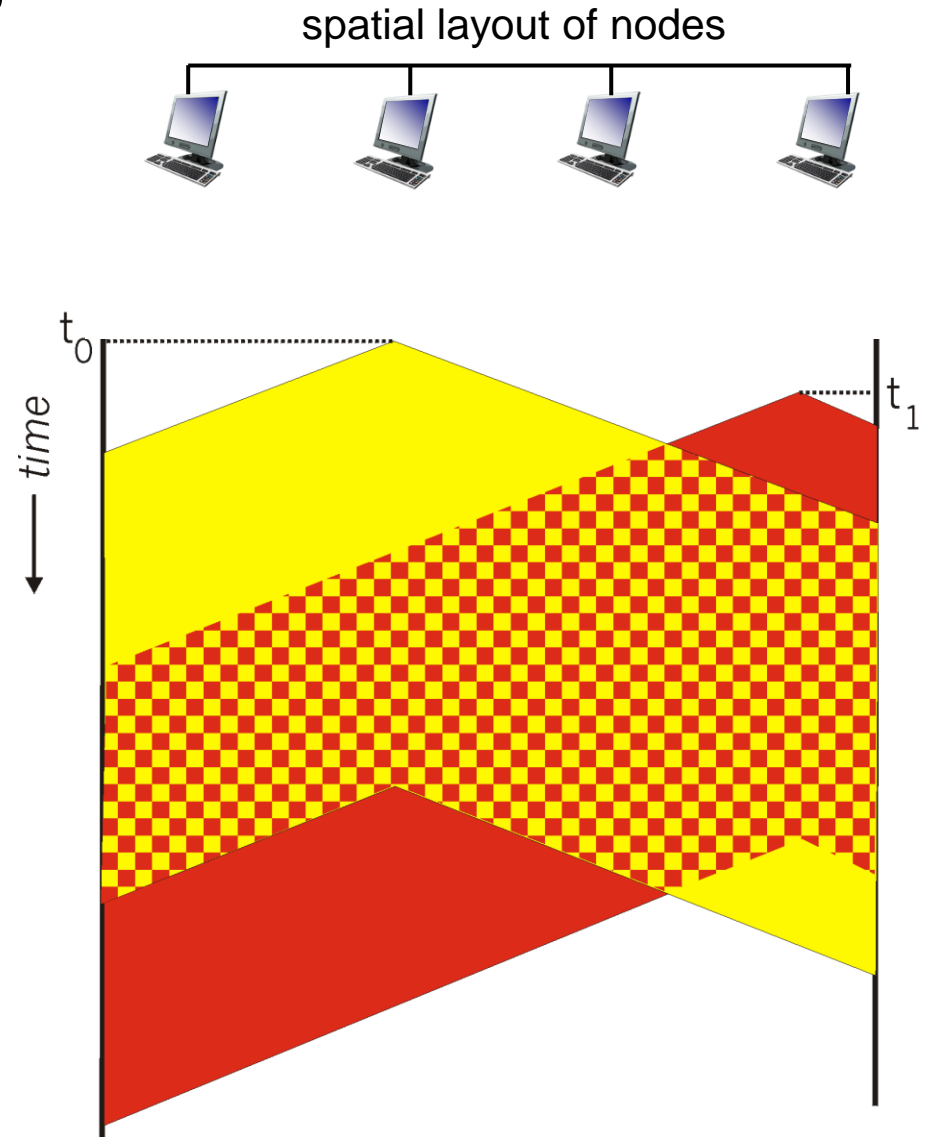# Slotted ALOHA (Contd.)

CSMA (carrier sense multiple access)

CSMA: listen before transmit:

if channel sensed idle: transmit entire frame

❖ if channel sensed busy, defer transmission

❖ human analogy: don't interrupt others!

CSMA collisions

- ❖ collisions can still occur: propagation delay means two nodes may not hear each other's transmission
- ❖ collision: entire packet transmission time wasted
  - ▪ distance & propagation delay play role in in determining collision probability

CSMA/CD (collision detection)

CSMA/CD: carrier sensing, deferral as in CSMA

- collisions detected within short time
- colliding transmissions aborted, reducing channel wastage