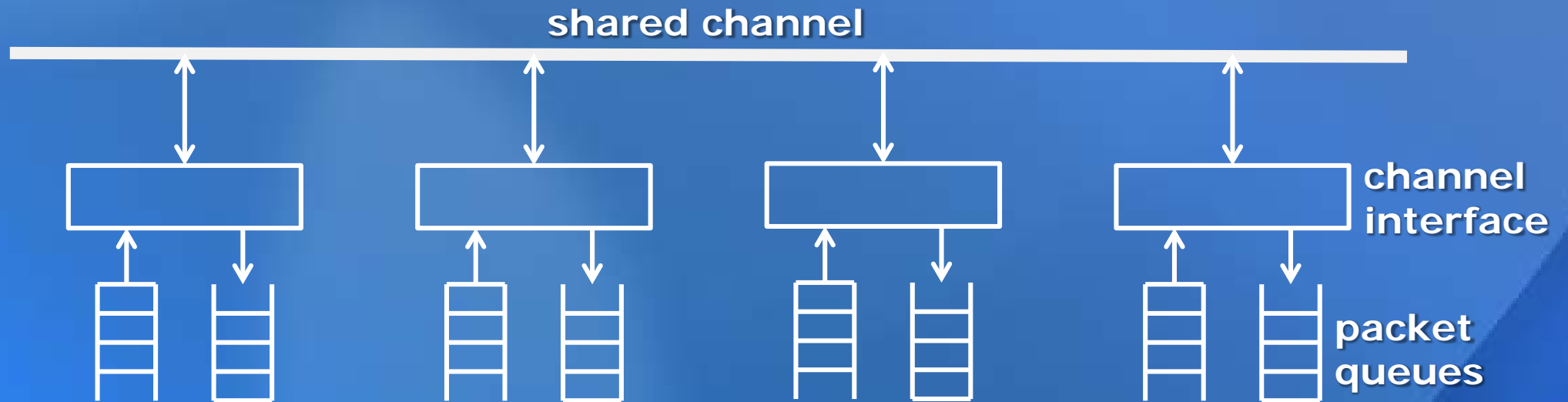


# Multiple Access Protocols

# Shared Communications Channels



**Terms: multiple access, channel access, channel sharing, media access control**

# Multiple Access Protocol

- a distributed algorithm that determines how nodes share a channel
- Ideally,
  - When only one node wants to transmit, it can send at the maximum channel rate  $R$ .
  - When  $M$  nodes want to transmit, each can send at an average rate  $R/M$
  - Fully decentralized
    - no special node to coordinate transmissions
    - no synchronization of clocks, slots
    - no out-of-band channel for coordination
  - Simple

# Types of Multiple Access Protocols

## "Taking turns"

- Token Passing

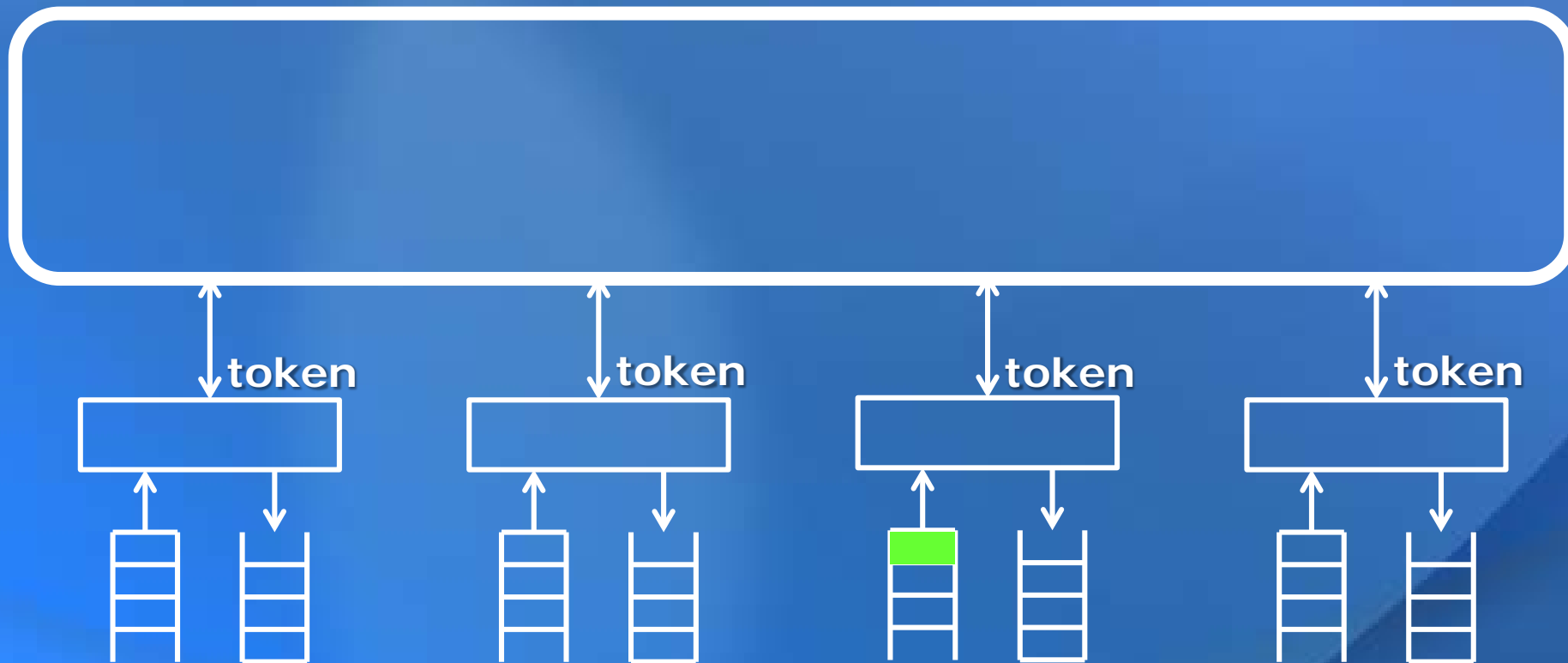
## Channel Partitioning

- Frequency Division Multiple Access (FDMA)
- Time Division Multiple Access (TDMA)

## Random Access

- Aloha Protocol

# Token Passing



# Types of Multiple Access Protocols

## "Taking turns"

- Token Passing

## Channel Partitioning

- Frequency Division Multiple Access (FDMA)
- Time Division Multiple Access (TDMA)

## Random Access

- Aloha Protocol

# Time Division Multiple Access

- Nodes get access to channel in "rounds"
- In each round, each node gets a fixed-length slot to transmit
- Example, 4 nodes:



## Advantages

- Fair
- No packet collisions
- Simple

## Disadvantages

- Requires central resource allocator
- Synchronization needed
- Channel under utilized if nodes have little data to transmit

# Types of Multiple Access Protocols

## “Taking turns”

- Token Passing

## Channel Partitioning

- Frequency Division Multiple Access (FDMA)
- Time Division Multiple Access (TDMA)

## Random Access

- Aloha Protocol