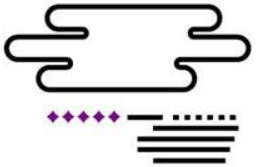


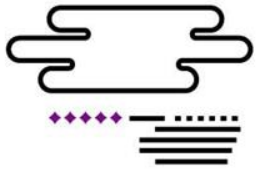
Introduction to Local Area Networks

Medium access control

André-Luc Beylot

Objectives

- Compare major medium access control schemes
- Understand their pros & cons



Medium access sharing issues

Sharing a single medium between multiple hosts:

- ⊕ Any host on the channel can receive data
- ⊖ Simultaneous transmissions are not possible

⇒ Medium access must be controled

Medium access schemes

Taxonomy

- Centralised methods

  A central node (*master*) shares medium access among the nodes (*slaves*)

  - Static
  - Dynamic

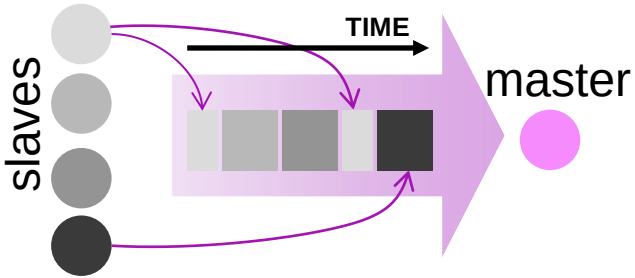
- Distributed methods

  The nodes collectively organise medium sharing

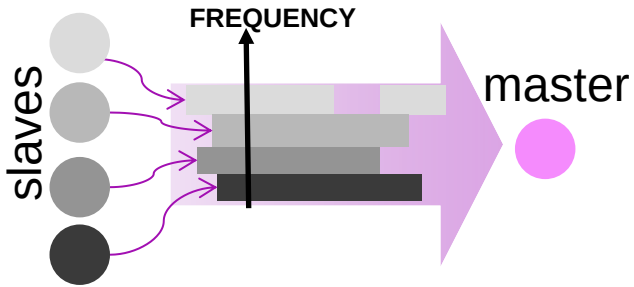
  - Deterministic
  - Random

Centralised static techniques

Time Division
Multiple Access (TDMA)



Frequency Division
Multiple Access (FDMA)



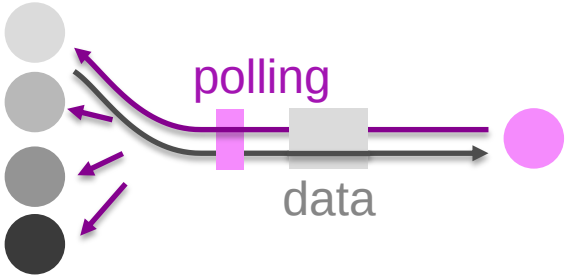
- Guaranteed resources
- No collision

- Hard to insert a new host
- Not suitable for variable flow streams
- Lack of resilience

Centralised dynamic techniques

Polling

- Central node periodically polls the nodes on a round robin basis



- Each node can send
  - A single frame
  - All the frame it has to send
  - A pre defined number of frames allowed

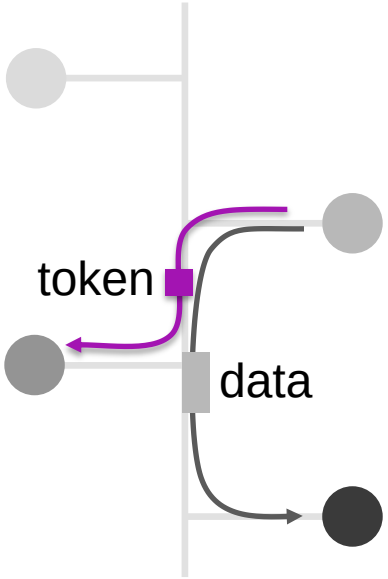
- More efficient on ressource usage than static methods
- Upper bounded based on the round robin duration

- Polling mute hosts
- Hard to insert a new host
- Lack of resilience

Distributed deterministic techniques

Token methods

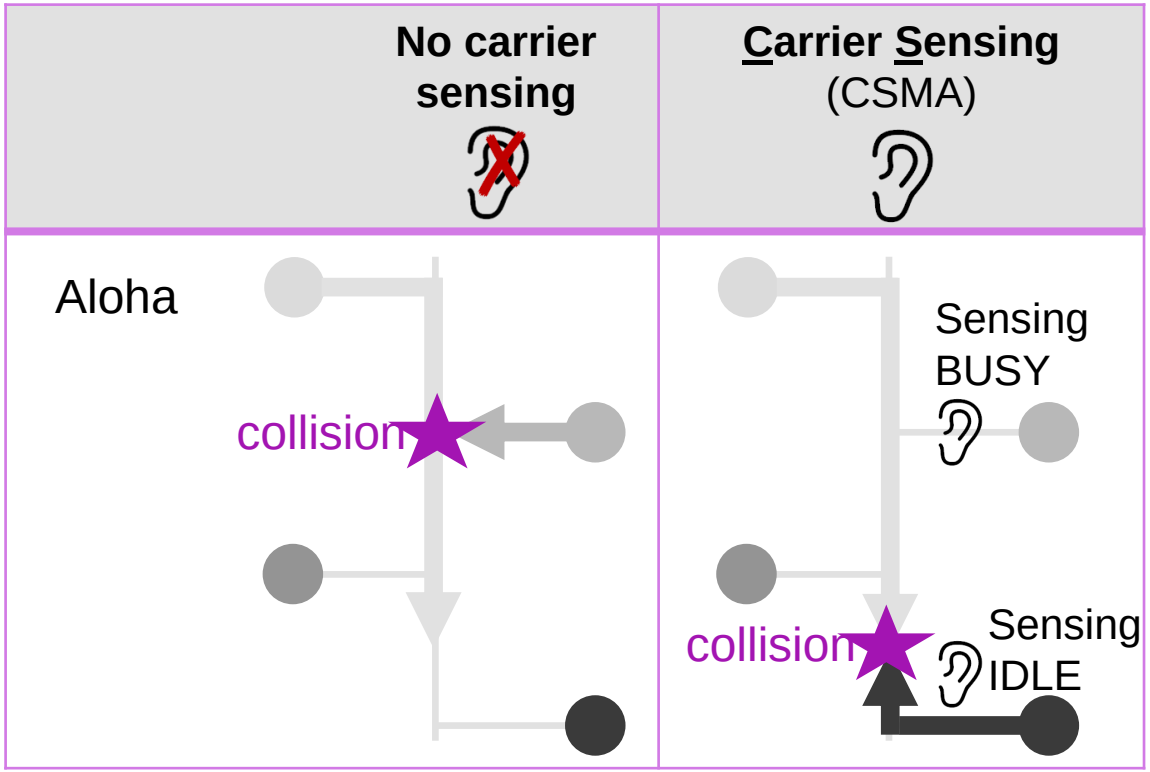
- Token = permission to send (encoded in a specific frame)
- Token Ring, Token Bus, FDDI…
- The token owner sends data, then the token
- The token goes to
  - The next neighbor in the topology
  - The highest priority host that reserved the token



- Eeasy to improv reliability
- Return time of the token upper bounded

- Complex implementation (ring setup, failure, …)

Distributed random techniques



Distributed random techniques

Steps \ Distributed random tech.	**No carrier sensing** (e.g. Aloha) 	**Carrier Sensing** (CSMA) 	
During transmission		 CSMA/CA	 CSMA/CD
Detecting collision	Acknowledgement		 By listening
Retransmission	After a random delay		

Distributed random techniques (II)

- Simple distributed implementation
- Adding a host straightforward
- Insensitive to breakdowns

- Low load networks
- Few hosts

To go further

- Mixing medium access techniques
  - Example : TDMA with free slots to reclaim resources
  - Allocation of a variable number of time slots

Conclusion

- Many differents medium access techniques
- Classification
  - Centralised vs distributed
  - Static vs dynamic
- There is no best medium access technique !