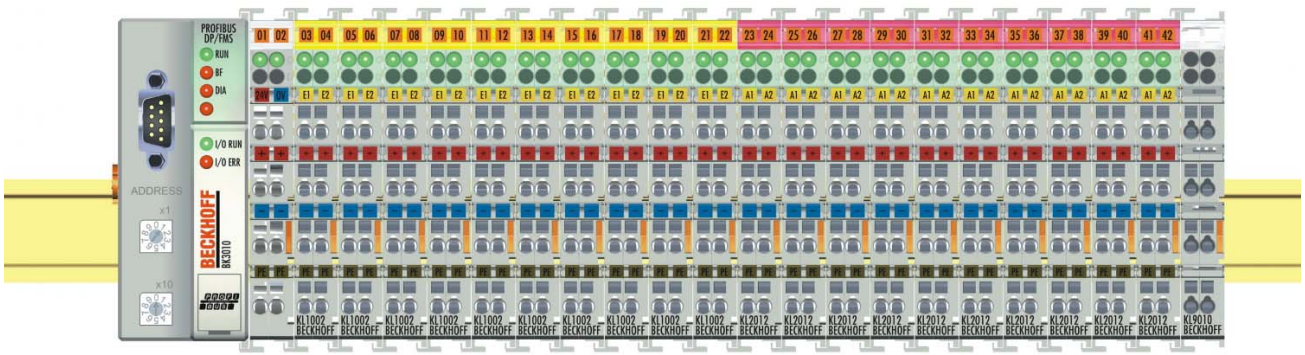
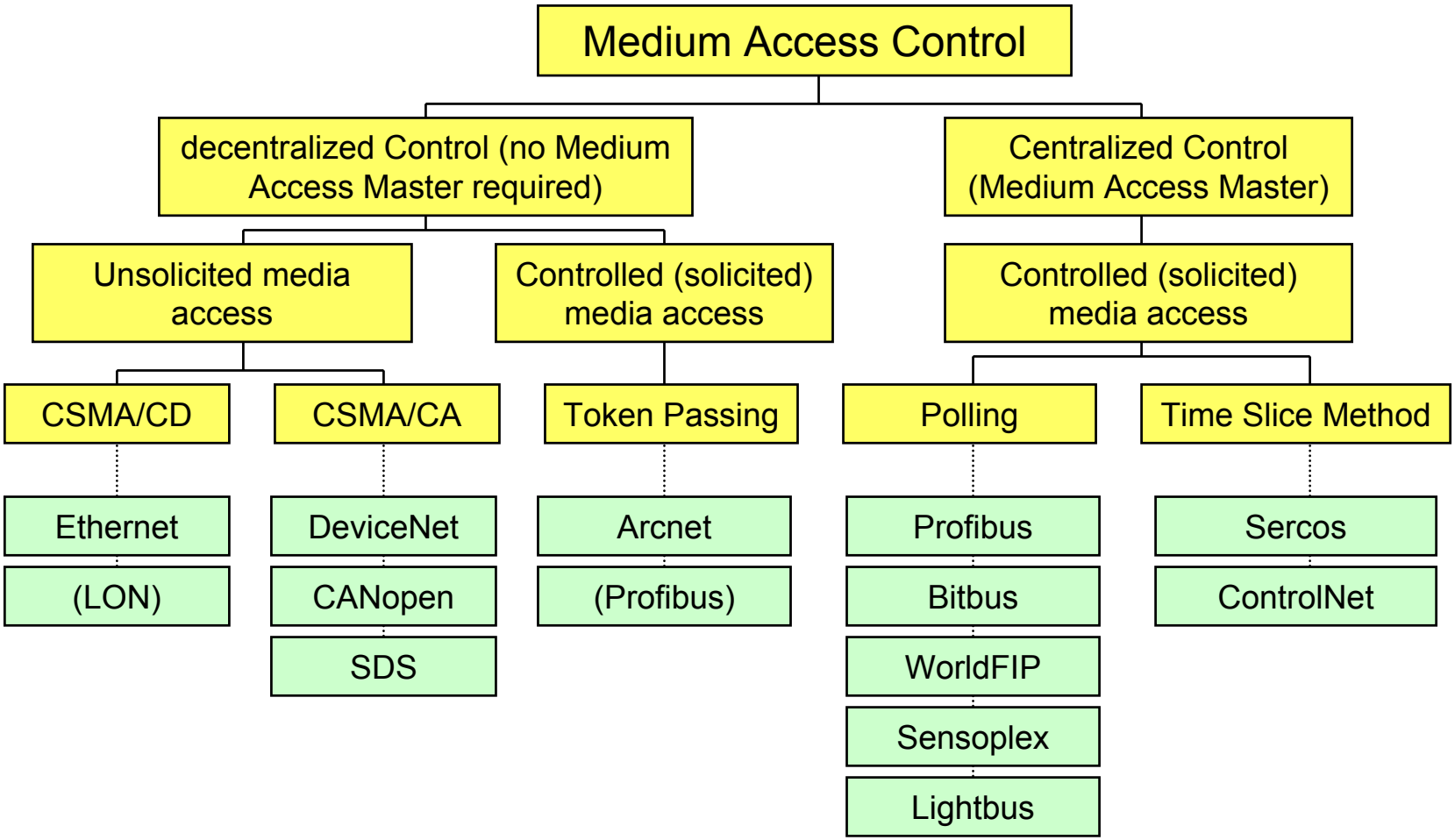
Features of Fieldbus Systems

- MAC: Medium Access Control
- Addressing
- Transmission Media
- Topology
- Node Hierarchy



Medium Access Control



Medium Access Control: CSMA/CD

Carrier

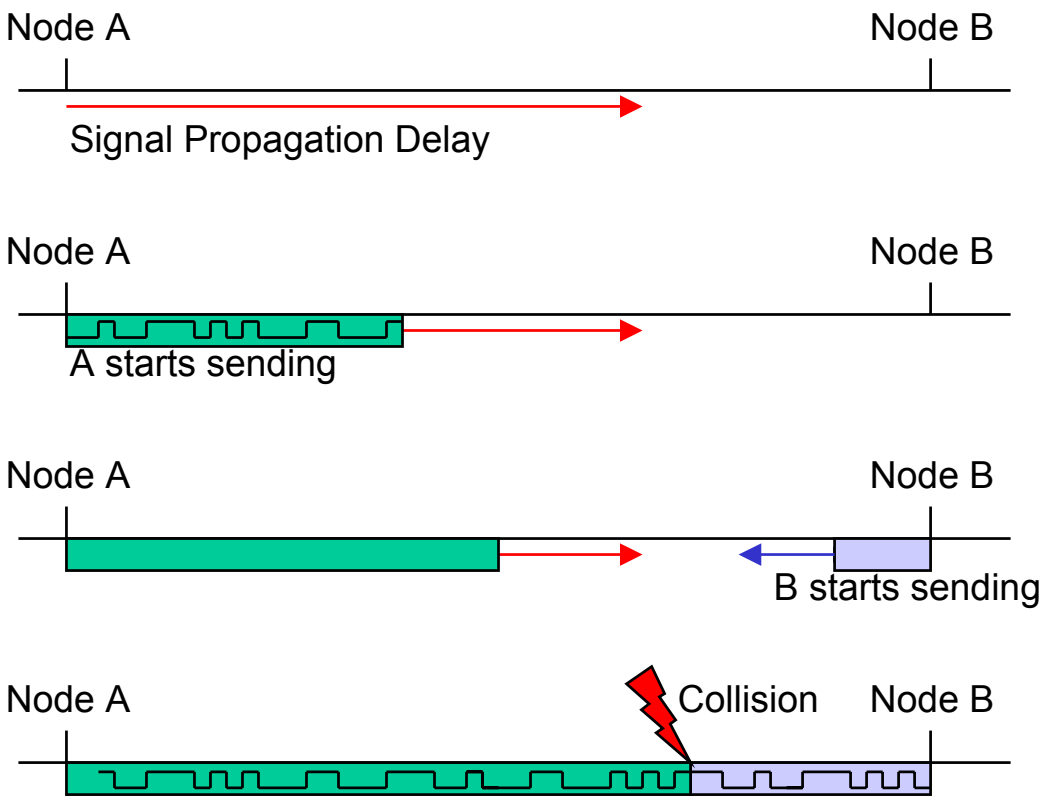
Sense

Multiple

Access /

Collision

Detection



Medium Access Control: CSMA/CA

Carrier

Sense

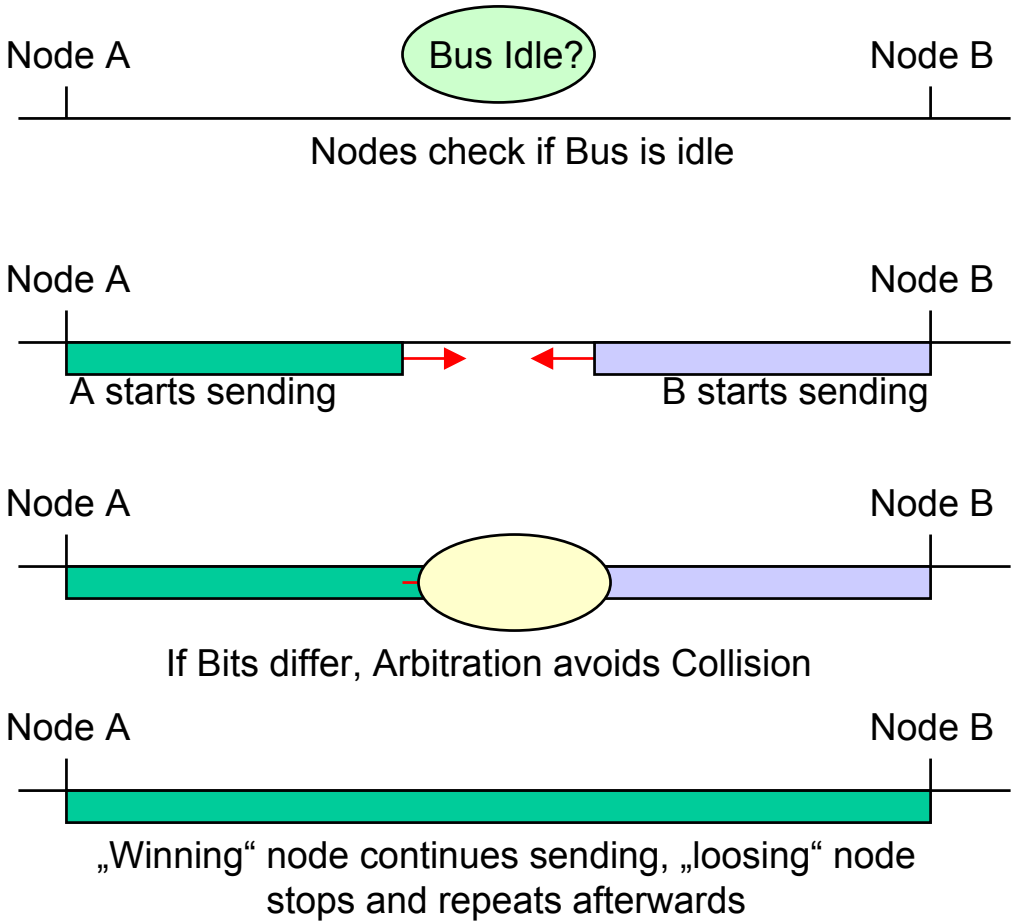
Multiple

Access /

Collision

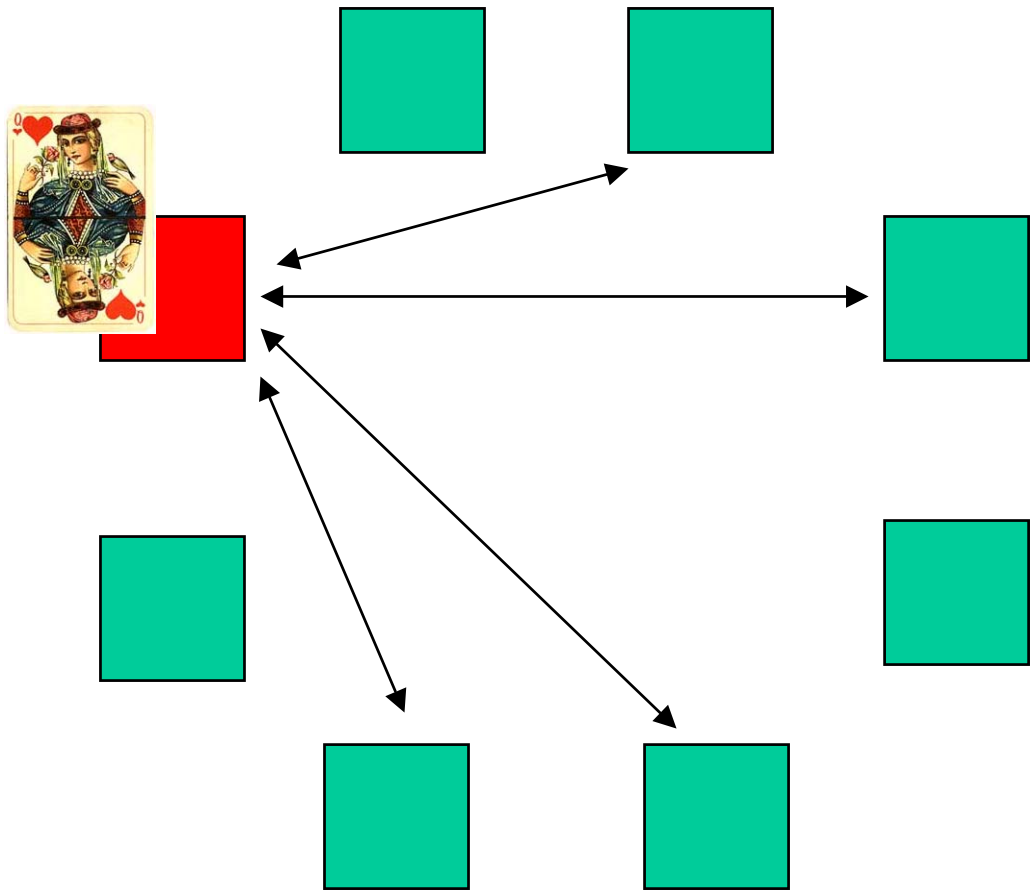
Avoiding

(CAN based systems)



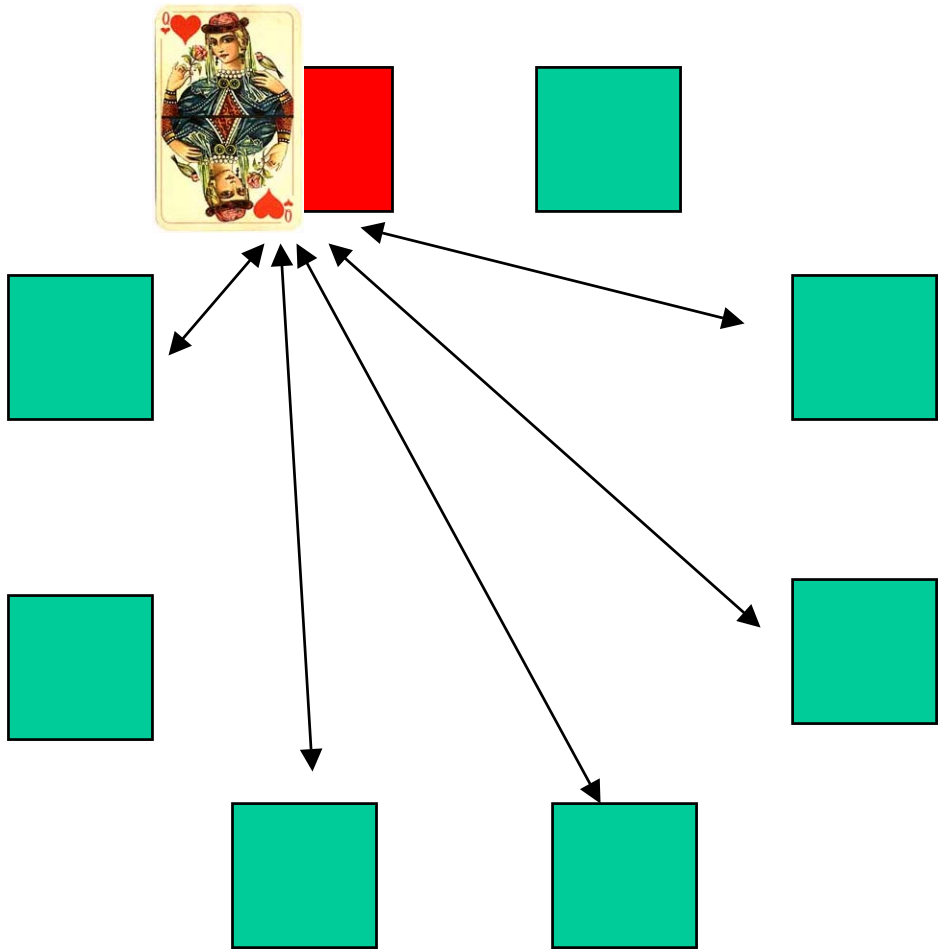
Medium Access Control: Token Passing

The node that holds the token controls the network traffic



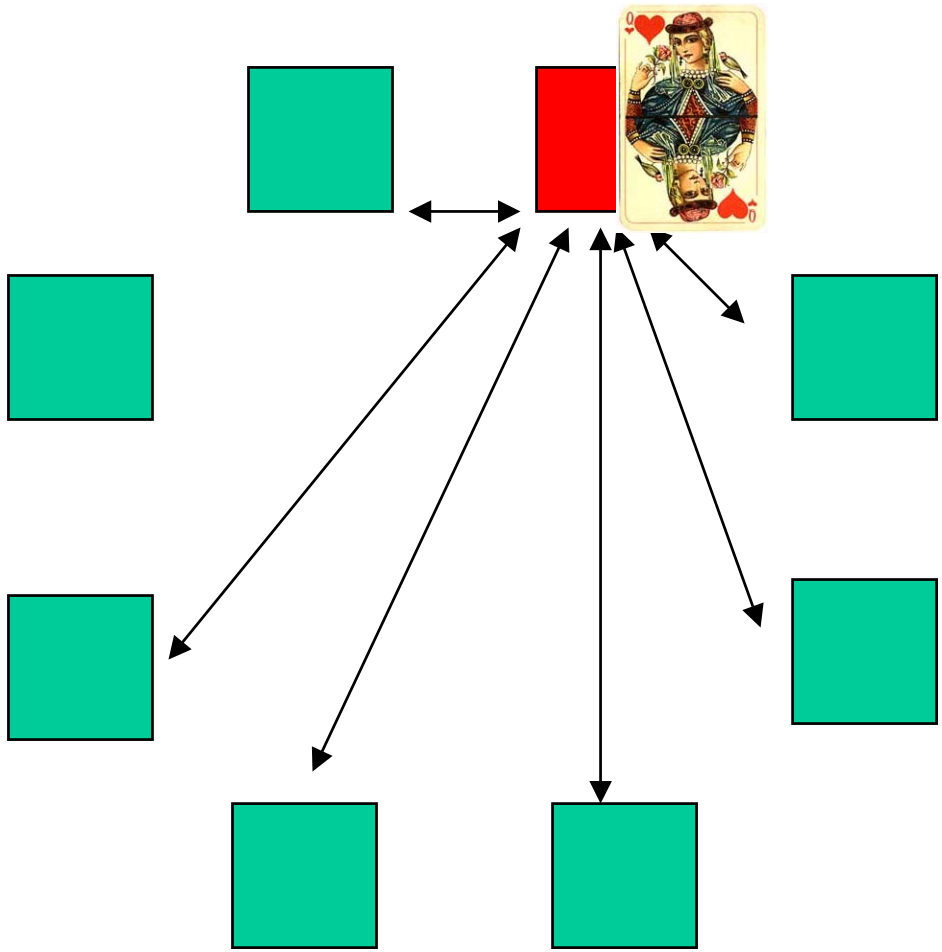
Medium Access Control: Token Passing

The node that holds the token controls the network traffic



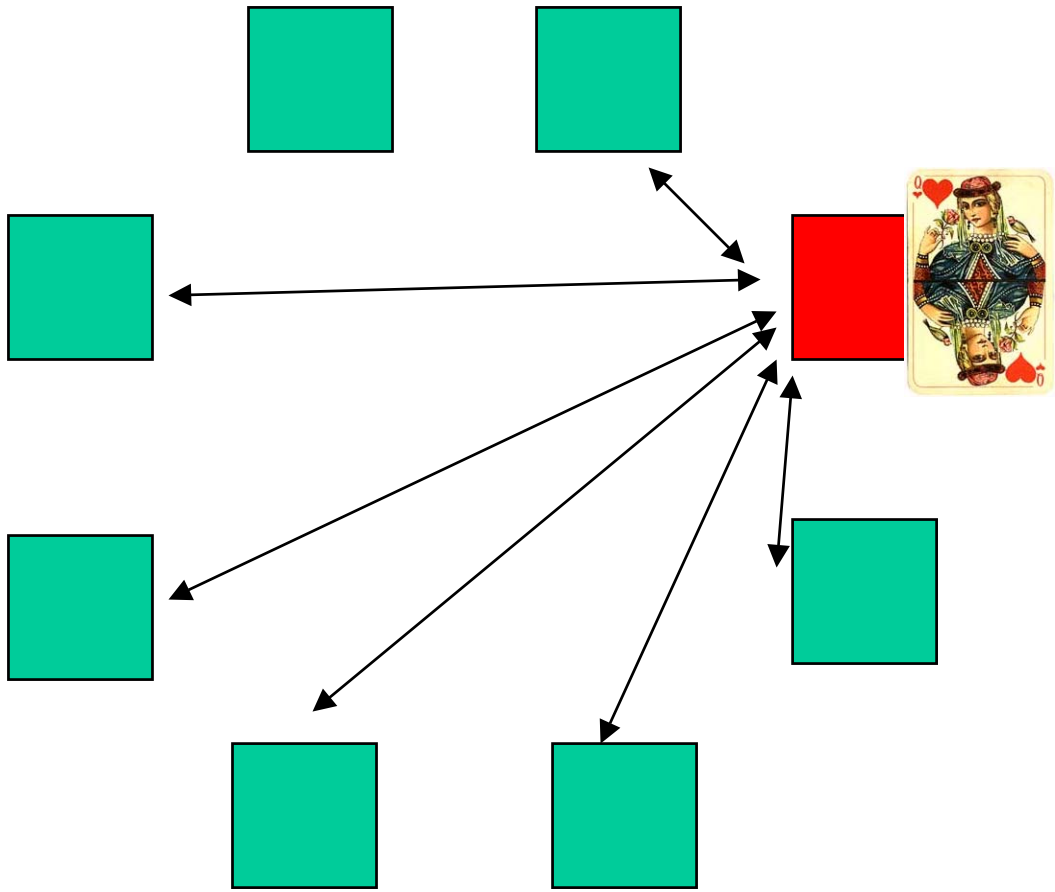
Medium Access Control: Token Passing

The node that holds the token controls the network traffic



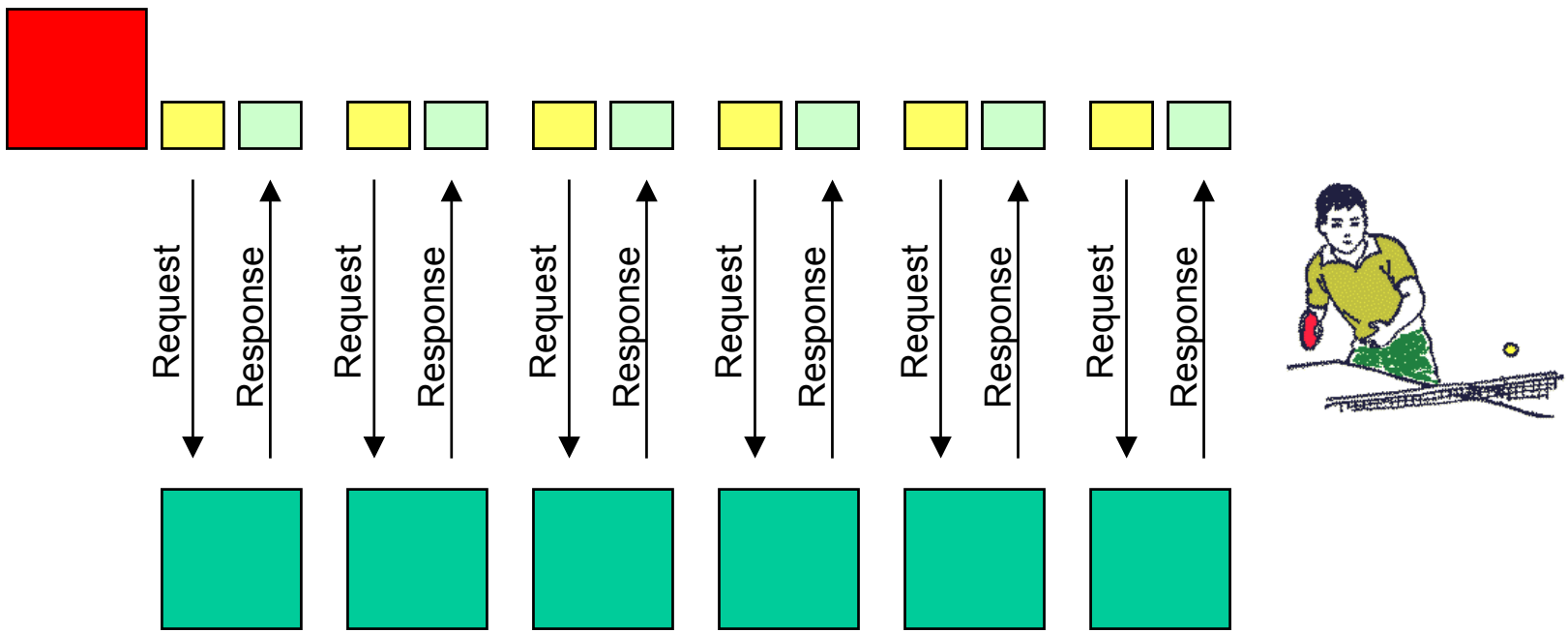
Medium Access Control: Token Passing

The node that holds the token controls the network traffic



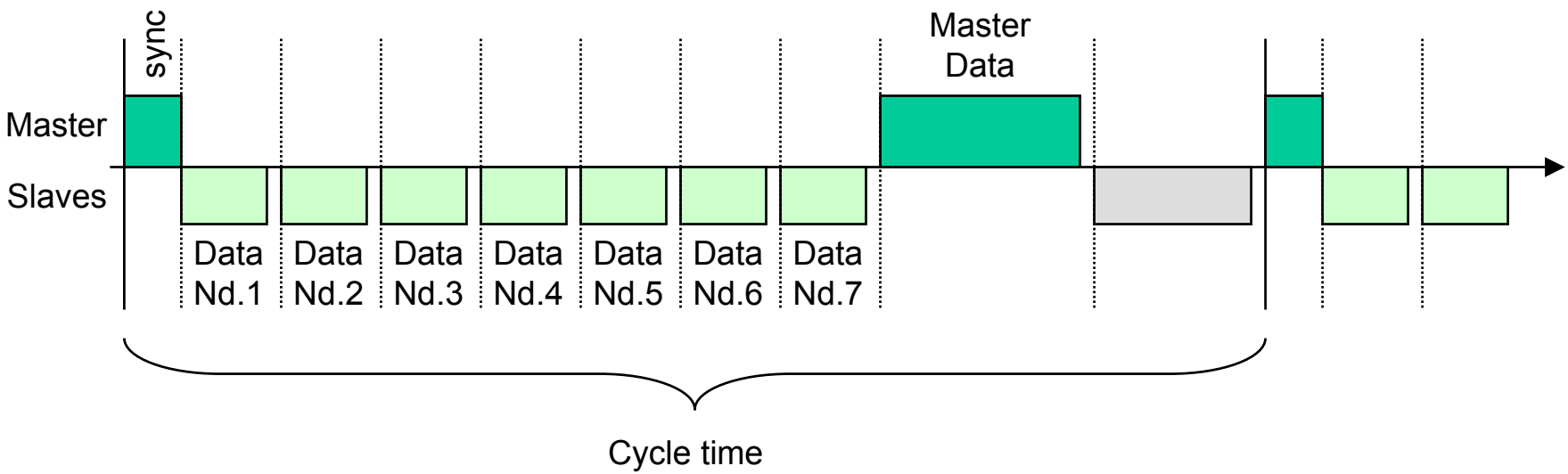
Medium Access Control: Polling

One master node polls the slave nodes



Medium Access Control: Time Slicing

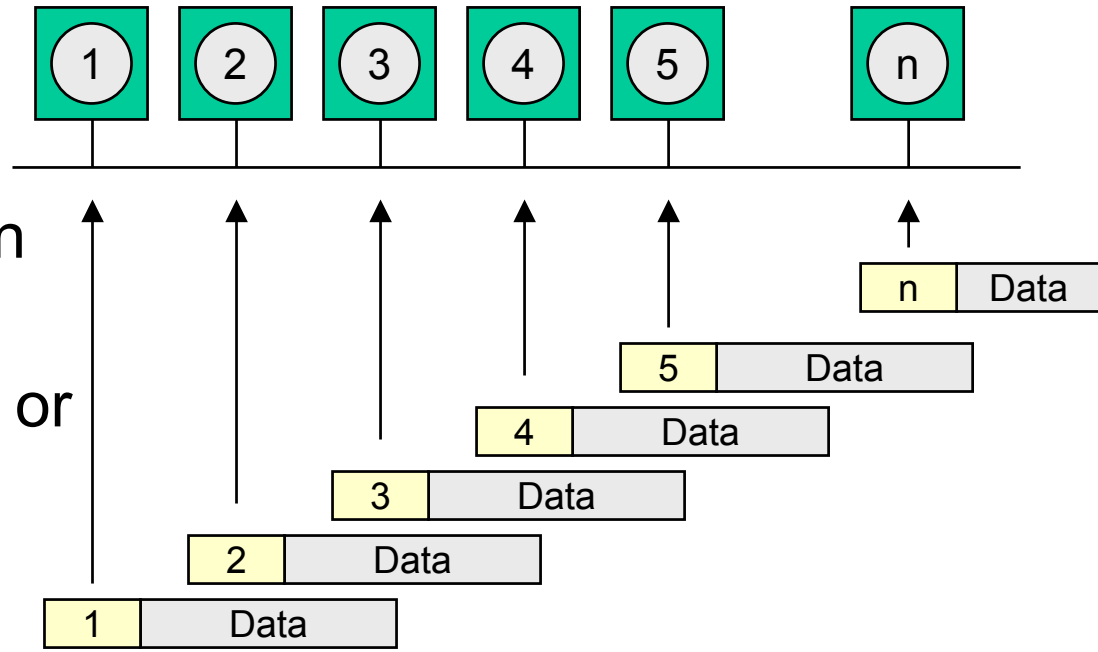
All nodes are synchronized and send within their time slice



Addressing

Node-Addressing

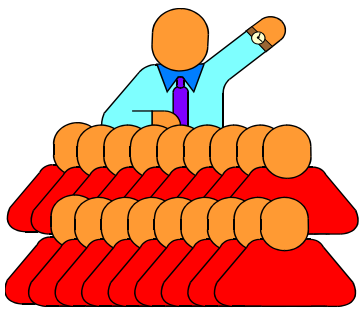
- Node processes Data with its destination address
- Peer to Peer, Multicast or Broadcast possible

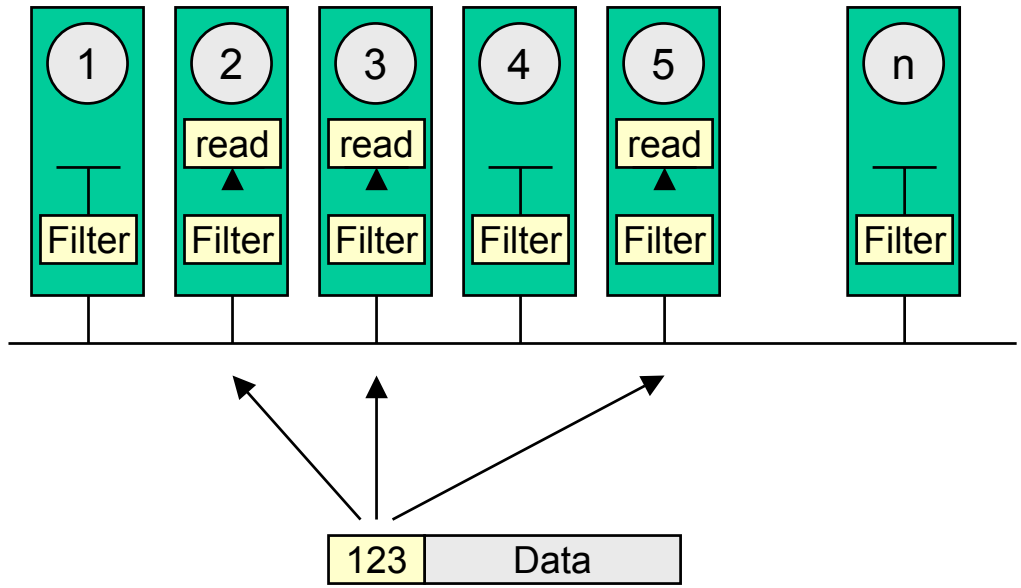


Addressing

Telegram-Addressing

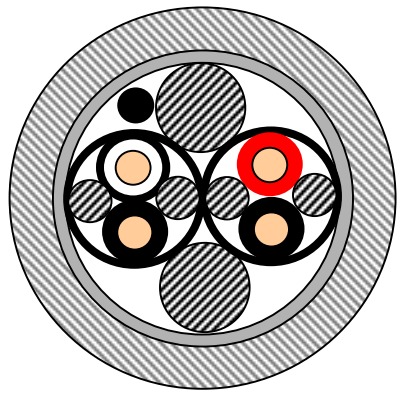
- Node processes Daten with the Ident-Number that he is interested in.
- Requires Broadcast





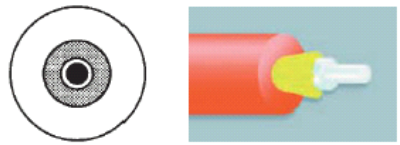
Transmission Media (Examples)

Copper:



- RS 485, 2/3/5-Wire
  (Profibus, -DP, Interbus-S, LON, Bitbus...)
- ISO 11898, 2-Wire (+ GND)
  (CAN "High Speed„)
- Power Supply Line
  (AS-Interface, LON, Interbus-Loop)
- Unshielded Twisted Pair (UTP)
  (Ethernet 10BaseT)
- Koax-Wire
  (Arcnet, Ethernet 10Base5, 10Base2)

Transmission Media (Examples)



Fiber Optics:

- Plastic Optical Fiber (POF) + HCS (hard clad silica)

(Beckhoff-Lightbus, Sercos, Interbus-S, Profibus)

- Glass Fibre (Single Mode + Multi Mode)

Type	Peak Wave Length	Damping	Max Length
POF	640...675nm	~2000 dB/km	40m
HCS	640..675nm	~7 dB/km	300m
Multi Mode	790..910nm	~3dB/km	1700m
Single Mode	1260..1380nm	~0,4 dB/km	10000m

POF: Made of PMMA (Polymethylmethacrylate)

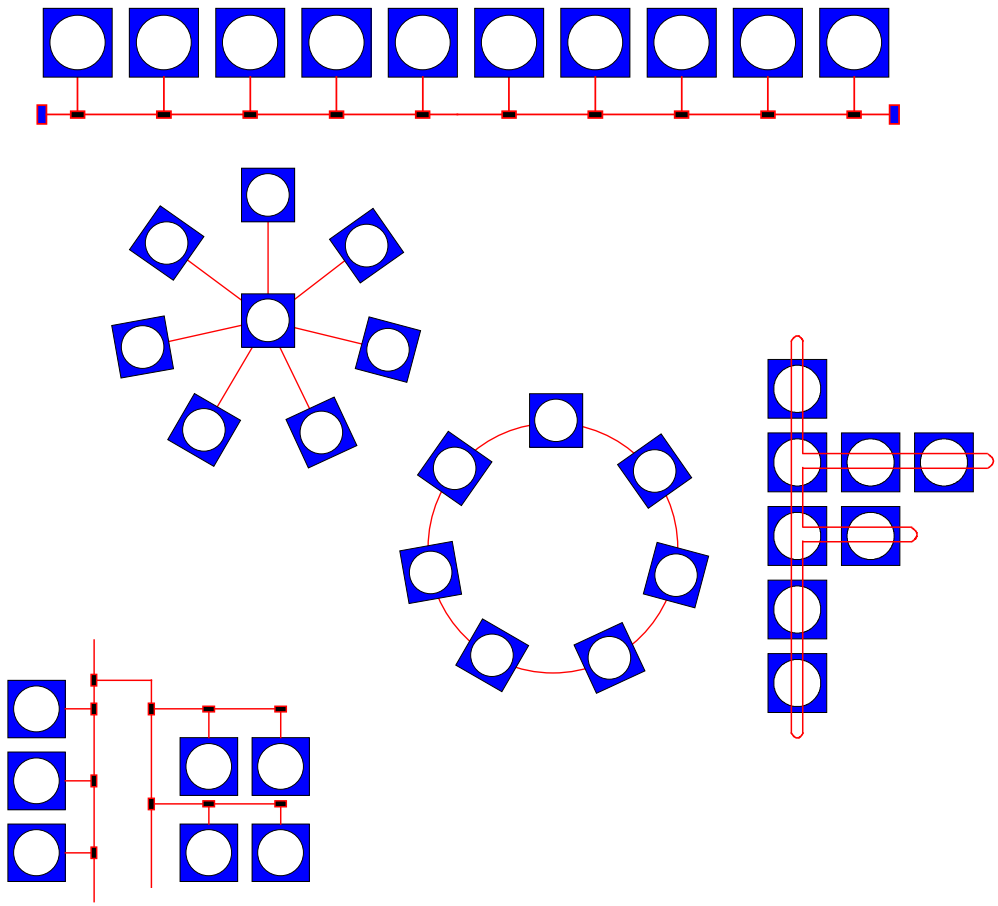
Topology

Bus / Line
- (electrical)

Star
- (electrical and optical)

Ring
- (electrical and optical)
- With special types

Tree
- (electrical)



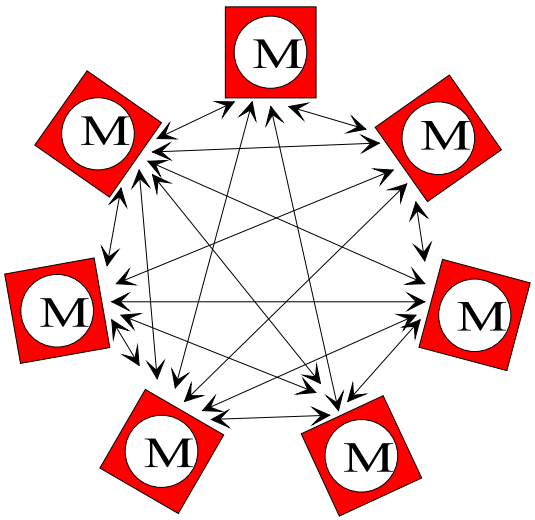
Node Hierarchy

Definitions:

Master: Node that controls the bus access and bus communication

Slave: Can only communicate with Master

Multi-Master System



Master-Slave-System