

## IEEE 802.4-Token Bus

BLM3051  
Data  
Communication

Week 10

- In worst-case scenarios, some computers seem to wait too long to transmit.
  - General Motors
  - 1980s
- Bus and Tree Topology
- Each computer recognizes the computers on its right and left.
- After the logical ring is established, the computer with the highest number will transmit.
- Gives the control frame (Token) to its neighbor
- Collision is impossible
- New computers can be added or removed.
- IEEE 802.4 MAC protocol is quite complex
  - Each computer included in the system must keep up to 10 different time information and
  - Evaluate approximately 24 status information.
- 75Ω Coaxial Cable
- 3 Different Modulation Techniques are used
  - Phase continuous frequency shift keying
  - Phase coherent frequency shift keying
  - Multilevel duobinary amplitude modulated shift keying
- Max speeds: 1,5 ve 10 Mbps

Furkan Çakmak

## IEEE 802.4-Token Bus - Framing

BLM3051  
Data  
Communication

Week 10

- SD: Starting Delimiter
- FC: Frame Control
- ED: Ending Delimiter
- Frame size is almost 5 times bigger than 802.3.
- Priority mechanism:
  - 4 levels priority: 0, 2, 4, 6

1 byte	1byte	1byte	2-6 byte	2-6 byte	0-8182	4byte.	1byte
Preamble	SD	FC	Dest.Addr	Src.Addr.	Data. Unit	CRC	ED

Furkan Çakmak

## IEEE 802.5-Token Ring

BLM3051  
Data  
Communication

Week 10

- It uses a technique based on the principle that the computers to be transmitted send their data sequentially.
- Token size: 3 bytes (even if the line is empty)
- Token Re-Sizing
- Physical Length of a Bit
- Example:
  - Transmission speed: R Mbps
  - Bit extraction rate:  $1/R \mu\text{sec}$
  - Signal propagation rate: SP m/ $\mu\text{sec}$
  - Every bit occupies on ring: SP/R m
- What is the number of bits (b) that can be simultaneously on an L-meter ring?

Furkan Çakmak

## IEEE 802.5-Token Ring

BLM3051  
Data  
Communication

Week 10

- Example: SP: 200m/ $\mu\text{sec}$
- R: 1 Mbps
- L: 1000m
- b: ?
- $b = L * R / SP$

Furkan Çakmak

# IEEE 802.5-Token Ring - Priority and Reservation

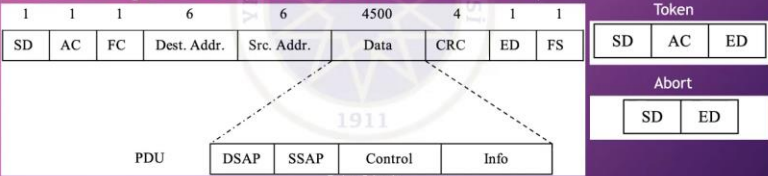
- For reservation: AC (Access Control) is used.
- Time Limitation
- Monitor Station
  - No Token Frame
  - Orphan Frame



Furkan Çakmak

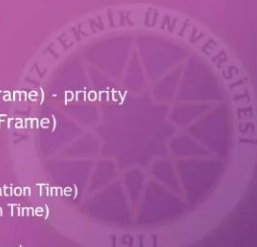
# IEEE 802.5-Token Ring - Framing

- NIC (Network Interface Card) Addresses (6-byte)
- Differential Manchester Coding
- Max speeds are 4 and 16 Mbps (IEEE 802.5t: 100 Mbps, IEEE 802.5v: 1 Gbps)
- First sending bit is MSB (different from 802.3 and 802.4)



# FDDI (Fiber Distributed Data Interface)

- ANSI and ITU-U standart
- Fiber optics: 100 Mbps
- Token
- S-Frame (Synchronous Frame) - priority
- A-Frame (Asynchronous Frame)
- Timing Register
  - SA (Synch. Allocation)
  - TTRT (Target Token Rotation Time)
  - AMT (Absolute Maximum Time)
- TRT (Token Rotation Timer)
- THT (Token Holding Time)

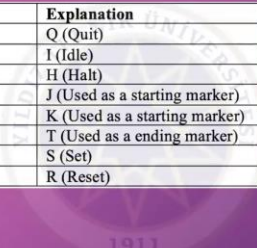


Furkan Çakmak

# FDDI (Fiber Distributed Data Interface) - Con't

- 4B/5B Coding
  - Using NRZ-I

5 Bit	Explanation	4 Bit	5 Bit	4 Bit	5 Bit
00000	Q (Quit)	0000	11110	1000	10010
11111	I (Idle)	0001	01001	1001	10011
00100	H (Halt)	0010	10100	1010	10110
11000	J (Used as a starting marker)	0011	10101	1011	10111
10001	K (Used as a starting marker)	0100	01010	1100	11010
01101	T (Used as a ending marker)	0101	01011	1101	11011
11001	S (Set)	0110	01110	1110	11100
00111	R (Reset)	0111	01111	1111	11101



Furkan Çakmak

# FDDI - Framing

BLM3051  
Data  
Communication  
Week 10

