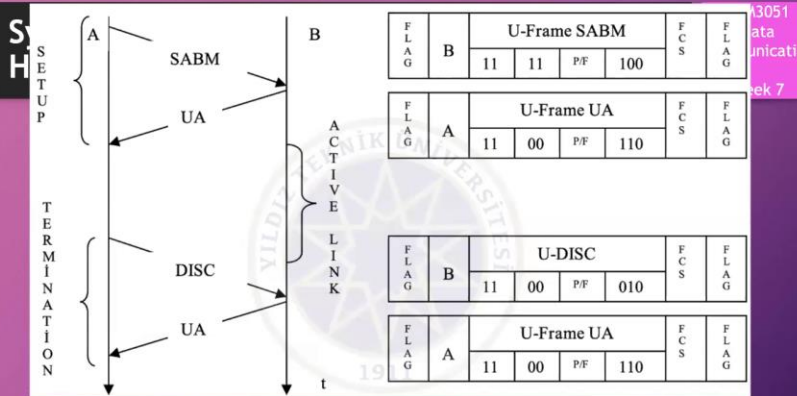


# Synchronous Protocols - Bit Oriented - HDLC Mechanism

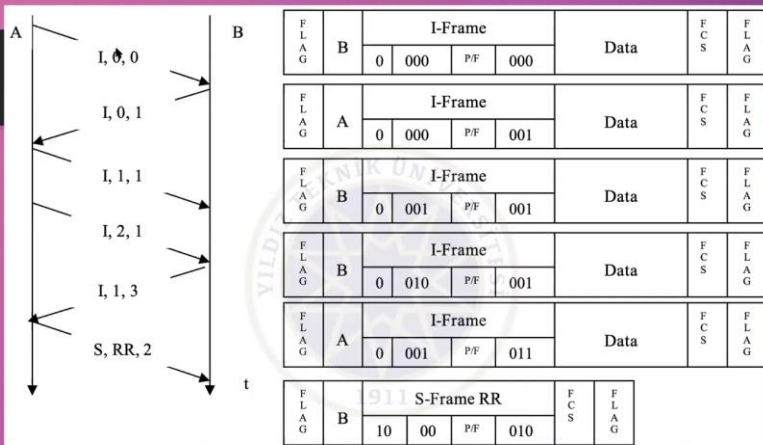
BLM305  
Data  
Communications  
Week 7

- I, U and S frames
- 3-phase mechanism
  - One of the sides must install the link
    - in order to be able to exchange data sequentially
  - User data, flow and control information required for error control must be transferred between the two ends.
  - One of the sides terminates the connection

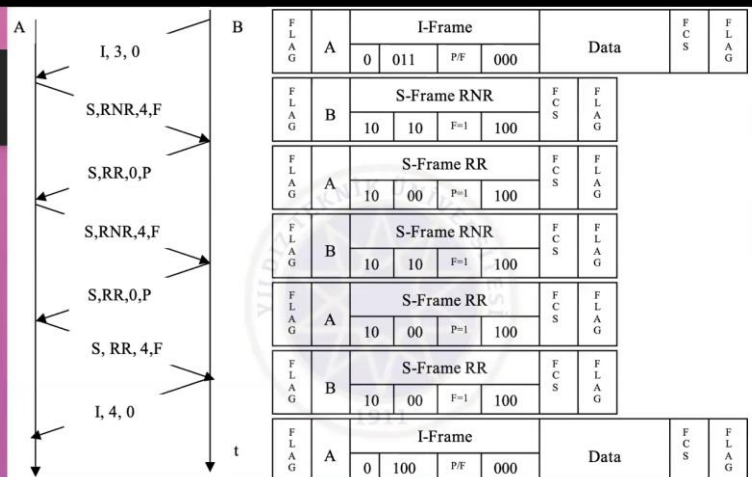
Furkan Çakmak



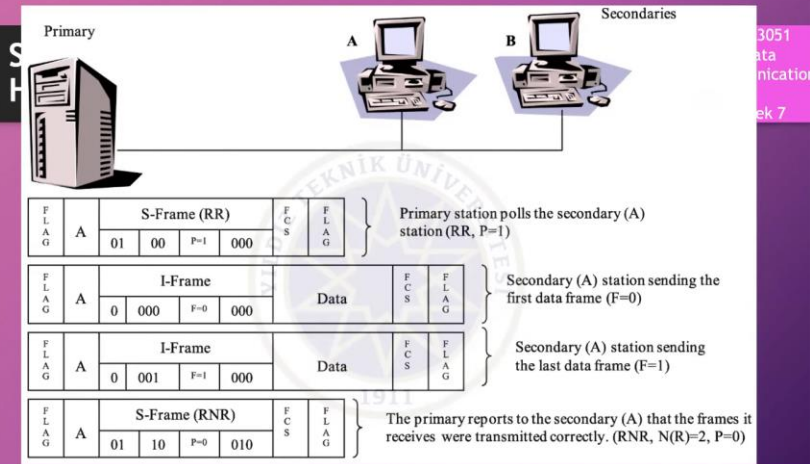
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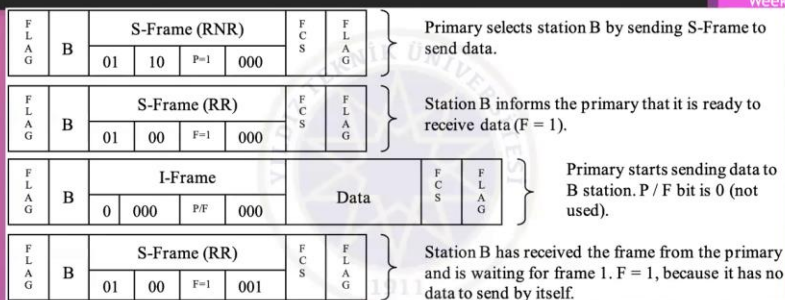
Furkan Çakmak



051  
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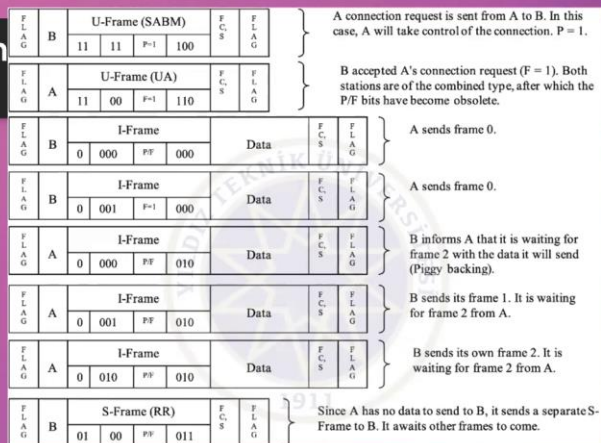


## Synchronous Protocols - Bit Oriented - HDLC Mechanism - Multi-Point



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## Synch HDLC



Furkan Çakmak

## LAN - Local Area Networks

- Multi-point mode
- Basic models:
  - Ethernet - IEEE 802
  - Token Bus - IEEE 802
  - Token Ring - IEEE 802
  - FDDI/CDDI (Fiber/Copper Distributed Data Interface) - ANSI
  - WLAN (Wireless LAN) - IEEE 802
- Data Link Layer is consist of HDLC
- 3 types of Media Access:
  - Fixed Based
    - TDMA, FDMA veya CDMA (Time/Frequency/Code Division Multiple Access)
  - Contention Based
    - Aloha, CSMA
  - Token/Reservation Based
    - Token Ring

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# IEEE 802 Project

BLM3051  
Data  
Communication  
Week 9

- LANs
  - 802.3 Ethernet
  - 802.4 Token Bus
  - 802.5 Token Ring
- Wireless LANs
  - 802.11 Wi-Fi
- Wireless PANs
  - 802.15 WPAN
  - 802.15.1 BlueTooth
  - 802.15.4 Zigbee
- WANs
  - 802.16 Wi-Max

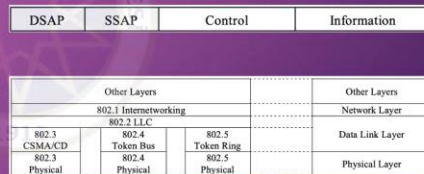


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## IEEE 802 Project - Con't

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Data  
Communication  
Week 9

- to ensure compatibility between protocols used in LANs
- MAC (Media Access Control)
- LLC (Logical Link Control)
  - Un-ack connectionless service
  - Connection mode service
  - Ack connectionless service
- PDU (Protocol Data Unit)
  - in LLC
  - DSAP (Destination Service Access Point)
  - SSAP (Source Service Access Point)
  - Control Field
  - Information Field

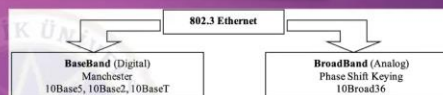


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## IEEE 802.3 Ethernet

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Data  
Communication  
Week 9

- 1972
- Xerox Corp.
- Aloha
  - Bob Metcalfe
  - 1973
  - Hawaii Islands
    - Radio network
  - Collision?
  - Utility Rate: 18%
- Slotted Aloha
  - Utility Rate: 37%

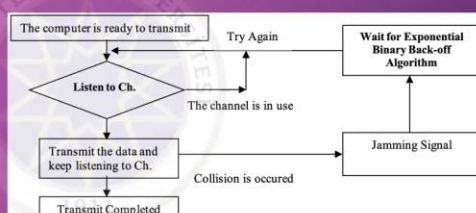


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## CSMA (Carrier Sense Multiple Access)

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Data  
Communication  
Week 9

- The goal is to improve the Slotted Aloha.
- Nonpersistent CSMA
- 1-Persistent CSMA
- p-Persistent CSMA
- CSMA/CD (Collision Detect)



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## IEEE 802.3 Ethernet - Framing

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Communication  
Week 9

7 byte	1byte	2-6 byte	2-6 byte	2 byte	46-1500	4byte
Preamble	SFD	Dest.Addr	Src.Addr	Length	Data. Unit	CRC

- Preamble: **10101010**
  - for sync.
- SFD (Start of Frame Delimiter): **10101011**

- Shared and Switched Ethernet

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## IEEE 802.3 Ethernet Variations

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Communication  
Week 9

- **IEEE 802.3u - IEEE 802.3y - Fast Ethernet**
  - 10 Mbps -> 100 Mbps
  - Auto Negotiation
- **IEEE 802.3z - IEEE 802.3ab Gigabit Ethernet**
  - Cat5/5e/6/7/8
  - 100 Mbps -> 1000 Mbps
  - Auto Negotiation
- **IEEE 802.3ae - IEEE 802.3ak - IEEE 802.3an - IEEE 802.3aq - 10 GigE**
  - 1 Gbps -> 10 Gbps
- **IEEE 802.3ba - 40/100G Ethernet**
  - 40-100 Gbps

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## Metro Ethernet, *Power over Ethernet (PoE)*

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Communication  
Week 9



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