



# CS684 – Network Protocols

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## Session 2



# The Link Layer (OSI layer 2)

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- Provides a protocol for communication over the physical medium
- Provides error checking
- Provides primitive flow control



# Classifications

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- LAN
- MAN
- WAN
- (GAN)



# Topologies

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- Star

- Every node connected to a central node

- Ring

- Each node connected to a left and right node; last node connected to first

- Bus

- All nodes connected to a common cable

- Meshed

- All nodes connected to every other node

- Point-to-Point

- Only two nodes in the network

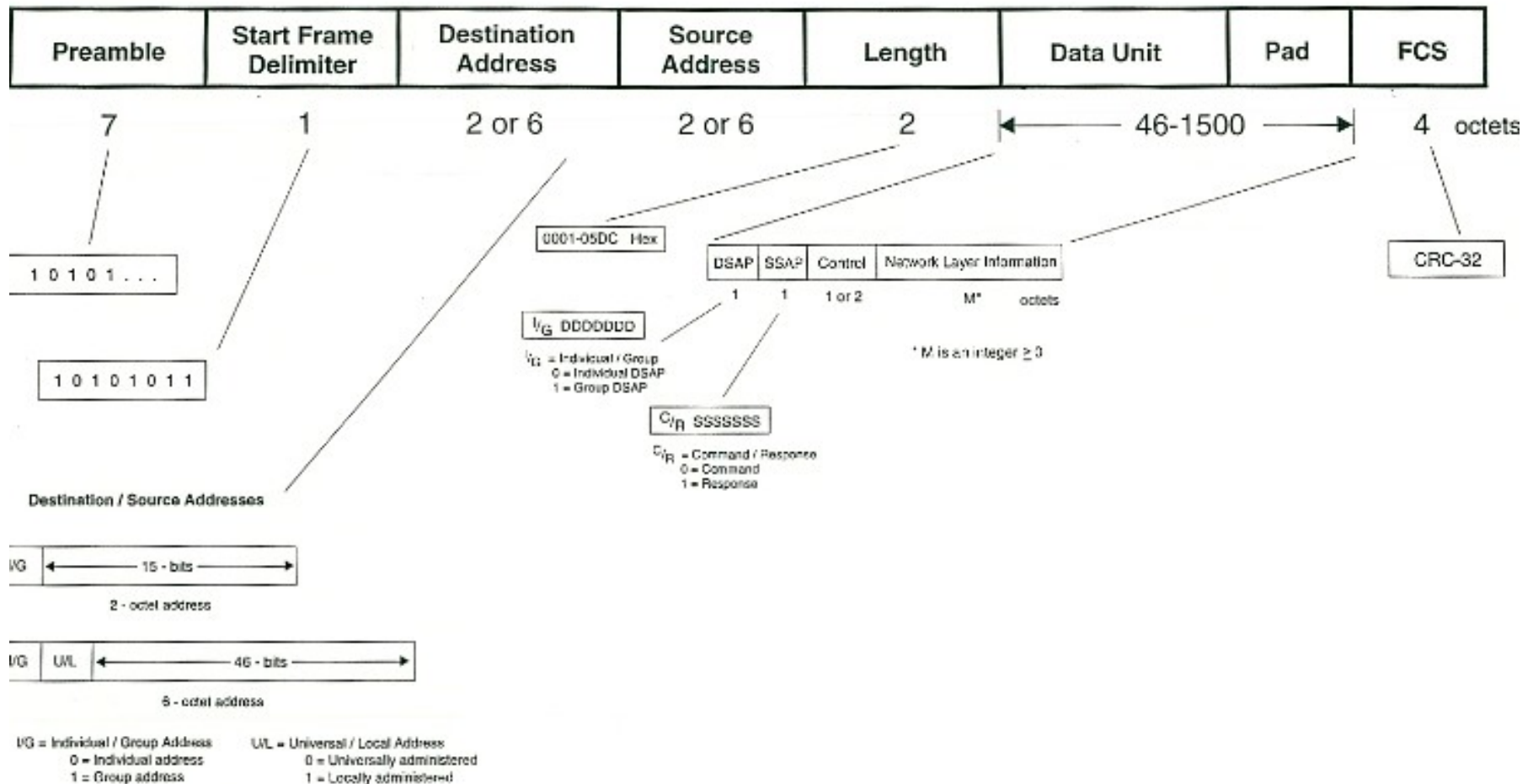


# Ethernet

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- Most common LAN protocol today
- Very inexpensive
- Designed by Xerox and released into the public domain.
- Controlled by the IEEE 802 working committee
- Current Maximum 1GBps

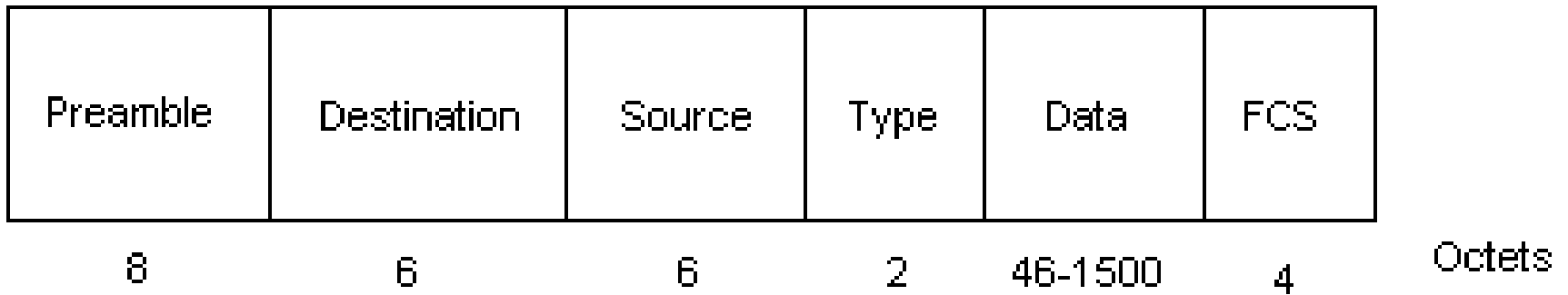
# Ethernet 802.3





# Ethernet V2

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# CSMA/CD Protocol

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- Carrier Sense Multiple Access with Collision Detection
  1. When a node has data to transmit, it first listens
  2. If there is silence on the network, begin transmitting; otherwise wait for silence.
  3. If during transmission, the voltage on the line rises above +5v, stop transmitting, generate a random number and wait that amount of time
  4. Restart with step 1 as necessary





# Token-Ring

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- Owned by IBM
- Expensive
- A token is passed in around the ring
- Only the station holding the ring may transmit
- Current Maximum 16MBps



# Maximum Transmission Unit

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- The MTU is the limit on the size of the frame
- A station must not transmit a frame larger than the MTU
- Ethernet V2 MTU - 1500
- Ethernet 802.3 MTU - 1492



# Internet Protocol

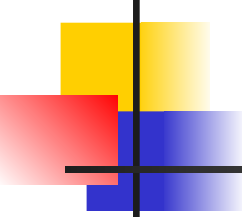
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# A history of IP

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- Originally designed by the DOD for military purposes
- Used to create the DARPANET
- DARPANET later evolved into the Internet for Educational purposes
- Recently been utilized more for commercial purposes



# IP Header

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	bits
Ver				IHL				Type of Service								Total Length																
Identifier												Flags				Fragment Offset																
Time To Live								Protocol								Header Checksum																
Source Address																																
Destination Address																																
Options + Padding																																

(Minimum IP Header Length 20 Octets)