Indian Institute of Information Technology, Vadodara
Department of Computer Science & Engineering
M.Tech Semester-I Computer Systems (CS611)
Name: Chetankumar Kamani, Student ID: 20251603005
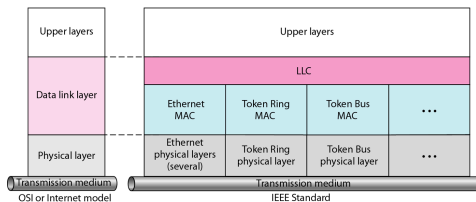
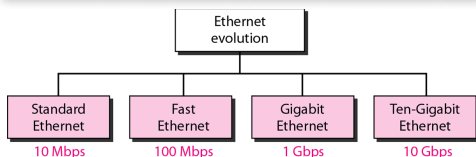Download this poster

IEEE 802.3 — The Ethernet LAN Standard

The IEEE 802 Project defines networking standards for LANs and MANs. IEEE 802.3 specifies the Ethernet standard, which is the most widely used LAN technology in the world.

1. IEEE standard for LANs

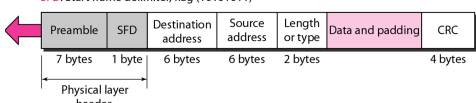LLC: Logical link control
MAC: Media access control

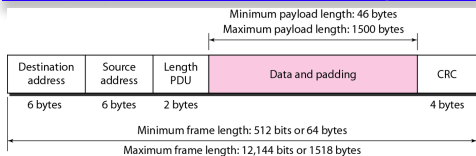| Upper layers	Upper layers			
Data link layer	LLC			
	Ethernet MAC	Token Ring MAC	Token Bus MAC	...
	Ethernet physical layers (several)	Token Ring physical layer	Token Bus physical layer	...
Physical layer				

Transmission medium — OSI or Internet model
Transmission medium — IEEE Standard

2. Ethernet Evolution

Ethernet evolution

Standard Ethernet	Fast Ethernet	Gigabit Ethernet	Ten-Gigabit Ethernet
10 Mbps	100 Mbps	1 Gbps	10 Gbps

3. 802.3 MAC Frame

Preamble: 56 bits of alternating 1s and 0s.
SFD: Start frame delimiter, flag (10101011)

Preamble	SFD	Destination address	Source address	Length or type	Data and padding	CRC
7 bytes	1 byte	6 bytes	6 bytes	2 bytes		4 bytes

Physical layer header

4. Minimum and Maximum Lengths

Minimum payload length: 46 bytes
Maximum payload length: 1500 bytes

Destination address	Source address	Length PDU	Data and padding	CRC
6 bytes	6 bytes	2 bytes		4 bytes

Minimum frame length: 512 bits or 64 bytes
Maximum frame length: 12,144 bits or 1518 bytes

5. Ethernet Address in Hexadecimal Notation

06 : 01 : 02 : 01 : 2C : 4B

6 bytes = 12 hex digits = 48 bits

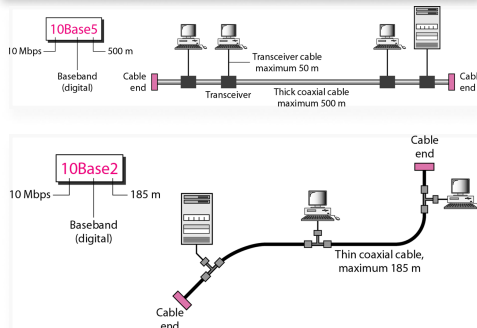Unicast: 0; multicast: 1

Byte 1   Byte 2   ...   Byte 6

- The least significant bit of the first byte defines the type of address. If the bit is 0, the address is unicast; otherwise, it is multicast.
- The broadcast destination address is a special case of the multicast address in which all bits are 1s.
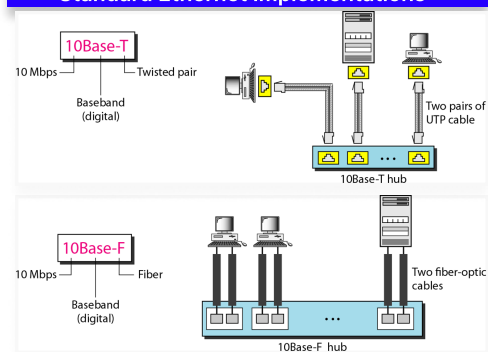
Unicast Address ▶ 4A:30:10:21:10:1A
Multicast Address ▶ 47:20:1B:2E:08:EE
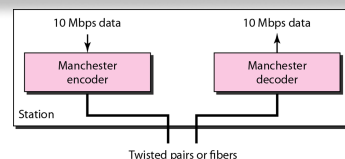Broadcast Address ▶ FF:FF:FF:FF:FF:FF

6. Standard Ethernet Implementations

10Base5
10 Mbps — 500 m
Baseband (digital)
Cable end
Transceiver cable maximum 50 m
Transceiver
Thick coaxial cable maximum 500 m
Cable end

10Base2
10 Mbps — 185 m
Baseband (digital)
Thin coaxial cable, maximum 185 m
Cable end
Cable end

Standard Ethernet Implementations

10Base-T
10 Mbps — Twisted pair
Baseband (digital)
Two pairs of UTP cable
10Base-T hub

10Base-F
10 Mbps — Fiber
Baseband (digital)
Two fiber-optic cables
10Base-F hub

7. Encoding in a Standard Ethernet implementation

10 Mbps data → Manchester encoder
10 Mbps data → Manchester decoder
Station
Twisted pairs or fibers

8. Access Method

- The standard Ethernet chose **CSMA/CD** with 1-persistent method.

9. Changes in the Standard

Standard Ethernet → Bridged Ethernet → Switched Ethernet → Full Duplex Ethernet

10. References

- Forouzan, B. A. (2007). Data communications and networking (4th ed.)
- Data Communication and Networking 5E, BEHROUZ A. FOROUZAN