

BCA – Part III
Computer Network

Ethernet and MAC Address :-

Ethernet is the Media Access protocol implemented at Data link layer for successful transmission of Data . Actually, the network address is defined by the network interface card that define local computer network address known as MAC address. This address is govern by the protocol known as Ethernet. This protocol is generally IEEE standard .

The original Ethernet was created in 1976 at Xerox's Palo Alto Research Centre. In the later days , different standard Ethernet is developed by the name as

1. Standard Ethernet (10 Mbps)
2. Fast Ethernet(100 Mbps)
3. Gigabit Ethernet(1 Gbps)
4. Ten-Gigabit Ethernet (10 Gbps)

1. Standard Ethernet :- it the first Ethernet and MAC sublayer governs the operation of access Method. It also frames data received from the upper layer and passes them to the physical layer .

The Standard Ethernet frame is of more than 26 byte long in which they bind multiple information as preamble, SFD,DA,SA, PDU,DATA and CRC. The Ethernet frame format may be shown as :-

Preamble (7B)	STD(1 B)	Destination Address 6 B	Source Address 6B	Length or type 2 B	Data and padding	CRC 4 Byte
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First information in Ethernet frame contain 7 byte of alternating 0s and 1s that alter the receiving system to coming frame and enable it to synchronize the input timing. It is added to physical layer and not the part of frame.

Start data delimiter . the second field signals the beginning of frame and warn the station that this is the last chance for synchronization.

The DA field is 6 byte and contain the physical address of the destination station.

The SA field is also 6 byte contain the physical address of the source station.

The length and type filed define type and length of the data to be transmitted with this frame.

Data and padding field is actually the data information to be transmitted . It may be of 46 byte to 1500 byte.

CRC field contains the information of error correction and detection

Type of Ethernet. →

1. 10Base5 (Thick Ethernet)→ It is the first implementation of Ethernet technology known as thick ethernet derived from the size of the cable.this Ethernet specification use a bus topology with an external trans receiver connected via a tap to a thick coaxial cable.this Ethernet can extend up to 500 meter .
2. 10Base2(Thin Ethernet)-> it is second implementation known as thin Ethernet or Cheapernet , uses bus topology . here transreceiver is normally part of the network interface card which is installed inside the station. It is more flexible and can us up to 200 meter. Coaxial cable is the main bus component of this Network.
3. 10BaseT(Twisted pair Ethernet)-> it is third implementation generally use in star topology. Here stations are connected with a hub via twisted pair cable. This Ethernet can work smoothly up to 100 meter.
4. 10BaseF(Fiber Ethernet)→ this type of Ethernet can work with optical fiber cable . the stations are connect using optical hub. We can setup this type of Ethernet upto 2000 meter.

The speed of transmission of above all the Ethernet is 10Mbps.

5. Bridge Ethernet→ to increase the speed of transmission, another Ethernet technology is invented in which bridge Ethernet is one of them. A bridge device the work into two or more network. Bandwidth wise each network is independent. As a result, by dividing the load of the network, maximum bandwidth can be achieved where each network can work with the speed 10Mbps. It means , in bridge Ethernet , if the network is divided in 10 different sub network then total speed can be 100 Mbps. The speed of Ethernet depends upon the total

number of sub network divided by the bridge at the time of consideration but bridge network has limit to divide into sub network.

6. Switched Ethernet:- the idea of bridge Ethernet can be extended to a switch LAN where a network can be divided into n-sub network . As a result , the speed of transmission can be increased strangely . the switch Ethernet may be further, half duplex and full duplex based .

7. Fast Ethernet-> Fast Ethernet is designed to compete the speed with fiberoptics channels. It is backward compatible with standard Ethernet but can transmit data 10 time faster.

The fast Ethernet can be summarized as :-

- a. Upgrade the data rate to 100Mbps
- b. Make it compatible with standard Ethernet
- c. Keep the same 48-bit addressing
- d. Keep the same frame format
- e. Keep the same maximum and minimum frame rate .

` In the fast Ethernet new feature is added called autonegotiation that allow a stations or a hub range of compatibility . it generally work with fibre optics cable but we have two technology to work with (100Base Tx) twisted pair cable, (100Base Fx) fibre optics cable..

8. Gigabit Ethernet→ it is the fastest Ethernet technology work with the transmission speed 1000 Mbps and can be extended up to 10 Gbps. IEEE committee standard named as standard 802.3z protocol architecture.

Summarized as :-

- a. Upgrade the data rate upto 1Gbps.
- b. Make it compatible with fast Ethernet
- c. Use 48 bit addressing
- d. Use the same frame format
- e. Keep the same minimum and maximum frame length
- f. To support autonegotiation as defined in fast Ethernet.

The Ethernet standard is :

1000Base Sx -> two wire short wave fiber

1000Base Lx → two –wire long range fiber

1000BaseCx → Two wire copper STP

1000Base T → Four wire UTP.

Gigabit Ethernet cannot use the Manchester encoding scheme because it involves a very high bandwidth.