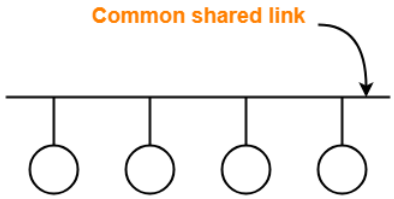
# Ethernet

- Ethernet is one of the standard LAN technologies used for building wired LANs.
- It is defined under IEEE 802.3.
- Ethernet is a widely used local area networking technology that enables devices to communicate with each other. Ethernet frames are basic units of data that are transmitted over Ethernet network

## Characteristics-

- Ethernet uses bus topology.
- In bus topology, all the stations are connected to a single half duplex link.

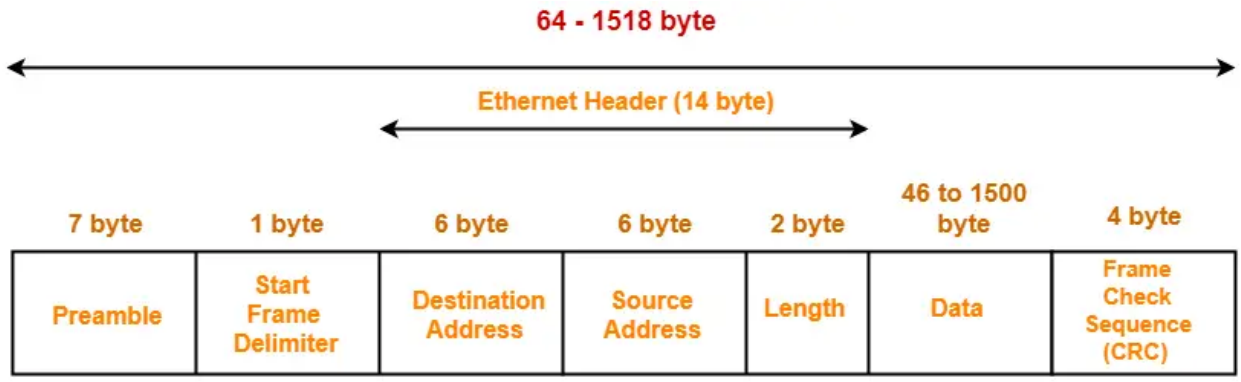



Bus Topology

- Ethernet uses **CSMA / CD** as access control method to deal with the collisions.

## Ethernet Frame Format-

- IEEE 802.3 defines the following Ethernet frame format-




IEEE 802.3 Ethernet Frame Format

## 1. Preamble-

- It is a 7 byte field that contains a pattern of alternating 0's and 1's.
- It alerts the stations that a frame is going to start.
- It also enables the sender and receiver to establish bit synchronization.

## 2. Start Frame Delimiter (SFD)-

- It is a 1 byte field which is always set to 10101011.
- The last two bits "11" indicate the end of Start Frame Delimiter and marks the beginning of the frame.

### NOTES

- The above two fields are added by the physical layer and represents the physical layer header.
- Sometimes, Start Frame Delimiter (SFD) is considered to be a part of Preamble.
- That is why, at many places, Preamble field length is described as 8 bytes.

## 3. Destination Address-

It is a 6 byte field that contains the MAC address of the destination for which the data is destined.

## 4. Source Address-

It is a 6 byte field that contains the MAC address of the source which is sending the data.

## 5. Length-

- It is a 2 byte field which specifies the length (number of bytes) of the data field.
- This field is required because Ethernet uses variable sized frames.

**NOTES**

- The maximum value that can be accommodated in this field = $2^{16} – 1 = 65535$.
- But it does not mean maximum data that can be sent in one frame is 65535 bytes.
- The maximum amount of data that can be sent in a Ethernet frame is 1500 bytes.
- This is to avoid the monopoly of any single station.

The following three fields collectively represents the **Ethernet Header**–

- Destination Address (6 bytes)
- Source Address (6 bytes)
- Length (2 bytes)
- Thus, Ethernet Header Size = 14 bytes.

## 6. Data-

- It is a variable length field which contains the actual data.
- It is also called as a **payload field**.
- The length of this field lies in the range [ 46 bytes , 1500 bytes ].
- Thus, in a Ethernet frame, minimum data has to be 46 bytes and maximum data can be 1500 bytes.

## 7. Frame Check Sequence (CRC)-

- It is a 4 byte field that contains the CRC code for error detection.

## ***Advantages of using ethernet***

- Its is simple to understand and easy to implement
- Its Maintenance is easy
- Its is cheap
- Relatively low cost.
- Speed.

## Disadvantages of Ethernet

Despite its widespread use, Ethernet does have its share of disadvantages, such as the following:

- Intended for smaller, shorter-distance networks.
- Limited mobility.
- Use of longer cables can create cross-talk.
- Doesn't work well with real-time or interactive applications.
- Speeds decrease with increased traffic.
- Receivers don't acknowledge the reception of data packets