DEVICES AND COMMUNICATION
BUSES FOR DEVICES NETWORK–

Lesson-25: ETHERNET PROTOCOL
Ethernet

- Inventor of Ethernet LAN—Robert Metcalfe
- About one third of the LANs in the world—Ethernet LANs.
- Ethernet is a protocol for local network of computers, workstations and devices.
- LAN—Service sharing by the local computers, systems and sharing of local resources like printers, hard disk space, software and data
- Each frame has a header like in a packet.
- IEEE 802.2 (ISO 8802.2) Standard data-link MAC Media Access control) layer
Ethernet LAN Features

- Bus topology, Wired LAN in IEEE 802.3 physical layer standard
- 10 Mbps, 100 Mbps (Unshielded and Shielded wires) and 4 Gbps (in twisted pair wiring mode)
- Broadcast medium—Passive, Wired connections based.
- Frame format like the IEEE 802.2
Ethernet LAN Features

- SNMP (Simple Network Management Protocol)
- Open system (therefore allows equipment of different specifications)
- Each one connected to a common communication channel in the network listens and if the channel is idle then transmits. If not idle, waits and tries again. Multi access is like in a Packet switched network
## TCP/IP Network 5 layers

<table>
<thead>
<tr>
<th>Layer</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Application</td>
<td>HTTP or FTP or Telnet or other</td>
</tr>
<tr>
<td>TCP or UDP</td>
<td></td>
</tr>
<tr>
<td>internet</td>
<td></td>
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<tr>
<td>Data-link</td>
<td></td>
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<tr>
<td>Physical</td>
<td></td>
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</tbody>
</table>

- **Ethernet 802.2**
- **Ethernet 802.3 wired LAN**
Ethernet LAN Network between data-link layers of devices/systems

MAC (media access control) address

Data-link from system

Ethernet interface

Frames

Ethernet Interface

IP address

Data-link System

MAC address

LAN Network Bus

From Internet

RARP

To Internet

IP address

Ethernet Interface

IP address

Ethernet Interface

IP address

Ethernet Interface

ARP

Internet

System

System

System

Frames
Ethernet LAN

- Passive, connection based
- Media access control (MAC) 48-bit address for transmitting and forwarding frames on same LAN only.
- Can also use multicast addressing—for sending frames to all or few select types of Ethernet devices
Connectivity to Internet

- Outside a LAN the Internet Protocol addresses sent
- Address Resolution Protocol (ARP) for resolving 32 bits Internet protocol addresses with the 48 bit destination host media address. RARP (reverse ARP) for vice versa
Header Bytes in Ethernet Frame

- A data for transmission fragments into the frames.
- Frame has a header.
- Firstly, the header has eight bytes, which defines a preamble.
- The preamble is for indicating start of a frame and is used for synchronization.
- Then the header has six bytes (48-bits) of destination MAC address.
- Six bytes (48-bits) of the source MAC address follow the destination MAC.
Data in Ethernet Frame

- Then there are six bytes. These are for the type field. These are meaningful only for the higher network layers and the length definition.
- Minimum 72 bytes and maximum 1500 bytes of data follow the length definition.
- Lastly, there are 4 bytes for CRC check for the frame sequence check.
Summary
We learnt

- Ethernet LAN protocol for local network of computers, workstations and devices
- Data-link layer protocol
- Each of the frames has a header like in a packet.
- IEEE 802.2 (ISO 8802.2) Standard
- Bus topology
- MAC addresses of 48-bit
End of Lesson 25 of Chapter 3