Computer Networks

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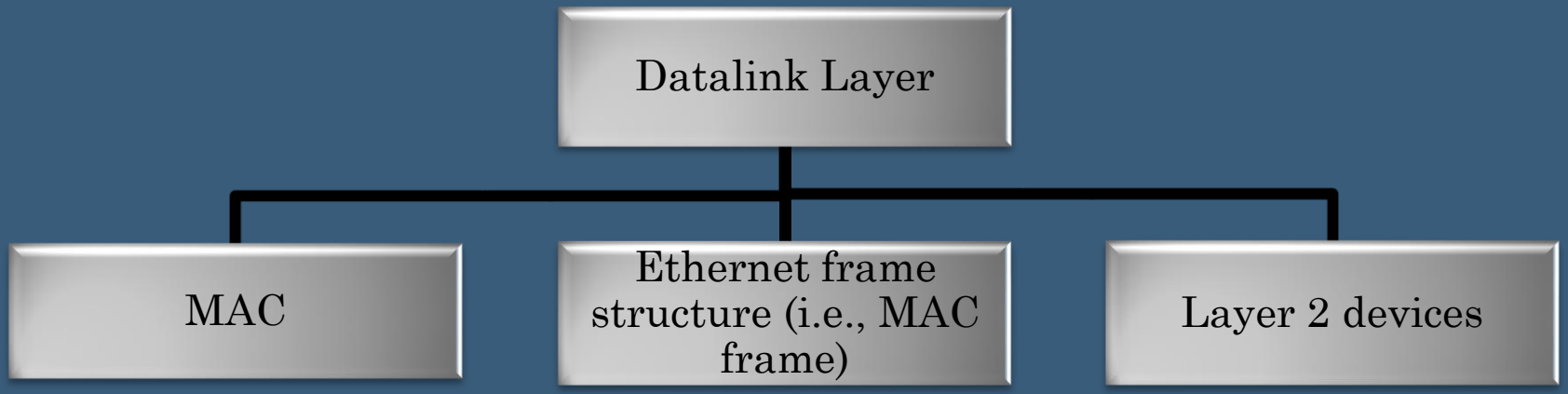
Lect_4

The datalink Layer

Datalink Layer



Datalink layer

1. MAC address
   - MAC stands for media access control.
   - Sometimes called physical address, hardware address or hop to hop address.
   - Def: it is a unique identifier assigned to a network interface controller (NIC) for use as a network address in communications within a network segment.
   - This use is common in most IEEE 802 networking technologies, including Ethernet, Wifi, and Bluetooth.
   - MAC addresses are controlled by IEEE.
   - It is represented in hexadecimal system (0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F).
   - Ethernet MAC address consist of 6 byte (i.e., 48 bits or 12 hexa).
   - Total number of MACs = 2^48 = 281, 474, 976, 710, 656.
     (over 281 trillion MAC).

Datalink layer

- MAC is burnet on ROM of DTE NIC.
- The first 6 hexa call vendor part or call OUI (Organization Unique Identifier) (ex.: 64-D0-D6 for samsung)
- The second 6 hexa call host part or HUI (Host Unique Identifier)
  (ex.: 04-D9-6C).
- No of OUI = 2 ^24 = 16,777,215.
- No of HUI = 2^24 = 16,777,215.

Datalink layer

- Type of destination MAC
  1. Unicast MAC
     - One to one or one send and only one receive (i.e., process).
     - Unicast MAC is hardware MAC.
  2. Broadcast MAC
     - One send and all process.
     - IEEE specified that this MAC is FF-FF-FF-FF-FF-FF.
     - It is hardware MAC.
     - Each NIC has unicast MAC (unique) and broadcast MAC (general).

Datalink layer

- What is the difference between flood and broadcast?
  - For flooding: the destination of frame is specific! just switch has no idea of where to switch it but simply switch to everyone it connected except the source interface.[frame exactly know its destination MAC]
  - For broadcasting: the destination of frame is NOT specific but to anyone(SO that is broadcast!). therefore its MAC address is ff-ff-ff-ff-ff-ff (or FF-FF-FF-FF-FF-FF, as a MAC address's case does not matter.)[frame has no idea of its destination MAC]

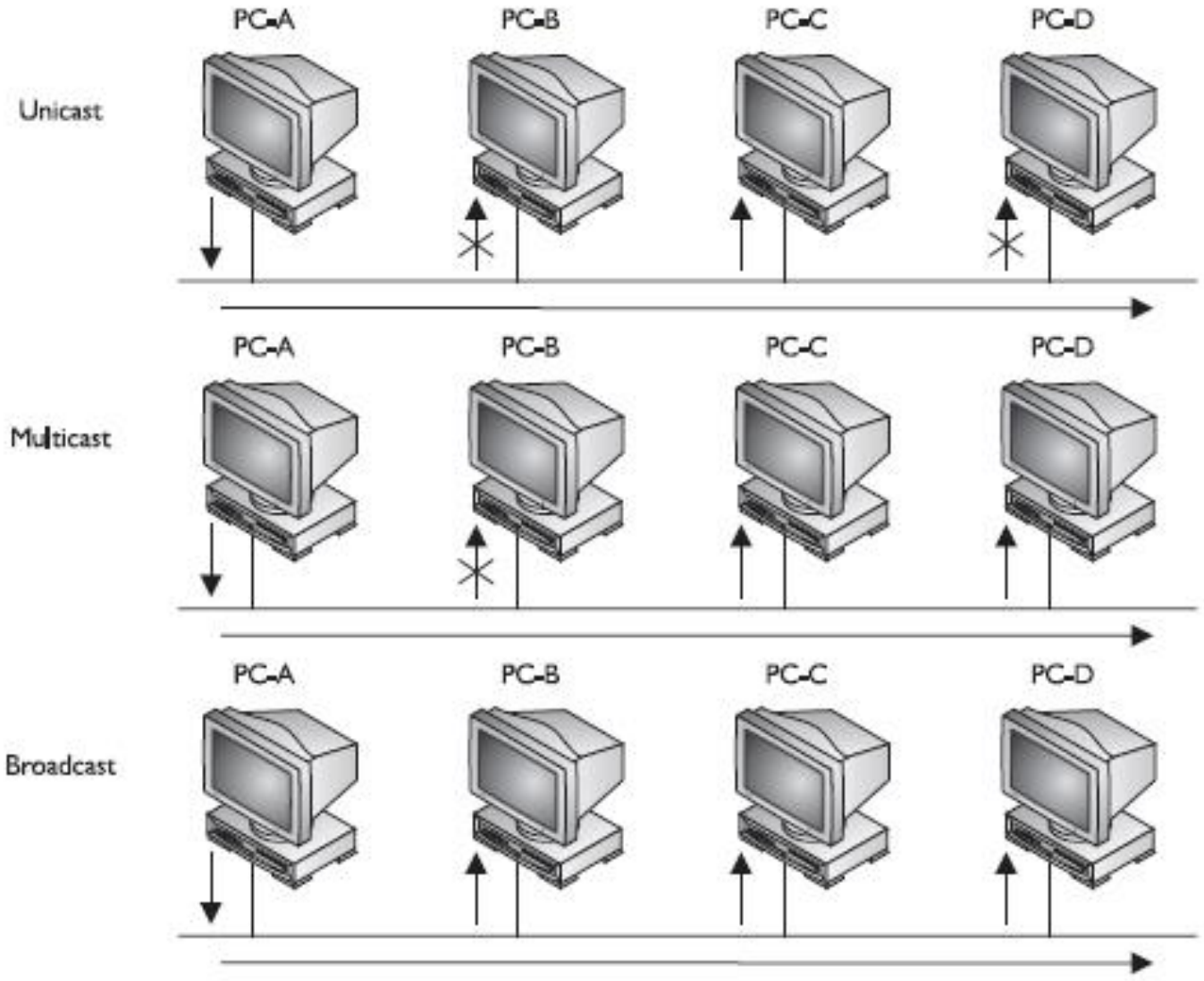
Datalink layer

3. Multicast MAC
   - Multicast MAC is a logical identifier for a group of hosts in a computer network that are available to process frames intended to be multicast for a designated network service.
   - Sometimes called group MAC.
   - One send and group or many receive.
   - It is software MAC, and installed on RAM of NIC.

Datalink layer

FIGURE 2-2

MAC address types



Datalink layer

2. Ethernet Frame Structure (i.e., MAC frame).

- MAC frame consist of :-
  1. Packet.
     1. Maximum size is 1500 byte.
     2. Minimum size 46 byte.
  2. Destination MAC
     1. It’s size is 6 byte.
  3. Source MAC
     1. It’s size is 6 byte.
  4. Type
     1. It refers to type of packet (i.e., IPV4, IPV6).
     2. It’s size is 2 byte.
  5. CRC

     it’s size is 4 byte.

Datalink layer

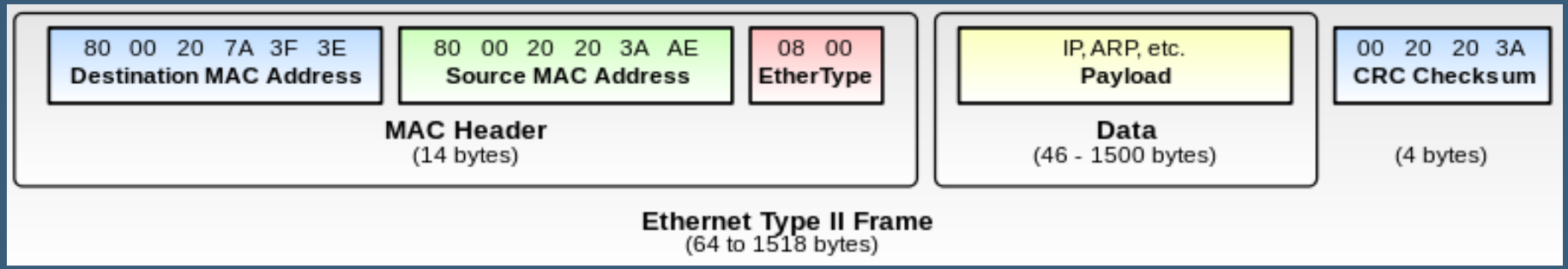
- Hence frame size will be :

  1- Minimum frame size

  46 + 18 = 64 bytes.

  2- Maximum frame size

  1500 + 18 = 1518 bytes.



Datalink layer

1. Layer 2 devices

- A layer 2 device is a device that understand MAC, for example:
  1. **NIC (Network Interface Card)**
  2. **Bridge :**
     - address learning
     - forwarding decisions are based on software
     - bridge is used for LAN segmentation

  3. **Switch:**
     - a multi-port bridge
     - forwarding decisions are based on hardware ASIC (Application Specific Integrated Circuits) (faster than bridge)

SEPARATOR TEXT GOES HERE

THANK YOU

For any questions feel free
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