SNS College of Engineering Coimbatore - 641107

UNIT 2

LINK LAYER

Services, ARP, DLC Protocols, HDLC, PPP, Media Access Control, Wired LANs: Ethernet, Wireless LANs: IEEE 802.11, Bluetooth, Connecting devices: Hubs, Routers, Switches.

Media Access Control

Media Access Control

MAC Addresses are unique **48-bit** that is embedded into a network card (known as a network interface card during manufacturing.
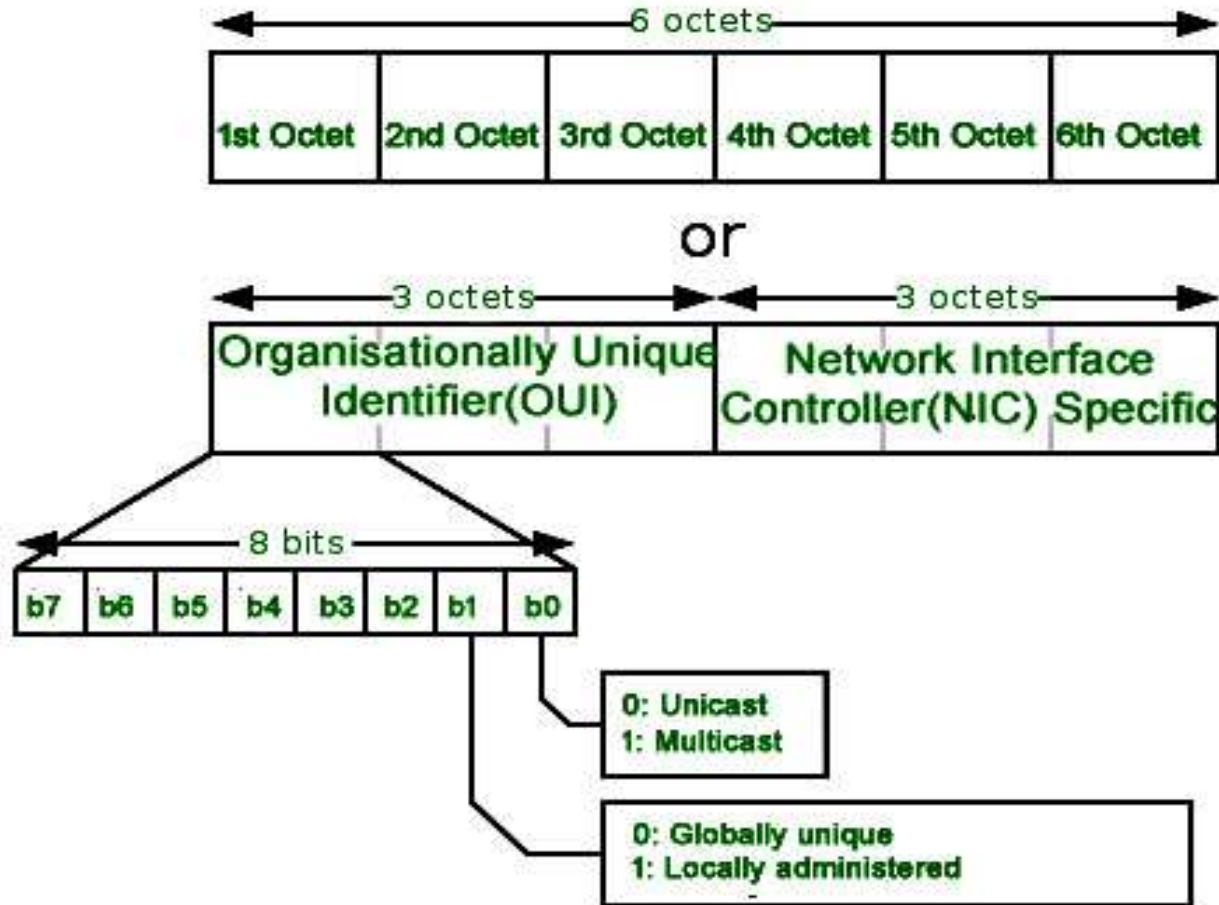
Also known as physical address.

Sublayers of Data link layer

- The data link layer is divided into two sublayers:
1. Logical Link Control (LLC) Sublayer
2. Media Access Control (MAC) Sublayer

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Format of MAC

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Fields of PPP

- MAC Address is a 12-digit hexadecimal number

- Represented by colon-hexadecimal notation.

- Some OUI of well known manufactures
  - CC:46:D6 (Cisco)
  - 3C:5A:B4 (Google, Inc.)
  - 3C:D9:2B (Hewlett Packard)
  - 00:9A:CD (Huawei Technologies co., Ltd

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Hypen-Hexadecimal notation

00-0a-83-b1-c0-8e

Colon-Hexadecimal notation

00:0a:83:b1:c0:8e

Period-separated hexadecimal notation

000.a83.b1c.08e

Colon-Hexadecimal notation is used by Linux OS and Period-separated Hexadecimal notation is used by Cisco Systems.

Command for MAC in W-OS


```
Command Prompt                    ×    +  ∨                                    —    □    ×

Microsoft Windows [Version 10.0.22621.1848]
(c) Microsoft Corporation. All rights reserved.

C:\Users\GFG0251>ipconfig/all

Windows IP Configuration

   Host Name . . . . . . . . . . . . : GFG0250-UDAY
   Primary Dns Suffix  . . . . . . . :
   Node Type . . . . . . . . . . . . : Hybrid
   IP Routing Enabled. . . . . . . . : No
   WINS Proxy Enabled. . . . . . . . : No
   DNS Suffix Search List. . . . . . : gfg.geeksforgeeks.org

Ethernet adapter Ethernet:

   Connection-specific DNS Suffix  . : gfg.geeksforgeeks.org
   Description . . . . . . . . . . . : Intel(R) Ethernet Connection (6) I219-LM
   Physical Address. . . . . . . . . : C8-F7-50-79-59-94
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::37aa:dd6c:99d6:662f%12(Preferred)
   IPv4 Address. . . . . . . . . . . : 10.143.75.110(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Lease Obtained. . . . . . . . . . : 14 July 2023 08:54:46
   Lease Expires . . . . . . . . . . : 22 July 2023 13:18:12
   Default Gateway . . . . . . . . . : 10.143.75.101
                                       10.143.75.102
   DHCP Server . . . . . . . . . . . : 10.143.70.253
   DHCPv6 IAID . . . . . . . . . . . : 214497104
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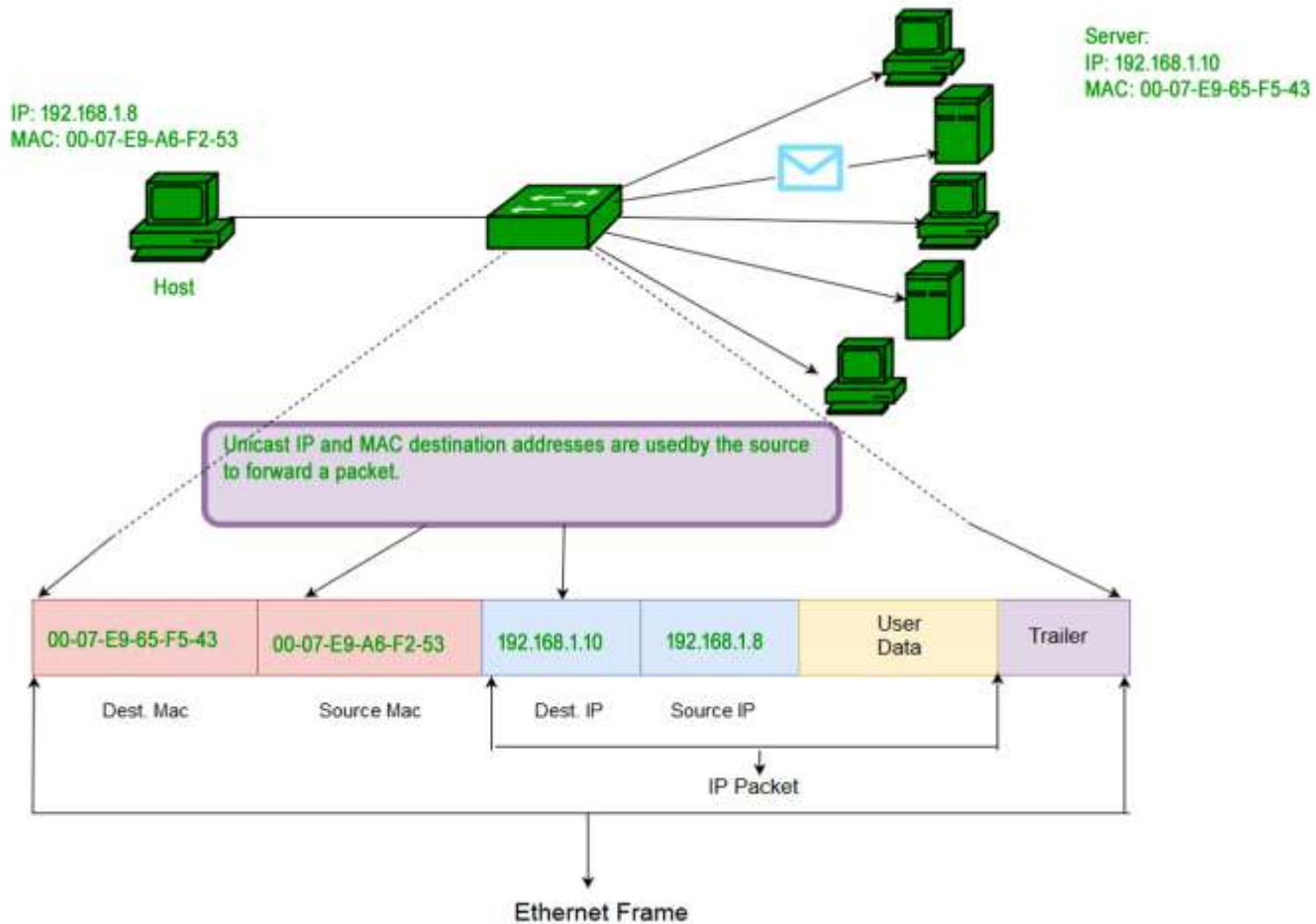
25.09.2023   7   K.Revathi,AP/IT
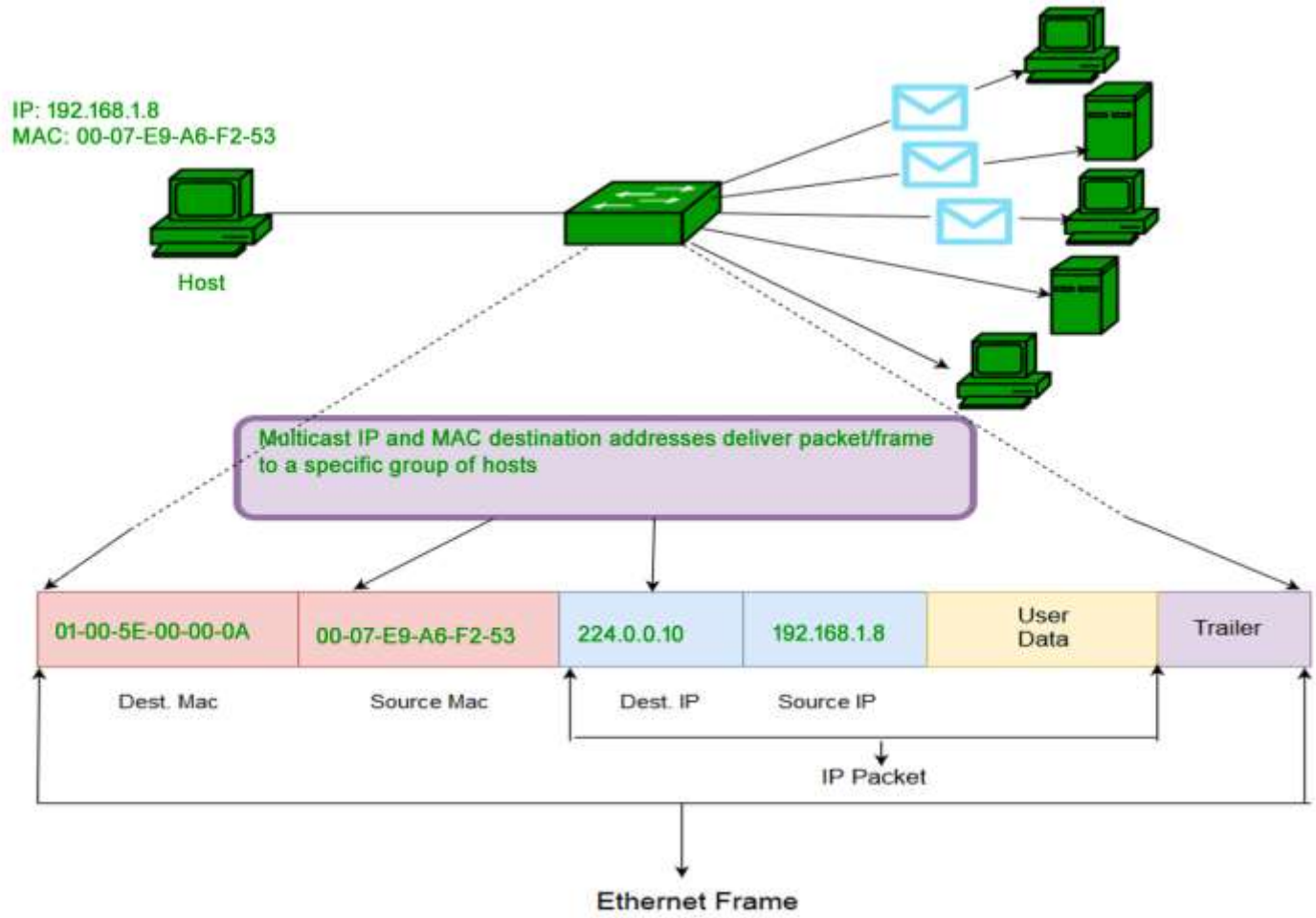
Types

- Unicast

- Multicast

- Broadcast

Unicast

Multicast
01-80-C2-00-00-00 to 01-80-C2-FF-FF-FF

Broadcast
(FF-FF-FF-FF-FF-FF)

IP: 192.168.1.8
MAC: 00-07-E9-A6-F2-53

Host

Broadcast IP and MAC destination addresses are used by the source to deliver packet to all hosts on the network

FF-FF-FF-FF-FF-FF	00-07-E9-A6-F2-53	192.168.1.255	192.168.1.8	User Data	Trailer
Dest. Mac	Source Mac	Dest. IP	Source IP		

IP Packet

Ethernet Frame
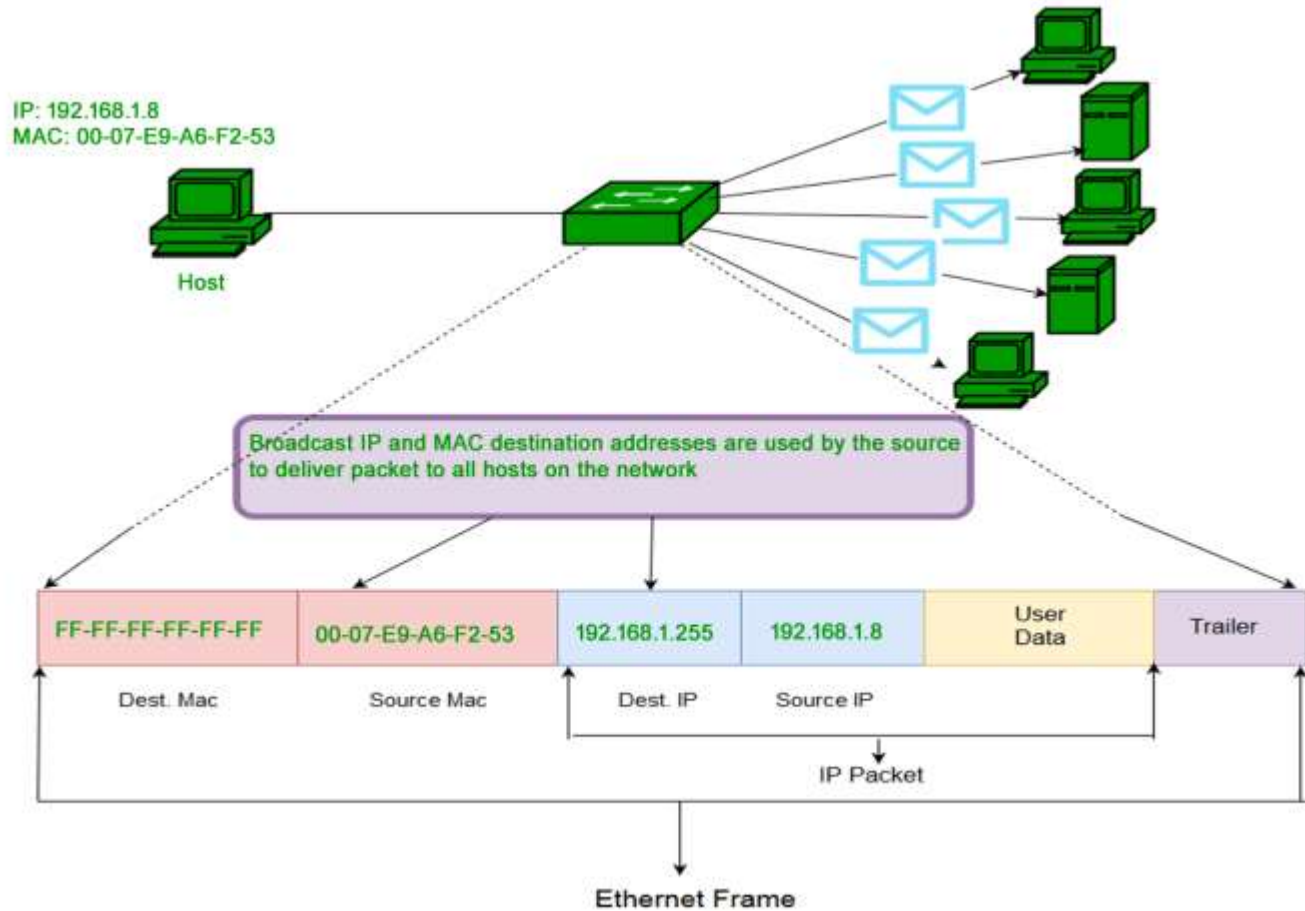
Characteristics

- Used in LAN
- Cannot be changed
- The first 3 bytes represent the manufacturer ID and the last 3 bytes represent a unique identifier assigned by the manufacturer
- MAC addresses are often used in conjunction with ARP to resolve IP addresses to MAC addresses

Advantages

- Uniqueness
- Simplicity
- Compatibility
- Security
- Fault tolerance
- Multicasting
- Efficiency
- Lower network overhead
- Ease of troubleshooting
- Flexibility

Disadvantages

- Limited address space
- Spoofing
- Inefficiency
- Static Addressing
- Limited scope
- Hardware dependent
- Lack of encryption
- No inherent security
- Collisions