

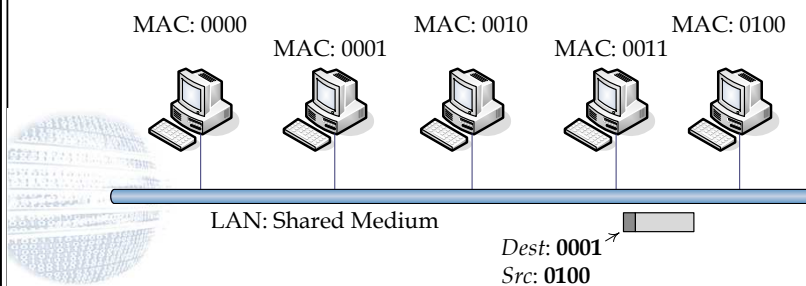
Lecture 7: Ethernet Hardware Addressing and Frame Format

Dr. Mohammed Hawa
Electrical Engineering Department
University of Jordan

EE426: Communication Networks

MAC Addresses

- The shared medium in a LAN connects a large number of stations.
- However, typically communications involve only one source and one destination.
- MAC Addresses allow a frame to reach its destination.



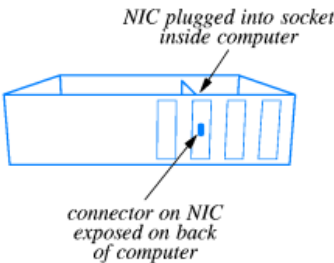
Copyright © Dr. Mohammed Hawa

Electrical Engineering Department, University of Jordan

2

Ethernet MAC Address

- Ethernet uses a unique 48 bit (6 byte) (MAC address) (Physical address) (Hardware address)
- Example:
 - 08-00-07-A9-B2-FC or 00:00:94:BA:0E:CC



NIC plugged into socket inside computer

connector on NIC exposed on back of computer

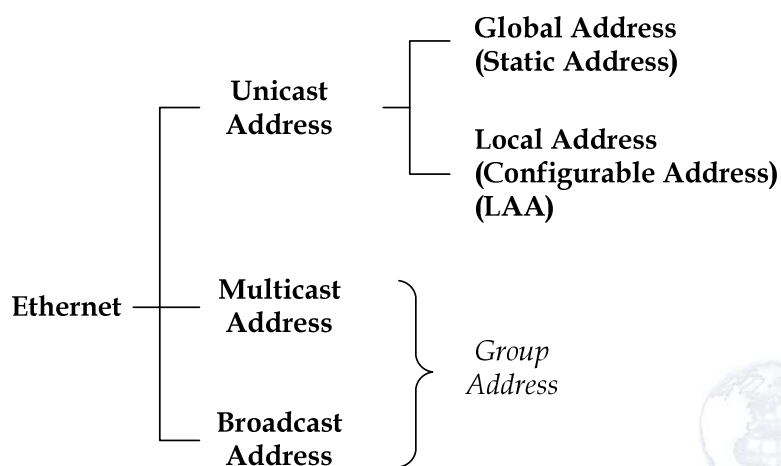
Copyright © Dr. Mohammed Hawa Electrical Engineering Department, University of Jordan 3

Does DA match hardware?

Bytes	7	1	6	6	2	0 - 1500	0 - 46	4
	Preamble	S O F	Destination Address	Source Address	Length	Data	Pad	CRC



Types of Ethernet MAC Addresses



Copyright © Dr. Mohammed Hawa

Electrical Engineering Department, University of Jordan

5

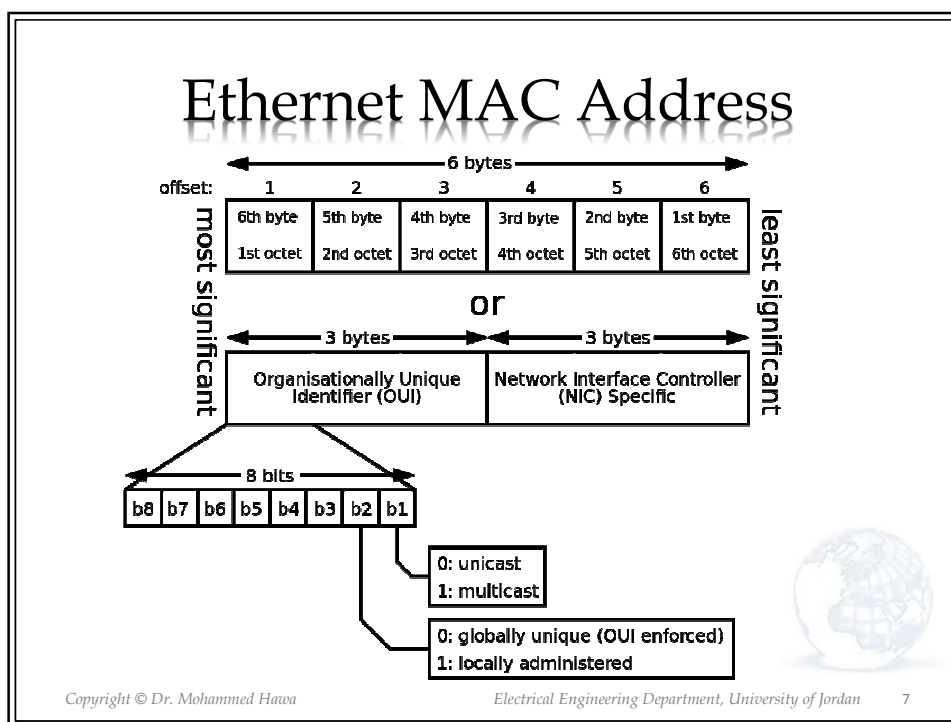
Types of Ethernet MAC Addresses

- **Group Address:** LSB of the destination address is a 1.
 - **Broadcast Address:** FF-FF-FF-FF-FF-FF.
 - **Multicast Address:** Other addresses with a LSB of 1.
- **Unicast Address:** LSB of the destination address is a 0.
- There are two types of **Unicast addresses** used by Ethernet:
 - **Global MAC Address** (also called Static MAC Address)
 - **Local MAC Address** (also called Configurable MAC Address, or Locally Administered Address).

Copyright © Dr. Mohammed Hawa

Electrical Engineering Department, University of Jordan

6



Rules for Reading Frames

- An Ethernet card passes the Ethernet frame to the upper layer if the destination address (DA) is equal to:
 - Broadcast address: FF-FF-FF-FF-FF-FF.
 - Multicast address of a multicast group to which the station belongs.
 - Global unicast address of the card when LAA is not setup.
 - LAA unicast address of the card when LAA is setup.
 - Any address if the card is in promiscuous mode.

Ethernet Headers & Frame Format Type II vs. IEEE 802.3

Type II Ethernet Frame:

Bytes	7	1	6	6	2	0-1500	0-46	4
	Preamble	S O F	Destination Address	Source Address	Type	// Data //	Pad	CRC

IEEE 802.3 Ethernet Frame:

Bytes	7	1	6	6	2	0-1500	0-46	4
	Preamble	S O F	Destination Address	Source Address	Length	// Data //	Pad	CRC

Ethernet Frame Fields [1]

- **Preamble:** Consists of 7 bytes, each byte containing the bit pattern **10101010**. It helps synchronize the receiver clock. No part of the preamble ever enters the Ethernet adapter's memory buffer since it is a physical layer header.
- **Start of Frame (SOF) delimiter:** One byte with the bit pattern **10101011** used for framing. It is compatible with other IEEE 802.x standards.
- **Destination Address (DA) and Source Address (SA):** Contain Ethernet MAC addresses of the source and destination (each of 6 bytes).

Type field

Protocol	Type field
IPv4 packet	0800h
IPv6 packet	86DD
CCITT X.25 packet	0805h
Frame Relay	6559h
Reverse ARP	8035h
Novel Corporation IPX	8137h - 8138h
Reserved	FFFFh



Ethernet Frame Fields [2]

- **Length:** Indicates how many bytes exist in the Data field of the frame. Possible values are 0 (or 8) to 1500. In this case, the Type of the frame is indicated by a special header in the data portion of the frame, called a Logical Link Control (LLC) header, and not by a field in the frame header.
- **Data:** Contains the upper layer PDU (0 to 1500 bytes).
- **Pad:** Frames with fewer than 64 bytes in total length are padded out to 64 bytes with random bytes in the Pad field.
- **CRC:** A 32-bit CRC code is used as an error detection code. The receiver verifies the CRC and if the frame contains errors, the frame is discarded.



Logical Link Control

- Logical Link Control (LLC) Layer: LLC is defined in the IEEE 802.2 standard.

