

CS & IT ENGINEERING

COMPUTER NETWORKS

IP Support Protocol

Lecture No-1



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A stylized illustration of a laptop with a blue screen and an orange base. The screen displays the text 'TOPICS TO BE COVERED'.

TOPICS TO
BE
COVERED

A dotted orange arrow pointing from the laptop screen to the right box.

IP Support protocols

ARP, ICMP, DHCP, RARP

Implementation of Broadcasting



IP/NL

(i) Limited Broadcast Address

255.255.255.255

(ii) Direct Broadcast Address

NID = 10.0.0.0

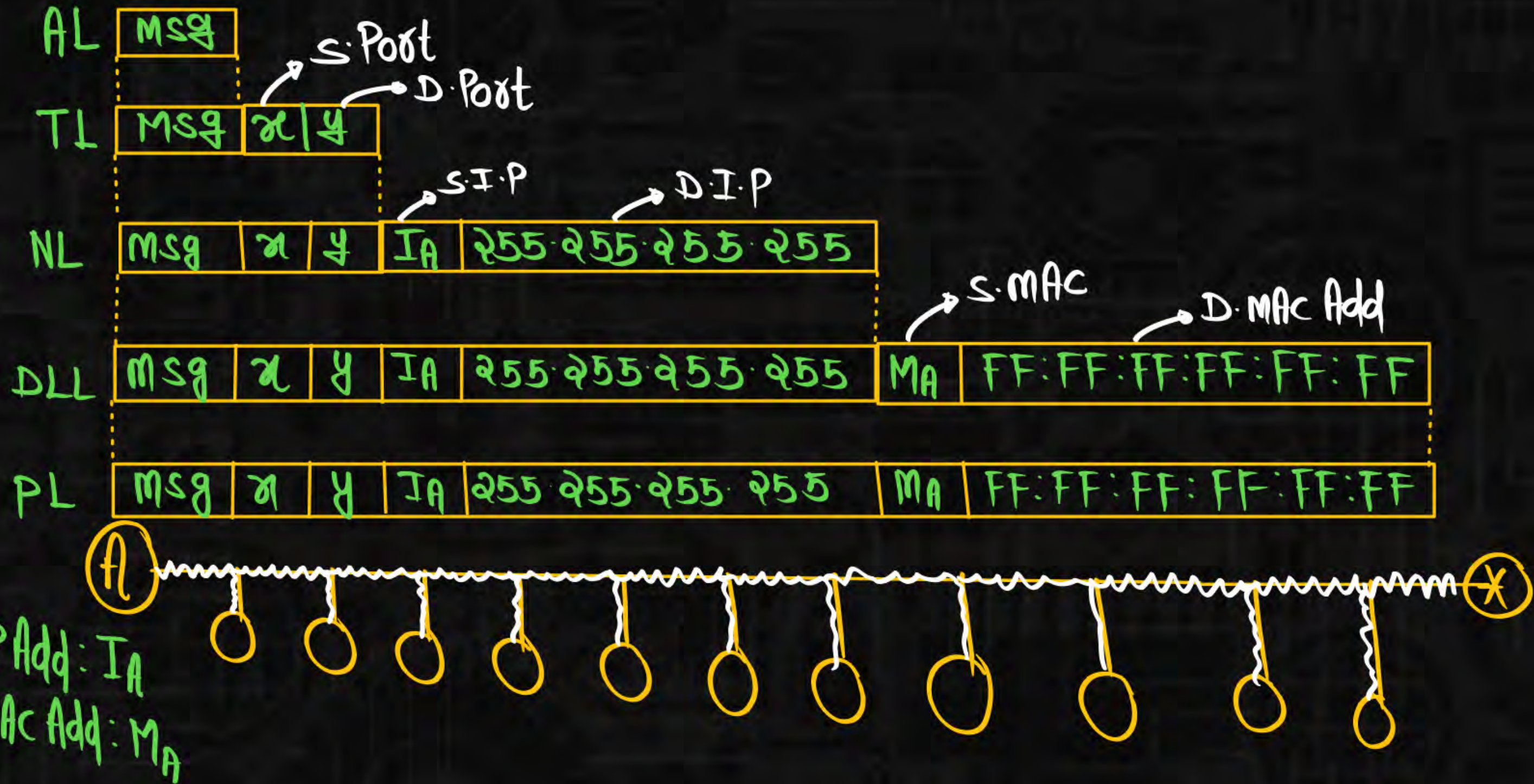
DBA = 10.255.255.255

DLL
↓

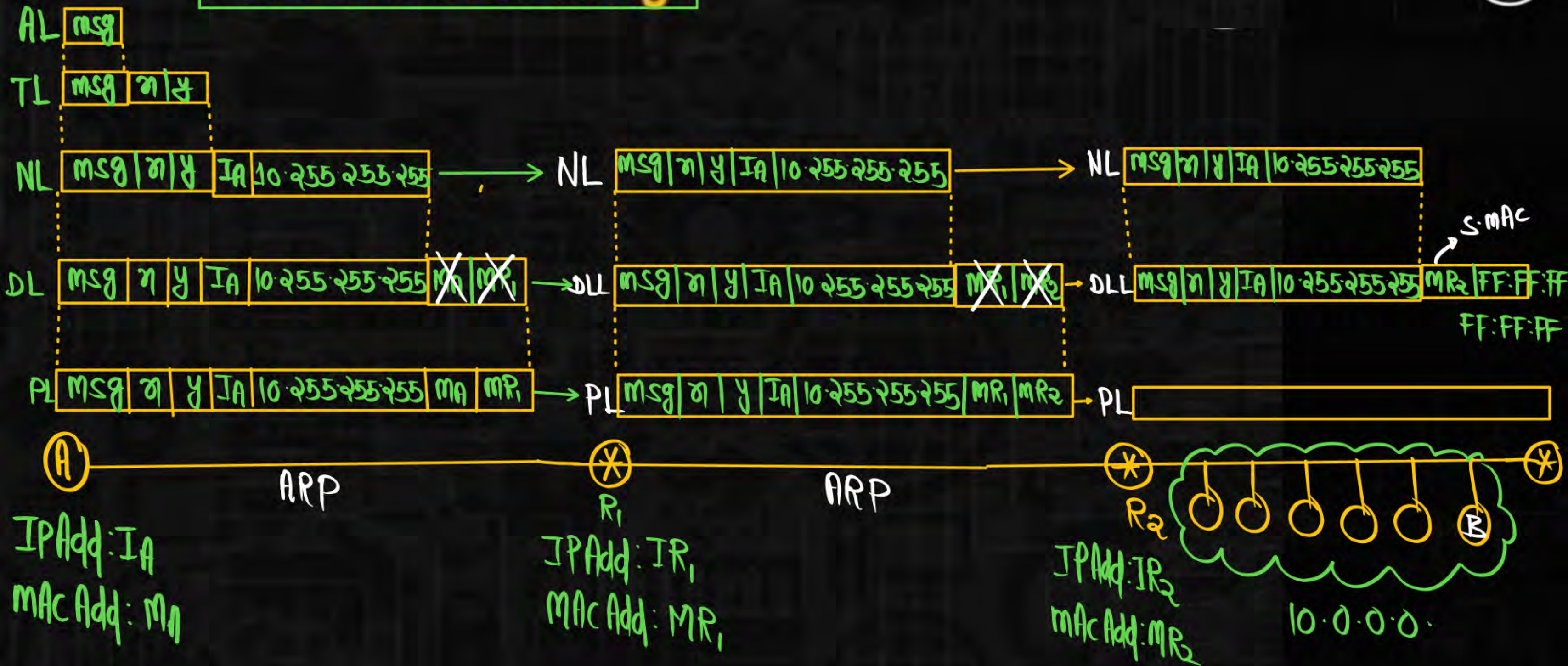
Broadcast MAC Address
(48bit)

FF:FF:FF:FF:FF:FF

Limited Broadcasting



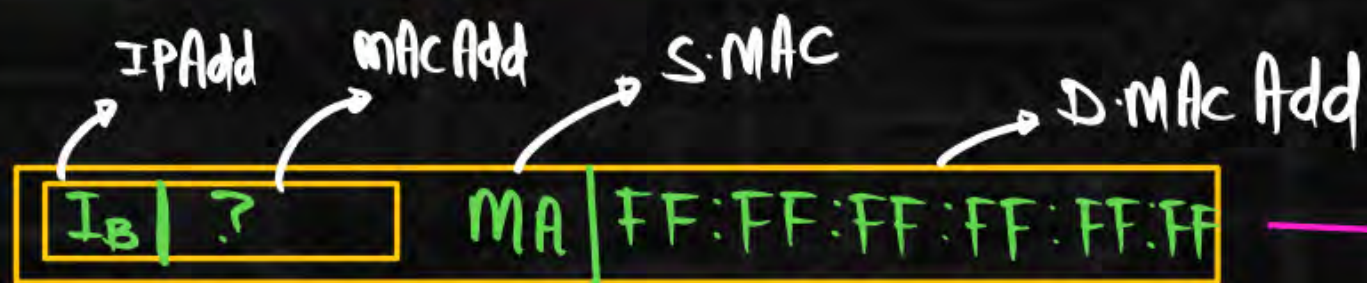
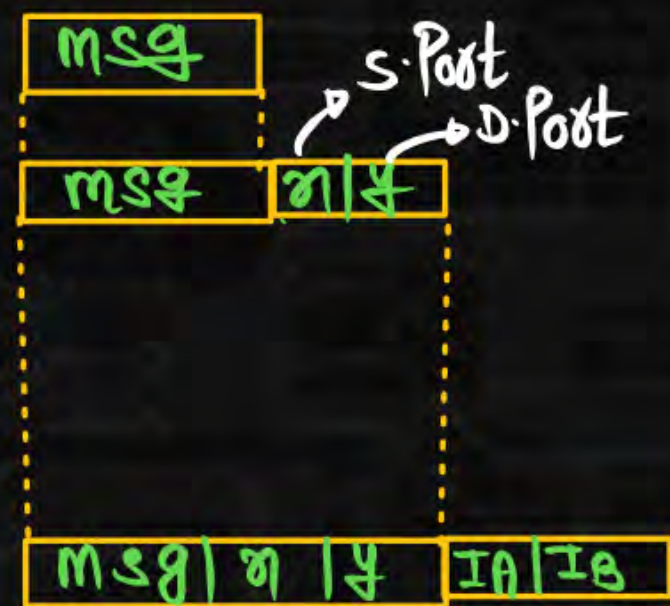
Direct Broadcasting



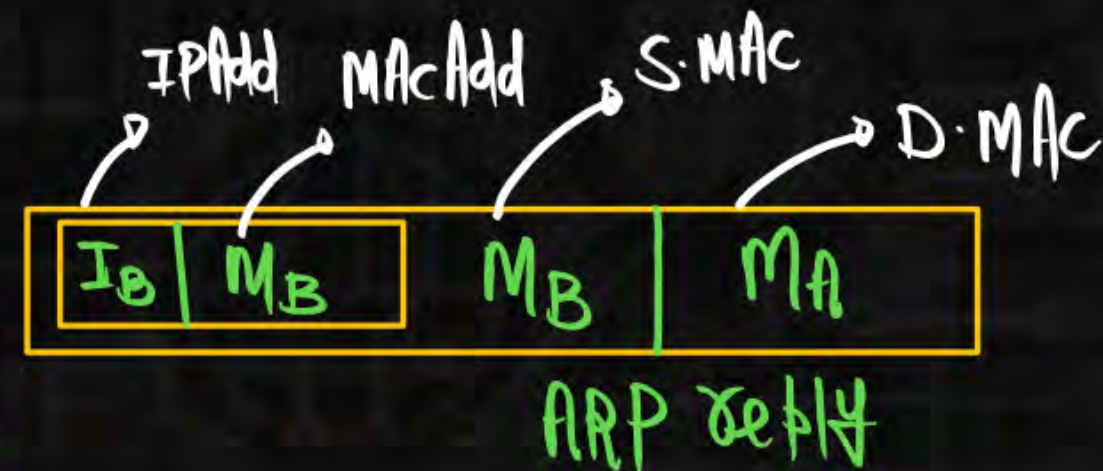
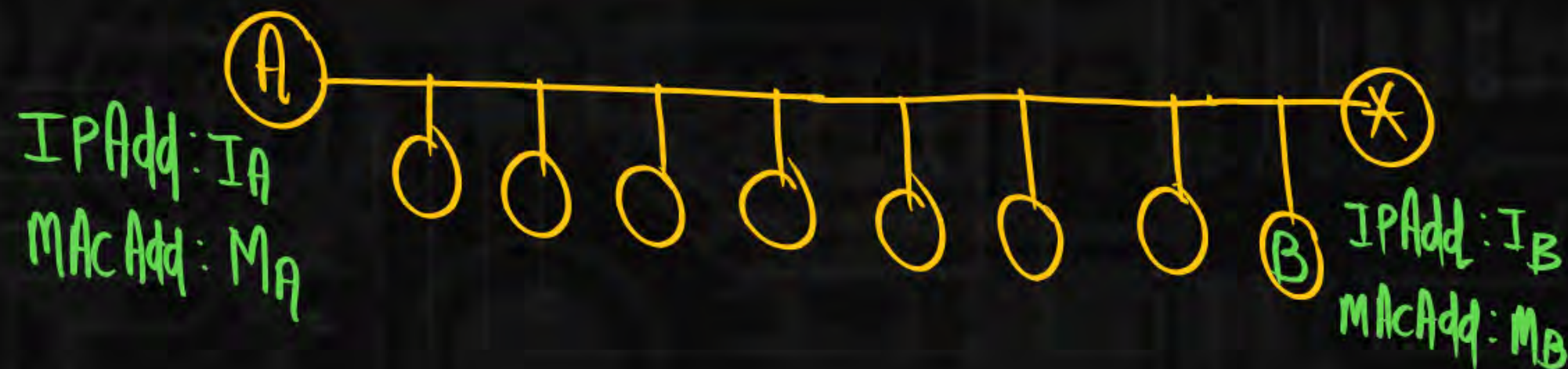
ARP

- ARP is a Communication Protocol used to Find the MAC Address of a device from its IP Address

IP Add $\xrightarrow{\text{ARP}}$ MAC Add



→ ARP request





- (I) Host $\xrightarrow{\text{ARP}}$ Host
- (II) Host $\xrightarrow{\text{ARP}}$ Router
- (III) Router $\xrightarrow{\text{ARP}}$ Router
- (IV) Router $\xrightarrow{\text{ARP}}$ Host

The important terms associated with ARP are :

1. **ARP Cache:** After resolving MAC address, the ARP sends it to the source Where it stores in a table for future reference. The subsequent communications can use the MAC address from the table.
2. **ARP Cache Timeout:** It indicates the time for which the MAC address in the ARP cache can reside.
3. **ARP request:** ARP request is broadcasting
4. **ARP response/reply:** ARP reply is unicasting.

CASE-1: The sender is a host and wants to send a packet to another host on the same network.

Use ARP to find another host's physical address

CASE-2: The sender is a host and wants to send a packet to another host on another network.

Sender looks at its routing table.

Find the IP address of the next hop (router) for this destination.

Use ARP to find the router's physical address

CASE-3: the sender is a router and received a datagram destined for a host on another network.

Router check its routing table.

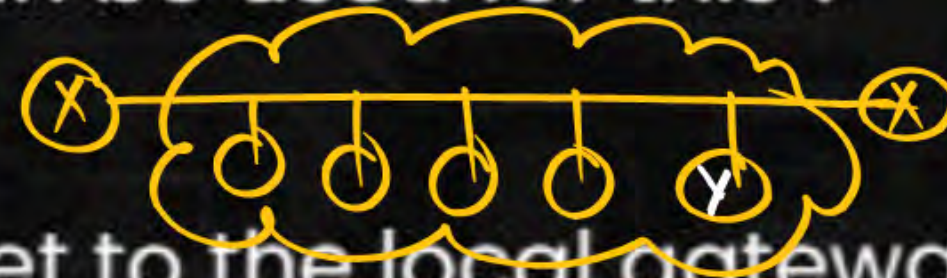
Find the IP address of the next router.

Use ARP to find the next router's physical address.

Case-4: The sender is a router that has received a datagram destined for a host in the same network.

Use ARP to find this host's physical address.

Q.1 Suppose that in a IP over Ethernet network, a machine X wishes to find the MAC address of another machine Y in its subnet. Which one of the following technique can be used for this ?



GATE 2019

- ☒ (A) X sends an ARP request packet to the local gateway's IP address which then finds the MAC address of Y and sends to X.
- ☐ (B) X sends an ARP request packet with broadcast IP address in its local subnet.
- ☐ (C) X sends an ARP request packet to the local gateway's MAC address which then finds the MAC address of Y and sends to X.
- ☒ (D) X sends an ARP request packet with broadcast MAC address in its local subnet.

Q.2 The address resolution protocol (ARP) is used for :

GATE 2005

- (A) Finding the IP address from the DNS
- (B) Finding the IP address of the default gateway
- (C) Finding the IP address that corresponds to a MAC address
- ✓ (D) Find the MAC address that corresponds to an IP address

Q.3 Which one of the following protocols is NOT used to resolve one form of address to another one ?

GATE 2016

- (A) DNS Domain Name \longrightarrow IP Address
- (B) ARP IP Add \longrightarrow MAC Address
- ☒ (C) DHCP
- (D) RARP MAC Add \longrightarrow IP Address

Q.4 Consider the following two statements.

S_1 : Destination MAC address of an ARP reply is a broadcast address. (F)

S_2 : Destination MAC address of an ARP request is a broadcast address. (T)

Which one of the following choices is correct?

GATE 2021

- (A) Both S_1 and S_2 are true.
- (B) S_1 is true and S_2 is false.
- ☒ (C) S_1 is false and S_2 is true.
- (D) Both S_1 and S_2 are false.

