/RECAP

MAC and IP

**MAC address can be discovered using address resolution.**

**There are two primary addresses assigned to a device on an Ethernet LAN:**

PHYSICAL ADDRESS (the MAC address)

- used for NIC-to-NIC communications on the same Ethernet network

LOGICAL ADDRESS (the IP address)

- used to send the packet from the source device to the destination device

Same or remote network

**When the destitution IP address (IPv4 or 6) is on a remote network, the destination MAC address will be the address of the host default gateway (router)**

**Routers examine the destination IPv4 address to determine the best path to froward the IPv4 packet.**

When the router receives the Ethernet frame, *it de-encapsulates the Layer 2 information.*

*Using the destination IPv4 address, it determines the next-hop device, and then encapsulates the IPv4 packet in a new data link frame for the outgoing interface.* Along each link in a path, an IP packet is encapsulated in a frame.

The frame is specific to the data link in a path, an IP packet is encapsulated in a frame. The frame is specific to the data link technology that is associated with that link, such as Ethernet

**If next-hop device is the final destination the destination MAC address will be that of the device Ethernet NIC**

Broadcast containment

A msg can only contain one destination MAC address

**Address resolution lets a host send a broadcast msg to a unique MAC address that is recognized by all hosts**

The broadcast MAC address is 48-bit address made up of all 1s

In hexadecimal notation is FFFF.FFFF.FFFF. (each F is 1111)

**When a host sends a broadcast msg, switches forward the msg to every connected host within the same local network**. For this is a local area network also called as a broadcast domain

If too many hosts are connected to the same broadcast domain, the broadcast traffic can become excessive

Its all limited by the capabilities of the switches used to connect them

*To improve performance, you may need to divide one local network into multiple networks*

On a local Ethernet network, a NIC only accepts a frame if the destination address is either the broadcast MAC address, or else corresponds to the MAC address of the NIC.

**Most network applications rely on the logical destination IP address to identify the location of the servers and clients.**

How does the sending host determine what destination MAC address to place within the frame?

The sending host can ARP to discover the MAC address of any host on the same network

ARP uses a 3-step process to discover and store the MAC address of a host on the local network when only the IPv4 address of the host is known:

1. **The sending host creates and sends a frame addressed to a broadcast MAC address.**

**Contained in the frame is a msg with the IPv4 address of the intended destination host**

1. **Each host on the network receives the broadcast frame and compares the IPv4 address   
    Inside the msg with its configured IPv4 address.**

**The host with matching IPv4 address sends its MAC address back to the original sending host**

1. **The sending host receives the msg and stores the MAC address and IPv4 address info in a table called an ARP table**