Laborotory work 5.

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**9.1.3 Packet Tracer – Identify MAC and IP Addresses**

## Part 1:  Gather PDU Information for Local Network Communication

### Step 1:  Gather PDU information as a packet travels from 172.16.31.5 to 172.16.31.2.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| At Device | Dest.Mac | Src Mac | Src IPv41 | Dest IPv4 |
| 172.16.31.3 | 000C.85CC.1DA7 |  | 172.16.31.3 | 172.16.31.2 |
| Hub |  |  |  |  |
| 172.16.31.2 | 0060.7036.28.49 | 000C.85CC.1DA7 | 172.16.31.2 | 172.16.31.3 |
|  |  |  |  |  |

What device has the destination MAC that is shown?

Answer: the router

## Reflection Questions

1. Were there different types of cables/media used to connect devices?

Answer: Yes: copper, fiber, and wireless

1. Did the cables change the handling of the PDU in any way?

Answer: No

1. Did the **Hub** lose any of the information that it received

Answer: No

1. What does the **Hub** do with MAC addresses and IP addresses?

Answer: Nothing

1. Did the wireless **Access Point** do anything with the information given to it?

Answer: Yes. It repackaged it as wireless 802.11 frames.

1. Was any MAC or IP address lost during the wireless transfer?

Answer: No

1. What was the highest OSI layer that the **Hub** and **Access Point** used?

Answer: Layer 1

1. Did the **Hub** or **Access Point** ever replicate a PDU that was rejected with a red “X”?

Answer: Yes

1. When examining the **PDU Details** tab, which MAC address appeared first, the source or the destination?

Answer: Destination

1. Why would the MAC addresses appear in this order?

Answer: A switch can begin forwarding a frame to a known MAC address more quickly if the destination is listed first

1. Was there a pattern to the MAC addressing in the simulation?

Answer: No

1. Did the switches ever replicate a PDU that was rejected with a red “X”?

Answer: No

1. Every time that the PDU was sent between the 10 network and the 172 network, there was a point where the MAC addresses suddenly changed.  Where did that occur?

Answer: It occurred at the router

1. Which device uses MAC addresses that start with 00D0:BA?

Answer: The router

1. What devices did the other MAC addresses belong to?

Answer: To the sender and receiver

1. Did the sending and receiving IPv4 addresses change fields in any of the PDUs?

Answer: No

1. When you follow the reply to a ping, sometimes called a *pong*, do you see the sending and receiving IPv4 addresses switch?

Answer: Yes

1. What is the pattern to the IPv4 addressing used in this simulation

Answer: Each port of a router requires a set of non-overlapping addresses

1. Why do different IP networks need to be assigned to different ports of a router?

Answer: The function of a router is to inter-connect different IP networks.

1. If this simulation was configured with IPv6 instead of IPv4, what would be different?

Answer: The IPv4 addresses would be replaced with IPv6 addresses, but everything else would be the same.

[**9.2.9 - Packet Tracer - Examine the ARP Table**](https://contenthub.netacad.com/itn#9.2.9)

## Part 1: Examine an ARP Request

### Step 1: Generate ARP requests by pinging 172.16.31.3 from 172.16.31.2.

1. Open the PDU and record the destination MAC address. Is this address listed in the table above?

Answer: No

1. ow many copies of the PDU did **Switch1** make?

Answer: 3

1. What is the IP address of the device that accepted the PDU?

Answer: 172.16.31.3

1. Open the PDU and examine Layer 2. What happened to the source and destination MAC addresses?

Answer: Source became destination, FFFF.FFFF.FFFF turned into MAC address of 172.16.31.3

1. How many copies of the PDU did the switch make during the ARP reply?

Answer: 1

### Step 2: Examine the ARP table.

1.Do the MAC addresses of the source and destination align with their IP addresses?

Answer: Yes

1. To what IP address does the MAC address entry correspond?

Answer: 172.16.31.3

1. In general, when does an end device issue an ARP request?

Answer: When it does not know the receiver’s MAC address.

## Part 2: Examine a Switch MAC Address Table

### Step 1: Generate additional traffic to populate the switch MAC address table.

* 1. Enter the ping 10.10.10.3 command. How many replies were sent and received?

Answer: 4 sent, 4 received.

### Step 2: Examine the MAC address table on the switches.

1. Do the entries correspond to those in the table above

Answer: Yes

1. Why are two MAC addresses associated with one port?

Answer: Because both devices connect to one port through the Access Point.

## Part 3: Examine the ARP Process in Remote Communications

### Step 1: Generate traffic to produce ARP traffic.

* 1. What is the IP address of the new ARP table entry?

Answer: 172.16.31.1

* 1. How many PDU appear?

ANSWER: 2

* 1. What is the target destination IP destination address of the ARP request?

Answer: 172.16.31.1

* 1. The destination IP address is not 10.10.10.1. Why?

Answer: The gateway address of the router interface is stored in the IPv4 configuration of the hosts. If the receiving host is not on the same network, the source uses the ARP process to determine a MAC address for the router interface serving as the gateway.

### Step 2: Examine the ARP table on Router1.

1. How many MAC addresses are in the table? Why?

ANSWER: Zero, This command means something completely different than the switch command show mac address-table.

1. Is there an entry for **172.16.31.2**?

Answer: Yes

1. What happens to the first ping in a situation where the router responds to the ARP request?

Annswer: It times out.

[**9.3.4 - Packet Tracer - IPv6 Neighbor Discovery**](https://contenthub.netacad.com/itn#9.3.4)

## Part 1: IPv6 Neighbor Discovery Local Network

### **Step 2: Switch to Simulation Mode to capture events.**

* 1. Why are ND PDUs present?

Answer: In order to send ICMPv6 ping packets to PCA2, PCA1 needs to know the MAC address of the destination. IPv6 ND requests this information on the network.

* 1. Under the OSI Model tab, what is the Message Type listed for ICMPv6?

Answer: ICMPv6 Echo Message Type: 134

* 1. What changed in the Layer 3 addressing?

Answer: The destination address is now an IPv6 multicast address of FF02::1:FF00:B

* 1. What Layer 2 addresses are shown?

Answer: The source address is PCA1 MAC – 0001.427E.E8ED and the destination MAC address is 3333.FF00.000B

* 1. Is there any difference between the In Layers and Out Layers for Layer 2?

Answer: No. The switch does not alter Layer 2 information, it only forwards the frame.

* 1. What addresses are displayed for the following?

Ethernet II DEST ADDR: 3333.0000.0001

Ethernet II SRC ADDR: 0001.961D.6301

IPv6 SRC IP: 2001:db8:acad:1::b

IPv6 DST IP: 2001:db8:acad:1::a

* 1. Select the first NDP event at RTA. Why are there no Out Layers?

ANSWER: The IPv6 address does not match the router’s address so it drops the packet.

* 1. Does PCA1 now have all of the necessary information to communicate with PCA2?

Answer: Yes, it now knows both the destination IPv6 address as well as the destination MAC address of PCA2.

* 1. What is the ICMPv6 Echo Message Type?

Answer: The ICMPv6 Echo Message Type is 129, an echo reply.

* 1. Why weren’t there any NDP events?

Answer: PCA1 already knows the MAC address of PCA2 so it doesn’t need to use Neighbor Discovery.

## Part 2: IPv6 Neighbor Discovery Remote Network

### **Step 1: Capture events for remote communication.**

* + 1. What address is being used for the Src IP in the inbound PDU?

Answer: The Link Local address for PCA1 – fe80::201:42ff:fe7e:e8ed

* + 1. What MAC address is being used for the destination MAC?

Answer: 0001.961d.6301, the MAC address of G0/0/0 of RTA

* + 1. What is missing in the outbound Layer 2 information?

Answer: The destination MAC address must be determined for the IPv6 destination address.

* + 1. Were there any NDP events?

Answer: NO

* + 1. Why is PCB1 using the router interface MAC address to make its ICMP PDUs?

Answer:

Because the destination device is on another network, PCB1 addresses the PDU to the default gateway interface MAC. RTA will determine how to address the PDU at Layer 2 to send it towards its destination.

### **Step 2: Examine router outputs.**

* + 1. How many addresses are listed?

Answer: 4 – IPv6 global unicast and link local addresses and MAC addresses for PCA1 and PCB1

* + 1. What devices are these addresses associated with?

Answer: What devices are these addresses associated with?

* + 1. Are there any entries for PCA2 listed (why or why not)?

Answer: PCA2 has not communicated across the network yet.

* + 1. Are there entries for PCA2?

Answer: Yes, the IPv6 address and MAC address for PCA2.

### **Reflection Questions**

1. When does a device require the IPv6 Neighbor Discovery process?

Answer: When the destination MAC address is not known. This process is similar to ARP with IPv4.

1. How does a router help to minimize the amount of IPv6 Neighbor Discovery traffic on a network?

Answer: The router keeps neighbor tables so that it doesn’t need to initiate ND for every destination host.

1. How does IPv6 minimize the impact of the ND process on network hosts?

Answer: It uses a multicast address so that only a handful of addresses would be listening to the Neighbor Discovery messages. IPv6 creates a specially crafted multicast destination MAC address which includes a portion of the node address.

1. How does the Neighbor Discovery process differ when a destination host is on the same LAN and when it is on a remote LAN?

Answer: When a destination host is on the same LAN segment only the device that matches the IPv6 address responds and other devices drop the packet. When the device is remote the gateway device (usually a router) provides the MAC address of the interface on the local interface for the destination MAC and then searches for the MAC address on the remote network. The router will then place the responding IPv6/MAC address pair in the IPv6 Neighbor table. (similar to an ARP table in IPv4)