

Lab 7.2.7 - View Network Device MAC Addresses



This lab has been updated for use on NETLAB+.

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Topology



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
S1	VLAN 1	192.168.1.2	255.255.255.0	N/A
PC-A	NIC	192.168.1.3	255.255.255.0	192.168.1.1

Objectives

Part 1: Configure Devices and Verify Connectivity

Part 2: Display, Describe, and Analyze Ethernet MAC Addresses

Background / Scenario

Every device on an Ethernet LAN is identified by a Layer 2 MAC address. This address is assigned by the manufacturer and stored in the firmware of the NIC. This lab will explore and analyze the components that make up a MAC address, and how you can find this information on a switch and a PC.

You will configure the switch and PC to match the addressing table. You will verify your configurations by testing for network connectivity.

After the devices have been configured and network connectivity has been verified, you will use various commands to retrieve information from the devices to answer questions about your network equipment.

Note: The switches used are Cisco Catalyst 2960s with Cisco IOS Release 15.2(2) (lanbasek9 image). Other switches and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and the output produced might vary from what is shown in the labs.

Instructions

Part 1: Configure Devices and Verify Connectivity

In this part, you will configure basic settings, such as the interface IP addresses and device name. For device name and address information, refer to the Topology and Addressing Table.

Step 1: Configure the IPv4 address for the PC.

- Configure the IPv4 address, subnet mask, and default gateway address for PC-A.

- b. From the command prompt on PC-A, ping the switch address.

Were the pings successful? Explain.

Type your answers here. No, I looked at the switch configuration and it has no IP Address. There is no way that PC-A can ping a non-existing IP address.

Step 2: Configure basic settings for the switch.

In this step, you will configure the device name and the IP address, and disable DNS lookup on the switch.

- a. Click on the switch to access the console port and enter global configuration mode.

```
Switch> enable
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#
```

- b. Assign a hostname to the switch based on the Addressing Table.

```
Switch(config)# hostname S1
```

- c. Disable DNS lookup.

```
S1(config)# no ip domain-lookup
```

- d. Configure and enable the SVI interface for VLAN 1.

```
S1(config)# interface vlan 1
S1(config-if)# ip address 192.168.1.2 255.255.255.0
S1(config-if)# no shutdown
S1(config-if)# end
*Mar  1 00:07:59.048: %SYS-5-CONFIG_I: Configured from console by console
```

Step 3: Verify network connectivity.

Ping the switch from PC-A.

Were the pings successful? Yes, we just assigned an IP address to a switch and turned on the management interface vlan. This allows the PC to use a arp request, then send messages and the ping works because

Type your answers here. the switch will respond to the arp now. I assume the I2 device still doesn't understand how to route though, but the PC will tell the switch to forward messages to the router though its default gateway. Personally, I would add in a default gateway for the switch as well.

Part 2: Display, Describe, and Analyze Ethernet MAC Addresses

Every device on an Ethernet LAN has a MAC address that is assigned by the manufacturer and stored in the firmware of the NIC. Ethernet MAC addresses are 48-bits long. They are displayed using six sets of hexadecimal digits that are usually separated by dashes, colons, or periods. The following example shows the same MAC address using the three different notation methods:

00-05-9A-3C-78-00

00:05:9A:3C:78:00

0005.9A3C.7800

Note: MAC addresses are also called physical addresses, hardware addresses, or Ethernet hardware addresses.

You will issue commands to display the MAC addresses on a PC and a switch, and analyze the properties of each one.

Step 1: Analyze the MAC address for the PC-A NIC.

Before you analyze the MAC address on PC-A, look at an example from a different PC NIC. You can issue the **ipconfig /all** command to view the MAC address of your NIC. An example screen output is shown below. When using the **ipconfig /all** command, notice that MAC addresses are referred to as physical addresses. Reading the MAC address from left to right, the first six hex digits refer to the vendor (manufacturer) of this device. These first six hex digits (3 bytes) are also known as the organizationally unique identifier (OUI). This 3-byte code is assigned to the vendor by the IEEE organization.

To find the manufacturer, use the keywords **IEEE OUI standards** to find an OUI lookup tool on the internet or navigate to <http://standards-oui.ieee.org/oui.txt> to find the registered OUI vendor codes. The last six digits are the NIC serial number assigned by the manufacturer.

- a. Using the output from the **ipconfig /all** command, answer the following questions.

```
C:\> ipconfig /all
<output omitted>
Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . : 
    Description . . . . . : Intel(R) 82577LM Gigabit Network Connection
    Physical Address. . . . . : 5C-26-0A-24-2A-60
    DHCP Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes
    Link-local IPv6 Address . . . . . : fe80::b875:731b:3c7b:c0b1%10(Preferred)
    IPv4 Address. . . . . : 192.168.1.147(Preferred)
    Subnet Mask . . . . . : 255.255.255.0
    Lease Obtained. . . . . : Friday, September 6, 2019 11:08:36 AM
    Lease Expires . . . . . : Saturday, September 7, 2019 11:08:36 AM
    Default Gateway . . . . . : 192.168.1.1
<output omitted>
```

What is the OUI portion of the MAC address for this device?

Type your answers here. 5C-26-0A

What is the serial number portion of the MAC address for this device?

Type your answers here. 24-4A-60

Using the example above, find the name of the vendor that manufactured this NIC.

Type your answers here. Dell <https://maclookup.app/search/result?mac=5C260A>

- b. From the command prompt on PC-A, issue the **ipconfig /all** command and identify the OUI portion of the MAC address for the NIC of PC-A.

Type your answers here. 00:50:56

Identify the serial number portion of the MAC address for the NIC of PC-A.

Type your answers here. B0:51:58

Identify the name of the vendor that manufactured the NIC of PC-A.

Type your answers here.

VMware <https://maclookup.app/macaddress/005056>

Step 2: Analyze the MAC address for the S1 F0/6 interface.

You can use a variety of commands to display MAC addresses on the switch.

- Access S1 and use the **show interfaces vlan 1** command to find the MAC address information. A sample is shown below. Use output generated by your switch to answer the questions.

```
S1# show interfaces vlan 1
Vlan1 is up, line protocol is up
  Hardware is EtherSVI, address is 001b.0c6d.8f40 (bia 001b.0c6d.8f40)
  Internet address is 192.168.1.2/24
  MTU 1500 bytes, BW 1000000 Kbit/sec, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive not supported
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 00:14:51, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts (0 IP multicasts)
    0 runs, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    34 packets output, 11119 bytes, 0 underruns
    0 output errors, 2 interface resets
    0 unknown protocol drops
    0 output buffer failures, 0 output buffers swapped out
```

What is the MAC address for VLAN 1 on S1?

Type your answers here. 38:20:56:6b:e1:40

What is the MAC serial number for VLAN 1?

Type your answers here. 6b:e1:40

What is the OUI for VLAN 1?

Type your answers here. 38:20:56

Based on this OUI, what is the name of the vendor?

Type your answers here. Cisco <https://maclookup.app/search/result?mac=38:20:56>

What does bia stand for?

Type your answers here. Burned in address

Why does the output show the same MAC address twice?

Type your answers here. The first one is assigned MAC the other is burned in MAC. The difference is assigned MAC is done by the administrator, burned in MAC is done by the manufacturer

- b. Another way to display the MAC address on the switch is to use the **show arp** command. Use the **show arp** command to display MAC address information. This command maps the Layer 2 address to its corresponding Layer 3 address. A sample is shown below. Use output generated by your switch to answer the questions.

S1# **show arp**

Protocol	Address	Age (min)	Hardware Addr	Type	Interface
Internet	192.168.1.2	-	001b.0c6d.8f40	ARPA	Vlan1
Internet	192.168.1.3	0	5c26.0a24.2a60	ARPA	Vlan1

What Layer 2 addresses are displayed on S1?

Type your answers here. 38:20:56:6b:e1:40

What Layer 3 addresses are displayed on S1?

Type your answers here. 192.168.1.2

Step 3: View the MAC addresses on the switch.

Issue the **show mac address-table** command on S1. A sample is shown below. Use output generated by your switch to answer the questions.

S1# **show mac address-table**

Mac Address Table

```
-----
```

Vlan	Mac Address	Type	Ports
----	-----	-----	-----
All	0100.0ccc.cccc	STATIC	CPU
All	0100.0ccc.cccd	STATIC	CPU
All	0180.c200.0000	STATIC	CPU
All	0180.c200.0001	STATIC	CPU
All	0180.c200.0002	STATIC	CPU
All	0180.c200.0003	STATIC	CPU
All	0180.c200.0004	STATIC	CPU
All	0180.c200.0005	STATIC	CPU
All	0180.c200.0006	STATIC	CPU
All	0180.c200.0007	STATIC	CPU
All	0180.c200.0008	STATIC	CPU
All	0180.c200.0009	STATIC	CPU
All	0180.c200.000a	STATIC	CPU

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```
All    0180.c200.000b    STATIC    CPU
All    0180.c200.000c    STATIC    CPU
All    0180.c200.000d    STATIC    CPU
All    0180.c200.000e    STATIC    CPU
All    0180.c200.000f    STATIC    CPU
All    0180.c200.0010    STATIC    CPU
All    ffff.ffff.ffff    STATIC    CPU
1      5c26.0a24.2a60    DYNAMIC    Fa0/6
```

Total Mac Addresses for this criterion: 21

Did the switch display the MAC address of PC-A? If you answered yes, what port was it on?

Type your answers here. Yes, Fa0/6

Reflection Questions

1. Can you have broadcasts at the Layer 2 level? If so, what would the MAC address be?

Type your answers here. Yes, ARP does exactly that. You would have FF:FF:FF:FF:FF:FF

2. Why would you need to know the MAC address of a device?

Type your answers here. I2 encapsulation, mac filtering, contacting manufacturer

Router and Switch Interface Summary Table

Router / Switch Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2
1800	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
1900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2801	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)
2811	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2960	Fast Ethernet 0/1 (F0/1)	Fast Ethernet 0/2 (F0/2)	n/a	n/a
3560	Fast Ethernet 0/1 (F0/1)	Fast Ethernet 0/2 (F0/2)	n/a	n/a
3650	Gigabit Ethernet 1/0/1 (G1/0/1)	Gigabit Ethernet 1/0/2 (G1/0/2)	n/a	n/a

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Router / Switch Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2
4221	Gigabit Ethernet 0/0/0 (G0/0/0)	Gigabit Ethernet 0/0/1 (G0/0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)
4300	Gigabit Ethernet 0/0/0 (G0/0/0)	Gigabit Ethernet 0/0/1 (G0/0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)

Note: To find out how the router is configured, look at the interfaces to identify the type of router and how many interfaces the router has. There is no way to effectively list all the combinations of configurations for each router class. This table includes identifiers for the possible combinations of Ethernet and Serial interfaces in the device. The table does not include any other type of interface, even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in Cisco IOS commands to represent the interface.