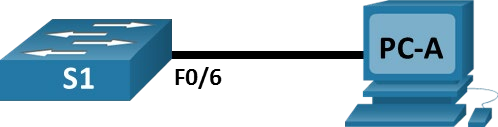


Lab - View Network Device MAC Addresses

**Topology**

****

**Addressing Table**

|  |  |  |  |
| --- | --- | --- | --- |
| **Device** | **Interface** | **IP Address** | **Subnet Mask** |
| S1 | VLAN 1 | 192.168.1.2 | 255.255.255.0 |
| PC-A | NIC | 192.168.1.3 | 255.255.255.0 |

**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 cable the equipment as shown in the topology. 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.

**Note**: Make sure that the switches have been erased and have no startup configurations. If you are unsure, ask your instructor.

**Required Resources**

* 1 Switch (Cisco 2960 with Cisco IOS Release 15.2(2) lanbasek9 image or comparable)
* 1 PC (Windows with a terminal emulation program, such as Tera Term)
* Console cable to configure the Cisco switch via the console ports
* Ethernet cables as shown in the topology

**Instructions**

# Part 1: Configure Devices and Verify Connectivity

In this part, you will set up the network topology and 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: Cable the network as shown in the topology.

1. Attach the devices shown in the topology and cable as necessary.
2. Power on all the devices in the topology.

## Step 2: Configure the IPv4 address for the PC.

1. Configure the IPv4 address, subnet mask for PC-A.
2. From the command prompt on PC-A, ping the switch address. Were the pings successful? Explain.

Answer: No, because we haven’t given IP address to switch yet.

## Step 3: 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.

1. Console into the switch and enter global configuration mode.

Switch> **enable**

Switch# **configure terminal**

Enter configuration commands, one per line. End with CNTL/Z. Switch(config)#

1. Assign a hostname to the switch based on the Addressing Table.

Switch(config)# **hostname S1**

1. Disable DNS lookup.

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

1. 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 4: Verify network connectivity.

Ping the switch from PC-A.

Were the pings successful?

Answer: Yes, they were successful.

# 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.

1. 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. . . . . . . . . . . : No

Autoconfiguration Enabled . . . . : Yes

Link-local IPv6 Address . . . . . : fe80::b875:731b:3c7b:c0b1%10(Preferred) IPv4 Address. . . . . . . . . . . : 192.168.1.3 (Preferred)

Subnet Mask . . . . . . . . . . . : 255.255.255.0

<output omitted>

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

Answer: AC-5A-FC

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

Answer: C1-E6-07

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

Answer: Intel

1. 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.

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

Answer: 34:47:66

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

## 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.

1. Console into 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 runts, 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?

Answer: 00d0.ff39.67ab

What is the MAC serial number for VLAN 1?

Answer: 39.67ab

What is the OUI for VLAN 1?

Answer: 00d0.ff

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

Answer: Cisco Systems, Inc

What does bia stand for?

Answer: BIA stands for Burned-In Address.

Why does the output show the same MAC address twice?

Answer: The output shows the same MAC address twice because the switch assigns its burned-in address to the VLAN1 interface as its MAC address by default.

1. 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?

Answer: 00D0.FF39.67AB and 0002.1634.4766

What Layer 3 addresses are displayed on S1?

Answer: 192.168.1.2 and 192.168.1.3

## 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 |
| 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?

Answer: Yes. Port: Fa0/6

**Reflection Questions**

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

Answer: Yes, MAC is FF:FF:FF:FF:FF:FF

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

Answer: Without MAC address we can’t send data and packets with each other, it helps identifying devices in local network.