

## Practical-9

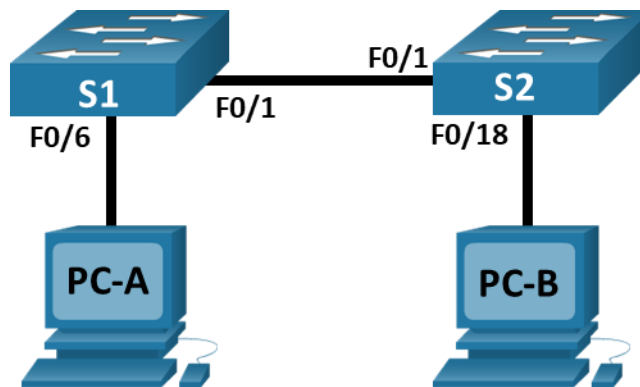
Aim: View the Switch MAC Address Table Topology.

Devices Used: Switch, PCs, and Cables

### Objectives

Part 1: Build and Configure the Network

Part 2: Examine the Switch MAC Address Table



### Addressing Table

Device	Interface	IP Address	Subnet Mask
S1	VLAN 1	192.168.1.11	255.255.255.0
S2	VLAN 1	192.168.1.12	255.255.255.0
PC-A	NIC	192.168.1.1	255.255.255.0
PC-B	NIC	192.168.1.2	255.255.255.0

### Background / Scenario

The purpose of a Layer 2 LAN switch is to deliver Ethernet frames to host devices on the local network. The switch records host MAC addresses that are visible on the network, and maps those MAC addresses to its own Ethernet switch ports. This process is called building the MAC address table. When a switch receives a frame from a PC, it examines the frame's source and destination MAC addresses. The source MAC address is recorded and mapped to the switch port from which it arrived. Then the destination MAC address is looked up in the MAC address table. If the destination MAC address is a known address, then the frame is forwarded out of the corresponding switch port associated with that MAC address. If the MAC address is unknown, then the frame is broadcasted out of all switch ports, except the one from which it came. It is important to observe and understand the function of a switch and how it delivers data on the network. The way a switch operates has implications for network administrators whose job it is to ensure secure and consistent network communication.

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Switches are used to interconnect and deliver information to computers on local area networks. Switches deliver Ethernet frames to host devices identified by network interface card MAC addresses.

## Procedure

### Part 1: Build and Configure the Network

Step 1: Cable the network according to the topology.

Step 2: Configure PC hosts.

Step 3: Initialize and reload switches as necessary.

Step 4: Configure basic settings for each switch.

- a. Configure device name as shown in the topology.
- b. Configure IP address as listed in Addressing Table.
- c. Assign cisco as the console and vty passwords.
- d. Assign class as the privileged EXEC password.

### Part 2: Examine the Switch MAC Address Table

A switch learns MAC addresses and builds the MAC address table, as network devices initiate communication on the network.

## Questions:

Q) Are there any MAC addresses recorded in the MAC address table?

**The switch may have one or more MAC addresses in its table, based on whether or not the students entered a ping command when configuring the network. The switch will most likely have learned MAC addresses through S1's F0/1 switch port. The switch will record multiple MAC addresses of hosts learned through the connection to the other switch on F0/1.**

Q) What MAC addresses are recorded in the table? To which switch ports are they mapped and to which devices do they belong? Ignore MAC addresses that are mapped to the CPU.

**There may be multiple MAC addresses recorded in the MAC address table, especially MAC addresses learned through S1's F0/1 switch port. In the example output above, the S1 F0/1 MAC address and PC-A MAC address are mapped to S2 F0/1.**

Q) If you had not previously recorded MAC addresses of network devices in Step 1, how could you tell which devices the MAC addresses belong to, using only the output from the **show mac address-table** command? Does it work in all scenarios?

**The output of the show mac address-table command shows the port that the MAC address was learned on. In most cases this would identify which network device the MAC address belongs to, except in the case of multiple MAC addresses associated to the same port. This happens when switches are connected to other switches and record all of the MAC addresses for devices connected to the other switch.**

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Result:

PC-A

```
Switch>enable
Switch#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname S1
S1(config)#interface vlan 1
S1(config-if)#ip address 192.168.1.11 255.255.255.0
S1(config-if)#no shutdown

S1(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

S1(config-if)#line console 0
S1(config-line)#password cisco
S1(config-line)#login
S1(config-line)#line vty 0 15
S1(config-line)#pass
% Incomplete command.
S1(config-line)#password cisco
S1(config-line)#login
S1(config-line)#exit
S1(config)#
S1(config)#enable password class
S1(config)#exit
S1#
%SYS-5-CONFIG_I: Configured from console by console

S1#show run
Building configuration...

Current configuration : 1169 bytes
!
version 15.0
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname S1
!
enable password class
!
!
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
!
interface FastEthernet0/1
!
interface FastEthernet0/2
!
interface FastEthernet0/3
!
interface FastEthernet0/4
!
interface FastEthernet0/5
!
interface FastEthernet0/6
!
interface FastEthernet0/7
!
interface FastEthernet0/8
!
interface FastEthernet0/9
!
interface FastEthernet0/10
!
interface FastEthernet0/11
```

```
:
interface FastEthernet0/12
!
interface FastEthernet0/13
!
interface FastEthernet0/14
!
interface FastEthernet0/15
!
interface FastEthernet0/16
!
interface FastEthernet0/17
!
interface FastEthernet0/18
!
interface FastEthernet0/19
!
interface FastEthernet0/20
!
interface FastEthernet0/21
!
interface FastEthernet0/22
!
interface FastEthernet0/23
!
interface FastEthernet0/24
!
interface GigabitEthernet0/1
!
interface GigabitEthernet0/2
!
interface Vlan1
 ip address 192.168.1.11 255.255.255.0
!
!
!
!
line con 0
 password cisco
 login
!
line vty 0 4
 password cisco
 login
line vty 5 15
```

```
login
line vty 5 15
 password cisco
 login
!
!
!
!
--More--
```

## PC-B

```
Switch>enable
Switch#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname S2
S2(config)#interface vlan 1
S2(config-if)#ip address 192.168.1.12 255.255.255.0
S2(config-if)#no shutdown

S2(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

S2(config-if)#exit
S2(config)#line console 0
S2(config-line)#password cisco
S2(config-line)#login
S2(config-line)#line vty 0 15
S2(config-line)#
S2(config-line)#
S2(config-line)#password cisco
S2(config-line)#exit
S2(config)#enable password class

S2#show run
Building configuration...

Current configuration : 1169 bytes
!
version 15.0
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname S2
!
enable password class
!
!
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
!
interface FastEthernet0/1
!
interface FastEthernet0/2
!
interface FastEthernet0/3
!
interface FastEthernet0/4
!
interface FastEthernet0/5
!
interface FastEthernet0/6
!
interface FastEthernet0/7
!
interface FastEthernet0/8
!
interface FastEthernet0/9
!
interface FastEthernet0/10
!
interface FastEthernet0/11
!
```

```
interface FastEthernet0/12
!
interface FastEthernet0/13
!
interface FastEthernet0/14
!
interface FastEthernet0/15
!
interface FastEthernet0/16
!
interface FastEthernet0/17
!
interface FastEthernet0/18
!
interface FastEthernet0/19
!
interface FastEthernet0/20
!
interface FastEthernet0/21
!
interface FastEthernet0/22
!
interface FastEthernet0/23
!
interface FastEthernet0/24
!
interface GigabitEthernet0/1
!
interface GigabitEthernet0/2
!
interface Vlan1
 ip address 192.168.1.12 255.255.255.0
!
!
!
!
line con 0
 password cisco
 login
!
line vty 0 4
 password cisco
 login
line vty 5 15
```

```
 login
line vty 5 15
 password cisco
 login
!
!
!
!
--More--
```

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig /all
```

```
FastEthernet0 Connection:(default port)
```

```
Connection-specific DNS Suffix...:
Physical Address.....: 000B.BE41.07CE
Link-local IPv6 Address.....: FE80::20B:BEFF:FE41:7CE
IPv6 Address.....: ::
IPv4 Address.....: 192.168.1.1
Subnet Mask.....: 255.255.255.0
Default Gateway.....: ::
                        0.0.0.0
DHCP Servers.....: 0.0.0.0
DHCPv6 IAID.....:
DHCPv6 Client DUID.....: 00-01-00-01-31-49-58-70-00-0B-BE-41-07-CE
DNS Servers.....: ::
                        0.0.0.0
```

```
Bluetooth Connection:
```

```
Connection-specific DNS Suffix...:
Physical Address.....: 0001.969A.9A18
Link-local IPv6 Address.....: ::
--More--
```

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig /all
```

```
FastEthernet0 Connection:(default port)
```

```
Connection-specific DNS Suffix...:
Physical Address.....: 0060.7038.A2A0
Link-local IPv6 Address.....: FE80::260:70FF:FE38:A2A0
IPv6 Address.....: ::
IPv4 Address.....: 192.168.1.2
Subnet Mask.....: 255.255.255.0
Default Gateway.....: ::
                        0.0.0.0
DHCP Servers.....: 0.0.0.0
DHCPv6 IAID.....:
DHCPv6 Client DUID.....: 00-01-00-01-78-A6-76-35-00-60-70-38-A2-A0
DNS Servers.....: ::
                        0.0.0.0
```

```
Bluetooth Connection:
```

```
Connection-specific DNS Suffix...:
Physical Address.....: 0001.6389.243C
Link-local IPv6 Address.....: ::
--More--
```



```

S1#show interface f0/1
FastEthernet0/1 is up, line protocol is up (connected)
  Hardware is Lance, address is 000a.f39d.6e01 (bia 000a.f39d.6e01)
  BW 100000 Kbit, DLY 1000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s
  input flow-control is off, output flow-control is off
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:08, output 00:00:05, 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
    956 packets input, 193351 bytes, 0 no buffer
    Received 956 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 watchdog, 0 multicast, 0 pause input
    0 input packets with dribble condition detected
    2357 packets output, 263570 bytes, 0 underruns
--More--

```

```

S2#
S2#show interface f0/1
FastEthernet0/1 is up, line protocol is up (connected)
  Hardware is Lance, address is 0007.ec86.0101 (bia 0007.ec86.0101)
  BW 100000 Kbit, DLY 1000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s
  input flow-control is off, output flow-control is off
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:08, output 00:00:05, 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
    956 packets input, 193351 bytes, 0 no buffer
    Received 956 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 watchdog, 0 multicast, 0 pause input
    0 input packets with dribble condition detected
    2357 packets output, 263570 bytes, 0 underruns
--More--

```

```

S2#
S2#show mac address-table
      Mac Address Table
-----
Vlan    Mac Address      Type      Ports
----    -
1       000a.f39d.6e02   DYNAMIC   Fa0/1
S2#

```



```

S1#
S1#show mac address-table
      Mac Address Table
-----
Vlan    Mac Address      Type    Ports
----    -
1       0007.ec86.0101    DYNAMIC Fa0/2
S1#

```

PC-B

Physical Config Desktop Programming Attributes

Command Prompt

```

C:\>arp -a
No ARP Entries Found
C:\>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time<1ms TTL=128
Reply from 192.168.1.1: bytes=32 time<1ms TTL=128
Reply from 192.168.1.1: bytes=32 time<1ms TTL=128
Reply from 192.168.1.1: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.1.11

Pinging 192.168.1.11 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.11: bytes=32 time<1ms TTL=255
Reply from 192.168.1.11: bytes=32 time<1ms TTL=255
Reply from 192.168.1.11: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.1.11:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.1.12

Pinging 192.168.1.12 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.12: bytes=32 time<1ms TTL=255
Reply from 192.168.1.12: bytes=32 time<1ms TTL=255
Reply from 192.168.1.12: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.1.12:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

```

```

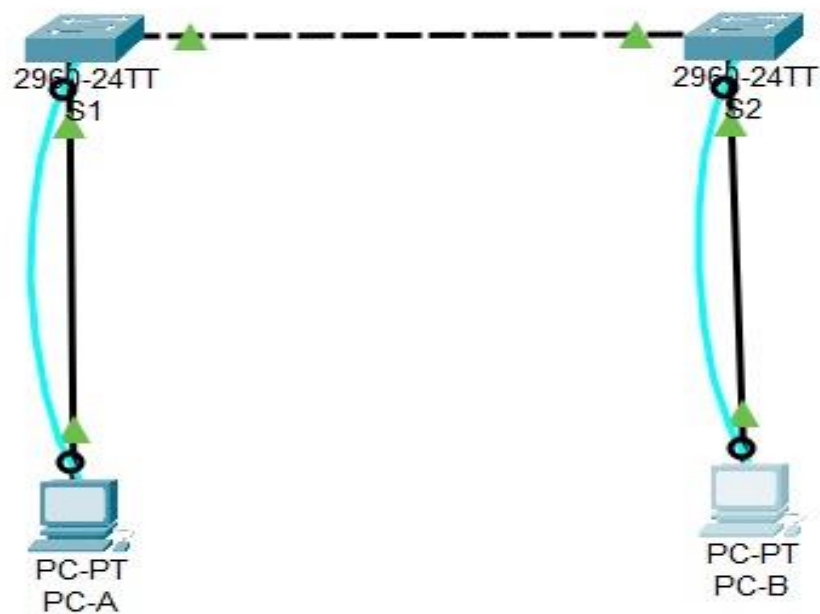
C:\>arp -a
Internet Address      Physical Address      Type
192.168.1.1           000b.be41.07ce       dynamic
192.168.1.11          0004.9a64.560b       dynamic
192.168.1.12          0030.a395.6cb3       dynamic

```

```

S2#show mac address-table
      Mac Address Table
-----
Vlan    Mac Address      Type      Ports
----    -
1       0004.9a64.560b    DYNAMIC   Fa0/1
1       000a.f39d.6e02    DYNAMIC   Fa0/1
1       000b.be41.07ce    DYNAMIC   Fa0/1
1       0060.7038.a2a0    DYNAMIC   Fa0/2

```



Result: The Switch MAC Address Table Topology has been configured.