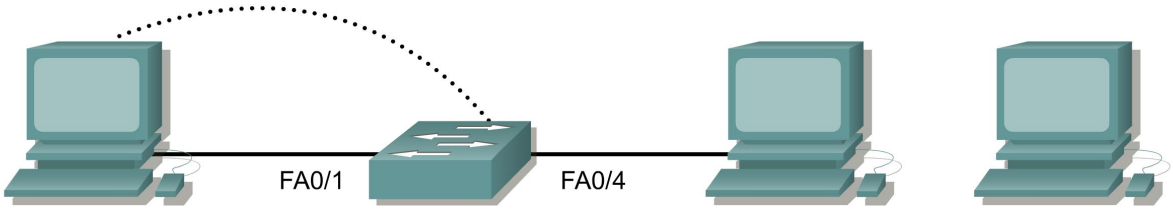
Lab 6.2.6 Add, Move, and Change MAC Addresses – 2900XL Series



Switch Designation	Switch Name	Enable Secret Password	Enable,VTY, and Console Passwords	VLAN 1 IP Address	Default Gateway IP Address	Subnet Mask
Switch 1	ALSwitch	class	cisco	192.168.1.2	192.168.1.1	255.255.255.0

Straight-through cable	
Serial cable	
Console (Rollover)	
Crossover cable	

Objective

- Create and verify a basic switch configuration.
- Move a PC from one switch port to another and add a new PC to the switch.

Background/Preparation

Cable a network similar to the one in the diagram. The configuration output used in this lab is produced from a 2950 series switch. Any other switch used may produce different output. The following steps are to be executed on each switch unless specifically instructed otherwise. Instructions are also provided for the 1900 Series switch, which initially displays a User Interface Menu. Select the “Command Line” option from the menu to perform the steps for this lab.

Start a HyperTerminal session.

Note: Go to the erase and reload instructions at the end of this lab. Perform those steps on all switches in this lab assignment before continuing.

Step 1 Configure the switch

Configure the hostname, access and command mode passwords, as well as the management VLAN settings. These values are shown in the chart. If problems occur while performing this configuration, refer to the Basic Switch Configuration lab.

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Step 2 Configure the hosts attached to the switch

Configure the hosts to use the same IP subnet for the address, mask, and default gateway as on the switch.

There is a third host needed for this lab. It needs to be configured with the address 192.168.1.7. The subnet mask is 255.255.255.0 and the default gateway is 192.168.1.1. Do not connect this PC to the switch yet.

Step 3 Verify connectivity

a. To verify that the hosts and switch are correctly configured, ping the switch IP address from the hosts.

b. Were the pings successful? Yes

c. If the answer is no, troubleshoot the hosts and switch configurations.

Step 4 Record the MAC addresses on the hosts

a. To determine and record the layer 2 addresses of the PC network interface cards enter the following.

If running Windows 98, check by using **Start** > **Run** > **`winipcfg`**. Click on **More info**.

If running Windows 2000, check by using **Start** > **Run** > **`cmd > ipconfig /all`**.

b. PC1: 08-00-46-06-FB-B6

c. PC4: 00-08-74-4D-8E-E2

Step 5 Determine what MAC addresses the switch has learned

a. Determine what MAC addresses the switch has learned by using the **`show mac-address-table`** command at the privileged exec mode prompt:

```
ALSwitch#show mac-address-table
```

b. How many dynamic addresses are there? 2

c. How many total MAC addresses are there? 51

d. Do the MAC addresses match the host MAC addresses? Yes

Step 6 Determine the show MAC table options

To determine the options that the **`mac-address-table`** command has using enter the **`?`** option as follows:

```
ALSwitch(config)#mac-address-table ?
```

Step 7 Set up a static MAC address

To setup a static MAC address on Fast Ethernet interface 0/4 enter the following:

Note: Use the address that was recorded for PC4 in Step 4. The MAC address 00e0.2917.1884 is used in the example statement only.

```
ALSwitch(config)#mac-address-table static 00e0.2917.1884 interface
fastethernet 0/4 vlan 1
```

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1900:

```
ALSwitch(config)#mac-address-table permanent 00e0.2917.1884 ethernet
0/4
```

Step 8 Verify the results

a. Enter the following to verify the MAC address table entries:

```
ALSwitch#show mac-address-table
```

b. How many static addresses are there? 1

Step 9 List port security options

a. To determine the options for setting port security on interface Fast Ethernet 0/4. Type **port security ?** from the interface configuration prompt for Fast Ethernet port 0/4.

```
ALSwitch(config)#interface fastethernet 0/4
ALSwitch(config-if)#switchport port-security ?
  aging         Port-security aging commands
  mac-address   Secure mac address
  maximum       Max secure addrs
  violation     Security Violation Mode
  <cr>
```

1900:

```
ALSwitch(config)#interface ethernet 0/4
ALSwitch(config-if)#port secure ?
  max-mac-count  Maximum number of addresses allowed on the port
  <cr>
```

b. Allow the switchport on Fast Ethernet 0/4 to accept only one device by typing **port-security** as follows:

```
ALSwitch(config-if)#switchport mode access

ALSwitch(config-if)#switchport port-security mac-address sticky
```

1900:

```
ALSwitch(config-if)#port secure
```

Step 10 Verify the results

a. Enter the following to verify the **mac-address-table** entries:

```
ALSwitch#show mac-address-table
```

b. How are the address types listed for the two MAC addresses? 1 static, 1 dynamic

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Step 11 Show the running configuration file

a. In the listing of the running configuration are there statements that directly reflect the security implementation? Yes

b. What do those statements mean? Port security is enabled.

Step 12 Limit the number of hosts on each port

a. Enter the following on interface Fast Ethernet 0/4 to set the port security maximum MAC count to 1:

```
ALSwitch(config)#interface fastethernet 0/4
ALSwitch(config-if)#switchport port-security maximum 1
```

1900:

```
ALSwitch(config)#interface ethernet 0/4
ALSwitch(config-if)#port secure max-mac-count 1
```

b. Disconnect the PC that is attached to Fast Ethernet 0/4. Connect to the port that the PC has been given the IP address 192.168.1.7. This PC has not yet been attached to the switch. To generate some traffic **ping** the switch address 192.168.1.2 with the -n 50 option. For example **ping 192.168.1.2 –n 50**, where 50 is the number of pings sent.

Step 13 Move host

a. Take the PC that had previously been connected to Fast Ethernet 0/4 and reconnect it to Fast Ethernet 0/8. The PC has been moved to a new location. This could be to another VLAN but in this instance all switch ports are in VLAN 1 and network 192.168.1.0.

b. From this PC on Fast Ethernet 0/8, **ping 192.168.1.2 –n 50**

c. Was the ping successful? Yes

d. Why or why not? No port security is enabled.

e. Enter the following to show the **mac-address-table**.

```
ALSwitch#show mac-address-table
```

f. Record observations about the show output.

```
ALSwitch#show mac-address-table
Dynamic Address Count:                  2
Secure Address Count:                   1
Static Address (User-defined) Count:    0
System Self Address Count:              49
Total MAC addresses:                    52
Maximum MAC addresses:                  2048
Non-static Address Table:
Destination Address  Address Type  VLAN  Destination Port
-------------------  ------------  ----  --------------------
0008.744d.8ee2       Dynamic          1  FastEthernet0/8
0800.4606.fbb6       Dynamic          1  FastEthernet0/1
00b0.d026.6ab5       Secure           1  FastEthernet0/4
```

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Step 14 Clear MAC table

a. Enter the following to clear the **mac-address-table:**

Note: This will unlock the MAC addresses from security and allow a new address to be registered.

```
ALSwitch#clear mac-address-table dynamic
```

b. From the PC on the Fast Ethernet 0/8, **ping 192.168.1.2 –n 50.**

c. Was the ping successful? Yes

d. If not troubleshoot as necessary.

Step 15 Change security settings

a. Enter the following to show the **mac-address-table:**

```
ALSwitch#show mac-address-table
```

b. Notice that Fast Ethernet 0/4 is secure. However, that security should be applied to the machine on port 0/8, as this is the machine that was moved from port 0/4. Remove port security from interface Fast Ethernet 0/4 as follows:

```
ALSwitch(config)#interface fastethernet 0/4

ALSwitch(config-if)#no switchport port-security mac-address sticky
0008.744d.8ee2
ALSwitch(config-if)#shutdown
ALSwitch(config-if)#no shutdown
```

1900:

```
ALSwitch(config)#interface ethernet 0/4
ALSwitch(config-if)#no port secure
```

c. Apply port security with a max-mac-count of 1 to interface Fast Ethernet 0/8 as follows:

```
ALSwitch(config)#interface fastethernet 0/8
ALSwitch(config-if)#switchport mode access
ALSwitch(config-if)#switchport port-security mac-address sticky
ALSwitch(config-if)#switchport port-security maximum 1
```

1900:

```
ALSwitch(config)#interface ethernet 0/8
ALSwitch(config-if)#port secure max-mac-count 1
```

d. Enter the following to clear the **mac-address-table.**

Note: Clearing individual entries could have also been done.

```
ALSwitch#clear mac-address-table
```

Step 16 Verify the results

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a. Verify that the mac-address-table has been cleared.

```
ALSwitch#show mac-address-table
```

b. Can all PCs still successfully **ping** each other? Yes

c. If not troubleshoot the switch and PCs.

Step 17 Exit the switch

Type **exit** to leave the switch welcome screen as follows:

```
Switch#exit
```

Once the steps are complete, logoff by typing **exit**, and turn all the devices off. Then remove and store the cables and adapter.

```
Switch>enable
Switch#configure terminal

Switch(config)#hostname ALSwitch

ALSwitch(config)#enable secret class

ALSwitch(config)#line con 0
ALSwitch(config-line)#password cisco
ALSwitch(config-line)#login
ALSwitch(config-line)#line vty 0 15
ALSwitch(config-line)#password cisco
ALSwitch(config-line)#login

ALSwitch(config-line)#interface Vlan1
ALSwitch(config-if)#ip address 192.168.1.2 255.255.255.0
ALSwitch(config-if)#no shutdown
ALSwitch(config-if)#ip default-gateway 192.168.1.1

ALSwitch(config)#exit


ALSwitch#show mac-address-table
Dynamic Address Count:                  1
Secure Address Count:                   0
Static Address (User-defined) Count:    0
System Self Address Count:              49
Total MAC addresses:                    50
Maximum MAC addresses:                  2048
Non-static Address Table:
Destination Address  Address Type  VLAN  Destination Port
-------------------  ------------  ----  --------------------
0008.744d.8ee2       Dynamic          1  FastEthernet0/4

ALSwitch#show mac-address-table
Dynamic Address Count:                  2
Secure Address Count:                   0
Static Address (User-defined) Count:    0
System Self Address Count:              49
Total MAC addresses:                    51
```


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```
Maximum MAC addresses:                    2048
Non-static Address Table:
Destination Address  Address Type  VLAN  Destination Port
-------------------  ------------  ----  --------------------
0008.744d.8ee2       Dynamic          1  FastEthernet0/4
0800.4606.fbb6       Dynamic          1  FastEthernet0/1

ALSwitch#configure terminal

ALSwitch(config)#mac-address-table ?
  aging-time    Set MAC address table entry maximum age
  dynamic       Configure a dynamic 802.1d address
  notification  Enable/Disable MAC Notification on the switch
  secure        Configure a secure address
  static        Configure a static 802.1d static address


ALSwitch(config)#mac-address-table static 0008.744d.8ee2 fa 0/4 vlan 1
ALSwitch(config)#exit



ALSwitch#show mac-address-table
Dynamic Address Count:                    1
Secure Address Count:                     0
Static Address (User-defined) Count:      1
System Self Address Count:               49
Total MAC addresses:                     51
Maximum MAC addresses:                 2048
Non-static Address Table:
Destination Address  Address Type  VLAN  Destination Port
-------------------  ------------  ----  --------------------
0800.4606.fbb6       Dynamic          1  FastEthernet0/1

Static Address Table:
Destination Address  Input Port  Output Ports
-------------------  ----------  -----------------------
0008.744d.8ee2              1    Fa0/1
                            1    Fa0/2
                            1    Fa0/3
                            1    Fa0/4
                            1    Fa0/5
                            1    Fa0/6
                            1    Fa0/7
                            1    Fa0/8
                            1    Fa0/9
                            1    Fa0/10
                            1    Fa0/11
                            1    Fa0/12
                            1    Fa0/13
                            1    Fa0/14
                            1    Fa0/15
                            1    Fa0/16
                            1    Fa0/17
                            1    Fa0/18
                            1    Fa0/19
                            1    Fa0/20
                            1    Fa0/21
                            1    Fa0/22
                            1    Fa0/23
```

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```
                                1   Fa0/24

ALSwitch#configure terminal
ALSwitch(config)#interface fastethernet0/4
ALSwitch(config-if)#port security ?
  action          action to take for security violation
  aging           Enable Port-security aging
  max-mac-count   maximum mac address count
  <cr>


ALSwitch#show mac-address-table
Dynamic Address Count:                   1
Secure Address Count:                    0
Static Address (User-defined) Count:     1
System Self Address Count:               49
Total MAC addresses:                     51
Maximum MAC addresses:                   2048
Non-static Address Table:
Destination Address  Address Type  VLAN  Destination Port
-------------------  ------------  ----  --------------------
0800.4606.fbb6       Dynamic          1  FastEthernet0/1

Static Address Table:
Destination Address  VLAN  Input Port  Output Ports
-------------------  ----  ----------  ------------------------
0008.744d.8ee2          1  Fa0/1
                        1  Fa0/2
                        1  Fa0/3
                        1  Fa0/4
                        1  Fa0/5
                        1  Fa0/6
                        1  Fa0/7
                        1  Fa0/8
                        1  Fa0/9
                        1  Fa0/10
                        1  Fa0/11
                        1  Fa0/12
                        1  Fa0/13
                        1  Fa0/14
                        1  Fa0/15
                        1  Fa0/16
                        1  Fa0/17
                        1  Fa0/18
                        1  Fa0/19
                        1  Fa0/20
                        1  Fa0/21
                        1  Fa0/22
                        1  Fa0/23
                        1  Fa0/24

ALSwitch#show running-config
Building configuration...

Current configuration:
!
version 12.0
no service pad
service timestamps debug uptime
service timestamps log uptime
```

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```
no service password-encryption
!
hostname ALSwitch
!
enable secret 5 $1$XAq/$YHK3C0pycowdpkuyHx8NG.


!
ip subnet-zero

!
interface FastEthernet0/1
!
interface FastEthernet0/2
!
interface FastEthernet0/3
!
interface FastEthernet0/4
 port security
!
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
!
```

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```
interface VLAN1
  ip address 192.168.1.2 255.255.255.0
  no ip directed-broadcast
  no ip route-cache
!
ip default-gateway 192.168.1.1
mac-address-table static 0008.744d.8ee2 FastEthernet0/4 vlan 1
!
line con 0
  password cisco
  login

line vty 0 4
  password cisco
  login
line vty 5 15
  password cisco
  login
!
end

ALSwitch#configure terminal
ALSwitch(config)#interface fastethernet 0/4
ALSwitch(config-if)#port security max-mac-count 1

ALSwitch(config-if)#end

ALSwitch#show mac-address-table
Dynamic Address Count:                   0
Secure Address Count:                    1
Static Address (User-defined) Count:     1
System Self Address Count:               49
Total MAC addresses:                     51
Maximum MAC addresses:                   2048
Non-static Address Table:
Destination Address  Address Type  VLAN  Destination Port
-------------------  ------------  ----  --------------------
00b0.d026.6ab5       Secure           1  FastEthernet0/4
Static Address Table:
Destination Address  VLAN  Input Port  Output Ports
-------------------  ----  ----------  ------------------------
0008.744d.8ee2          1  Fa0/1
                        1  Fa0/2
                        1  Fa0/3
                        1  Fa0/4
                        1  Fa0/5
                        1  Fa0/6
                        1  Fa0/7
                        1  Fa0/8
                        1  Fa0/9
                        1  Fa0/10
                        1  Fa0/11
                        1  Fa0/12
                        1  Fa0/13
                        1  Fa0/14
                        1  Fa0/15
                        1  Fa0/16
                        1  Fa0/17
                        1  Fa0/18
                        1  Fa0/19
```


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```
                                1   Fa0/20
                                1   Fa0/21
                                1   Fa0/22
                                1   Fa0/23
                                1   Fa0/24

ALSwitch#show mac-address-table
Dynamic Address Count:                  1
Secure Address Count:                   1
Static Address (User-defined) Count:    1
System Self Address Count:              49
Total MAC addresses:                    52
Maximum MAC addresses:                  2048
Non-static Address Table:
Destination Address  Address Type  VLAN  Destination Port
-------------------  ------------  ----  --------------------
0800.4606.fbb6       Dynamic          1  FastEthernet0/1
00b0.d026.6ab5       Secure           1  FastEthernet0/4

Static Address Table:
Destination Address  VLAN  Input Port  Output Ports
-------------------  ----  ----------  ------------------------
0008.744d.8ee2          1  Fa0/1
                        1  Fa0/2
                        1  Fa0/3
                        1  Fa0/4
                        1  Fa0/5
                        1  Fa0/6
                        1  Fa0/7
                        1  Fa0/8
                        1  Fa0/9
                        1  Fa0/10
                        1  Fa0/11
                        1  Fa0/12
                        1  Fa0/13
                        1  Fa0/14
                        1  Fa0/15
                        1  Fa0/16
                        1  Fa0/17
                        1  Fa0/18
                        1  Fa0/19
                        1  Fa0/20
                        1  Fa0/21
                        1  Fa0/22
                        1  Fa0/23
                        1  Fa0/24
ALSwitch#
ALSwitch#copy running-config startup-config
Building configuration...

Current configuration:
!
version 12.0
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname ALSwitch
!
```

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```
enable secret 5 $1$XAq/$YHK3C0pycowdpkuyHx8NG.

!
ip subnet-zero

!
interface FastEthernet0/1
!
interface FastEthernet0/2
!
interface FastEthernet0/3
!
interface FastEthernet0/4
 port security max-mac-count 1
!
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 VLAN1
 ip address 192.168.1.2 255.255.255.0
 no ip directed-broadcast
 no ip route-cache
!
```

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```
ip default-gateway 192.168.1.1
mac-address-table secure 00b0.d026.6ab5 FastEthernet0/4 vlan 1
mac-address-table static 0008.744d.8ee2 FastEthernet0/4 vlan 1
!
line con 0
 password cisco
 login

line vty 0 4
 password cisco
 login
line vty 5 15
 password cisco
 login
!
end


ALSwitch#clear mac-address-table

ALSwitch#show mac-address-table
Dynamic Address Count:                   2
Secure Address Count:                    1
Static Address (User-defined) Count:     0
System Self Address Count:               49
Total MAC addresses:                     52
Maximum MAC addresses:                   2048
Non-static Address Table:
Destination Address  Address Type  VLAN  Destination Port
-------------------  ------------  ----  --------------------
0008.744d.8ee2       Dynamic          1  FastEthernet0/8
0800.4606.fbb6       Dynamic          1  FastEthernet0/1
00b0.d026.6ab5       Secure           1  FastEthernet0/4


ALSwitch#configure terminal
ALSwitch(config)#interface fastethernet 0/4
ALSwitch(config-if)#no port security
ALSwitch(config-if)#interface fastethernet 0/8
ALSwitch(config-if)#port security max-mac-count 1
ALSwitch(config-if)#end

ALSwitch#clear mac-address-table

ALSwitch#show mac-address-table
Dynamic Address Count:                   1
Secure Address Count:                    0
Static Address (User-defined) Count:     0
System Self Address Count:               49
Total MAC addresses:                     50
Maximum MAC addresses:                   2048
Non-static Address Table:
Destination Address  Address Type  VLAN  Destination Port
-------------------  ------------  ----  --------------------
00b0.d026.6ab5       Dynamic          1  FastEthernet0/4

ALSwitch#show mac-address-table
Dynamic Address Count:                   2
Secure Address Count:                    1
Static Address (User-defined) Count:     0
```

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```
System Self Address Count:                  49
Total MAC addresses:                        52
Maximum MAC addresses:                      2048
Non-static Address Table:
Destination Address  Address Type  VLAN  Destination Port
-------------------  ------------  ----  --------------------
00b0.d026.6ab5       Dynamic          1  FastEthernet0/4
0800.4606.fbb6       Dynamic          1  FastEthernet0/1
0008.744d.8ee2       Secure           1  FastEthernet0/8
```


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Erasing and Reloading the Switch

For the majority of the labs in CCNA 3 and CCNA 4 it is necessary to start with an unconfigured switch. Use of a switch with an existing configuration may produce unpredictable results. These instructions allow preparation of the switch prior to performing the lab so previous configuration options do not interfere. The following is the procedure for clearing out previous configurations and starting with an unconfigured switch. Instructions are provided for the 2900, 2950, and 1900 Series switches.

2900 and 2950 Series Switches

1. Enter into the privileged EXEC mode by typing **enable**.

   If prompted for a password, enter **class** (if that does not work, ask the instructor).

   ```
   Switch>enable
   ```

2. Remove the VLAN database information file.

   ```
   Switch#delete flash:vlan.dat
   Delete filename [vlan.dat]?[Enter]
   Delete flash:vlan.dat? [confirm] [Enter]
   ```

   If there was no VLAN file, this message is displayed.

   ```
   %Error deleting flash:vlan.dat (No such file or directory)
   ```

3. Remove the switch startup configuration file from NVRAM.

   ```
   Switch#erase startup-config
   ```

   The responding line prompt will be:

   ```
   Erasing the nvram filesystem will remove all files! Continue? [confirm]
   ```

   Press **Enter** to confirm.

   The response should be:

   ```
   Erase of nvram: complete
   ```

4. Check that VLAN information was deleted.

   Verify that the VLAN configuration was deleted in Step 2 using the **show vlan** command. If previous VLAN configuration information (other than the default management VLAN 1) is still present it will be necessary to power cycle the switch (hardware restart) instead of issuing the **reload** command. To power cycle the switch, remove the power cord from the back of the switch or unplug it. Then plug it back in.

   If the VLAN information was successfully deleted in Step 2, go to Step 5 and restart the switch using the **reload** command.

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5. Software restart (using the **reload** command)

   Note: This step is not necessary if the switch was restarted using the power cycle method.

   a. At the privileged EXEC mode enter the command **reload**.

      ```
      Switch#reload
      ```

      The responding line prompt will be:

      ```
      System configuration has been modified. Save? [yes/no]:
      ```

   b. Type **n** and then press **Enter**.

      The responding line prompt will be:

      ```
      Proceed with reload? [confirm] [Enter]
      ```

      The first line of the response will be:

      ```
      Reload requested by console.
      ```

      After the switch has reloaded, the line prompt will be:

      ```
      Would you like to enter the initial configuration dialog? [yes/no]:
      ```

   c. Type **n** and then press **Enter**.

      The responding line prompt will be:

      ```
      Press RETURN to get started! [Enter]
      ```

1900 Series Switches

1. Remove VLAN Trunking Protocol (VTP) information.

   ```
   #delete vtp
   This command resets the switch with VTP parameters set to factory
   defaults.
   All other parameters will be unchanged.

   Reset system with VTP parameters set to factory defaults, [Y]es or
   [N]o?
   ```

   Enter **y** and press **Enter**.

2. Remove the switch startup configuration from NVRAM.

   ```
   #delete nvram
   ```

   This command resets the switch with factory defaults. All system parameters will revert to their default factory settings. All static and dynamic addresses will be removed.

   Reset system with factory defaults, [**Y**]es or [**N**]o?

   Enter **y** and press **Enter**.

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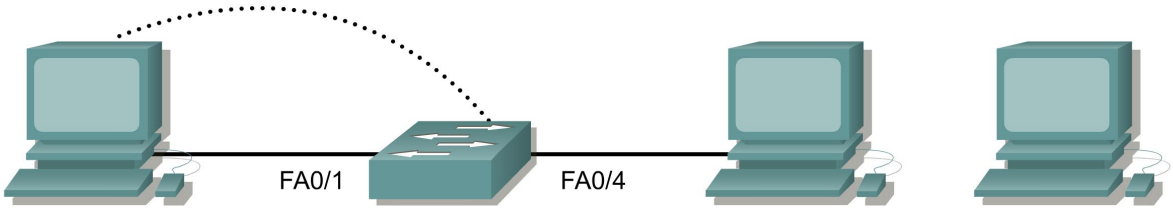
Lab 6.2.6 Add, Move, and Change MAC Addresses – 2950 Series



Switch Designation	Switch Name	Enable Secret Password	Enable,VTY, and Console Passwords	VLAN 1 IP Address	Default Gateway IP Address	Subnet Mask
Switch 1	ALSwitch	class	cisco	192.168.1.2	192.168.1.1	255.255.255.0

Straight-through cable	
Serial cable	
Console (Rollover)	
Crossover cable	

Objective

- Create and verify a basic switch configuration.
- Move a PC from one switch port to another and add a new PC to the switch.

Background/Preparation

Cable a network similar to the one in the diagram. The configuration output used in this lab is produced from a 2950 series switch. Any other switch used may produce different output. The following steps are to be executed on each switch unless specifically instructed otherwise. Instructions are also provided for the 1900 Series switch, which initially displays a User Interface Menu. Select the “Command Line” option from the menu to perform the steps for this lab.

Start a HyperTerminal session.

Note: Go to the erase and reload instructions at the end of this lab. Perform those steps on all switches in this lab assignment before continuing.

Step 1 Configure the switch

Configure the hostname, access and command mode passwords, as well as the management VLAN settings. These values are shown in the chart. If problems occur while performing this configuration, refer to the Basic Switch Configuration lab.

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Step 2 Configure the hosts attached to the switch

Configure the hosts to use the same IP subnet for the address, mask, and default gateway as on the switch.

There is a third host needed for this lab. It needs to be configured with the address 192.168.1.7. The subnet mask is 255.255.255.0 and the default gateway is 192.168.1.1. Do not connect this PC to the switch yet.

Step 3 Verify connectivity

a. To verify that the hosts and switch are correctly configured, ping the switch IP address from the hosts.

b. Were the pings successful? Yes

c. If the answer is no, troubleshoot the hosts and switch configurations.

Step 4 Record the MAC addresses on the hosts

a. To determine and record the layer 2 addresses of the PC network interface cards enter the following.

If running Windows 98, check by using **Start** > **Run** > **`winipcfg`**. Click on **More info**.

If running Windows 2000, check by using **Start** > **Run** > **`cmd > ipconfig /all`**.

b. PC1: 08-00-46-06-FB-B6

c. PC4: 00-08-74-4D-8E-E2

Step 5 Determine what MAC addresses the switch has learned

a. Determine what MAC addresses the switch has learned by using the **`show mac-address-table`** command at the privileged exec mode prompt:

```
ALSwitch#show mac-address-table
```

b. How many dynamic addresses are there? 2

c. How many total MAC addresses are there? 6

d. Do the MAC addresses match the host MAC addresses? Yes

Step 6 Determine the show MAC table options

To determine the options that the **`mac-address-table`** command has using enter the **`?`** option as follows:

```
ALSwitch(config)#mac-address-table ?
```

Step 7 Set up a static MAC address

To setup a static MAC address on Fast Ethernet interface 0/4 enter the following:

Note: Use the address that was recorded for PC4 in Step 4. The MAC address 00e0.2917.1884 is used in the example statement only.

```
ALSwitch(config)#mac-address-table static 00e0.2917.1884 interface
fastethernet 0/4 vlan 1
```

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```
   1900:
ALSwitch(config)#mac-address-table permanent 00e0.2917.1884 ethernet
0/4
```

Step 8 Verify the results

a. Enter the following to verify the MAC address table entries:

```
ALSwitch#show mac-address-table
```

b. How many static addresses are there? 5

Step 9 List port security options

a. To determine the options for setting port security on interface Fast Ethernet 0/4. Type **port security ?** from the interface configuration prompt for Fast Ethernet port 0/4.

```
ALSwitch(config)#interface fastethernet 0/4
ALSwitch(config-if)#switchport port-security ?
  aging         Port-security aging commands
  mac-address   Secure mac address
  maximum       Max secure addrs
  violation     Security Violation Mode
  <cr>

   1900:
ALSwitch(config)#interface ethernet 0/4
ALSwitch(config-if)#port secure ?
  max-mac-count  Maximum number of addresses allowed on the port
  <cr>
```

b. Allow the switchport on Fast Ethernet 0/4 to accept only one device by typing **port-security** as follows:

```
ALSwitch(config-if)#switchport mode access
ALSwitch(config-if)#switchport port-security mac-address sticky

   1900:
ALSwitch(config-if)#port secure
```

Step 10 Verify the results

a. Enter the following to verify the **mac-address-table** entries:

```
ALSwitch#show mac-address-table
```

b. How are the address types listed for the two MAC addresses? 1 static, 1 dynamic

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Step 11 Show the running configuration file

a. In the listing of the running configuration are there statements that directly reflect the security implementation? Yes

b. What do those statements mean? Port security is enabled

Step 12 Limit the number of hosts on each port

a. Enter the following on interface Fast Ethernet 0/4 to set the port security maximum MAC count to 1:

```
ALSwitch(config)#interface fastethernet 0/4
ALSwitch(config-if)#switchport port-security maximum 1


   1900:

ALSwitch(config)#interface ethernet 0/4
ALSwitch(config-if)#port secure max-mac-count 1
```

b. Disconnect the PC that is attached to Fast Ethernet 0/4. Connect to the port that the PC has been given the IP address 192.168.1.7. This PC has not yet been attached to the switch. To generate some traffic **ping** the switch address 192.168.1.2 with the -n 50 option. For example **ping 192.168.1.2 –n 50**, where 50 is the number of pings sent.

Step 13 Move host

a. Take the PC that had previously been connected to Fast Ethernet 0/4 and reconnect it to Fast Ethernet 0/8. The PC has been moved to a new location. This could be to another VLAN but in this instance all switch ports are in VLAN 1 and network 192.168.1.0.

b. From this PC on Fast Ethernet 0/8, **ping 192.168.1.2 –n 50**

c. Was the ping successful? Yes

d. Why or why not? No port security is enabled.

e. Enter the following to show the **mac-address-table**.

```
ALSwitch#show mac-address-table
```

f. Record observations about the show output.

```
ALSwitch#show mac-address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
  All    000a.b772.2b40    STATIC       CPU
  All    0100.0ccc.cccc    STATIC       CPU
  All    0100.0ccc.cccd    STATIC       CPU
  All    0100.0cdd.dddd    STATIC       CPU
  1    0008.744d.8ee2    DYNAMIC     Fa0/8
  1    0800.4606.fbb6    DYNAMIC     Fa0/1
Total Mac Addresses for this criterion: 6
```

Step 14 Clear MAC table

a. Enter the following to clear the **mac-address-table**:

Note: This will unlock the MAC addresses from security and allow a new address to be registered.

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```
ALSwitch#clear mac-address-table dynamic
```

b. From the PC on the Fast Ethernet 0/8, **ping 192.168.1.2 –n 50**.

c. Was the ping successful? Yes

d. If not troubleshoot as necessary.

Step 15 Change security settings

a. Enter the following to show the **mac-address-table:**

```
ALSwitch#show mac-address-table
```

b. Notice that Fast Ethernet 0/4 is secure. However, that security should be applied to the machine on port 0/8, as this is the machine that was moved from port 0/4. Remove port security from interface Fast Ethernet 0/4 as follows:

```
ALSwitch(config)#interface fastethernet 0/4

ALSwitch(config-if)#no switchport port-security mac-address sticky
0008.744d.8ee2
ALSwitch(config-if)#shutdown
ALSwitch(config-if)#no shutdown
```

1900:

```
ALSwitch(config)#interface ethernet 0/4
ALSwitch(config-if)#no port secure
```

c. Apply port security with a **max-mac-count** of 1 to interface Fast Ethernet 0/8 as follows:

```
ALSwitch(config)#interface fastethernet 0/8
ALSwitch(config-if)#switchport mode access
ALSwitch(config-if)#switchport port-security
ALSwitch(config-if)#switchport port-security mac-address sticky
ALSwitch(config-if)#switchport port-security maximum 1
```

1900:

```
ALSwitch(config)#interface ethernet 0/8
ALSwitch(config-if)#port secure max-mac-count 1
```

d. Enter the following to clear the **mac-address-table.**

Note: Clearing individual entries could have also been done.

```
ALSwitch#clear mac-address-table
```

Step 16 Verify the results

a. Verify that the **mac-address-table** has been cleared.

```
ALSwitch#show mac-address-table
```

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b. Can all PCs still successfully ping each other? Yes

c. If not troubleshoot the switch and PCs.

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Step 17 Exit the switch

Type **exit** to leave the switch welcome screen as follows:

```
Switch#exit
```

Once the steps are complete, logoff by typing **exit**, and turn all the devices off. Then remove and store the cables and adapter.

```
C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=10ms TTL=255
Reply from 192.168.1.2: bytes=32 time<10ms TTL=255
Reply from 192.168.1.2: bytes=32 time<10ms TTL=255
Reply from 192.168.1.2: bytes=32 time<10ms TTL=255

Ping statistics for 192.168.1.2:
      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
      Minimum = 0ms, Maximum =  10ms, Average =  2ms



C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time<10ms TTL=255
Reply from 192.168.1.2: bytes=32 time<10ms TTL=255
Reply from 192.168.1.2: bytes=32 time<10ms TTL=255
Reply from 192.168.1.2: bytes=32 time<10ms TTL=255

Ping statistics for 192.168.1.2:
      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
      Minimum = 0ms, Maximum =  0ms, Average =  0ms

C:\>

Switch>enable
Switch#configure terminal
Switch(config)#hostname ALSwitch
ALSwitch(config)#enable secret class
ALSwitch(config)#line con 0
ALSwitch(config-line)#password cisco
ALSwitch(config-line)#login
ALSwitch(config-line)#line vty 0 15
ALSwitch(config-line)#password cisco
ALSwitch(config-line)#login

ALSwitch(config-line)#interface Vlan1
ALSwitch(config-if)#ip address 192.168.1.2 255.255.255.0
ALSwitch(config-if)#
ALSwitch(config-if)#exit

ALSwitch(config)#exit
```

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```
ALSwitch#show mac-address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
  All    000a.b772.2b40    STATIC       CPU
  All    0100.0ccc.cccc    STATIC       CPU
  All    0100.0ccc.cccd    STATIC       CPU
  All    0100.0cdd.dddd    STATIC       CPU
Total Mac Addresses for this criterion: 4

ALSwitch#show mac-address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
  All    000a.b772.2b40    STATIC       CPU
  All    0100.0ccc.cccc    STATIC       CPU
  All    0100.0ccc.cccd    STATIC       CPU
  All    0100.0cdd.dddd    STATIC       CPU
  1    0008.744d.8ee2    DYNAMIC      Fa0/4
  1    0800.4606.fbb6    DYNAMIC      Fa0/1
Total Mac Addresses for this criterion: 6

ALSwitch#configure terminal
ALSwitch(config)#mac-address-table ?
aging-time Set MAC address table entry maximum age
notification Enable/Disable MAC Notification on the switch
static static keyword

ALSwitch(config)#mac-address-table static 0008.744d.8ee2 interface
      fastethernet 0/4 vlan 1
ALSwitch(config)#end

ALSwitch#show running-configuration
00:02:20: %SYS-5-CONFIG_I: Configured from console by con
ALSwitch#show mac-address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
  All    000a.b772.2b40    STATIC       CPU
  All    0100.0ccc.cccc    STATIC       CPU
  All    0100.0ccc.cccd    STATIC       CPU
  All    0100.0cdd.dddd    STATIC       CPU
  1    0008.744d.8ee2    STATIC      Fa0/4
  1    0800.4606.fbb6    DYNAMIC      Fa0/1
Total Mac Addresses for this criterion: 6
ALSwitch#config terminal
ALSwitch(config)#interface fastethernet 0/4
ALSwitch(config-if)#switchport port-security ?
  aging         Port-security aging commands
  mac-address   Secure mac address
  maximum       Max secure addrs
  violation     Security Violation Mode
  <cr>
```

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```
ALSwitch(config-if)#switchport mode access
ALSwitch(config-if)#switchport port-security mac-address sticky
ALSwitch(config-if)#end
ALSwitch#show mac-address-table
          Mac Address Table
------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
  All    000a.b772.2b40    STATIC       CPU
  All    0100.0ccc.cccc    STATIC       CPU
  All    0100.0ccc.cccd    STATIC       CPU
  All    0100.0cdd.dddd    STATIC       CPU
  1    0008.744d.8ee2    STATIC      Fa0/4
  1    0800.4606.fbb6    DYNAMIC     Fa0/1
Total Mac Addresses for this criterion: 6
ALSwitch#configure terminal
ALSwitch(config)#interface fastethernet 0/4
ALSwitch(config-if)#switchport port-security maximum 1
ALSwitch(config-if)#end



ALSwitch#show mac-address-table
          Mac Address Table
------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
  All    000a.b772.2b40    STATIC       CPU
  All    0100.0ccc.cccc    STATIC       CPU
  All    0100.0ccc.cccd    STATIC       CPU
  All    0100.0cdd.dddd    STATIC       CPU
  1    0008.744d.8ee2    DYNAMIC     Fa0/8
  1    0800.4606.fbb6    DYNAMIC     Fa0/1
Total Mac Addresses for this criterion: 6

ALSwitch#clear mac-address-table dynamic
ALSwitch#configure terminal
ALSwitch(config)#interface fastethernet 0/4
ALSwitch(config-if)#no switchport port-security mac-address sticky
ALSwitch(config-if)#$rt port-security mac-address sticky 0008.744d.8ee2
ALSwitch(config-if)#shutdown

ALSwitch(config-if)#interface fastethernet0/8
ALSwitch(config-if)#switchport mode access
ALSwitch(config-if)#switchport port-security mac-address sticky
ALSwitch(config-if)#switchport port-security maximum 1
ALSwitch(config-if)#end

ALSwitch#clear mac-address-table dynamic

ALSwitch#show mac-address-table
          Mac Address Table
------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
  All    000a.b772.2b40    STATIC       CPU
```

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```
  All    0100.0ccc.cccc    STATIC      CPU
  All    0100.0ccc.cccd    STATIC      CPU
  All    0100.0cdd.dddd    STATIC      CPU
  1    0008.744d.8ee2    STATIC      Fa0/8
  1    00b0.d026.6ab5    DYNAMIC     Fa0/4
  1    0800.4606.fbb6    DYNAMIC     Fa0/1
Total Mac Addresses for this criterion: 7
```

Erasing and Reloading the Switch

For the majority of the labs in CCNA 3 and CCNA 4 it is necessary to start with an unconfigured switch. Use of a switch with an existing configuration may produce unpredictable results. These instructions allow preparation of the switch prior to performing the lab so previous configuration options do not interfere. The following is the procedure for clearing out previous configurations and starting with an unconfigured switch. Instructions are provided for the 2900, 2950, and 1900 Series switches.

2900 and 2950 Series Switches

1. Enter into the privileged EXEC mode by typing **enable**.

   If prompted for a password, enter **class** (if that does not work, ask the instructor).

   ```
   Switch>enable
   ```

2. Remove the VLAN database information file.

   ```
   Switch#delete flash:vlan.dat
   Delete filename [vlan.dat]?[Enter]
   Delete flash:vlan.dat? [confirm] [Enter]
   ```

   If there was no VLAN file, this message is displayed.

   ```
   %Error deleting flash:vlan.dat (No such file or directory)
   ```

3. Remove the switch startup configuration file from NVRAM.

   ```
   Switch#erase startup-config
   ```

   The responding line prompt will be:

   ```
   Erasing the nvram filesystem will remove all files! Continue? [confirm]
   ```

   Press **Enter** to confirm.

   The response should be:

   ```
   Erase of nvram: complete
   ```

4. Check that VLAN information was deleted.

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Verify that the VLAN configuration was deleted in Step 2 using the **show vlan** command. If previous VLAN configuration information (other than the default management VLAN 1) is still present it will be necessary to power cycle the switch (hardware restart) instead of issuing the **reload** command. To power cycle the switch, remove the power cord from the back of the switch or unplug it. Then plug it back in.

If the VLAN information was successfully deleted in Step 2, go to Step 5 and restart the switch using the **reload** command.

5. Software restart (using the **reload** command)

   Note: This step is not necessary if the switch was restarted using the power cycle method.

   a. At the privileged EXEC mode enter the command **reload**.

   ```
   Switch#reload
   ```

   The responding line prompt will be:

   ```
   System configuration has been modified. Save? [yes/no]:
   ```

   b. Type **n** and then press **Enter**.

   The responding line prompt will be:

   ```
   Proceed with reload? [confirm] [Enter]
   ```

   The first line of the response will be:

   ```
   Reload requested by console.
   ```

   After the switch has reloaded, the line prompt will be:

   ```
   Would you like to enter the initial configuration dialog? [yes/no]:
   ```

   c. Type **n** and then press **Enter**.

   The responding line prompt will be:

   ```
   Press RETURN to get started! [Enter]
   ```

1900 Series Switches

a. Remove VLAN Trunking Protocol (VTP) information.

```
#delete vtp
This command resets the switch with VTP parameters set to factory
defaults.
All other parameters will be unchanged.

Reset system with VTP parameters set to factory defaults, [Y]es or
[N]o?
```

Enter **y** and press **Enter**.

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b. Remove the switch startup configuration from NVRAM.

```
#delete nvram
```

This command resets the switch with factory defaults. All system parameters will revert to their default factory settings. All static and dynamic addresses will be removed.

Reset system with factory defaults, [**Y**]es or [**N**]o?

Enter **y** and press **Enter**.

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