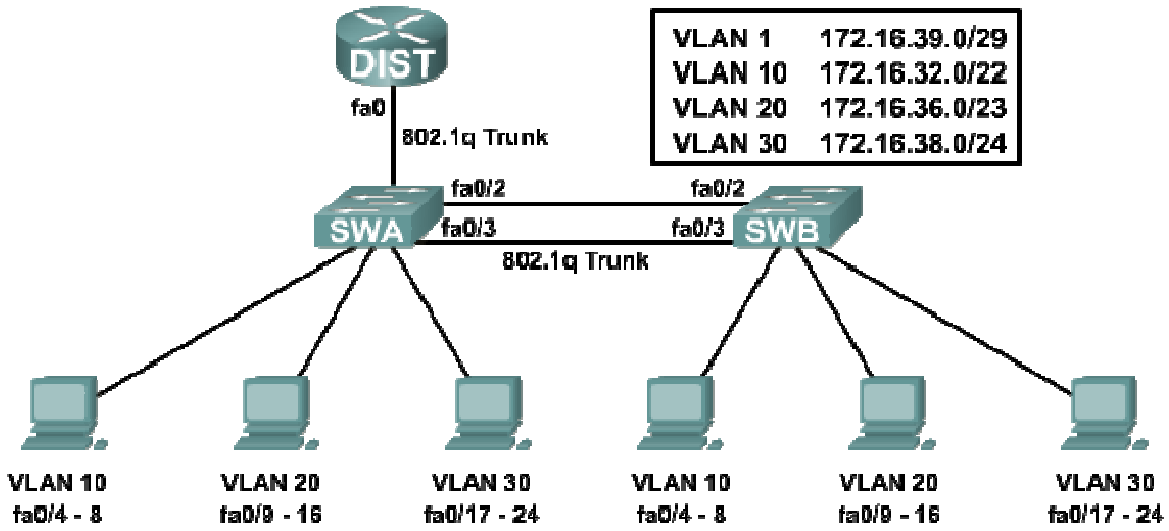
CCNA3 Module 9 Challenge Lab



Device	Interface	IP Address	Subnet Mask
SWA	VLAN1	172.16.39.2	255.255.255.248
SWB	VLAN1	172.16.39.3	255.255.255.248
DIST	Fa0.1	172.16.39.1	255.255.255.248
	Fa0.10	172.16.32.1	255.255.252.0
	Fa0.20	172.16.36.1	255.255.254.0
	Fa0.30	172.16.38.1	255.255.255.0

Objectives

- Configure STP, port security, VLANs, VTP, and inter-VLAN routing

Step 1: Cable the Topology and Basic Configuration

- Choose two 2950 switches and one router with a Fast Ethernet interface (1700 or 2600) and cable them according to the topology. (If using NetLab, choose a switch router pod)
- Configure the switches and router according to your Instructor's required basic configuration hostnames, host tables, lines and banner. Configure each of the switches with the correct VLAN1 IP addresses and the correct default gateway.
- Verify connectivity between SWA and SWB. Pings should be successful. If not, troubleshoot.

Step 2: Configure the Root Bridge for STP

- SWA should always be the root bridge. Configure SWA with a spanning tree priority of 4096 for all four VLANs (1, 10, 20, and 30)
- Verify SWA is the root with the **`show spanning-tree summary`** command. SWA should be listed as the root bridge as shown in the output below.

```
SWA#show spanning-tree summary
Switch is in pvst mode
Root bridge for: VLAN0001, VLAN0010, VLAN0020, VLAN0030
EtherChannel misconfiguration guard is enabled
Extended system ID   is enabled
Portfast             is disabled by default
PortFast BPDU Guard  is disabled by default
Portfast BPDU Filter is disabled by default
Loopguard            is disabled by default
UplinkFast           is disabled
BackboneFast         is disabled
Pathcost method used is short

Name                   Blocking Listening Learning Forwarding STP Active
---------------------- -------- --------- -------- ---------- ----------
VLAN0001                    0         0        0          3          3
VLAN0010                    0         0        0          3          3
VLAN0020                    0         0        0          3          3
VLAN0030                    0         0        0          3          3
---------------------- -------- --------- -------- ---------- ----------
4 vlans                     0         0        0         12         12

SWB#show spanning-tree summary
Switch is in pvst mode
Root bridge for: none
EtherChannel misconfiguration guard is enabled
Extended system ID   is enabled
Portfast             is disabled by default
PortFast BPDU Guard  is disabled by default
Portfast BPDU Filter is disabled by default
Loopguard            is disabled by default
UplinkFast           is disabled
BackboneFast         is disabled
Pathcost method used is short

Name                   Blocking Listening Learning Forwarding STP Active
---------------------- -------- --------- -------- ---------- ----------
VLAN0001                    1         0        0          1          2
VLAN0010                    1         0        0          1          2
VLAN0020                    1         0        0          1          2
VLAN0030                    1         0        0          1          2
---------------------- -------- --------- -------- ---------- ----------
4 vlans                     4         0        0          4          8
```

Step 3: Configure Port Security

- As a security precaution, disable the FastEthernet 0/1 interface on SWB since this interface will not be used for access mode or trunk mode.

On both SWA and SWB…

- Configure the access ports (fa0/4 – 24) for access mode and turn on port security.
- The first MAC address learned should “stick” to the port and no other MAC addresses should be allowed (maximum of 1 MAC per port).
- A security violation should automatically shutdown the port.

- Verify port security with the **`show port-security`** command. Your output should look similar to the output below

```
SWA#show port-security
Secure Port      MaxSecureAddr  CurrentAddr  SecurityViolation  Security Action
                    (Count)       (Count)      (Count)
---------------------------------------------------------------------------
     Fa0/4           1               0             0               Shutdown
     Fa0/5           1               0             0               Shutdown
     Fa0/6           1               0             0               Shutdown
     Fa0/7           1               0             0               Shutdown
     Fa0/8           1               0             0               Shutdown
     Fa0/9           1               0             0               Shutdown
     Fa0/10          1               0             0               Shutdown
     Fa0/11          1               0             0               Shutdown
     Fa0/12          1               0             0               Shutdown
     Fa0/13          1               0             0               Shutdown
     Fa0/14          1               0             0               Shutdown
     Fa0/15          1               0             0               Shutdown
     Fa0/16          1               0             0               Shutdown
     Fa0/17          1               0             0               Shutdown
     Fa0/18          1               0             0               Shutdown
     Fa0/19          1               0             0               Shutdown
     Fa0/20          1               0             0               Shutdown
     Fa0/21          1               0             0               Shutdown
     Fa0/22          1               0             0               Shutdown
     Fa0/23          1               0             0               Shutdown
     Fa0/24          1               0             0               Shutdown
---------------------------------------------------------------------------
Total Addresses in System : 0
Max Addresses limit in System : 1024

SWB#show port-security
Secure Port      MaxSecureAddr  CurrentAddr  SecurityViolation  Security Action
                    (Count)       (Count)      (Count)
---------------------------------------------------------------------------
     Fa0/4           1               0             0               Shutdown
     Fa0/5           1               0             0               Shutdown
     Fa0/6           1               0             0               Shutdown
     Fa0/7           1               0             0               Shutdown
     Fa0/8           1               0             0               Shutdown
     Fa0/9           1               0             0               Shutdown
     Fa0/10          1               0             0               Shutdown
     Fa0/11          1               0             0               Shutdown
     Fa0/12          1               0             0               Shutdown
     Fa0/13          1               0             0               Shutdown
     Fa0/14          1               0             0               Shutdown
     Fa0/15          1               0             0               Shutdown
     Fa0/16          1               0             0               Shutdown
     Fa0/17          1               0             0               Shutdown
     Fa0/18          1               0             0               Shutdown
     Fa0/19          1               0             0               Shutdown
     Fa0/20          1               0             0               Shutdown
     Fa0/21          1               0             0               Shutdown
     Fa0/22          1               0             0               Shutdown
     Fa0/23          1               0             0               Shutdown
     Fa0/24          1               0             0               Shutdown
---------------------------------------------------------------------------
Total Addresses in System : 0
Max Addresses limit in System : 1024
```


Step 4: Configure VTP and VLANs

- Configure SWA as the VTP server with the domain name **CCNA3** and password **cisco**. Configure SWB as a VTP client in the same domain using the same password.
- Configure VLANs with names on the VTP server.
  - VLAN 10 is the Accounting VLAN
  - VLAN 20 is the Marketing VLAN
  - VLAN 30 is the Purchasing VLAN
- Configure the appropriate ports on SWA and SWB for Trunking. Verify Trunking is properly configured with the show interface trunk command on both SWA and SWB.

```
SWA#show interface trunk

Port        Mode         Encapsulation  Status        Native vlan
Fa0/1       on           802.1q         trunking      1
Fa0/2       on           802.1q         trunking      1
Fa0/3       on           802.1q         trunking      1

Port      Vlans allowed on trunk
Fa0/1       1-4094
Fa0/2       1-4094
Fa0/3       1-4094

Port        Vlans allowed and active in management domain
Fa0/1       1,10,20,30
Fa0/2       1,10,20,30
Fa0/3       1,10,20,30

Port        Vlans in spanning tree forwarding state and not pruned
Fa0/1       1,10,20,30
Fa0/2       1,10,20,30
Fa0/3       1,10,20,30

SWB#show interface trunk

Port        Mode         Encapsulation  Status        Native vlan
Fa0/2       on           802.1q         trunking      1
Fa0/3       on           802.1q         trunking      1

Port      Vlans allowed on trunk
Fa0/2       1-4094
Fa0/3       1-4094

Port        Vlans allowed and active in management domain
Fa0/2       1,10,20,30
Fa0/3       1,10,20,30

Port        Vlans in spanning tree forwarding state and not pruned
Fa0/2       1,10,20,30
Fa0/3       none
```

- Assign access ports to their correct VLAN as specified in the topology.
- Verify both the VTP status and VLAN configuration on both switches with the **show vtp status** and **show vlan brief** commands. Your output should look similar to the output below.

```
SWA#show vtp status
VTP Version                     : 2
Configuration Revision          : 1
Maximum VLANs supported locally : 64
Number of existing VLANs        : 8
VTP Operating Mode              : Server
VTP Domain Name                 : CCNA3
VTP Pruning Mode                : Disabled
VTP V2 Mode                     : Disabled
VTP Traps Generation            : Disabled
MD5 digest                      : 0xE0 0x67 0x70 0x4A 0x3C 0xAB 0x44 0x67
Configuration last modified by 172.16.39.2 at 3-10-93 01:23:32
Local updater ID is 172.16.39.2 on interface Vl1 (lowest numbered VLAN interface
found)

SWA#show vlan brief
```



```
VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active
10   Accounting                        active    Fa0/4, Fa0/5, Fa0/6, Fa0/7
                                                 Fa0/8
20   Marketing                         active    Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                 Fa0/13, Fa0/14, Fa0/15, Fa0/16
30   Purchasing                        active    Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                 Fa0/21, Fa0/22, Fa0/23, Fa0/24
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active

SWB#show vtp status
VTP Version                     : 2
Configuration Revision          : 1
Maximum VLANs supported locally : 64
Number of existing VLANs        : 8
VTP Operating Mode              : Client
VTP Domain Name                 : CCNA3
VTP Pruning Mode                : Disabled
VTP V2 Mode                     : Disabled
VTP Traps Generation            : Disabled
MD5 digest                      : 0xE0 0x67 0x70 0x4A 0x3C 0xAB 0x44 0x67
Configuration last modified by 172.16.39.2 at 3-10-93 01:23:32

SWB#show vlan brief

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/1
10   Accounting                        active    Fa0/4, Fa0/5, Fa0/6, Fa0/7
                                                 Fa0/8
20   Marketing                         active    Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                 Fa0/13, Fa0/14, Fa0/15, Fa0/16
30   Purchasing                        active    Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                 Fa0/21, Fa0/22, Fa0/23, Fa0/24
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
```

Step 5: Set up DHCP on the DIST Router

- Although DHCP is a CCNA4 objective, it will help in this lab to use dynamic assignment of IP addresses. Add the following commands while in global configuration mode on DIST.

```
ip dhcp excluded-address 172.16.32.1 172.16.32.10
ip dhcp excluded-address 172.16.36.1 172.16.36.10
ip dhcp excluded-address 172.16.38.1 172.16.38.10
!
ip dhcp pool VLAN10
   network 172.16.32.0 255.255.252.0
   default-router 172.16.32.1
!
ip dhcp pool VLAN20
   network 172.16.36.0 255.255.254.0
   default-router 172.16.36.1
!
ip dhcp pool VLAN30
   network 172.16.38.0 255.255.255.0
   default-router 172.16.38.1
```


Step 6: Configure inter-VLAN Routing

Configure DIST to route all VLANs by completing the following:

- Activate the physical interface.
- Create subinterfaces for each of the four VLANs. Number each subinterface with the VLAN number. For example, the VLAN1 subinterface should be numbered fa0.1 or fa0/0.1, depending on the router.
- Configure each subinterface for 802.1q trunking and assign each subinterface the first IP address in the appropriate subnet for that VLAN (refer to the topology)
- Configure each subinterface with an appropriate description.
- Verify that the **show ip interface brief** command output is similar to the output below.

```
DLA#show ip interface brief
Interface                  IP-Address      OK? Method Status                Prot
ocol
FastEthernet0              unassigned      YES unset  up                    up

FastEthernet0.1            172.16.39.1     YES manual up                    up

FastEthernet0.10           172.16.32.1     YES manual up                    up

FastEthernet0.20           172.16.36.1     YES manual up                    up

FastEthernet0.30           172.16.38.1     YES manual up                    up

Serial0                    unassigned      YES unset  administratively down down

Serial1                    unassigned      YES unset  administratively down down
```

- Verify connectivity between all three devices. Each device should be able to ping the other two devices.

```
DLA#ping SWA

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.39.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/4/8 ms

DLA#ping SWB

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.39.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/4/4 ms

SWB#ping SWA

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.39.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/4/4 ms
```


Step 7: Verify inter-VLAN Routing

- Attach two workstations to different VLANs.
- Verify that each workstation received an IP address from the DHCP server on DIST
- Verify that the two workstations can ping each other. Traceroute should show that the ping packets are going through the router. Below is some sample output of this verification. Yours should look similar.

```
-----------------------------------------------------
Configuration for a Workstation attached to VLAN 10
-----------------------------------------------------

C:\>ipconfig

Windows IP Configuration


Ethernet adapter Local Area Connection:

        Connection-specific DNS Suffix  . :
        IP Address. . . . . . . . . . . . : 172.16.32.11
        Subnet Mask . . . . . . . . . . . : 255.255.252.0
        Default Gateway . . . . . . . . . : 172.16.32.1

-----------------------------------------------------
Configuration for a Workstation attached to VLAN 20
-----------------------------------------------------

C:\>ipconfig

Windows IP Configuration


Ethernet adapter Local Area Connection:

        Connection-specific DNS Suffix  . :
        IP Address. . . . . . . . . . . . : 172.16.36.11
        Subnet Mask . . . . . . . . . . . : 255.255.255.0
        Default Gateway . . . . . . . . . : 172.16.36.1

-------------------------------------------
VLAN 10 Workstation pings VLAN 20 workstation
-------------------------------------------

C:\>ping 172.16.36.11

Pinging 172.16.36.11 with 32 bytes of data:

Reply from 172.16.36.11: bytes=32 time=2ms TTL=127
Reply from 172.16.36.11: bytes=32 time=1ms TTL=127
Reply from 172.16.36.11: bytes=32 time=1ms TTL=127
Reply from 172.16.36.11: bytes=32 time<1ms TTL=127

Ping statistics for 172.16.36.11:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 2ms, Average = 1ms

-----------------------------------------------------
VLAN 10 Workstation traces path to VLAN 20 workstation
-----------------------------------------------------

C:\>tracert 172.16.36.11

Tracing route to 172.16.36.12 over a maximum of 30 hops

  1     1 ms     1 ms    <1 ms  172.16.32.1
  2    <1 ms    <1 ms    <1 ms  172.16.36.11

Trace complete.
```

- Verify that the two workstation MAC address are “stuck” to the configuration. This can be verified with either the **show run** or **show mac-address-table** commands. The sticky command used ealier causes the output to show that these two MAC address are now statically configured, as shown in the outputs below.

```
SWA#show mac-address-table
```



```
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
 All    000d.2903.ef40    STATIC      CPU
 All    0100.0ccc.cccc    STATIC      CPU
 All    0100.0ccc.cccd    STATIC      CPU
 All    0100.0cdd.dddd    STATIC      CPU
   1    000c.857f.9ea0    DYNAMIC     Fa0/1
   1    000d.28f2.6942    DYNAMIC     Fa0/2
   1    000d.28f2.6943    DYNAMIC     Fa0/3
  10    000c.857f.9ea0    DYNAMIC     Fa0/1
  10    000d.56a1.a975    STATIC      Fa0/4
  20    000c.857f.9ea0    DYNAMIC     Fa0/1
  20    000d.56a1.c8f7    STATIC      Fa0/9
Total Mac Addresses for this criterion: 11

SWA#show run

<output omitted>
!
interface FastEthernet0/4
 switchport port-security mac-address sticky 000d.56a1.a975
!
interface FastEthernet0/9
 switchport port-security mac-address sticky 000d.56a1.c8f7
```

- The **show port-security** command should now show that the two ports are now counted.

```
SWA#show port-security
Secure Port      MaxSecureAddr  CurrentAddr  SecurityViolation  Security Action
                    (Count)       (Count)      (Count)
-------------------------------------------------------------------------------
     Fa0/4            1              1             0              Shutdown
     Fa0/5            1              0             0              Shutdown
     Fa0/6            1              0             0              Shutdown
     Fa0/7            1              0             0              Shutdown
     Fa0/8            1              0             0              Shutdown
     Fa0/9            1              1             0              Shutdown
     Fa0/10           1              0             0              Shutdown
     Fa0/11           1              0             0              Shutdown
     Fa0/12           1              0             0              Shutdown
     Fa0/13           1              0             0              Shutdown
     Fa0/14           1              0             0              Shutdown
     Fa0/15           1              0             0              Shutdown
     Fa0/16           1              0             0              Shutdown
     Fa0/17           1              0             0              Shutdown
     Fa0/18           1              0             0              Shutdown
     Fa0/19           1              0             0              Shutdown
     Fa0/20           1              0             0              Shutdown
     Fa0/21           1              0             0              Shutdown
     Fa0/22           1              0             0              Shutdown
     Fa0/23           1              0             0              Shutdown
     Fa0/24           1              0             0              Shutdown
-------------------------------------------------------------------------------
Total Addresses in System : 2
Max Addresses limit in System : 1024
```


- Verify that a port currently used by one of your workstation will shutdown when another workstation is attached to the same port. When you attach the workstation, you will see the link beat light go green for a brief moment. Then it will go dark as the port is automatically shutdown. On the switch console, you may get syslog messages similar to the output shown below.

```
2d23h: %LINK-3-UPDOWN: Interface FastEthernet0/4, changed state to down

2d23h: %PORT_SECURITY-2-PSECURE_VIOLATION: Security violation occurred,
caused by MAC address 000d.56a1.acfc on port Fa0/4.

2d23h: %PM-4-ERR_DISABLE: psecure-violation error detected on Fa0/4,
putting Fa0/4 in err-disable state
```

- Verify the port is shutdown with the **show interface** and **show port-security** commands.

```
SWA#show interface fastethernet 0/4
FastEthernet0/4 is down, line protocol is down (err-disabled)

SWA#show port-security
Secure Port      MaxSecureAddr  CurrentAddr  SecurityViolation  Security Action
                    (Count)        (Count)       (Count)
---------------------------------------------------------------------------
     Fa0/4           1              1             1               Shutdown
     Fa0/5           1              0             0               Shutdown
     Fa0/6           1              0             0               Shutdown
     Fa0/7           1              0             0               Shutdown
     Fa0/8           1              0             0               Shutdown
     Fa0/9           1              1             0               Shutdown
     Fa0/10          1              0             0               Shutdown
     Fa0/11          1              0             0               Shutdown
     Fa0/12          1              0             0               Shutdown
     Fa0/13          1              0             0               Shutdown
     Fa0/14          1              0             0               Shutdown
     Fa0/15          1              0             0               Shutdown
     Fa0/16          1              0             0               Shutdown
     Fa0/17          1              0             0               Shutdown
     Fa0/18          1              0             0               Shutdown
     Fa0/19          1              0             0               Shutdown
     Fa0/20          1              0             0               Shutdown
     Fa0/21          1              0             0               Shutdown
     Fa0/22          1              0             0               Shutdown
     Fa0/23          1              0             0               Shutdown
     Fa0/24          1              0             0               Shutdown
---------------------------------------------------------------------------
Total Addresses in System : 2
Max Addresses limit in System : 1024
```

Step 8: Documentation

- Capture the scripts from all three devices and add to your engineering journal.

