

Packet Tracer - Configure Layer 3 Switching and Inter-VLAN Routing

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Addressing Table

Device	Interface	IP Address / Prefix
MLS	VLAN 10	192.168.10.254 /24
		2001:db8:acad:10::1/64
	VLAN 20	192.168.20.254 /24
		2001:db8:acad:20::1/64
	VLAN 30	192.168.30.254/24
		2001:db8:acad:30::1/64
	VLAN 99	192.168.99.254/24
	G0/2	209.165.200.225
		2001:db8:acad:a::1/64
PC0	NIC	192.168.10.1
PC1	NIC	192.168.20.1
PC2	NIC	192.168.30.1
PC3	NIC	192.168.10.2/24
		2001:db8:acad:10::2/64
PC4	NIC	192.168.20.2/24
		2001:db8:acad:20::2/64
PC5	NIC	192.168.30.2
		2001:db8:acad:10::2/64
S1	VLAN 99	192.168.99.1
S2	VLAN 99	192.168.99.2
S3	VLAN 99	192.168.99.3

Objectives

Part 1: Configure Layer 3 Switching

Part 2: Configure Inter-VLAN Routing

Part 3: Configure IPv6 Inter-VLAN Routing

Background / Scenario

A multilayer switch like the Cisco Catalyst 3650 is capable of both Layer 2 switching and Layer 3 routing. One of the advantages of using a multilayer switch is this dual functionality. A benefit for a small to medium-sized company would be the ability to purchase a single multilayer switch instead of separate switching and routing network devices. Capabilities of a multilayer switch include the ability to route from one VLAN to another using multiple switched virtual interfaces (SVIs), as well as the ability to convert a Layer 2 switchport to a Layer 3 interface.

Instructions

Part 1: Configure Layer 3 Switching

In Part 1, you will configure the GigabitEthernet 0/2 port on switch MLS as a routed port and verify that you can ping another Layer 3 address.

- On MLS, configure G0/2 as a routed port and assign an IP address according to the Addressing Table.

```
MLS(config)# interface g0/2
MLS(config-if)# no switchport
MLS(config-if)# ip address 209.165.200.225 255.255.255.252
```

- Verify connectivity to **Cloud** by pinging 209.165.200.226.

```
MLS# ping 209.165.200.226

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.165.200.226, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
```

Part 2: Configure Inter-VLAN Routing

Step 1: Add VLANs.

Add VLANs to MLS according to the table below. Packet Tracer scoring is case-sensitive, so type the names exactly as shown.

VLAN Number	VLAN Name
10	Staff
20	Student
30	Faculty

Step 2: Configure SVI on MLS.

Configure and activate the SVI interfaces for VLANs 10, 20, 30, and 99 according to the Addressing Table. The configuration for VLAN 10 is shown below as an example.

```
MLS(config)# interface vlan 10
MLS(config-if)# ip address 192.168.10.254 255.255.255.0
```

Step 3: Configure Trunking on MLS.

Trunk configuration differs slightly on a Layer 3 switch. On the Layer 3 switch, the trunking interface needs to be encapsulated with the dot1q protocol, however it is not necessary to specify VLAN numbers as it is when working with a router and subinterfaces.

- On MLS, configure interface **g0/1**.
- Make the interface a static trunk port.

```
MLS(config-if)# switchport mode trunk
```

- c. Specify the native VLAN as 99.

```
MLS(config-if)# switchport trunk native vlan 99
```

- d. Encapsulate the link with the dot1q protocol.

```
MLS(config-if)# switchport trunk encapsulation dot1q
```

Note: Packet Tracer may not score the trunk encapsulation.

Step 4: Configure trunking on S1.

- a. Configure interface **g0/1** of S1 as a static trunk.
- b. Configure the native VLAN on the trunk.

Step 5: Enable routing.

- a. Use the **show ip route** command. Are there any active routes?

No

- b. Enter the **ip routing** command to enable routing in global configuration mode.

```
MLS(config)# ip routing
```

- c. Use the **show ip route** command to verify routing is enabled.

```
MLS# show ip route
```

```
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route
```

```
Gateway of last resort is not set
```

```
C    192.168.10.0/24 is directly connected, Vlan10
C    192.168.20.0/24 is directly connected, Vlan20
C    192.168.30.0/24 is directly connected, Vlan30
C    192.168.99.0/24 is directly connected, Vlan99
     209.165.200.0/30 is subnetted, 1 subnets
C      209.165.200.224 is directly connected, GigabitEthernet0/2
```

Step 6: Verify end-to-end connectivity.

- a. From PC0, ping PC3 or MLS to verify connectivity within VLAN 10.
- b. From PC1, ping PC4 or MLS to verify connectivity within VLAN 20.
- c. From PC2, ping PC5 or MLS to verify connectivity within VLAN 30.
- d. From S1, ping S2, S3, or MLS to verify connectivity with VLAN 99.
- e. To verify inter-VLAN routing, ping devices outside the sender's VLAN.
- f. From any device, ping this address inside **Cloud**, 209.165.200.226.

The Layer 3 switch is now routing between VLANs and providing routed connectivity to the cloud.

Part 3: Configure IPv6 Inter-VLAN Routing

Layer 3 switches also route between IPv6 networks.

Step 1: Enable IPv6 routing.

Enter the **ipv6 unicast-routing** command to enable IPv6 routing in global configuration mode.

```
MLS(config)# ipv6 unicast-routing
```

Step 2: Configure SVI for IPv6 on MLS.

Configure IPv6 addressing on SVI for VLANs 10, 20, and 30 according to the Addressing Table. The configuration for VLAN 10 is shown below.

```
MLS(config)# interface vlan 10
MLS(config-if)# ipv6 address 2001:db8:acad:10::1/64
```

Step 3: Configure G0/2 with IPv6 on MLS.

- a. Configure IPv6 addressing on G0/2.

```
MLS(config)# interface G0/2
MLS(config-if)# ipv6 address 2001:db8:acad:a::1/64
```

- b. Use the **show ipv6 route** command to verify IPv6 connected networks.

```
MLS# show ipv6 route
IPv6 Routing Table - 10 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
       U - Per-user Static route, M - MIPv6
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
       O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       D - EIGRP, EX - EIGRP external
S    ::/0 [1/0]
    via 2001:DB8:ACAD:A::2, GigabitEthernet0/2
C    2001:DB8:ACAD:A::/64 [0/0]
    via ::, GigabitEthernet0/2
L    2001:DB8:ACAD:A::1/128 [0/0]
    via ::, GigabitEthernet0/2
C    2001:DB8:ACAD:10::/64 [0/0]
    via ::, Vlan10
L    2001:DB8:ACAD:10::1/128 [0/0]
    via ::, Vlan10
C    2001:DB8:ACAD:20::/64 [0/0]
    via ::, Vlan20
L    2001:DB8:ACAD:20::1/128 [0/0]
    via ::, Vlan20
C    2001:DB8:ACAD:30::/64 [0/0]
    via ::, Vlan30
L    2001:DB8:ACAD:30::1/128 [0/0]
    via ::, Vlan30
L    FF00::/8 [0/0]
    via ::, Null0
```

Step 4: Verify IPv6 connectivity.

Devices PC3, PC4, and PC5 have been configured with IPv6 addresses. Verify IPv6 inter-VLAN routing and connectivity to **Cloud**.

- a. From PC3, ping MLS to verify connectivity within VLAN 10.
- b. From PC4, ping MLS to verify connectivity within VLAN 20.

- c. From PC5, ping MLS to verify connectivity within VLAN 30.
- d. To verify inter-VLAN routing, ping between devices PC3, PC4, and PC5.
- e. From PC3 ping the address inside **Cloud**, 2001:db8:acad:a::2.

Part 4: Post your screenshots

On the PT Activity window, make sure that the completion grade is **100%**. Click on the **Check Results** button and select the **Assessment Items** tab. Take a screen shot of the whole window, showing the table of assessment items, and the score/item count. Own your photo by placing a watermark on your photo with your name and USC ID Number. Paste your screenshot below:

The screenshot shows the Cisco Packet Tracer Activity Results window. The title bar indicates the file path: D:\InBus\CpE 3212\4.3.8 Packet Tracer - Configure Layer 3 Switching and Inter-VLAN Routing.pka. The window has a menu bar (File, Edit, Options, View, Tools, Extensions, Window, Help) and a toolbar. The main area displays 'Activity Results' with a 'Time Elapsed: 00:48:27' indicator. A message reads: 'Congratulations Danica Marie Dumalagan! You completed the activity.' Below this are three tabs: 'Overall Feedback', 'Assessment Items', and 'Connectivity Tests'. The 'Assessment Items' tab is active, showing a tree view of the network configuration and a table of assessment items. The tree view shows the following structure:

- Network
 - MLS
 - Ports
 - GigabitEthernet0/1
 - Native VLAN: Correct
 - Port Mode: Correct
 - GigabitEthernet0/2
 - IP Address: Correct
 - IPv6 Addresses
 - 2001:DB8:ACAD:A::1
 - IP Address: Correct
 - Prefix Length: Correct
 - Subnet Mask: Correct
 - SwitchPort: Correct
 - Vlan10
 - IP Address: Correct
 - IPv6 Addresses
 - 2001:DB8:ACAD:10::1
 - IP Address: Correct
 - Prefix Length: Correct
 - Vlan20
 - IP Address: Correct
 - IPv6 Addresses
 - 2001:DB8:ACAD:20::1
 - IP Address: Correct
 - Prefix Length: Correct
 - Vlan30
 - IP Address: Correct
 - IPv6 Addresses
 - 2001:DB8:ACAD:30::1

The table of assessment items is as follows:

Assessment Items	Status	Points	Component(s)	Feedback
Native VLAN	Correct	1	Switching	
Port Mode	Correct	1	Other	
IP Address	Correct	1	Ip	
IPv6 Addresses				
2001:DB8:ACAD:A::1				
IP Address	Correct	1	IPv6	
Prefix Length	Correct	1	IPv6	
Subnet Mask	Correct	1	Ip	
SwitchPort	Correct	1	Other	
Vlan10				
IP Address	Correct	1	Ip	
IPv6 Addresses				
2001:DB8:ACAD:10::1				
IP Address	Correct	1	IPv6	
Prefix Length	Correct	1	IPv6	
Vlan20				
IP Address	Correct	1	Ip	
IPv6 Addresses				
2001:DB8:ACAD:20::1				
IP Address	Correct	1	IPv6	
Prefix Length	Correct	1	IPv6	
Vlan30				
IP Address	Correct	1	Ip	
IPv6 Addresses				
2001:DB8:ACAD:30::1				

On the right side, there is a summary table:

Component	Items/Total	Score
IPv6	8/8	8/8
Ip	6/6	6/6
Other	3/3	3/3
Routing	2/2	2/2
Switching	5/5	5/5

Below the summary table, the text 'Danica Marie A. Dumalagan 18103276' is displayed. A 'Close' button is located at the bottom right of the window.