

Lab 9: VLAN Configuration and InterVLAN Communication

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CSE B (B1 – 14)

Lab Exercise 1

Create a topology as shown and Create 2 VLANs on the switch: VLAN 10 and VLAN 20. You can give them custom names.

Assign switch ports to the VLANs.

An access port is assigned to a single VLAN . These ports are configured for switch ports that connect to devices with a normal network card, for example a PC in a network.

A trunk port on the other hand is a port that can be connected to another switch or router. This port can carry traffic of multiple VLANs

Assign static IP addresses to the four PCs which are located in the separate VLANs. PC1 and PC2 fall in VLAN10 while PC3 and PC4 fall in VLAN20.

PC1 IP address 192.168.1.10 Subnet mask 255.255.255.0 Default gateway 192.168.1.1

PC2: IP address 192.168.1.20 Subnet mask 255.255.255.0 Default gateway 192.168.1.1

PC3: IP address 192.168.2.10 Subnet mask 255.255.255.0 Default gateway 192.168.2.1

PC4: IP address 192.168.2.20 Subnet mask 255.255.255.0 Default gateway 192.168.2.1

To test communication between hosts in the same VLAN:

Ping PC2 from PC1 both in VLAN 10. Ping test should be successful.

To test connectivity between hosts in different VLANs:

Ping PC3 in VLAN20 from PC1 in VLAN10. Ping here will definitely fail. Why?

PC1 in VLAN 10 needs to communicate with PC3 in VLAN 20. Facilitate inter-VLAN communication using Router-on-a-Stick.

Configure the router with Router-on-a-Stick:

- Assign the switch port connect to the router as trunk

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- Create subinterfaces on the router's physical interface connected to the switch for each VLAN.
- Assign IP addresses to each subinterface matching the respective VLANs:

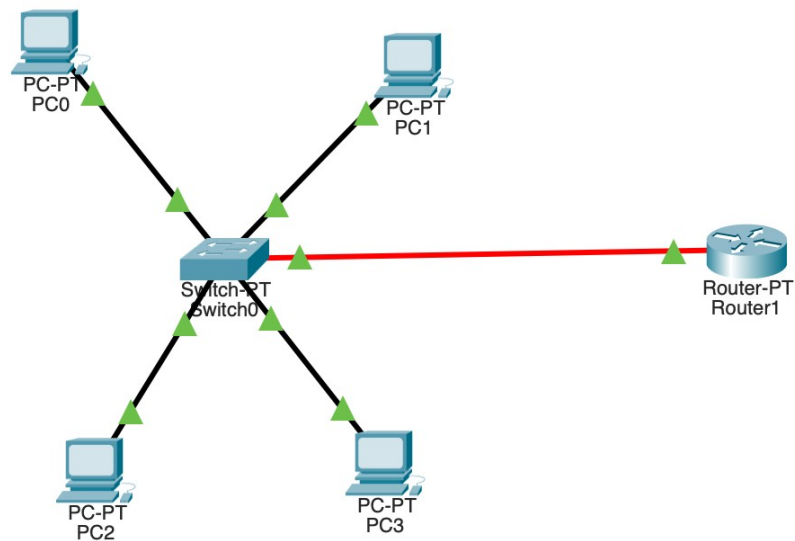
o Subinterface G0/0.10 (VLAN 10): IP Address - 192.168.1.1, Subnet Mask - 255.255.255.0

o Subinterface G0/0.20 (VLAN 20): IP Address - 192.168.2.1, Subnet Mask - 255.255.255.0

- Enable routing in the router.

Retry the ping from PC1 (192.168.1.10) to PC3 (192.168.2.10). This time, the ping should be successful as the router will route traffic between VLAN 10 and VLAN 20 using the configured subinterfaces.

Network Design



Assigning IP addresses to PCs

For PC0 -

IP Configuration	
<input type="radio"/> DHCP	<input checked="" type="radio"/> Static
IPv4 Address	<input type="text" value="192.168.1.10"/>
Subnet Mask	<input type="text" value="255.255.255.0"/>
Default Gateway	<input type="text" value="192.168.1.1"/>
DNS Server	<input type="text" value="0.0.0.0"/>

Similarly, assign IP addresses for PCs 1, 2 and 3 using the values given in the question.

Configuring VLANs

```
Switch>enable
Switch#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 10
Switch(config-vlan)#name vlan10
Switch(config-vlan)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name vlan20
Switch(config-vlan)#exit
Switch(config)#
```

Assigning switch and trunk ports

```
Switch(config)#int fa0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit
Switch(config)#int fa1/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit
Switch(config)#
Switch(config)#int fa2/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
Switch(config)#int fa3/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
Switch(config)#
Switch(config)#int fa4/1
Switch(config-if)#switchport mode trunk
Switch(config-if)#exit
Switch(config)#
```

Pinging withing VLANs

Pinging from PC0 (IP 192.168.1.10) to PC1 (IP 192.168.1.20)

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.20

Pinging 192.168.1.20 with 32 bytes of data:

Reply from 192.168.1.20: bytes=32 time=2ms TTL=128
Reply from 192.168.1.20: bytes=32 time=1ms TTL=128
Reply from 192.168.1.20: bytes=32 time<1ms TTL=128
Reply from 192.168.1.20: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.20:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 0ms

C:\>
```

Configuring Router-on-a-Stick

```

Router>en
Router#
Router#
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa4/0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet4/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet4/0, changed state to up

Router(config-if)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa4/0.10
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet4/0.10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet4/0.10, changed state to up

Router(config-subif)#encapsulation dot1Q 10
Router(config-subif)#ip address 192.168.1.1 255.255.255.0
Router(config-subif)#exit
Router(config)#int fa4/0.20
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet4/0.20, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet4/0.20, changed state to up

Router(config-subif)#encapsulation dot1Q 20
Router(config-subif)#ip address 192.168.2.1 255.255.255.0
Router(config-subif)#exit
Router(config)#

```

Pinging between VLANs

Pinging from PC1 (IP 192.168.1.20) to PC2 (IP 192.168.2.20)

Command Prompt

```

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.2.10

Pinging 192.168.2.10 with 32 bytes of data:

Request timed out.
Reply from 192.168.2.10: bytes=32 time<1ms TTL=127
Reply from 192.168.2.10: bytes=32 time<1ms TTL=127
Reply from 192.168.2.10: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.2.10:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>|

```

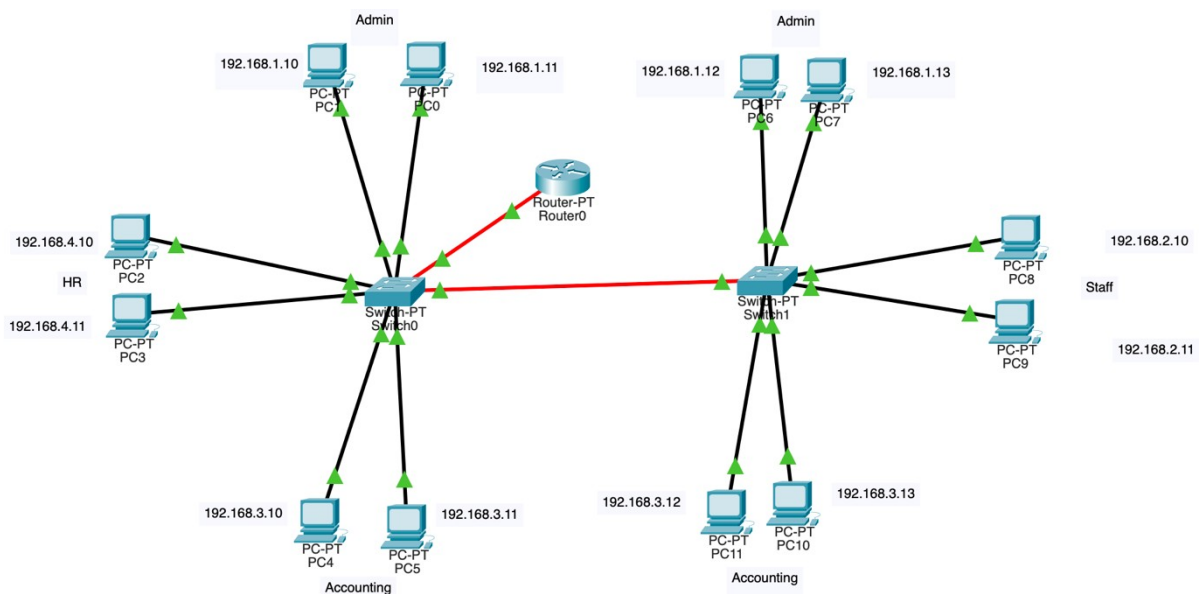
Additional Exercise

You are a network administrator tasked with segmenting the network into VLANs for different departments within a company. The topology diagram provided shows the network setup, which includes two switches (Switch1 and Switch2) and four departments: Staff, Admin, HR, and Accounting (Acct).

Create VLANs on Switch1 and Switch2 and Assign the appropriate ports to each VLAN based on the VLAN assignments. Test communication within the same VLAN. Test communication between different VLANs (will fail initially)

Provide inter-VLAN communication using Router-on-a-Stick between Acct, HR and Admin only.

Network Design



Configuring VLANs

Do this configuration for both Switch0 and Switch1

```
Switch>
Switch>en
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 10
Switch(config-vlan)#name HR
Switch(config-vlan)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name accounting
Switch(config-vlan)#exit
Switch(config)#vlan 30
Switch(config-vlan)#name admin
Switch(config-vlan)#exit
Switch(config)#vlan 40
Switch(config-vlan)#name staff
Switch(config-vlan)#exit
Switch(config)#
```

Assigning switch and trunk ports

- For switch0

```
Switch(config)#int range fa0/1, fa1/1
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 30
Switch(config-if-range)#exit
Switch(config)#int range fa2/1, fa3/1
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 10
Switch(config-if-range)#exit
Switch(config)#int range fa6/1, fa7/1
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 20
Switch(config-if-range)#exit
Switch(config)#int range fa4/1, fa5/1
Switch(config-if-range)#switchport mode trunk
```

- For switch1

```
Switch(config)#int range fa0/1, fa1/1
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 30
Switch(config-if-range)#exit
Switch(config)#int range fa2/1, fa3/1
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 40
Switch(config-if-range)#exit
Switch(config)#int range fa6/1, fa7/1
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 20
Switch(config-if-range)#exit
Switch(config)#int fa4/1
Switch(config-if)#switchport mode trunk
Switch(config-if)#exit
Switch(config)#
```

```

Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int fa4/0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet4/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet4/0, changed state to up

Router(config-if)#exit
Router(config)#
Router(config)#int fa4/0.30
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet4/0.30, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet4/0.30, changed state to up

Router(config-subif)#encapsulation dot1Q 30
Router(config-subif)#ip address 192.168.1.1 255.255.255.0
Router(config-subif)#exit
Router(config)#int fa4/0.10
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet4/0.10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet4/0.10, changed state to up

Router(config-subif)#encapsulation dot1Q 10
Router(config-subif)#ip address 192.168.4.1 255.255.255.0
Router(config-subif)#exit
Router(config)#
Router(config)#int fa4/0.20
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet4/0.20, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet4/0.20, changed state to up

Router(config-subif)#encapsulation dot1Q 20
Router(config-subif)#ip address 192.168.3.1 255.255.255.0
Router(config-subif)#exit
Router(config)#

```

Testing communication within same VLAN (PC4 to PC10)

```

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.3.13

Pinging 192.168.3.13 with 32 bytes of data:

Reply from 192.168.3.13: bytes=32 time=1ms TTL=128
Reply from 192.168.3.13: bytes=32 time<1ms TTL=128
Reply from 192.168.3.13: bytes=32 time<1ms TTL=128
Reply from 192.168.3.13: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.3.13:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>

```


Testing communication between different VLANs

- Admin to HR (PC7 to PC3)

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.4.11

Pinging 192.168.4.11 with 32 bytes of data:

Request timed out.
Reply from 192.168.4.11: bytes=32 time<1ms TTL=127
Reply from 192.168.4.11: bytes=32 time<1ms TTL=127
Reply from 192.168.4.11: bytes=32 time=22ms TTL=127

Ping statistics for 192.168.4.11:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 22ms, Average = 7ms

C:\>
```

- HR to Accounting (PC2 to PC5)

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.3.11

Pinging 192.168.3.11 with 32 bytes of data:

Request timed out.
Reply from 192.168.3.11: bytes=32 time<1ms TTL=127
Reply from 192.168.3.11: bytes=32 time<1ms TTL=127
Reply from 192.168.3.11: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.3.11:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

- Accounting to Admin (PC11 to PC0)

```
Cisco Packet Tracer PC Command Line 1.0
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=127
Reply from 192.168.1.11: bytes=32 time<1ms TTL=127
Reply from 192.168.1.11: bytes=32 time<1ms TTL=127

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
```

- Staff to HR (PC9 to PC2)

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.4.10

Pinging 192.168.4.10 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.4.10:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

This does not work since Staff is not a part of inter-VLAN communication.