

Practical 5

Aim : Implement Inter-VLAN Networking

❖ What is Inter-Vlan Routing ?

- Inter-VLAN (Virtual Local Area Network) routing is a technique used to enable communication between different VLANs in a network. VLANs are used to logically segment a network into multiple broadcast domains, and each VLAN functions as a separate virtual network
- Inter-VLAN routing is necessary when you want devices in different VLANs to communicate with each other. This is typically achieved by using a router or a Layer 3 switch to route traffic between the VLANs. Here's a brief overview of how inter-VLAN routing works:
- Physical or Logical Separation: VLANs are created to logically or physically separate devices in a network. Each VLAN has its own broadcast domain.
- Router or Layer 3 Switch: A router or a Layer 3 switch is used to perform inter-VLAN routing. This device has interfaces configured for each VLAN, effectively acting as a gateway for the devices in those VLANs.
- Subinterfaces: On a router, subinterfaces are configured on the router interface connected to the switch, with each subinterface corresponding to a specific VLAN. Each subinterface is assigned an IP address in the respective VLAN's subnet.
- segmentation.

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0/1.10	192.168.10.1	255.255.255.0	N/A
	G0/0/1.20	192.168.20.1	255.255.255.0	
	G0/0/1.30	192.168.30.1	255.255.255.0	
	G0/0/1.1000	N/A	N/A	
S1	VLAN 10	192.168.10.11	255.255.255.0	192.168.10.1
S2	VLAN 10	192.168.10.12	255.255.255.0	192.168.10.1
PC-A	NIC	192.168.20.3	255.255.255.0	192.168.20.1
PC-B	NIC	192.168.30.3	255.255.255.0	192.168.30.1

VLAN Table

VLAN	Name	Interface Assigned
10	Management	S1: VLAN 10
		S2: VLAN 10
20	Sales	S1: F0/6
30	Operations	S2: F0/18
999	Parking_Lot	S1: F0/2-4, F0/7-24, G0/1-2
		S2: F0/2-17, F0/19-24, G0/1-2
1000	Native	N/A

❖ Objectives :

Part 1: Build the Network and Configure Basic Device Settings

Part 2: Create VLANs and Assign Switch Ports

Part 3: Configure an 802.1Q Trunk between the Switches

Part 4: Configure Inter-VLAN Routing on the Router

Part 5: Verify Inter-VLAN Routing is working

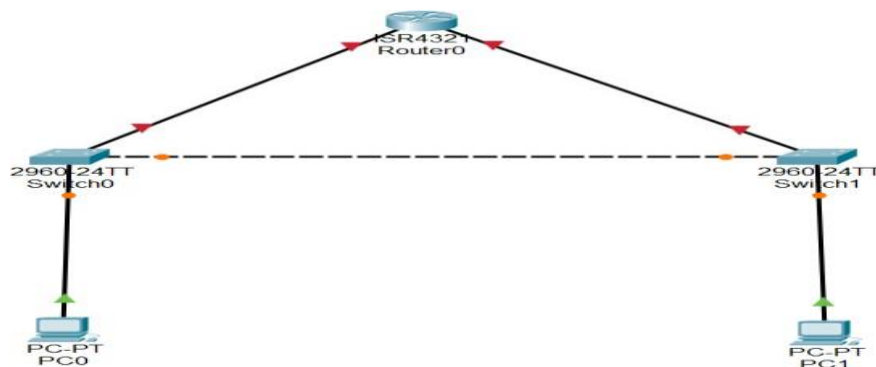
❖ Required Resources :

1. Router : ISR4321 Router
2. Switches : 2960-24TT Switch
3. PCs

❖ Part 1 : Build the Network and Configure Basic Device Settings



Cable the network as shown in the topology.



Step 1 : Configure basic settings for the switch.

S1 :

- en
- conf t
- hostname S1
- vlan 20
- name Sales
- vlan 30
- name Operations

S2 :

- en
- conf t
- hostname S2
- vlan 20
- name Sales
- vlan 30
- name Operations

```
-----  
FastEthernet0/2, changed state to up
```

```
Switch>en  
Switch#conf t  
Enter configuration commands, one per line. End with  
CNTL/Z.  
Switch(config)#hostname S1  
S1(config)#vlan 20  
S1(config-vlan)#name Sales  
S1(config-vlan)#vlan 30  
S1(config-vlan)#name Operations  
S1(config-vlan)#
```

```
-----  
  
Switch>en  
Switch#conf t  
Enter configuration commands, one per line. End with  
CNTL/Z.  
Switch(config)#hostname S2  
S2(config)#vlan 20  
S2(config-vlan)#name Sales  
S2(config-vlan)#vlan 30  
S2(config-vlan)#name Operations  
S2(config-vlan)#
```

- **do sh vlan** (To check if vlan is created)
- **exit**

```
S1(config-vlan)#vlan 30
S1(config-vlan)#name Operations
S1(config-vlan)#do sh vlan
```

VLAN	Name	Status	Ports
1	default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, Fa0/6, Fa0/7, Fa0/8 Fa0/9, Fa0/10, Fa0/11, Fa0/12 Fa0/13, Fa0/14, Fa0/15, Fa0/16 Fa0/17, Fa0/18, Fa0/19, Fa0/20 Fa0/21, Fa0/22, Fa0/23, Fa0/24 Gig0/1, Gig0/2
20	Sales	active	
30	Operations	active	
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

VLAN	Type	SAID	MTU	Parent	RingNo	BridgeNo	Stp	BrdgMode	Trans1	Trans2
1	enet	100001	1500	-	-	-	-	-	0	0
20	enet	100020	1500	-	-	-	-	-	0	0
30	enet	100030	1500	-	-	-	-	-	0	0

Step 2 : Assign Vlans to correct switch interfaces

S1 :

- interface fastEthernet 0/1
- switchport mode access
- switchport access vlan 20

S2 :

- interface fastEthernet 0/1
- switchport mode access
- switchport access vlan 30

```
S1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
S1(config)#inter
S1(config)#interface fast
S1(config)#interface fastEthernet 0/1
S1(config-if)#switch
S1(config-if)#switchport mo
S1(config-if)#switchport mode ?
access Set trunking mode to ACCESS unconditionally
dynamic Set trunking mode to dynamically negotiate access or trunk mode
trunk Set trunking mode to TRUNK unconditionally
S1(config-if)#switchport mode acc
S1(config-if)#switchport mode access
S1(config-if)#switchport access vlan 20
```

- show vlan brief

```

S2#show vlan brief
VLAN Name                Status    Ports
-----
1    default              active    Fa0/2, Fa0/3, Fa0/4, Fa0/5
                                           Fa0/6, Fa0/7, Fa0/8, Fa0/9
                                           Fa0/10, Fa0/11, Fa0/12, Fa0/13
                                           Fa0/14, Fa0/15, Fa0/16, Fa0/17
                                           Fa0/18, Fa0/19, Fa0/20, Fa0/21
                                           Fa0/22, Fa0/23, Fa0/24, Gig0/1
                                           Gig0/2
20   Sales                active
30   Operations           active    Fa0/1
1002 fddi-default         active
1003 token-ring-default   active
1004 fddinet-default      active
1005 trnet-default        active
S2#

```

➤ Manually configure trunk interface F0/1 on switch S1 and S2.

S1 :

- interface f0/1
switchport mode trunk

S2 :

- interface f0/1
switchport mode trunk

```

S1(config)#
S1(config)#inter
S1(config)#interface f0/1
S1(config-if)#swi
S1(config-if)#switchport mo
S1(config-if)#switchport mode tr
S1(config-if)#switchport mode trunk

S1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

S1(config-if)#

```

```

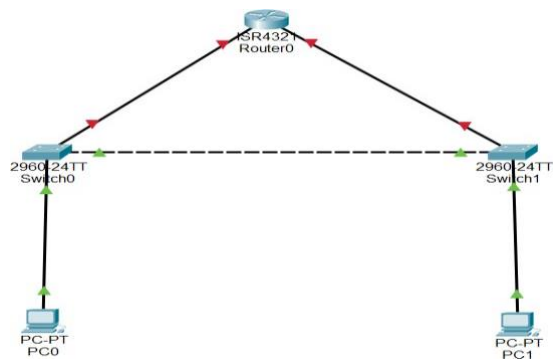
S2(config)#interface f0/1
S2(config-if)#sw
S2(config-if)#switchport mo
S2(config-if)#switchport mode ?
    access    Set trunking mode to ACCESS unconditionally
    dynamic   Set trunking mode to dynamically negotiate access or trunk mode
    trunk     Set trunking mode to TRUNK unconditionally
S2(config-if)#switchport mode tru
S2(config-if)#switchport mode trunk

S2(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

S2(config-if)#

```



Step 2 : Basic config of router

- en
conf t
hostname R1
- interface gigabitEthernet 0/0/0
no shutdown
exit

```

Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R1
R1(config)#hostname R1
R1(config)#inter
R1(config)#interface gig
R1(config)#interface gigabitEthernet 0/0/0
R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up

R1(config-if)#exit
R1(config)#
  
```

- interface gigaEthernet 0/0/0.20
encapsulation dot1Q 20
description Sales
ip address 192.168.20.1 255.255.255.0

```

R1(config-if)#exit
R1(config)#interface gigabitEthernet 0/0/0.20
R1(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0.20, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0.20, changed state to up

R1(config-subif)#en
R1(config-subif)#encapsulation do
R1(config-subif)#encapsulation dot1Q
% Incomplete command.
R1(config-subif)#encapsulation dot1Q 20
R1(config-subif)#description Sales
R1(config-subif)#ip address 192.168.20.1 255.255.255.0
R1(config-subif)#exit
R1(config)#
  
```

- interface gigaEthernet 0/0/0.30
encapsulation dot1Q 30
description Sales
ip address 192.168.30.1 255.255.255.0

```
R1(config-subif)#exit
R1(config)#interface gigabitEthernet 0/0/0.30
R1(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0.30, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0.30, changed state to up

R1(config-subif)#encapsulation dot1Q 30
R1(config-subif)#description Operations
R1(config-subif)#ip address 192.168.30.1 255.255.255.0
R1(config-subif)#exit
R1(config)#
```

Step 3: Verify Inter-VLAN Routing is Working

