Ex.No:6b	Configuration of Inter VLAN using Router on a stick method
Date :	

Objective(s):

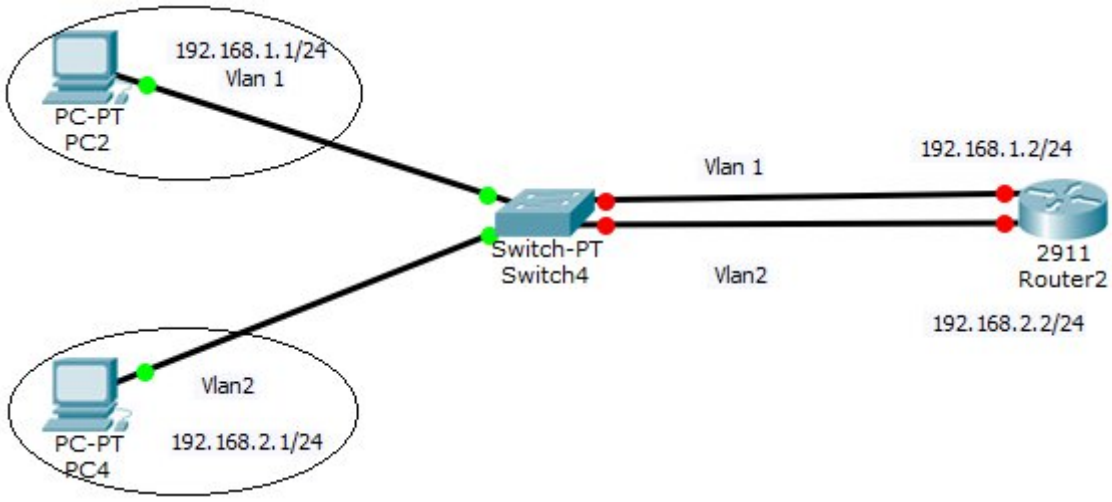
To design and implement Inter VLAN using switch configuration

Introduction:

'Router on a Stick' allows routing between VLANs with only one interface. Each VLAN represents a different Subnet. In general, routers can take traffic from only one subnet and transfer it to another subnet. And we can assign only one IP Address to a router interface. 'Router on a stick' allow us to create sub-interfaces, and assign IP Addresses to those sub-interfaces. To make it work, we have to create a truck connection between the switch and a router so that traffic from multiple VLANs can be sent to the router.

If we create a route between VLANs without the 'Router on a Stick' method, then we have to waste interfaces on the switches and routers. And if we enable routing between multiple VLANs then it will become practically inefficient as the switches and the routers will use those multiple interfaces.

The image below is an alternative method for allowing routing between VLANs. As you can see, we are using two interfaces on both the router and a switch to allow routing between VLANs. We have not created sub-interface in the below figure.

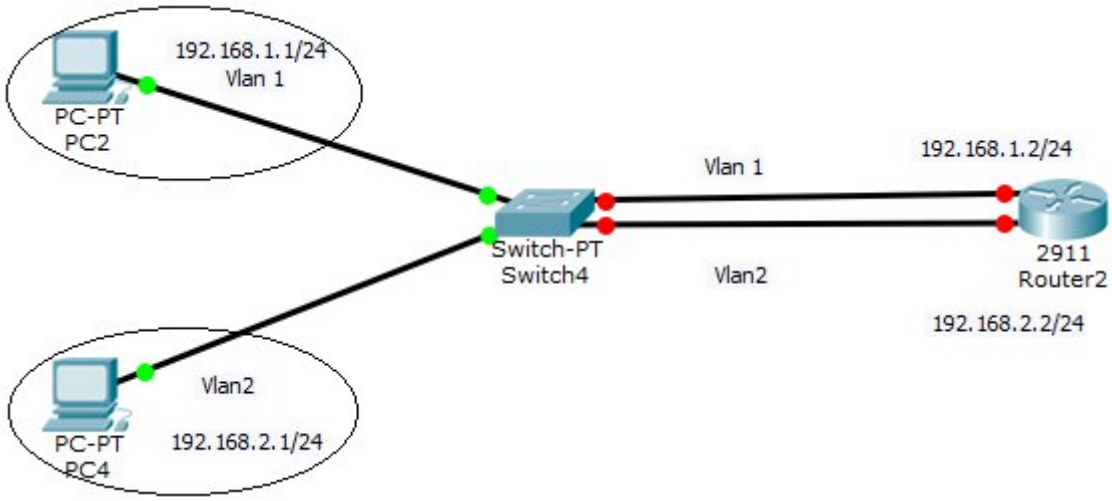


You can see that we have to use extra interfaces for each VLAN. So, it becomes practically non-efficient if we have multiple VLANs. Hence, 'Router on a Stick' is a perfect solution for routing between VLANs with just one router interface.

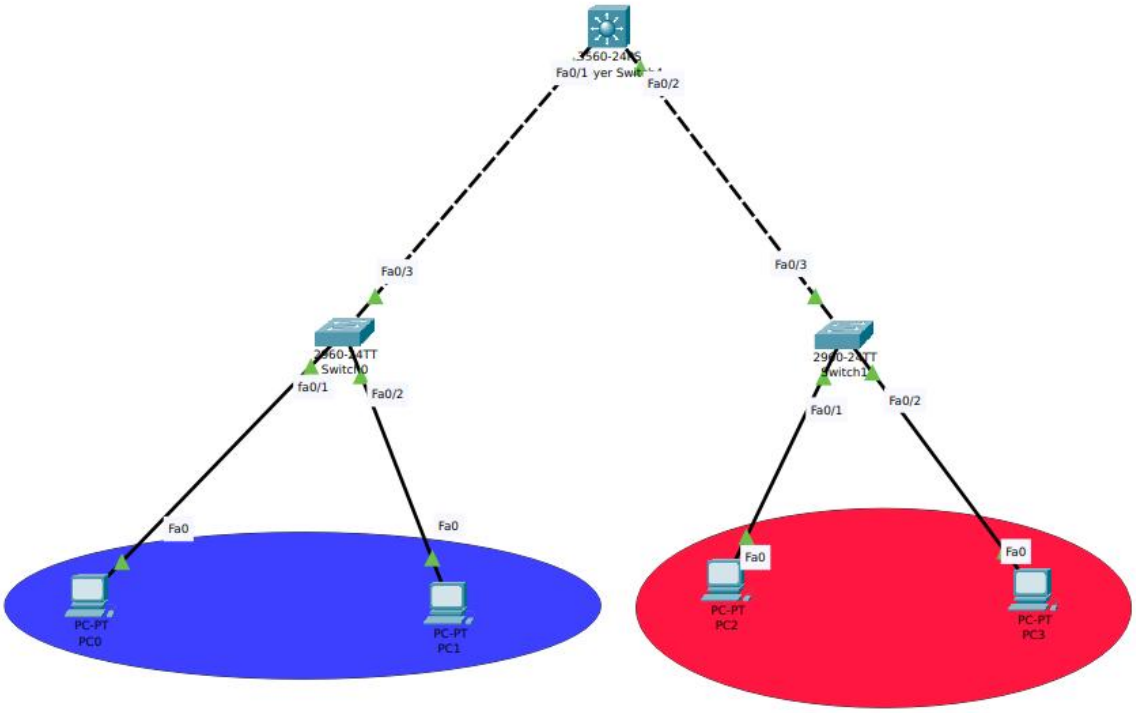
The more simple way to do routing between VLANs is by using a Layer 3 Switch. We just have to create virtual interfaces for each VLAN and assign them IP Addresses from the same network. A Layer 3 Switch will then enable routing between VLANs as it has routing capabilities as well. However, Layer 3 Switch is quite expensive so it might not be an affordable option for small office networks.

In the below lab, we will configure 'Router on a Stick' that would allow routing between the VLANs. Some of the important concepts in this lab are – to create sub-interfaces, use encapsulation dot1Q command to encapsulate the traffic, and mentioning the VLAN number to ascertain that for which VLAN the sub-interface should respond.

1. **Device Requirements:**
   1.
   2.
   3.
   4.
2. **Network Diagram for your experiment (draw the diagram either hand drawing/ms paint or any other drawing tools)**



3. **Network Diagram (Packet tracer diagram before configuration):**



4. **Configuration details:**

Device Name	Interface Name	IP Address	Subnet mask
Router	GigabitEthernet 0/0.10	192.168.10.1	255.255.255.0
Router	GigabitEthernet 0/0.20	192.168.20.1	255.255.255.0
PC1	FastEthernet 1/0	192.168.10.2	255.255.255.0
PC2	FastEthernet 1/0	192.168.20.2	255.255.255.0

5. **Describe step by step configuration steps properly (you may copy the commands used in the configuration tab and paste it.)**
    1. **Create VLANs**
    2. **Configure interfaces**
    3. **Configure trunking**

1. **Create VLANs:**

Switch> enable

Switch# configure terminal

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
```

2. Configure interfaces:

```
Switch(config)# interface fastethernet 0/1
Switch(config-if)# switchport mode access
Switch(config-if)# switchport access vlan 10
Switch(config-if)# exit

Switch(config)# interface fastethernet 1/1
Switch(config-if)# switchport mode access
Switch(config-if)# switchport access vlan 20
Switch(config-if)# exit
```

3. Configure trunking:

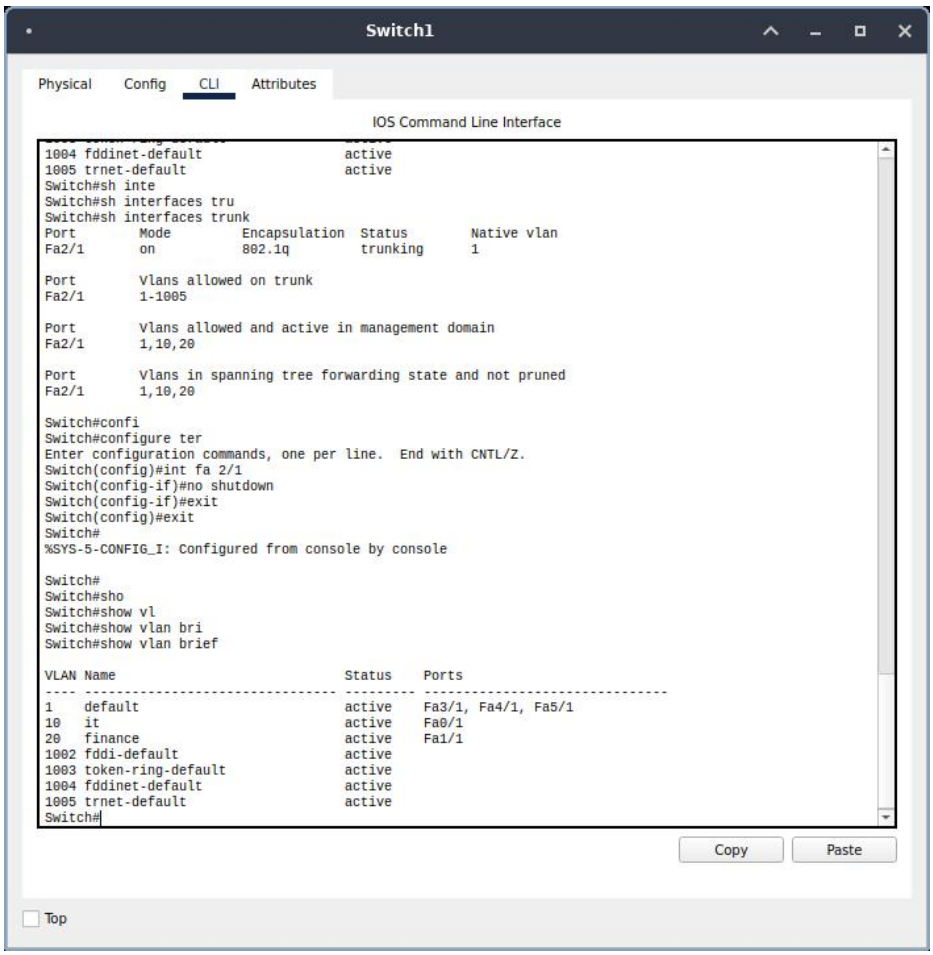
```
Switch(config)# interface gigabitEthernet 0/1
Switch(config-if)# switchport mode trunk
Switch(config-if)# exit
```

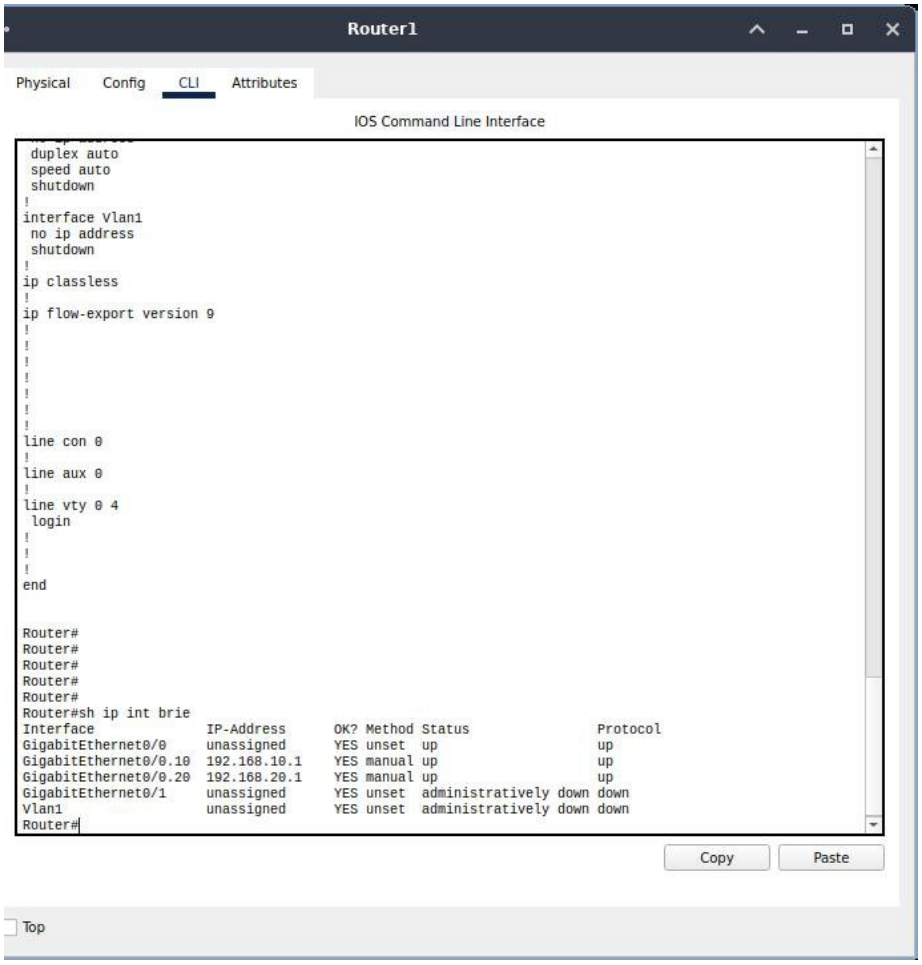
4. Configure sub-interfaces on router:

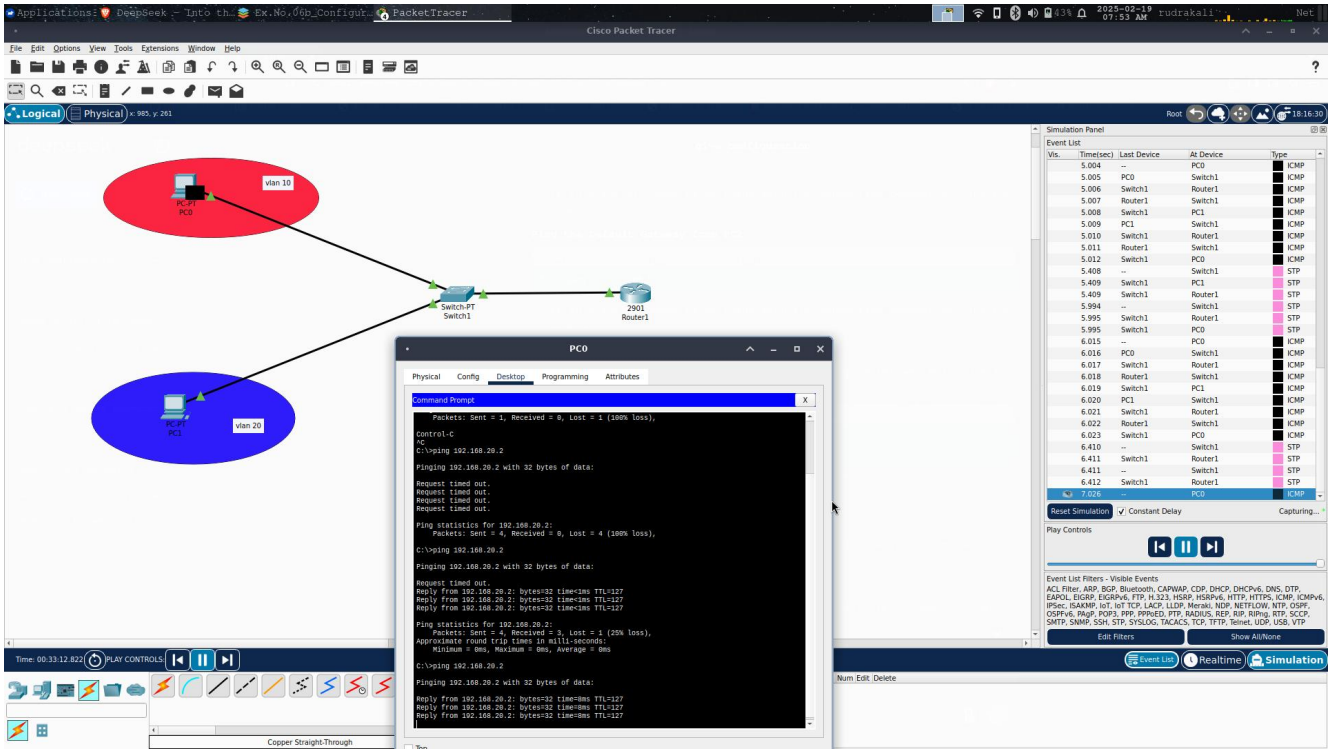
```
Router> enable
Router# configure terminal
Router(config)# interface gigabitEthernet 0/0.10
Router(config-subif)# encapsulation dot1Q 10
Router(config-subif)# ip address 192.168.10.1 255.255.255.0
Router(config-subif)# exit

Router(config)# interface gigabitEthernet 0/0.20
Router(config-subif)# encapsulation dot1Q 20
Router(config-subif)# ip address 192.168.20.1 255.255.255.0
Router(config-subif)# exit
Router(config)# interface gigabitEthernet 0/0
Router(config-if)# no shutdown
Router(config-if)# exit
```

6. Output Diagram (Minimum 3 screenshot):







Google Drive link of the packet tracer file (give view permission):

Link: https://drive.google.com/drive/folders/1gc5Rhyawap6cbm6FZdm3sW6r-taF5aCG?usp=sharing

CONCLUSION (provide conclusion about this experiment):

Successfully implemented the inter vlan with a switch and router , and performed router-on-stick
Using this configuration we pinged between different vlan's.

Rubrics for Experiment Assessment:

Rubrics	Good	Normal	Poor	Marks
Creation of Topology (4)	Created the topology, Identify the proper devices and making the connections **(4)**	Created the topology, Identify the proper devices, making the connections But missing some features **(3)**	Created wrong topology, Failed to Identify the proper devices and making connections **(1)**	
Verify the connectivity (4)	Verified the connectivity in all the levels **(4)**	Verified the connectivity at some levels (only some nodes) **(2)**	Verified the connectivity is not done. **(1)**	
Timely Completion (2)	Completed the lab before the allotted time **(2)**	Completed the lab after the deadline **(1)**	Did not submitted before grading **(0)**	
			Total	