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Name	**V VISHWARADHYA**
Class/Section	**S 24 & SLOT 2**
Ex.No:	**6b**
Date of Submission	
Name of the Experiment	**Configuration of Inter VLAN using Router**
Google Drive link of the packet tracer file (give view permission):	**https://drive.google.com/drive/folders/1f3jWwxvbLKpi8Y-LapWqn9ViVd8lg4b5?usp=drive_link**

Objective(s):

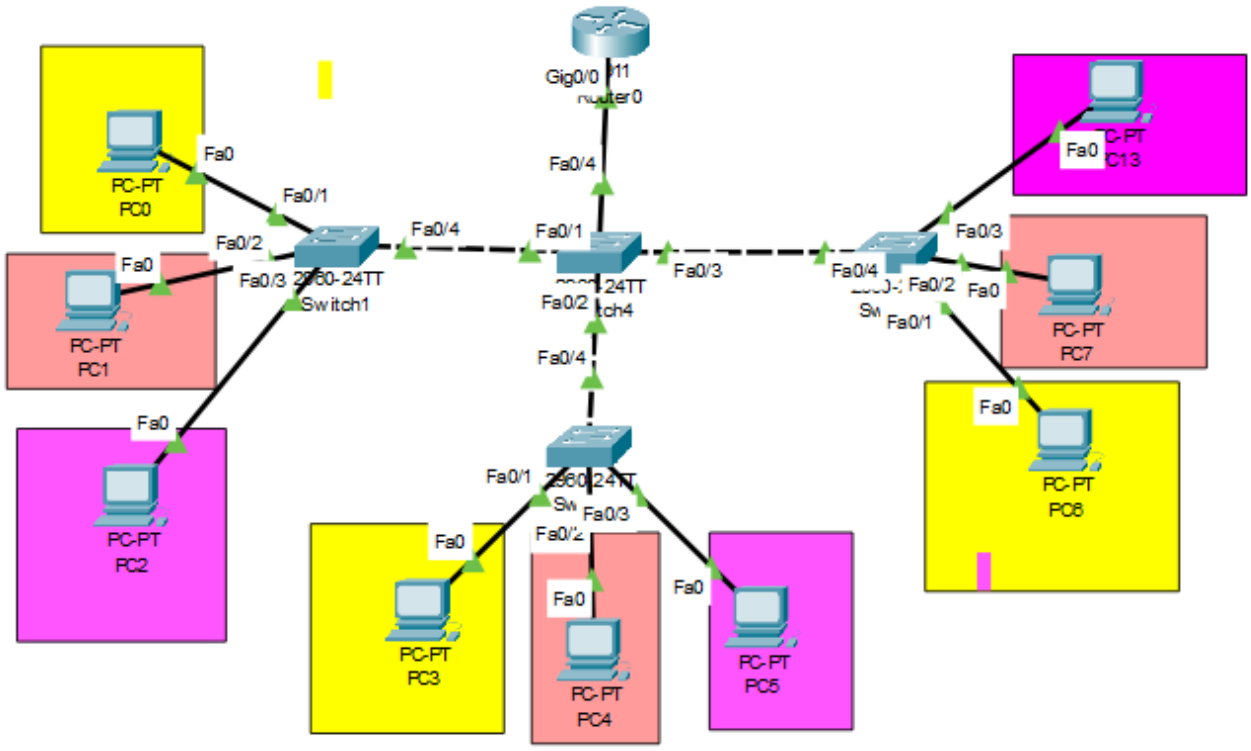
To design and implement Inter VLAN using switch configuration

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.

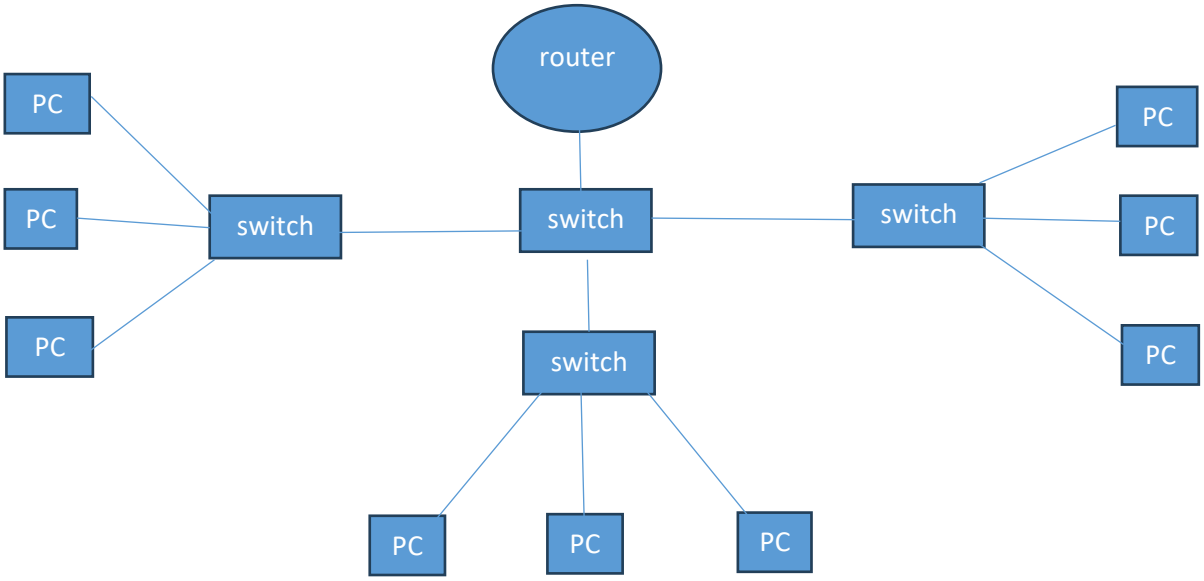


You can see that we have to use extra interfaces for each VLAN. So, it becomes practically non-efficient if we have multiple VLANs. Hence, 'Router on a Stick' is a perfect solution for routing between VLANs with just one router interface.

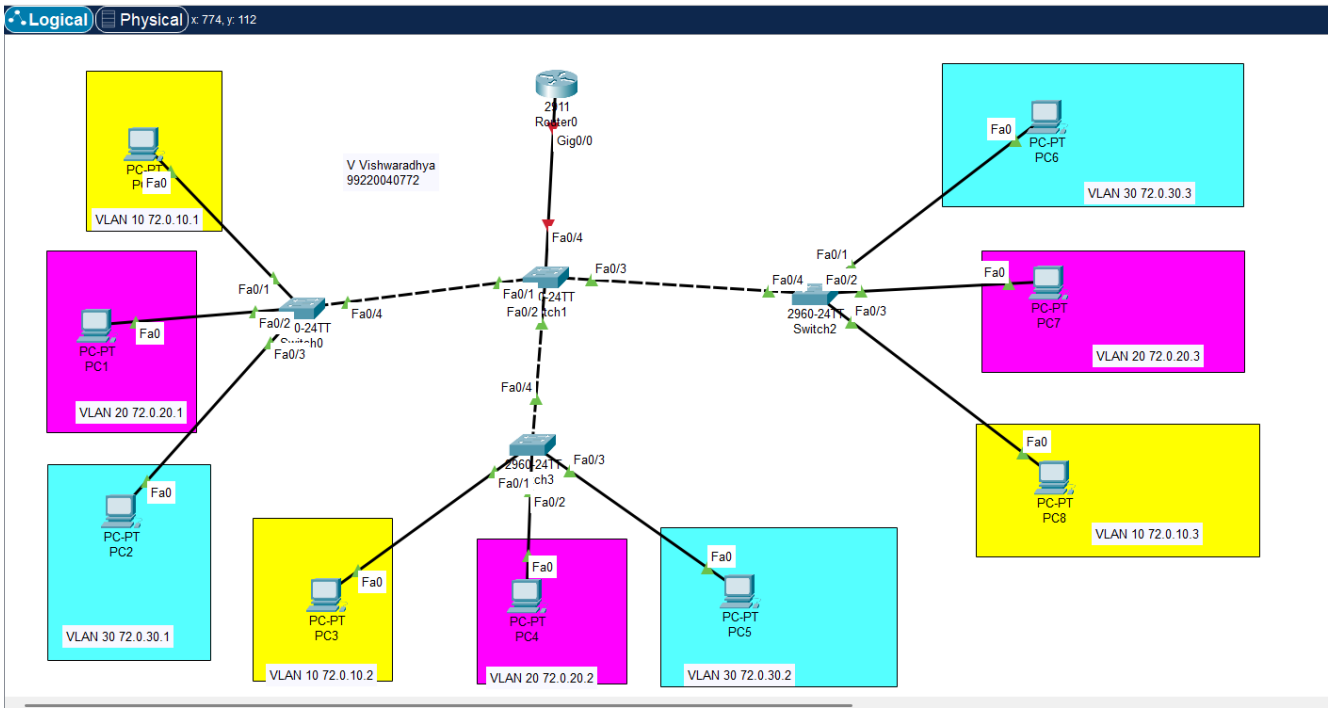
The simpler way to do routing between VLANs is by using a Layer 3 Switch. We just have to create virtual interfaces for each VLAN and assign them IP Addresses from the same network. A Layer 3 Switch will then enable routing between VLANs as it has routing capabilities as well. However, Layer 3 Switch 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. PC
   2. Switch (2960-24TT)
   3. Router (2911)
   4. Cables (copper straight, copper cross-over)
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
PC0	FastEthernet0/1	72.0.10.1	255.255.255.0
PC1	FastEthernet0/2	72.0.20.1	255.255.255.0
PC2	FastEthernet0/3	72.0.30.1	255.255.255.0
PC3	FastEthernet0/1	72.0.10.2	255.255.255.0
PC4	FastEthernet0/2	72.0.20.2	255.255.255.0
PC5	FastEthernet0/3	72.0.30.2	255.255.255.0
PC6	FastEthernet0/1	72.0.10.3	255.255.255.0
PC7	FastEthernet0/2	72.0.20.3	255.255.255.0
PC8	FastEthernet0/3	72.0.30.3	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.)**

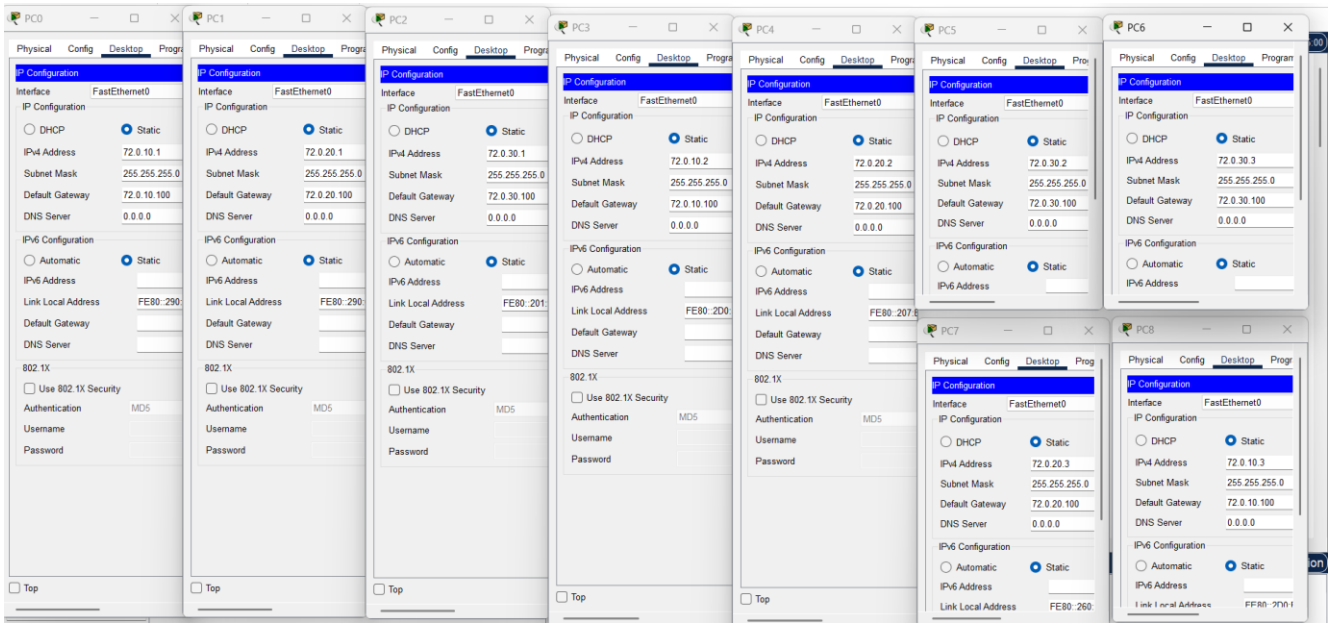
   At Switches

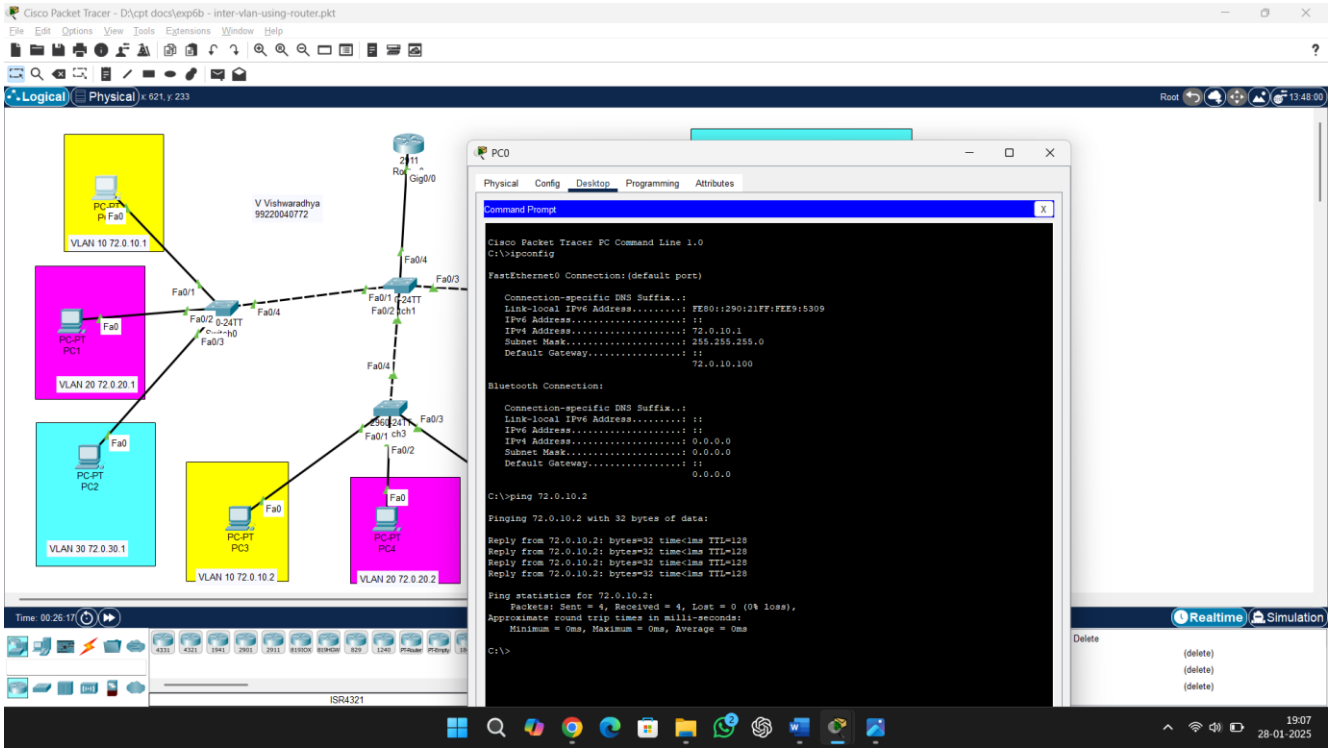
   1. **Enable**
   2. **show vlan**
   3. **configure terminal**
   4. **vlan 10**
   5. **vlan 20**
   6. **vlan 30**
   7. **show vlan**
   8. **interface fastEthernet 0/ [interface Number]**
   9. **switchport mode access**
   10. **switchport access vlan [vlan name]**
   11. **enable (On switch 4)**
   12. **configure terminal**
   13. **interface fastEthernet 0/ [interface Number]**
   14. **switchport mode trunk**

At Router

1. **enable**
2. **configure terminal**
3. **interface gigabitEthernet 0/0.10**
4. **encapsulation dot1Q 10**
5. **ip address 72.0.10.100 255.255.255.0**
6. **exit**
7. **interface gigabitEthernet 0/0.20**
8. **encapsulation dot1Q 20**
9. **ip address 72.0.20.100 255.255.255.0**
10. **exit**
11. **interface gigabitEthernet 0/0.30**
12. **encapsulation dot1Q 30**
13. **ip address 72.0.30.100 255.255.255.0**
14. **exit**
15. **show ip interface brief**
16. **interface gigabitEthernet 0/0**
17. **no shut**

6. Output Diagram (Minimum 3 screenshot):




Cisco Packet Tracer - D:\cpt docs\exp6b - inter-vlan-using-router.pkt
Logical
Physical
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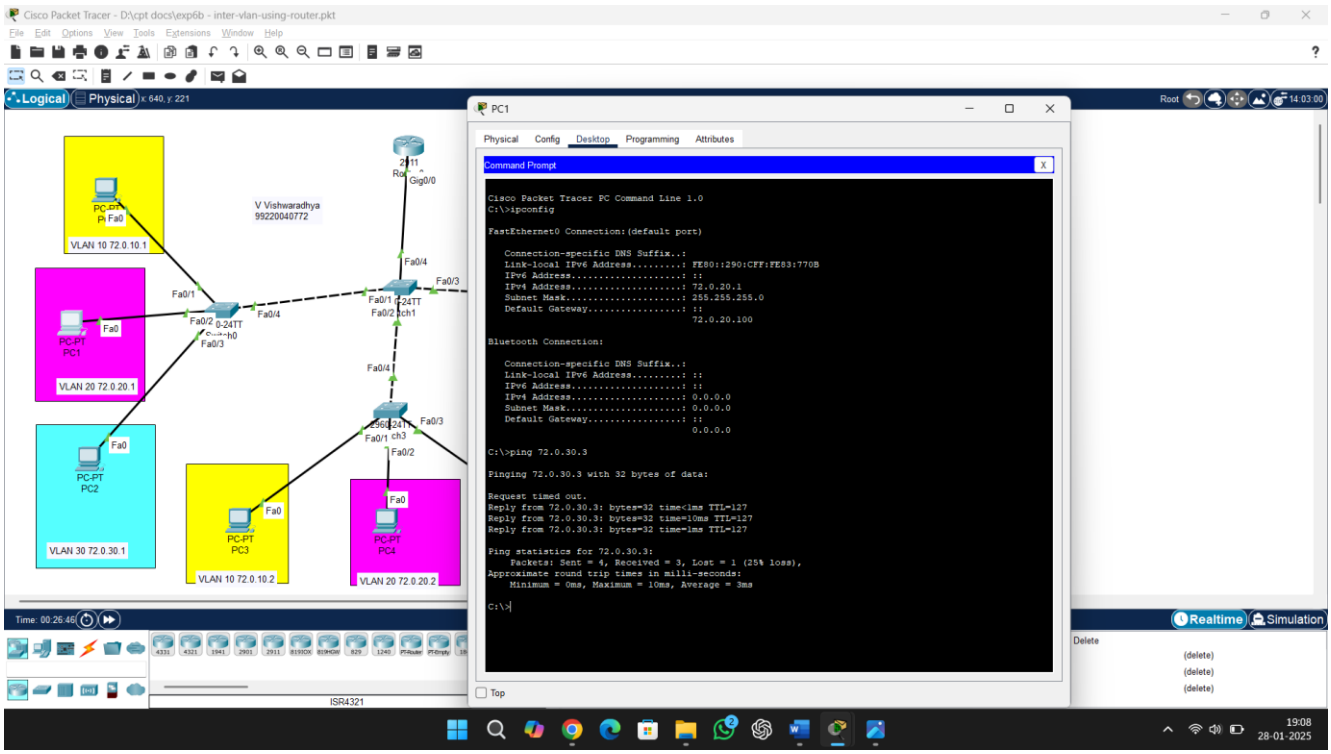
99220040772
VLAN 10 72.0.10.1
VLAN 20 72.0.20.1
VLAN 30 72.0.30.1
VLAN 10 72.0.10.2
VLAN 20 72.0.20.2
PC0
Physical
Config
Desktop
Programming
Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig
FastEthernet0 Connection:(default port)
Connection-specific DNS Suffix..:
Link-local IPv6 Address.....: FE80::290:21FF:FEE9:5309
IPv6 Address.....: ::
IPv4 Address.....: 72.0.10.1
Subnet Mask.....: 255.255.255.0
Default Gateway.....: ::
72.0.10.100
Bluetooth Connection:
Connection-specific DNS Suffix..:
Link-local IPv6 Address.....: ::
IPv6 Address.....: ::
IPv4 Address.....: 0.0.0.0
Subnet Mask.....: 0.0.0.0
Default Gateway.....: ::
0.0.0.0
C:\>ping 72.0.10.2
Pinging 72.0.10.2 with 32 bytes of data:
Reply from 72.0.10.2: bytes=32 time<1ms TTL=128
Reply from 72.0.10.2: bytes=32 time<1ms TTL=128
Reply from 72.0.10.2: bytes=32 time<1ms TTL=128
Reply from 72.0.10.2: bytes=32 time<1ms TTL=128
Ping statistics for 72.0.10.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>
Realtime
Simulation
ISR4321
19:07
28-01-2025


Cisco Packet Tracer - D:\cpt docs\exp6b - inter-vlan-using-router.pkt
Logical
Physical
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99220040772
VLAN 10 72.0.10.1
VLAN 20 72.0.20.1
VLAN 30 72.0.30.1
VLAN 10 72.0.10.2
VLAN 20 72.0.20.2
PC1
Physical
Config
Desktop
Programming
Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig
FastEthernet0 Connection:(default port)
Connection-specific DNS Suffix..:
Link-local IPv6 Address.....: FE80::290:CFF:FE83:770B
IPv6 Address.....: ::
IPv4 Address.....: 72.0.20.1
Subnet Mask.....: 255.255.255.0
Default Gateway.....: ::
72.0.20.100
Bluetooth Connection:
Connection-specific DNS Suffix..:
Link-local IPv6 Address.....: ::
IPv6 Address.....: ::
IPv4 Address.....: 0.0.0.0
Subnet Mask.....: 0.0.0.0
Default Gateway.....: ::
0.0.0.0
C:\>ping 72.0.30.3
Pinging 72.0.30.3 with 32 bytes of data:
Request timed out.
Reply from 72.0.30.3: bytes=32 time<1ms TTL=127
Reply from 72.0.30.3: bytes=32 time=10ms TTL=127
Reply from 72.0.30.3: bytes=32 time=1ms TTL=127
Ping statistics for 72.0.30.3:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 10ms, Average = 3ms
C:\>
Top
Realtime
Simulation
ISR4321
19:08
28-01-2025

CONCLUSION (provide conclusion about this experiment):

Thus, the design and implementation of inter VLAN network using Router configuration is successfully implemented using the devices.

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	