Lab3A VLANs and InterVLAN Routing

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Lab Theory

A **LAN** includes all devices in the same broadcast domain.

A **broadcast domain** includes the set of all LAN-connected devices, so that when any of the devices sends a broadcast frame, all the other devices get a copy of the frame. So, from one perspective, you can think of a LAN and a broadcast domain as being basically the same thing.

With **VLANs**, a switch can configure some interfaces into one broadcast domain and some into another, creating multiple broadcast domains. These individual broadcast domains created by the switch are called virtual LANs (VLAN).

Lab Objectives

1. To understand how to create Virtual Local Area Networks (VLANs) on switches
2. To understand how to assign switch ports to different VLANs
3. To understand VLAN trunking with multiple switches
4. To create VLAN routing through one router for multiple VLANs

Network Topology

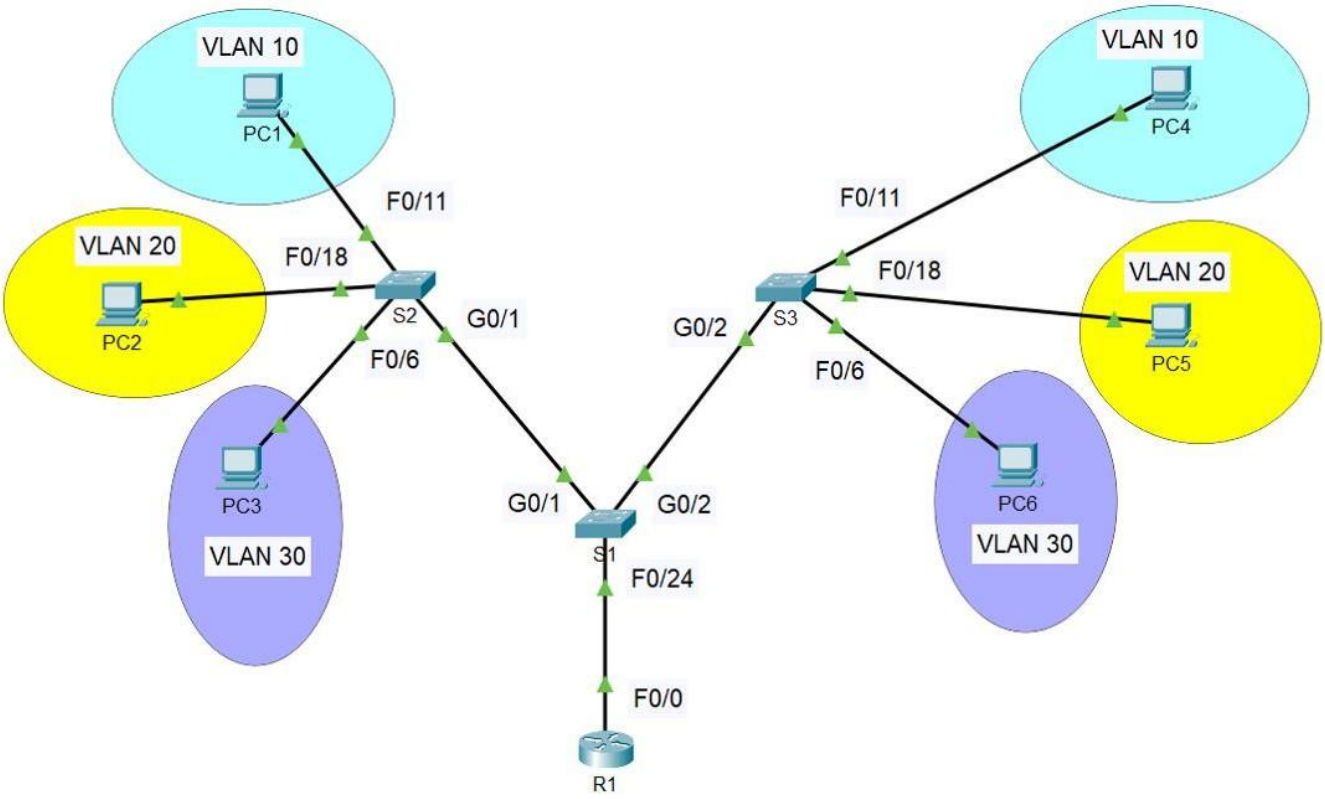


Fig1: VLANs routing

Procedure

1. The major network address for group X is 1.1.0.0/16
2. Create proper VLANs on each of the three switches (Ignore VLAN 30).
3. Assign ports to VLANs as follows

Network name	VLAN Name	Ports on S2 & S3
VLAN10	Ten	Fa0/7 – Fa0/12
VLAN20	Twenty	Fa0/13 – Fa0/18
VLAN99	Management	Fa0/19 – Fa0/20

4. On S2 use the command **show vlan brief** to display a summary of the VLANs.
5. Take a screen capture of the result and insert the image below ***[1 mark]***

```
S2#
S2#show vlan brief

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, Fa0/12, Fa0/13
                                                 Fa0/14, Fa0/15, Fa0/16, Fa0/17
                                                 Fa0/19, Fa0/20, Fa0/21, Fa0/22
                                                 Fa0/23, Fa0/24
10   ten                               active    Fa0/11
20   twenty                            active    Fa0/18
1002 fddi-default                      act/unsup
1003 token-ring-default                act/unsup
1004 fddinet-default                   act/unsup
1005 trnet-default                     act/unsup
S2#GROUP 1
```

Fig2: VLANs and ports of S2

6. Repeat steps 4 and 5 for S3 and insert the image below

```
S3#show vlan brief

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
                                                 Gi0/1, Gi0/2
10   ten                               active
20   twenty                            active
99   management                        active
1002 fddi-default                      act/unsup
1003 token-ring-default                act/unsup
1004 fddinet-default                   act/unsup
1005 trnet-default                     act/unsup
S3#GROUP 1
```

Fig3: VLANs and ports of S3

7. Use the following table for subnet addresses, where X is your group number.

Network name	Address
VLAN10	1.1.10.0/24

VLAN20	1.1.20.0/24

8. The PCs and the router connected to switches should have the following addresses

Device	Network	Address
PC1, PC4	VLAN10	PC1:1.1.10.1, PC4: 1.1.10.2
PC2, PC5	VLAN20	PC2:1.1.20.1, PC5: 1.1.20.2
Gateways	All networks	.100 address

9. Configure proper links to be trunks (those that link network devices)
10. On S1 display the ports that are configured as trunk (sh ip int tru)
11. Take a screen capture of the result and insert it below ***[1 mark]***

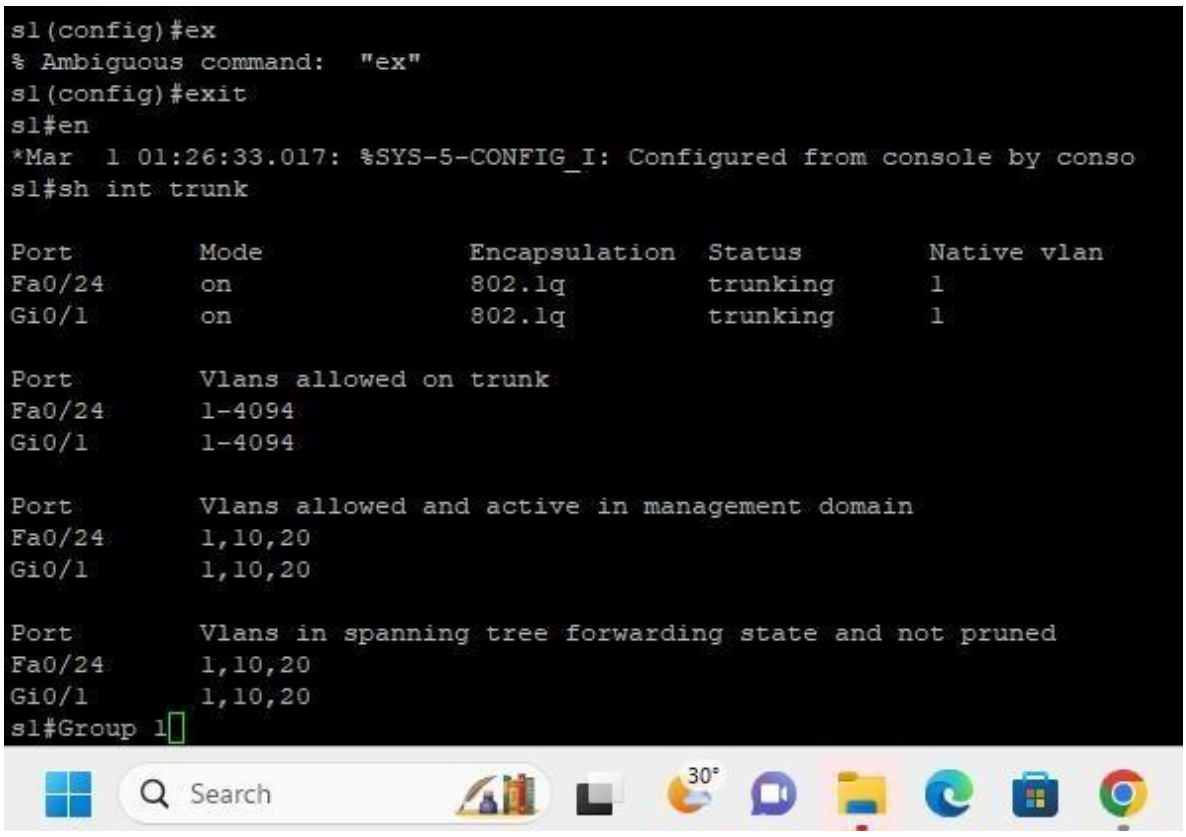
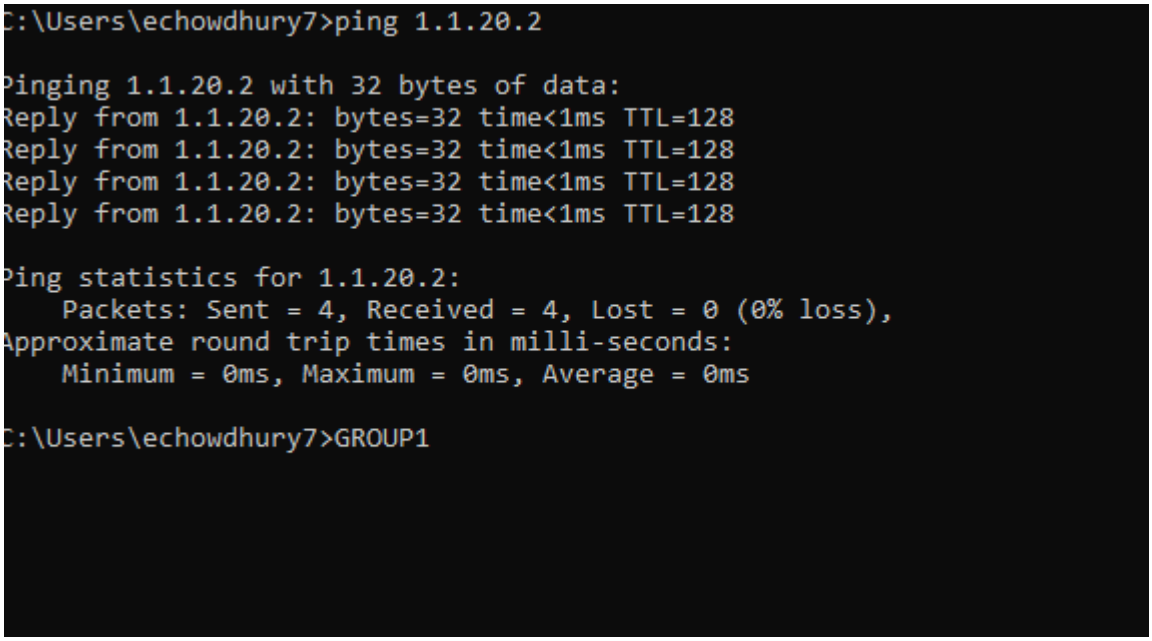


Fig4: Trunk ports of S1

12. Check connectivity between PCs in the same VLAN
    a. PC1 must be able to ping PC4
    b. PC2 must be able to ping PC5
13. Take a screen capture of one of the above two pings. insert the image below ***[1 mark]***



```
C:\Users\echowdhury7>
C:\Users\echowdhury7>
C:\Users\echowdhury7>
C:\Users\echowdhury7>ping 1.1.20.2

Pinging 1.1.20.2 with 32 bytes of data:
Reply from 1.1.20.2: bytes=32 time<1ms TTL=128
Reply from 1.1.20.2: bytes=32 time<1ms TTL=128
Reply from 1.1.20.2: bytes=32 time<1ms TTL=128
Reply from 1.1.20.2: bytes=32 time<1ms TTL=128

Ping statistics for 1.1.20.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Fig5: PC___pinging PC___

14. Configure R1 as ROAS to allow all PCs to ping each other. You must create and configure sub-interfaces on the router's F0/0.
15. Use the command **Show ip int brief** to display the IP addresses of your router.
16. Take a screen capture of the above and insert the image below ***[1 mark]***

```
R1#show ip int br
Interface                  IP-Address      OK? Method Status                Protocol
FastEthernet0/0            unassigned      YES unset  up                    up
FastEthernet0/0.10         1.1.10.100      YES manual up                    up
FastEthernet0/0.20         1.1.20.100      YES manual up                    up
FastEthernet0/1            unassigned      YES unset  administratively down down
Serial0/0/0                unassigned      YES unset  administratively down down
Serial0/0/1                unassigned      YES unset  administratively down down
R1#show ip int brief
Interface                  IP-Address      OK? Method Status                Protocol
FastEthernet0/0            unassigned      YES unset  up                    up
FastEthernet0/0.10         1.1.10.100      YES manual up                    up
FastEthernet0/0.20         1.1.20.100      YES manual up                    up
FastEthernet0/1            unassigned      YES unset  administratively down down
Serial0/0/0                unassigned      YES unset  administratively down down
Serial0/0/1                unassigned      YES unset  administratively down down
R1#Group 1
```

Fig6: IP addresses of gateways

17. At this point, all your PCs must be able to ping each other.

Ping from PC1 to PC2 and insert a screen capture of the results here: ***[1 mark]***

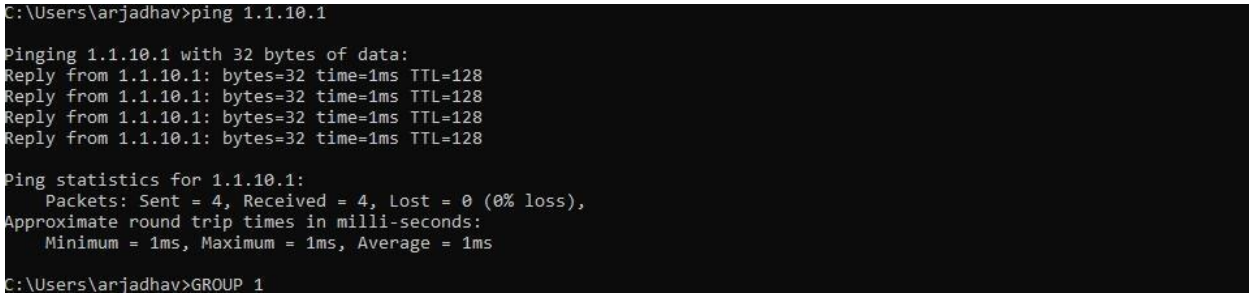


Fig7: Final Connectivity Test

18. **Discussion** ***[1 mark]***

The command **switchport mode** has three options: access, trunk and dynamic

Explain the **switchport mode dynamic** mode

Switchport mode dynamic is like giving your switch the power to adjust itself. It allows the switch to decide if it is, transferring lots of data between switches or, connecting to individual devices like computers or printers. It's a flexible setting that lets the switch adapt to whatever it's connected to, without needing direct instructions.

Appendix

Useful Commands

Switches*:*

Vlan id

Show vlan br

switchport mode access

switchport mode trunk

switchport access vlan

show int trunk

Router-
interface sub_int_id

show ip int br

show ip route