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Laboratory Report

CSE-402: Computer Networks Laboratory

Submitted by

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Experiment 03
Experiment Name: VLSI configuration with 3-layer switch and router

Objectives:

This Experiment provides the configuration and troubleshooting steps applicable to the creation of Layer 3 interfaces. VLANs divide broadcast domains in a LAN environment. Whenever hosts in one VLAN need to communicate with hosts in another VLAN, the traffic must be routed between them. This is known as inter-VLAN routing. On Catalyst switches it is accomplished by the creation of Layer 3 interfaces (switch virtual interfaces (SVIs)).The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Introduction:

A VLAN (virtual LAN) abstracts the idea of the local area network (LAN) by providing data link connectivity for a subnet. A LAN is a group of computers and devices that share a communications line or wireless link to a server within the same geographical area.
dot1q protocol: IEEE **802.1Q**, often referred to as **Dot1q**, is the networking standard that supports virtual LANs (VLANs) on an IEEE 802.3 Ethernet network. The standard defines a system of VLAN tagging for Ethernet frames and the accompanying procedures to be used by bridges and switches in handling such frames.

Circuit:

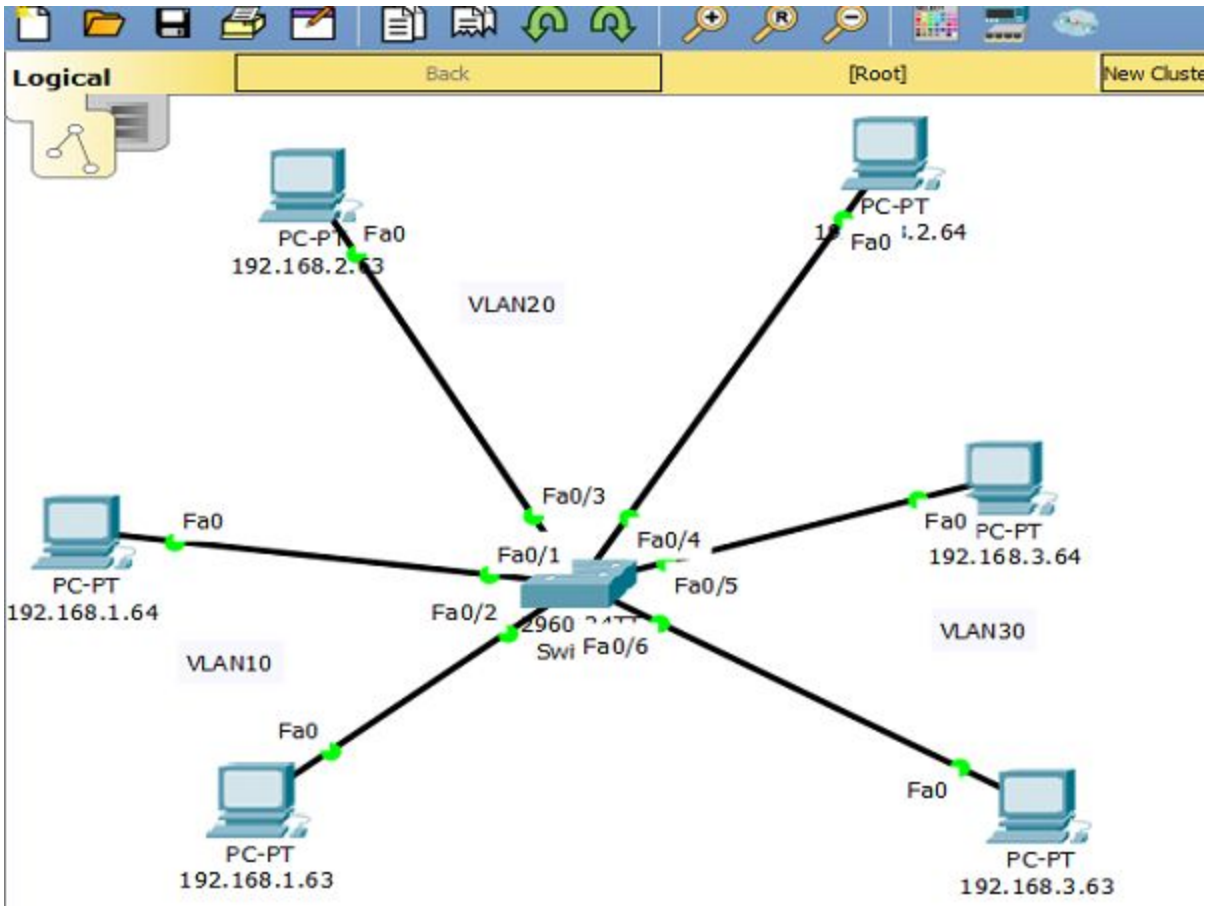

Figure1: VLAN Configuration with switch

IOS Command Line Interface:

Switch>en
Switch#vlan database
% Warning: It is recommended to configure VLAN from config mode,
as VLAN database mode is being deprecated. Please consult user
documentation for configuring VTP/VLAN in config mode.

Switch(vlan)#vlan 10 name A
VLAN 10 added:
Name: A
Switch(vlan)#vlan 20 name B
VLAN 20 added:

```
   Name: B
Switch(vlan)#vlan 30 name C
VLAN 30 added:
   Name: C
Switch(vlan)#exit
APPLY completed.
Exiting....
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#int fa0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#int fa0/2
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#int fa0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 30
Switch(config-if)#int fa0/4
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 30
Switch(config-if)#int fa0/5
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
Switch(config-if)#int fa0/6
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
Switch(config-if)#end
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#sh vlan brief

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    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
10 A active Fa0/1, Fa0/2
20 B active Fa0/5, Fa0/6
30 C active Fa0/3, Fa0/4
1002 fddi-default active
1003 token-ring-default active
1004 fddinet-default active
1005 trnet-default active
Switch#

Result:

Now apply ping on PC of IP 192.168.2.63 to PC 192.168.2.63 of same VLAN 10 will be success. But to the PC 192.168.3.63 of different VLAN, the ping will fail as shown below. Similarly you can verify the ICMP packet under simulation mode.

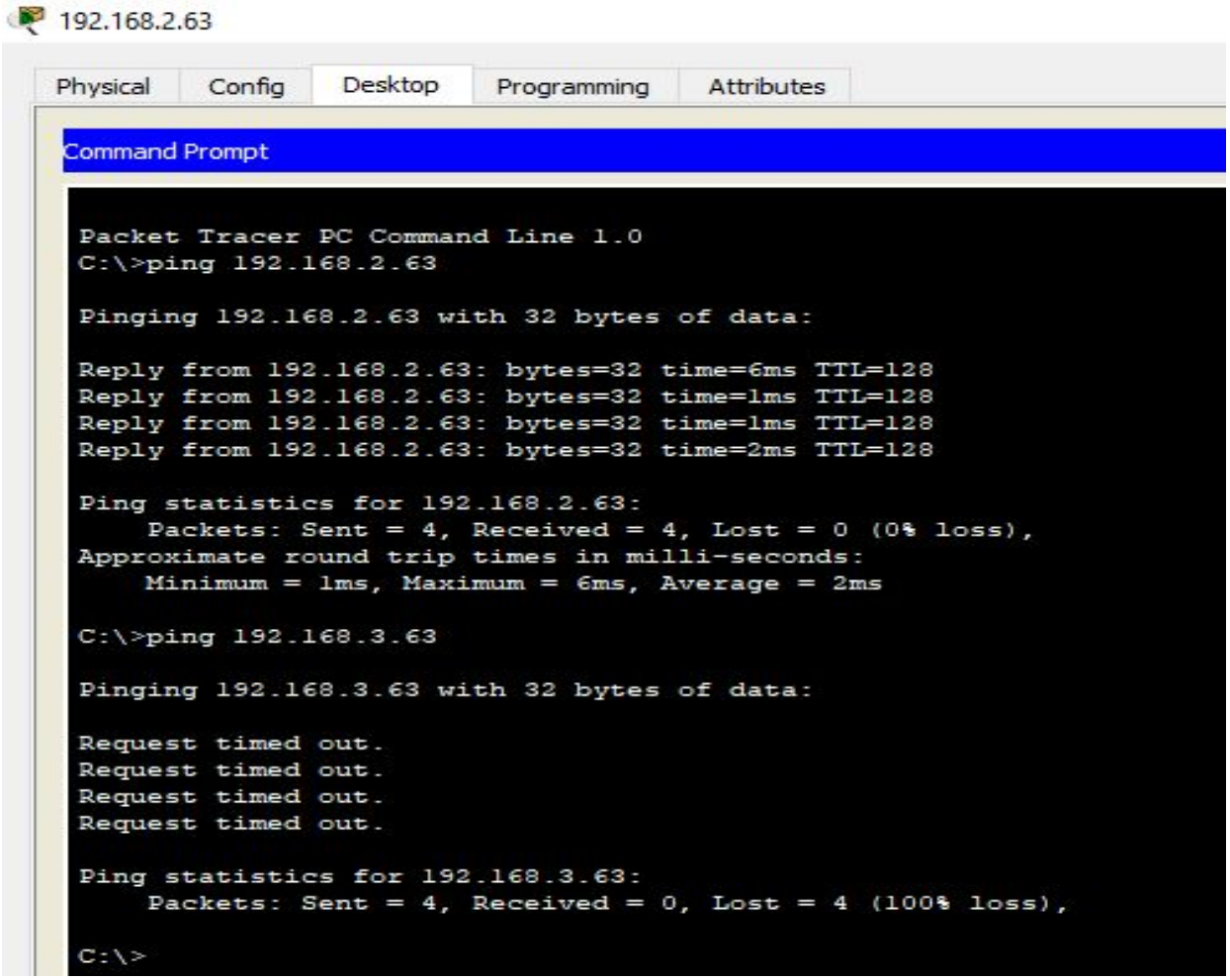

Figure 2: Ping Command

Circuit:

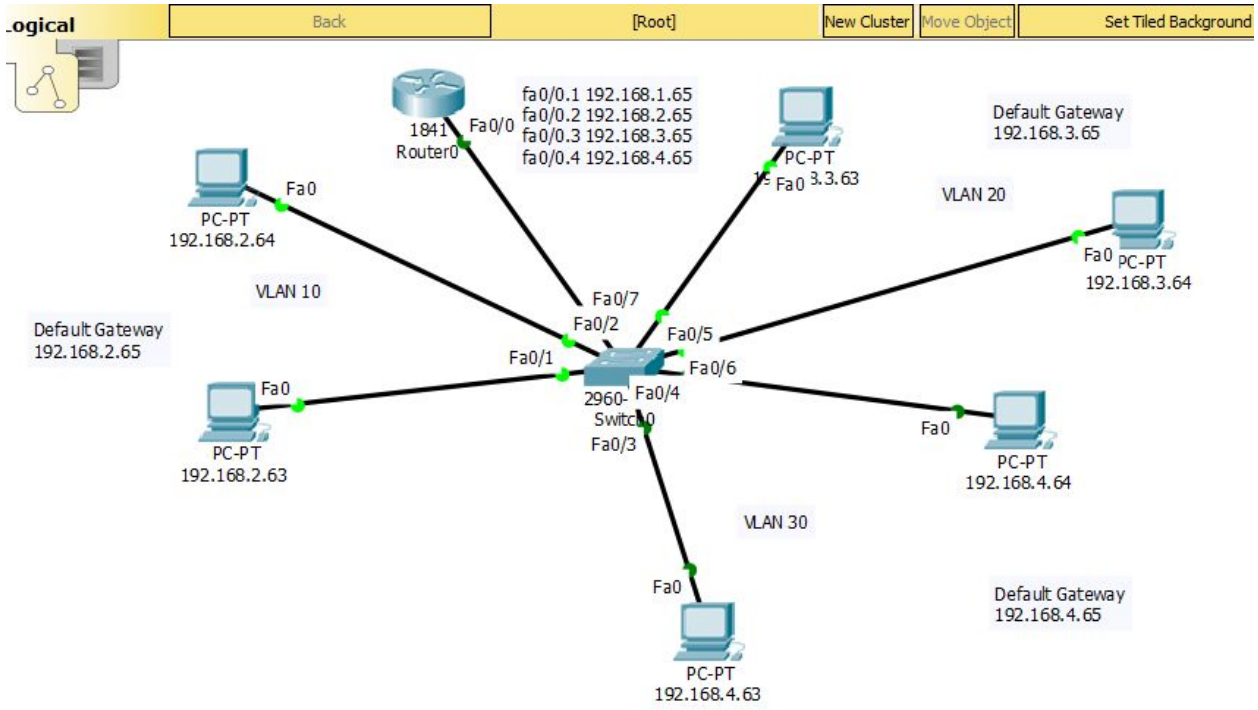

Figure 3. Configuration of 3 layer switch and router

IOS Command Line Interface:

--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: no
Press RETURN to get started!
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
Router(config-if)#int fa0/0.1
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.1, changed state to up
Router(config-subif)#encapsulation dot1q 1
Router(config-subif)#ip add 192.168.1.65 255.255.255.0
Router(config-subif)#
Router(config)#int fa0/0.2
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.2, changed state to up
Router(config-subif)#encapsulation dot1q 10
Router(config-subif)#ip add 192.168.2.65 255.255.255.0
Router(config-subif)#int fa0/0.3
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.3, changed state to up
Router(config-subif)#encapsulation dot1q 20
Router(config-subif)#ip add 192.168.3.65 255.255.255.0
Router(config-subif)#int fa0/0.4
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.4, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.4, changed state to up
Router(config-subif)#encapsulation dot1q 30
Router(config-subif)#ip add 192.168.4.65 255.255.255.0
Router(config-subif)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP

i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

C 192.168.1.0/24 is directly connected, FastEthernet0/0.1
C 192.168.2.0/24 is directly connected, FastEthernet0/0.2
C 192.168.3.0/24 is directly connected, FastEthernet0/0.3
C 192.168.4.0/24 is directly connected, FastEthernet0/0.4

Router#

Result:

When we use router and configure default gateways then we overcome the transmission of data between two different networks.

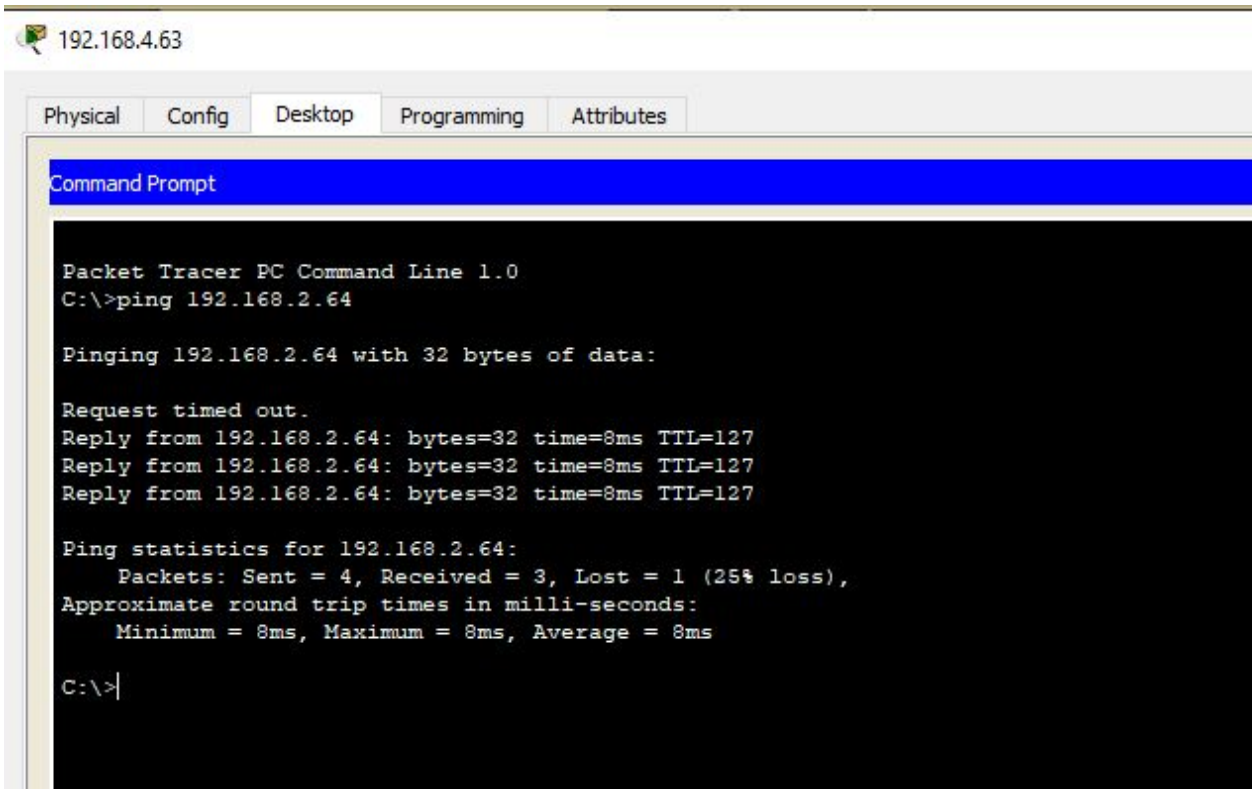

Figure 4. ping command