INSTITUTE OF ENGINEERING

ADVANCED COLLEGE OF ENGINEERING AND MANAGEMENT

Kupondole, Lalitpur

(AFFILIATED TO TRIBHUVAN UNIVERSITY)

Lab no:3

Subject: Computer Network

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Submitted To:

Department of Computer

and

Electronics Engineering

Lab 3: OSPF routing and VLAN on ipv4.

Objective:

1. Set up OSPF routing protocol
2. Visualize VLAN setup

Introduction

Open Shortest Path First (OSPF) is a routing protocol for Internet Protocol (IP) networks. It uses a link state routing (LSR) algorithm and falls into the group of interior gateway protocols (IGPs), operating within a single autonomous system (AS). It is defined as OSPF Version 2 in RFC 2328 (1998) for IPv4. The updates for IPv6 are specified as OSPF Version 3 in RFC 5340 (2008). OSPF supports the Classless Inter-Domain Routing (CIDR) addressing model. OSPF is a widely used IGP in large enterprise networks.

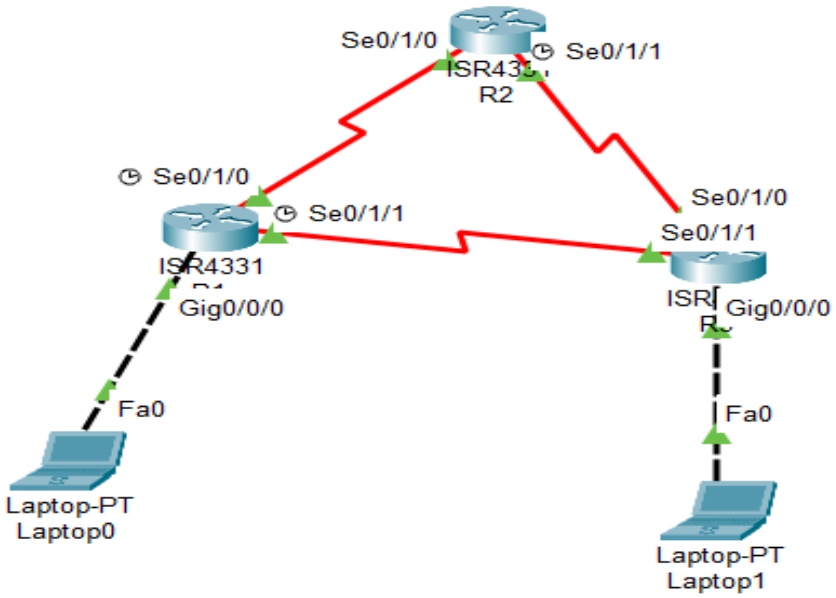
A VLAN (virtual LAN) is a subnetwork which can group together collections of devices on separate physical local area networks (LANs). A LAN is a group of computers and devices that share a communications line or wireless link to a server within the same geographical area.

VLANs make it easy for network administrators to partition a single switched network to match the functional and security requirements of their systems without having to run new cables or make major changes in their current network infrastructure. VLANs are often set up by larger businesses to re-partition devices for better traffic management.

VLANs are also important because they can help improve the overall performance of a network by grouping together devices that communicate most frequently. VLANs also provide security on larger networks by allowing a higher degree of control over which devices have access to each other. VLANs tend to be flexible because they are based on logical connections, rather than physical.

OSPF

Design:



Procedure:

1. First the required tools were selected.
2. The required ports of the routers were turned on.
3. Then the IP and subnet mask for each Laptop and router ports was set
    a. For laptops this was gone by going to the desktop and ip configurations
    b. For routers this was done by going to the configuration and selecting the required port
4. Required connections were made between the routers and laptops
5. The OSPF network was added in the required routers through the routing section of the config tab .

codes:

Router1

Router>enable

Router# config terminal

Router(config)#interface FastEthernet0/0

```
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#ip address 40.0.0.1 255.0.0.0
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown
Router(config-if)#exit

Router(config)#router ospf 1
Router(config-router)#router-id 1.1.1.1
Router(config-router)#network 10.0.0.0 0.255.255.255 area 0 //*wild card mask
Router(config-router)#network 40.0.0.0 0.255.255.255 area 0//*wild card mask
Router(config-router)#network 192.168.1.0 0.0.0.255 area 0
Router(config-router)#end
Router#wr
Router#
```

Router2

```
Router>enable
Router# configure terminal
Router(config)#interface Serial2/0
Router(config-if)#ip address 10.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown
Router(config-if)#exit

Router(config)#router ospf 1
Router(config-router)#router-id 2.2.2.2
Router(config-router)#network 10.0.0.0 0.255.255.255 area 0//*wild card mask
Router(config-router)#network 30.0.0.0 0.255.255.255 area 0//*wild card mask
Router(config-router)#end
Router#wr
```

Router#

Router3

Router>enable
Router# configure terminal
Router(config)#interface Serial2/0
Router(config-if)#ip address 30.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#ip address 40.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.100.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit

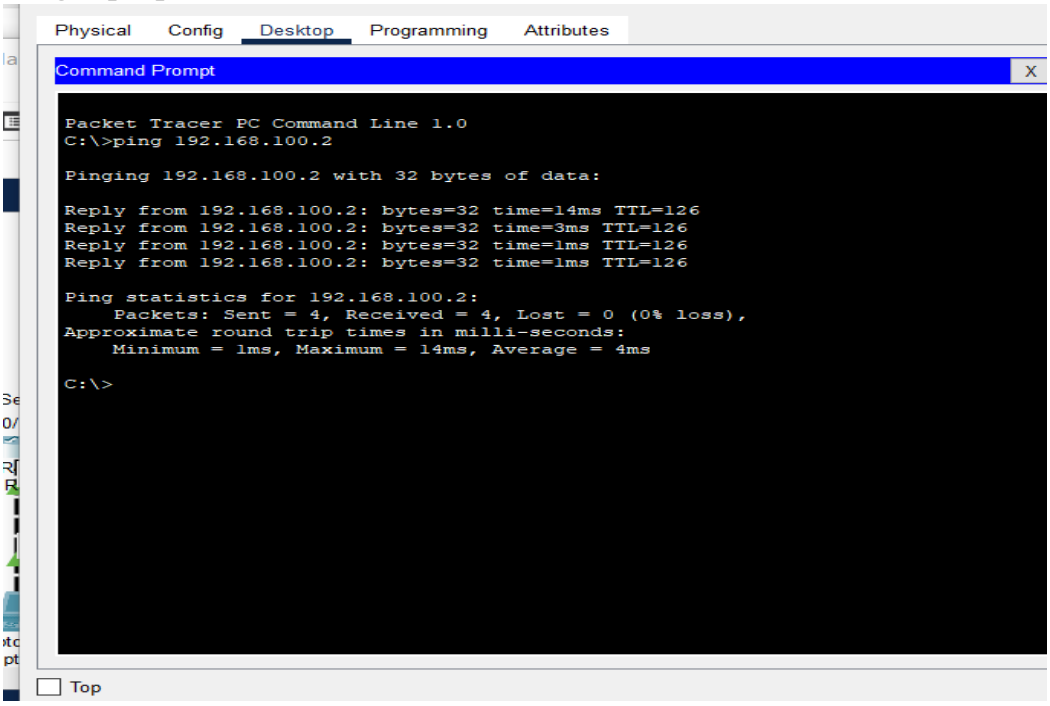
Router(config)#router ospf 1
Router(config-router)#router-id 3.3.3.3
Router(config-router)#network 30.0.0.0 0.255.255.255 area 0//*wild card mask
Router(config-router)#network 40.0.0.0 0.255.255.255 area 0//*wild card mask
Router(config-router)#network 192.168.100.0 0.0.0.255 area 0
Router(config-router)#end
Router#wr
Router#

Checking OSPF status from any Router

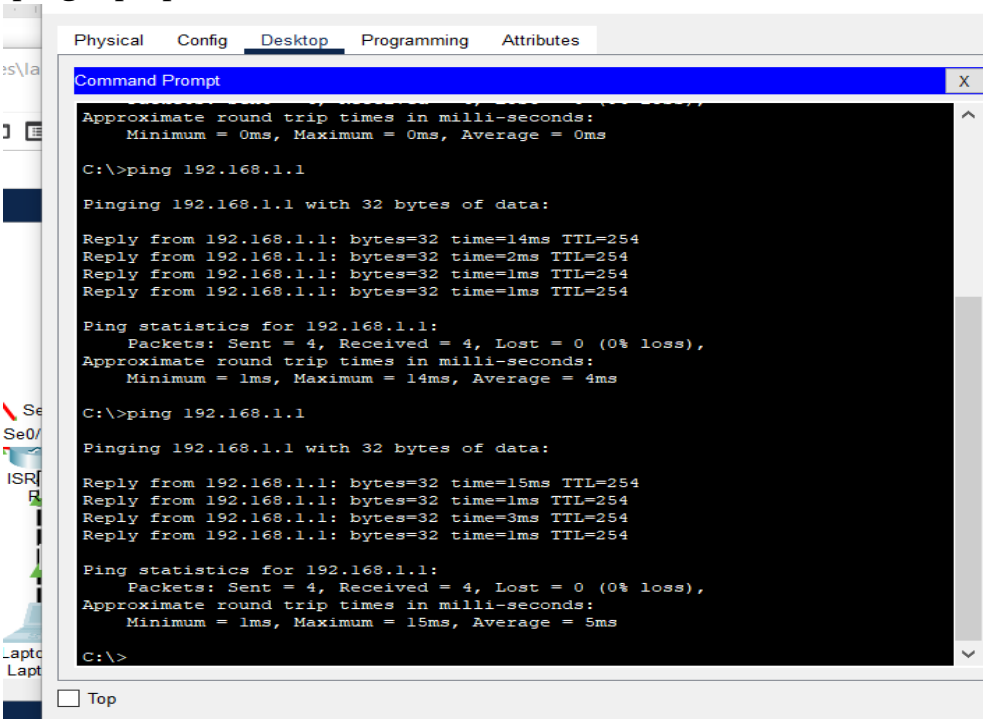
Router#show ip ospf neighbor
Router#show ip ospf database
Router#show ip route ospf

Output:

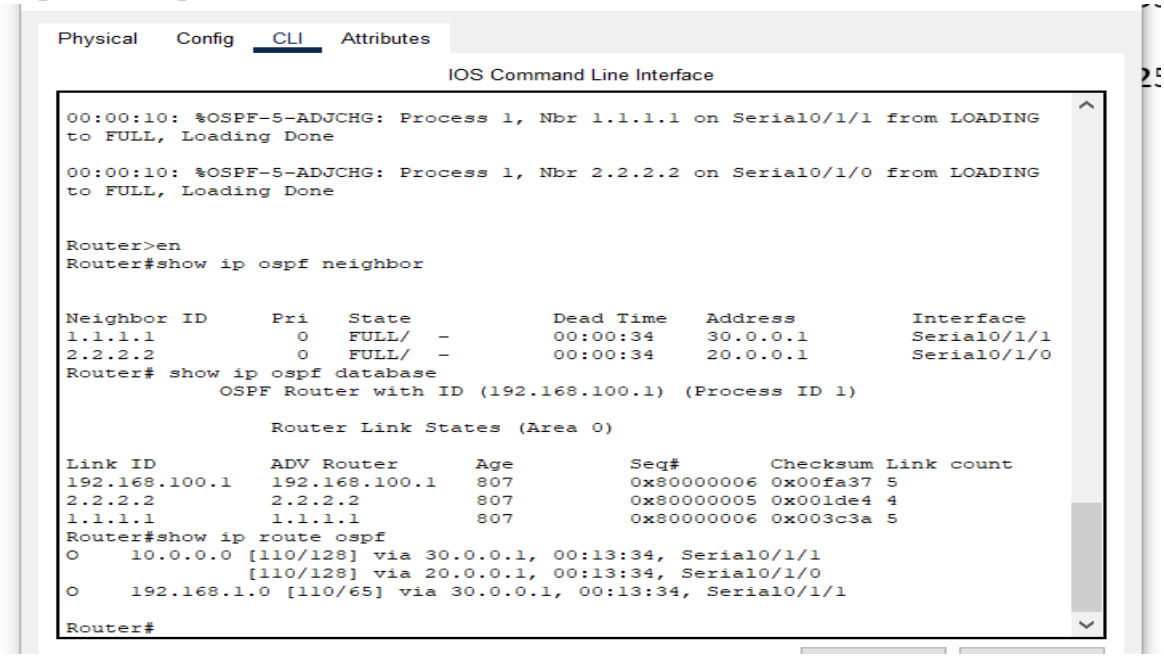
Ping laptop 1 to 2



ping laptop 2 to 1

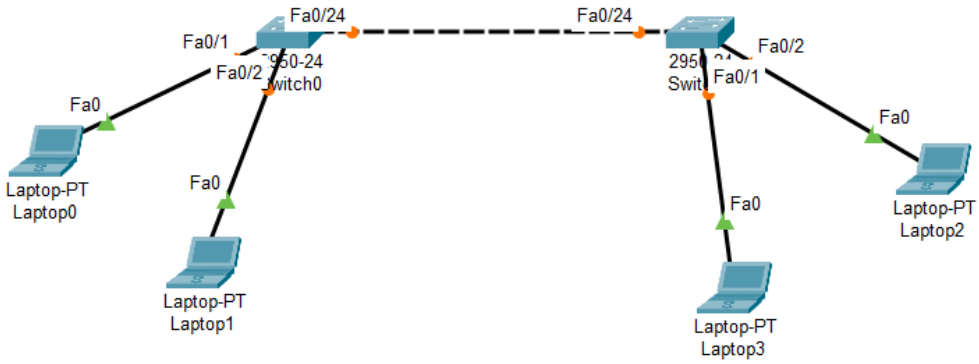


Ospf show ip



VLAN

Design:



Procedure:

1. First the required tools were selected.
2. The required ports of the switches were turned on.
3. Then the IP and subnet mask for each Laptop ports was set
    a. For laptops this was gone by going to the desktop and ip configurations
    b. For switches this was done by going to the configuration and selecting the required port
4. Required connections were made between the switches and laptops

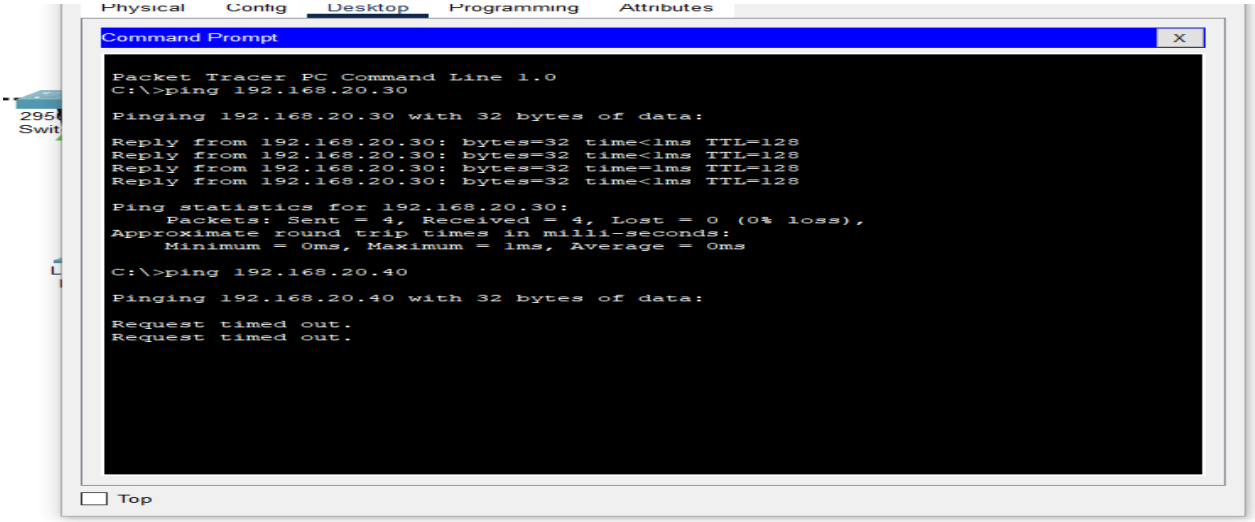
The VLAN was configured .

Codes:

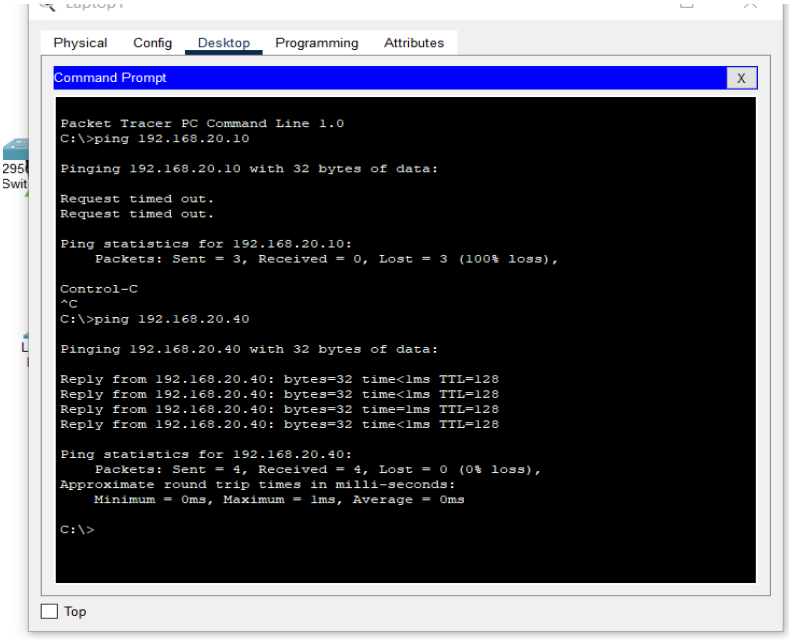
```
Switch>enable
Switch # configure terminal
Switch(config)#vlan 10                  //vlan database configuration start from here with number
Switch(config-vlan)#name Account   //name assigning on vlan number
Switch(config-vlan)#vlan 20
Switch(config-vlan)#name Exam
Switch(config-vlan)#exit                        // vlan end
Switch(config)#interface  fa0/24
Switch(config-if)#switchport mode trunk      // two-way communication on multiple networks
Switch(config-if)#exit
Switch(config)#interface fa0/1
Switch(config-if)#switchport access vlan 10   // assigning vlan for switch to virtually divide
Switch(config-if)#exit
Switch(config)#interface fa0/11
Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
Switch(config)#interface range fa0/15-18       // assigning multiple ports into single vlan
Switch(config-if-range)#switchport  access vlan 20
Switch(config-if-range)#exit
Switch(config)#exit
Switch#wr
```

Output:

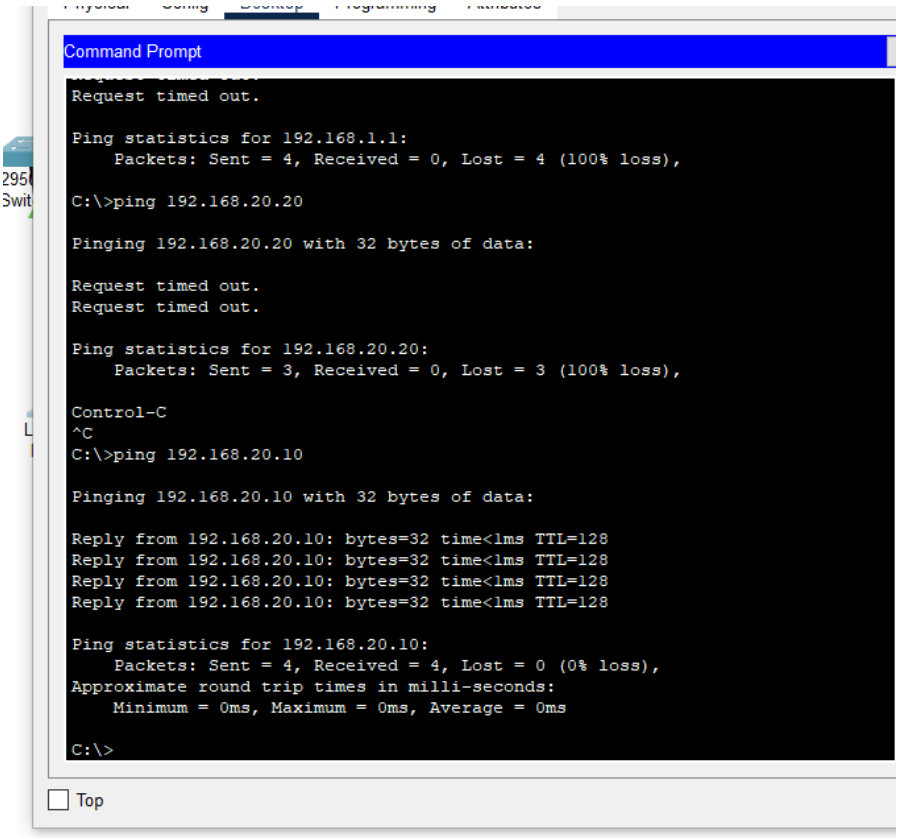
From laptop 1



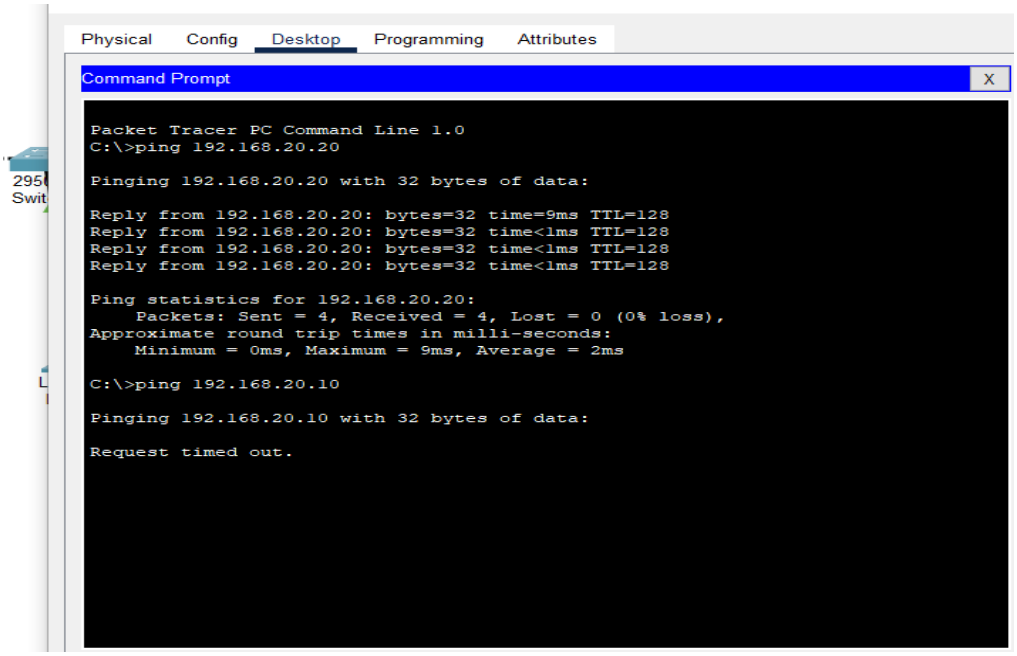
Laptop 2



Laptop 3



Laptop 4



Discussion And Conclusion

In this lab we visualized the ospf routing protocol and VLAN network. We simulated the message passing and also the ip addresses were analysed.