Practical 1
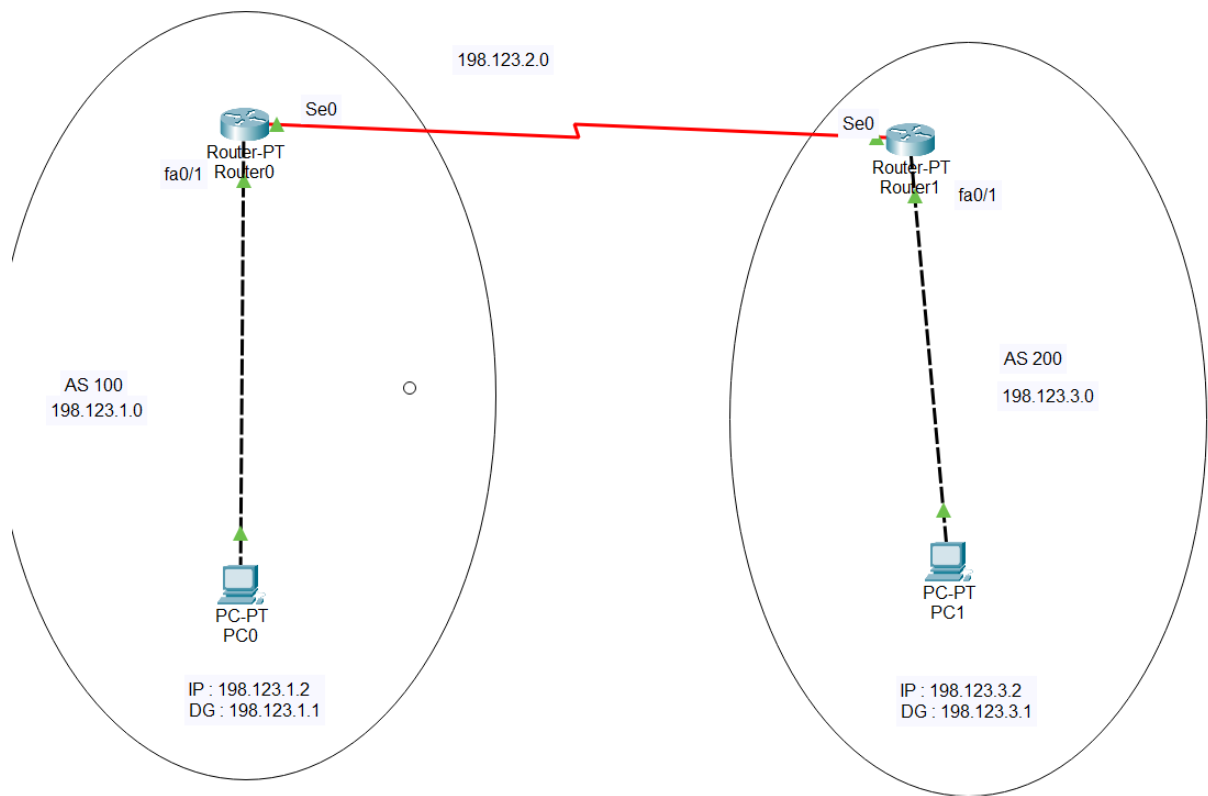
AIM: Implement eBGP for IPv4

Steps:

1. Create the topology (2- end device, 2- PT Router, Automatic connection)
2. Give the IP to the end device
3. Assign the IP address to the interface of router (Config interface)

Router0 — □ ✕

Physical   Config   CLI   Attributes

```
              GLOBAL
             Settings
        Algorithm Settings
              ROUTING
              Static
              RIP
             INTERFACE
         FastEthernet0/0
         FastEthernet1/0
            Serial2/0
            Serial3/0
         FastEthernet4/0
         FastEthernet5/0
```

FastEthernet0/0

Port Status	☑ On
Bandwidth	◉ 100 Mbps ○ 10 Mbps ☑ Auto
Duplex	○ Half Duplex ◉ Full Duplex ☑ Auto
MAC Address	0060.2FBE.5805

IP Configuration
IPv4 Address   198.123.1.1
Subnet Mask   255.255.255.0

Tx Ring Limit   10

Equivalent IOS Commands

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
%BGP-5-ADJCHANGE: neighbor 198.123.2.2 Up


Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
```

4. Configure the router for BGP protocol.

R0> en
R0# conf t
R0 (config) # router bgp 100
          # network 198.123.1.0
          # network 198.123.2.0
          # neighbor 198.123.2.2 remote-as 200
          # neighbor 198.123.3.2 remote-as 200

R1> en
R1# conf t
R1 (config) # router bgp 200
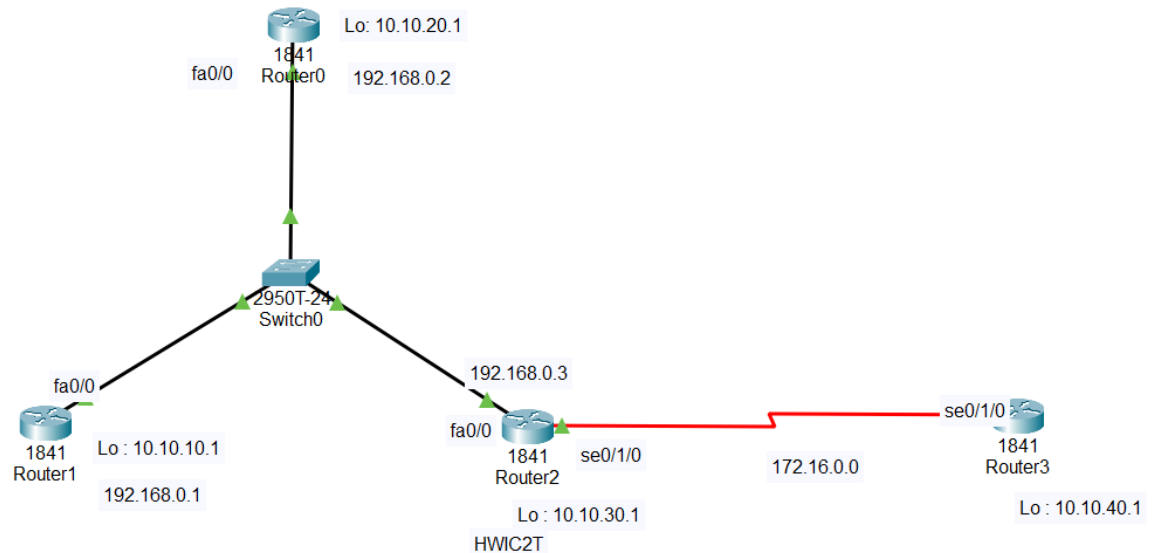   # network 198.123.3.0
          # network 198.123.2.0
          # neighbor 198.123.2.1 remote-as 100
          # neighbor 198.123.1.2 remote-as 100

5. Check the connectivity by passing the data.

Practical 2 :
AIM : Implement Single area OSPF.

Steps:
1. Create topology
2. Assign the connections (automatic)
3. Code the router for interface
4. Code the router for OSPF
5. Check the Connectivity

Configure R0
Router>en
Router#conf t
Router(config)#int loopback 0
Router(config-if)#ip add 10.10.20.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#int fa0/0
Router(config-if)#ip add 192.168.0.2 255.255.255.0
Router(config-if)#no shut
Router(config-if)#
Router(config-if)#exit

Configure router R1
Router>en
Router#conf t
Router(config)#int loopback 0
Router(config-if)#ip add 10.10.10.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#exit

```
Router(config)#int fa0/0
Router(config-if)#ip add 192.168.0.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#exit
```

Configure router R2
```
Router>en
Router#conf t
Router(config)#int loopback 0
Router(config-if)#ip add 10.10.30.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#int Serial0/1/0
Router(config-if)#ip add 172.16.0.1 255.255.255.252
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#int fa0/0
Router(config-if)#ip add 192.168.0.3 255.255.255.0
Router(config-if)#no shut
Router(config-if)#exit
```

Configure router R3
```
Router#conf t
Router(config)#int loopback 0
Router(config-if)#ip add 10.10.40.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#int Serial0/1/0
Router(config-if)#ip add 172.16.0.2 255.255.255.252
Router(config-if)#no shut
Router(config-if)#exit
```

Configure OSPF on router R0
```
Router(config)#router ospf 1
Router(config-router)#router-id 10.2.2.2
Router(config-router)#network 10.10.20.0 0.0.0.255 area 0
Router(config-router)#network 192.168.0.0 0.0.0.255 area 0
Router(config-router)#exit
Router#wr
Building configuration...
[OK]
```

Configure OSPF on router R1
```
Router(config)#router ospf 1
Router(config-router)#router-id 10.1.1.1
Router(config-router)#network 10.10.10.0 0.0.0.255 area 0
Router(config-router)#network 192.168.0.0 0.0.0.255 area 0
Router(config-router)#exit
```

```
Router(config)#^Z
Router#wr
Building configuration...
[OK]
```

Configure OSPF on router R2
```
Router(config)#router ospf 1
Router(config-router)#router-id 10.3.3.3
Router(config-router)#network 10.10.30.0 0.0.0.255 area 0
Router(config-router)#network 172.16.0.0 0.0.0.3 area 0
Router(config-router)#network 192.168.0.0 0.0.0.255 area 0
Router(config-router)#^Z
Router#wr
Building configuration...
[OK]
```

Configure OSPF on router R3
```
Router(config)#router ospf 1
Router(config-router)#router-id 10.4.4.4
Router(config-router)#network 10.10.40.0 0.0.0.255 area 0
Router(config-router)#network 172.16.0.0 0.0.0.3 area 0
Router(config-router)#exit
Router(config)#^Z
Router#wr
Building configuration...
[OK]
```

Check connectivity on R0
```
R1#sh ip route
10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks
O 10.10.10.1/32 [110/2] via 192.168.0.1, 00:03:38, FastEthernet0/0
C 10.10.20.0/24 is directly connected, Loopback0
O 10.10.30.1/32 [110/2] via 192.168.0.3, 00:01:26, FastEthernet0/0
172.16.0.0/30 is subnetted, 1 subnets
O 172.16.0.0 [110/65] via 192.168.0.3, 00:01:26, FastEthernet0/0
C 192.168.0.0/24 is directly connected, FastEthernet0/0

R1#ping 10.10.10.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.10.10.1, timeout is 2 seconds:!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/1 ms
```

Check connectivity on R1
```
Router#ship route
10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
C 10.10.10.0/24 is directly connected, Loopback0
O 10.10.20.1/32 [110/2] via 192.168.0.2, 00:06:27, FastEthernet0/0
O 10.10.30.1/32 [110/2] via 192.168.0.3, 00:04:20, FastEthernet0/0
```

O 10.10.40.1/32 [110/66] via 192.168.0.3, 00:03:10, FastEthernet0/0
172.16.0.0/30 is subnetted, 1 subnets
O 172.16.0.0 [110/65] via 192.168.0.3, 00:04:20, FastEthernet0/0
C 192.168.0.0/24 is directly connected, FastEthernet0/0

Router#ping 10.10.20.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.10.20.1, timeout is 2 seconds:!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/2 ms

Check connectivity on R2
Router#ship route
10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
O 10.10.10.1/32 [110/2] via 192.168.0.1, 00:05:07, FastEthernet0/0
O 10.10.20.1/32 [110/2] via 192.168.0.2, 00:05:07, FastEthernet0/0
C 10.10.30.0/24 is directly connected, Loopback0
O 10.10.40.1/32 [110/65] via 172.16.0.2, 00:03:54, Serial0/1/0
172.16.0.0/30 is subnetted, 1 subnets
C 172.16.0.0 is directly connected, Serial0/1/0
C 192.168.0.0/24 is directly connected, FastEthernet0/0

Router#ping 10.10.10.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.10.10.1, timeout is 2 seconds:!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/2 ms

Check connectivity on router R3
Router#ship route
10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
O 10.10.10.1/32 [110/66] via 172.16.0.1, 00:04:34, Serial0/1/0
O 10.10.20.1/32 [110/66] via 172.16.0.1, 00:04:34, Serial0/1/0
O 10.10.30.1/32 [110/65] via 172.16.0.1, 00:04:34, Serial0/1/0
C 10.10.40.0/24 is directly connected, Loopback0
172.16.0.0/30 is subnetted, 1 subnets
C 172.16.0.0 is directly connected, Serial0/1/0
O 192.168.0.0/24 [110/65] via 172.16.0.1, 00:04:34, Serial0/1/0

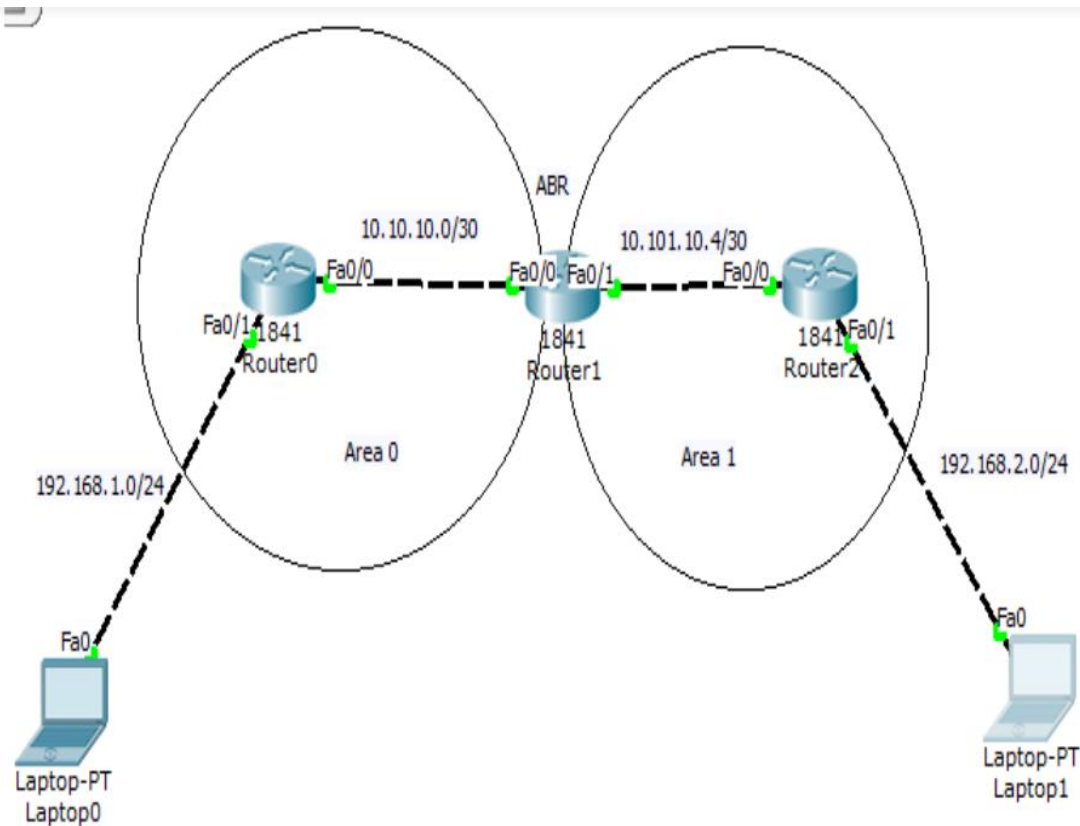Router#ping 10.10.30.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.10.30.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/16/76 ms

Practical 3:
Implement OSPF using Multi area

Steps
1. Create the topology
2. Make the connection (automatic)
3. Give IP address to the system
4. Configure the router for interface
5. Configure the router for OSPF
6. Check the connectivity

Configure Router R0
Router>en
Router#conf t
Router(config)#int fa0/0
Router(config-if)#ip add 10.10.10.1 255.255.255.252
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#int fa0/1
Router(config-if)#ip add 192.168.1.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#exit
Router#wr
Building configuration...
[OK]
Configure Router R1
Router>en

```
Router#conf t
Router(config)#int fa0/0
Router(config-if)#ip add 10.10.10.2 255.255.255.252
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#int fa0/1
Router(config-if)#ip add 10.101.10.1 255.255.255.252
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#exit
Router#wr
Building configuration...
[OK]
Router#
```

Configure Router R2

```
Router>en
Router#conf t
Router(config)#int fa0/0
Router(config-if)#ip add 10.10.101.2 255.255.255.252
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#int fa0/1
Router(config-if)#ip add 192.168.2.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#exit
Router#wr
Building configuration...
[OK]
Router#
```

Configure Router R0 for OSPF

```
Router(config)#router ospf 24222

Router(config-router)#network 10.10.10.0 0.0.0.3 area 0

Router(config-router)#network 192.168.1.0 0.0.0.255 area 0

Router(config-router)#exit
```

Configure Router R1 for OSPF

```
Router(config-if)#router ospf 24222

Router(config-router)#network 10.10.10.0 0.0.0.3 area 0

Router(config-router)#network 10.101.10.0 0.0.0.3 area 1

Router(config-router)#exit
```

Configure Router R2 for OSPF

Router(config)#router ospf 24222

Router(config-router)#network 10.101.10.2 0.0.0.3 area 1

Router(config-router)#network 192.168.2.0 0.0.0.255 area 1

Router(config-router)#exit

Show IP Connectivity on R0
Router#sh ip route ospf
10.0.0.0/30 is subnetted, 2 subnets
O IA 10.10.10.4 [110/2] via 10.10.10.2, 00:06:28, FastEthernet0/0
O IA 192.168.2.0 [110/3] via 10.10.10.2, 00:03:48, FastEthernet0/0
Router#
Show IP Connectivity on R1
Router#sh ip route ospf
O 192.168.1.0 [110/2] via 10.10.10.1, 00:10:50, FastEthernet0/0
O 192.168.2.0 [110/2] via 10.10.10.6, 00:08:16, FastEthernet0/1
Router#
Show IP Connectivity on R2
Router#sh ip route ospf
10.0.0.0/30 is subnetted, 2 subnets
O IA 10.10.10.0 [110/2] via 10.10.10.5, 00:04:58, FastEthernet0/0
O IA 192.168.1.0 [110/3] via 10.10.10.5, 00:04:58, FastEthernet0/0
Router#

Show IP Connectivity of neighbor on R0
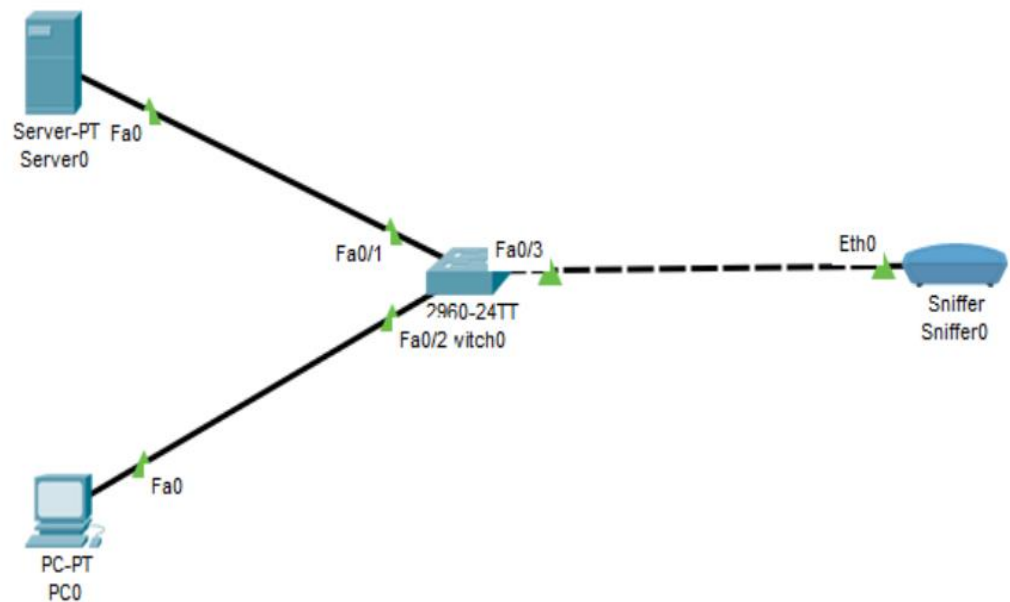
Router#sh ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface
10.10.10.5 1 FULL/BDR 00:00:36 10.10.10.2 FastEthernet0/0
Router#
Show IP Connectivity of neighbor on R1

Router>en
Router#sh ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface
192.168.1.1 1 FULL/DR 00:00:39 10.10.10.1 FastEthernet0/0
192.168.2.1 1 FULL/BDR 00:00:32 10.10.10.6 FastEthernet0/1
Router#
Show IP Connectivity of neighbor on R2

Router#sh ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

10.10.10.5 1 FULL/DR 00:00:32 10.10.10.5 FastEthernet0/0
Router#

Practical 4:
AIM : Implement SPAN

PC0/Desktop/IP Configuration

Server0/Desktop/IP Configuration

Sniffer/GUI

Current filters by default are STP only.

Configure Switch0

Switch>en
Switch#conf t
Switch(config)#monitor session 1 source int fa0/1
Switch(config)#monitor session 1 destination int fa0/3
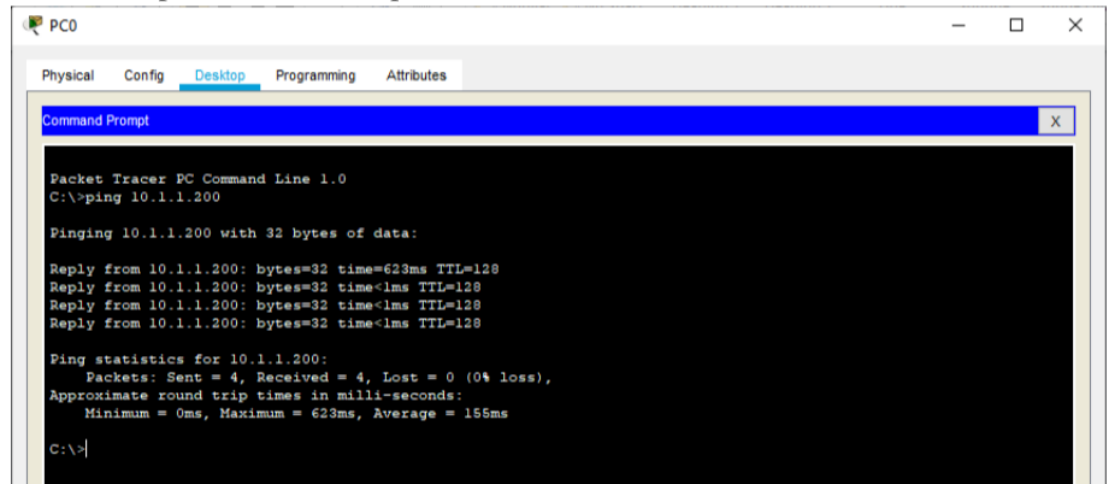Switch(config)#^Z

```
Switch#sh monitor
Session 1
---------

Type                    : Local Session
Description             : -
Source Ports            :
    Both                : Fa0/1
Destination Ports       : Fa0/3
    Encapsulation       : Native
            Ingress     : Disabled
```

PC0/Desktop/Command Prompt

```
Packet Tracer PC Command Line 1.0
C:\>ping 10.1.1.200

Pinging 10.1.1.200 with 32 bytes of data:

Reply from 10.1.1.200: bytes=32 time=623ms TTL=128
Reply from 10.1.1.200: bytes=32 time<1ms TTL=128
Reply from 10.1.1.200: bytes=32 time<1ms TTL=128
Reply from 10.1.1.200: bytes=32 time<1ms TTL=128

Ping statistics for 10.1.1.200:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 623ms, Average = 155ms

C:\>
```

Now check the sniffer. It consist of ICMP traffic.
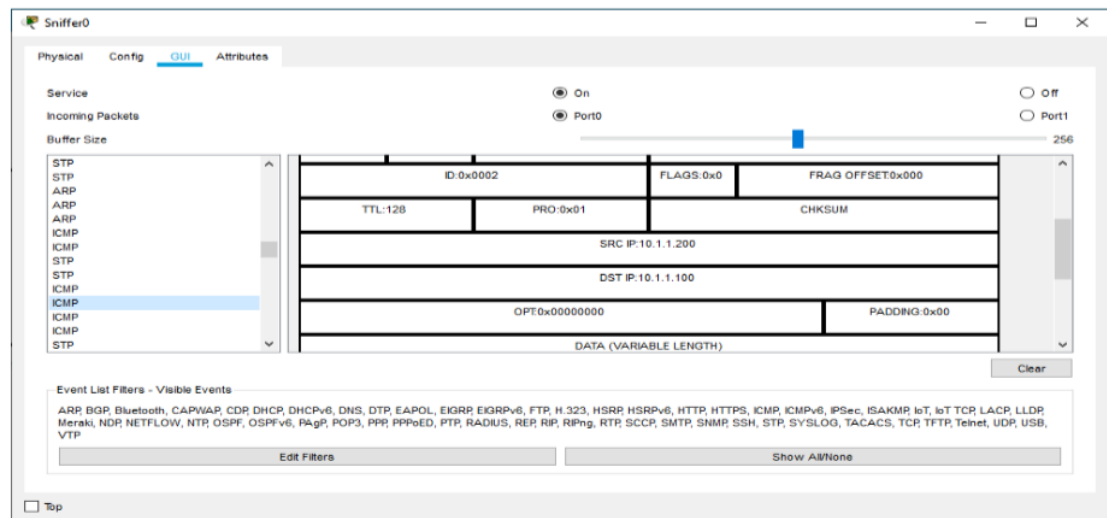
Practical 5
AIM : Implement Standard IPv4 ACLs

Configure R0
Router>en
Router#conf t
Router(config)#host R0
R0(config)#int fa0/0
R0(config-if)#ip add 192.168.3.1 255.255.255.0
R0(config-if)#no shut
R0(config-if)#exit
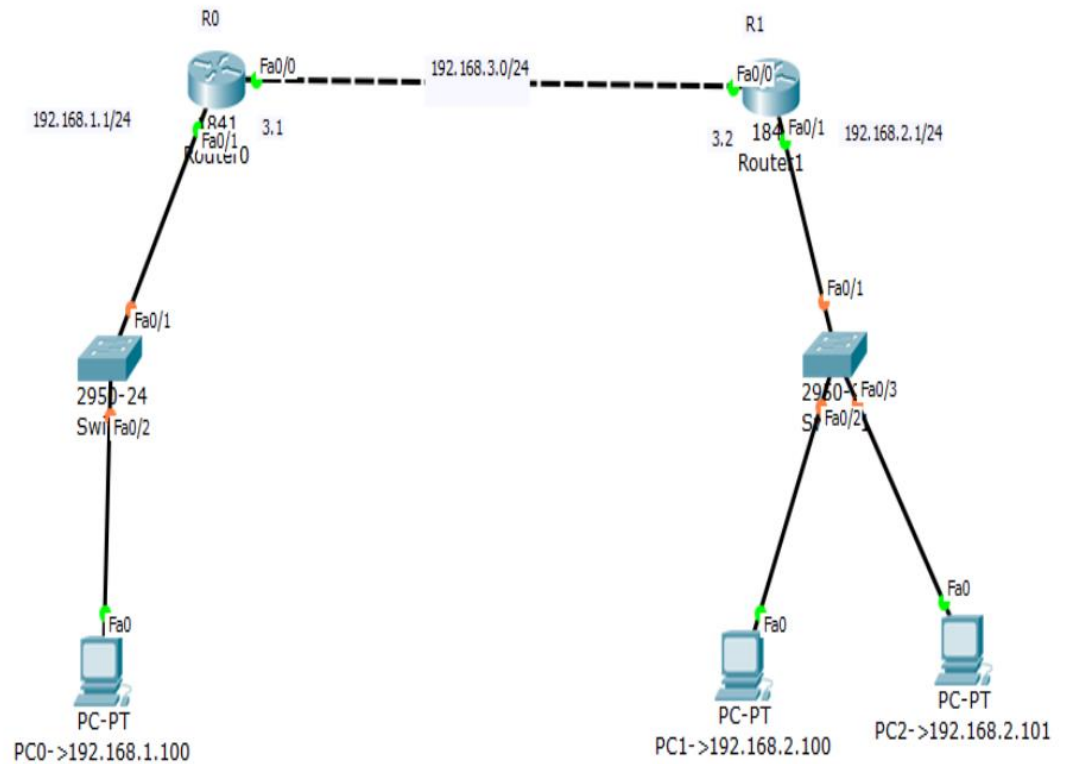R0(config)#int fa0/1
R0(config-if)#ip add 192.168.1.1 255.255.255.0
R0(config-if)#no shut
R0(config-if)#exit

Configure R1
Router>en
Router#conf t
Router(config)#host R1
R1(config)#int fa0/0
R1(config-if)#ip add 192.168.3.2 255.255.255.0
R1(config-if)#no shut
R1(config-if)#exit
R1(config)#int fa0/1
R1(config-if)#ip add 192.168.2.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#exit

Configure static route on R0

R0(config)#ip route 192.168.2.0 255.255.255.0 192.168.3.2
R0(config)#exit

Configure static route on R1

R1(config)#ip route 192.168.1.0 255.255.255.0 192.168.3.1
R1(config)#exit

Configure access list on R0

R0>en
R0#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R0(config)#access-list 1 deny 192.168.2.101 0.0.0.0
R0(config)#access-list 1 permit any
R0(config)#int fa0/1
R0(config-if)#ip access-group 1 out

R0(config-if)#
R0#

Practical 6
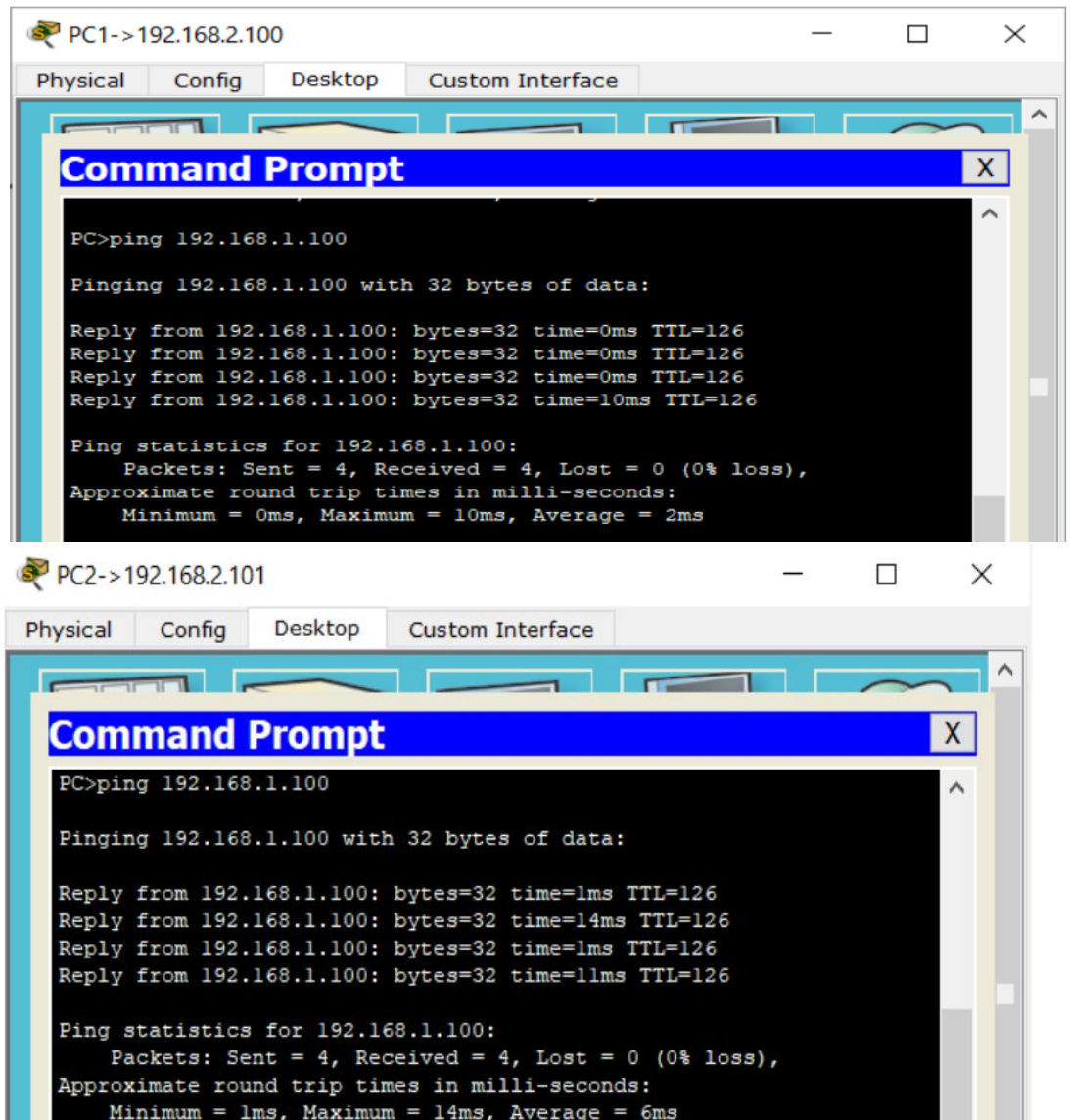**AIM : Implement Extended IPv4 ACLs**
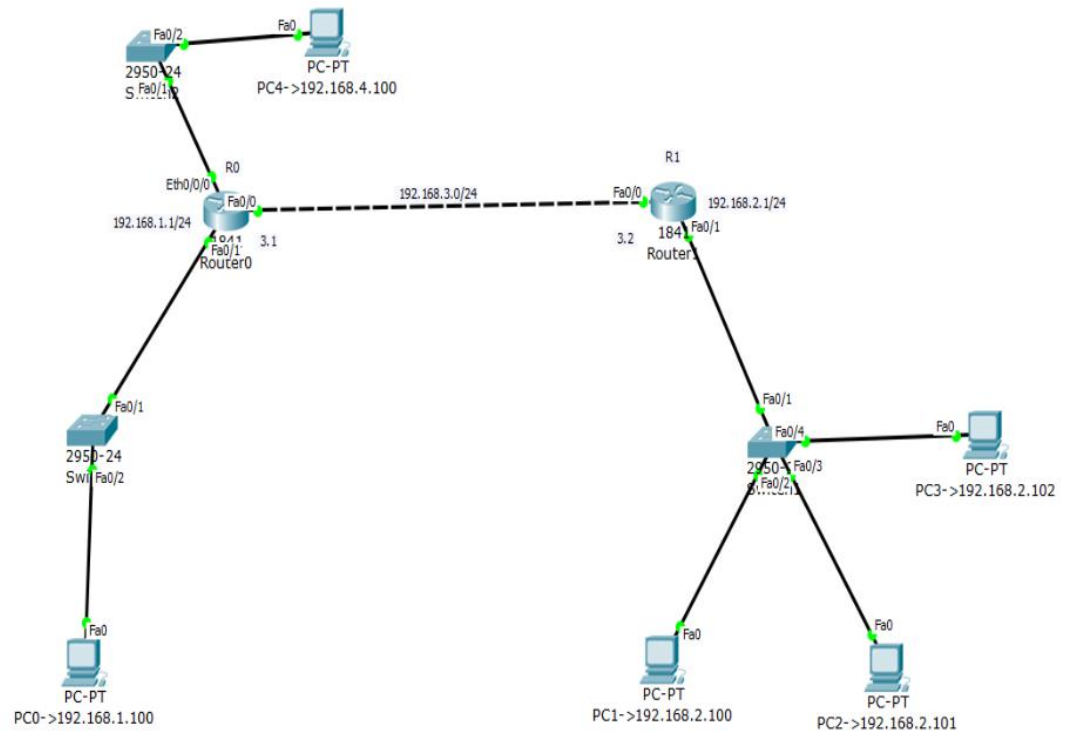
Configure R0
Router>en
Router#conf t
Router(config)#host R0
R0(config)#int fa0/0
R0(config-if)#ip add 192.168.3.1 255.255.255.0
R0(config-if)#no shut
R0(config-if)#exit
R0(config)#int fa0/1
R0(config-if)#ip add 192.168.1.1 255.255.255.0
R0(config-if)#no shut
R0(config-if)#exit
R0(config)#int eth0/0/0
R0(config-if)#ip add 192.168.4.1 255.255.255.0
R0(config-if)#no shut
R0(config-if)#exit

Configure R1
Router>en
Router#conf t
Router(config)#host R1

R1(config)#int fa0/0
R1(config-if)#ip add 192.168.3.2 255.255.255.0
R1(config-if)#no shut
R1(config-if)#exit
R1(config)#int fa0/1
R1(config-if)#ip add 192.168.2.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#exit

Configure static route on R0
R0(config)#ip route 192.168.2.0 255.255.255.0 192.168.3.2
R0(config)#exit
Configure static route on R1
R1(config)#ip route 192.168.1.0 255.255.255.0 192.168.3.1
R1(config)#ip route 192.168.4.0 255.255.255.0 192.168.3.1
R1(config)#exit

Configure access list on R0
R0#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R0(config)#access-list 1 deny host 192.168.2.100
R0(config)#access-list 1 deny host 192.168.2.101
R0(config)#access-list 1 permit any
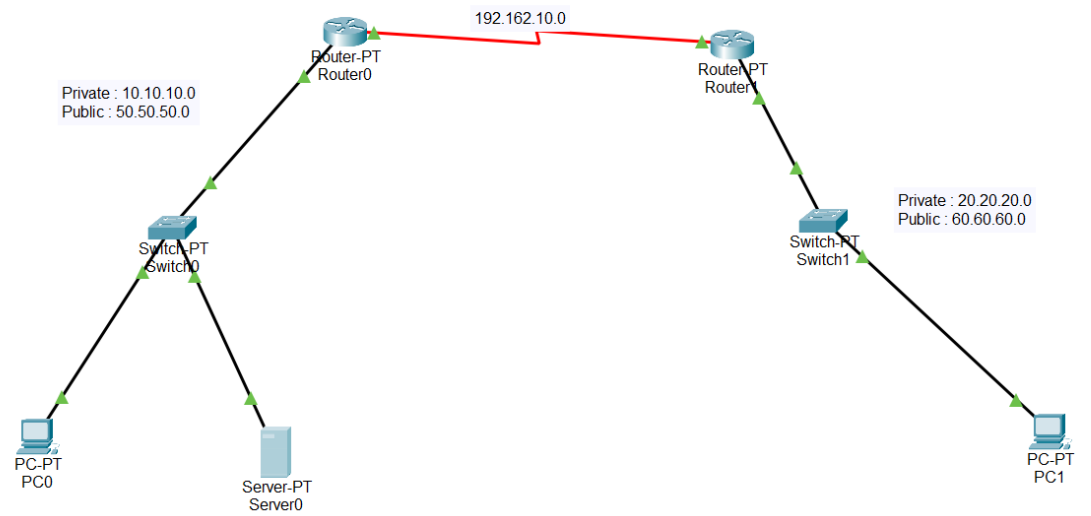R0(config)#int fa0/1
R0(config-if)#ip access-group 1 out

Configure access list on R1
R1#en
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#access-list 100 deny ip 192.168.2.100 0.0.0.0 192.168.1.0 0.0.0.255
R1(config)#access-list 100 permit ip any
R1(config)#int fa0/1
R1(config-if)#ip access-group 100 in

Practical 7
AIM: Implement NAT

Private : 10.10.10.0
Public : 50.50.50.0

192.162.10.0

Private : 20.20.20.0
Public : 60.60.60.0

Router-PT
Router0

Router-PT
Router1

Switch-PT
Switch0

Switch-PT
Switch1

PC-PT
PC0

Server-PT
Server0

PC-PT
PC1

Router0

Physical   Config   CLI   Attributes

GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0

FastEthernet0/0

Port Status   ☑ On
Bandwidth   ○ 100 Mbps ○ 10 Mbps ☑ Auto
Duplex   ○ Half Duplex ● Full Duplex ☑ Auto
MAC Address   00E0.B08A.E90A

IP Configuration
IPv4 Address   10.10.10.1
Subnet Mask   255.0.0.0

Tx Ring Limit   10

Router0

Physical   Config   CLI   Attributes

GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0

Serial2/0

Port Status   ☑ On
Duplex   ○ Full Duplex
Clock Rate   2000000

IP Configuration
IPv4 Address   192.162.10.1
Subnet Mask   255.255.255.0

Tx Ring Limit   10

Router1

Physical Config CLI Attributes

GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0

FastEthernet0/0

Port Status   ☑ On
Bandwidth   ○ 100 Mbps ○ 10 Mbps ☑ Auto
Duplex   ○ Half Duplex ○ Full Duplex ☑ Auto
MAC Address   0050.0F1B.180E

IP Configuration
IPv4 Address   20.20.20.1
Subnet Mask   255.0.0.0

Tx Ring Limit   10

Router1

Physical Config CLI Attributes

GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0

Serial2/0

Port Status   ☑ On
Duplex   ○ Full Duplex
Clock Rate   1200

IP Configuration
IPv4 Address   192.162.10.2
Subnet Mask   255.255.255.0

Tx Ring Limit   10

PC0

Physical Config Desktop Programming Attributes

IP Configuration   X

Interface   FastEthernet0

IP Configuration
○ DHCP   ● Static
IPv4 Address   10.10.10.2
Subnet Mask   255.0.0.0
Default Gateway   10.10.10.1
DNS Server   0.0.0.0

Server0

Physical Config Services Desktop Programming Attributes

IP Configuration   X

IP Configuration
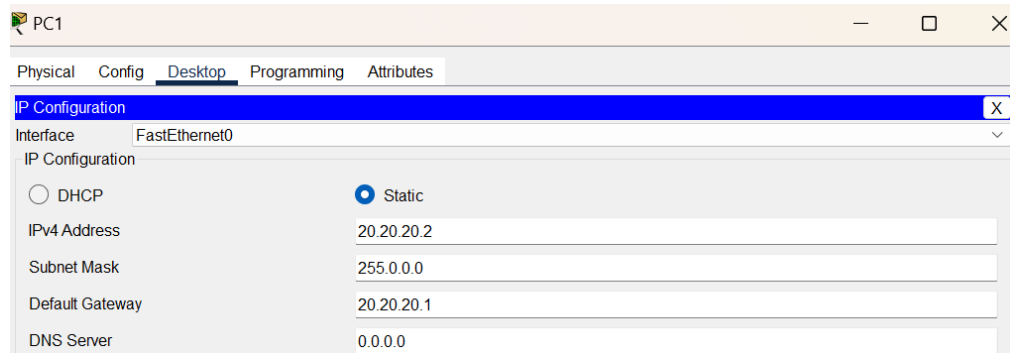○ DHCP   ● Static
IPv4 Address   10.10.10.3
Subnet Mask   255.0.0.0
Default Gateway   10.10.10.1
DNS Server   0.0.0.0

Router R0:
Router # ip nat inside source static 10.10.10.2 50.50.50.2
Router # ip nat inside source static 10.10.10.2 50.50.50.3
Router # interface fa0/0
Router # ip nat inside
Router # exit
Router # interface fa1/0
Router # ip nat inside
Router # exit
Router # interface serial2/0
Router # ip nat outside
Router # exit

Router R1:
Router # ip nat inside source static 20.20.20.2 60.60.60.2
Router # interface fa0/0
Router # ip nat inside
Router # exit
Router # interface serial2/0
Router # ip nat outside
Router # exit

Router R0 with static information:
Router# ip route 60.0.0.0 255.0.0.0 192.162.10.2
Router# exit

Router R1 with static information:
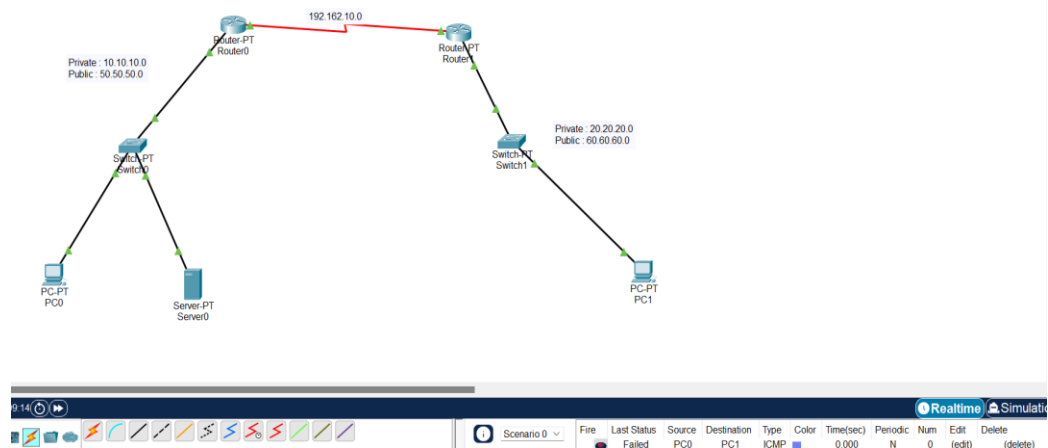Router# ip route 50.0.0.0 255.0.0.0 192.162.10.1
Router# exit

Check ip route Router R0:
Router# show ip route

Check ip route Router R1:
Router# show ip route

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 60.60.60.2

Pinging 60.60.60.2 with 32 bytes of data:

Request timed out.
Reply from 60.60.60.2: bytes=32 time=1ms TTL=126
Reply from 60.60.60.2: bytes=32 time=1ms TTL=126
Reply from 60.60.60.2: bytes=32 time=1ms TTL=126

Ping statistics for 60.60.60.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\>ping 20.20.20.2

Pinging 20.20.20.2 with 32 bytes of data:

Reply from 10.10.10.1: Destination host unreachable.
Request timed out.
Reply from 10.10.10.1: Destination host unreachable.
Reply from 10.10.10.1: Destination host unreachable.

Ping statistics for 20.20.20.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>

```
PC1

Physical    Config    Desktop    Programming    Attributes

Command Prompt

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 50.50.50.2

Pinging 50.50.50.2 with 32 bytes of data:

Reply from 50.50.50.2: bytes=32 time=14ms TTL=126
Reply from 50.50.50.2: bytes=32 time=1ms TTL=126
Reply from 50.50.50.2: bytes=32 time=1ms TTL=126
Reply from 50.50.50.2: bytes=32 time=2ms TTL=126

Ping statistics for 50.50.50.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 14ms, Average = 4ms

C:\>ping 10.10.10.2

Pinging 10.10.10.2 with 32 bytes of data:

Reply from 20.20.20.1: Destination host unreachable.
Reply from 20.20.20.1: Destination host unreachable.
Reply from 20.20.20.1: Destination host unreachable.
Reply from 20.20.20.1: Destination host unreachable.

Ping statistics for 10.10.10.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```
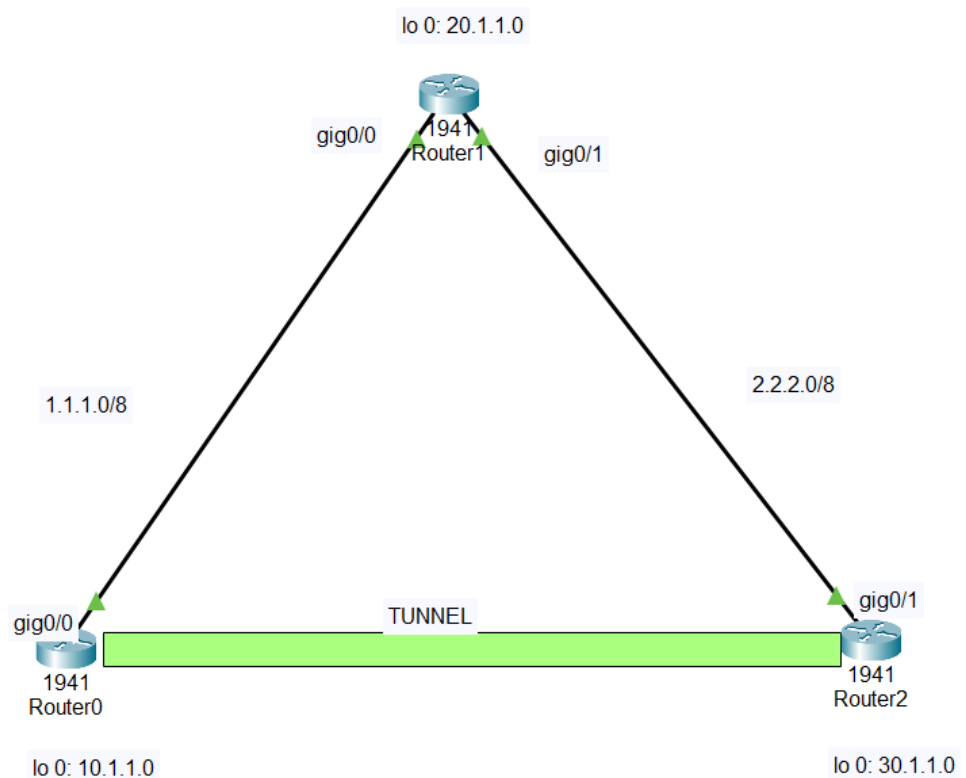
Practical 8
AIM: Implement GRE Tunnel

Configure Router Ro

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int gig0/0
Router(config-if)#ip address 1.1.1.1 255.0.0.0
Router(config-if)#no shut
Router(config-if)#int lo 0
Router(config-if)#ip add 10.1.1.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#

Configure Router R1

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int gig0/0
Router(config-if)#ip add 1.1.1.2 255.0.0.0
Router(config-if)#no shut
Router(config-if)#int gig0/1
Router(config-if)#ip add 2.2.2.1 255.0.0.0
Router(config-if)#no shut
Router(config-if)#int lo 0
Router(config-if)#ip add 20.1.1.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#
Router(config)#hostname ISP

Configure Router R2

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int gig0/1
Router(config-if)#ip add 2.2.2.2 255.0.0.0
Router(config-if)#no shut
Router(config-if)#int lo 0
Router(config-if)#ip add 30.1.1.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#exit

Configure GRE on R0

Router(config-if)#tunnel source gig0/0
Router(config-if)#tunnel destination 2.2.2.2
Router(config-if)#ip add 192.168.13.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#end

Configure GRE on R2
Router(config-if)#tunnel source gig0/1
Router(config-if)#tunnel destination 1.1.1.1
Router(config-if)#ip add 192.168.13.3 255.255.255.0
Router(config-if)#no shut
Router(config-if)#end
Router#

Configure Static route on R0:
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 2.0.0.0 255.0.0.0 1.1.1.2
Router(config)#

Configure Static route on R2:
Router(config)#ip route 1.0.0.0 255.0.0.0 2.2.2.1

Check connectivity from R0:
Router#ping 192.168.13.3
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.13.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/1 ms

Check connectivity from R2:
Router#ping 192.168.13.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.13.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/1 ms