

Institute of Computer Technology

B. Tech Computer Science and Engineering

Sub: Computer Networks

Course Code:-2CSE502

Sem-V(CS)

Class:-A

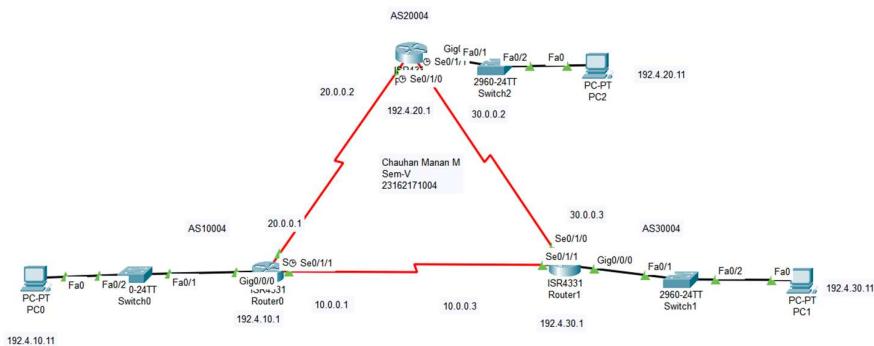
Practical:9

Aim: To design a network using Border Gateway Protocol (BGP).

Scenario:

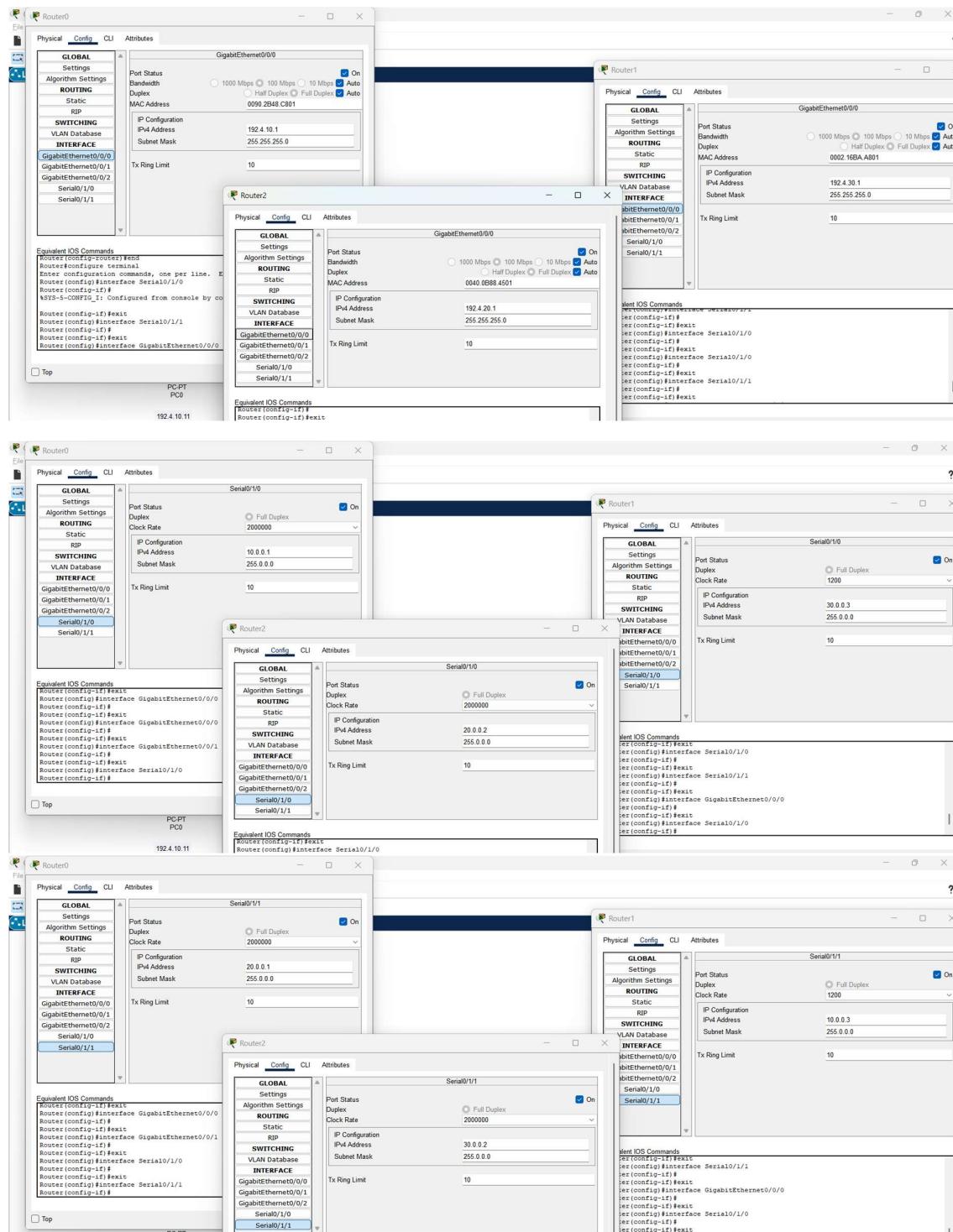
Consider that organization has three departments and as routing protocol Border Gateway Protocol (BGP) is to be implemented. Configure network as shown in figure below and implement Border Gateway Protocol (BGP). Procedure:

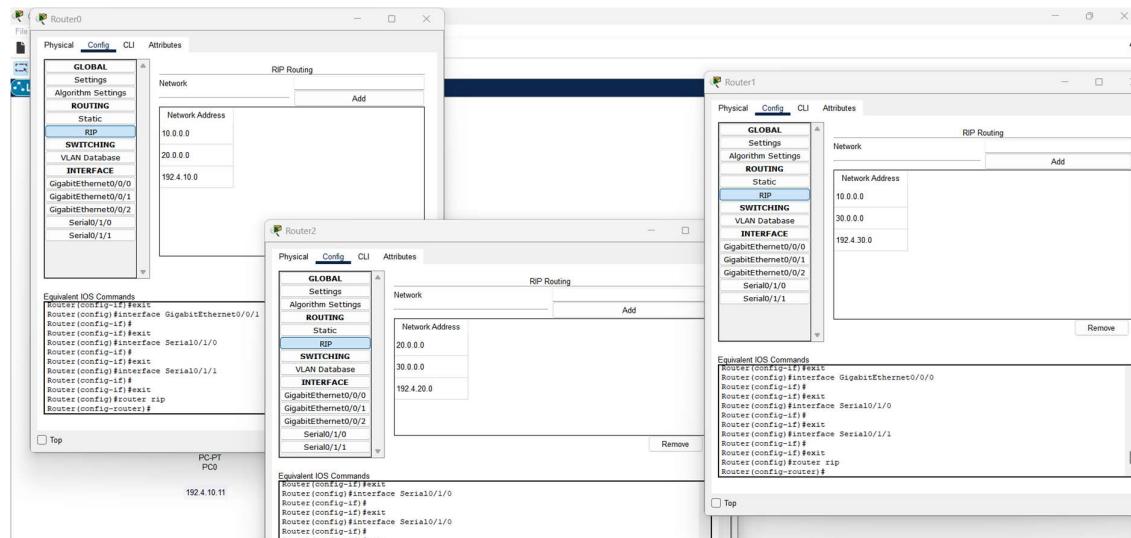
1) Create network as given below:-



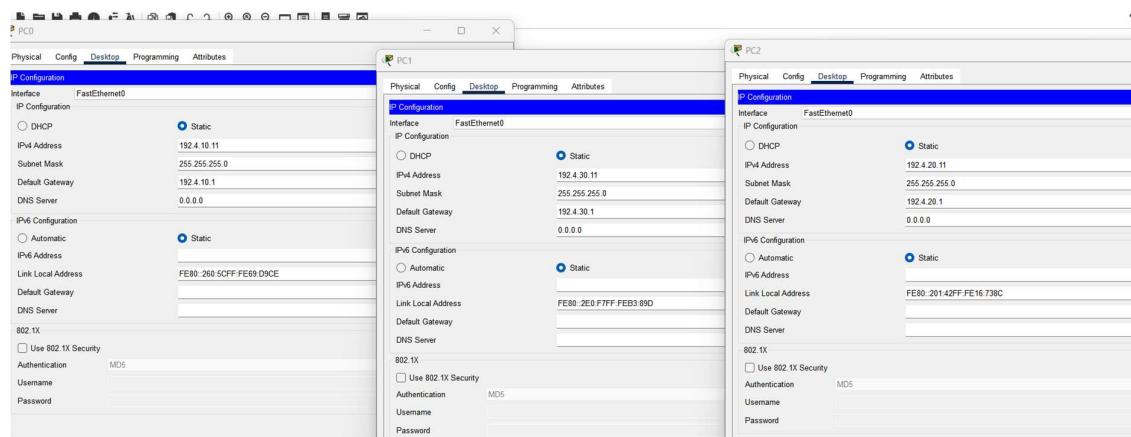
2) Configure IP address (All Devices, Routers)

Routers:-





PC's Configuration:-



3) Configure Border Gateway Protocol (BGP)

Router 0

```
network 192.4.10.0 0.0.0.255 area 0
network 10.0.0.0 0.255.255.255 area 0
network 20.0.0.0 0.255.255.255 area 0
!
router bgp 10004
bgp log-neighbor-changes
no synchronization
neighbor 10.0.0.3 remote-as 30004
neighbor 20.0.0.2 remote-as 20004
network 192.4.10.0
!
router rip
network 10.0.0.0
-----
```

Router 2

```
!
router bgp 20004
bgp log-neighbor-changes
no synchronization
neighbor 20.0.0.1 remote-as 10004
neighbor 30.0.0.3 remote-as 30004
network 192.4.20.0
!
```

Router1

Physical Config **CLI** Attributes

IOS Comm

```
ip address 30.0.0.3 255.0.0.0
!
interface Serial0/1/1
 ip address 10.0.0.3 255.0.0.0
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 log-adjacency-changes
 network 192.4.30.0 0.0.0.255 area 0
 network 10.0.0.0 0.255.255.255 area 0
 network 30.0.0.0 0.255.255.255 area 0
!
router bgp 30004
 bgp log-neighbor-changes
 no synchronization
 neighbor 10.0.0.1 remote-as 10004
 neighbor 30.0.0.2 remote-as 20004
 network 192.4.30.0
!
router rip
 network 10.0.0.0
 network 30.0.0.0
 network 192.4.30.0
!
ip classless
!
ip flow-export version 9
!
```

Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
network 10.0.0.0 0.255.255.255 area 0
network 30.0.0.0 0.255.255.255 area 0
!
router bgp 30004
bgp log-neighbor-changes
no synchronization
neighbor 10.0.0.1 remote-as 10004
neighbor 30.0.0.2 remote-as 20004
!
router rip
network 10.0.0.0
network 30.0.0.0
network 192.4.30.0
!
Router(config-router)#network 192.4.30.0 mask 255.255.255.0
Router(config-router)#{%BGP-5-ADJCHANGE: neighbor 30.0.0.2 Up

Router(config-router)#do show ip route
Codes: L - local, C - connected, S - static, 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        10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C          10.0.0.0/8 is directly connected, Serial0/1/1
L        10.0.0.3/32 is directly connected, Serial0/1/1
O        20.0.0.0/8 [110/128] via 30.0.0.2, 00:19:02, Serial0/1/0
          30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C          30.0.0.0/8 is directly connected, Serial0/1/0
L          30.0.0.3/32 is directly connected, Serial0/1/0
B        192.4.10.0/24 [20/0] via 10.0.0.1, 00:00:00
B        192.4.20.0/24 [20/0] via 30.0.0.2, 00:00:00
          192.4.30.0/24 is variably subnetted, 2 subnets, 2 masks
C          192.4.30.0/24 is directly connected, GigabitEthernet0/0/0
L          192.4.30.1/32 is directly connected, GigabitEthernet0/0/0
--More-- |
```

Router0

Physical Config **CLI** Attributes

IOS Command Line Interface

```
router bgp 10004
bgp log-neighbor-changes
no synchronization
neighbor 10.0.0.3 remote-as 30004
neighbor 20.0.0.2 remote-as 20004
network 192.4.10.0
!
router rip
network 10.0.0.0
network 20.0.0.0
network 192.4.10.0
!
ip classless
!

Router(config-router)#%BGP-5-ADJCHANGE: neighbor 10.0.0.3 Up
%BGP-5-ADJCHANGE: neighbor 20.0.0.2 Up

Router(config-router)#do show ip route
Codes: L - local, C - connected, S - static, 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

      10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        10.0.0.0/8 is directly connected, Serial0/1/0
L        10.0.0.1/32 is directly connected, Serial0/1/0
      20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        20.0.0.0/8 is directly connected, Serial0/1/1
L        20.0.0.1/32 is directly connected, Serial0/1/1
      192.4.10.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.4.10.0/24 is directly connected, GigabitEthernet0/0/0
L        192.4.10.1/32 is directly connected, GigabitEthernet0/0/0
B        192.4.20.0/24 [20/0] via 20.0.0.2, 00:00:00
B        192.4.30.0/24 [20/0] via 10.0.0.3, 00:00:00

Router(config-router)#

```

Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router>
Router>en
Router#router bgp 20004
^
% Invalid input detected at '^' marker.

Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router bgp 20004
Router(config-router)#neighbor 20.0.0.1 remote-as 10004
Router(config-router)%%BGP-5-ADJCHANGE: neighbor 20.0.0.1 Up

Router(config-router)#neighbor 30.0.0.3 remote-as 30004
Router(config-router)%%BGP-5-ADJCHANGE: neighbor 30.0.0.3 Up

Router(config-router)#network 192.4.20.0 mask 255.255.255.0
Router(config-router)#do show ip route
Codes: L - local, C - connected, S - static, 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

O    10.0.0.0/8 [110/128] via 30.0.0.3, 00:19:11, Serial0/1/1
      20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C      20.0.0.0/8 is directly connected, Serial0/1/0
L      20.0.0.2/32 is directly connected, Serial0/1/0
      30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C      30.0.0.0/8 is directly connected, Serial0/1/1
L      30.0.0.2/32 is directly connected, Serial0/1/1
B    192.4.10.0/24 [20/0] via 20.0.0.1, 00:00:00
      192.4.20.0/24 is variably subnetted, 2 subnets, 2 masks
C      192.4.20.0/24 is directly connected, GigabitEthernet0/0/0
L      192.4.20.1/32 is directly connected, GigabitEthernet0/0/0
B    192.4.30.0/24 [20/0] via 30.0.0.3, 00:00:00
--More-- |
```

Conclusion:-

The network was successfully configured using Border Gateway Protocol (BGP). After assigning IP addresses and enabling BGP on all routers, they exchanged routing information across different Autonomous Systems. This demonstrated how BGP is used for inter-domain routing, allowing routers in separate ASes to share reachability information and maintain stable, scalable communication across networks.