

INSTITUTE OF COMPUTER TECHNOLOGY

B-TECH COMPUTER SCIENCE ENGINEERING 2025-26

SUBJECT: COMPUTER NETWORKS

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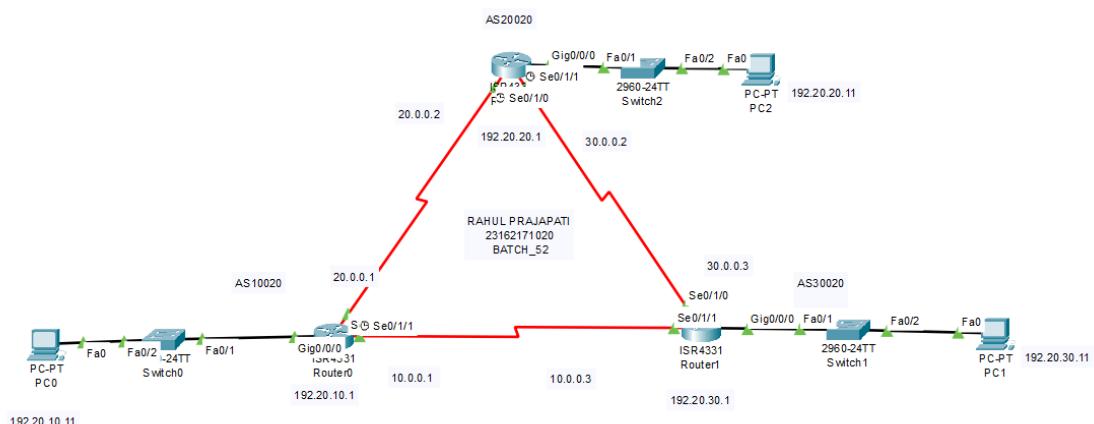
BRANCH: CYBER SECURITY

BATCH: 52

PRACTICAL_09

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

1. NETWORK DESIGN:



2. PCs_IP:

Three windows show the IP configuration for three hosts (PC0, PC1, and PC2) using static IP addresses:

- PC0:** IP Address: 192.20.10.11, Subnet Mask: 255.255.255.0, Default Gateway: 192.20.10.1, DNS Server: 0.0.0.0.
- PC1:** IP Address: 192.20.30.11, Subnet Mask: 255.255.255.0, Default Gateway: 192.20.30.1, DNS Server: 0.0.0.0.
- PC2:** IP Address: 192.20.20.11, Subnet Mask: 255.255.255.0, Default Gateway: 192.20.20.1, DNS Server: 0.0.0.0.

3. ROUTERS_IP_CONFIGURATION:

Router0 Configuration (Config Tab)

Port	Status	Bandwidth	Duplex	MAC Address
GigabitEthernet0/0	On	1000 Mbps	Auto	0010.11C8.8E48
Serial0/1/0	On	100 Mbps	Full Duplex	000B.BEB0.880E
Serial0/1/1	On	100 Mbps	Full Duplex	0001.4365.513B

Router1 Configuration (Config Tab)

Port	Status	Bandwidth	Duplex	MAC Address
GigabitEthernet0/0	On	1000 Mbps	Auto	0010.11C8.8E48
Serial0/1/0	On	100 Mbps	Full Duplex	000B.BEB0.880E
Serial0/1/1	On	100 Mbps	Full Duplex	0001.4365.513B

Router2 Configuration (Config Tab)

Port	Status	Bandwidth	Duplex	MAC Address
GigabitEthernet0/0	On	1000 Mbps	Auto	0010.11C8.8E48
Serial0/1/0	On	100 Mbps	Full Duplex	000B.BEB0.880E
Serial0/1/1	On	100 Mbps	Full Duplex	0001.4365.513B

Equivalent IOS Commands

```

Router0# config terminal
Router0(config)# interface gigabitethernet0/0
Router0(config-if)# ip address 192.20.10.1 255.255.255.0
Router0(config-if)# end
Router0# config terminal
Router0(config)# interface serial0/1/0
Router0(config-if)# ip address 192.20.10.1 255.255.255.0
Router0(config-if)# end
Router0# config terminal
Router0(config)# interface serial0/1/1
Router0(config-if)# ip address 192.20.10.1 255.255.255.0
Router0(config-if)# end

Router1# config terminal
Router1(config)# interface gigabitethernet0/0
Router1(config-if)# ip address 192.20.30.1 255.255.255.0
Router1(config-if)# end
Router1# config terminal
Router1(config)# interface serial0/1/0
Router1(config-if)# ip address 192.20.30.1 255.255.255.0
Router1(config-if)# end
Router1# config terminal
Router1(config)# interface serial0/1/1
Router1(config-if)# ip address 192.20.30.1 255.255.255.0
Router1(config-if)# end

Router2# config terminal
Router2(config)# interface gigabitethernet0/0
Router2(config-if)# ip address 192.20.20.1 255.255.255.0
Router2(config-if)# end
Router2# config terminal
Router2(config)# interface serial0/1/0
Router2(config-if)# ip address 192.20.20.1 255.255.255.0
Router2(config-if)# end
Router2# config terminal
Router2(config)# interface serial0/1/1
Router2(config-if)# ip address 192.20.20.1 255.255.255.0
Router2(config-if)# end

```


Router0 Configuration (Config Tab)

Port	Status	Duplex	Clock Rate
Serial0/1/0	On	Full Duplex	2000000
Serial0/1/1	On	Full Duplex	2000000

Router1 Configuration (Config Tab)

Port	Status	Duplex	Clock Rate
Serial0/1/0	On	Full Duplex	1200
Serial0/1/1	On	Full Duplex	1200

Router2 Configuration (Config Tab)

Port	Status	Duplex	Clock Rate
Serial0/1/0	On	Full Duplex	2000000
Serial0/1/1	On	Full Duplex	2000000

Equivalent IOS Commands

```

Router0# config terminal
Router0(config)# interface serial0/1/0
Router0(config-if)# ip address 10.0.0.1 255.0.0.0
Router0(config-if)# end
Router0# config terminal
Router0(config)# interface serial0/1/1
Router0(config-if)# ip address 10.0.0.1 255.0.0.0
Router0(config-if)# end

Router1# config terminal
Router1(config)# interface serial0/1/0
Router1(config-if)# ip address 10.0.0.3 255.0.0.0
Router1(config-if)# end
Router1# config terminal
Router1(config)# interface serial0/1/1
Router1(config-if)# ip address 10.0.0.3 255.0.0.0
Router1(config-if)# end

Router2# config terminal
Router2(config)# interface serial0/1/0
Router2(config-if)# ip address 10.0.0.2 255.0.0.0
Router2(config-if)# end
Router2# config terminal
Router2(config)# interface serial0/1/1
Router2(config-if)# ip address 10.0.0.2 255.0.0.0
Router2(config-if)# end

```


Router0 Configuration (Config Tab)

Port	Status	Duplex	Clock Rate
Serial0/1/1	On	Full Duplex	2000000

Router1 Configuration (Config Tab)

Port	Status	Duplex	Clock Rate
Serial0/1/1	On	Full Duplex	1200

Router2 Configuration (Config Tab)

Port	Status	Duplex	Clock Rate
Serial0/1/1	On	Full Duplex	2000000

Equivalent IOS Commands

```

Router0# config terminal
Router0(config)# interface serial0/1/1
Router0(config-if)# ip address 20.0.0.1 255.0.0.0
Router0(config-if)# end

Router1# config terminal
Router1(config)# interface serial0/1/1
Router1(config-if)# ip address 20.0.0.3 255.0.0.0
Router1(config-if)# end

Router2# config terminal
Router2(config)# interface serial0/1/1
Router2(config-if)# ip address 20.0.0.2 255.0.0.0
Router2(config-if)# end

```

4. IP_ROUTE & CONFIGURATION:

A. ROUTER_1:

```
Router1
Physical Config CLI Attributes
IOS Command Line Interface
Router>
Router>enable
Router#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router bgp 30020
Router(config-router)#neighbor 30.0.0.2 remote-as 20020
Router(config-router)#{%BGP-5-ADJCHANGE: neighbor 30.0.0.2 Up

Router(config-router)#neighbor 10.0.0.1 remote-as 10020
Router(config-router)#network 192.20.30.0 mask 255.255.255.0
Router(config-router)#do show ip route
```

```
Router1
Physical Config CLI Attributes
IOS Command Line Interface
!
router bgp 30020
  bgp log-neighbor-changes
  no synchronization
  neighbor 30.0.0.2 remote-as 20020
  neighbor 10.0.0.1 remote-as 10020
  network 192.20.30.0
!
ip classless
```

```
Router1
Physical Config CLI Attributes
IOS Command Line Interface
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, Serial0/1/1
L        10.0.0.3/32 is directly connected, Serial0/1/1
      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        192.20.20.0/24 [20/0] via 30.0.0.2, 00:00:00
      192.20.30.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.20.30.0/24 is directly connected, GigabitEthernet0/0/0
L        192.20.30.1/32 is directly connected, GigabitEthernet0/0/0
```

A. ROUTER_0:

Router0

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router>enable
Router#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router bgp 10020
Router(config-router)#neighbor 10.0.0.3 remote-as 30020
Router(config-router)#neighbor 20.0.0.2 remote-as 20020
Router(config-router)#network 192.20.10.0 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
```

Router0

Physical Config **CLI** Attributes

IOS Command Line Interface

```
!
router bgp 10020
bgp log-neighbor-changes
no synchronization
neighbor 10.0.0.3 remote-as 30020
neighbor 20.0.0.2 remote-as 20020
network 192.20.10.0
!
ip classless
```

Router0

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router(config)#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
      192.20.10.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.20.10.0/24 is directly connected, GigabitEthernet0/0/0
L        192.20.10.1/32 is directly connected, GigabitEthernet0/0/0
```

A. ROUTER_2:

Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router>enable
Router#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router bgp 20020
Router(config-router)#neighbor 20.0.0.1 remote-as 10020
Router(config-router)#neighbor 30.0.0.3 remote-as 30020
Router(config-router)#network 192.20.20.0 mask 255.255.255.0
Router(config-router)#do show ip route
```

Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
no ip address
shutdown
!
router bgp 20020
bgp log-neighbor-changes
no synchronization
neighbor 20.0.0.1 remote-as 10020
neighbor 30.0.0.3 remote-as 30020
network 192.20.20.0
```

Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
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

      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
      192.20.20.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.20.20.0/24 is directly connected, GigabitEthernet0/0/0
L        192.20.20.1/32 is directly connected, GigabitEthernet0/0/0
B        192.20.30.0/24 [20/0] via 30.0.0.3, 00:00:00
```

Conclusion:

BGP was successfully configured. After assigning IP addresses and enabling BGP on all routers, they exchanged routing information between different Autonomous Systems. This confirmed that BGP supports inter-domain routing and helps maintain stable and scalable communication across networks.