# BGP Dynamic Routing Protocol

**🎯 Objective:**

Configure and verify **eBGP (External BGP)** routing between four autonomous systems to exchange routing information between different networks.

**🖧 Network Topology:**

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AI-generated content may be incorrect.

**📋 IP Addressing Table:**

| **Router** | **Interface** | **IP Address** | **Subnet Mask** | **Connected Network** | **AS Number** |
| --- | --- | --- | --- | --- | --- |
| R1 | Fa0/0 | 192.168.10.1 | 255.255.255.0 | 192.168.10.0 | 100 |
| R1 | Loopback 0 | 10.10.10.1 | 255.255.255.0 | 10.10.10.0 | 100 |
| R2 | Fa0/1 | 192.168.20.1 | 255.255.255.0 | 192.168.20.0 | 200 |
| R2 | Fa0/0 | 192.168.10.2 | 255.255.255.0 | 192.168.10.2 | 200 |
| R3 | Fa0/1 | 192.168.30.1 | 255.255.255.0 | 192.168.30.0 | 300 |
| R3 | Fa0/0 | 192.168.20.2 | 255.255.255.0 | 192.168.20.0 | 300 |
| R4 | Fa0/0 | 192.168.30.2 | 255.255.255.0 | 192.168.30.0 | 400 |
| R4 | Loopback 0 | 20.20.20.1 | 255.255.255.0 | 20.20.20.0 | 400 |

**🔧 Router Configuration**

**🔹 CLI on Router1 (R1):**

R1> enable

R1# configure terminal

R1(config)# interface FastEthernet0/0

R1(config-if)# ip address 192.168.10.1 255.255.255.0

R1(config-if)# no shutdown

R1(config-if)# exit

R1(config)# interface loopback 0

R1(config-if)# ip address 10.10.10.1 255.255.255.0

R1(config-if)# no shutdown

R1(config-if)# exit

R1(config)# router bgp 100

R1(config-router)# neighbor 192.168.10.2 remote-as 200

R1(config-router)# network 192.168.10.0 mask 255.255.255.0

R1(config-router)# network 10.10.10.0 mask 255.255.255.0

R1(config-router)# exit

R1(config)# exit

R1# write memory

**🔹 CLI on Router2 (R2):**

R2> enable

R2# configure terminal

R2(config)# interface FastEthernet0/0

R2(config-if)# ip address 192.168.10.2 255.255.255.0

R2(config-if)# no shutdown

R2(config-if)# exit

R2(config)# interface FastEthernet0/1

R2(config-if)# ip address 192.168.20.1 255.255.255.0

R2(config-if)# no shutdown

R2(config-if)# exit

R2(config)# router bgp 200

R2(config-router)# neighbor 192.168.10.1 remote-as 100

R2(config-router)# neighbor 192.168.20.2 remote-as 300

R2(config-router)# network 192.168.10.0 mask 255.255.255.0

R2(config-router)# network 192.168.20.0 mask 255.255.255.0

R2(config-router)# exit

R2(config)# exit

R2# write memory

**🔹 CLI on Router3 (R3):**

R3> enable

R3# configure terminal

R3(config)# interface FastEthernet0/0

R3(config-if)# ip address 192.168.20.2 255.255.255.0

R3(config-if)# no shutdown

R3(config-if)# exit

R3(config)# interface FastEthernet0/1

R3(config-if)# ip address 192.168.30.1 255.255.255.0

R3(config-if)# no shutdown

R3(config-if)# exit

R3(config)# router bgp 300

R3(config-router)# neighbor 192.168.20.1 remote-as 200

R3(config-router)# neighbor 192.168.30.2 remote-as 400

R3(config-router)# network 192.168.20.0 mask 255.255.255.0

R3(config-router)# network 192.168.30.0 mask 255.255.255.0

R3(config-router)# exit

R3(config)# exit

R3# write memory

**🔹 CLI on Router4 (R4):**

R4> enable

R4# configure terminal

R4(config)# interface FastEthernet0/0

R4(config-if)# ip address 192.168.34.2 255.255.255.0

R4(config-if)# no shutdown

R4(config-if)# exit

R4(config)# interface loopback 0

R4(config-if)# ip address 20.20.20.1 255.255.255.0

R4(config-if)# no shutdown

R4(config-if)# exit

R4(config)# router bgp 400

R4(config-router)# neighbor 192.168.30.1 remote-as 300

R4(config-router)# network 20.20.20.0 mask 255.255.255.0

R4(config-router)# network 192.168.30.0 mask 255.255.255.0

R4(config-router)# exit

R4(config)# exit

R4# write memory

**🔎 Verification Commands & Sample Output**

**✅ 1. Check BGP Neighbors**

R2# show ip bgp summary

**Sample Output:**

BGP router identifier 192.168.20.1, local AS number 200

Neighbor V AS MsgRcvd MsgSent TblVer InQ OutQ Up/Down State/PfxRcd

192.168.10.1 4 100 28 25 8 0 0 00:23:24 4

192.168.20.2 4 300 29 24 8 0 0 00:22:11 4

**✅ 2. Check BGP Routing Table**

R3# show ip bgp

**Sample Output:**

BGP table version is 8, local router ID is 192.168.30.1

Status codes: s suppressed, d damped, h history, \* valid, > best, i - internal,

r RIB-failure, S Stale

Origin codes: i - IGP, e - EGP, ? - incomplete

Network Next Hop Metric LocPrf Weight Path

\*> 10.10.10.0/24 192.168.20.1 0 0 0 200 100 i

\*> 20.20.20.0/24 192.168.30.2 0 0 0 400 i

\*> 192.168.10.0/24 192.168.20.1 0 0 0 200 i

\* 192.168.20.0/24 192.168.20.1 0 0 0 200 i

\*> 0.0.0.0 0 0 32768 i

\*> 192.168.30.0/24 0.0.0.0 0 0 32768 i

\* 192.168.30.2 0 0 0 400 i

**✅ 3. Check IP Routing Table**

R1# show ip route bgp

**Sample Output:**

B 20.20.20.0 [20/0] via 192.168.10.2, 00:00:00

B 192.168.20.0/24 [20/0] via 192.168.10.2, 00:00:00

B 192.168.30.0/24 [20/0] via 192.168.10.2, 00:00:00

**🛠️ Troubleshooting Tips**

|  |  |  |
| --- | --- | --- |
| Problem | Cause | Solution |
| Neighbor not established | AS mismatch | Verify remote-as command |
| BGP routes not seen | No network statement | Add network <ip> mask <mask> in BGP |
| State stuck in Idle | Layer 1 issue | Ensure interfaces are up (no shutdown) |
| Routes not advertised | Missing network command | Use show ip bgp to confirm |
| Loop prevention issues | iBGP confusion | Use next-hop-self for iBGP, not needed here (eBGP) |