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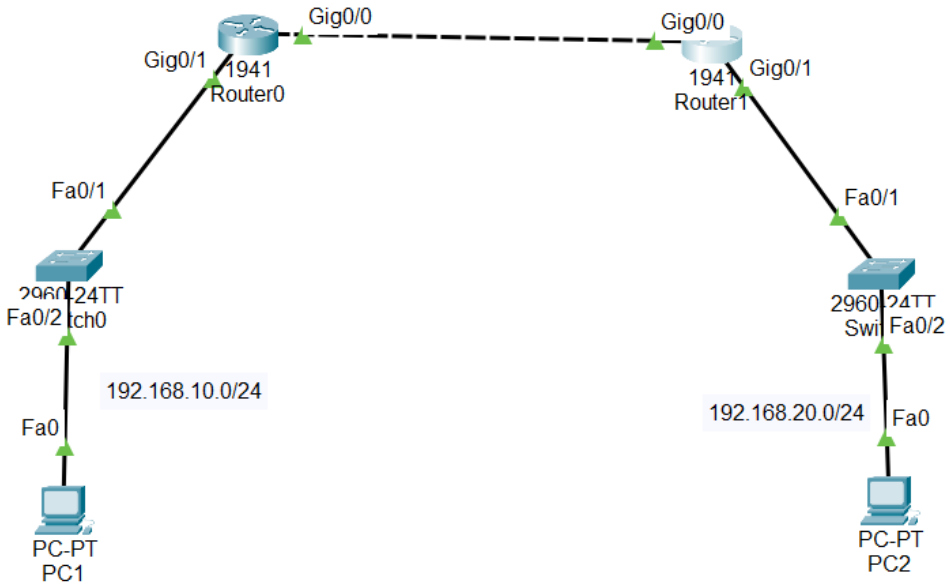
Kelas : MI3A

OSPF & BGP Dynamic Routing

PERCOBAAN 2

- OSPF



1. Buat Topologi Seperti Gambar diatas

2. Buat Pengalamat di PC

No	Nama Device	Alamat	Gateway	Netmask
1	PC1	192.168.10.2	192.168.10.1	255.255.255.0
2	PC2	192.168.20.2	192.168.20.1	255.255.255.0

3. Konfigurasi IP address pada router0

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int gig0/1
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

Router(config-if)#exit
Router(config)#int gig0/0
Router(config-if)#ip add 10.10.10.1 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

Router(config)#hostname Router0_09010182327008
Router0_09010182327008(config)#
```

4. Konfigurasi IP Address pada router1

```
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 192.168.20.1 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

Router(config-if)#exit
Router(config)#gig0/0
               ^
% Invalid input detected at '^' marker.

Router(config)#int gig0/0
Router(config-if)#ip add 10.10.10.2 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#hostname Router1_09010182327008
Router1_09010182327008(config)#
```

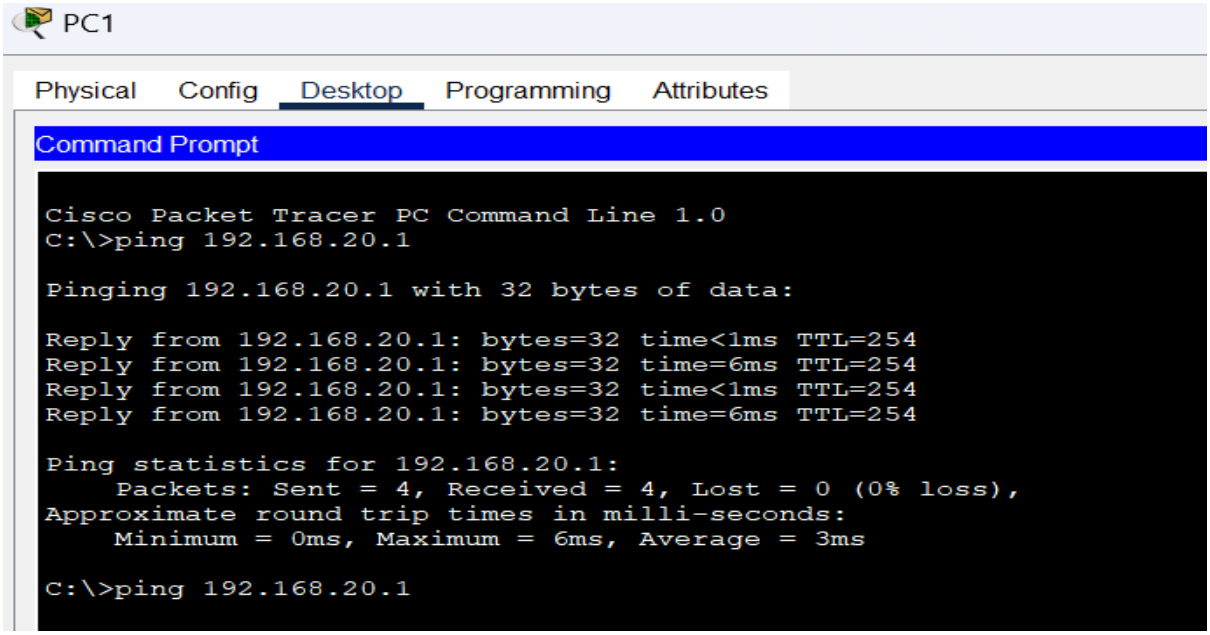
5. Konfigurasi Routing OSPF pada router0

```
Router(config)#hostname Router0_09010182327008
Router0_09010182327008(config)#router ospf 10
Router0_09010182327008(config-router)#network 192.168.10.0 0.0.0.255 area 0
Router0_09010182327008(config-router)#network 10.10.10.0 0.0.0.255 area 0
Router0_09010182327008(config-router)#
```

6. Konfigurasi Routing OSPF pada router1

```
Router1_09010182327008(config)#router ospf 10
Router1_09010182327008(config-router)#network 192.168.20.0 0.0.0.255 area 0
Router1_09010182327008(config-router)#network 10.10.10.0 0.0.0.255 area 0
Router1_09010182327008(config-router)#
```

7. Ping ke masing-masing PC untuk memeriksa koneksi



Show IP Route

```
Router0_09010182327008>en
Router0_09010182327008#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       10.10.10.0/24 is directly connected, GigabitEthernet0/0
L       10.10.10.1/32 is directly connected, GigabitEthernet0/0
     192.168.10.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.10.0/24 is directly connected, GigabitEthernet0/1
L       192.168.10.1/32 is directly connected, GigabitEthernet0/1
O    192.168.20.0/24 [110/2] via 10.10.10.2, 00:08:46, GigabitEthernet0/0

Router1_09010182327008>en
Router1_09010182327008#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       10.10.10.0/24 is directly connected, GigabitEthernet0/0
L       10.10.10.2/32 is directly connected, GigabitEthernet0/0
O    192.168.10.0/24 [110/2] via 10.10.10.1, 00:09:19, GigabitEthernet0/0
     192.168.20.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.20.0/24 is directly connected, GigabitEthernet0/1
L       192.168.20.1/32 is directly connected, GigabitEthernet0/1
```

PERCOBAAN 2

- BGP

1. Buat Topologi Seperti Gambar diatas

2. Buat Pengalamat di PC

No	Nama Device	Alamat	Gateway	Netmask
1	PC1	192.168.10.2	192.168.10.1	255.255.255.0
2	PC2	192.168.20.2	192.168.20.1	255.255.255.0
3	PC3	192.168.30.2	192.168.20.1	255.255.255.0

3. Konfigurasi IP Address pada Router A

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname routerA_09010182327008
routerA_09010182327008(config)#int gi0/0
routerA_09010182327008(config-if)#ip address 10.10.10.1 255.255.255.0
routerA_09010182327008(config-if)#no sh

routerA_09010182327008(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

routerA_09010182327008(config-if)#ex
routerA_09010182327008(config)#int gi0/1
routerA_09010182327008(config-if)#ip add 192.168.10.1 255.255.255.0
routerA_09010182327008(config-if)#no sh

routerA_09010182327008(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

routerA_09010182327008(config-if)#ex
routerA_09010182327008(config)#
```

4. Konfigurasi BGP pada Router A

```
routerA_09010182327008(config)#router bgp 10
routerA_09010182327008(config-router)#neighbor 10.10.10.2 remote-as 20
routerA_09010182327008(config-router)#network 10.10.10.0 mask 255.255.255.0
routerA_09010182327008(config-router)#network 192.168.10.0 mask 255.255.255.0
routerA_09010182327008(config-router)#ex
routerA 09010182327008(config)#ex
```

5. Konfigurasi IP Address pada Router B

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname RouterB_09010182327008
RouterB_09010182327008(config)#int gi0/0
RouterB_09010182327008(config-if)#ip add 10.10.10.2 255.255.255.0
RouterB_09010182327008(config-if)#no sh

RouterB_09010182327008(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

RouterB_09010182327008(config-if)#ex
RouterB_09010182327008(config)#int gi0/1
RouterB_09010182327008(config-if)#ip add 10.10.20.1 255.255.255.0
RouterB_09010182327008(config-if)#no sh

RouterB_09010182327008(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

RouterB_09010182327008(config-if)#ex
RouterB_09010182327008(config)#int gi0/2
RouterB_09010182327008(config-if)#ip add 192.168.20.1 255.255.255.0
RouterB_09010182327008(config-if)#no sh

RouterB_09010182327008(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to up

RouterB_09010182327008(config-if)#ex
RouterB_09010182327008(config)#
```

6. Konfigurasi BGP pada Router B

```
RouterB_09010182327008(config-if)#ex
RouterB_09010182327008(config)#router bgp 20
RouterB_09010182327008(config-router)#neighbor 10.10.10.1 remote-as 10
RouterB_09010182327008(config-router)#%BGP-5-ADJCHANGE: neighbor 10.10.10.1 Up

RouterB_09010182327008(config-router)#neighbor 10.10.20.2 remote-as 30
RouterB_09010182327008(config-router)#network 10.10.10.0 mask 255.255.255.0
RouterB_09010182327008(config-router)#network 10.10.20.0 mask 255.255.255.0
RouterB_09010182327008(config-router)#network 192.168.20.0 mask 255.255.255.0
RouterB_09010182327008(config-router)#ex
```

7. Konfigurasi IP Address pada Router C

```
Router(config)#hostname routerC_09010182327008
routerC_09010182327008(config)#int gi0/0
routerC_09010182327008(config-if)#ip add 10.10.20.2 255.255.255.0
routerC_09010182327008(config-if)#%BGP-4-NORTRID: BGP could not pick a router-id. Please
configure manually.

routerC_09010182327008(config-if)#no sh

routerC_09010182327008(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
%BGP-5-ADJCHANGE: neighbor 10.10.20.1 Up

routerC_09010182327008(config-if)#ex
routerC_09010182327008(config)#int gi0/0
routerC_09010182327008(config-if)#ip add 192.168.30.1 255.255.255.0
routerC_09010182327008(config-if)#
%BGP-3-NOTIFICATION: sent to neighbor 10.10.20.1 6/0 (unsupported) 0 bytes

routerC_09010182327008(config-if)#no sh
routerC_09010182327008(config-if)#ex
routerC_09010182327008(config)#
```

8. Konfigurasi BGP pada Router C

```
RouterC_09010182327008(config-if)#ex
RouterC_09010182327008(config)#router bgp 30
RouterC_09010182327008(config-router)#neighbor 10.10.20.1 remote-as 20
RouterC_09010182327008(config-router)#%BGP-5-ADJCHANGE: neighbor 10.10.20.1 Up

RouterC_09010182327008(config-router)#network 10.10.20.0 mask 255.255.255.0
RouterC_09010182327008(config-router)#network 192.168.30.0 mask 255.255.255.0
RouterC_09010182327008(config-router)#
```

9. Ping ke masing-masing PC untuk memeriksa koneksi

Ping A ke B dan C

```
C:\>ping 192.168.20.2

Pinging 192.168.20.2 with 32 bytes of data:

Reply from 192.168.20.2: bytes=32 time<1ms TTL=126
Reply from 192.168.20.2: bytes=32 time<1ms TTL=126
Reply from 192.168.20.2: bytes=32 time<1ms TTL=126
Reply from 192.168.20.2: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.20.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.30.2

Pinging 192.168.30.2 with 32 bytes of data:

Reply from 192.168.30.2: bytes=32 time<1ms TTL=125
Reply from 192.168.30.2: bytes=32 time<1ms TTL=125
Reply from 192.168.30.2: bytes=32 time<1ms TTL=125
Reply from 192.168.30.2: bytes=32 time<1ms TTL=125

Ping statistics for 192.168.30.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

Ping B ke A dan C

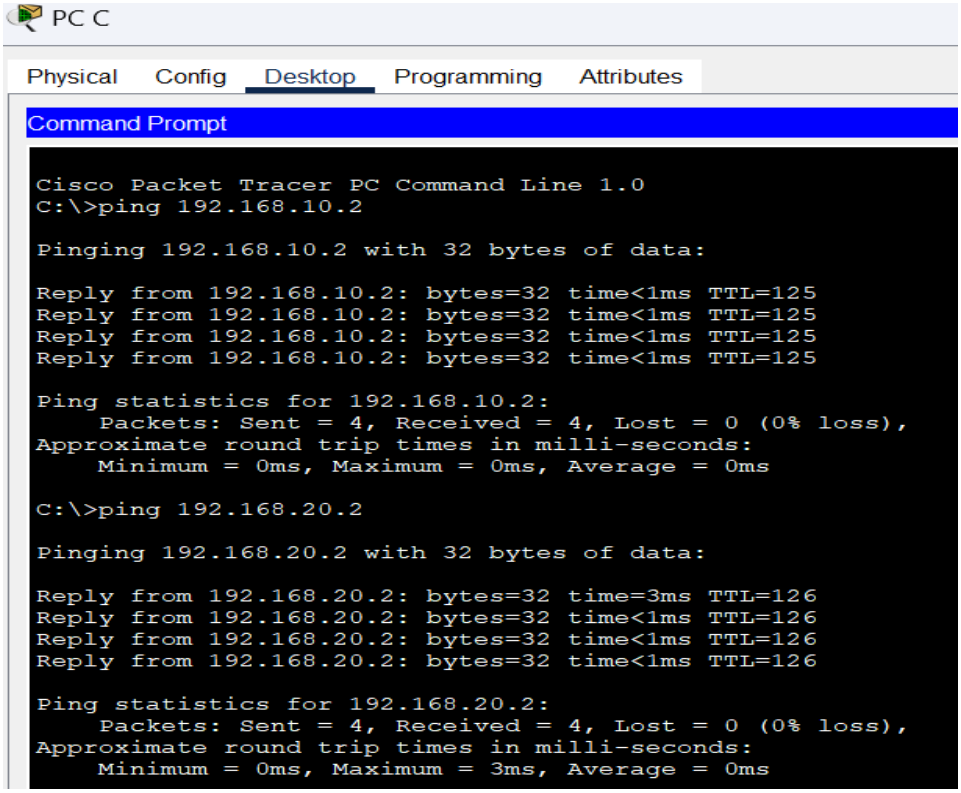
PC B

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.10.2

Pinging 192.168.10.2 with 32 bytes of data:

Reply from 192.168.10.2: bytes=32 time<1ms TTL=126
Reply from 192.168.10.2: bytes=32 time=1ms TTL=126
Reply from 192.168.10.2: bytes=32 time<1ms TTL=126
Reply from 192.168.10.2: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.10.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 192.168.30.2

Pinging 192.168.30.2 with 32 bytes of data:

Reply from 192.168.30.2: bytes=32 time<1ms TTL=126
Reply from 192.168.30.2: bytes=32 time<1ms TTL=126
Reply from 192.168.30.2: bytes=32 time=1ms TTL=126
Reply from 192.168.30.2: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.30.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

Ping C ke A dan B



Show IP Route

```
RouterA_09010182327008>en
RouterA_09010182327008#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, 3 subnets, 2 masks
C       10.10.10.0/24 is directly connected, GigabitEthernet0/0
L       10.10.10.1/32 is directly connected, GigabitEthernet0/0
B       10.10.20.0/24 [20/0] via 10.10.10.2, 00:00:00
     192.168.10.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.10.0/24 is directly connected, GigabitEthernet0/1
L       192.168.10.1/32 is directly connected, GigabitEthernet0/1
B    192.168.20.0/24 [20/0] via 10.10.10.2, 00:00:00
B    192.168.30.0/24 [20/0] via 10.10.10.2, 00:00:00
```

```
RouterB_09010182327008>en
RouterB_09010182327008#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, 4 subnets, 2 masks
C       10.10.10.0/24 is directly connected, GigabitEthernet0/0
L       10.10.10.2/32 is directly connected, GigabitEthernet0/0
C       10.10.20.0/24 is directly connected, GigabitEthernet0/1
L       10.10.20.1/32 is directly connected, GigabitEthernet0/1
B    192.168.10.0/24 [20/0] via 10.10.10.1, 00:00:00
     192.168.20.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.20.0/24 is directly connected, GigabitEthernet0/2
L       192.168.20.1/32 is directly connected, GigabitEthernet0/2
B    192.168.30.0/24 [20/0] via 10.10.20.2, 00:00:00


RouterC_09010182327008#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, 3 subnets, 2 masks
B       10.10.10.0/24 [20/0] via 10.10.20.1, 00:00:00
C       10.10.20.0/24 is directly connected, GigabitEthernet0/0
L       10.10.20.2/32 is directly connected, GigabitEthernet0/0
B    192.168.10.0/24 [20/0] via 10.10.20.1, 00:00:00
B    192.168.20.0/24 [20/0] via 10.10.20.1, 00:00:00
     192.168.30.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.30.0/24 is directly connected, GigabitEthernet0/1
L       192.168.30.1/32 is directly connected, GigabitEthernet0/1
```

Hasil Praktikum

Pada praktikum ini, kita berhasil melakukan konfigurasi topologi jaringan OSPF dan BGP. Dan Uji koneksi yang kita lakukan perintah ping antara berhasil dilakukan dan berfungsi dengan baik.

Analisis Praktikum

Pada percobaan pertama, konfigurasi OSPF menentukan jalur terbaik bagi pengiriman paket data antar router. Sebagai protokol routing link-state, OSPF memungkinkan setiap router di jaringan untuk mengetahui topologi lengkap dari jaringan tersebut. Dibandingkan dengan protokol berbasis *distance-vector* (seperti RIP), OSPF memiliki konvergensi lebih cepat karena pembaruan langsung diteruskan ke semua router saat ada perubahan. Secara keseluruhan, OSPF sangat fleksibel, efisien, dan dapat diskalakan, sehingga cocok untuk digunakan dalam jaringan yang kompleks dan besar.

Pada percobaan keuda dapat dilihat protokol BGP adalah salah satu protokol routing dinamis yang berbasis *path-vector* yang digunakan untuk pertukaran informasi routing antar jaringan otonom (Autonomous System/AS). Kelebihan dari protokol BGP itu dirancang untuk menangani jaringan besar dengan ribuan prefiks, seperti yang ditemukan di internet global dan lebih stabil karena BGP tidak sering memperbarui tabel routing (dibandingkan dengan protokol routing dinamis lainnya), sehingga lebih stabil di lingkungan besar.

Kesimpulan

OSPF adalah sebuah routing protocol yang digunakan dalam jaringan IP untuk menentukan jalur terbaik bagi pengiriman paket data antar router. OSPF memiliki Konvergensi cepat dalam lingkungan internal dan dengan desain jaringan hierarkis, jaringan OSPF dapat mengurangi kompleksitas dan meningkatkan efisiensi sehingga cocok untuk jaringan internal (LAN/WAN) di dalam satu domain otonom yang memerlukan efisiensi jalur berdasarkan metrik tertentu.

Border Gateway Protocol (BGP) adalah salah satu protokol routing dinamis yang digunakan untuk menghubungkan antar tetangga (neighbor) dalam jaringan yang memiliki fitur Autonomous System (AS). Dengan skalabilitas yang tinggi, BGP mampu melakukan pertukaran data secara otomatis dan efisien, sehingga sangat cocok untuk digunakan dalam jaringan yang kompleks.