

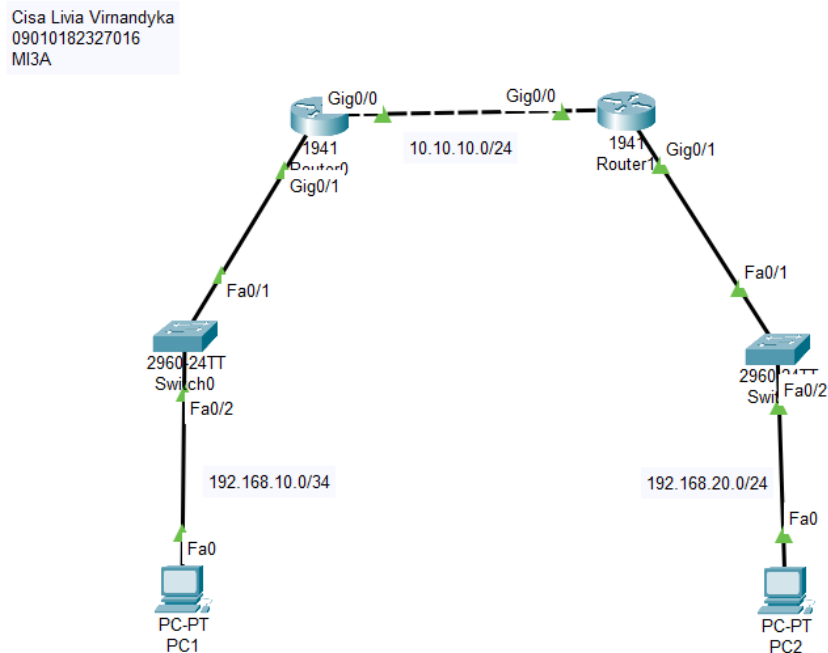
OSPF & BGP DYNAMIC ROUTING

Nama : Cisa Livia Virmandyka
NIM : 09010182327016
Kelas : MI3A
MK : Praktikum Jaringan Komputer

OSPF (Open Shortest Path First):

- Protokol routing link-state yang menggunakan algoritma Dijkstra untuk menentukan jalur terpendek berdasarkan "cost".
- Digunakan dalam jaringan besar dengan konsep area, menghubungkan antar area dengan backbone (Area 0).

1. Buat Topologi Jaringan sesuai gambar di modul praktikum.

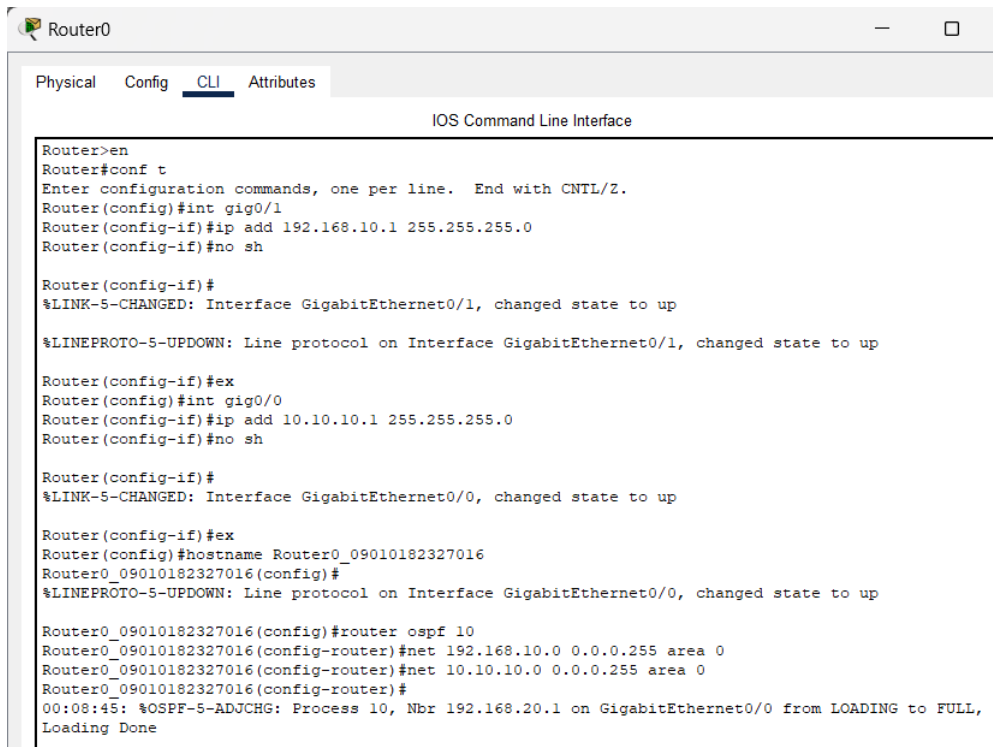


2. Set IP Address di masing-masing perangkat sesuai table pengalamatan.

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 OSPF pada Router:

- Router0



The screenshot shows the CLI window for Router0. The window has tabs for Physical, Config, CLI (selected), and Attributes. The title bar says 'Router0'. The main area is titled 'IOS Command Line Interface'. The command history shows the following sequence of commands and their outputs:

```
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 192.168.10.1 255.255.255.0
Router(config-if)#no sh

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

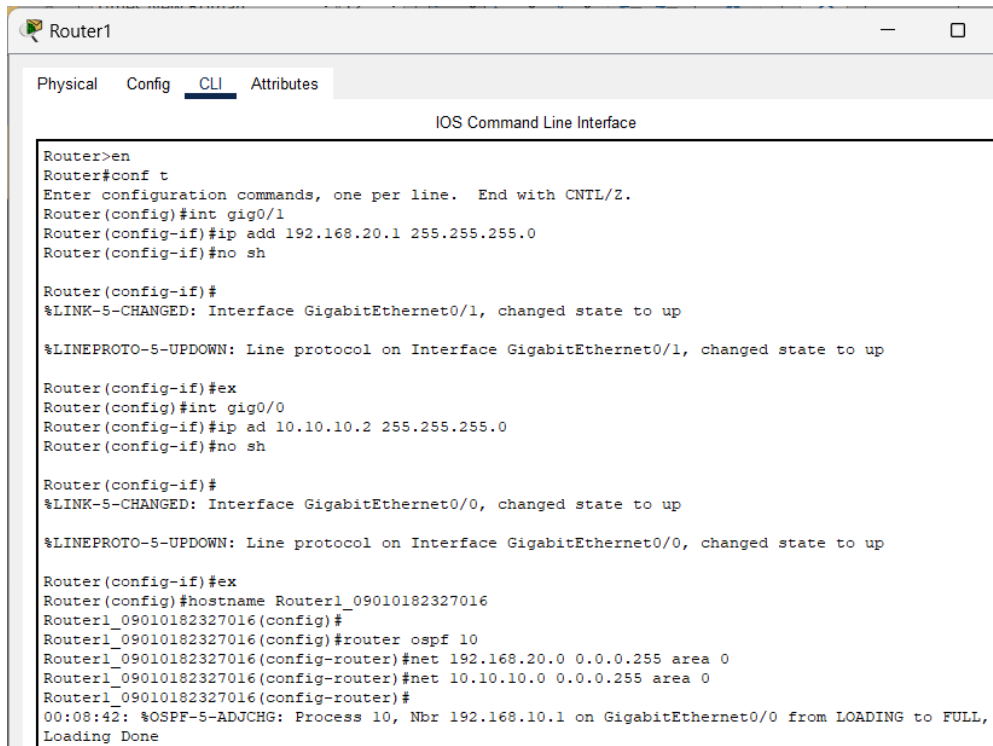
Router(config-if)#ex
Router(config)#int gig0/0
Router(config-if)#ip add 10.10.10.1 255.255.255.0
Router(config-if)#no sh

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

Router(config-if)#ex
Router(config)#hostname Router0_09010182327016
Router0_09010182327016(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

Router0_09010182327016(config)#router ospf 10
Router0_09010182327016(config-router)#net 192.168.10.0 0.0.0.255 area 0
Router0_09010182327016(config-router)#net 10.10.10.0 0.0.0.255 area 0
Router0_09010182327016(config-router)#
00:08:45: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.20.1 on GigabitEthernet0/0 from LOADING to FULL,
Loading Done
```

- Router1



The screenshot shows the CLI window for Router1. The window has tabs for Physical, Config, CLI (selected), and Attributes. The title bar says 'Router1'. The main area is titled 'IOS Command Line Interface'. The command history shows the following sequence of commands and their outputs:

```
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 sh

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)#ex
Router(config)#int gig0/0
Router(config-if)#ip ad 10.10.10.2 255.255.255.0
Router(config-if)#no sh

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)#ex
Router(config)#hostname Router1_09010182327016
Router1_09010182327016(config)#
Router1_09010182327016(config)#router ospf 10
Router1_09010182327016(config-router)#net 192.168.20.0 0.0.0.255 area 0
Router1_09010182327016(config-router)#net 10.10.10.0 0.0.0.255 area 0
Router1_09010182327016(config-router)#
00:08:42: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.10.1 on GigabitEthernet0/0 from LOADING to FULL,
Loading Done
```

4. SS hasil perintah #show ip route dari setiap routing OSPF dan BGP.

- Router0

```
Router0_09010182327016>en
Router0_09010182327016#sh 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, 00:02:25, GigabitEthernet0/0
```

- Router1

```
Router1_09010182327016>en
Router1_09010182327016#sh 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

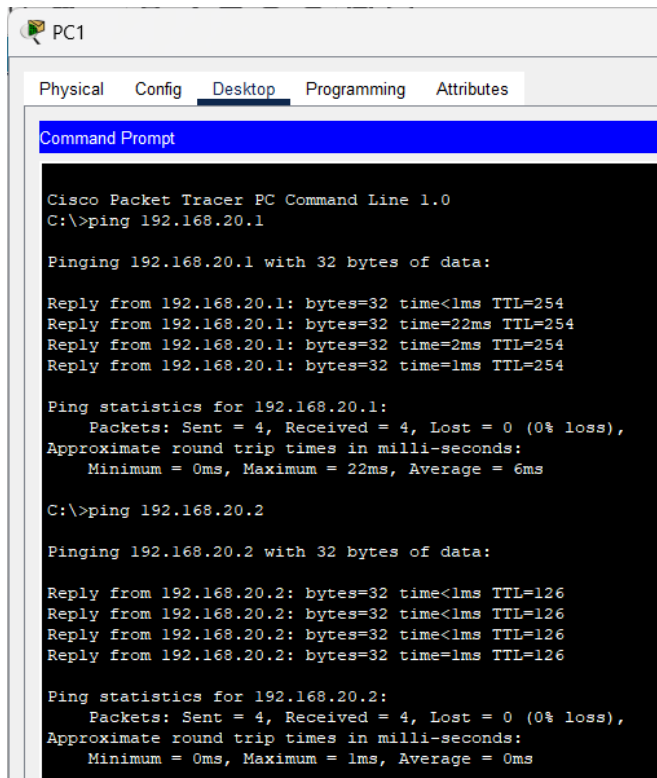
    10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.10.10.0/24 is directly connected, GigabitEthernet0/0
L       10.10.10.2/32 is directly connected, GigabitEthernet0/0
O       192.168.10.0/24 [110/2] via 10.10.10.1, 00:02:51, GigabitEthernet0/0
    192.168.20.0/24 is variably subnetted, 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
```

5. Tabel hasil PING

No	Sumber	Tujuan	Hasil	
			Ya	Tidak
1	PC1	PC2	Ya	-
2	PC2	PC1	Ya	-

6. Test PING ke masing-masing PC

- PC1 ke PC2



The screenshot shows the PC1 interface in Cisco Packet Tracer. The 'Desktop' tab is selected, and the 'Command Prompt' window is open. The command prompt displays the results of two ping commands: one to 192.168.20.1 and another to 192.168.20.2. Both pings are successful with 0% loss.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.20.1

Pinging 192.168.20.1 with 32 bytes of data:

Reply from 192.168.20.1: bytes=32 time<1ms TTL=254
Reply from 192.168.20.1: bytes=32 time=22ms TTL=254
Reply from 192.168.20.1: bytes=32 time=2ms TTL=254
Reply from 192.168.20.1: bytes=32 time=1ms TTL=254

Ping statistics for 192.168.20.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 22ms, Average = 6ms

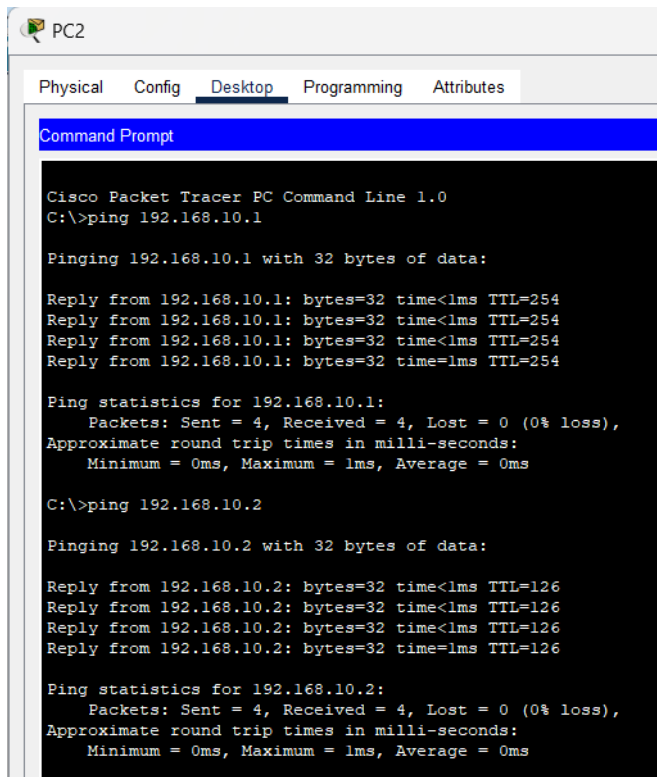
C:\>ping 192.168.20.2

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 = 1ms, Average = 0ms
```

- PC2 ke PC1



The screenshot shows the PC2 interface in Cisco Packet Tracer. The 'Desktop' tab is selected, and the 'Command Prompt' window is open. The command prompt displays the results of two ping commands: one to 192.168.10.1 and another to 192.168.10.2. Both pings are successful with 0% loss.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.10.1

Pinging 192.168.10.1 with 32 bytes of data:

Reply from 192.168.10.1: bytes=32 time<1ms TTL=254
Reply from 192.168.10.1: bytes=32 time<1ms TTL=254
Reply from 192.168.10.1: bytes=32 time<1ms TTL=254
Reply from 192.168.10.1: bytes=32 time=1ms TTL=254

Ping statistics for 192.168.10.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 192.168.10.2

Pinging 192.168.10.2 with 32 bytes of data:

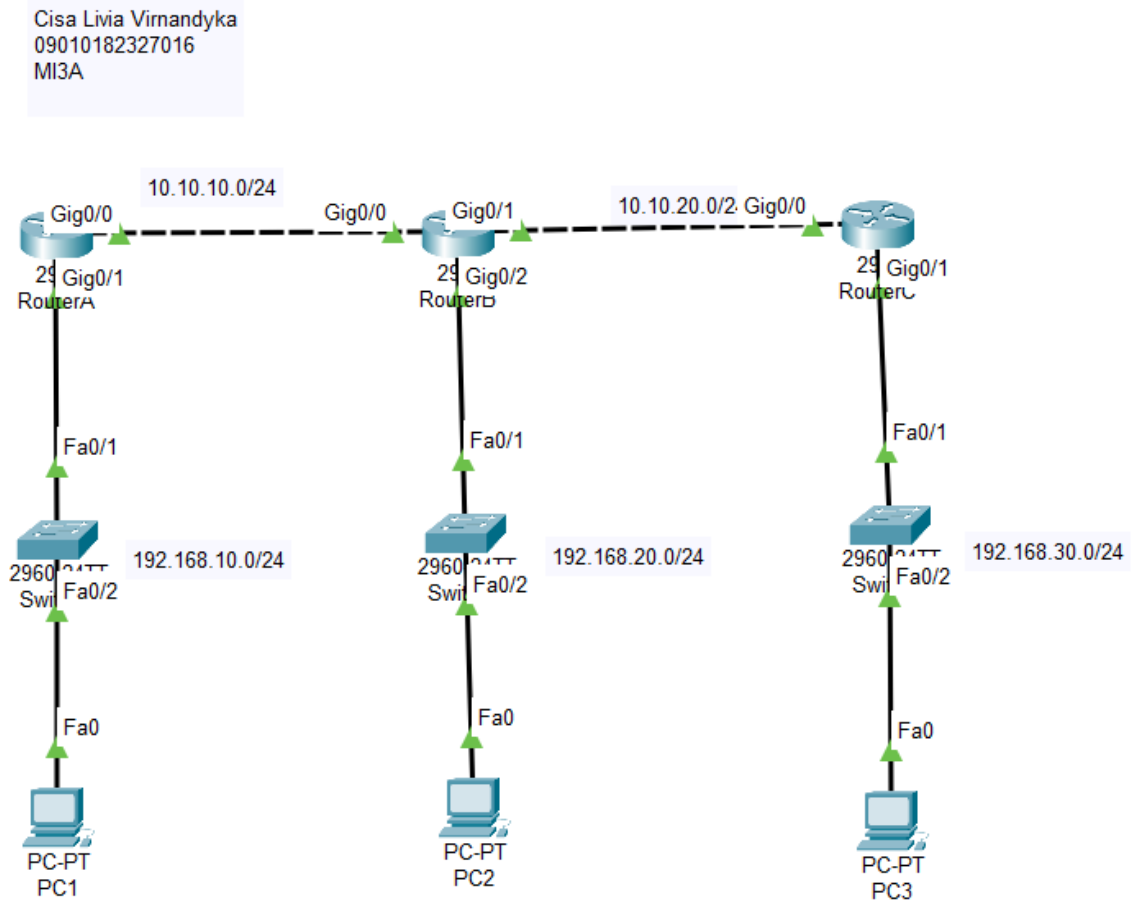
Reply from 192.168.10.2: bytes=32 time<1ms TTL=126
Reply from 192.168.10.2: bytes=32 time<1ms TTL=126
Reply from 192.168.10.2: bytes=32 time<1ms TTL=126
Reply from 192.168.10.2: bytes=32 time=1ms TTL=126

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
```

BGP (Border Gateway Protocol):

- Protokol routing untuk jaringan yang luas dan kompleks seperti jaringan ISP.
- Menggunakan prinsip path-vector untuk membuat keputusan routing dan mampu menghubungkan banyak Autonomous System (AS).

1. Buat Topologi Jaringan sesuai dengan gambar di modul praktikum.



2. Set IP Address di masing-masing perangkat sesuai table.

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	192.168.30.1	255.255.255.0

3. Konfigurasi BGP pada Router:

- RouterA

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname RouterA_09010182327016
RouterA_09010182327016(config)#
RouterA_09010182327016(config)#int gig0/0
RouterA_09010182327016(config-if)#ip add 10.10.10.1 255.255.255.0
RouterA_09010182327016(config-if)#no sh

RouterA_09010182327016(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

RouterA_09010182327016(config-if)#ex
RouterA_09010182327016(config)#int gig0/1
RouterA_09010182327016(config-if)#ip add 192.168.10.1 255.255.255.0
RouterA_09010182327016(config-if)#no sh

RouterA_09010182327016(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_09010182327016(config-if)#ex
RouterA_09010182327016(config)#ex
RouterA_09010182327016#
%SYS-5-CONFIG_I: Configured from console by console

RouterA_09010182327016#conf t
Enter configuration commands, one per line. End with CNTL/Z.
RouterA_09010182327016(config)#router bgp 10
RouterA_09010182327016(config-router)#neighbor 10.10.10.2 remote-as 20
RouterA_09010182327016(config-router)#net 10.10.10.0 mask 255.255.255.0
RouterA_09010182327016(config-router)#net 192.168.10.0 mask 255.255.255.0
RouterA_09010182327016(config-router)#ex
RouterA_09010182327016(config)#ex
RouterA_09010182327016#
%SYS-5-CONFIG_I: Configured from console by console

RouterA_09010182327016#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
%BGP-5-ADJCHANGE: neighbor 10.10.10.2 Up
```

- RouterB

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname RouterB_09010182327016
RouterB_09010182327016(config)#int gig0/0
RouterB_09010182327016(config-if)#ip ad 10.10.10.2 255.255.255.0
RouterB_09010182327016(config-if)#no sh

RouterB_09010182327016(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_09010182327016(config-if)#ex
RouterB_09010182327016(config)#int gig0/1
RouterB_09010182327016(config-if)#ip add 10.10.20.1 255.255.255.0
RouterB_09010182327016(config-if)#no sh

RouterB_09010182327016(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

RouterB_09010182327016(config-if)#ex
RouterB_09010182327016(config)#int gig0/2
RouterB_09010182327016(config-if)#ip add 192.168.20.1 255.255.255.0
RouterB_09010182327016(config-if)#no sh

RouterB_09010182327016(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_09010182327016(config-if)#ex
RouterB_09010182327016(config)#ex
RouterB_09010182327016#
%SYS-5-CONFIG_I: Configured from console by console

RouterB_09010182327016#conf t
Enter configuration commands, one per line. End with CNTL/Z.
RouterB_09010182327016(config)#router bgp 20
RouterB_09010182327016(config-router)#neighbor 10.10.10.1 remote-as 10
RouterB_09010182327016(config-router)#%BGP-5-ADJCHANGE: neighbor 10.10.10.1 Up

RouterB_09010182327016(config-router)#neighbor 10.10.20.2 remote-as 30
RouterB_09010182327016(config-router)#net 10.10.10.0 mask 255.255.255.0
RouterB_09010182327016(config-router)#net 10.10.20.0 mask 255.255.255.0
RouterB_09010182327016(config-router)#net 192.168.20.0 mask 255.255.255.0
RouterB_09010182327016(config-router)#ex
RouterB_09010182327016(config)#ex
RouterB_09010182327016#
%SYS-5-CONFIG_I: Configured from console by console

RouterB_09010182327016#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
%BGP-5-ADJCHANGE: neighbor 10.10.20.2 Up
```

- RouterC

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname RouterC_09010182327016
RouterC_09010182327016(config)#int gi0/0
RouterC_09010182327016(config-if)#ip add 10.10.20.2 255.255.255.0
RouterC_09010182327016(config-if)#no sh

RouterC_09010182327016(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

RouterC_09010182327016(config-if)#ex
RouterC_09010182327016(config)#int gi0/1
RouterC_09010182327016(config-if)#ip add 192.168.30.1 255.255.255.0
RouterC_09010182327016(config-if)#no sh

RouterC_09010182327016(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
ex
RouterC_09010182327016(config)#ex
RouterC_09010182327016#
%SYS-5-CONFIG_I: Configured from console by console

RouterC_09010182327016#conf t
Enter configuration commands, one per line. End with CNTL/Z.
RouterC_09010182327016(config)#router bgp 30
RouterC_09010182327016(config-router)#neighbor 10.10.20.1 remote-as 20
RouterC_09010182327016(config-router)##BGP-5-ADJCHANGE: neighbor 10.10.20.1 Up

RouterC_09010182327016(config-router)#net 10.10.20.0 mask 255.255.255.0
RouterC_09010182327016(config-router)#net 192.168.30.0 mask 255.255.255.0
RouterC_09010182327016(config-router)#ex
RouterC_09010182327016(config)#
```

4. SS hasil perintah #show ip route dari routing BGP.

- RouterA

```
RouterA_09010182327016>en
RouterA_09010182327016#sh 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

```
RouterB_09010182327016>en
RouterB_09010182327016#sh 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

```
RouterC_09010182327016>en
RouterC_09010182327016#sh 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

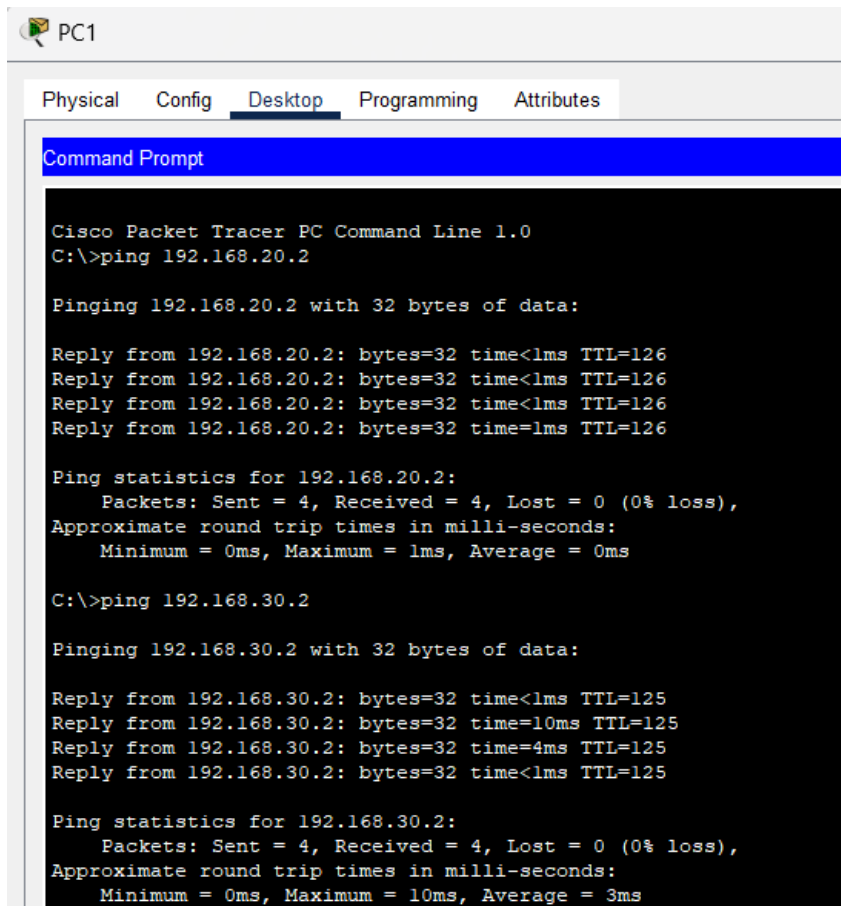
      10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks
B       10.10.10.0/24 [20/0] via 10.10.20.1, 00:00:00
C       10.10.20.0/24 is directly connected, GigabitEthernet0/0
L       10.10.20.2/32 is directly connected, GigabitEthernet0/0
B       192.168.10.0/24 [20/0] via 10.10.20.1, 00:00:00
B       192.168.20.0/24 [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
```

5. Test PING ke masing-masing PC

No	Sumber	Tujuan	Hasil	
			Ya	Tidak
1	PC1	PC2	Ya	-
		PC3	Ya	-
2	PC2	PC1	Ya	-
		PC3	Ya	-
3	PC3	PC1	Ya	-
		PC2	Ya	-

6. Test PING ke masing-masing PC

- PC1 ke PC2 dan PC3



```

PC1
Physical Config Desktop Programming Attributes
Command Prompt

Cisco Packet Tracer PC Command Line 1.0
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 = 1ms, Average = 0ms

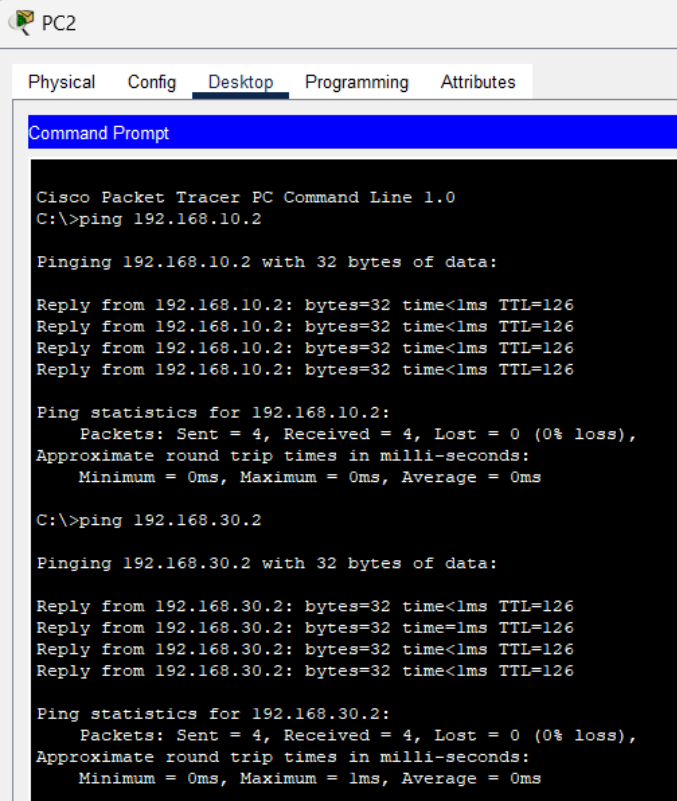
C:\>ping 192.168.30.2

Pinging 192.168.30.2 with 32 bytes of data:

Reply from 192.168.30.2: bytes=32 time<1ms TTL=125
Reply from 192.168.30.2: bytes=32 time=10ms TTL=125
Reply from 192.168.30.2: bytes=32 time=4ms 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 = 10ms, Average = 3ms
  
```

- PC2 ke PC1 dan PC3



The screenshot shows the Command Prompt window for PC2 in Cisco Packet Tracer. The window has tabs for Physical, Config, Desktop (selected), Programming, and Attributes. The Command Prompt title bar is blue and says "Command Prompt". The text inside the window is as follows:

```
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<lms TTL=126
Reply from 192.168.10.2: bytes=32 time<lms TTL=126
Reply from 192.168.10.2: bytes=32 time<lms TTL=126
Reply from 192.168.10.2: bytes=32 time<lms 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 = 0ms, Average = 0ms

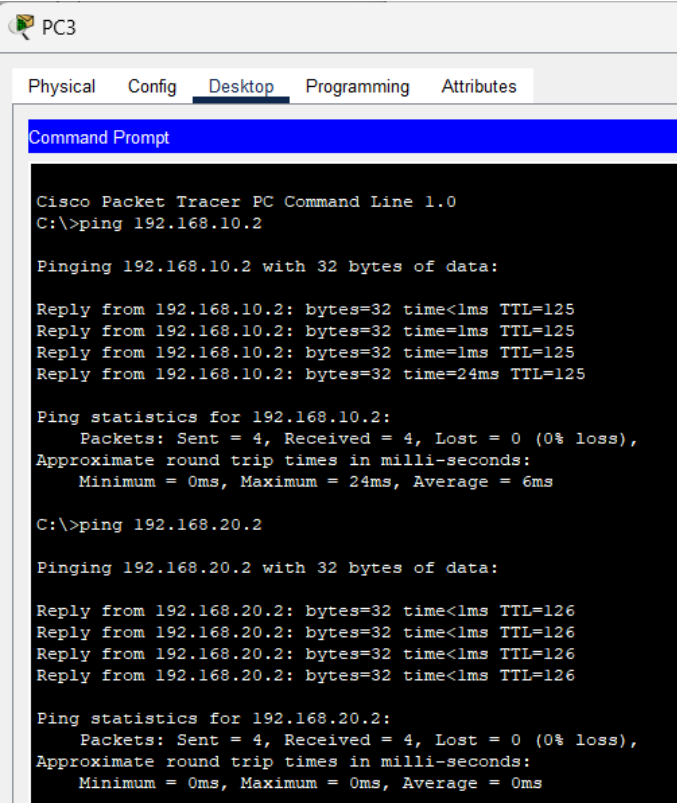
C:\>ping 192.168.30.2

Pinging 192.168.30.2 with 32 bytes of data:

Reply from 192.168.30.2: bytes=32 time<lms TTL=126
Reply from 192.168.30.2: bytes=32 time<lms TTL=126
Reply from 192.168.30.2: bytes=32 time<lms TTL=126
Reply from 192.168.30.2: bytes=32 time<lms 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 = lms, Average = 0ms
```

- PC3 ke PC1 dan PC2



The screenshot shows the Command Prompt window for PC3 in Cisco Packet Tracer. The window has tabs for Physical, Config, Desktop (selected), Programming, and Attributes. The Command Prompt title bar is blue and says "Command Prompt". The text inside the window is as follows:

```
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<lms TTL=125
Reply from 192.168.10.2: bytes=32 time<lms TTL=125
Reply from 192.168.10.2: bytes=32 time<lms TTL=125
Reply from 192.168.10.2: bytes=32 time=24ms TTL=125

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 = 24ms, Average = 6ms

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<lms TTL=126
Reply from 192.168.20.2: bytes=32 time<lms TTL=126
Reply from 192.168.20.2: bytes=32 time<lms TTL=126
Reply from 192.168.20.2: bytes=32 time<lms 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
```

PENJELASAN TERKAIT HASIL PRAKTIKUM

1. Hasil Pengujian OSPF:

- Setelah konfigurasi OSPF dilakukan di kedua router, setiap router mampu mengenali jaringan yang terhubung ke router lainnya melalui area backbone (Area 0).
- Hasil ping antar-PC (misalnya, dari PC1 ke PC2) menunjukkan bahwa kedua PC di jaringan yang berbeda berhasil berkomunikasi, yang berarti routing OSPF berfungsi dengan baik.
- Pada perintah show ip route, setiap router menampilkan informasi rute OSPF yang baru ditambahkan, yang mencakup jaringan lokal dan jaringan yang diperoleh melalui protokol OSPF.

2. Hasil Pengujian BGP:

- Setelah konfigurasi BGP, setiap router berhasil membangun hubungan tetangga (neighbor) dengan Autonomous System (AS) tetangganya. Misalnya, RouterA dapat mendeteksi RouterB sebagai neighbor melalui AS yang berbeda.
- Hasil ping antar-PC (misalnya, dari PC A ke PC C) menunjukkan bahwa perangkat di jaringan yang terhubung ke AS yang berbeda juga dapat berkomunikasi dengan baik.
- Output perintah show ip route menunjukkan bahwa rute baru telah ditambahkan melalui BGP, dan rute ini mengarahkan paket data menuju AS tetangga.

ANALISIS TERKAIT PRAKTIKUM

1. OSPF:

- Protokol OSPF mengizinkan setiap router dalam jaringan untuk memiliki pandangan lengkap terhadap topologi jaringan di dalam area yang sama. Dalam percobaan ini, OSPF dengan area backbone (Area 0) memungkinkan setiap router untuk berbagi informasi topologi, yang mendukung konvergensi cepat ketika ada perubahan topologi.
- Dalam percobaan ini, konfigurasi OSPF sederhana pada dua router membantu memahami peran OSPF dalam jaringan berskala kecil hingga menengah. Namun, OSPF juga mendukung skalabilitas dengan konsep area, yang memungkinkan penerapan di jaringan yang lebih kompleks.

2. BGP:

- BGP berfungsi sebagai protokol routing antar-AS, dan digunakan untuk mengelola pertukaran rute antara sistem yang memiliki kebijakan routing independen. Dalam percobaan ini, konfigurasi BGP di tiga router memperlihatkan bahwa setiap router hanya mengetahui rute yang diumumkan oleh AS tetangganya.

- Salah satu fitur BGP adalah penggunaan path vector, yang membuat keputusan routing berdasarkan urutan AS yang dilalui. Dalam praktikum ini, rute yang ditambahkan dalam tabel routing menunjukkan bahwa jaringan dapat berkomunikasi meskipun terhubung melalui AS yang berbeda.
- BGP lebih cocok untuk jaringan dengan kebutuhan skalabilitas tinggi dan untuk menghubungkan berbagai AS. Penggunaan BGP dalam praktik nyata sering terlihat pada jaringan ISP dan perusahaan besar dengan infrastruktur jaringan kompleks.

KESIMPULAN

- OSPF dan BGP adalah dua protokol routing yang berbeda dalam konsep dan penggunaannya, tetapi keduanya berhasil dikonfigurasi dengan baik dalam percobaan ini. OSPF menunjukkan kecepatan konvergensi dan efisiensi jalur, yang cocok untuk jaringan berskala menengah hingga besar di dalam satu organisasi atau area.
- BGP, di sisi lain, terbukti efektif dalam menghubungkan jaringan dari berbagai AS yang berbeda dan cocok untuk implementasi dalam skala yang jauh lebih besar, seperti antar-ISP atau jaringan antar-lokasi perusahaan besar.

Praktikum ini membantu memahami bagaimana setiap protokol bekerja, cara konfigurasi, serta manfaat masing-masing dalam penerapannya pada jaringan skala kecil dan besar. OSPF lebih efisien di dalam jaringan area yang sama, sementara BGP sangat kuat dalam menghubungkan jaringan besar dengan kebijakan routing independen.