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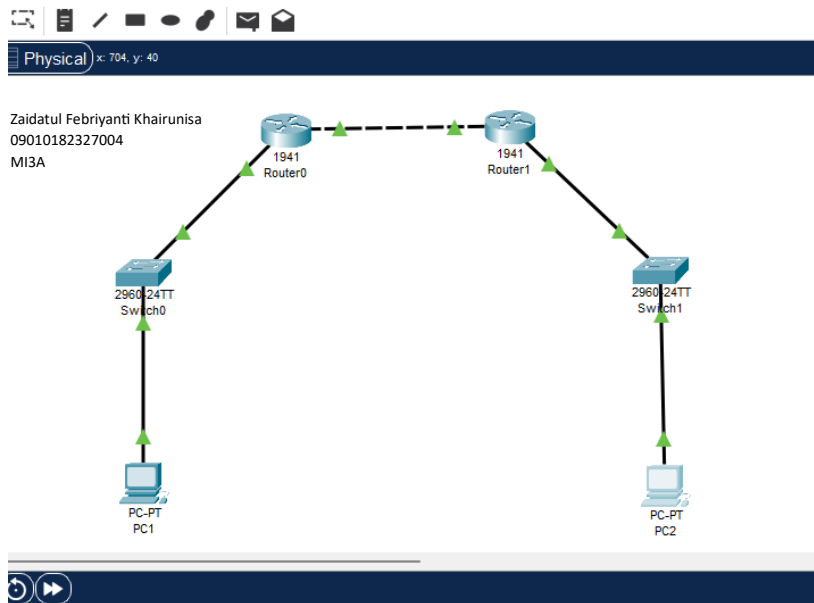
Kelas : MI3A

MK : Praktikum Jaringan Komputer

## LAPORAN PRAKTIKUM OSPF & BGP Dynamic Routing

- OSPF

### Gambar Topologi



### ➤ Konfigurasi IP address pada router 0

```
Router0
Physical Config CLI Attributes
IOS Command Line Interface

--- System Configuration Dialog ---
Would you like to enter the initial configuration dialog? [yes/no]: no

Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTRL/Z.
Router(config)#int gig0/1
Router(config-if)#ip add 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

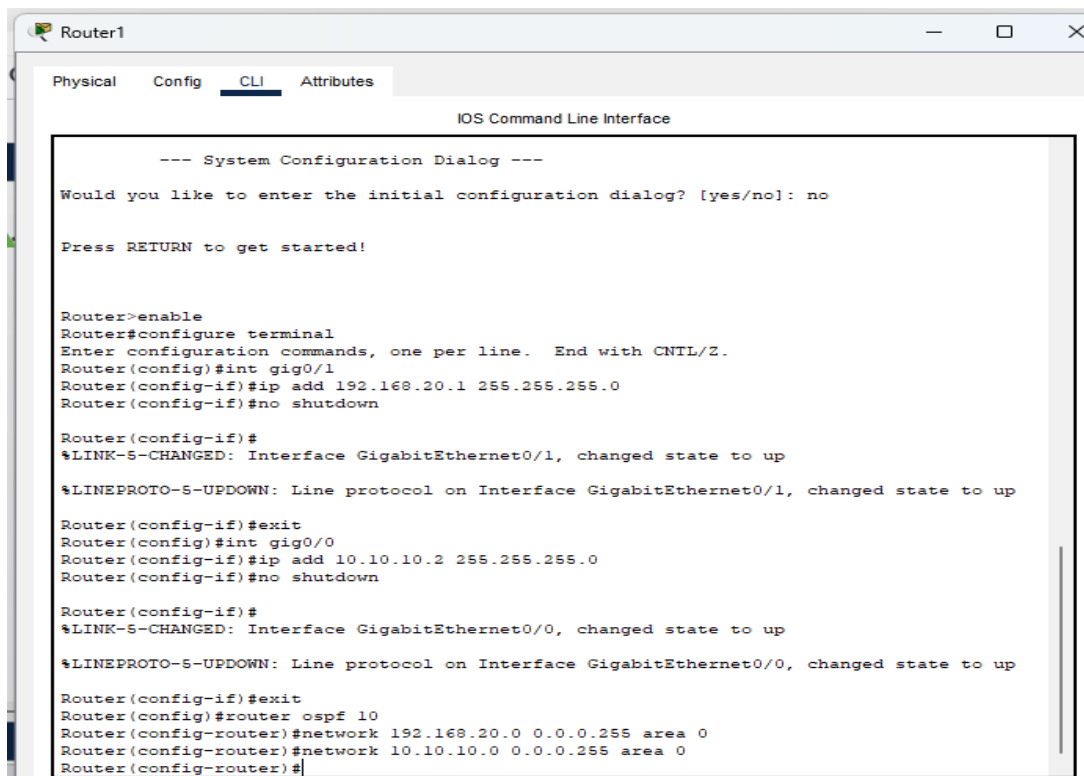
Router(config-if)#exit
Router(config)#int gig0/0
Router(config-if)#ip add 10.10.10.1 255.255.255.0
Router(config-if)#no shutdown

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

## ➤ Konfigurasi IP address pada router 1



```
Router1
Physical Config CLI Attributes
IOS Command Line Interface

--- System Configuration Dialog ---
Would you like to enter the initial configuration dialog? [yes/no]: no

Press RETURN to get started!

Router>enable
Router#configure terminal
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-S-CHANGED: Interface GigabitEthernet0/1, changed state to up
%LINEPROTO-S-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 10.10.10.2 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-S-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-S-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
Router(config-if)#exit
Router(config)#router ospf 10
Router(config-router)#network 192.168.20.0 0.0.0.255 area 0
Router(config-router)#network 10.10.10.0 0.0.0.255 area 0
Router(config-router)#
```

## ➤ Hasil Perintah #show ip router0

```
Router#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

Router#
00:00:45: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.20.1 on GigabitEthernet0/0 from LOADING
to FULL, Loading Done
```

## ➤ Hasil Perintah #show ip router1

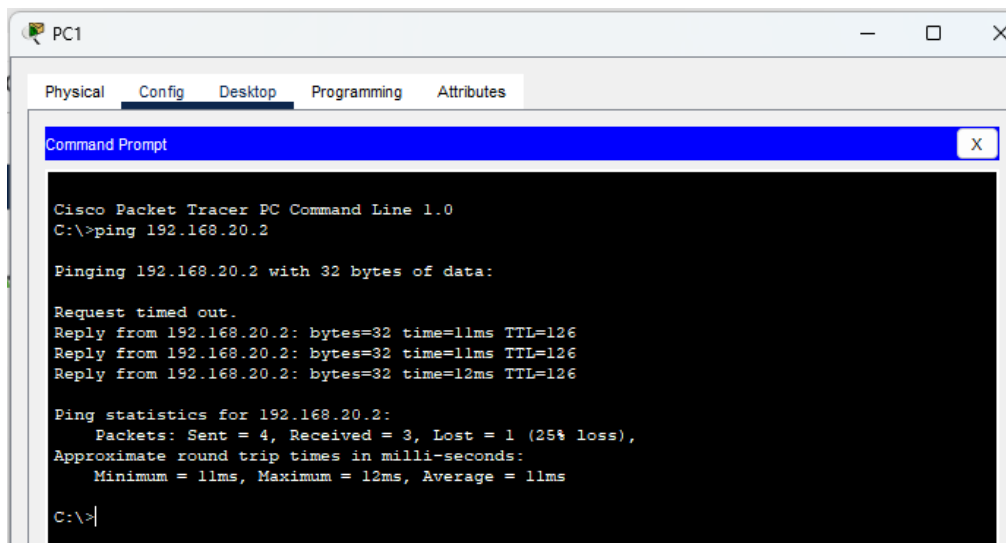
```
Router#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - 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, 00:00:58, 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

Router#
```

## Hasil Ping PC1 ke PC2



The screenshot shows the Cisco Packet Tracer PC Command Line interface for PC1. The user has entered the command 'ping 192.168.20.2'. The output shows that the ping was successful, with 3 out of 4 packets received and a 25% loss. The round trip times are 11ms, 12ms, and 12ms.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.20.2

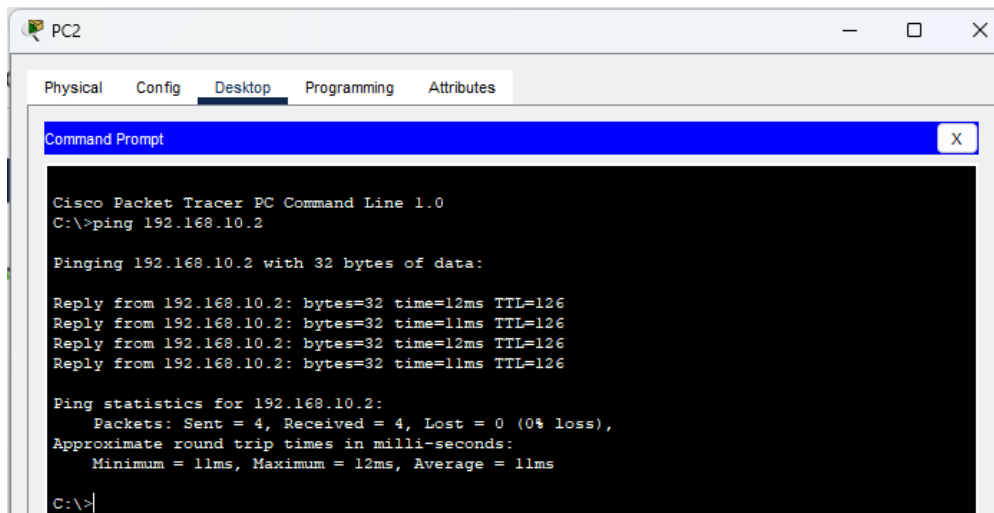
Pinging 192.168.20.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.20.2: bytes=32 time=11ms TTL=126
Reply from 192.168.20.2: bytes=32 time=11ms TTL=126
Reply from 192.168.20.2: bytes=32 time=12ms TTL=126

Ping statistics for 192.168.20.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 11ms, Maximum = 12ms, Average = 11ms

C:\>
```

## Hasil ping PC2 ke PC1



The screenshot shows the Cisco Packet Tracer PC Command Line interface for PC2. The user has entered the command 'ping 192.168.10.2'. The output shows that the ping was successful, with 4 out of 4 packets received and 0% loss. The round trip times are 12ms, 11ms, 12ms, and 11ms.

```
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=12ms TTL=126
Reply from 192.168.10.2: bytes=32 time=11ms TTL=126
Reply from 192.168.10.2: bytes=32 time=12ms TTL=126
Reply from 192.168.10.2: bytes=32 time=11ms 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 = 11ms, Maximum = 12ms, Average = 11ms

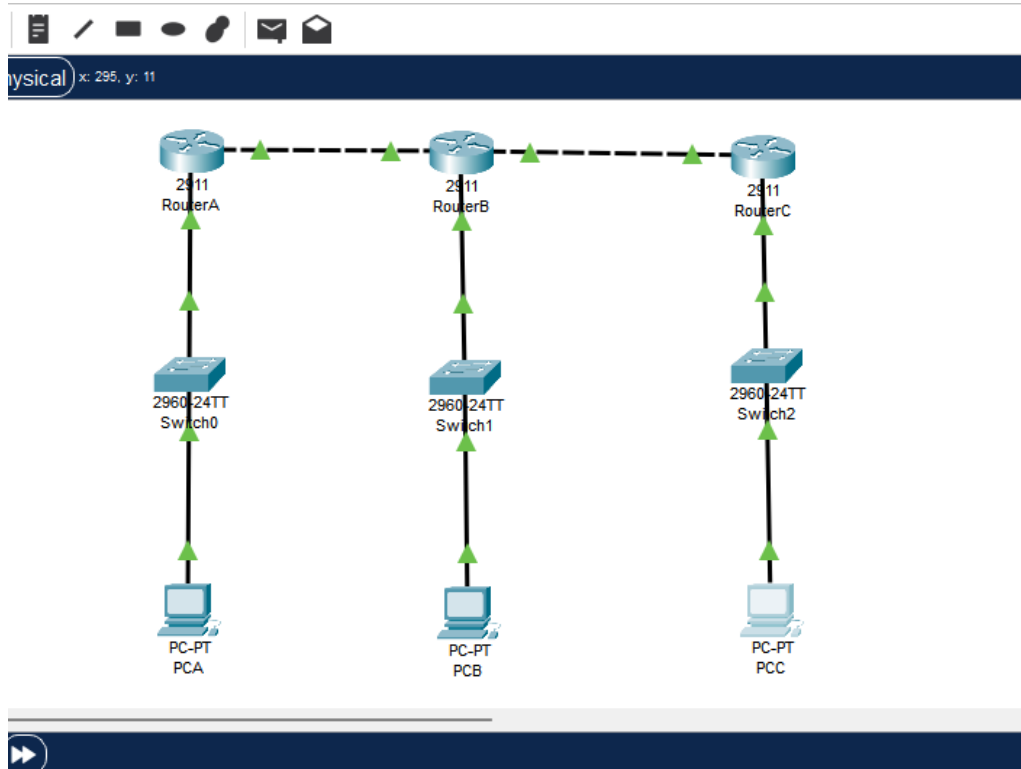
C:\>
```

## Tabel Hasil Ping

No	sumber	Tujuan	Hasil	
			Ya	Tidak
1	PC1	PC2	Ya	
2	PC2	PC1	Ya	

- BGP

## Gambar Topologi BGP



## Konfigurasi IP Address dan BGP pada Router A

```
RouterA
Physical Config CLI Attributes
IOS Command Line Interface

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname RouterA_09010182327004
RouterA_09010182327004(config)#int gi0/0
RouterA_09010182327004(config-if)#ip address 10.10.10.1 255.255.255.0
RouterA_09010182327004(config-if)#no shutdown

RouterA_09010182327004(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

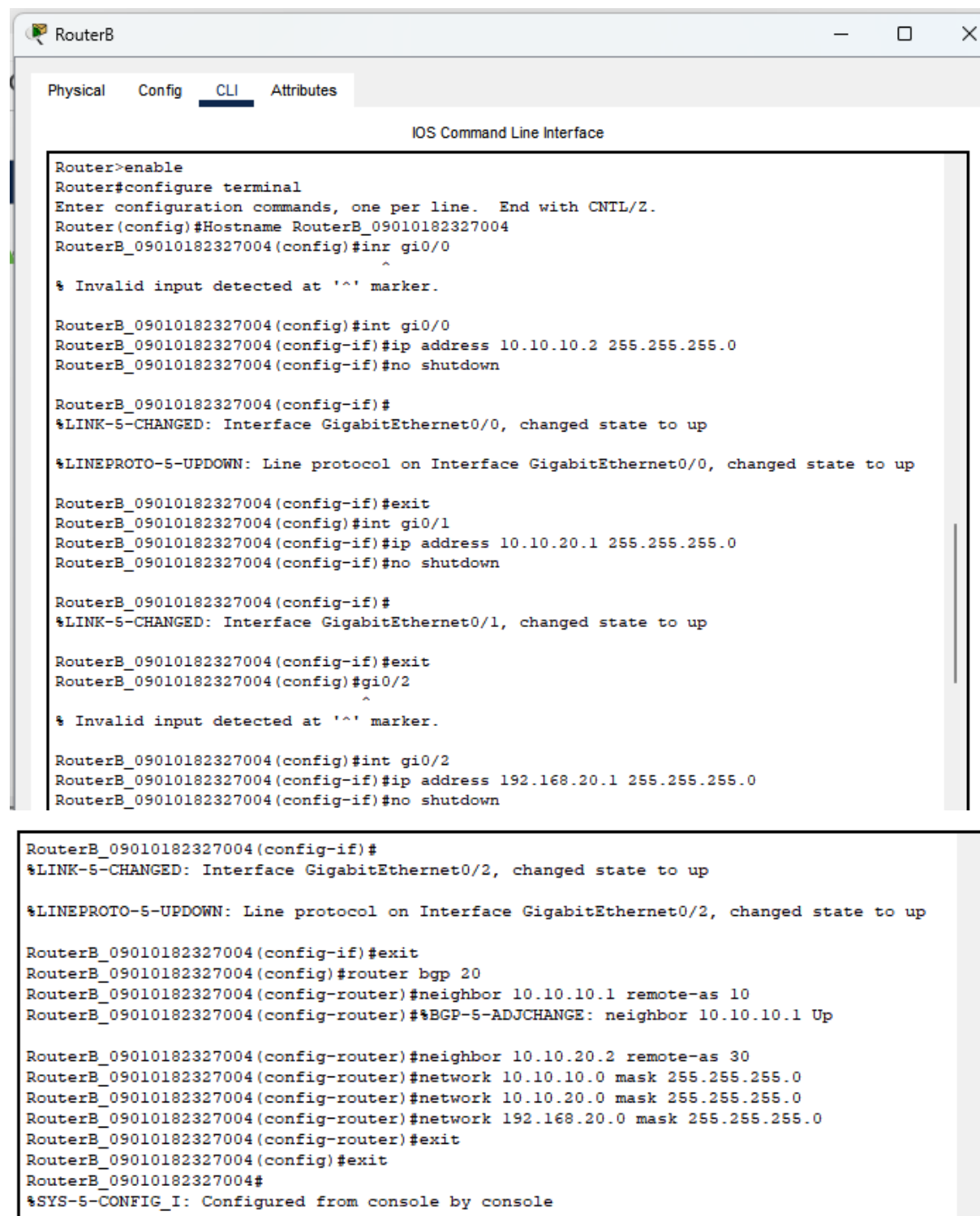
RouterA_09010182327004(config-if)#exit
RouterA_09010182327004(config)#int gi0/1
RouterA_09010182327004(config-if)#ip address 192.168.10.1 255.255.255.0
RouterA_09010182327004(config-if)#no shutdown

RouterA_09010182327004(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_09010182327004(config-if)#exit
RouterA_09010182327004(config)#router bgp 10
RouterA_09010182327004(config-router)#neighbor 10.10.10.2 remote-as 20
RouterA_09010182327004(config-router)#network 10.10.10.0 mask 255.255.255.0
RouterA_09010182327004(config-router)#network 192.168.10.0 mask 255.255.255.0
RouterA_09010182327004(config-router)#exit
RouterA_09010182327004(config)#exit
RouterA_09010182327004#
%SYS-5-CONFIG_I: Configured from console by console
```

## Konfigurasi IP Address dan BGP pada Router B



```
RouterB
Physical Config CLI Attributes
IOS Command Line Interface

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#Hostname RouterB_09010182327004
RouterB_09010182327004(config)#inr gi0/0
      ^
% Invalid input detected at '^' marker.

RouterB_09010182327004(config)#int gi0/0
RouterB_09010182327004(config-if)#ip address 10.10.10.2 255.255.255.0
RouterB_09010182327004(config-if)#no shutdown

RouterB_09010182327004(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_09010182327004(config-if)#exit
RouterB_09010182327004(config)#int gi0/1
RouterB_09010182327004(config-if)#ip address 10.10.20.1 255.255.255.0
RouterB_09010182327004(config-if)#no shutdown

RouterB_09010182327004(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

RouterB_09010182327004(config-if)#exit
RouterB_09010182327004(config)#gi0/2
      ^
% Invalid input detected at '^' marker.

RouterB_09010182327004(config)#int gi0/2
RouterB_09010182327004(config-if)#ip address 192.168.20.1 255.255.255.0
RouterB_09010182327004(config-if)#no shutdown

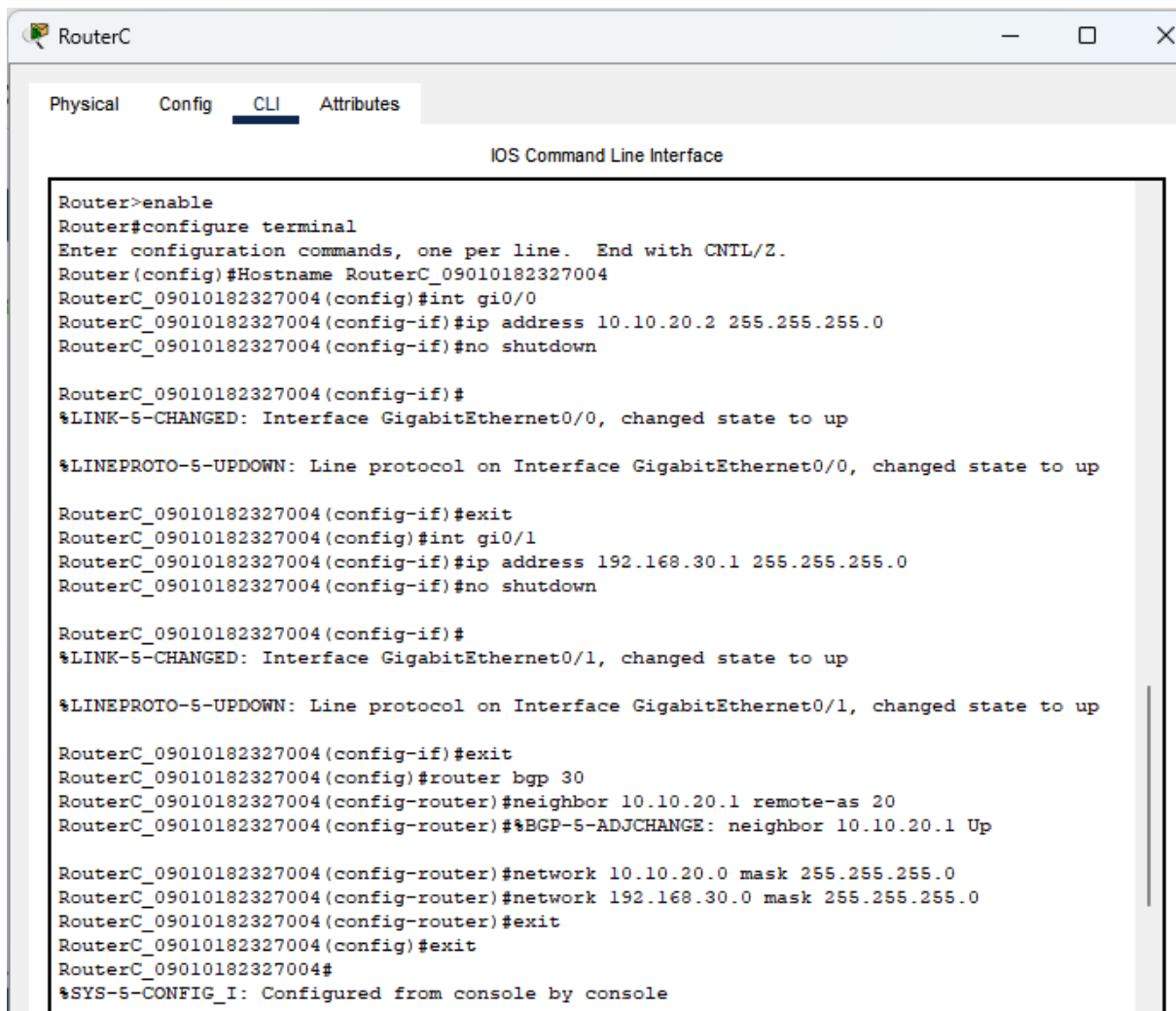
RouterB_09010182327004(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to up

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

RouterB_09010182327004(config-if)#exit
RouterB_09010182327004(config)#router bgp 20
RouterB_09010182327004(config-router)#neighbor 10.10.10.1 remote-as 10
RouterB_09010182327004(config-router)#%BGP-5-ADJCHANGE: neighbor 10.10.10.1 Up

RouterB_09010182327004(config-router)#neighbor 10.10.20.2 remote-as 30
RouterB_09010182327004(config-router)#network 10.10.10.0 mask 255.255.255.0
RouterB_09010182327004(config-router)#network 10.10.20.0 mask 255.255.255.0
RouterB_09010182327004(config-router)#network 192.168.20.0 mask 255.255.255.0
RouterB_09010182327004(config-router)#exit
RouterB_09010182327004(config)#exit
RouterB_09010182327004#
%SYS-5-CONFIG_I: Configured from console by console
```

## Konfigurasi IP Address dan BGP pada Router C



```
RouterC
Physical Config CLI Attributes

IOS Command Line Interface

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#Hostname RouterC_09010182327004
RouterC_09010182327004(config)#int gi0/0
RouterC_09010182327004(config-if)#ip address 10.10.20.2 255.255.255.0
RouterC_09010182327004(config-if)#no shutdown

RouterC_09010182327004(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_09010182327004(config-if)#exit
RouterC_09010182327004(config)#int gi0/1
RouterC_09010182327004(config-if)#ip address 192.168.30.1 255.255.255.0
RouterC_09010182327004(config-if)#no shutdown

RouterC_09010182327004(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

RouterC_09010182327004(config-if)#exit
RouterC_09010182327004(config)#router bgp 30
RouterC_09010182327004(config-router)#neighbor 10.10.20.1 remote-as 20
RouterC_09010182327004(config-router)#%BGP-5-ADJCHANGE: neighbor 10.10.20.1 Up

RouterC_09010182327004(config-router)#network 10.10.20.0 mask 255.255.255.0
RouterC_09010182327004(config-router)#network 192.168.30.0 mask 255.255.255.0
RouterC_09010182327004(config-router)#exit
RouterC_09010182327004(config)#exit
RouterC_09010182327004#
%SYS-5-CONFIG_I: Configured from console by console
```

## Hasil #show ip route pada router A

```
RouterA_09010182327004#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

      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

RouterA_09010182327004#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
%BGP-5-ADJCHANGE: neighbor 10.10.10.2 Up
```

## Hasil #show ip route pada router B

```
RouterB_09010182327004#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
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

RouterB_09010182327004#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
%BGP-5-ADJCHANGE: neighbor 10.10.20.2 Up
```

## Hasil #show ip route pada router C

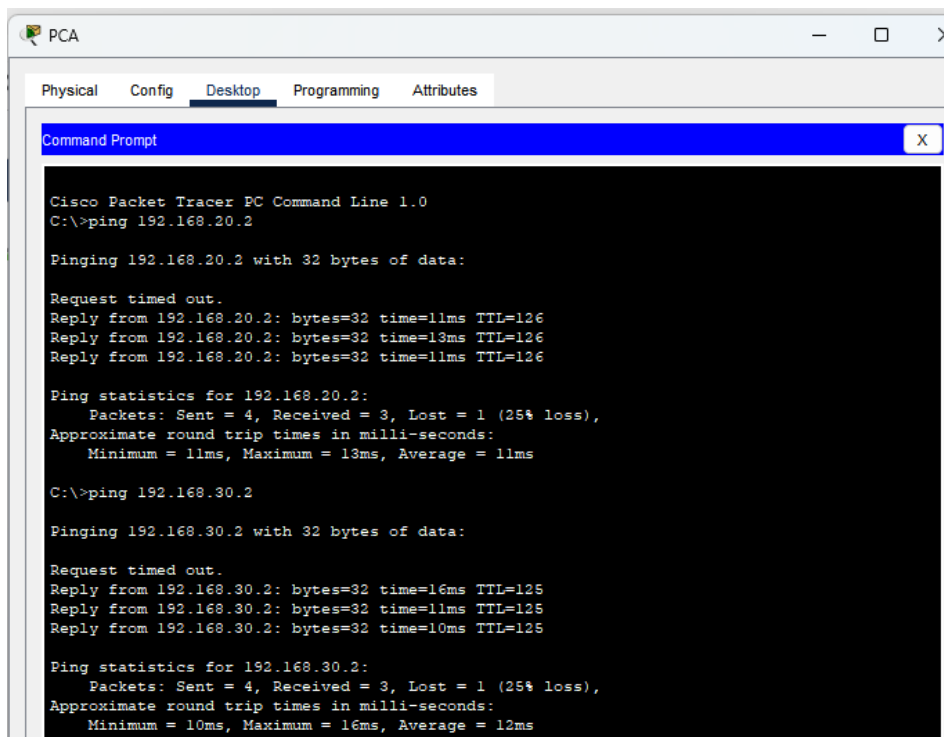
```
RouterC_09010182327004#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF 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

RouterC_09010182327004#
```

## Hasil Ping dari PCA ke PCB dan PCC



```
PCA
Physical Config Desktop Programming Attributes
Command Prompt X

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.20.2

Pinging 192.168.20.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.20.2: bytes=32 time=11ms TTL=126
Reply from 192.168.20.2: bytes=32 time=13ms TTL=126
Reply from 192.168.20.2: bytes=32 time=11ms TTL=126

Ping statistics for 192.168.20.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 11ms, Maximum = 13ms, Average = 11ms

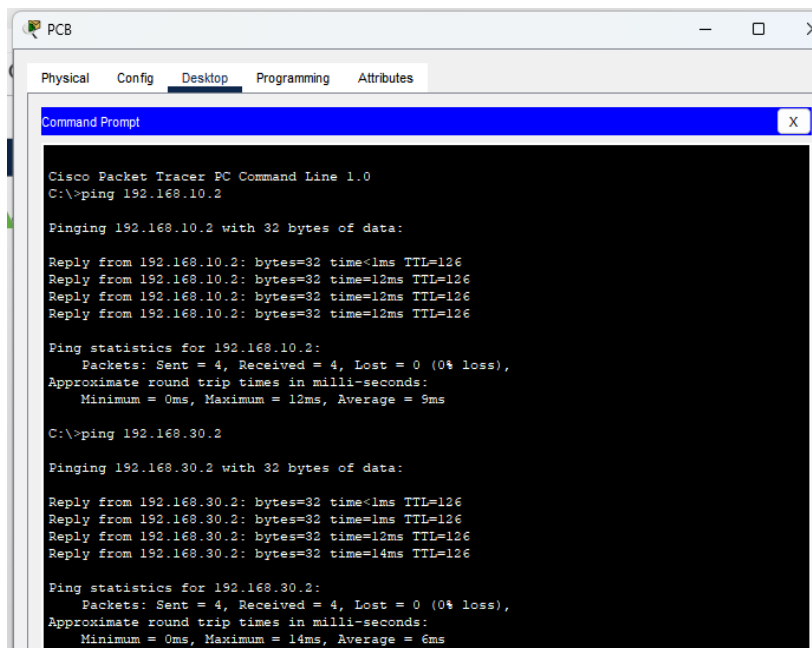
C:\>ping 192.168.30.2

Pinging 192.168.30.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.30.2: bytes=32 time=16ms TTL=125
Reply from 192.168.30.2: bytes=32 time=11ms TTL=125
Reply from 192.168.30.2: bytes=32 time=10ms TTL=125

Ping statistics for 192.168.30.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 10ms, Maximum = 16ms, Average = 12ms
```

## Hasil Ping dari PCB ke PCA dan PCC



```

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=12ms TTL=126
Reply from 192.168.10.2: bytes=32 time=12ms TTL=126
Reply from 192.168.10.2: bytes=32 time=12ms 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 = 12ms, Average = 9ms

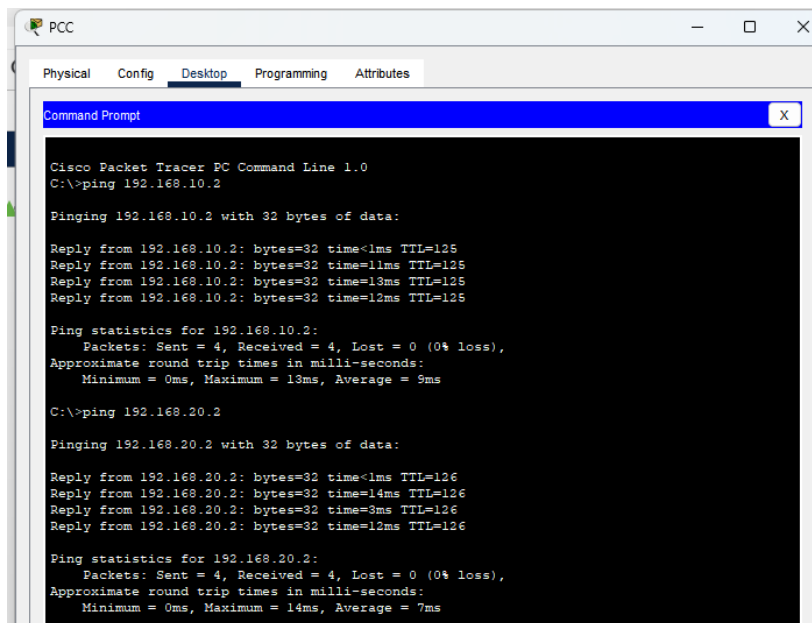
C:\>ping 192.168.30.2

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=12ms TTL=126
Reply from 192.168.30.2: bytes=32 time=14ms 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 = 14ms, Average = 6ms
    
```

## Hasil Ping dari PCC ke PCA dan PCB



```

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=125
Reply from 192.168.10.2: bytes=32 time=11ms TTL=125
Reply from 192.168.10.2: bytes=32 time=13ms TTL=125
Reply from 192.168.10.2: bytes=32 time=12ms 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 = 13ms, Average = 9ms

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=14ms TTL=126
Reply from 192.168.20.2: bytes=32 time=3ms TTL=126
Reply from 192.168.20.2: bytes=32 time=12ms 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 = 14ms, Average = 7ms
    
```

## Tabel hasil ping

No	sumber	Tujuan	Hasil	
			Ya	Tidak
1	PCA	PCB	Ya	
		PCC	Ya	
2	PCB	PCA	Ya	
		PCC	Ya	
3	PCC	PCA	Ya	
		PCB	Ya	



## **Penjelasan Praktikum**

Praktikum ini bertujuan untuk memahami dan mengimplementasikan dua protokol routing, yaitu OSPF (Open Shortest Path First) dan BGP (Border Gateway Protocol), yang memiliki peran penting dalam jaringan IP. Praktikum dilakukan dengan menggunakan perangkat lunak Cisco Packet Tracer, yang memungkinkan simulasi jaringan.

### **1. OSPF:**

OSPF adalah protokol routing berbasis link-state yang menggunakan algoritma Dijkstra untuk menghitung jalur terpendek.

Pada praktikum ini, konfigurasi dilakukan untuk membuat topologi sesuai dengan gambar yang disediakan, dengan konfigurasi IP dan pengaturan routing OSPF pada router yang memastikan setiap router bisa berkomunikasi dengan PC lain di jaringan yang berbeda.

### **2. BGP:**

BGP digunakan untuk menghubungkan Autonomous System (AS) yang berbeda. Protokol ini sering digunakan oleh ISP atau jaringan besar untuk menyediakan jalur routing yang efisien.

Pada praktikum BGP, konfigurasi dilakukan antara router dengan AS berbeda dan menggunakan tetangga BGP agar masing-masing router dapat mengenali dan mengupdate tabel routing dengan benar.

### **Analisis;**

Dari praktikum ini, konfigurasi OSPF dan BGP terlihat memiliki peran masing-masing yang sesuai dengan tujuan implementasinya. OSPF lebih cocok untuk jaringan internal (IGP), mengandalkan struktur area untuk efisiensi dalam jaringan besar. BGP, sebaliknya, berfokus pada routing antar AS yang berbeda dengan mempertimbangkan stabilitas dan konsistensi rute di jaringan global.

Beberapa hal penting yang ditemukan dalam praktikum:

OSPF memiliki kecepatan konvergensi yang cepat dan dapat melakukan penyesuaian cepat terhadap perubahan topologi.

BGP menggunakan pendekatan yang lebih terstruktur melalui path vector dan memiliki skalabilitas tinggi untuk jaringan luas.

### **Kesimpulan;**

Praktikum ini berhasil menunjukkan pentingnya pemahaman terhadap jenis dan implementasi routing protocol. OSPF cocok untuk jaringan internal karena efisiensinya dalam routing dinamis, sementara BGP sangat dibutuhkan dalam koneksi antar jaringan besar.