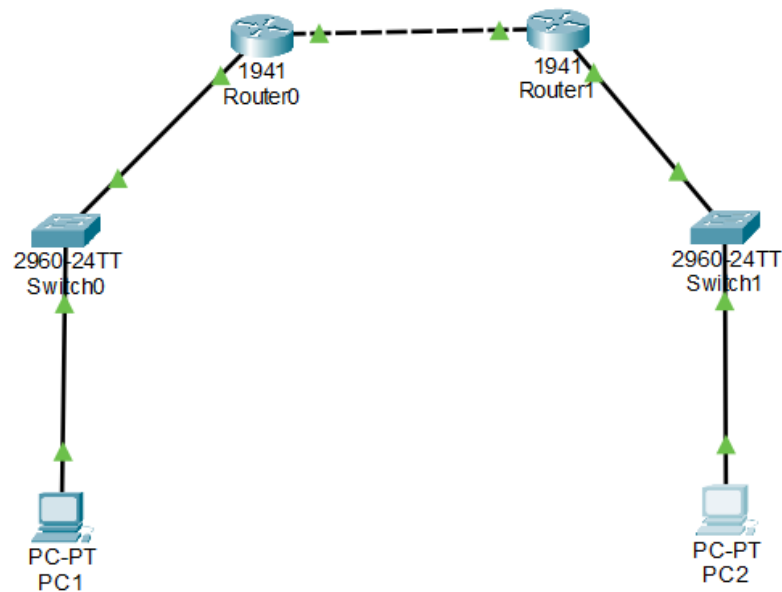Nama:Riski Sapitri
Nim:09010282327025
Kelas:Manajemen Informatika 3A
Mata Kuliah:Prkatikum Jaringan Komputer

OSPF & BGP Dynamic Routing

OSPF


```
Router0_09010282327025>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, 00:49:57, GigabitEthernet0/0

Router0 09010282327025>
```

```
R1_09010282327025>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, 00:44:56, 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

R1_09010282327025>
```

- PC1→PC2

```
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=10ms TTL=254
Reply from 192.168.20.1: bytes=32 time<1ms TTL=254
Reply from 192.168.20.1: bytes=32 time<1ms TTL=254
Reply from 192.168.20.1: bytes=32 time=10ms 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 = 10ms, Average = 5ms

C:\>
```

- PC2→PC1

```
Ping statistics for 192.168.10.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

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=11ms TTL=126
Reply from 192.168.10.2: bytes=32 time=11ms TTL=126
Reply from 192.168.10.2: bytes=32 time=13ms 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 = 13ms, Average = 8ms

C:\>
```

Analisis Percobaan:
Menyiapkan Topologi Jaringan: Menggunakan beberapa router yang terhubung untuk membentuk sebuah jaringan.

Mengaktifkan OSPF: Mengonfigurasi OSPF pada setiap router dengan perintah router ospf.

Menetapkan Router ID: Router ID yang unik diatur pada setiap router agar bisa membedakan satu router dengan lainnya dalam jaringan OSPF.

Menambahkan Jaringan ke OSPF: Jaringan yang terhubung dengan router dimasukkan ke dalam OSPF menggunakan perintah network IP wildcard mask area.

Verifikasi Rute: Menggunakan perintah show ip route untuk memastikan rute yang diterima melalui OSPF.

Kesimpulan:
Percobaan OSPF menunjukkan bahwa OSPF adalah protokol routing yang efisien, andal, dan cocok untuk jaringan besar dan dinamis. OSPF mampu melakukan konvergensi dengan cepat, menangani perubahan topologi, dan menjaga kestabilan jaringan dengan memperbarui rute secara otomatis. Keunggulan seperti kemampuan untuk mengelompokkan jaringan ke dalam Area, menghindari looping, serta mengelola jaringan yang lebih besar menjadikan OSPF pilihan yang tepat untuk implementasi dalam lingkungan jaringan yang kompleks.

BGP
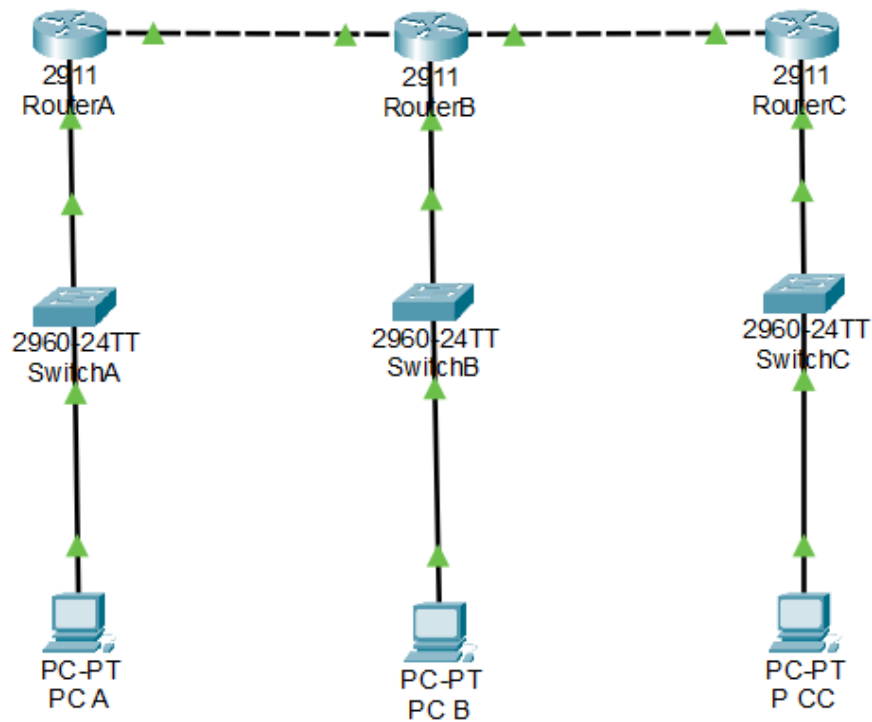
- RouterA

```
RouterA_09010282327025>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

RouterA_09010282327025>
```

- RouterB

```
RouterB_09010282327025>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

RouterB 09010282327025>
```

- Router3

```
Router3_09010282327025#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

     192.168.20.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.20.0/24 is directly connected, GigabitEthernet0/0
L        192.168.20.2/32 is directly connected, GigabitEthernet0/0
     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

Router3_09010282327025#
```

```
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<1ms TTL=126
Reply from 192.168.20.2: bytes=32 time=11ms TTL=126
Reply from 192.168.20.2: bytes=32 time=13ms 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 = 0ms, Maximum = 13ms, Average = 8ms
```

```
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=11ms TTL=126
Reply from 192.168.10.2: bytes=32 time=13ms TTL=126
Reply from 192.168.10.2: bytes=32 time=14ms TTL=126
Reply from 192.168.10.2: bytes=32 time=14ms 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 = 14ms, Average = 13ms
```

```
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=255
Reply from 192.168.20.2: bytes=32 time=1ms TTL=255
Reply from 192.168.20.2: bytes=32 time<1ms TTL=255
Reply from 192.168.20.2: bytes=32 time<1ms TTL=255

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:\>
```

Analisis percobaan:
Percobaan BGP bertujuan untuk mengonfigurasi dan memahami cara kerja BGP dalam memilih rute antar-AS (Autonomous System). BGP menggunakan atribut seperti AS Path, Local Preference, dan MED untuk memilih jalur terbaik. Setelah konfigurasi BGP selesai, router mulai bertukar informasi rute dengan router tetangga dan memilih jalur optimal berdasarkan kebijakan yang ditentukan.

Kesimpulan:
BGP efektif untuk routing antar-AS, menawarkan skalabilitas tinggi dan fleksibilitas dalam menerapkan kebijakan routing. Meskipun waktu konvergensinya lebih lama, BGP adalah pilihan utama untuk jaringan besar dan kompleks yang membutuhkan kontrol penuh terhadap pemilihan jalur.