

Konfigurasi OSPF Multi Area Pada Cisco Router

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Interior Gateway Protocol (IGP) Interior Gateway Protocol merupakan protokol yang biasa digunakan untuk bertukar informasi routing di antara node node dalam suatu jaringan autonomous (jaringan yang dikelola 1 manajemen). Pada igp (interior gateway protocol) dikenal 3 jenis metode dynamic routing :

Metode 1 : DV (Distance Vector Routing)

Tanpa info topologi jaringan lengkap, tiap router melakukan broadcast informasi distance value (dv) ke router lain dan juga menerima broadcast informasi dv dari router lainnya. algoritma DV berasal dari algoritma Bellman-Ford. Untuk pemahaman mendalam tentang logika algoritma Bellman Ford, jika sempat akan saya tulis dalam artikel lainnya.

Metode 3 : Linkstate Routing

Tiap router memiliki informasi topologi jaringan lengkap. Berdasarkan informasi tadi, setiap router menghitung logical path terbaik sebagai next hops.

Metode 3 : Hybrid

Gabungan linkstate dan dv

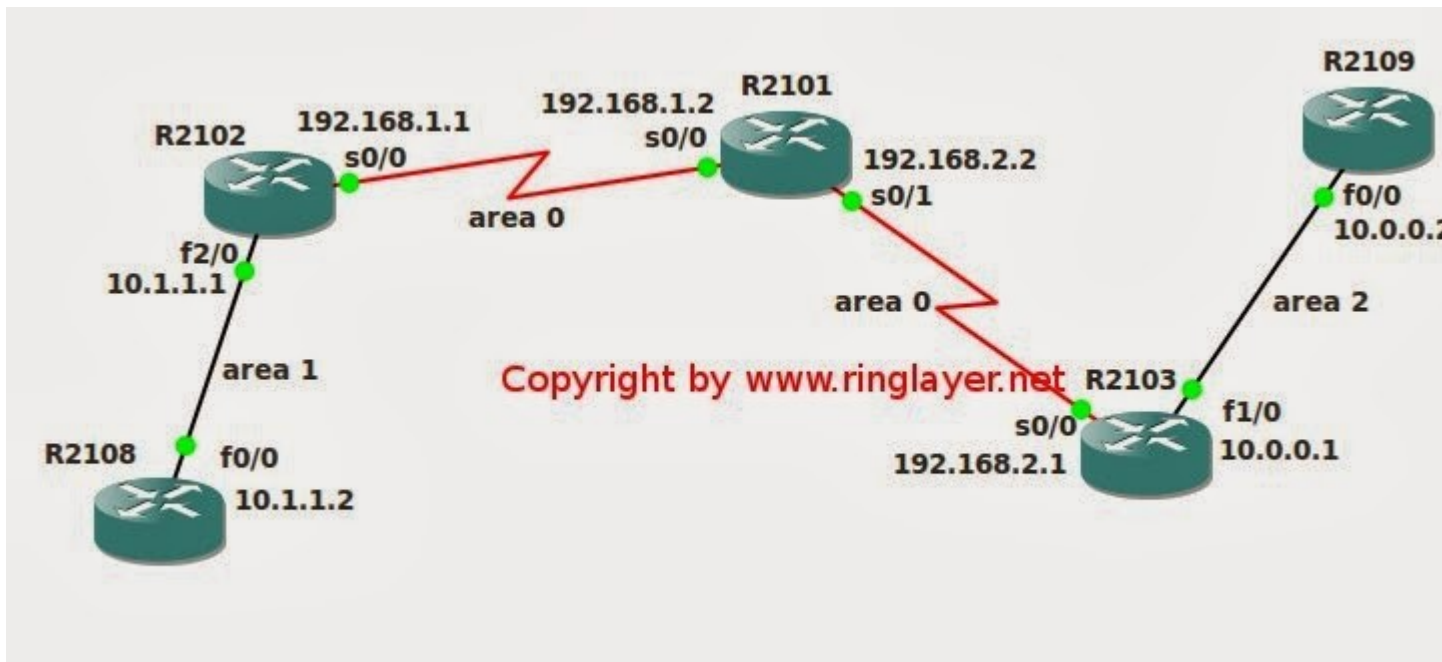
Ketiga jenis routing di atas disebut sebagai dynamic routing karena mekanismenya menggunakan sistem update table routing, berbeda dengan static routing yang tidak menggunakan algoritma untuk update routing table.

Konfigurasi OSPF IGP

Topologi

Open Shortest Fast First termasuk protokol igp yang menggunakan algoritma linkstate routing. Pada

kesempatan kali ini kita akan menggunakan suatu topologi sederhana untuk ospf dengan 3 area :



Keterangan Topologi

Pada topologi di atas kita memiliki 3 ospf area yaitu :

- Area 0 : link antara R2101 dan R2102, dan link antara R2101 dan R2103
- Area 1 : link antara R2108 dan R2102
- Area 2 : link antara R2109 dan R2103

Konfigurasi IP Address

Langkah pertama seperti biasa, lakukan konfigurasi ip address

Konfigurasi Pada R2102

```
R2102#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2102(config)#int s0/0
R2102(config-if)#ip address 192.168.1.1 255.255.255.0
R2102(config-if)#no shut
R2102(config-if)#int f2/0
R2102(config-if)#ip address 10.1.1.1 255.255.255.0
R2102(config-if)#no shut
R2102(config-if)#exit
```

Konfigurasi Pada R2101

```
R2101#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2101(config)#int s0/0
R2101(config-if)#ip address 192.168.1.2 255.255.255.0
R2101(config-if)#no shut
R2101(config-if)#int s0/1
R2101(config-if)#ip address 192.168.2.2 255.255.255.0
```

```
R2101(config-if)#no shut
R2101(config-if)#exit
```

Konfigurasi Pada R2103

```
R2103#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2103(config)#int s0/0
R2103(config-if)#ip address 192.168.2.1 255.255.255.0
R2103(config-if)#no shut
R2103(config-if)#int f1/0
R2103(config-if)#ip address 10.0.0.1 255.255.255.0
R2103(config-if)#no shut
R2103(config-if)#exit
```

Konfigurasi Pada R2108

```
R2108>ena
R2108#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2108(config)#interface FastEthernet0/0
R2108(config-if)#ip address 10.1.1.2 255.255.255.0
R2108(config-if)#no shut
R2109(config-if)#exit
```

Konfigurasi Pada R2109

```
R2109>ena
R2109#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2109(config)#int f0/0
R2109(config-if)#ip address 10.0.0.2 255.255.255.0
R2109(config-if)#no shut
R2109(config-if)#exit
```

Inverse Mask

Sebelum mengkonfigurasi area kita perlu memahami inverse mask. Pada contoh di atas kita menggunakan subnet mask 255.255.255.0, di sini sengaja sama semua untuk memudahkan. Untuk membuat inverse mask dari 255.255.255.0 caranya pertama tama adalah lakukan konversi semua octet menjadi binary :

255 sebagai octet pertama kita convert menjadi 11111111, di mana untuk melakukan inverse mask kita tinggal mengganti byte 1 menjadi 0 sehingga octet 255 adalah: 00000000 atau 0 desimal, hal yang sama kita lakukan pada octet lainnya, pada akhirnya yang berbeda adalah octet terakhir yaitu : 0 kita convert ke binary menjadi 00000000 jika diinverse menjadi 11111111 atau 255 desimal. Sehingga inverse mask dari 255.255.255.0 adalah 0.0.0.255.

Konfigurasi Area

Langkah selanjutnya setelah melakukan konfigurasi ip address adalah melakukan konfigurasi ospf area agar node-node dalam as terpopulasi dengan baik. Ini merupakan konfigurasi terakhir yang akan kita lakukan.

Berikut ini konfigurasi ospf area, di sini ada 3 area yaitu area 0, area 1 dan area 2 (seperti tercantum di topologi) :

Konfigurasi pada R2101:

```
R2101#conf t
R2101(config)#no router rip
R2101(config)#router ospf 100
R2101(config-router)#log-adjacency-changes
R2101(config-router)#network 192.168.1.2 0.0.0.255 area 0
```

```
R2101(config-router)#network 192.168.2.2 0.0.0.255 area 0
R2101(config-router)#exit
```

Konfigurasi pada R2102:

```
R2102#conf t
R2102(config)#no router rip
R2102(config)#router ospf 100
R2102(config-router)#router-id 10.1.1.1
R2102(config-router)#log-adjacency-changes
R2102(config-router)#network 192.168.1.1 0.0.0.255 area 0
R2102(config-router)#network 10.1.1.1 0.0.0.255 area 1
R2102(config-router)#area 1 virtual-link 10.1.1.2
R2102(config-router)#exit
```

Konfigurasi pada R2108:

```
R2108#conf t
R2108(config)#no router rip
R2108(config)#router ospf 108
R2108(config-router)#router-id 10.1.1.2
R2108(config-router)#network 10.1.1.2 0.0.0.255 area 1
R2108(config-router)#area 1 virtual-link 10.1.1.1
R2108(config-router)#exit
```

Konfigurasi pada R2103:

```
R2103#conf t
R2103(config)#no router rip
R2103(config)#router ospf 100
R2103(config-router)#router-id 10.0.0.1
R2103(config-router)#log-adjacency-changes
R2103(config-router)#network 192.168.2.1 0.0.0.255 area 0
R2103(config-router)#network 10.0.0.1 0.0.0.255 area 2
R2103(config-router)#area 2 virtual-link 10.0.0.2
R2103(config-router)#exit
```

Konfigurasi pada R2109:

```
R2109#conf t
R2109(config)#no router rip
R2109(config)#router ospf 109
R2109(config-router)#router-id 10.0.0.2
R2109(config-router)#network 10.0.0.2 0.0.0.255 area 2
R2109(config-router)#area 2 virtual-link 10.0.0.1
R2109(config-router)#exit
```

Untuk konfirmasi bisa dicek dengan sh ip route pada masing masing router :

Pada R2108

```
R2108#sh ip route
Codes: 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
        i - IS-IS, su - IS-IS summary, 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

    10.0.0.0/24 is subnetted, 2 subnets
C       10.1.1.0 is directly connected, FastEthernet0/0
O IA    10.0.0.0 [110/130] via 10.1.1.1, 00:01:47, FastEthernet0/0
O       192.168.1.0/24 [110/65] via 10.1.1.1, 00:01:47, FastEthernet0/0
O       192.168.2.0/24 [110/129] via 10.1.1.1, 00:01:47, FastEthernet0/0
R2108#
```

Pada R2102

```
R2108#sh ip route
Codes: 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
        i - IS-IS, su - IS-IS summary, 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

    10.0.0.0/24 is subnetted, 2 subnets
C       10.1.1.0 is directly connected, FastEthernet0/0
O IA    10.0.0.0 [110/130] via 10.1.1.1, 00:01:47, FastEthernet0/0
O       192.168.1.0/24 [110/65] via 10.1.1.1, 00:01:47, FastEthernet0/0
O       192.168.2.0/24 [110/129] via 10.1.1.1, 00:01:47, FastEthernet0/0
R2108#
```

Pada R2101

```
R2108#sh ip route
Codes: 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
       i - IS-IS, su - IS-IS summary, 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

    10.0.0.0/24 is subnetted, 2 subnets
C       10.1.1.0 is directly connected, FastEthernet0/0
O IA    10.0.0.0 [110/130] via 10.1.1.1, 00:01:47, FastEthernet0/0
O       192.168.1.0/24 [110/65] via 10.1.1.1, 00:01:47, FastEthernet0/0
O       192.168.2.0/24 [110/129] via 10.1.1.1, 00:01:47, FastEthernet0/0
R2108#
```

Pada R2103

```
R2108#sh ip route
Codes: 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
       i - IS-IS, su - IS-IS summary, 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

    10.0.0.0/24 is subnetted, 2 subnets
C       10.1.1.0 is directly connected, FastEthernet0/0
O IA    10.0.0.0 [110/130] via 10.1.1.1, 00:01:47, FastEthernet0/0
O       192.168.1.0/24 [110/65] via 10.1.1.1, 00:01:47, FastEthernet0/0
O       192.168.2.0/24 [110/129] via 10.1.1.1, 00:01:47, FastEthernet0/0
R2108#
```


Pada R2109

```
R2108#sh ip route
Codes: 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
       i - IS-IS, su - IS-IS summary, 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

10.0.0.0/24 is subnetted, 2 subnets
C      10.1.1.0 is directly connected, FastEthernet0/0
O IA   10.0.0.0 [110/130] via 10.1.1.1, 00:01:47, FastEthernet0/0
O      192.168.1.0/24 [110/65] via 10.1.1.1, 00:01:47, FastEthernet0/0
O      192.168.2.0/24 [110/129] via 10.1.1.1, 00:01:47, FastEthernet0/0
R2108#
```

Untuk pengujian konektivitas cukup dites dengan ping dari R2108 ke edge R2109 (edge to edge testing):

```
R2108#sh ip int brief
Interface      IP-Address      OK? Method Status      Protocol
FastEthernet0/0 10.1.1.2        YES NVRAM    up          up
Serial1/0       unassigned      YES NVRAM    administratively down down
Serial1/1       unassigned      YES NVRAM    administratively down down
Serial1/2       unassigned      YES NVRAM    administratively down down
Serial1/3       unassigned      YES NVRAM    administratively down down
FastEthernet2/0 unassigned      YES unset   up          down
FastEthernet2/1 unassigned      YES unset   up          down
FastEthernet2/2 unassigned      YES unset   up          down
FastEthernet2/3 unassigned      YES unset   up          down
FastEthernet2/4 unassigned      YES unset   up          down
FastEthernet2/5 unassigned      YES unset   up          down

R2108#ping 10.0.0.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.0.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 20/28/40 ms
R2108#
```

dan dari R2109 ke R2108 :

```
R2109#sh ip int brief
Interface                IP-Address      OK? Method Status      Protocol
FastEthernet0/0          10.0.0.2        YES NVRAM    up          up
Serial1/0                 unassigned      YES NVRAM    administratively down down
Serial1/1                 unassigned      YES NVRAM    administratively down down
Serial1/2                 unassigned      YES NVRAM    administratively down down
Serial1/3                 unassigned      YES NVRAM    administratively down down
FastEthernet2/0           unassigned      YES unset   up          down
FastEthernet2/1           unassigned      YES unset   up          down
FastEthernet2/2           unassigned      YES unset   up          down
FastEthernet2/3           unassigned      YES unset   up          down
FastEthernet2/4           unassigned      YES unset   up          down
FastEthernet2/5           unassigned      YES unset   up          down

R2109#ping 10.1.1.2      Copyright by www.ringlayer.net

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 16/26/40 ms
R2109#
```

Sekian semoga bermanfaat dan cukup informatif.