LAPORAN TUGAS PRAKTIKUM LAN SWITCHING 7

PENGENALAN SERTA BASIC IMPLEMENTASI CISCO PACKET TRACER (PORT SECURITY - ETHERCHANNEL)

Disusun oleh:

Jonatan : 1222002006
M.David Hollyday Eldo :1222002012
Muhammad Fabian : 1212002010
Reza Juliandry :1222002021
Sahrul Rizal : 1222002011
Shabbrina :1222002007

SISTEM INFORMASI
Fakultas Teknik Dan Ilmu Komputer
Universitas Bakrie
Kawasan Rasuna Epicentrum Jl. HR Rasuna Said Kav C–22, Kuningan, Jakarta Selatan.
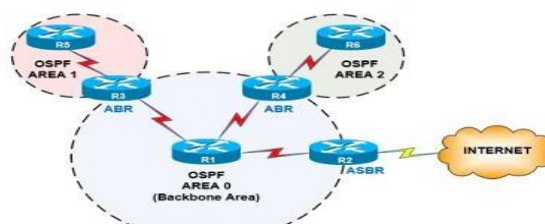Website: http://www.bakrie.ac.id/

DYNAMIC ROUTING OSPF

Protokol routing dinamis Open Shortest Path First (OSPF) dibuat untuk mengatasi batasan Routing Information Protocol (RIP) saat mengelola jaringan yang lebih besar dan kompleks. Berikut adalah beberapa poin penting yang berkaitan dengan OSPF:

➢ Algoritma Djikstra: Algoritma Djikstra membantu OSPF memilih rute terbaik berdasarkan keandalan, jarak, dan kecepatan.
➢ Protokol Link State: OSPF adalah bagian dari Interior Gateway Protocol (IGP), yang memungkinkan jalur dengan bandwidth atau biaya matrix terkecil.
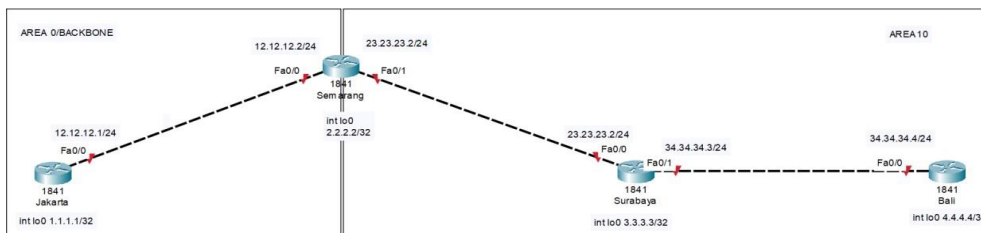
Oleh karena itu, OSPF adalah salah satu protokol routing dinamis terbaik yang cocok untuk jaringan yang rumit.

Dyamic Routing OSPF

Tugas praktikum :

Dokumentasi Dynamic routing OSPF

1. **Configurasi IP add router JKT :**

```
Router>
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 12.12.12.1 255.0.0.0
Router(config-if)#ip address 12.12.12.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state
to up
```

Config Routing OSPF + IP Loopback

```
Router(config)#router ospf 10
Router(config-router)#network 12.12.12.0 0.0.0.255 area 0
Router(config-router)#network 1.1.1.1 0.0.0.0 area 0
Router(config-router)#
```

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int loopback 0

Router(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up

Router(config-if)#ip add 1.1.1.1 255.255.255.255
Router(config-if)#
```

2. Configurasi IP add router SMG :

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 12.12.12.2 255.0.0.0
Router(config-if)#ip address 12.12.12.2 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state
to up

Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#ip address 23.23.23.2 255.0.0.0
Router(config-if)#ip address 23.23.23.2 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state
to up
```

Config Routing OSPF + IP Loopback :

```
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 10
Router(config-router)#network 12.12.12.0 0.0.0.255 area 0
Router(config-router)#network 23.23.23.0 0.0.0.255 area 10
Router(config-router)#network 2.2.2.2 0.0.0.0 area 10
Router(config-router)#
```

```
Router(config-router)#ex
Router(config)#int loopback 0

Router(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up

Router(config-if)#ip add 2.2.2.2 255.255.255.255
Router(config-if)#
```

3. Configurasi IP add router SBY :

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 23.23.23.2 255.0.0.0
Router(config-if)#ip address 23.23.23.3 255.0.0.0
Router(config-if)#ip address 23.23.23.3 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state
to up

Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#ip address 34.34.34.3 255.0.0.0
Router(config-if)#ip address 34.34.34.3 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state
to up
```

Config Routing OSPF + IP Loopback :

```
Router(config-router)#ex
Router(config)#router ospf 10
Router(config-router)#network 34.34.34.0 0.0.0.255 area 10
Router(config-router)#network 23.23.23.0 0.0.0.255 area 10
Router(config-router)#network 3.3.3.3 0.0.0.0 area 10
Router(config-router)#
```

```
Router(config-router)#ex
Router(config)#int loopback 0

Router(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up

Router(config-if)#ip add 3.3.3.3 255.255.255.255
Router(config-if)#
```

Configurasi IP add router BALI :

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 34.34.34.4 255.0.0.0
Router(config-if)#ip address 34.34.34.4 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state
to up
```

Config Routing OSPF + IP Loopback :

```
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 10
Router(config-router)#network 34.34.34.0 0.0.0.255 area 10
Router(config-router)#network 4.4.4.4 0.0.0.0 area 10
Router(config-router)#
```

```
Router(config)#int loopback 0

Router(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up

Router(config-if)#ip add 4.4.4.4 255.255.255.255
Router(config-if)#
```

VERIFIKASI :

```
Router>en
Router#
Router#show ip route ospf
     1.0.0.0/32 is subnetted, 1 subnets
O       1.1.1.1 [110/2] via 12.12.12.1, 00:05:51, FastEthernet0/0
     3.0.0.0/32 is subnetted, 1 subnets
O       3.3.3.3 [110/2] via 23.23.23.3, 00:02:18, FastEthernet0/1
     4.0.0.0/32 is subnetted, 1 subnets
O       4.4.4.4 [110/3] via 23.23.23.3, 00:01:15, FastEthernet0/1
     34.0.0.0/24 is subnetted, 1 subnets
O       34.34.34.0 [110/2] via 23.23.23.3, 00:11:23, FastEthernet0/1

Router#show ip ospf neigh


Neighbor ID     Pri   State          Dead Time   Address         Interface
12.12.12.1       1    FULL/DR        00:00:36    12.12.12.1
FastEthernet0/0
34.34.34.3       1    FULL/BDR       00:00:33    23.23.23.3
FastEthernet0/1
```

```
Router#show ip ospf neigh


Neighbor ID      Pri   State           Dead Time   Address         Interface
12.12.12.1         1   FULL/DR         00:00:36    12.12.12.1      FastEthernet0/0
34.34.34.3         1   FULL/BDR        00:00:33    23.23.23.3      FastEthernet0/1
Router#show ip ospf database
              OSPF Router with ID (23.23.23.2) (Process ID 10)

              Router Link States (Area 0)

Link ID          ADV Router       Age         Seq#        Checksum Link count
23.23.23.2       23.23.23.2       901         0x80000003 0x005a1e 1
12.12.12.1       12.12.12.1       396         0x80000003 0x00cfd9 2

              Net Link States (Area 0)
Link ID          ADV Router       Age         Seq#        Checksum
12.12.12.1       12.12.12.1       953         0x80000001 0x004ad5

              Summary Net Link States (Area 0)
Link ID          ADV Router       Age         Seq#        Checksum
23.23.23.0       23.23.23.2       891         0x80000001 0x001eb3
34.34.34.0       23.23.23.2       721         0x80000002 0x009816
2.2.2.2          23.23.23.2       292         0x80000003 0x00fc10
3.3.3.3          23.23.23.2       179         0x80000004 0x00d630
4.4.4.4          23.23.23.2       115         0x80000005 0x00b050

              Router Link States (Area 10)

Link ID          ADV Router       Age         Seq#        Checksum Link count
23.23.23.2       23.23.23.2       297         0x80000003 0x002dee 2
34.34.34.3       34.34.34.3       184         0x80000005 0x0016d8 3
34.34.34.4       34.34.34.4       120         0x80000003 0x00d4b4 2

              Net Link States (Area 10)
Link ID          ADV Router       Age         Seq#        Checksum
23.23.23.2       23.23.23.2       725         0x80000001 0x008325
34.34.34.3       34.34.34.3       598         0x80000001 0x001142

              Summary Net Link States (Area 10)
Link ID          ADV Router       Age         Seq#        Checksum
12.12.12.0       23.23.23.2       895         0x80000001 0x00ac46
1.1.1.1          23.23.23.2       391         0x80000002 0x0037d9
Router#
```
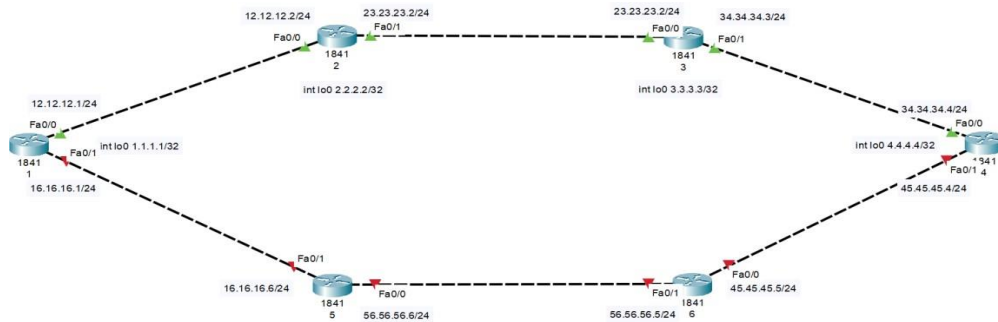
Test Packet Sukses

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete	
	Successful	Jakarta	Semarang	ICMP		0.000	N	0	(edit)		(delete)
	Successful	Jakarta	Surabaya	ICMP		0.000	N	1	(edit)		(delete)
	Successful	Jakarta	Bali	ICMP		0.000	N	2	(edit)		(delete)
	Successful	Bali	Jakarta	ICMP		0.000	N	3	(edit)		(delete)

OSPF Redundancy

Dalam OSPF, redundansi berarti kemampuan jaringan untuk beroperasi dengan baik meskipun terjadi kegagalan pada salah satu bagian jaringan. Ada beberapa cara untuk mencapai redundansi dalam OSPF:

➢ Router Ditetapkan (DR) dan Router Backup Ditetapkan (BDR): Dalam jaringan OSPF, DR dan BDR dipilih untuk mengurangi jumlah pesan yang harus dikirim antara router. DR mengirimkan informasi topologi ke semua router di area, sementara BDR bertanggung jawab untuk menangani kegagalan DR.

➢ Banyak Area: Menggunakan lebih dari satu area OSPF memungkinkan untuk mengisolasi kegagalan di satu area tanpa mempengaruhi area lainnya. Ini meningkatkan redundansi dan mengurangi dampak kegagalan.

➢ Redistribusi: Menggabungkan OSPF dengan protokol routing lain, seperti BGP atau EIGRP, memungkinkan penggabungan rute dari berbagai sumber. Dalam kasus di mana satu jalur gagal, rute alternatif dapat diambil dari protokol routing lain.

➢ Virtual Link: Anda dapat menggunakan virtual link untuk menghubungkan area yang tidak terhubung langsung ke Area 0 (Backbone) melalui area lain. Ini memastikan konektivitas bahkan jika ada kegagalan di area tertentu.

Tugas Praktikum :

Diatas adalah contoh dokumentasi OSPF Redundancy

Disini untuk configurasi dari router 1 sampai dengan ruouter 4 ssama sperti config sebelumnya jadi kita hanya menambah 2 router lagi :

1. Router 1 OSPF :

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 16.16.16.0 0.0.0.255 area 0
Router(config-router)#network 12.12.12.0 0.0.0.255 area 0
Router(config-router)#network 1.1.1.1 0.0.0.0 area 0
Router(config-router)#ex
Router(config)#int fa0/0
Router(config-if)#ip ospf cost 100
Router(config-if)#
```

2. Router 2 OSPF :

```
Router(config-if)#ex
Router(config)#router ospf 1
Router(config-router)#network 23.23.23.0 0.0.0.255 area 0
Router(config-router)#network 12.12.12.0 0.0.0.255 area 0
Router(config-router)#network 2.2.2.2 0.0.0.0 area 0
Router(config-router)#ex
Router(config)#int fa0/0
Router(config-if)#bandwith 10000
                        ^
% Invalid input detected at '^' marker.

Router(config-if)#bandwidth 10000
Router(config-if)#
```

3. Router 3 OSPF :

```
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 34.34.34.0 0.0.0.255 area 0
Router(config-router)#network 23.23.23.0 0.0.0.255 area 0
Router(config-router)#network 3.3.3.3 0.0.0.0 area 0
Router(config-router)#ex
Router(config)#
```

4. Router 4 OSPF :

```
Router(config)#
Router(config)#router ospf 1
Router(config-router)#network 34.34.34.0 0.0.0.255 area 0
Router(config-router)#network 45.45.45.0 0.0.0.255 area 0
Router(config-router)#network 4.4.4.4 0.0.0.255 area 0
Router(config-router)#
```

5. Router 5 OSPF :

```
Router(config)#
Router(config)#router ospf 1
Router(config-router)#network 56.56.56.0 0.0.0.255 area 0
Router(config-router)#network 45.45.45.0 0.0.0.255 area 0
Router(config-router)#network 5.5.5.5 0.0.0.0 area 0
Router(config-router)#
```

6. Router 6 OSPF :

```
Router(config)#
Router(config)#router ospf 1
Router(config-router)#network 56.56.56.0 0.0.0.255 area 0
Router(config-router)#network 16.16.16.0 0.0.0.255 area 0
Router(config-router)#network 6.6.6.6 0.0.0.0 area 0
Router(config-router)#
```

Setiap router harus mengatur setting pereference bandwithnya dengan cara ini:

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#auto-cost reference-bandwidth 100000
% OSPF: Reference bandwidth is changed.
        Please ensure reference bandwidth is consistent across all routers.
Router(config-router)#
```

Konfigurasi ini memastikan bahwa redundansi OSPF dan metrik biaya disesuaikan dengan persyaratan yang ditunjukkan pada diagram. Pemilihan jalur OSPF akan dipengaruhi oleh ketentuan jika bandwidth OSPF atau biayanya berubah pada interface tertentu.

Verifikasi :

```
Router#sh ip ospf interface

Loopback0 is up, line protocol is up
  Internet address is 1.1.1.1/32, Area 0
  Process ID 1, Router ID 1.1.1.1, Network Type LOOPBACK, Cost: 12
  Loopback interface is treated as a stub Host
FastEthernet0/0 is up, line protocol is up
  Internet address is 16.16.16.1/24, Area 0
  Process ID 1, Router ID 1.1.1.1, Network Type BROADCAST, Cost: 100
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 1.1.1.1, Interface address 16.16.16.1
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:09
  Index 2/2, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 0, Adjacent neighbor count is 0
  Suppress hello for 0 neighbor(s)
FastEthernet0/1 is up, line protocol is up
  Internet address is 12.12.12.1/24, Area 0
  Process ID 1, Router ID 1.1.1.1, Network Type BROADCAST, Cost: 1000
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 1.1.1.1, Interface address 12.12.12.1
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:04
  Index 3/3, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 0, Adjacent neighbor count is 0
  Suppress hello for 0 neighbor(s)
Router#
```