



ROUTE SUMMARIZATION OSPF, EIGRP dan RIPv2

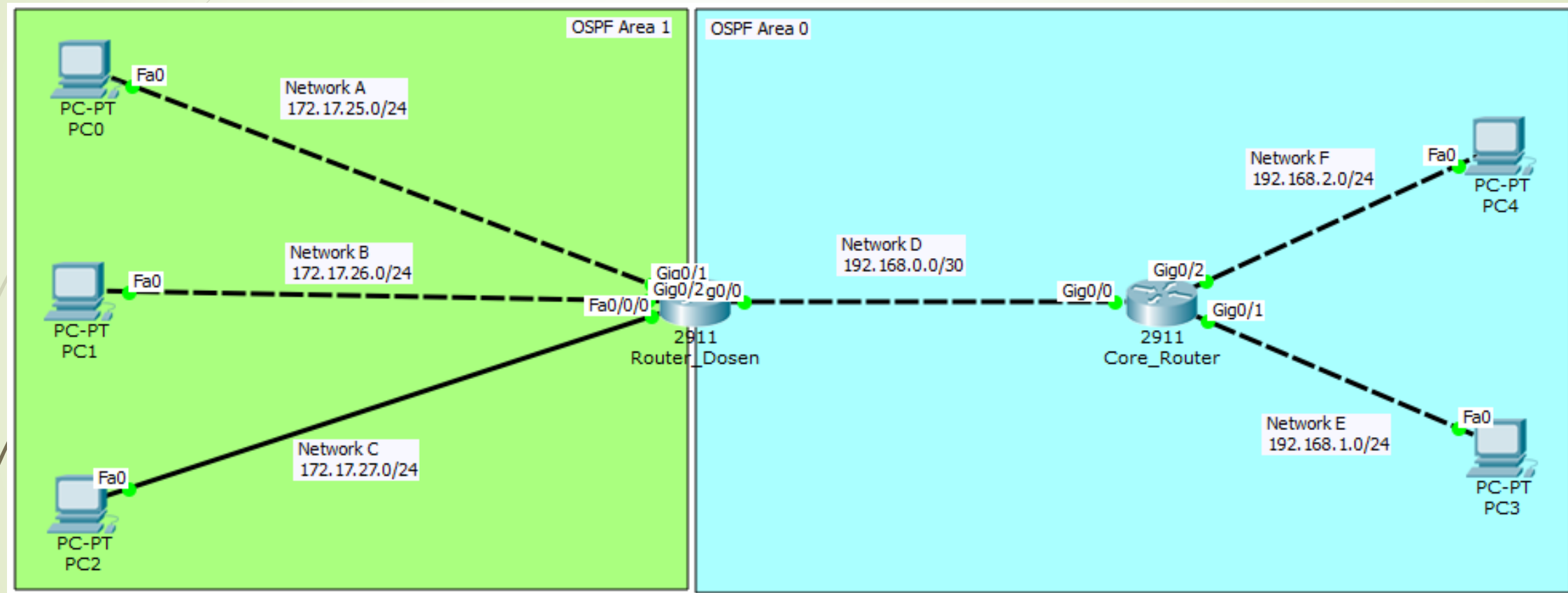
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FILE TEMPLATE TOPOLOGI CISCO PACKET TRACER

- File template topologi jaringan yang digunakan untuk mengujicoba *route summarization* dapat diunduh di alamat <https://goo.gl/a7WixM>.
- File template ini dapat dibuka menggunakan aplikasi Cisco Packet Tracer versi 6.2 Didalamnya memuat 3 file masing-masing untuk template konfigurasi *route summarization* di routing protocol OSPF, EIGRP dan RIPv2.
- File template telah memiliki konfigurasi dasar untuk setiap perangkat baik PC maupun router seperti pengalamatan IP pada setiap interface yang diatur secara manual.

OSPF NETWORK TOPOLOGY



KONFIGURASI OSPF DI ROUTER_DOSEN

1. Berpindah dari user mode ke privilege mode
`ROUTER_DOSEN>enable`
2. Berpindah dari privilege mode ke global configuration mode.
`ROUTER_DOSEN#conf t`
3. Mengaktifkan routing protocol OSPF dengan process ID 1.
`ROUTER_DOSEN(config)#router ospf 1`
4. Mengatur alamat jaringan pada router yang menjadi bagian dari jaringan OSPF.
192.168.0.0/30 dituliskan menggunakan wildcard subnet
`ROUTER_DOSEN(config-router)#network 192.168.0.0 0.0.0.3 area 0`

Network A, B, C dituliskan menggunakan alamat network classfull 172.17.0.0/16 dengan wildcard network
`ROUTER_DOSEN(config-router)#network 172.17.0.0 0.0.255.255 area 1`
5. Berpindah ke privilege mode
`ROUTER_DOSEN(config-router)#end`

INFORMASI ROUTING PROTOCOL YANG AKTIF DI ROUTER_DOSEN

```
ROUTER_DOSEN#show ip protocols
```

```
Routing Protocol is "ospf 1"
```

```
Outgoing update filter list for all interfaces is not set
```

```
Incoming update filter list for all interfaces is not set
```

```
Router ID 192.168.0.1
```

```
Number of areas in this router is 2. 2 normal 0 stub 0 nssa
```

```
Maximum path: 4
```

```
Routing for Networks:
```

```
192.168.0.0 0.0.0.255 area 0
```

```
172.17.0.0 0.0.255.255 area 1
```

```
Routing Information Sources:
```

Gateway	Distance	Last Update
192.168.0.1	110	00:17:02
192.168.2.1	110	00:19:35

```
Distance: (default is 110)
```

KONFIGURASI OSPF DI CORE_ROUTER

1. Berpindah dari user mode ke privilege mode
`CORE_ROUTER>enable`
2. Berpindah dari privilege mode ke global configuration mode.
`CORE_ROUTER#conf t`
3. Mengaktifkan routing protocol OSPF dengan process ID 1.
`CORE_ROUTER(config)#router ospf 1`
4. Mengatur alamat jaringan pada router yang menjadi bagian dari jaringan OSPF.

192.168.0.0/30 dituliskan menggunakan wildcard subnet

`CORE_ROUTER(config-router)#network 192.168.0.0 0.0.0.3 area 0`

192.168.1.0/24 dituliskan menggunakan wildcard network

`CORE_ROUTER(config-router)#network 192.168.1.0 0.0.0.255 area 0`

Alamat IP pada interface GigabitEthernet0/2 yaitu 192.168.2.1 dituliskan menggunakan wildcard host untuk mewakili Network F 192.168.2.0/24

`CORE_ROUTER(config-router)#network 192.168.2.1 0.0.0.0 area 0`

5. Berpindah ke privilege mode
`CORE_ROUTER(config-router)#end`

INFORMASI ROUTING PROTOCOL YANG AKTIF DI CORE_ROUTER

```
CORE_ROUTER#show ip protocols
```

```
Routing Protocol is "ospf 1"
```

```
Outgoing update filter list for all interfaces is not set
```

```
Incoming update filter list for all interfaces is not set
```

```
Router ID 192.168.2.1
```

```
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
```

```
Maximum path: 4
```

```
Routing for Networks:
```

```
192.168.0.0 0.0.0.3 area 0
```

```
192.168.1.0 0.0.0.255 area 0
```

```
192.168.2.1 0.0.0.0 area 0
```

```
Routing Information Sources:
```

Gateway	Distance	Last Update
---------	----------	-------------

192.168.0.1	110	00:07:27
-------------	-----	----------

192.168.2.1	110	00:00:08
-------------	-----	----------

```
Distance: (default is 110)
```

INFORMASI TABEL ROUTING DI ROUTER_DOSEN

```
ROUTER_DOSEN#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
```

```
172.17.0.0/16 is variably subnetted, 6 subnets, 2 masks
```

```
C       172.17.25.0/24 is directly connected, GigabitEthernet0/1
```

```
L       172.17.25.1/32 is directly connected, GigabitEthernet0/1
```

```
C       172.17.26.0/24 is directly connected, GigabitEthernet0/2
```

```
L       172.17.26.1/32 is directly connected, GigabitEthernet0/2
```

```
C       172.17.27.0/24 is directly connected, Vlan1
```

```
L       172.17.27.1/32 is directly connected, Vlan1
```

```
192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
```

```
C       192.168.0.0/30 is directly connected, GigabitEthernet0/0
```

```
L       192.168.0.1/32 is directly connected, GigabitEthernet0/0
```

```
O       192.168.1.0/24 [110/2] via 192.168.0.2, 00:13:28, GigabitEthernet0/0
```

```
O       192.168.2.0/24 [110/2] via 192.168.0.2, 00:13:28, GigabitEthernet0/0
```

INFORMASI TABEL ROUTING DI CORE_ROUTER

```
CORE_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
```

```
172.17.0.0/24 is subnetted, 3 subnets
```

```
O IA 172.17.25.0/24 [110/2] via 192.168.0.1, 00:09:54, GigabitEthernet0/0
```

```
O IA 172.17.26.0/24 [110/2] via 192.168.0.1, 00:09:54, GigabitEthernet0/0
```

```
O IA 172.17.27.0/24 [110/2] via 192.168.0.1, 00:09:54, GigabitEthernet0/0
```

```
192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
```

```
C 192.168.0.0/30 is directly connected, GigabitEthernet0/0
```

```
L 192.168.0.2/32 is directly connected, GigabitEthernet0/0
```

```
192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
```

```
C 192.168.1.0/24 is directly connected, GigabitEthernet0/1
```

```
L 192.168.1.1/32 is directly connected, GigabitEthernet0/1
```

```
192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
```

```
C 192.168.2.0/24 is directly connected, GigabitEthernet0/2
```

```
L 192.168.2.1/32 is directly connected, GigabitEthernet0/2
```

Terlihat terdapat 3 entri di routing tabel terkait network yang terhubung langsung dengan Router_Dosen yang didapat oleh Core_Router melalui OSPF (Kode O – OSPF).

PERHITUNGAN ROUTE SUMMARIZATION

- **Route Summarization** adalah menentukan jumlah bit terpanjang yang sama di semua alamat subnet dengan mengkonversi alamat tersebut ke format biner.
- Oktet 1 dan 2 dari Network A, B, dan C memiliki nilai yang sama. Mulai berbeda dari oktet ke 3 sehingga lakukan konversi nilai decimal di oktet ini ke biner.

Network A : 172.17.25.0/24 → 172.17. **000110**01.0

Network B : 172.17.26.0/24 → 172.17. **000110**10.0

Network C : 172.17.27.0/24 → 172.17. **000110**11.0

- Jumlah bit terpanjang yang sama adalah: 22 bit, sehingga ringkasannya adalah 172.17.24.0/22. Nilai **22 bit diperoleh dari:**

Oktet 1: 8 bit,

Oktet 2: 8 bit,

Oktet 3: 6 bit

Sehingga $8 + 8 + 6 = 22$

- Nilai **172.17.24.0 diperoleh dari:**

Oktet 1 dan 2 yaitu **172.17** dari ketiga network sudah sama.

Oktet 3 hanya 6 bit pertama yang sama yaitu **000110**00 sehingga dikonversi ke decimal menjadi **24**.

KONFIGURASI ROUTE SUMMARIZATION PADA OSPF DI ROUTER_DOSEN

Sintak penulisan *OSPF route summarization* pada **mode router configuration** adalah:

area *area-id* **range** *alamat-ip-ringkasan subnetmask-ringkasan*

1. Berpindah dari *privilege mode* ke *global configuration mode*.
ROUTER_DOSEN#conf t
2. Berpindah ke *router configuration mode* untuk *routing protocol OSPF* dengan **process ID 1**.
ROUTER_DOSEN(config)#router ospf 1
3. Mengatur *route summarization* secara manual.
ROUTER_DOSEN(config-router)#area 1 range 172.17.24.0 255.255.252.0
4. Berpindah ke *privilege mode*
ROUTER_DOSEN(config-router)#end

MEMVERIFIKASI HASIL ROUTE SUMMARIZATION DI CORE_ROUTER

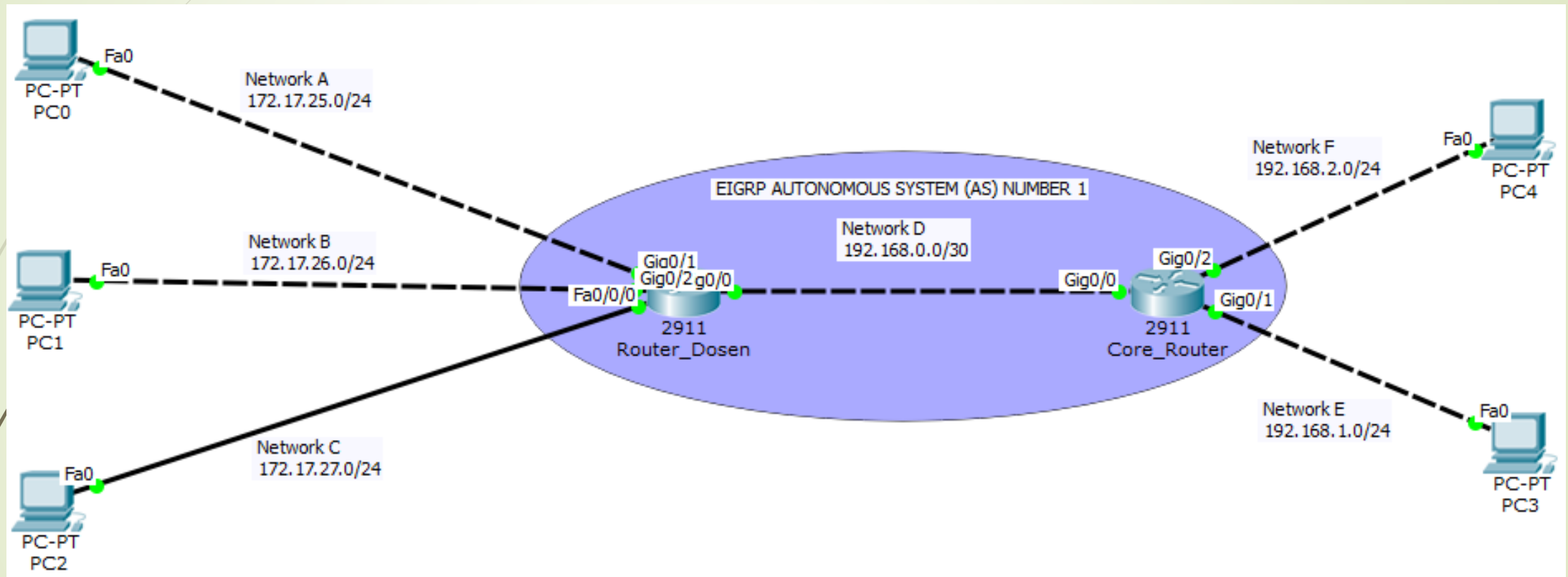
```
CORE_ROUTER#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type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

    172.17.0.0/22 is subnetted, 1 subnets
O IA   172.17.24.0/22 [110/2] via 192.168.0.1, 00:01:36, GigabitEthernet0/0
    192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.0.0/30 is directly connected, GigabitEthernet0/0
L       192.168.0.2/32 is directly connected, GigabitEthernet0/0
    192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/1
L       192.168.1.1/32 is directly connected, GigabitEthernet0/1
    192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.2.0/24 is directly connected, GigabitEthernet0/2
L       192.168.2.1/32 is directly connected, GigabitEthernet0/2
```

Terlihat terdapat 1 entri di routing yang didapat oleh Core_Router melalui OSPF dari ROUTER_DOSEN yaitu **172.17.24.0/22** yang merupakan hasil dari **ROUTE SUMMARIZATION**.

EIGRP NETWORK TOPOLOGY



KONFIGURASI EIGRP DI ROUTER_DOSEN

1. Berpindah dari user mode ke privilege mode
`ROUTER_DOSEN>enable`
2. Berpindah dari privilege mode ke global configuration mode.
`ROUTER_DOSEN#conf t`
3. Mengaktifkan routing protocol EIGRP pada AS number 1.
`ROUTER_DOSEN(config)#router eigrp 1`
4. Mengatur alamat jaringan pada router yang menjadi bagian dari jaringan EIGRP.
`ROUTER_DOSEN(config-router)#network 192.168.0.0`
`ROUTER_DOSEN(config-router)#network 172.17.0.0`
5. Berpindah ke privilege mode
`ROUTER_DOSEN(config-router)#end`

INFORMASI ROUTING PROTOCOL YANG AKTIF DI ROUTER_DOSEN

```
ROUTER_DOSEN#show ip protocols
```

```
Routing Protocol is "eigrp 1 "  
  Outgoing update filter list for all interfaces is not set  
  Incoming update filter list for all interfaces is not set  
  Default networks flagged in outgoing updates  
  Default networks accepted from incoming updates  
  Redistributing: eigrp 1  
  EIGRP-IPv4 Protocol for AS(1)  
    Metric weight K1=1, K2=0, K3=1, K4=0, K5=0  
    NSF-aware route hold timer is 240  
    Router-ID:  
    Topology : 0 (base)  
      Active Timer: 3 min  
      Distance: internal 90 external 170  
      Maximum path: 4  
      Maximum hopcount 100  
      Maximum metric variance 1  
  
  Automatic Summarization: disabled  
  Automatic address summarization:  
  Maximum path: 4  
  Routing for Networks:  
    172.17.0.0  
    192.168.0.0  
  Routing Information Sources:  
    Gateway          Distance      Last Update  
    192.168.0.2       90           325699  
  Distance: internal 90 external 170
```

KONFIGURASI EIGRP DI CORE_ROUTER

1. Berpindah dari user mode ke privilege mode
`CORE_ROUTER>enable`
2. Berpindah dari privilege mode ke global configuration mode.
`CORE_ROUTER#conf t`
3. Mengaktifkan routing protocol EIGRP pada AS number 1.
`CORE_ROUTER(config)#router eigrp 1`
4. Mengatur alamat jaringan pada router yang menjadi bagian dari jaringan EIGRP.
`CORE_ROUTER(config-router)#network 192.168.0.0`
`CORE_ROUTER(config-router)#network 192.168.1.0`
`CORE_ROUTER(config-router)#network 192.168.2.0`
5. Berpindah ke privilege mode
`CORE_ROUTER(config-router)#end`

INFORMASI ROUTING PROTOCOL YANG AKTIF DI CORE_ROUTER

```
CORE_ROUTER#show ip protocols

Routing Protocol is "eigrp 1 "
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Default networks flagged in outgoing updates
  Default networks accepted from incoming updates
  Redistributing: eigrp 1
  EIGRP-IPv4 Protocol for AS(1)
    Metric weight K1=1, K2=0, K3=1, K4=0, K5=0
    NSF-aware route hold timer is 240
    Router-ID:
    Topology : 0 (base)
      Active Timer: 3 min
      Distance: internal 90 external 170
      Maximum path: 4
      Maximum hopcount 100
      Maximum metric variance 1

  Automatic Summarization: disabled
  Automatic address summarization:
  Maximum path: 4
  Routing for Networks:
    192.168.0.0
    192.168.1.0
    192.168.2.0
  Routing Information Sources:
    Gateway          Distance      Last Update
    192.168.0.1       90           325699
  Distance: internal 90 external 170
```

INFORMASI TABEL ROUTING DI ROUTER_DOSEN

```
ROUTER_DOSEN#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
```

```
172.17.0.0/16 is variably subnetted, 6 subnets, 2 masks
```

```
C    172.17.25.0/24 is directly connected, GigabitEthernet0/1  
L    172.17.25.1/32 is directly connected, GigabitEthernet0/1  
C    172.17.26.0/24 is directly connected, GigabitEthernet0/2  
L    172.17.26.1/32 is directly connected, GigabitEthernet0/2  
C    172.17.27.0/24 is directly connected, Vlan1  
L    172.17.27.1/32 is directly connected, Vlan1
```

```
192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
```

```
C    192.168.0.0/30 is directly connected, GigabitEthernet0/0  
L    192.168.0.1/32 is directly connected, GigabitEthernet0/0
```

```
D    192.168.1.0/24 [90/5376] via 192.168.0.2, 00:03:43, GigabitEthernet0/0  
D    192.168.2.0/24 [90/5376] via 192.168.0.2, 00:03:43, GigabitEthernet0/0
```

INFORMASI TABEL ROUTING DI CORE_ROUTER

```
CORE_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

    172.17.0.0/24 is subnetted, 3 subnets
D       172.17.25.0/24 [90/5376] via 192.168.0.1, 00:04:22, GigabitEthernet0/0
D       172.17.26.0/24 [90/5376] via 192.168.0.1, 00:04:22, GigabitEthernet0/0
D       172.17.27.0/24 [90/25625856] via 192.168.0.1, 00:04:22, GigabitEthernet0/0
    192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.0.0/30 is directly connected, GigabitEthernet0/0
L       192.168.0.2/32 is directly connected, GigabitEthernet0/0
    192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/1
L       192.168.1.1/32 is directly connected, GigabitEthernet0/1
    192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.2.0/24 is directly connected, GigabitEthernet0/2
L       192.168.2.1/32 is directly connected, GigabitEthernet0/2
```

Terlihat terdapat 3 entri di routing tabel terkait network yang terhubung langsung dengan Router_Dosen yang didapat oleh Core_Router melalui EIGRP (Kode D – DUAL).

KONFIGURASI ROUTE SUMMARIZATION PADA EIGRP DI ROUTER_DOSEN

Sintak penulisan *EIGRP route summarization* pada **interface configuration** adalah:

ip summary-address eigrp *as-number alamat-network-ringkasan subnetmask-ringkasan*

1. Berpindah dari privilege mode ke global configuration mode.
ROUTER_DOSEN#conf t
2. Berpindah ke interface configuration GigabitEthernet0/0 yang mengarah ke CORE_ROUTER.
ROUTER_DOSEN(config)#int Gi0/0
3. Mengatur route summarization secara manual.
ROUTER_DOSEN(config-router)#ip summary-address eigrp 1 172.17.24.0 255.255.252.0
4. Berpindah ke privilege mode
ROUTER_DOSEN(config-router)#end

VERIFIKASI HASIL KONFIGURASI ROUTE SUMMARIZATION DI ROUTER_DOSEN(1)

```
ROUTER_DOSEN#show ip protocols
```

```
Routing Protocol is "eigrp 1 "
```

```
Outgoing update filter list for all interfaces is not set
```

```
Incoming update filter list for all interfaces is not set
```

```
Default networks flagged in outgoing updates
```

```
Default networks accepted from incoming updates
```

```
Redistributing: eigrp 1
```

```
EIGRP-IPv4 Protocol for AS(1)
```

```
Metric weight K1=1, K2=0, K3=1, K4=0, K5=0
```

```
NSF-aware route hold timer is 240
```

```
Router-ID:
```

```
Topology : 0 (base)
```

```
Active Timer: 3 min
```

```
Distance: internal 90 external 170
```

```
Maximum path: 4
```

```
Maximum hopcount 100
```

```
Maximum metric variance 1
```

```
Automatic Summarization: disabled
```

```
Automatic address summarization:
```

```
172.17.24.0/22 for GigabitEthernet0/0, GigabitEthernet0/1, GigabitEthernet0/2, Vlan1
```

```
Summarizing with metric 5120
```

```
Maximum path: 4
```

```
Routing for Networks:
```

```
172.17.0.0
```

```
192.168.0.0
```

```
Routing Information Sources:
```

Gateway	Distance	Last Update
192.168.0.2	90	942432

```
Distance: internal 90 external 170
```

VERIFIKASI HASIL KONFIGURASI ROUTE SUMMARIZATION DI ROUTER_DOSEN(2)

```
ROUTER_DOSEN#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

172.17.0.0/16 is variably subnetted, 7 subnets, 3 masks

```
D    172.17.24.0/22 is a summary, 00:01:55, Null0
C    172.17.25.0/24 is directly connected, GigabitEthernet0/1
L    172.17.25.1/32 is directly connected, GigabitEthernet0/1
C    172.17.26.0/24 is directly connected, GigabitEthernet0/2
L    172.17.26.1/32 is directly connected, GigabitEthernet0/2
C    172.17.27.0/24 is directly connected, Vlan1
L    172.17.27.1/32 is directly connected, Vlan1
    192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.0.0/30 is directly connected, GigabitEthernet0/0
L    192.168.0.1/32 is directly connected, GigabitEthernet0/0
D    192.168.1.0/24 [90/5376] via 192.168.0.2, 00:01:53, GigabitEthernet0/0
D    192.168.2.0/24 [90/5376] via 192.168.0.2, 00:01:53, GigabitEthernet0/0
```

- **Null0 interface** digunakan untuk mencegah paket dikirim atau diproses lebih lanjut jika router tidak memiliki rute spesifik.

VERIFIKASI HASIL ROUTE SUMMARIZATION DI CORE_ROUTER

```

CORE_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

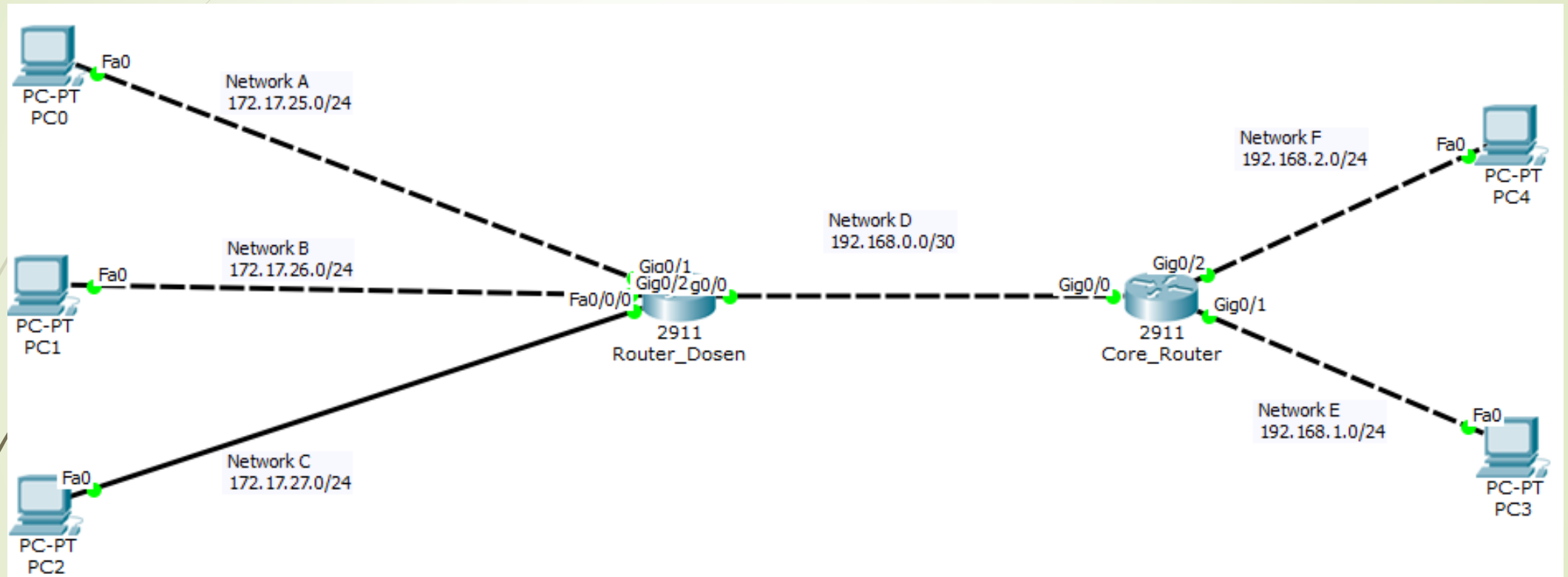
Gateway of last resort is not set

    172.17.0.0/22 is subnetted, 1 subnets
D       172.17.24.0/22 [90/5376] via 192.168.0.1, 00:07:01, GigabitEthernet0/0
    192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.0.0/30 is directly connected, GigabitEthernet0/0
L       192.168.0.2/32 is directly connected, GigabitEthernet0/0
    192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/1
L       192.168.1.1/32 is directly connected, GigabitEthernet0/1
    192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.2.0/24 is directly connected, GigabitEthernet0/2
L       192.168.2.1/32 is directly connected, GigabitEthernet0/2

```

Terlihat terdapat 1 entri di routing tabel terkait dengan 3 network yang terhubung langsung dengan Router_Dosen yang didapat oleh Core_Router melalui EIGRP yaitu **172.17.24.0/22** yang merupakan hasil dari **ROUTE SUMMARIZATION**.

RIPv2 NETWORK TOPOLOGY



KONFIGURASI RIPv2 DI ROUTER_DOSEN

1. Berpindah dari user mode ke privilege mode
`ROUTER_DOSEN>enable`
2. Berpindah dari privilege mode ke global configuration mode.
`ROUTER_DOSEN#conf t`
3. Mengaktifkan routing protocol RIPv2.
`ROUTER_DOSEN(config)#router rip`
`ROUTER_DOSEN(config-router)#version 2`
4. Mengatur alamat jaringan pada router yang menjadi bagian dari jaringan RIP.
`ROUTER_DOSEN(config-router)#network 192.168.0.0`
`ROUTER_DOSEN(config-router)#network 172.17.0.0`
5. Berpindah ke privilege mode
`ROUTER_DOSEN(config-router)#end`

INFORMASI ROUTING PROTOCOL YANG AKTIF DI ROUTER_DOSEN

```
ROUTER_DOSEN#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 25 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send  Recv  Triggered RIP  Key-chain
  GigabitEthernet0/0    2     2
  GigabitEthernet0/1    2     2
  GigabitEthernet0/2    2     2
  Vlan1                 2     2
Automatic network summarization is in effect
Maximum path: 4
Routing for Networks:
  172.17.0.0
  192.168.0.0
Passive Interface(s):
Routing Information Sources:
  Gateway         Distance      Last Update
  192.168.0.2      120           00:00:09
Distance: (default is 120)
```

Terlihat secara default RIP melakukan **automatic network summarization**.

KONFIGURASI RIPv2 DI CORE_ROUTER

1. Berpindah dari user mode ke privilege mode
`CORE_ROUTER>enable`
2. Berpindah dari privilege mode ke global configuration mode.
`CORE_ROUTER#conf t`
3. Mengaktifkan routing protocol RIPv2.
`CORE_ROUTER(config)#router rip`
`CORE_ROUTER(config-router)#version 2`
4. Mengatur alamat jaringan pada router yang menjadi bagian dari jaringan RIP.
`CORE_ROUTER(config-router)#network 192.168.0.0`
`CORE_ROUTER(config-router)#network 192.168.1.0`
`CORE_ROUTER(config-router)#network 192.168.2.0`
5. Berpindah ke privilege mode
`CORE_ROUTER(config-router)#end`

INFORMASI ROUTING PROTOCOL YANG AKTIF DI CORE_ROUTER

```
CORE_ROUTER#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 10 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send  Recv  Triggered RIP  Key-chain
  GigabitEthernet0/0    2     2
  GigabitEthernet0/1    2     2
  GigabitEthernet0/2    2     2
Automatic network summarization is in effect
Maximum path: 4
Routing for Networks:
  192.168.0.0
  192.168.1.0
  192.168.2.0
Passive Interface(s):
Routing Information Sources:
  Gateway            Distance            Last Update
  192.168.0.1         120                 00:00:09
Distance: (default is 120)
```

Terlihat secara default RIP melakukan **automatic network summarization**.

INFORMASI TABEL ROUTING DI ROUTER_DOSEN

```
ROUTER_DOSEN#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
```

```
    172.17.0.0/16 is variably subnetted, 6 subnets, 2 masks
```

```
C       172.17.25.0/24 is directly connected, GigabitEthernet0/1
```

```
L       172.17.25.1/32 is directly connected, GigabitEthernet0/1
```

```
C       172.17.26.0/24 is directly connected, GigabitEthernet0/2
```

```
L       172.17.26.1/32 is directly connected, GigabitEthernet0/2
```

```
C       172.17.27.0/24 is directly connected, Vlan1
```

```
L       172.17.27.1/32 is directly connected, Vlan1
```

```
    192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
```

```
C       192.168.0.0/30 is directly connected, GigabitEthernet0/0
```

```
L       192.168.0.1/32 is directly connected, GigabitEthernet0/0
```

```
R       192.168.1.0/24 [120/1] via 192.168.0.2, 00:00:25, GigabitEthernet0/0
```

```
R       192.168.2.0/24 [120/1] via 192.168.0.2, 00:00:25, GigabitEthernet0/0
```

INFORMASI TABEL ROUTING DI CORE_ROUTER

30

```
CORE_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
```

```
R    172.17.0.0/16 [120/1] via 192.168.0.1, 00:00:28, GigabitEthernet0/0  
    192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks  
C    192.168.0.0/30 is directly connected, GigabitEthernet0/0  
L    192.168.0.2/32 is directly connected, GigabitEthernet0/0  
    192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks  
C    192.168.1.0/24 is directly connected, GigabitEthernet0/1  
L    192.168.1.1/32 is directly connected, GigabitEthernet0/1  
    192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks  
C    192.168.2.0/24 is directly connected, GigabitEthernet0/2  
L    192.168.2.1/32 is directly connected, GigabitEthernet0/2
```

Terlihat terdapat 1 entri di routing tabel sebagai hasil **automatic network summarization** yaitu **172.17.0.0/16**. Route summarization ini merupakan hasil ringkasan dari 3 network yang terhubung langsung dengan ROUTER_DOSEN yaitu Network A, B dan C yang didapat oleh CORE_ROUTER melalui RIP (Kode R – RIP).

MENONAKTIFKAN AUTOMATIC NETWORK SUMMARIZATION DI ROUTER_DOSEN DAN CORE_ROUTER

- Berpindah ke mode *global configuration*

```
# conf t
```

- Berpindah ke *router configuration mode* untuk RIP

```
(config)# router rip
```

```
(config-router)# no auto-summary
```

- Berpindah ke mode *privilege*

```
(config-router)# end
```

- Memverifikasi hasil penonaktifan **automatic network summarization**

```
# show ip protocols
```

Perhatikan outputnya akan terlihat pesan “**Automatic network summarization is not in effect**”.

VERIFIKASI PENONAKTIFAN AUTOMATIC NETWORK SUMMARIZATION RIP DI ROUTER_DOSEN

```
ROUTER_DOSEN#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 25 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send  Recv  Triggered RIP  Key-chain
GigabitEthernet0/0    2      2
Vlan1                 2      2
GigabitEthernet0/1    2      2
GigabitEthernet0/2    2      2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.17.0.0
  192.168.0.0
Passive Interface(s):
Routing Information Sources:
  Gateway            Distance            Last Update
  192.168.0.2         120                 00:00:10
Distance: (default is 120)
```

VERIFIKASI PENONAKTIFAN AUTOMATIC NETWORK SUMMARIZATION RIP DI CORE_ROUTER

```
CORE_ROUTER#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 7 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send  Recv  Triggered RIP  Key-chain
  GigabitEthernet0/0    2     2
  GigabitEthernet0/1    2     2
  GigabitEthernet0/2    2     2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  192.168.0.0
  192.168.1.0
  192.168.2.0
Passive Interface(s):
Routing Information Sources:
  Gateway            Distance      Last Update
  192.168.0.1         120           00:00:25
Distance: (default is 120)
```

VERIFIKASI INFORMASI ROUTING TABLE DI CORE_ROUTER

```
CORE_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

    172.17.0.0/24 is subnetted, 3 subnets
R       172.17.25.0/24 [120/1] via 192.168.0.1, 00:00:10, GigabitEthernet0/0
R       172.17.26.0/24 [120/1] via 192.168.0.1, 00:00:10, GigabitEthernet0/0
R       172.17.27.0/24 [120/1] via 192.168.0.1, 00:00:10, GigabitEthernet0/0
    192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.0.0/30 is directly connected, GigabitEthernet0/0
L       192.168.0.2/32 is directly connected, GigabitEthernet0/0
    192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/1
L       192.168.1.1/32 is directly connected, GigabitEthernet0/1
    192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.2.0/24 is directly connected, GigabitEthernet0/2
L       192.168.2.1/32 is directly connected, GigabitEthernet0/2
```

Terlihat terdapat **3 entri kode R** di tabel routing yang diperoleh **CORE_ROUTER** dari **ROUTER_DOSEN** terkait Network A, B, dan C dari **RIP**. Hal ini menunjukkan RIP tidak melakukan **automatic network summarization**.

KONFIGURASI MANUAL ROUTE SUMMARIZATION PADA RIPv2 DI ROUTER_DOSEN

Sintak penulisan *RIP manual route summarization* pada **interface configuration** adalah:

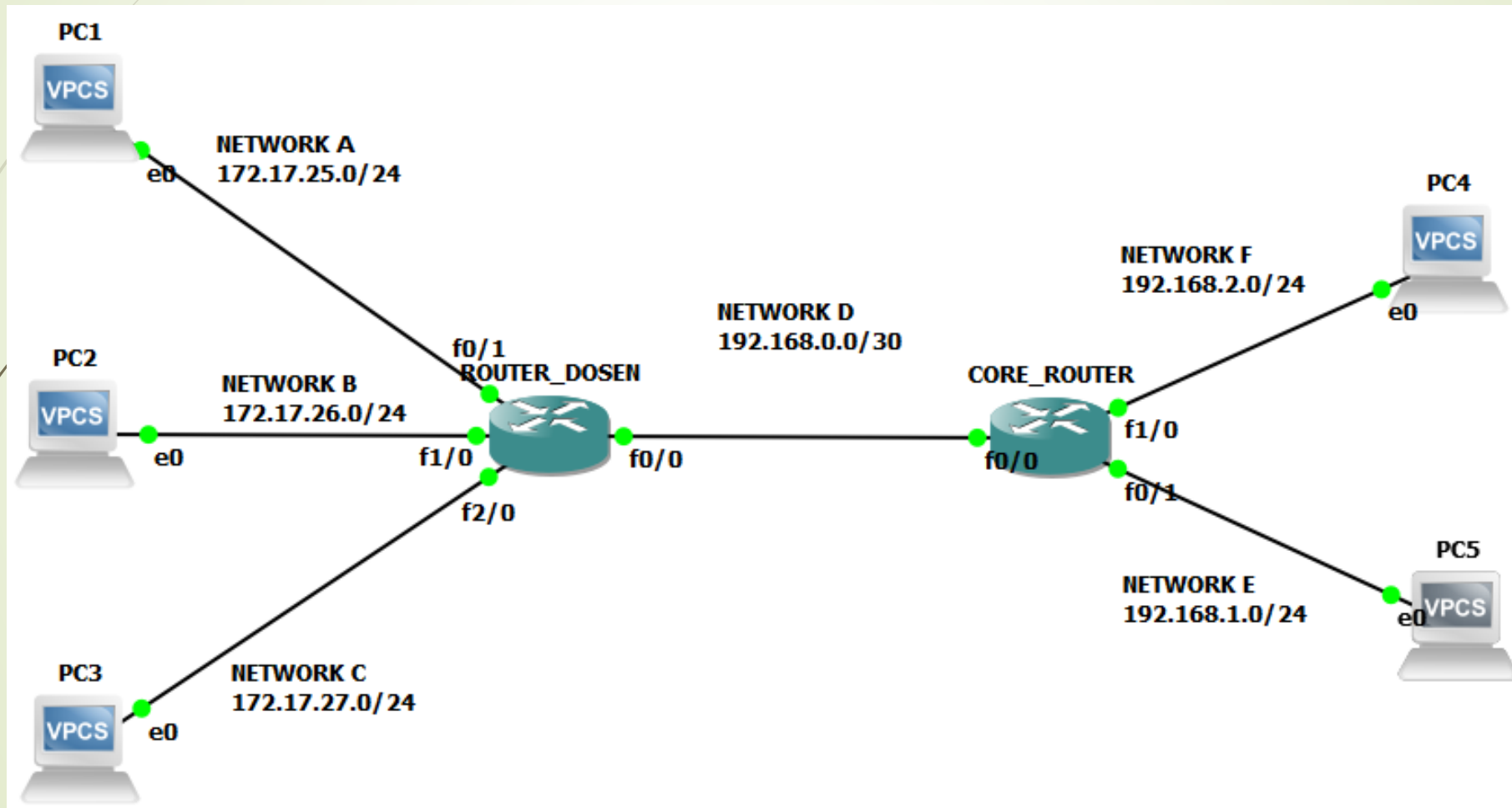
ip summary-address rip *alamat-ringkasan subnetmask-ringkasan*

Berdasarkan gambar topologi jaringan yang digunakan maka *interface* sebagai lokasi penerapan *manual route summarization* adalah **interface GigabitEthernet0/0** yang menghubungkan **ROUTER_DOSEN** ke **CORE_ROUTER**. Konfigurasinya terlihat sebagai berikut:

```
ROUTER_DOSEN(config)# int gi0/0
ROUTER_DOSEN(config-if)#ip summary-address rip 172.17.24.0
255.255.252.0
```

Namun karena keterbatasan fitur yang dimiliki oleh CISCO PACKET TRACER maka ujicoba RIP manual route summarization dicontohkan menggunakan Cisco IOS yang telah dikonfigurasi pada GNS3.

TOPOLOGI JARINGAN DI GNS3 UNTUK UJICOBAMANUAL ROUTE SUMMARIZATION DI RIPv2



KONFIGURASI ROUTE SUMMARIZATION DI ROUTER_DOSEN

```
ROUTER_DOSEN#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
ROUTER_DOSEN(config)#router rip
ROUTER_DOSEN(config-router)#no auto-summary
ROUTER_DOSEN(config-router)#exit
ROUTER_DOSEN(config)#int f0/0
ROUTER_DOSEN(config-if)#ip summary-address rip 172.17.24.0 255.255.252.0
ROUTER_DOSEN(config-if)#end
```

VERIFIKASI HASIL KONFIGURASI ROUTE SUMMARIZATION DI ROUTER_DOSEN

```
ROUTER_DOSEN#show ip protocols
Routing Protocol is "rip"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Sending updates every 30 seconds, next due in 19 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Redistributing: rip
  Default version control: send version 2, receive version 2
    Interface          Send  Recv  Triggered RIP  Key-chain
  FastEthernet0/0      2      2
  FastEthernet0/1      2      2
  FastEthernet1/0      2      2
  FastEthernet2/0      2      2
  Automatic network summarization is not in effect
  Address Summarization:
    172.17.24.0/22 for FastEthernet0/0
  Maximum path: 4
  Routing for Networks:
    172.17.0.0
    192.168.0.0
  Routing Information Sources:
    Gateway          Distance      Last Update
  192.168.0.2         120          00:00:22
  Distance: (default is 120)
```

VERIFIKASI INFORMASI ROUTING TABLE DI CORE_ROUTER

```
CORE_ROUTER#show 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

    172.17.0.0/22 is subnetted, 1 subnets
R       172.17.24.0 [120/1] via 192.168.0.1, 00:00:07, FastEthernet0/0
    192.168.0.0/30 is subnetted, 1 subnets
C       192.168.0.0 is directly connected, FastEthernet0/0
C       192.168.1.0/24 is directly connected, FastEthernet0/1
C       192.168.2.0/24 is directly connected, FastEthernet1/0
```

- Terlihat terdapat 1 entri di routing tabel dengan kode **R (RIP)** yang diperoleh **CORE_ROUTER** dari **ROUTER_DOSEN** yaitu **172.17.24.0/22** yang merupakan hasil dari konfigurasi **ROUTE SUMMARIZATION**.

ADA PERTANYAAN?

TERIMA KASIH