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**Welcome
To
Network for you
OSPF Summarization**



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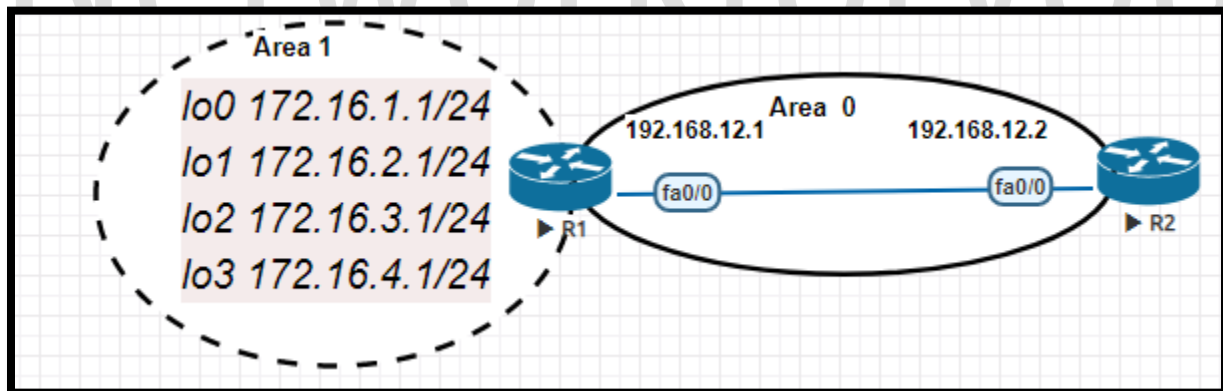
OSPF Summarization:

- Route summarization, also called route aggregation.
- It is a method of minimizing the number of routing tables in an IP (Internet Protocol) network.
- It works by consolidating selected multiple routes into a single route advertisement.
- The route summarization helps to reduce OSPF traffic and the route computation.
- OSPF support Route summarization only at ABR (Area Border Router) or ASBR (Autonomous system boundary router).

Advantages of Summarization:

- **Saves Memory** -Routing tables will be smaller which reduces memory requirements.
- **Saves Bandwidth** -There are less routes to advertise so we save some bandwidth.
- **Saves CPU Cycles** - Less packets to process and smaller routing tables to work on.
- **Stability** -Prevents routing table instability due to flapping networks.

OSPF Summarization at ABR Lab:



R1 Configuration	R2 Configuration
en config t hostname R1	en config t hostname R2

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```
int f0/0  
ip add 192.168.12.1 255.255.255.0  
no sh
```

```
int lo0  
ip add 172.16.1.1 255.255.255.0
```

```
int lo1  
ip add 172.16.2.1 255.255.255.0
```

```
int lo2  
ip add 172.16.3.1 255.255.255.0
```

```
int lo3  
ip add 172.16.4.1 255.255.255.0
```

```
router ospf 1
```

```
int f0/0  
ip ospf 1 area 0
```

```
int lo0  
ip ospf 1 area 1
```

```
int lo1
```

```
ip ospf 1 area 1
```

```
int lo2
```

```
ip ospf 1 area 1
```

```
int lo3
```

```
ip ospf 1 area 1
```

area 1 range 172.16.0.0 255.255.248.0

```
int f0/0  
ip add 192.168.12.2 255.255.255.0  
no sh
```

```
int lo0  
ip add 2.2.2.2 255.0.0.0
```

```
router ospf 1
```

```
int f0/0  
ip ospf 1 area 0
```

```
int lo0  
ip ospf 1 area 0
```

Calculating the Summarize route:

172.16.1.0

172.16.4.0

172.16.00000 001.0 = 8 + 8 + 5 = 21 => 255.255.248.0

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172.16.0.0/24

So IP will be 172.16.0.0 and subnet mask is 255.255.255.0

```
R1#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

C     192.168.12.0/24 is directly connected, FastEthernet0/0
     2.0.0.0/32 is subnetted, 1 subnets
O     2.2.2.2 [110/11] via 192.168.12.2, 00:04:46, FastEthernet0/0
     172.16.0.0/16 is variably subnetted, 5 subnets, 2 masks
C     172.16.4.0/24 is directly connected, Loopback3
O     172.16.0.0/21 is a summary, 00:04:46, Null0
C     172.16.1.0/24 is directly connected, Loopback0
C     172.16.2.0/24 is directly connected, Loopback1
C     172.16.3.0/24 is directly connected, Loopback2
```

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```
R2#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

C     192.168.12.0/24 is directly connected, FastEthernet0/0
C     2.0.0.0/8 is directly connected, Loopback0
     172.16.0.0/21 is subnetted, 1 subnets
O IA  172.16.0.0 [110/11] via 192.168.12.1, 00:00:25, FastEthernet0/0
```

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```
R2#ping 172.16.1.1

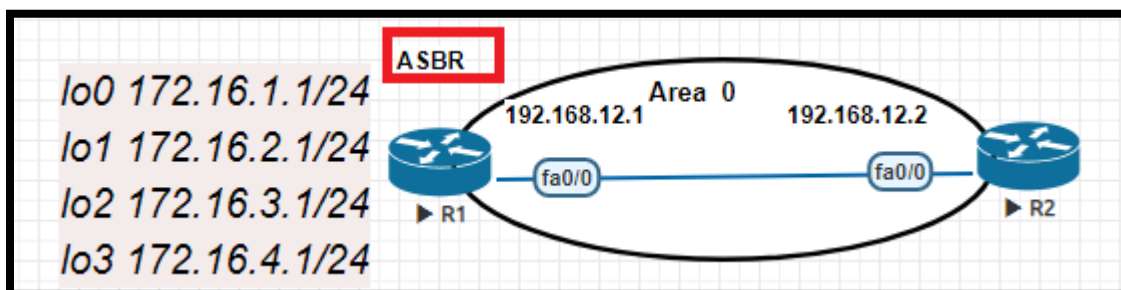
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.1.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 12/17/28 ms
R2#ping 172.16.2.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.2.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/12/20 ms
R2#ping 172.16.3.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.3.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/18/24 ms
R2#ping 172.16.4.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.4.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/12/20 ms
```

OSPF Summarization at ABR Lab:



R1 Configuration	R2 Configuration
en config t hostname R1	en config t hostname R2

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```
int f0/0
ip add 192.168.12.1 255.255.255.0
no sh

int lo0
ip add 172.16.1.1 255.255.255.0

int lo1
ip add 172.16.2.1 255.255.255.0

int lo2
ip add 172.16.3.1 255.255.255.0

int lo3
ip add 172.16.4.1 255.255.255.0

router ospf 1

int f0/0
ip ospf 1 area 1

router ospf 1
redistribute connected subnets
summary-address 172.16.0.0 255.255.248.0
```

```
int f0/0
ip add 192.168.12.2 255.255.255.0
no sh

int lo0
ip add 2.2.2.2 255.0.0.0

router ospf 1

int f0/0
ip ospf 1 area 1

int lo0
ip ospf 1 area 1
```

Calculating the Summarize route:

172.16.1.0

172.16.4.0

$172.16.00000\ 001.0 = 8 + 8 + 5 = 21 \Rightarrow 255.255.248.0$

172.16.00000 100.0

So IP will be 172.16.0.0 and subnet mask is 255.255.248.0

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```
R2#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

C     192.168.12.0/24 is directly connected, FastEthernet0/0
C     2.0.0.0/8 is directly connected, Loopback0
      172.16.0.0/21 is subnetted, 1 subnets
O E2   172.16.0.0 [110/20] via 192.168.12.1, 00:00:13, FastEthernet0/0
```

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