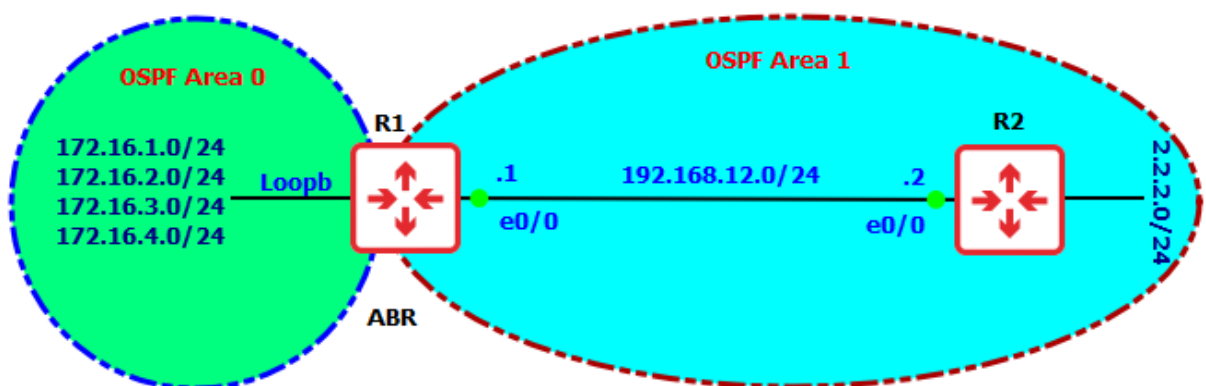


OSPF Summarization:

- o Consolidation of multiple routes into one single advertisement is called Summarization.
- o Process of summarizing subnets into larger subnet to be advertised to upstream routers
- o A feature allows Routing Protocols to summarize its routes to their classful networks.
- o OSPF can do the summarization but it is impossible to summarize within an area.
- o The route summarization helps to reduce OSPF traffic and the route computation.
- o OSPF, unlike EIGRP, doesn't support automatic summarization or route aggregation.
- o Summarization between areas can be done on ABR by using single command under OSPF.
- o The area-id= command Identifier of the area about which routes are to be summarized.
- o OSPF can summarize the routes only on the Area Boarder Router (ABRs) and on ASBRs.
- o Inter-Area route summarization can only be done on the Area Boarder Router (ABR).
- o This means to summarize routes from one particular area into the another OSPF Area.
- o External route summarization is specific to external routes that are injected into OSPF.
- o OSPF summarize on an ABR or ASBR and OSPF can only summarize LSA type 3 and 5.
- o OSPF Summarization reduce Type 3 flooding and saves router CPU and RAM resource.
- o Summarization can be used for route manipulation by using longest match prefix concept.

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.



R1 IP Configuration

```
R1(config)#interface e0/0
R1(config-if)#ip add 192.168.12.1 255.255.255.0
R1(config-if)#no shutdown

R1(config)#interface loopback1
R1(config-if)#ip add 172.16.1.1 255.255.255.0

R1(config)#interface loopback2
R1(config-if)#ip add 172.16.2.1 255.255.255.0

R1(config)#interface loopback3
R1(config-if)#ip add 172.16.3.1 255.255.255.0

R1(config)#interface loopback4
R1(config-if)#ip add 172.16.4.1 255.255.255.0
```

R2 IP Configuration

```
R2(config)#interface e0/0
R2(config-if)#ip add 192.168.12.2 255.255.255.0
R2(config-if)#no shutdown

R2(config)#interface loopback2
R2(config-if)#ip add 2.2.2.2 255.255.255.0
```

R1 OSPF Configuration

```
R1(config)#router ospf 1
R1(config-router)#network 172.16.1.0 0.0.0.255 area 0
R1(config-router)#network 172.16.2.0 0.0.0.255 area 0
R1(config-router)#network 172.16.3.0 0.0.0.255 area 0
R1(config-router)#network 172.16.4.0 0.0.0.255 area 0
R1(config-router)#network 192.168.12.0 0.0.0.255 area 1
```

R2 OSPF Configuration

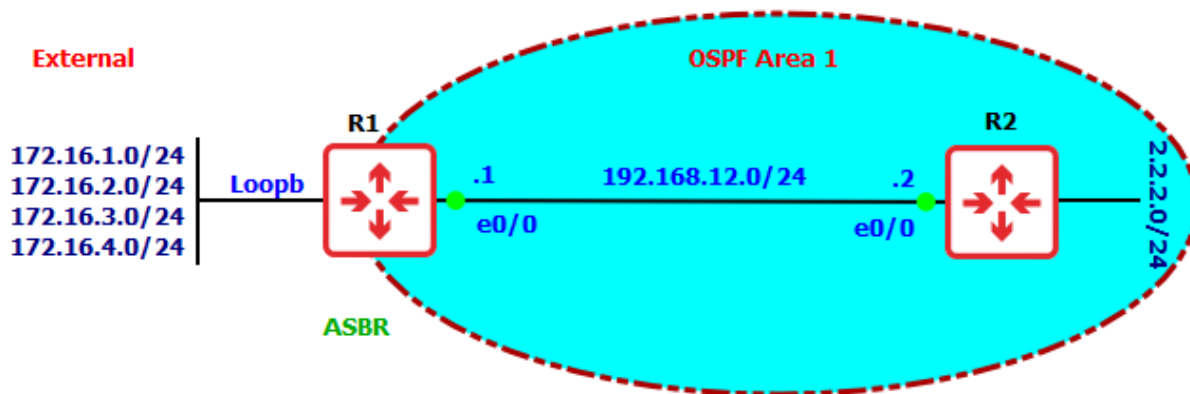
```
R2(config)#router ospf 1
R2(config-router)#network 192.168.12.0 0.0.0.255 area 1
R2(config-router)#network 2.2.2.0 0.0.0.255 area 1
```

OSPF Summarization

```
R1(config)#router ospf 1
R1(config-router)#area 0 range 172.16.0.0 255.255.0.0

R1#show ip route ospf

R1#show ip ospf database
```



R1 IP Configuration

```
R1(config)#interface e0/0
R1(config-if)#ip add 192.168.12.1 255.255.255.0
R1(config-if)#no shutdown
R1(config)#interface loopback1
R1(config-if)#ip add 172.16.1.1 255.255.255.0
R1(config)#interface loopback2
R1(config-if)#ip add 172.16.2.1 255.255.255.0
R1(config)#interface loopback3
R1(config-if)#ip add 172.16.3.1 255.255.255.0
R1(config)#interface loopback4
R1(config-if)#ip add 172.16.4.1 255.255.255.0
```

R2 IP Configuration

```
R2(config)#interface e0/0
R2(config-if)#ip add 192.168.12.2 255.255.255.0
R2(config-if)#no shutdown
R2(config)#interface loopback2
R2(config-if)#ip add 2.2.2.2 255.255.255.0
```

R1 OSPF Configuration

```
R1(config)#router ospf 1
R1(config-router)#network 192.168.12.0 0.0.0.255 area 1
R1(config-router)#redistribute connected subnets
```

R2 OSPF Configuration

```
R2(config)#router ospf 1
R2(config-router)#network 192.168.12.0 0.0.0.255 area 1
R2(config-router)#network 2.2.2.0 0.0.0.255 area 1
```

OSPF Summarization

```
R1(config)#router ospf 1
R1(config-router)#summary-address 172.16.0.0 255.255.0.0
```

OSPF Show Commands

```
R1#show ip route ospf
R1#show ip ospf database
```

Before Summarization

```
R2#show ip route ospf
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
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, H - NHRP, l - LISP
a - application route
+ - replicated route, % - next hop override
```

Gateway of last resort is not set

```
172.16.0.0/32 is subnetted, 4 subnets
O IA 172.16.1.1 [110/11] via 192.168.12.1, 00:00:04, Ethernet0/0
O IA 172.16.2.1 [110/11] via 192.168.12.1, 00:00:04, Ethernet0/0
O IA 172.16.3.1 [110/11] via 192.168.12.1, 00:00:04, Ethernet0/0
O IA 172.16.4.1 [110/11] via 192.168.12.1, 00:00:04, Ethernet0/0
```

After Summarization

```
R2#show ip route ospf
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
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, H - NHRP, l - LISP
a - application route
+ - replicated route, % - next hop override
```

Gateway of last resort is not set

```
O IA 172.16.0.0/16 [110/11] via 192.168.12.1, 00:07:45, Ethernet0/0
```