



## How to configure OSPF Virtual Links

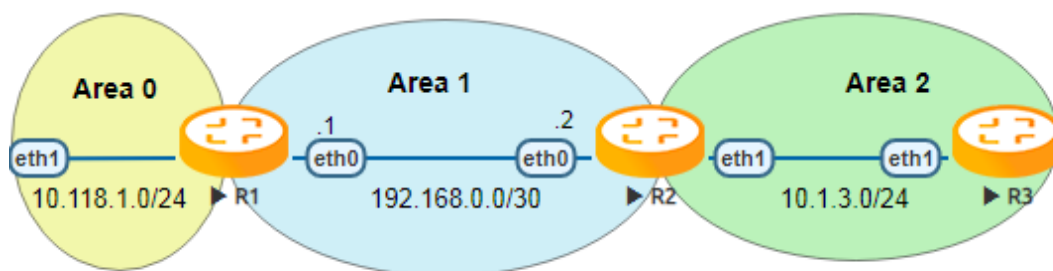
Srividya Anantapatnaikuni - 2021-08-20 - 0 Comments - in OSPF

### Introduction:

OSPF protocol requires all areas to be directly connected to the backbone area (area 0). However, it is not always possible to have a physical link to a backbone area. In this case, you can use a virtual link to connect to the backbone through a non-backbone area. The area through which you configure the virtual link, is called a transit area, which must have all the routing information.

Keep in mind that this is typically a far more complex design consideration when applied to a real-world network. At least one end of a virtual link must be terminated on a backbone (area 0) router.

The below topology has three areas (area 0, 1, 2) and area 0 and 2 are not directly connected to each other. In order to reach each other, virtual link is configured for area 1



We configure the virtual-link between ABRs by referencing the peer router's RID(Router ID), not an IP address. Here, we need to configure the virtual links on R1 and R2 for Area 1 which will help the Area 2 to be directly connected to Area 0.

### Configuration:

R1:

```
set protocols ospf area 0 network '10.118.1.0/24'  
set protocols ospf area 1 network '192.168.0.0/30'  
set protocols ospf area 1 virtual-link 2.2.2.2  
set protocols ospf log-adjacency-changes  
set protocols ospf parameters router-id '1.1.1.1'
```

R2:

```
set protocols ospf area 1 network '192.168.0.0/30'  
set protocols ospf area 1 virtual-link 1.1.1.1  
set protocols ospf area 2 network '10.1.3.0/24'  
set protocols ospf log-adjacency-changes  
set protocols ospf parameters router-id '2.2.2.2'
```

R3:

```
set protocols ospf area 2 network '10.1.3.0/24'  
set protocols ospf parameters router-id '3.3.3.3'  
set protocols ospf log-adjacency-changes
```

#### Verification:

R1:

```
Log: vyos ospfd[777]: AdjChg: Nbr 2.2.2.2(default) on VLINK0: Loading  
-> Full (LoadingDone)
```

```
vyos@R1:~$ show ip ospf neighbor
```

Neighbor ID	Pri	State	Dead Time	Address	
Interface		L			
2.2.2.2	1	Full/DR	30.303s	192.168.0.2	
eth0:192.168.0.1	0				
2.2.2.2	1	Full/DR0ther	30.508s	192.168.0.2	VLINK0
0					
4.4.4.4	1	Full/DR	30.557s	10.118.1.2	
eth1:10.118.1.1	0				

```
vyos@R1:~$ show ip ospf interface
```

```
VLINK0 is up  
  ifindex 0, MTU 1500 bytes, BW 0 Mbit <UP>  
  Internet Address 192.168.0.1/30, Peer 192.168.0.2, Area 0.0.0.0  
  MTU mismatch detection: enabled  
  Router ID 1.1.1.1, Network Type VIRTUALLINK, Cost: 1  
  Transmit Delay is 1 sec, State Point-To-Point, Priority 1  
  No backup designated router on this network
```

```
Multicast group memberships: <None>
Timer intervals configured, Hello 10s, Dead 40s, Wait 40s,
Retransmit 5
Hello due in 3.994s
Neighbor Count is 1, Adjacent neighbor count is 1
```

```
vyos@R1:~$ show ip route
C>* 1.1.1.1/32 is directly connected, lo, 09:29:23
0>* 10.1.3.0/24 [110/2] via 192.168.0.2, eth0, weight 1, 09:28:42
*
* via 192.168.0.2, eth1 inactive, weight 1,
09:28:42
0 10.118.1.0/24 [110/1] is directly connected, eth1, weight 1,
09:29:19
C>* 10.118.1.0/24 is directly connected, eth1, 09:29:23
0 192.168.0.0/30 [110/1] is directly connected, eth0, weight 1,
09:29:19
C>* 192.168.0.0/30 is directly connected, eth0, 09:29:22
```

R2:

```
Log: ospfd[775]: AdjChg: Nbr 1.1.1.1(default) on VLINK0: Loading ->
Full (LoadingDone)
```

```
vyos@R2:~$ show ip ospf neighbor
Neighbor ID      Pri State           Dead Time Address
Interface        L
3.3.3.3          1 Full/DR          39.287s 10.1.3.2
eth1:10.1.3.1    0
1.1.1.1          1 Full/Backup      33.257s 192.168.0.1
eth0:192.168.0.2 0
1.1.1.1          1 Full/DR0ther     36.944s 192.168.0.1    VLINK0
0
```

```
vyos@R2:~$ show ip ospf interface
VLINK0 is up
ifindex 0, MTU 1500 bytes, BW 0 Mbit <UP>
Internet Address 192.168.0.2/30, Peer 192.168.0.1, Area 0.0.0.0
MTU mismatch detection: enabled
Router ID 2.2.2.2, Network Type VIRTUALLINK, Cost: 1
Transmit Delay is 1 sec, State Point-To-Point, Priority 1
No backup designated router on this network
Multicast group memberships: <None>
```

```
Timer intervals configured, Hello 10s, Dead 40s, Wait 40s,  
Retransmit 5  
Hello due in 6.847s  
Neighbor Count is 1, Adjacent neighbor count is 1
```

```
vyos@R2:~$ show ip route  
C>* 2.2.2.2/32 is directly connected, lo, 09:32:26  
0 10.1.3.0/24 [110/1] is directly connected, eth1, weight 1,  
09:32:22  
C>* 10.1.3.0/24 is directly connected, eth1, 09:32:26  
0>* 10.118.1.0/24 [110/2] via 192.168.0.1, eth0, weight 1, 09:30:12  
via 192.168.0.1, eth0, weight 1, 09:30:12  
0 192.168.0.0/30 [110/1] is directly connected, eth0, weight 1,  
09:31:05  
C>* 192.168.0.0/30 is directly connected, eth0, 09:32:25
```

R3:

```
vyos@R3:~$ show ip ospf neighbor  
Neighbor ID Pri State Dead Time Address  
Interface RXmtL RqstL DBsmL  
2.2.2.2 1 Full/Backup 34.684s 10.1.3.1  
eth1:10.1.3.2 0 0 0
```

```
vyos@R3:~$ show ip route  
C>* 3.3.3.3/32 is directly connected, lo, 10:09:44  
0 10.1.3.0/24 [110/1] is directly connected, eth1, 10:09:43  
C>* 10.1.3.0/24 is directly connected, eth1, 10:09:43  
0>* 10.118.1.0/24 [110/3] via 10.1.3.1, eth1, 09:26:47  
0>* 192.168.0.0/30 [110/2] via 10.1.3.1, eth1, 09:27:07
```