

OSPF Multi-Area

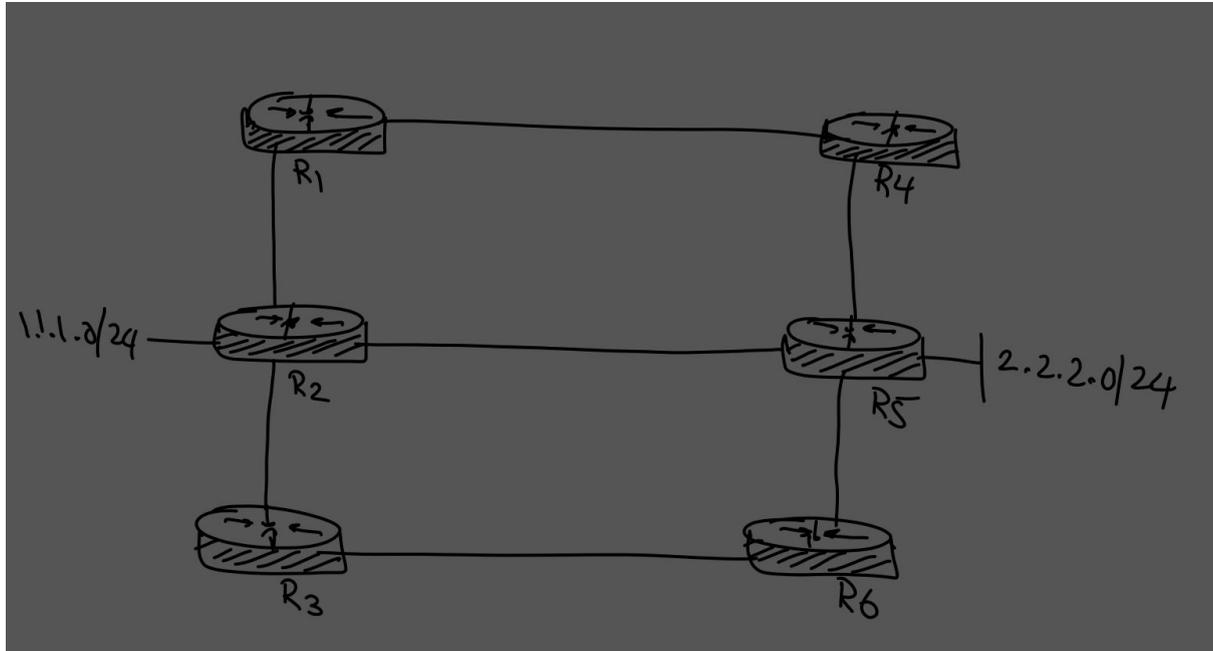
In this article I want to talk about OSPF Multi-Area solution.

OSPF uses the concept of area, and the area is like a subdomain.

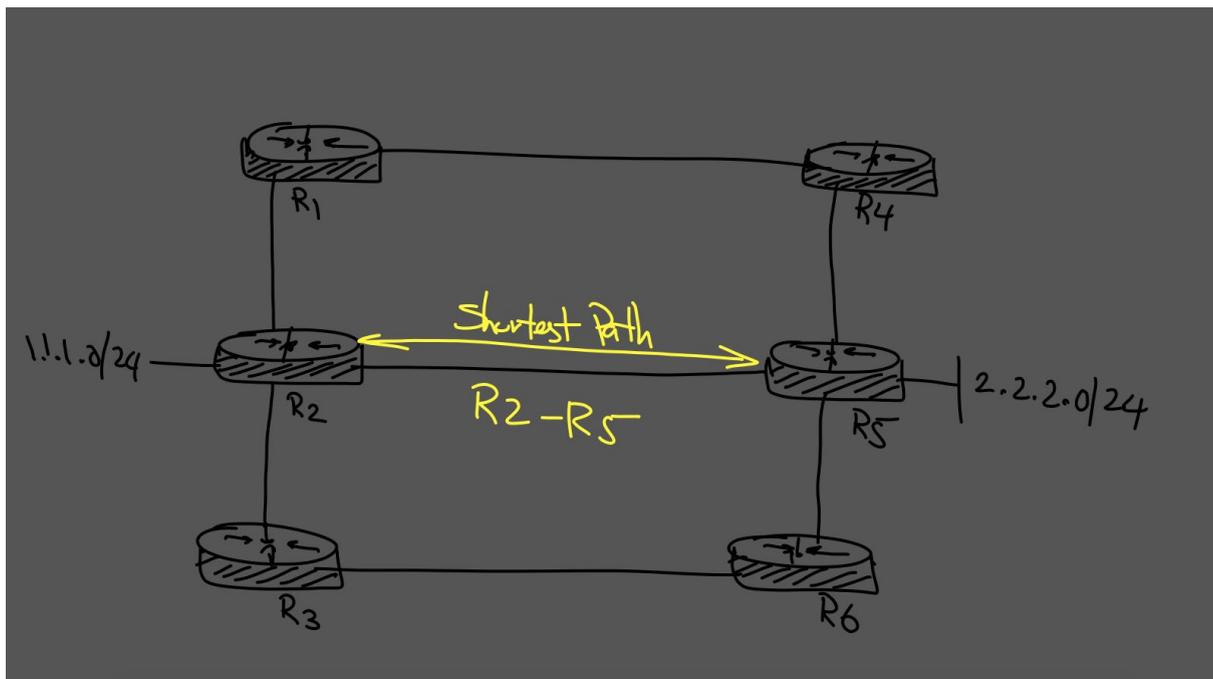
When a router interface is in a specific area, it maintains the topology information of that area.

An important note about OSPF is that an interface can only belong to "ONE" area. The issue with the rule is In some topologies; it can cause sub-optimal routing.

In my scenario, we are trying to demo this sub-optimal routing experience.



If the network behind R2 (1.1.1.0/24) wants to reach the network behind R5(2.2.2.0/24), what is the best path?



Clearly, the shortest path is the R2-R5 Direct link!

Challenge

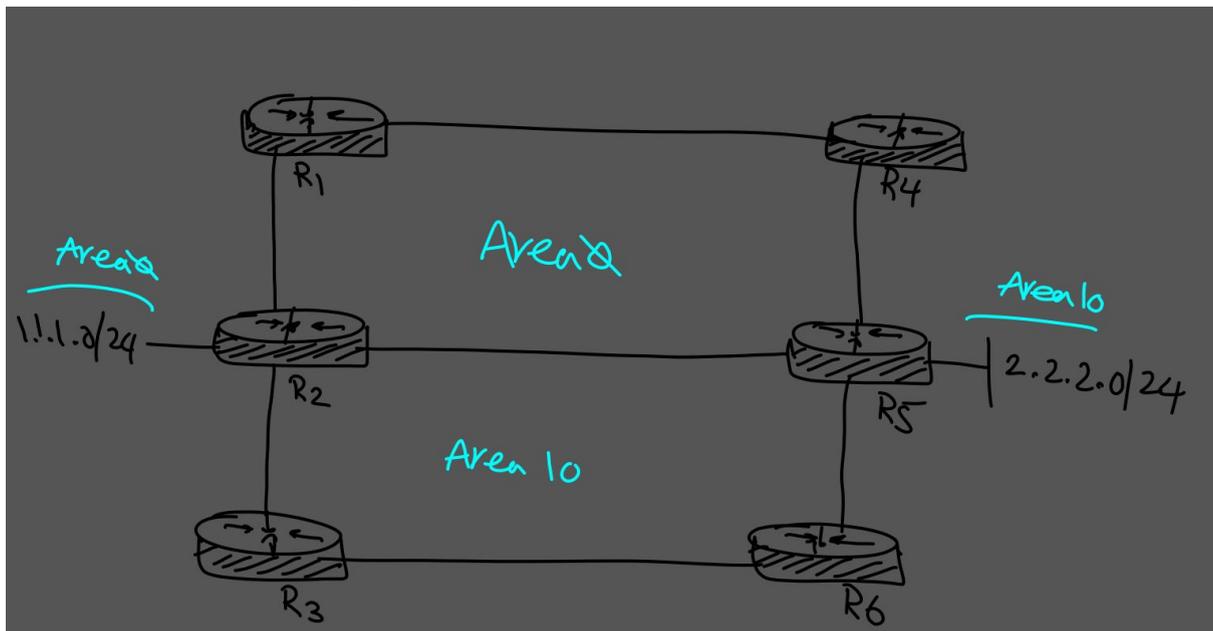
In our scenario, if the "R2-R5" link belongs to area "0", which link is best and shortest from the "R2" point of view?

And how about if the "R2-R5" link belongs to area "10"?

Let's find out!

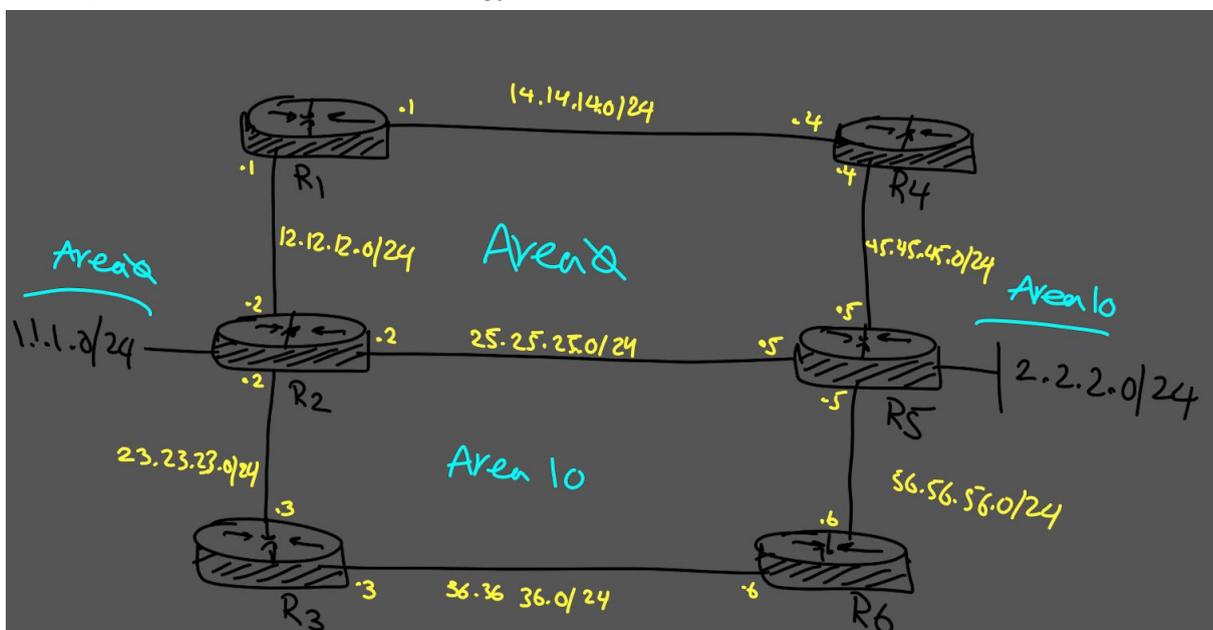
We configure loopbacks into two different areas.

Loopback "0" in "R2" belongs to the area "0"; loopback "0" in "R5" belongs to the area "10", and the "R2-R5" link belongs to the area "0."



Now we are going to configure OSPF and check the result!

In this picture, we can see the topology and ip addresses of this scenario



R2-R5 link belongs to area 0

R2-Configuration

```
!  
interface GigabitEthernet0/1  
  ip address 25.25.25.2 255.255.255.0  
  ip ospf 1 area 0  
  duplex auto  
  speed auto  
  media-type rj45  
end
```

R2#

R5-Configuration

```
interface GigabitEthernet0/1  
  ip address 25.25.25.5 255.255.255.0  
  ip ospf 1 area 0  
  duplex auto  
  speed auto  
  media-type rj45  
end
```

R5#

Now check out the traces:

1- from R5 (2.2.2.2) to R2(1.1.1.1)

```
R5#traceroute 1.1.1.1 source 2.2.2.2
Type escape sequence to abort.
Tracing the route to 1.1.1.1
VRF info: (vrf in name/id, vrf out name/id)
 1 25.25.25.2 7 msec 8 msec *
R5#
```

2- now from R2(1.1.1.1) to R5(2.2.2.2)

```
ip ospf 1 area 10
duplex auto
speed auto
media-type rj45
end

R2#sh run int gi 0/1
Building configuration...

Current configuration : 133 bytes
!
interface GigabitEthernet0/1
ip address 25.25.25.2 255.255.255.0
ip ospf 1 area 0
duplex auto
speed auto
media-type rj45
end

R2#trac
R2#traceroute 2.2.2.2 sou
R2#traceroute 2.2.2.2 source 1.1.1.1
Type escape sequence to abort.
Tracing the route to 2.2.2.2
VRF info: (vrf in name/id, vrf out name/id)
 1 23.23.23.3 8 msec 3 msec 4 msec
 2 36.36.36.6 9 msec 4 msec 5 msec
 3 65.65.65.5 9 msec * 6 msec
R2#
```

Sub-optimal

** the reason is Inter area Route win! (2.2.2.2 in Area 10 will be the reason)*

Sub-optimal

This suboptimal routing is due to intra-area route preference over the inter area routes

Solution

With multi-area adjacency, a single physical link (router interface) can belong to multiple OSPF areas.

Now we have multiple intra-area paths sharing the same physical link.

Important notes about multi-area solution:

- You must configure OSPF on the primary interface.
- Link type must be point-to-point

Now is configuration time.

Step 1:

change ospf network type into "point-to-point."

Step 2:

we have to go under interface and issue this command

ip ospf 1 multiarea x ---> in our example x=10

```
interface GigabitEthernet0/1
 ip address 25.25.25.5 255.255.255.0
 ip ospf network point-to-point
 ip ospf multi-area 10
 ip ospf 1 area 0
 duplex auto
 speed auto
 media-type rj45
end
R5#
```

```
interface GigabitEthernet0/1
 ip address 25.25.25.5 255.255.255.0
 ip ospf network point-to-point
 ip ospf multi-area 10
 ip ospf 1 area 0
 duplex auto
 speed auto
 media-type rj45
end
R5#sh ip ospf neighbor
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
4.4.4.4	1	FULL/DR	00:00:37	54.54.54.4	GigabitEthernet0/3
1.1.1.1	0	FULL/-	00:00:37	25.25.25.2	GigabitEthernet0/1
1.1.1.1	0	FULL/-	00:00:38	25.25.25.2	OSPF_MA0
6.6.6.6	1	FULL/DR	00:00:37	65.65.65.6	GigabitEthernet0/2

Handwritten annotations: "Point-to-Point" with arrows pointing to "ip ospf network point-to-point" and "ip ospf multi-area 10". "Multi-Area" with arrows pointing to "ip ospf multi-area 10" and "OSPF_MA0".

After issuing the command on both sides (R2 and R5), we have a new adjacency:

I want to try traceroute again but this time after ospf multi-area configuration:

```
R5#traceroute 1.1.1.1 source 2.2.2.2
Type escape sequence to abort.
Tracing the route to 1.1.1.1
VRF info: (vrf in name/id, vrf out name/id)
 1 25.25.25.2 13 msec * 5 msec
R5#
```

```
R2#traceroute 2.2.2.2 source 1.1.1.1
Type escape sequence to abort.
Tracing the route to 2.2.2.2
VRF info: (vrf in name/id, vrf out name/id)
 1 25.25.25.5 12 msec * 5 msec
R2#
```

Conclusion

Now in both directions, we are choosing the shortest path, and we don't experience any suboptimal routing.

I hope this article is useful for you and you enjoyed it.