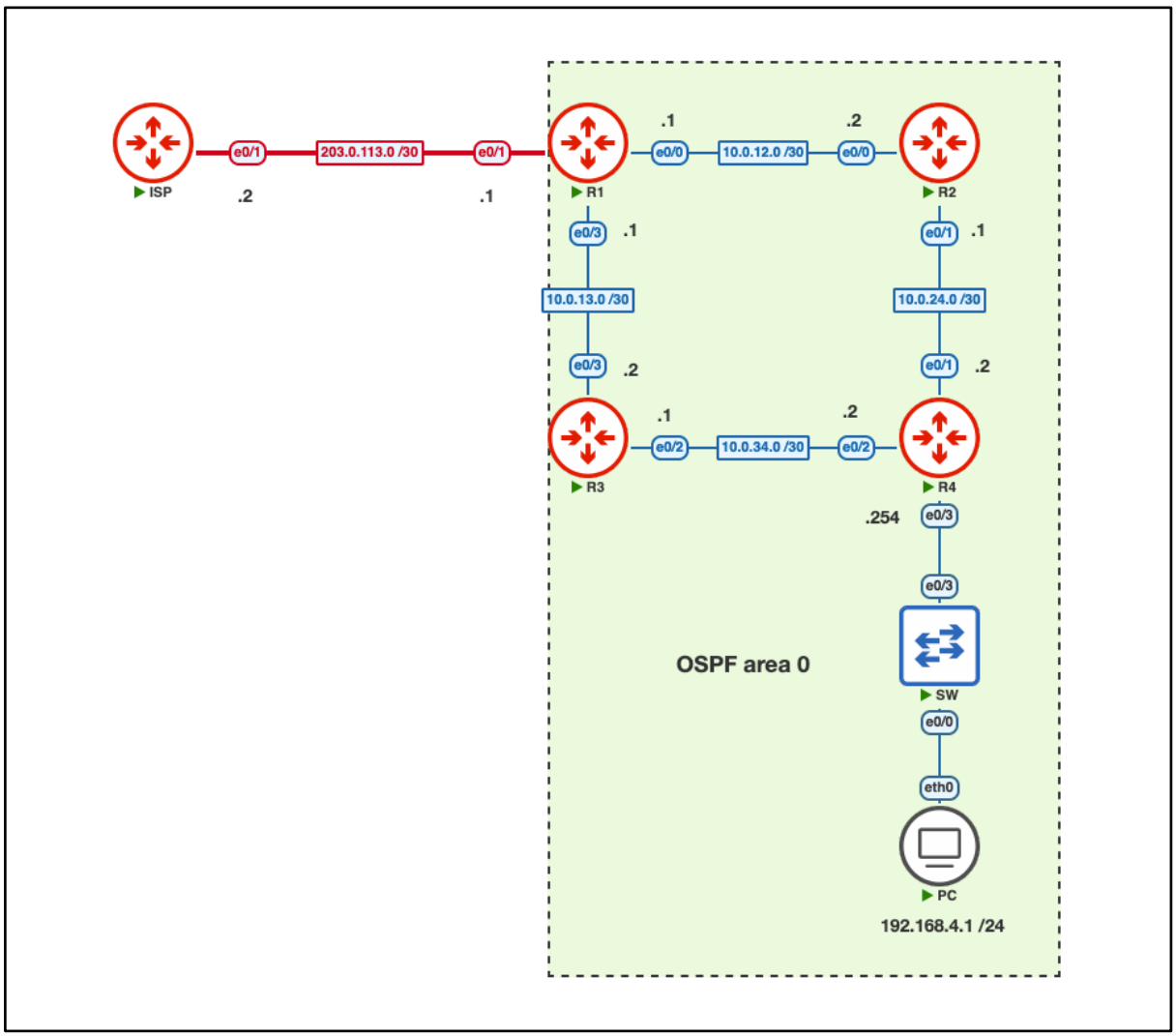
Single Area OSPF with Default Route Advertisement:



This lab focuses on configuring **single-area OSPF (Area 0)** to enable dynamic routing and redundancy among multiple routers. All devices were assigned proper IP addresses, loopback interfaces were configured for stable router IDs, and unnecessary interfaces were set as passive. Router R1 was configured as an **ASBR** to advertise a default route from the ISP into the OSPF domain. Connectivity and routing were verified using ping and routing table checks, and link failure testing confirmed OSPF's ability to automatically reroute traffic and reconverge when the primary path was restored.

Pnet-Lab Github Link :

Step 1: All routers and the PC were configured with appropriate hostnames, IP addresses, and subnet masks as per the topology. Router interfaces were enabled to ensure basic Layer-3 connectivity between all directly connected devices.

Device Name	Interface	IP address	Subnet Mask
ISP	e0/1	203.0.113.2	255.255.255.252
R1	e0/0	10.0.12.1	255.255.255.252
	e0/3	10.0.13.1	255.255.255.252
R2	e0/0	10.0.12.2	255.255.255.252
	e0/1	10.0.24.1	255.255.255.252
R3	e0/3	10.0.13.2	255.255.255.252
	e0/2	10.0.34.1	255.255.255.252
R4	e0/1	10.0.24.2	255.255.255.252
	e0/2	10.0.34.2	255.255.255.252
	e0/3	192.168.4.254	255.255.255.0

PC1
IP Address: 192.168.4.1 Subnet Mast: 255.255.255.0 Default Gateway: 192.168.4.254

Step 2: On R4, a loopback interface was configured to provide a stable router ID, and OSPF was enabled in Area 0. The LAN-facing interface and the loopback interface were set as passive to prevent unnecessary OSPF hello messages while still advertising the networks.

R4
enable configure terminal interface loopback 0 ip address 4.4.4.4 255.255.255.255 exit router ospf 4 passive-interface Ethernet0/3

```
passive-interface Loopback0
network 0.0.0.0 255.255.255.255 area 0
```

Step 3: On R3, a loopback interface was configured and advertised into OSPF Area 0. OSPF was enabled on all required point-to-point links, and the loopback interface was configured as passive to maintain routing stability.

R3
enable
configure terminal
interface loopback 0
ip address 3.3.3.3 255.255.255.255
exit
router ospf 3
passive-interface Loopback0
network 3.3.3.3 0.0.0.0 area 0
network 10.0.13.2 0.0.0.0 area 0
network 10.0.34.1 0.0.0.0 area 0

Step 4: On R2, a loopback interface was configured and OSPF was enabled using a summarized network statement to advertise all relevant interfaces into Area 0. The loopback interface was configured as passive.

R2
enable
configure terminal
interface loopback 0
ip address 2.2.2.2 255.255.255.255
exit
router ospf 2
passive-interface Loopback0
network 10.0.0.0 0.0.255.255 area 0

Step 4: On R1, a loopback interface was configured and the router was set up as an **ASBR** by configuring a static default route toward the ISP. This default route was injected into the OSPF domain using the default-information originate command so all internal routers could reach external networks.

R1
enable
configure terminal
interface loopback 0
ip address 2.2.2.2 255.255.255.255
exit
ip route 0.0.0.0 0.0.0.0 203.0.113.2
router ospf 1
passive-interface Loopback0
network 10.0.12.0 0.0.0.3 area 0
network 10.0.13.0 0.0.0.3 area 0
default-information originate

Conclusion: OSPF operation and routing were verified on all routers using routing table and neighbor checks. End-to-end connectivity was tested by pinging from the PC to external destinations. Link failure and recovery tests confirmed that OSPF dynamically recalculates routes and restores the optimal path after convergence.

```
VPCS> trace 203.0.113.2
trace to 203.0.113.2, 8 hops max, press Ctrl+C to stop
 1   192.168.4.254   1.274 ms  0.670 ms  0.796 ms
 2   10.0.34.1   5.511 ms  0.874 ms  0.767 ms
 3   10.0.13.1   1.238 ms  1.061 ms  1.055 ms
 4   *203.0.113.2   1.094 ms (ICMP type:3, code:3, Destination port unreachable)  *

VPCS>
VPCS>
VPCS> ping 203.0.113.2

84 bytes from 203.0.113.2 icmp_seq=1 ttl=252 time=0.726 ms
84 bytes from 203.0.113.2 icmp_seq=2 ttl=252 time=1.286 ms
84 bytes from 203.0.113.2 icmp_seq=3 ttl=252 time=0.957 ms
84 bytes from 203.0.113.2 icmp_seq=4 ttl=252 time=0.995 ms
84 bytes from 203.0.113.2 icmp_seq=5 ttl=252 time=0.987 ms
```