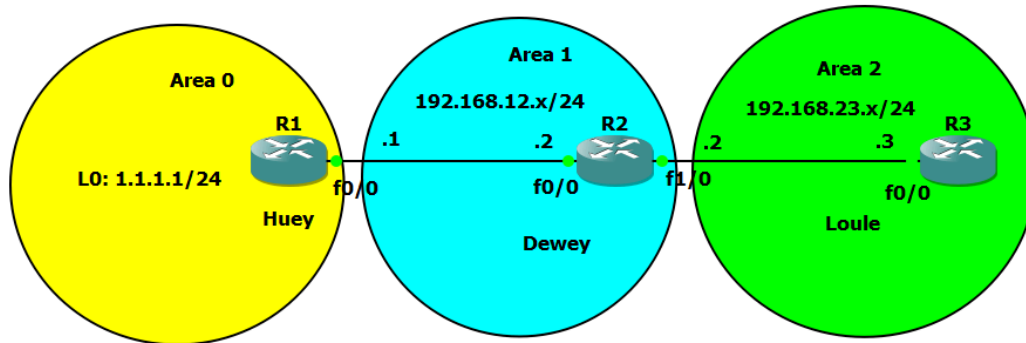


Practical 3-Implement the concept of OSPF Virtual-Link Configuration



R1

R1#conf t

Enter configuration commands, one per line. End with CNTL/Z.

R1(config)#ip cef

R1(config)#int lo0

R1(config-if)#ip add 1.1.1.1 255.255.255.0

R1(config-if)#no shut

R1(config-if)#ex

R1(config)#int fa 0/0

R1(config-if)#ip add 192.168.12.1 255.255.255.0

R1(config-if)#no shut

R1(config-if)#duplex auto

R1(config-if)#speed auto

R1(config-if)#ex

R1(config)#

```

R1(config)#ip cef
R1(config)#int la0
    ^
% Invalid input detected at '^' marker.

R1(config)#int lo0
R1(config-if)#
*Mar  1 00:01:56.839: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
R1(config-if)#ip add 1.1.1.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#ex
R1(config)#int fa 0/0
R1(config-if)#ip add 192.168.12.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#duplex a
*Mar  1 00:03:33.987: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
*Mar  1 00:03:34.987: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
R1(config-if)#duplex auto
R1(config-if)#speed auto
R1(config-if)#ex

```

R2

R2#conf t

Enter configuration commands, one per line. End with CNTL/Z.

```

R2(config)#int lo 0
R2(config-if)#ex
R2(config)#int fa0/0
R2(config-if)#ip add 192.168.12.2 255.255.255.0
R2(config-if)#no shut
R2(config-if)#duplex auto
R2(config-if)#speed auto
R2(config-if)#ex
R2(config)#int fa 1/0
R2(config-if)#ip add 192.168.23.2 255.255.255.0
R2(config-if)#no shut
R2(config-if)#duplex auto
R2(config-if)#speed auto
R2(config-if)#ex

```

```

R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#int lo 0
R2(config-if)#ex
R2(config)#int fa0/0
R2(config-if)#ip add 192.168.12.2 255.255.255.0
R2(config-if)#no shut
R2(config-if)#duplex auto
R2(config-if)#speed auto
R2(config-if)#ex
R2(config)#int fa 1/0
R2(config-if)#ip add 192.168.23.2 255.255.255.0
R2(config-if)#no shut
R2(config-if)#
*Mar  1 00:13:44.455: %LINK-3-UPDOWN: Interface FastEthernet1/0, changed state to up
*Mar  1 00:13:45.455: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up
R2(config-if)#duplex auto
R2(config-if)#speed auto
R2(config-if)#ex

```

R3

R3#conf t

Enter configuration commands, one per line. End with CNTL/Z.

```
R3(config)#ip cef
R3(config)#int lo0
R3(config-if)#ip
R3(config-if)#ip add 172.16.0.1 255.255.255.0
R3(config-if)#no shut
R3(config-if)#ex
R3(config)#int lo1
R3(config-if)#ip add
R3(config-if)#ip add 172.16.1.1 255.255.255.0
R3(config-if)#no shut
R3(config-if)#ex
R3(config)#int lo2
R3(config-if)#
R3(config-if)#ip add 172.16.2.1 255.255.255.0
R3(config-if)#no shut
R3(config-if)#ex
R3(config)#int lo3
R3(config-if)#ip
R3(config-if)#ip add 172.16.3.1 255.255.255.0
R3(config-if)#no shut
R3(config-if)#ex
R3(config)#int fa0/0
R3(config-if)#ip add 192.168.23.3 255.255.255.0
R3(config-if)#no shut
R3(config-if)#speed auto
R3(config-if)#duplex auto
R3(config-if)#speed auto
R3(config-if)#ex
```

```

R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#ip cef
R3(config)#int lo0
R3(config-if)#ip
*Mar 1 00:04:03.875: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
R3(config-if)#ip add 172.16.0.1 255.255.255.0
R3(config-if)#no shut
R3(config-if)#ex
R3(config)#int lo1
R3(config-if)#ip add
*Mar 1 00:05:13.959: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to up
R3(config-if)#ip add 172.16.1.1 255.255.255.0
R3(config-if)#no shut
R3(config-if)#ex
R3(config)#int lo2
R3(config-if)#
*Mar 1 00:05:45.687: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback2, changed state to up
R3(config-if)#ip add 172.16.2.1 255.255.255.0
R3(config-if)#no shut
R3(config-if)#ex
R3(config)#int lo3
R3(config-if)#ip
*Mar 1 00:06:27.791: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback3, changed state to up
R3(config-if)#ip add 172.16.3.1 255.255.255.0
R3(config-if)#no shut
R3(config-if)#ex
R3(config)#int fa0/0
R3(config-if)#ip add 192.168.23.3 255.255.255.0
R3(config-if)#no shut
R3(config-if)#
*Mar 1 00:07:34.423: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
*Mar 1 00:07:35.423: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
R3(config-if)#duplex auto
^
% Invalid input detected at '^' marker.

R3(config-if)#speed auto
R3(config-if)#duplex auto
R3(config-if)#speed auto
R3(config-if)#ex

```

Show IP Route

R1

R1#show ip route

```

R1#show 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    1.0.0.0/24 is subnetted, 1 subnets
C      1.1.1.0 is directly connected, Loopback0

```

R2

R2#show ip route

```
R2#show 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    192.168.23.0/24 is directly connected, FastEthernet1/0
```

R3

R3#show ip route

```
R3#show 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

      172.16.0.0/24 is subnetted, 4 subnets
C      172.16.0.0 is directly connected, Loopback0
C      172.16.1.0 is directly connected, Loopback1
C      172.16.2.0 is directly connected, Loopback2
C      172.16.3.0 is directly connected, Loopback3
C    192.168.23.0/24 is directly connected, FastEthernet0/0
```

R1

R1#conf t

Enter configuration commands, one per line. End with CNTL/Z.

R1(config)#router ospf 1

R1(config-router)#network 192.168.12.0 0.0.0.255 area 1

R1(config-router)#network 1.1.1.0 0.0.0.255 area 0

R1(config-router)#ex

```
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router ospf 1
R1(config-router)#network 192.168.12.0 0.0.0.255 area 1
R1(config-router)#network 1.1.1.0 0.0.0.255 area 0
R1(config-router)#ex
```

R2

R2(config)#router ospf 1

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

R2(config-router)#network 192.168.23.0 0.0.0.255 area 2

R2(config-router)#ex

```
R2(config)#router ospf 1
R2(config-router)#network 192.168.12.0 0.0.0.255 area 1
R2(config-router)#network 192.168
*Mar  1 00:19:50.075: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on FastEthernet0/0 from LOADING to FULL, Loading Done
R2(config-router)#network 192.168.23.0 0.0.0.255 area 2
R2(config-router)#ex
```

R3

R3(config)#router ospf 1

R3(config-router)#network 192.168.23.0 0.0.0.255 area 2

R3(config-router)#e

R3(config-router)#ex

```
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 1
R3(config-router)#network 192.168.23.0 0.0.0.255 area 2
R3(config-router)#e
*Mar  1 00:19:53.075: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.23.2 on FastEthernet0/0 from LOADING to FULL, Loading Done
R3(config-router)#ex
```

R1

R1# Show ip ospf neighbor

R1#show ip ospf neighbor

Neighbor ID	Pri	State	Dead Time	Address	Interface
192.168.23.2	1	FULL/BDR	00:00:30	192.168.12.2	FastEthernet0/0

R2

R2# Show ip ospf neighbor

R2#show ip ospf neighbor

Neighbor ID	Pri	State	Dead Time	Address	Interface
1.1.1.1	1	FULL/DR	00:00:31	192.168.12.1	FastEthernet0/0
172.16.3.1	1	FULL/BDR	00:00:34	192.168.23.3	FastEthernet1/0

R3

R3# Show ip ospf neighbor

R3#show ip ospf neighbor

Neighbor ID	Pri	State	Dead Time	Address	Interface
192.168.23.2	1	FULL/DR	00:00:35	192.168.23.2	FastEthernet0/0

Virtual link

R1

R1#conf t

Enter configuration commands, one per line. End with CNTL/Z.

R1(config)#router ospf 1

R1(config-router)#area 1 virtual-link 192.168.23.2

```
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#router ospf 1
R1(config-router)#area 1 virtual-link 192.168.23.2
R1(config-router)#
*Mar  1 00:28:34.651: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.23.2 on OSPF_VL0 from LOADING to FULL, Loading Done
```

R2

R2#conf t

Enter configuration commands, one per line. End with CNTL/Z.

R2(config)#router ospf 1

R2(config-router)#area 1 virtual-link 1.1.1.1

```
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#router ospf 1
R2(config-router)#area 1 virtual-link 1.1.1.1
R2(config-router)#
*Mar  1 00:26:34.699: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on OSPF_VL0 from LOADING to FULL, Loading Done
```