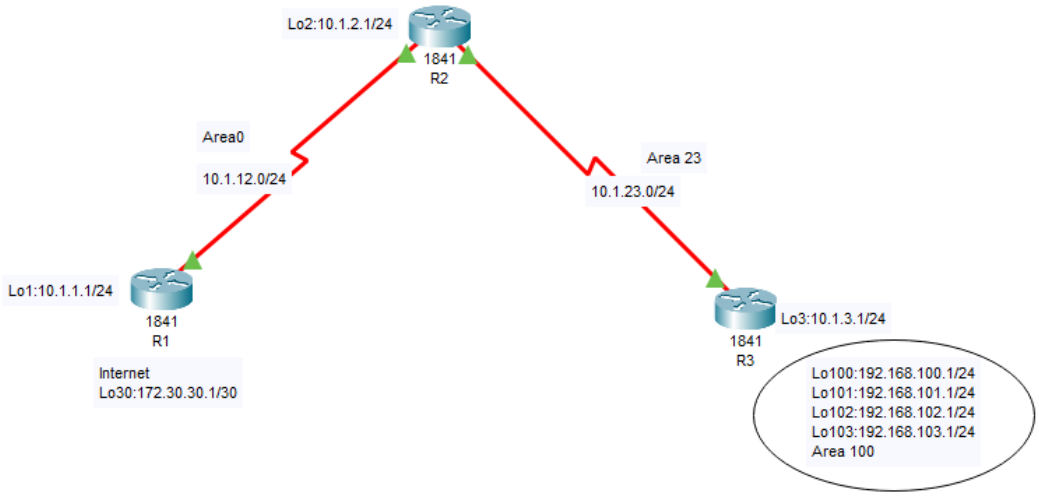

Step 1: Configure addressing and loopbacks.

```
R1(config)# interface Loopback1
R1(config-if)# description Engineering Department
R1(config-if)# ip address 10.1.1.1 255.255.255.0
R1(config-if)# exit
R1(config)# interface FastEthernet0/0
R1(config-if)# ip address 10.1.200.1 255.255.255.0
R1(config-if)# no shutdown
```

```
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)# interface loopback 2
R2(config-if)# description Marketing Department
R2(config-if)# ip address 10.1.2.1 255.255.255.0
R2(config-if)# interface serial 0/0/0
R2(config-if)# ip address 10.1.12.2 255.255.255.0
R2(config-if)# no shutdown
R2(config-if)# interface serial 0/0/1
R2(config-if)# ip address 10.1.23.2 255.255.255.0
R2(config-if)# clockrate 64000
R2(config-if)# no shutdown
```

Step 2: Add interfaces into OSPF.

Step 3: Create a virtual link

```
R3>en
R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#router ospf 1
R3(config-router)#network 10.1.3.0 0.0.0.255 area 23
R3(config-router)#network 10.1.23.0 0.0.0.255 area 23
R3(config-router)#
00:05:11: %OSPF-6-AREACHG: 10.1.23.0/0 changed from area 2 to area 23

R3(config-router)#network 10.1.23.0 0.0.0.255 area 23
R3(config-router)#
00:05:20: %OSPF-5-ADJCHG: Process 1, Nbr 10.1.2.1 on Serial0/1/0 from LOADING to FULL,
Loading Done

R3(config-router)#exit
R3(config)#router ospf 1
R3(config-router)#network 192.168.100.0 0.0.0.3.255 area 100
                                        ^
% Invalid input detected at '^' marker.

R3(config-router)#network 192.168.100.0 0.0.3.255 area 100
R3(config-router)#exit
R3(config)#int lol00
R3(config-if)#ip ospf network point-to-point
R3(config-if)#int lol02
R3(config-if)#ip ospf network point-to-point
R3(config-if)#int lol03
R3(config-if)#ip ospf network point-to-point
R3(config-if)#
```

```
R2>en
R2#sh ip ospf neighor
                  ^
% Invalid input detected at '^' marker.

R2#sh ip ospf neighbor


Neighbor ID     Pri   State           Dead Time   Address         Interface
172.30.30.1       0   FULL/  -        00:00:36    10.1.12.1       Serial0/1/0
R2#
00:05:20: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.103.1 on Serial0/1/1 from LOADING to
FULL, Loading Done

R2#sh ip ospf neighbor


Neighbor ID     Pri   State           Dead Time   Address         Interface
172.30.30.1       0   FULL/  -        00:00:32    10.1.12.1       Serial0/1/0
192.168.103.1     0   FULL/  -        00:00:37    10.1.23.3       Serial0/1/1
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#router ospf 1
R2(config-router)#area 23 virtual-link 192.168.103.1
R2(config-router)#
```

```
R3(config-router)#area 23 virtual-link 10.1.2.1
R3(config-router)#
00:19:11: %OSPF-5-ADJCHG: Process 1, Nbr 10.1.2.1 on OSPF_VL0 from LOADING to FULL,
Loading Done
```

```
R2#sh ip ospf neighbor


Neighbor ID     Pri   State           Dead Time   Address         Interface
192.168.103.1     0   FULL/  -        00:00:37    10.1.23.3       OSPF_VL0
172.30.30.1       0   FULL/  -        00:00:32    10.1.12.1       Serial0/1/0
192.168.103.1     0   FULL/  -        00:00:37    10.1.23.3       Serial0/1/1
R2#sh ip ospf interface

Loopback2 is up, line protocol is up
  Internet address is 10.1.2.1/24, Area 0
  Process ID 1, Router ID 10.1.2.1, Network Type POINT-TO-POINT, Cost: 1
  Transmit Delay is 1 sec, State POINT-TO-POINT,
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
  Index 1/1, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Suppress hello for 0 neighbor(s)
Serial0/1/0 is up, line protocol is up
  Internet address is 10.1.12.2/24, Area 0
  Process ID 1, Router ID 10.1.2.1, Network Type POINT-TO-POINT, Cost: 64
  Transmit Delay is 1 sec, State POINT-TO-POINT
```

```
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 1 , Adjacent neighbor count is 1
    Adjacent with neighbor 172.30.30.1
  Suppress hello for 0 neighbor(s)
Serial0/1/1 is up, line protocol is up
  Internet address is 10.1.23.2/24, Area 23
  Process ID 1, Router ID 10.1.2.1, Network Type POINT-TO-POINT, Cost: 64
  Transmit Delay is 1 sec, State POINT-TO-POINT,
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:05
  Index 3/3, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 1 , Adjacent neighbor count is 1
    Adjacent with neighbor 192.168.103.1
  Suppress hello for 0 neighbor(s)
OSPF_VL0 is up, line protocol is up
  Internet address is 10.1.23.2/24, Area 0
  Process ID 1, Router ID 10.1.2.1, Network Type VIRTUAL_LINK, Cost: 64
  Configured as demand circuit.
  Run as demand circuit.
  DoNotAge LSA allowed.
  Transmit Delay is 1 sec, State POINT-TO-POINT
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    oob-resync timeout 40
    Hello due in 00:00:00
  Supports Link-local Signaling (LLS)
  Index 4/4, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 0, maximum is 0
  Last flood scan time is 0 msec, maximum is 0 msec
  Suppress hello for 0 neighbor(s)
R2#
R2#
```

```
R3>en
R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#router ospf 1
R3(config-router)#area 100 range 192.168.100.0 255.255.252.0
```

Step4 :Summarize an area

```
R3#sh ip route
Codes: C - connected, S - static, I - IGRP, 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, E - EGP
       i - IS-IS, 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

     10.0.0.0/24 is subnetted, 5 subnets
O       10.1.1.0 [110/129] via 10.1.23.2, 00:23:25, Serial0/1/0
O       10.1.2.0 [110/65] via 10.1.23.2, 00:23:25, Serial0/1/0
C       10.1.3.0 is directly connected, Loopback3
O       10.1.12.0 [110/128] via 10.1.23.2, 00:23:25, Serial0/1/0
C       10.1.23.0 is directly connected, Serial0/1/0
O    192.168.100.0/22 is a summary, 00:00:00, Null0
C    192.168.100.0/24 is directly connected, Loopback100
C    192.168.101.0/24 is directly connected, Loopback101
C    192.168.102.0/24 is directly connected, Loopback102
C    192.168.103.0/24 is directly connected, Loopback103

R3#
```