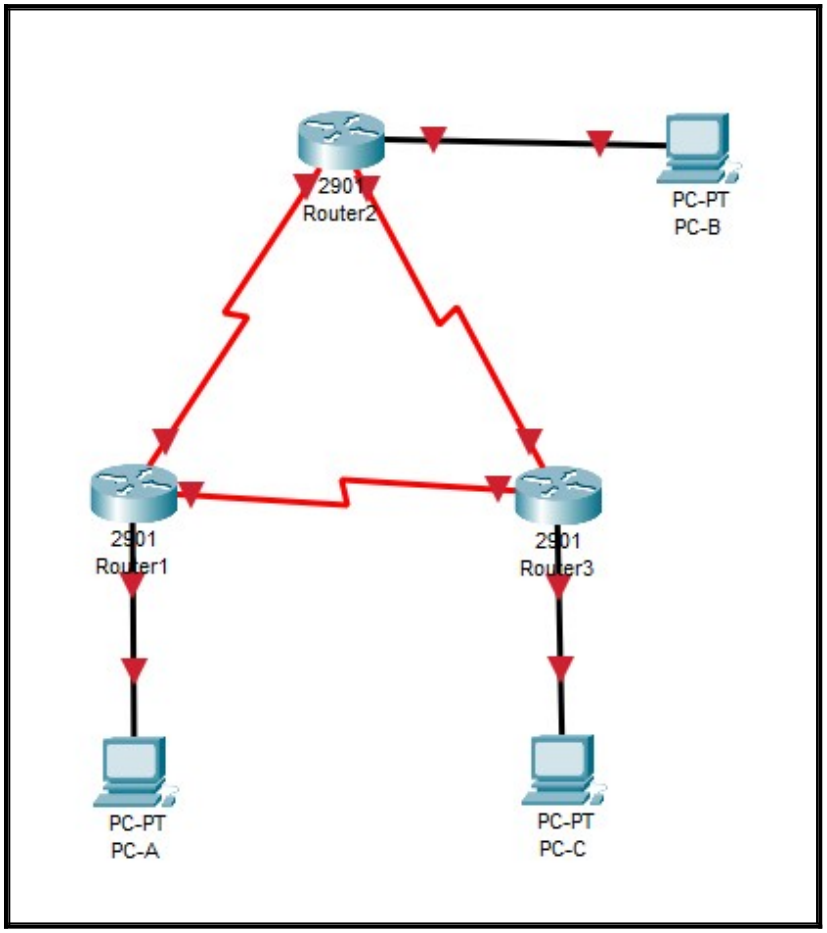
Travaux pratiques : configuration du protocole OSPFv2 de base dans une zone unique (8.2.4.5).

Sommaire :

Partie 1 : Création du réseau et configuration des paramètres de base du périphérique :

Étape 1 : **Câbler le réseau conformément à la topologie.**



1ère étape : Nous câblons le réseau conformément à la topologie.

Étape 3 : Configurer les paramètres de base pour chaque routeur.

```
R1#sh run
Building configuration...

Current configuration : 971 bytes
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R1
!
!
!
enable secret 5 $1$mERr$9cTjUIEqNGurQiFU.ZeCi1
!
!
!
!
!
!
no ip cef
no ipv6 cef
!
!
!
!
license udi pid CISCO2901/K9 sn FTX1524OH0D-
!
!
!
!
!
!
!
!
!
no ip domain-lookup
!
!
spanning-tree mode pvst
!
!
!
!
!
!
interface GigabitEthernet0/0
 ip address 192.168.1.1 255.255.255.0
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
```

```
interface Serial0/0/0
 ip address 192.168.12.1 255.255.255.252
 clock rate 128000
 shutdown
!
interface Serial0/0/1
 ip address 192.168.13.1 255.255.255.252
!
interface Vlan1
 --More-- R1# no ip address
 shutdown
!
ip classless
!
ip flow-export version 9
!
!
!
!
!
!
!
!
line con 0
 exec-timeout 5 0
 password cisco
 logging synchronous
 login
!
line aux 0
!
line vty 0 4
 exec-timeout 5 0
 password cisco
 logging synchronous
 login
!
!
!
end
```

Configuration R1

```
R2#sh run
Building configuration...

Current configuration : 970 bytes
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R2
!
!
!
enable secret 5 $1$mERr$9cTjUIEqNGurQiFU.ZeCi1
!
!
!
!
!
!
no ip cef
no ipv6 cef
!
!
!
!
license udi pid CISCO2901/K9 sn FTX1524X0W5-
!
!
!
!
!
!
!
!
!
!
no ip domain-lookup
!
!
spanning-tree mode pvst
!
!
!
!
!
!
interface GigabitEthernet0/0
 ip address 192.168.2.1 255.255.255.0
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
```

```
interface Serial0/0/0
 ip address 192.168.12.2 255.255.255.252
!
interface Serial0/0/1
 ip address 192.168.23.1 255.255.255.252
 clock rate 128000
!
interface Vlan1
 no ip address
 shutdown
!
ip classless
!
ip flow-export version 9
!
!
!
no cdp run
!
!
!
!
!
!
line con 0
 exec-timeout 5 0
 password cisco
 logging synchronous
 login
!
line aux 0
!
line vty 0 4
 exec-timeout 5 0
 password cisco
 logging synchronous
 login
!
!
!
end
```

Configuration R2

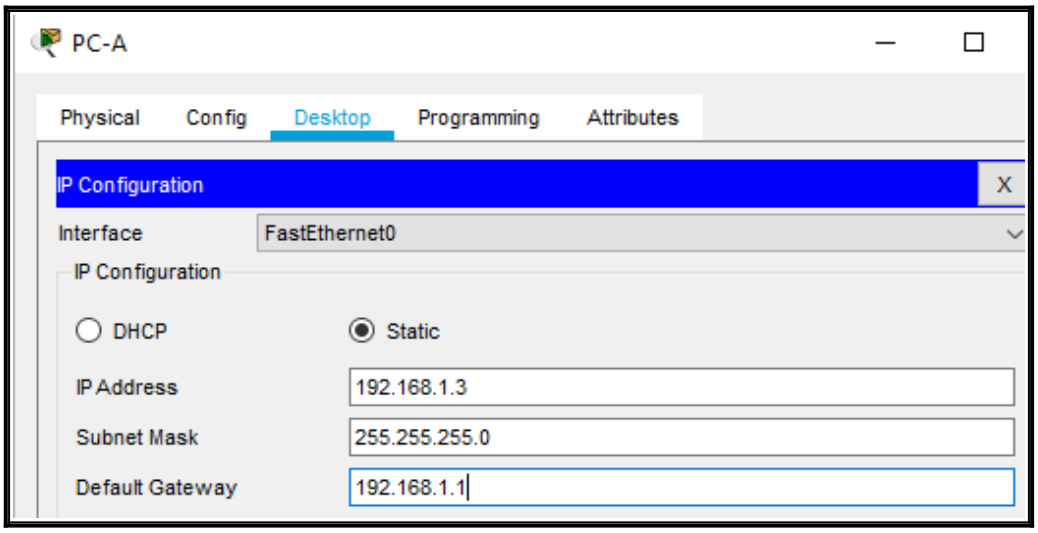
```
R3#sh run
Building configuration...

Current configuration : 970 bytes
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R3
!
!
!
enable secret 5 $1$mERr$9cTjUIEqNGurQiFU.ZeCi1
!
!
!
!
!
!
no ip cef
no ipv6 cef
!
!
!
!
license udi pid CISCO2901/K9 sn FTX152497ZR-
!
!
!
!
!
!
!
!
!
no ip domain-lookup
!
!
spanning-tree mode pvst
!
!
!
!
!
!
interface GigabitEthernet0/0
 ip address 192.168.3.1 255.255.255.0
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
```

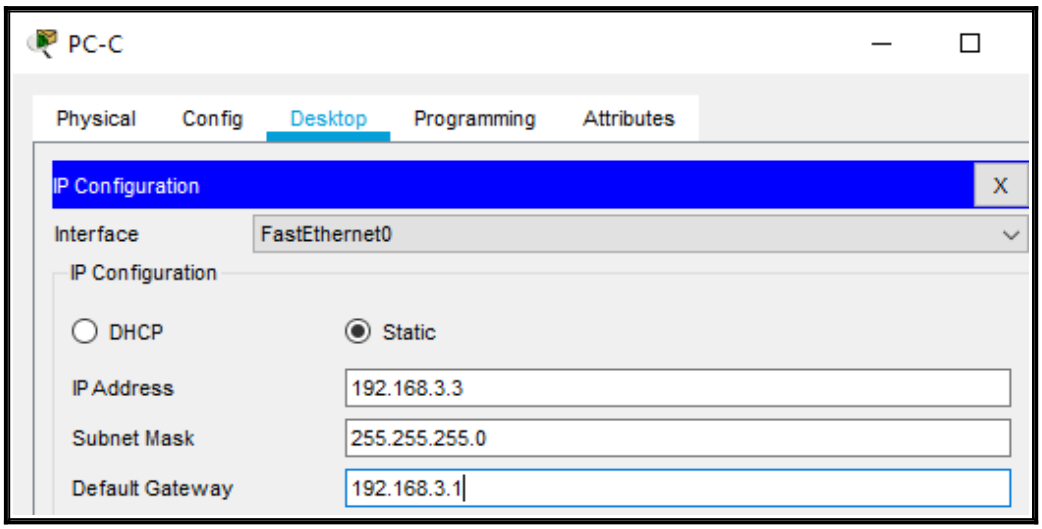
```
interface Serial0/0/0
 ip address 192.168.13.2 255.255.255.252
 clock rate 128000
!
interface Serial0/0/1
 ip address 192.168.23.2 255.255.255.252
!
interface Vlan1
 no ip address
 shutdown
!
ip classless
!
ip flow-export version 9
!
!
!
no cdp run
!
!
!
!
!
!
line con 0
 exec-timeout 5 0
 password cisco
 logging synchronous
 login
!
line aux 0
!
line vty 0 4
 exec-timeout 5 0
 password cisco
 logging synchronous
 login
!
!
!
end
```

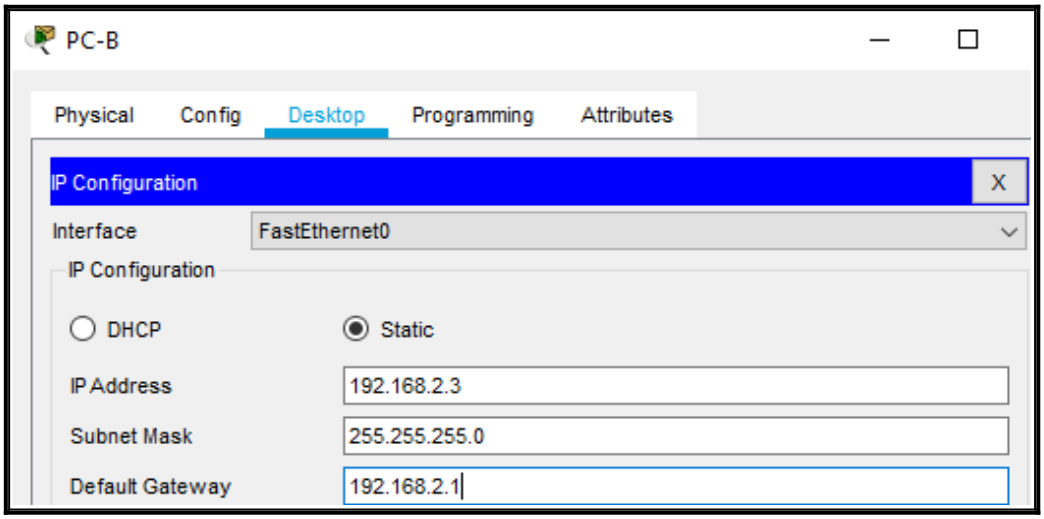
Configuration R3

3ème étape : Nous configurons les paramètres de base sur chaque routeur de la topologie.

Étape 4 : Configurer les hôtes de PC.





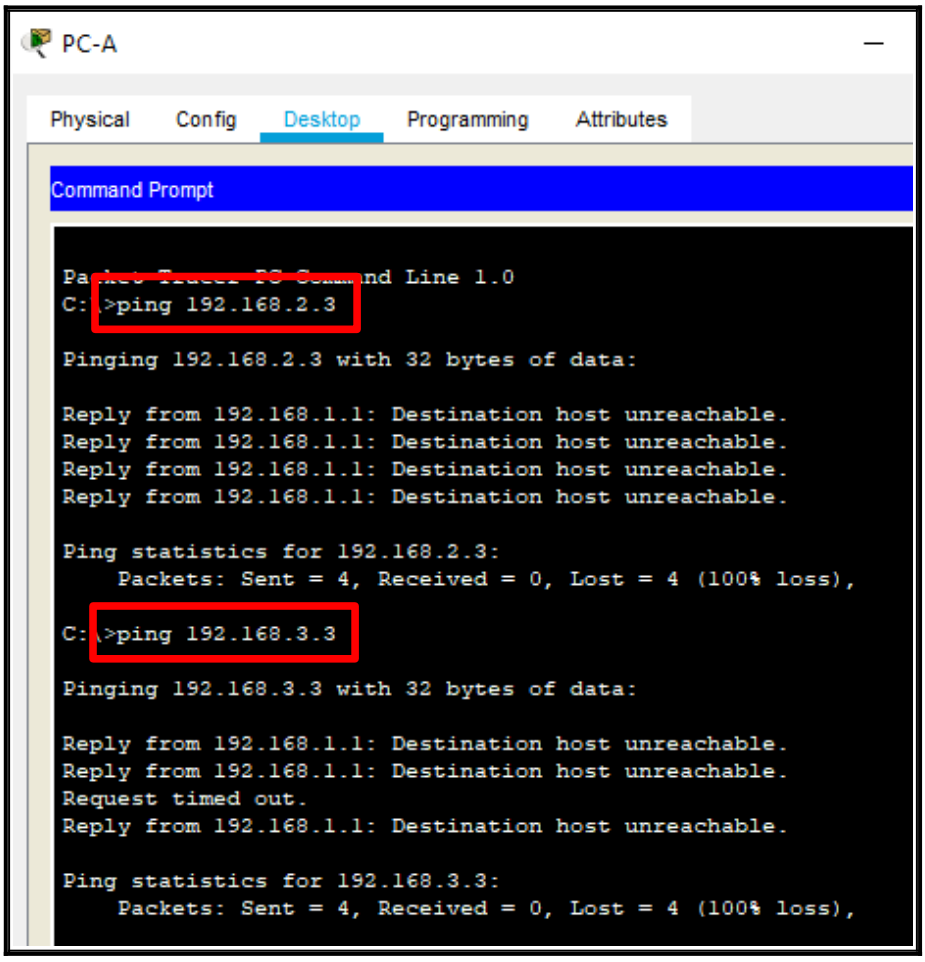


4ème étape : Nous configurons les hôtes de PC.

Étape 5 : Tester la connectivité.

```
R1#ping 192.168.12.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.12.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/3/5 ms

R1#ping 192.168.13.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.13.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 3/4/8 ms
```

5ème étape : Nous constatons avec ce test sur R1 que les routeurs peuvent communiqué entre eux.



Même procédure depuis PC-A vers les autres stations PC-B et PC-C mais les machine ne peuvent pas communiqué entre elles.

Partie 2 : Configuration et vérification du routage OSPF :

Étape 1 : Configurez le protocole OSPF sur R1.

```
R1(config)#router ospf 1
R1(config-router)#network 192.168.1.0 0.0.0.255 area 0
R1(config-router)#network 192.168.12.0 0.0.0.3 area 0
R1(config-router)#network 192.168.13.0 0.0.0.3 area 0
```

1ère étape : Sur R1 nous configurons le protocole ospf, ajoutons les instructions réseaux sur ce même routeur en lui ajoutant 0 comme ID de zone.

Étape 2 : Configurez le protocole OSPF sur R2 et R3.

```
R2(config)#router ospf 1
R2(config-router)#network 192.168.2.0 0.0.0.0 area 0

R2(config-router)#network 192.168.12.0 0.0.0.3 area 0
R2(config-router)#network 192.168.2.0 0.0.0.0 area 0
01:00:21: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.13.1 on Seri

R2(config-router)#network 192.168.2.0 0.0.0.255 area 0
R2(config-router)#network 192.168.23.0 0.0.0.3 area 0
```

R2

```
R3(config)#router ospf 1
R3(config-router)#network 192.168.3.0 0.0.0.255 area 0
R3(config-router)#network 192.168.13.0 0.0.0.3 area 0
R3(config-router)#ne
01:03:28: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.13.1 on
t
R3(config-router)#network 192.168.23.0 0.0.0.3 area 0
```

R3

2ème étape : Même procédure que l'étape 1 mais cette fois-ci sur R2 et R3.

Étape 3 : Vérifier les voisins OSPF et les informations de routage.

R1

```
R1#show ip ospf neighbor


Neighbor ID     Pri   State           Dead Time   Address         Interface
192.168.23.2      0   FULL/  -        00:00:39    192.168.13.2    Serial0/0/1
192.168.23.1      0   FULL/  -        00:00:38    192.168.12.2    Serial0/0/0
R1#show ip route
Codes: L - local, 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, 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

     192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/0
L       192.168.1.1/32 is directly connected, GigabitEthernet0/0
O    192.168.2.0/24 [110/65] via 192.168.12.2, 00:06:21, Serial0/0/0
O    192.168.3.0/24 [110/65] via 192.168.13.2, 00:03:35, Serial0/0/1
     192.168.12.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.12.0/30 is directly connected, Serial0/0/0
L       192.168.12.1/32 is directly connected, Serial0/0/0
     192.168.13.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.13.0/30 is directly connected, Serial0/0/1
L       192.168.13.1/32 is directly connected, Serial0/0/1
     192.168.23.0/30 is subnetted, 1 subnets
O       192.168.23.0/30 [110/128] via 192.168.12.2, 00:03:18, Serial0/0/0
                        [110/128] via 192.168.13.2, 00:03:18, Serial0/0/1
```

R2

```
R2#show ip ospf neighbor


Neighbor ID     Pri   State           Dead Time   Address         Interface
192.168.13.1      0   FULL/  -        00:00:39    192.168.12.1    Serial0/0/0
192.168.23.2      0   FULL/  -        00:00:33    192.168.23.2    Serial0/0/1
R2#show ip route
Codes: L - local, 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, 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

O    192.168.1.0/24 [110/65] via 192.168.12.1, 00:07:26, Serial0/0/0
     192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.2.0/24 is directly connected, GigabitEthernet0/0
L       192.168.2.1/32 is directly connected, GigabitEthernet0/0
O    192.168.3.0/24 [110/65] via 192.168.23.2, 00:03:53, Serial0/0/1
     192.168.12.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.12.0/30 is directly connected, Serial0/0/0
L       192.168.12.2/32 is directly connected, Serial0/0/0
     192.168.13.0/30 is subnetted, 1 subnets
O       192.168.13.0/30 [110/128] via 192.168.12.1, 00:03:53, Serial0/0/0
                        [110/128] via 192.168.23.2, 00:03:53, Serial0/0/1
     192.168.23.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.23.0/30 is directly connected, Serial0/0/1
L       192.168.23.1/32 is directly connected, Serial0/0/1
```

R3

```
R3#show ip ospf neighbor


Neighbor ID     Pri   State           Dead Time   Address         Interface
192.168.13.1      0   FULL/  -        00:00:30    192.168.13.1    Serial0/0/0
192.168.23.1      0   FULL/  -        00:00:37    192.168.23.1    Serial0/0/1
R3#show ip route
Codes: L - local, 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, 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

O    192.168.1.0/24 [110/65] via 192.168.13.1, 00:04:52, Serial0/0/0
O    192.168.2.0/24 [110/65] via 192.168.23.1, 00:04:25, Serial0/0/1
     192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.3.0/24 is directly connected, GigabitEthernet0/0
L       192.168.3.1/32 is directly connected, GigabitEthernet0/0
     192.168.12.0/30 is subnetted, 1 subnets
O       192.168.12.0/30 [110/128] via 192.168.13.1, 00:04:25, Serial0/0/0
                        [110/128] via 192.168.23.1, 00:04:25, Serial0/0/1
     192.168.13.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.13.0/30 is directly connected, Serial0/0/0
L       192.168.13.2/32 is directly connected, Serial0/0/0
     192.168.23.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.23.0/30 is directly connected, Serial0/0/1
L       192.168.23.2/32 is directly connected, Serial0/0/1
```

3ème étape : Nous vérifions les voisins OSPF (neighbor) et les informations de routage sur les trois routeurs.

Étape 4 : Vérifier les paramètres de protocole OSPF

R1

```
R1#show ip protocols

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 192.168.13.1
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    192.168.1.0 0.0.0.255 area 0
    192.168.12.0 0.0.0.3 area 0
    192.168.13.0 0.0.0.3 area 0
  Routing Information Sources:
    Gateway         Distance      Last Update
    192.168.13.1         110      00:05:58
    192.168.23.1         110      00:05:31
    192.168.23.2         110      00:05:31
  Distance: (default is 110)
```

R2

```
R2#show ip protocols

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 192.168.23.1
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    192.168.2.0 0.0.0.0 area 0
    192.168.12.0 0.0.0.3 area 0
    192.168.2.0 0.0.0.255 area 0
    192.168.23.0 0.0.0.3 area 0
  Routing Information Sources:
    Gateway         Distance      Last Update
    192.168.13.1         110      00:06:23
    192.168.23.1         110      00:05:56
    192.168.23.2         110      00:05:56
  Distance: (default is 110)
```

R3

```
R3#show ip protocols

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 192.168.23.2
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    192.168.3.0 0.0.0.255 area 0
    192.168.13.0 0.0.0.3 area 0
    192.168.23.0 0.0.0.3 area 0
  Routing Information Sources:
    Gateway         Distance      Last Update
    192.168.13.1         110      00:06:40
    192.168.23.1         110      00:06:14
    192.168.23.2         110      00:06:14
  Distance: (default is 110)
```

4ème étape : Nous vérifions les paramètres de protocole **OSPF** sur tous les routeurs.

Étape 5 : *Vérifier les informations de processus OSPF*

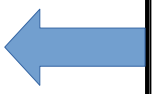
R1

```
R1#show ip ospf
 Routing Process "ospf 1" with ID 192.168.13.1
 Supports only single TOS(TOS0) routes
 Supports opaque LSA
 SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
 Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs
 Number of external LSA 0. Checksum Sum 0x000000
 Number of opaque AS LSA 0. Checksum Sum 0x000000
 Number of DCbitless external and opaque AS LSA 0
 Number of DoNotAge external and opaque AS LSA 0
 Number of areas in this router is 1. 1 normal 0 stub 0 nssa
 External flood list length 0
    Area BACKBONE(0)
        Number of interfaces in this area is 3
        Area has no authentication
        SPF algorithm executed 9 times
        Area ranges are
        Number of LSA 3. Checksum Sum 0x0170ee
        Number of opaque link LSA 0. Checksum Sum 0x000000
        Number of DCbitless LSA 0
        Number of indication LSA 0
        Number of DoNotAge LSA 0
        Flood list length 0
```

R2

```
R2#show ip ospf
 Routing Process "ospf 1" with ID 192.168.23.1
 Supports only single TOS(TOS0) routes
 Supports opaque LSA
 SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
 Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs
 Number of external LSA 0. Checksum Sum 0x000000
 Number of opaque AS LSA 0. Checksum Sum 0x000000
 Number of DCbitless external and opaque AS LSA 0
 Number of DoNotAge external and opaque AS LSA 0
 Number of areas in this router is 1. 1 normal 0 stub 0 nssa
 External flood list length 0
    Area BACKBONE(0)
        Number of interfaces in this area is 3
        Area has no authentication
        SPF algorithm executed 8 times
        Area ranges are
        Number of LSA 3. Checksum Sum 0x0170ee
        Number of opaque link LSA 0. Checksum Sum 0x000000
        Number of DCbitless LSA 0
        Number of indication LSA 0
        Number of DoNotAge LSA 0
        Flood list length 0
```

R3



```
R3#show ip ospf
 Routing Process "ospf 1" with ID 192.168.23.2
 Supports only single TOS(TOS0) routes
 Supports opaque LSA
 SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
 Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs
 Number of external LSA 0. Checksum Sum 0x000000
 Number of opaque AS LSA 0. Checksum Sum 0x000000
 Number of DCbitless external and opaque AS LSA 0
 Number of DoNotAge external and opaque AS LSA 0
 Number of areas in this router is 1. 1 normal 0 stub 0 nssa
 External flood list length 0
    Area BACKBONE(0)
        Number of interfaces in this area is 3
        Area has no authentication
        SPF algorithm executed 4 times
        Area ranges are
        Number of LSA 3. Checksum Sum 0x0170ee
        Number of opaque link LSA 0. Checksum Sum 0x000000
        Number of DCbitless LSA 0
        Number of indication LSA 0
        Number of DoNotAge LSA 0
        Flood list length 0
```

5ème étape : Nous vérifions cette fois-ci les informations de **processus OSPF** sur les trois routeurs.

Étape 6 : *Vérifier les paramètres d'interface OSPF*

R1

```
R1#show ip ospf interface

GigabitEthernet0/0 is up, line protocol is up
  Internet address is 192.168.1.1/24, Area 0
  Process ID 1, Router ID 192.168.13.1, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 192.168.13.1, Interface address 192.168.1.1
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:01
  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
  Neighbor Count is 0, Adjacent neighbor count is 0
  Suppress hello for 0 neighbor(s)
Serial0/0/0 is up, line protocol is up
  Internet address is 192.168.12.1/30, Area 0
  Process ID 1, Router ID 192.168.13.1, 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 00:00:01
  Index 2/2, 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 192.168.23.1
  Suppress hello for 0 neighbor(s)
Serial0/0/1 is up, line protocol is up
  Internet address is 192.168.13.1/30, Area 0
  Process ID 1, Router ID 192.168.13.1, 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 00:00:08
  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 192.168.23.2
  Suppress hello for 0 neighbor(s)
```

R2

```
R2#show ip ospf interface

Serial0/0/0 is up, line protocol is up
  Internet address is 192.168.12.2/30, Area 0
  Process ID 1, Router ID 192.168.23.1, 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 00:00:00
  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
  Neighbor Count is 1 , Adjacent neighbor count is 1
    Adjacent with neighbor 192.168.13.1
  Suppress hello for 0 neighbor(s)
GigabitEthernet0/0 is up, line protocol is up
  Internet address is 192.168.2.1/24, Area 0
  Process ID 1, Router ID 192.168.23.1, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 192.168.23.1, Interface address 192.168.2.1
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:06
  Index 2/2, 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 0, Adjacent neighbor count is 0
  Suppress hello for 0 neighbor(s)
Serial0/0/1 is up, line protocol is up
  Internet address is 192.168.23.1/30, Area 0
  Process ID 1, Router ID 192.168.23.1, 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 00:00:08
  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 192.168.23.2
  Suppress hello for 0 neighbor(s)
```

R3

```
R3#show ip ospf interface

GigabitEthernet0/0 is up, line protocol is up
  Internet address is 192.168.3.1/24, Area 0
  Process ID 1, Router ID 192.168.23.2, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 192.168.23.2, Interface address 192.168.3.1
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:06
  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
  Neighbor Count is 0, Adjacent neighbor count is 0
  Suppress hello for 0 neighbor(s)
Serial0/0/0 is up, line protocol is up
  Internet address is 192.168.13.2/30, Area 0
  Process ID 1, Router ID 192.168.23.2, 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 00:00:06
  Index 2/2, 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 192.168.13.1
  Suppress hello for 0 neighbor(s)
Serial0/0/1 is up, line protocol is up
  Internet address is 192.168.23.2/30, Area 0
  Process ID 1, Router ID 192.168.23.2, 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 00:00:04
  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 192.168.23.1
  Suppress hello for 0 neighbor(s)
```

6ème étape : Nous vérifions les paramètres d'interface OSPF

Étape 7 : *Vérifier la connectivité de bout en bout.*

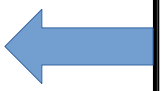
PC-A

```
C:\>ping 192.168.2.3

Pinging 192.168.2.3 with 32 bytes of data:

Reply from 192.168.2.3: bytes=32 time=2ms TTL=126
Reply from 192.168.2.3: bytes=32 time=1ms TTL=126
Reply from 192.168.2.3: bytes=32 time=1ms TTL=126
Reply from 192.168.2.3: bytes=32 time=8ms TTL=126

Ping statistics for 192.168.2.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 8ms, Average = 3ms

C:\>ping 192.168.3.3

Pinging 192.168.3.3 with 32 bytes of data:

Reply from 192.168.3.3: bytes=32 time=2ms TTL=126
Reply from 192.168.3.3: bytes=32 time=1ms TTL=126
Reply from 192.168.3.3: bytes=32 time=2ms TTL=126
Reply from 192.168.3.3: bytes=32 time=4ms TTL=126

Ping statistics for 192.168.3.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 4ms, Average = 2ms
```

PC-B

```
C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Reply from 192.168.1.3: bytes=32 time=6ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 6ms, Average = 2ms

C:\>ping 192.168.3.3

Pinging 192.168.3.3 with 32 bytes of data:

Reply from 192.168.3.3: bytes=32 time=1ms TTL=126
Reply from 192.168.3.3: bytes=32 time=8ms TTL=126
Reply from 192.168.3.3: bytes=32 time=1ms TTL=126
Reply from 192.168.3.3: bytes=32 time=7ms TTL=126

Ping statistics for 192.168.3.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 8ms, Average = 4ms
```

PC-C



```
C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Reply from 192.168.1.3: bytes=32 time=6ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126
Reply from 192.168.1.3: bytes=32 time=8ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 8ms, Average = 4ms

C:\>ping 192.168.2.3

Pinging 192.168.2.3 with 32 bytes of data:

Reply from 192.168.2.3: bytes=32 time=2ms TTL=126
Reply from 192.168.2.3: bytes=32 time=8ms TTL=126
Reply from 192.168.2.3: bytes=32 time=1ms TTL=126
Reply from 192.168.2.3: bytes=32 time=2ms TTL=126

Ping statistics for 192.168.2.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 8ms, Average = 3ms
```

7ème étape : Nous vérifions la connectivité entre chaque pc, toutes les requêtes de ping fonctionne correctement.

Partie 3 : Modification des attributions d'ID de routeur :

Étape 1 : *Modifier les ID de routeur en utilisant des adresses de bouclage.*

```
R1(config)#interface lo0

R1(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up

R1(config-if)#ip address 1.1.1.1 255.255.255.255
R1(config-if)#end
```

```
R2(config)#interface lo0

R2(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up

R2(config-if)#ip address 2.2.2.2 255.255.255.255
```

```
R3(config)#interface lo0

R3(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up

R3(config-if)#ip address 3.3.3.3 255.255.255.255
R3(config-if)#end
```

1ère étape : Nous attribuons une adresse IP au bouclage 0 sur R1, R2 et R3.

R1

```
R1#show ip protocols

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 1.1.1.1
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    192.168.1.0 0.0.0.255 area 0
    192.168.12.0 0.0.0.3 area 0
    192.168.13.0 0.0.0.3 area 0
  Routing Information Sources:
    Gateway         Distance      Last Update
    1.1.1.1              110      00:00:20
    2.2.2.2              110      00:00:20
    3.3.3.3              110      00:00:20
  Distance: (default is 110)

R1#show ip ospf neighbor


Neighbor ID     Pri   State           Dead Time   Address         Interface
3.3.3.3           0   FULL/  -        00:00:38    192.168.13.2    Serial0/0/1
2.2.2.2           0   FULL/  -        00:00:38    192.168.12.2    Serial0/0/0
```

R2

```
R2#show ip protocols

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 2.2.2.2
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    192.168.2.0 0.0.0.0 area 0
    192.168.12.0 0.0.0.3 area 0
    192.168.2.0 0.0.0.255 area 0
    192.168.23.0 0.0.0.3 area 0
  Routing Information Sources:
    Gateway         Distance      Last Update
    1.1.1.1              110      00:01:12
    2.2.2.2              110      00:01:12
    3.3.3.3              110      00:01:12
  Distance: (default is 110)

R2#show ip ospf neighbor


Neighbor ID     Pri   State           Dead Time   Address         Interface
1.1.1.1           0   FULL/  -        00:00:33    192.168.12.1    Serial0/0/0
3.3.3.3           0   FULL/  -        00:00:39    192.168.23.2    Serial0/0/1
```

R3

```
R3#show ip protocols

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 3.3.3.3
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    192.168.3.0 0.0.0.255 area 0
    192.168.13.0 0.0.0.3 area 0
    192.168.23.0 0.0.0.3 area 0
  Routing Information Sources:
    Gateway         Distance      Last Update
    1.1.1.1              110      00:01:42
    2.2.2.2              110      00:01:41
    3.3.3.3              110      00:01:42
  Distance: (default is 110)

R3#show ip ospf neighbor


Neighbor ID     Pri   State           Dead Time   Address         Interface
1.1.1.1           0   FULL/  -        00:00:35    192.168.13.1    Serial0/0/0
2.2.2.2           0   FULL/  -        00:00:37    192.168.23.1    Serial0/0/1
```

2ème étape : Ces deux commandes permettent l'une d'afficher le nouvel **ID** du routeur et l'autre pour afficher l'**ID des routeurs voisins**.

Étape 2 : *Modifier l'ID de routeur sur R1 à l'aide de la commande router-id.*

```
R1(config)#router ospf 1
R1(config-router)#router-id 11.11.11.11
R1(config-router)#Reload or use "clear ip ospf process" command, for this to take effect


R1(config-router)#end
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#clear ip ospf process
Reset ALL OSPF processes? [no]: yes
```

R1

```
R2(config)#router ospf 1
R2(config-router)#router-id 22.22.22.22
R2(config-router)#Reload or use "clear ip ospf process" command, for this to take effect


R2(config-router)#end
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#clear ip ospf process
Reset ALL OSPF processes? [no]: yes
```

R2

```
R3(config)#router ospf 1
R3(config-router)#router-id 33.33.33.33
R3(config-router)#Reload or use "clear ip ospf process" command, for this to take effect


R3(config-router)#end
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#clear ip ospf process
Reset ALL OSPF processes? [no]: yes
```

R3

1ère étape : Grâce à cette commande nous modifions l'ID des trois routeurs.

```
R1#show ip protocols

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 11.11.11.11
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    192.168.1.0 0.0.0.255 area 0
    192.168.12.0 0.0.0.3 area 0
    192.168.13.0 0.0.0.3 area 0
  Routing Information Sources:
    Gateway         Distance      Last Update
    1.1.1.1              110      00:07:43
    2.2.2.2              110      00:03:09
    3.3.3.3              110      00:01:16
    11.11.11.11          110      00:00:25
    22.22.22.22          110      00:00:11
    33.33.33.33          110      00:00:11
  Distance: (default is 110)

R1#show ip ospf neighbor


Neighbor ID     Pri   State           Dead Time   Address         Interface
33.33.33.33       0   FULL/  -        00:00:30    192.168.13.2    Serial0/0/1
22.22.22.22       0   FULL/  -        00:00:30    192.168.12.2    Serial0/0/0
```

2ème étape : Après avoir réinitialiser le processus de routage **OSPF**, nous sur les routeurs nous vérifions depuis **R1** que la modification des ID à bien fonctionné.

Partie 4 : Configuration des interfaces passives OSPF :

Étape 1 : *Configurer une interface passive.*

```
R1#show ip ospf interface g0/0

GigabitEthernet0/0 is up, line protocol is up
  Internet address is 192.168.1.1/24, Area 0
  Process ID 1, Router ID 11.11.11.11, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 11.11.11.11, Interface address 192.168.1.1
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:06
  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
  Neighbor Count is 0, Adjacent neighbor count is 0
  Suppress hello for 0 neighbor(s)
```

1ère étape : Cette commande nous permet d'indiquer le temps restant avant la réception du prochain paquet Hello.

```
R1(config)#router ospf 1
R1(config-router)#passive-interface g0/0
R1(config-router)#show ip ospf interface g0/0
```

2ème étape : Nous modifions l'interface G0/0 sur R1 en passive.

```
R1#show ip ospf interface g0/0

GigabitEthernet0/0 is up, line protocol is up
  Internet address is 192.168.1.1/24, Area 0
  Process ID 1, Router ID 11.11.11.11, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State WAITING, Priority 1
  No designated router on this network
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    No Hellos (Passive interface)
  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
  Neighbor Count is 0, Adjacent neighbor count is 0
  Suppress hello for 0 neighbor(s)
```

3ème étape : Nous saisissons cette commande pour vérifier que l'interface G0/0 est désormais passive.

R2

```
R2#show ip route
Codes: L - local, 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, 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

     2.0.0.0/32 is subnetted, 1 subnets
C       2.2.2.2/32 is directly connected, Loopback0
O    192.168.1.0/24 [110/65] via 192.168.12.1, 00:10:13, Serial0/0/0
     192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.2.0/24 is directly connected, GigabitEthernet0/0
L       192.168.2.1/32 is directly connected, GigabitEthernet0/0
O    192.168.3.0/24 [110/65] via 192.168.23.2, 00:07:11, Serial0/0/1
     192.168.12.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.12.0/30 is directly connected, Serial0/0/0
L       192.168.12.2/32 is directly connected, Serial0/0/0
     192.168.13.0/30 is subnetted, 1 subnets
O       192.168.13.0/30 [110/128] via 192.168.23.2, 00:07:11, Serial0/0/1
                        [110/128] via 192.168.12.1, 00:07:11, Serial0/0/0
     192.168.23.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.23.0/30 is directly connected, Serial0/0/1
L       192.168.23.1/32 is directly connected, Serial0/0/1
```

R3

```
R3#show ip route
Codes: L - local, 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, 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

     3.0.0.0/32 is subnetted, 1 subnets
C       3.3.3.3/32 is directly connected, Loopback0
O    192.168.1.0/24 [110/65] via 192.168.13.1, 00:10:52, Serial0/0/0
O    192.168.2.0/24 [110/65] via 192.168.23.1, 00:07:58, Serial0/0/1
     192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.3.0/24 is directly connected, GigabitEthernet0/0
L       192.168.3.1/32 is directly connected, GigabitEthernet0/0
     192.168.12.0/30 is subnetted, 1 subnets
O       192.168.12.0/30 [110/128] via 192.168.23.1, 00:07:58, Serial0/0/1
                        [110/128] via 192.168.13.1, 00:07:58, Serial0/0/0
     192.168.13.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.13.0/30 is directly connected, Serial0/0/0
L       192.168.13.2/32 is directly connected, Serial0/0/0
     192.168.23.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.23.0/30 is directly connected, Serial0/0/1
L       192.168.23.2/32 is directly connected, Serial0/0/1
```

4ème étape : Cette commande est saisit sur **R2** et **R3** afin de vérifier qu'une route vers le réseau **192.168.1.0/24** est toujours disponible.

Étape 2 : Définir l'interface passive comme interface par défaut sur un routeur.

```
R1#show ip ospf neighbor

Neighbor ID     Pri   State           Dead Time   Address         Interface
22.22.22.22       0   FULL/  -        00:00:38    192.168.12.2    Serial0/0/0
```

1ère étape : Cette commande effectuer sur R1 permet de vérifier que R2 est répertorié en tant que voisin OSPF.

```
R2(config)#router ospf 1
R2(config-router)#passive-interface default
R2(config-router)#
00:17:42: %OSPF-5-ADJCHG: Process 1, Nbr 11.11.11.11 on Serial0/0/0 from FULL to DOWN, Neighbor Down: Interface down or
detached

00:17:42: %OSPF-5-ADJCHG: Process 1, Nbr 33.33.33.33 on Serial0/0/1 from FULL to DOWN, Neighbor Down: Interface down or
detached
```

2ème étape : Sur R2 nous définissons toutes les interfaces OSPF comme étant passives par défaut.

```
R1#show ip ospf neighbor

Neighbor ID     Pri   State           Dead Time   Address         Interface
33.33.33.33       0   FULL/  -        00:00:37    192.168.13.2    Serial0/0/1
```

3ème étape : Ici à l'expiration du compteur d'arrêt, R2 n'est plus répertorié en tant que voisin OSPF.

```
R2#show ip ospf interface s0/0/0

Serial0/0/0 is up, line protocol is up
  Internet address is 192.168.12.2/30, Area 0
  Process ID 1, Router ID 22.22.22.22, 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
    No Hellos (Passive interface)
  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
  Suppress hello for 0 neighbor(s)
```

4ème étape : Nous affichons sur R2 le statut OSPF de l'interface S0/0/0.

```
R1#show ip route
Codes: L - local, 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, 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

     1.0.0.0/32 is subnetted, 1 subnets
C       1.1.1.1/32 is directly connected, Loopback0
     192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/0
L       192.168.1.1/32 is directly connected, GigabitEthernet0/0
O    192.168.3.0/24 [110/65] via 192.168.13.2, 00:11:38, Serial0/0/1
     192.168.12.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.12.0/30 is directly connected, Serial0/0/0
L       192.168.12.1/32 is directly connected, Serial0/0/0
     192.168.13.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.13.0/30 is directly connected, Serial0/0/1
L       192.168.13.1/32 is directly connected, Serial0/0/1
     192.168.23.0/30 is subnetted, 1 subnets
O       192.168.23.0/30 [110/128] via 192.168.13.2, 00:01:53, Serial0/0/1
```

```
R3#show ip route
Codes: L - local, 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, 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

     3.0.0.0/32 is subnetted, 1 subnets
C       3.3.3.3/32 is directly connected, Loopback0
O    192.168.1.0/24 [110/65] via 192.168.13.1, 00:14:54, Serial0/0/0
     192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.3.0/24 is directly connected, GigabitEthernet0/0
L       192.168.3.1/32 is directly connected, GigabitEthernet0/0
     192.168.12.0/30 is subnetted, 1 subnets
O       192.168.12.0/30 [110/128] via 192.168.13.1, 00:01:39, Serial0/0/0
     192.168.13.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.13.0/30 is directly connected, Serial0/0/0
L       192.168.13.2/32 is directly connected, Serial0/0/0
     192.168.23.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.23.0/30 is directly connected, Serial0/0/1
L       192.168.23.2/32 is directly connected, Serial0/0/1
```

5ème étape : Toutes les interfaces de R2 sont passives, donc aucune information de routage n'est annoncée. Nous vérifions donc sur R1 et R3 que le réseau 192.168.2.0/24 n'apparaît plus.

```
R2(config)#router ospf 1
R2(config-router)#no passive-interface s0/0/0
R2(config-router)#
00:21:44: %OSPF-5-ADJCHG: Process 1, Nbr 11.11.11.11 on Serial0/0/0 from LOADING to FULL, Loading Done
```

6ème étape : Sur R2, avec cette commande le routeur envoie et reçois des mises à jour de routage OSPF.

R1

```
R1#show ip route
Codes: L - local, 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, 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

     1.0.0.0/32 is subnetted, 1 subnets
C       1.1.1.1/32 is directly connected, Loopback0
     192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/0
L       192.168.1.1/32 is directly connected, GigabitEthernet0/0
O    192.168.2.0/24 [110/65] via 192.168.12.2, 00:00:24, Serial0/0/0
O    192.168.3.0/24 [110/65] via 192.168.13.2, 00:14:11, Serial0/0/1
     192.168.12.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.12.0/30 is directly connected, Serial0/0/0
L       192.168.12.1/32 is directly connected, Serial0/0/0
     192.168.13.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.13.0/30 is directly connected, Serial0/0/1
L       192.168.13.1/32 is directly connected, Serial0/0/1
     192.168.23.0/30 is subnetted, 1 subnets
O       192.168.23.0/30 [110/128] via 192.168.12.2, 00:00:24, Serial0/0/0
                        [110/128] via 192.168.13.2, 00:00:24, Serial0/0/1

R1#show ip ospf neighbor


Neighbor ID     Pri   State           Dead Time   Address         Interface
33.33.33.33       0   FULL/  -        00:00:39    192.168.13.2    Serial0/0/1
22.22.22.22       0   FULL/  -        00:00:39    192.168.12.2    Serial0/0/0
```

R3

```
R3# show ip route
Codes: L - local, 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, 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

     3.0.0.0/32 is subnetted, 1 subnets
C       3.3.3.3/32 is directly connected, Loopback0
O    192.168.1.0/24 [110/65] via 192.168.13.1, 00:18:02, Serial0/0/0
O    192.168.2.0/24 [110/129] via 192.168.13.1, 00:01:22, Serial0/0/0
     192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.3.0/24 is directly connected, GigabitEthernet0/0
L       192.168.3.1/32 is directly connected, GigabitEthernet0/0
     192.168.12.0/30 is subnetted, 1 subnets
O       192.168.12.0/30 [110/128] via 192.168.13.1, 00:04:47, Serial0/0/0
     192.168.13.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.13.0/30 is directly connected, Serial0/0/0
L       192.168.13.2/32 is directly connected, Serial0/0/0
     192.168.23.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.23.0/30 is directly connected, Serial0/0/1
L       192.168.23.2/32 is directly connected, Serial0/0/1

R3#show ip ospf neighbor


Neighbor ID     Pri   State           Dead Time   Address         Interface
11.11.11.11       0   FULL/  -        00:00:36    192.168.13.1    Serial0/0/0
```

7ème étape : Via cette commande nous cherchons une route vers le **réseau 192.168.2.0/24**.

```
R2(config)#router ospf 1
R2(config-router)#no passive-interface s0/0/1
```

8ème étape : Nous modifions l'interface **S0/0/1** sur **R2** pour lui permettre d'annoncer les routes OSPF.

```
R3#show ip route
Codes: L - local, 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, 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

     3.0.0.0/32 is subnetted, 1 subnets
C       3.3.3.3/32 is directly connected, Loopback0
O    192.168.1.0/24 [110/65] via 192.168.13.1, 00:20:16, Serial0/0/0
O    192.168.2.0/24 [110/65] via 192.168.23.1, 00:00:10, Serial0/0/1
     192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.3.0/24 is directly connected, GigabitEthernet0/0
L       192.168.3.1/32 is directly connected, GigabitEthernet0/0
     192.168.12.0/30 is subnetted, 1 subnets
O       192.168.12.0/30 [110/128] via 192.168.23.1, 00:00:10, Serial0/0/1
                        [110/128] via 192.168.13.1, 00:00:10, Serial0/0/0
     192.168.13.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.13.0/30 is directly connected, Serial0/0/0
L       192.168.13.2/32 is directly connected, Serial0/0/0
     192.168.23.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.23.0/30 is directly connected, Serial0/0/1
L       192.168.23.2/32 is directly connected, Serial0/0/1
```

9ème étape : Nous saisissons de nouveau cette commande afin d'observer le changement au niveau de l'interface **S0/0/1**.

Partie 5 : Modification des métriques OSPF :

Étape 1 : *Modifiez la bande passante de référence sur les routeurs.*

```
R1#show interface g0/0
GigabitEthernet0/0 is up, line protocol is up (connected)
  Hardware is CN Gigabit Ethernet, address is 0001.64a3.be01 (bia 0001.64a3.be01)
  Internet address is 192.168.1.1/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 100 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, media type is RJ45
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 watchdog, 1017 multicast, 0 pause input
     0 input packets with dribble condition detected
```

1ère étape : Nous affichons sur **R1** le paramètre de bande passante par défaut pour l'interface **g0/0**.

```
R1#show ip route ospf
O     192.168.2.0 [110/65] via 192.168.12.2, 00:07:02, Serial0/0/0
O     192.168.3.0 [110/65] via 192.168.13.2, 00:20:49, Serial0/0/1
      192.168.23.0/30 is subnetted, 1 subnets
O        192.168.23.0 [110/128] via 192.168.12.2, 00:07:02, Serial0/0/0
                      [110/128] via 192.168.13.2, 00:07:02, Serial0/0/1
```

2ème étape : Sur R1 nous déterminons la route vers le **réseau 192.168.3.0/24**.

```
R3#show ip ospf interface g0/0

GigabitEthernet0/0 is up, line protocol is up
  Internet address is 192.168.3.1/24, Area 0
  Process ID 1, Router ID 33.33.33.33, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 33.33.33.33, Interface address 192.168.3.1
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:07
  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
  Neighbor Count is 0, Adjacent neighbor count is 0
  Suppress hello for 0 neighbor(s)
```

3ème étape : Sur R3 nous déterminons le **coût** du routage pour **G0/0**.

```
R1#show ip ospf interface s0/0/1

Serial0/0/1 is up, line protocol is up
  Internet address is 192.168.13.1/30, Area 0
  Process ID 1, Router ID 11.11.11.11, 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 00:00:00
  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 33.33.33.33
  Suppress hello for 0 neighbor(s)
```

4ème étape : Même manipulation mais sur **R1** pour l'interface **S0/0/1**.

```
R1(config)#router ospf 1
R1(config-router)#auto-cost reference-bandwidth 10000
% OSPF: Reference bandwidth is changed.
        Please ensure reference bandwidth is consistent across all routers.
```

5ème étape : Sur R1 nous modifions le paramètre de **bande passante** de référence par défaut.

```
R2(config)#router ospf 1
R2(config-router)#auto-cost reference-bandwidth 10000
% OSPF: Reference bandwidth is changed.
        Please ensure reference bandwidth is consistent across all routers.
```

```
R3(config)#router ospf 1
R3(config-router)#auto-cost reference-bandwidth 10000
% OSPF: Reference bandwidth is changed.
        Please ensure reference bandwidth is consistent across all routers.
```

6ème étape : Même commande que sur R1 mais cette fois-ci sur **R2** et **R3**.

```
R3#show ip ospf interface g0/0

GigabitEthernet0/0 is up, line protocol is up
  Internet address is 192.168.3.1/24, Area 0
  Process ID 1, Router ID 33.33.33.33, Network Type BROADCAST, Cost: 100
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 33.33.33.33, Interface address 192.168.3.1
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:08
  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
  Neighbor Count is 0, Adjacent neighbor count is 0
  Suppress hello for 0 neighbor(s)
```

```
Serial0/0/1 is up, line protocol is up
  Internet address is 192.168.23.2/30, Area 0
  Process ID 1, Router ID 33.33.33.33, Network Type POINT-TO-POINT, Cost: 6476
  Transmit Delay is 1 sec, State POINT-TO-POINT,
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:06
  Index 2/2, 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 22.22.22.22
  Suppress hello for 0 neighbor(s)
```

7ème étape : Nous affichons sur R3 le nouveau coût de g0/0 et de s0/0/1 sur R1.

```
R1#show ip route ospf
O    192.168.2.0 [110/6576] via 192.168.12.2, 00:04:19, Serial0/0/0
O    192.168.3.0 [110/6576] via 192.168.13.2, 00:03:30, Serial0/0/1
     192.168.23.0/30 is subnetted, 1 subnets
O       192.168.23.0 [110/12952] via 192.168.12.2, 00:03:20, Serial0/0/0
                     [110/12952] via 192.168.13.2, 00:03:20, Serial0/0/1
```

8ème étape : Nous affichons depuis R1 le nouveau **coût cumulé** de la route **192.168.3.0/24**.

```
R1(config)#router ospf 1
R1(config-router)#auto-cost reference-bandwidth 100
% OSPF: Reference bandwidth is changed.
        Please ensure reference bandwidth is consistent across all routers.
```

```
R2(config-router)#auto-cost reference-bandwidth 100
% OSPF: Reference bandwidth is changed.
        Please ensure reference bandwidth is consistent across all routers.
```

```
R3(config-router)#auto-cost reference-bandwidth 100
% OSPF: Reference bandwidth is changed.
        Please ensure reference bandwidth is consistent across all routers.
```

9ème étape : Nous **réinitialisons** la bande passante sur R1 ainsi que R2 et R3.

Étape 2 : *Modifiez la bande passante d'une interface.*

```
R1#show interface s0/0/0
Serial0/0/0 is up, line protocol is up (connected)
  Hardware is HD64570
  Internet address is 192.168.12.1/30
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
     Conversations  0/0/256 (active/max active/max total)
     Reserved Conversations 0/0 (allocated/max allocated)
     Available Bandwidth 1158 kilobits/sec
  5 minute input rate 57 bits/sec, 0 packets/sec
  5 minute output rate 59 bits/sec, 0 packets/sec
     568 packets input, 40348 bytes, 0 no buffer
     Received 0 broadcasts, 0 runs, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     591 packets output, 41416 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 output buffer failures, 0 output buffers swapped out
 --More--
```

1ère étape : Nous affichons sur R1 le paramètre de bande passante actuel sur s0/0/0.

```
R1#show ip route ospf
O    192.168.2.0 [110/65] via 192.168.12.2, 00:00:36, Serial0/0/0
O    192.168.3.0 [110/65] via 192.168.13.2, 00:01:37, Serial0/0/1
     192.168.23.0/30 is subnetted, 1 subnets
O       192.168.23.0 [110/128] via 192.168.12.2, 00:00:36, Serial0/0/0
                     [110/128] via 192.168.13.2, 00:00:36, Serial0/0/1
```

2ème étape : Nous affichons sur R1 le coût cumulé de la route vers le **réseau 192.168.23.0/24**.

```
R1(config)#interface s0/0/0
R1(config-if)#bandwidth 128
```

3ème étape : Nous configurons la bande passante sur **s0/0/0 à 128 Kbits/s**.

```
R1#show ip route ospf
O    192.168.2.0 [110/129] via 192.168.13.2, 00:00:36, Serial0/0/1
O    192.168.3.0 [110/65] via 192.168.13.2, 00:03:02, Serial0/0/1
     192.168.23.0/30 is subnetted, 1 subnets
O       192.168.23.0 [110/128] via 192.168.13.2, 00:00:36, Serial0/0/1
```

4ème étape : Sur R1 la table de routage n'indique plus la route vers le **réseau 192.168.23.0/24** via l'interface s0/0/0. Puisque la meilleur route de moindre coût passe désormais par **s0/0/1.**

```
R1#show ip ospf interface s0/0/1

Serial0/0/1 is up, line protocol is up
  Internet address is 192.168.13.1/30, Area 0
  Process ID 1, Router ID 11.11.11.11, 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 00:00:02
  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 33.33.33.33
  Suppress hello for 0 neighbor(s)
R1#show ip ospf interface s0/0/0

Serial0/0/0 is up, line protocol is up
  Internet address is 192.168.12.1/30, Area 0
  Process ID 1, Router ID 11.11.11.11, Network Type POINT-TO-POINT, Cost: 781
  Transmit Delay is 1 sec, State POINT-TO-POINT,
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:01
  Index 2/2, 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 22.22.22.22
  Suppress hello for 0 neighbor(s)
```

5ème étape : Le coût de s0/0/0 est passé de 64 à 781.

```
R1(config)#interface s0/0/1
R1(config-if)#bandwidth 128
```

6ème étape : Nous modifions la bande passante de l'interface s0/0/1.

```
R1#show ip route ospf
O    192.168.2.0 [110/782] via 192.168.12.2, 00:00:26, Serial0/0/0
O    192.168.3.0 [110/782] via 192.168.13.2, 00:00:26, Serial0/0/1
     192.168.23.0/30 is subnetted, 1 subnets
O       192.168.23.0 [110/845] via 192.168.12.2, 00:00:26, Serial0/0/0
                     [110/845] via 192.168.13.2, 00:00:26, Serial0/0/1
```

7ème étape : Nous affichons le coût cumulé des deux routes vers le réseau 192.168.23.0/24, une via s0/0/0 et une via s0/0/1.

```
R3#show ip route ospf
O    192.168.1.0 [110/65] via 192.168.13.1, 00:08:17, Serial0/0/0
O    192.168.2.0 [110/65] via 192.168.23.1, 00:07:20, Serial0/0/1
     192.168.12.0/30 is subnetted, 1 subnets
O       192.168.12.0 [110/128] via 192.168.23.1, 00:05:50, Serial0/0/1
```

8ème étape : Le coût cumulé de 192.168.1.0/24 correspond toujours as 65.

```
R2(config)#interface s0/0/0
R2(config-if)#bandwidth 128
R2(config-if)#interface s0/0/1
R2(config-if)#bandwidth 128
```

```
R3(config-if)#interface s0/0/0
R3(config-if)#bandwidth 128
R3(config-if)#interface s0/0/1
R3(config-if)#bandwidth 128
```

9ème étape : Nous saisissons cette commande sur toutes les interfaces série restantes dans la topologie.

```
R3#show ip route ospf
O    192.168.1.0 [110/782] via 192.168.13.1, 00:02:08, Serial0/0/0
O    192.168.2.0 [110/782] via 192.168.23.1, 00:02:08, Serial0/0/1
     192.168.12.0/30 is subnetted, 1 subnets
O       192.168.12.0 [110/1562] via 192.168.23.1, 00:01:18, Serial0/0/1
                     [110/1562] via 192.168.13.1, 00:01:18, Serial0/0/0
```

10ème étape : Le nouveau coût cumulé est donc de 1562.

Étape 3 : Modifiez le coût de la route.

```
R1#show ip route ospf
O    192.168.2.0 [110/782] via 192.168.12.2, 00:07:11, Serial0/0/0
O    192.168.3.0 [110/782] via 192.168.13.2, 00:07:11, Serial0/0/1
     192.168.23.0/30 is subnetted, 1 subnets
O       192.168.23.0 [110/1562] via 192.168.12.2, 00:01:42, Serial0/0/0
                     [110/1562] via 192.168.13.2, 00:01:42, Serial0/0/1
```

1ère étape : Nous observons le coût de la route par l'interface s0/0/1.

```
R1#show ip route ospf
O    192.168.2.0 [110/782] via 192.168.12.2, 00:08:18, Serial0/0/0
O    192.168.3.0 [110/1563] via 192.168.12.2, 00:00:08, Serial0/0/0
     192.168.23.0/30 is subnetted, 1 subnets
O       192.168.23.0 [110/1562] via 192.168.12.2, 00:00:08, Serial0/0/0
```

2ème étape : Après avoir appliquer la commande « **ip ospf cost 1565** » à l'interface S0/0/1 sur R1. Nous affichons l'impact de cette modification sur la table de routage. Toutes les routes OSPF pour R1 sont à présent acheminées via R2.