

Nom-Prénom



RSX101

Sujet : Etude de quelques propriétés du
protocole OSPF Mono-Area
« LAB DM »

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Attendus :

- L'intitulé du CR doit porter le nom : RSX101_DMOSPF
Mono Area-Nom auditeur.Prénom auditeur-sujet.doc
- Le CR doit être impérativement au format Word
- La réponse à chaque question doit figurer après
- Le fichier PKT réalisé avec **Packet Tracer**

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2. Commandes utiles

Commande	Description
router ospf process_id	Enters router config mode for an OSPF process
network <i>network-address</i> <i>wildcard_mask</i> <i>area</i>	<p>La commande network détermine quelles interfaces participent au processus de routage pour une zone OSPF</p> <p>Wildcard Mask : masque inversé, pour identifier un réseau ou un sous réseau</p> <p>Lors de l'application d'un wildcard mask il faut savoir que:</p> <p>Un bit avec une valeur de 0 vérifie la correspondance de l'adresse.</p> <p>Un bit avec une valeur de 1 ignore la valeur correspondante de l'adresse.</p> <p>Donc :</p> <p>0.0.0.255 correspond à un masque normal en /24 ou 255.255.255.0</p> <p>0.0.255.255 correspond à un masque normal en /16 ou 255.255.0.0</p> <p>area area-id fait référence à la zone OSPF</p>
show ip ospf	Displays OSPF process information
show ip ospf neighbor	Displays OSPF neighbor information
show ip ospf database	Displays OSPF link-state database
show ip ospf interface	Displays OSPF interface information
area area_id rang network mask	Summarizes OSPF routes at an area Border Router (ABR)
clear ip ospf process	Stops and restarts the OSPF process
no ip domain-lookup	<p>Pour désactiver la recherche DNS ("domain-lookup") en mode console, il suffit de s'y mettre en mode configuration</p> <p>Routeur > enable Routeur #conf terminal Routeur (config)#no ip domain-lookup</p>
logging synchronous	Cette directive permet de synchroniser la sortie terminal et la ligne de commande. Par exemple, si vous tapez une ligne de commande et que le routeur affiche un message dans le terminal, votre texte va alors se réafficher.
exec-timeout 0 0	Ceci permet de désactiver le timeout en ligne de commande. Ceci peut être utile dans le cas d'un laboratoire de test.
router-id <i>adr-ip</i>	Pour spécifier manuellement une adresse ip (sur 32 bits) comme router ID

Figure 1 : liste de quelques commandes utiles

3. Topologie d'étude

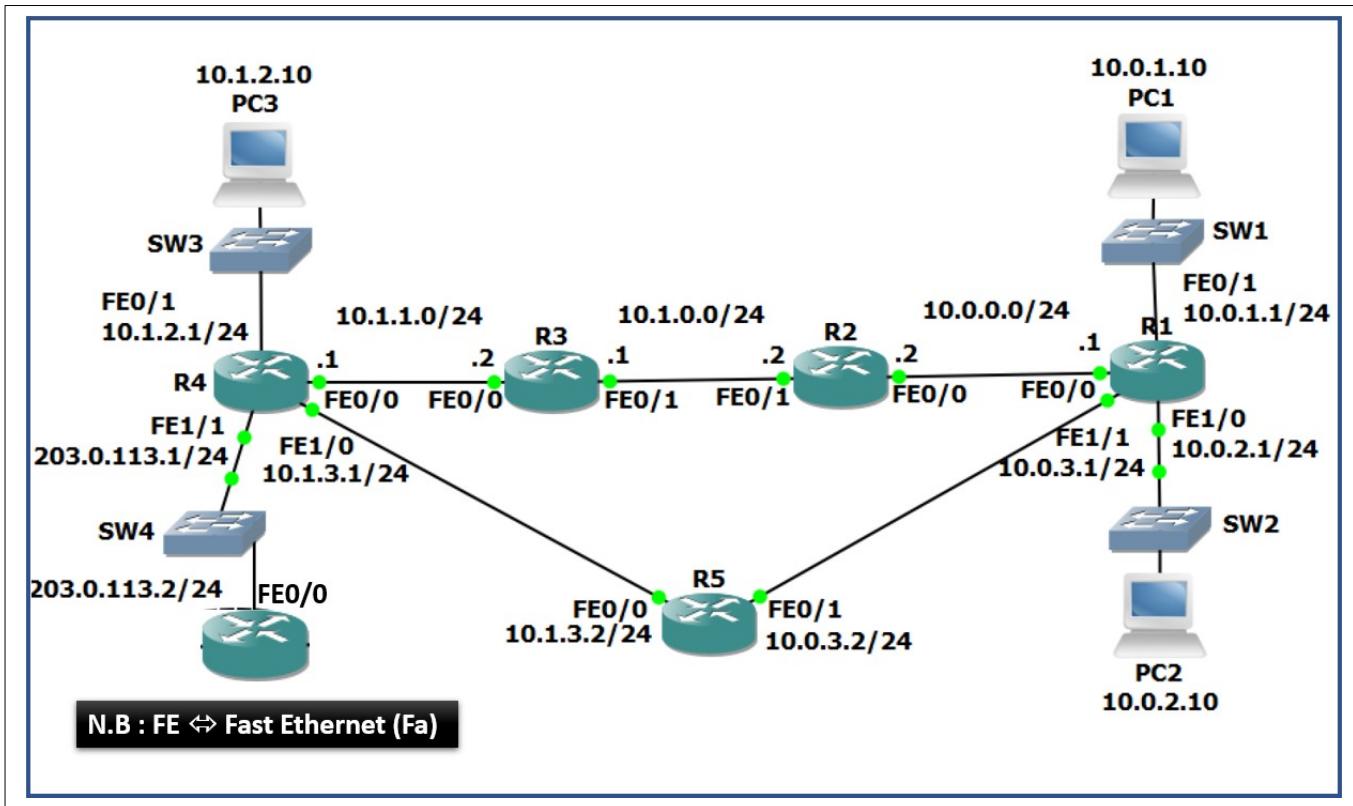


Figure 2 : schéma de la topologie d'étude

4. Table d'adressage

Pérophérique	Interface	Adresse IPv4	Masque de sous-réseau	Passerelle par défaut	Zone OSPFv2
R1	FE0/0 (Fa0/0)	10.0.0.1	/24	NA	0
	FE0/1 (Fa0/1)	10.0.1.1	/24	NA	0
	FE1/0 (Fa1/0)	10.0.2.1	/24	NA	0
	FE1/1 (Fa1/1)	10.0.3.1	/24	NA	0
R2	FE0/0 (Fa0/0)	10.0.0.2	/24	NA	0
	FE0/1 (Fa0/1)	10.1.0.2	/24	NA	0
R3	FE0/0 (Fa0/0)	10.1.0.1	/24	NA	0
	FE0/1 (Fa0/1)	10.1.1.2	/24	NA	0
R4	FE0/0 (Fa0/0)	10.1.1.1	/24	NA	0
	FE0/1 (Fa0/1)	10.1.2.1	/24	NA	0
	FE1/0 (Fa1/0)	10.1.3.1	/24	NA	0
	FE1/1 (Fa1/1)	203.0.113.1	/24	NA	0
R5	FE0/0 (Fa0/0)	10.1.3.2	/24	NA	0
	FE0/1 (Fa0/1)	10.0.3.2	/24	NA	0
Internet (Service Provider)	FE0/0 (Fa0/0)	203.0.113.2	/24	NA	
PC1	NIC	10.0.1.10	/24	10.0.1.1	
PC2	NIC	10.0.2.10	/24	10.0.2.1	
PC3	NIC	10.1.2.10	/24	10.1.2.1	

Figure 3 : table d'adressage

5. Modèles d'équipements à utiliser pour construire la topologie

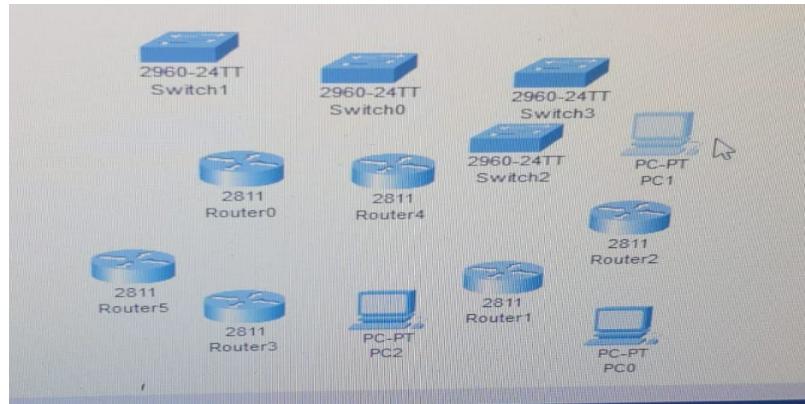
Type de device	Modèle	Nbr dans ma topologie
Routeur	2811	
Switch	2960-24TT	4
PC	PC-PT	3

Figure 4 : modèles des équipements utilisés dans la topologie

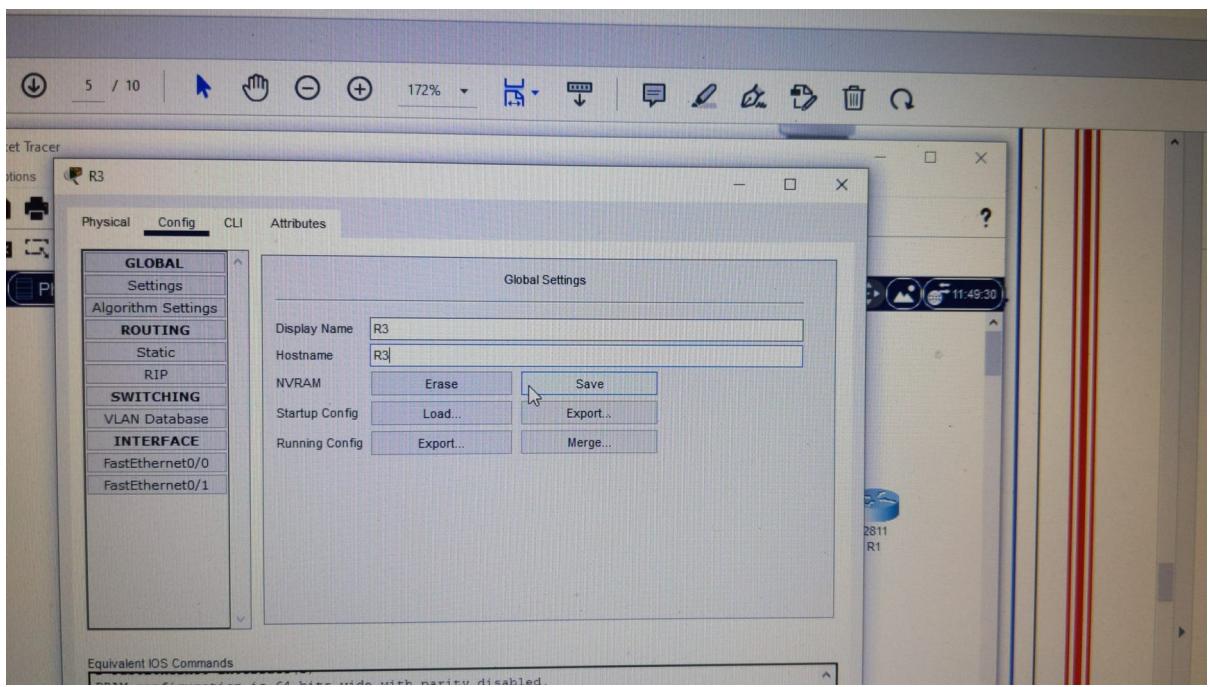
6. Première étape : configuration de la topologie

A. Partie 1 : configuration des routeurs et des PC's de la topologie

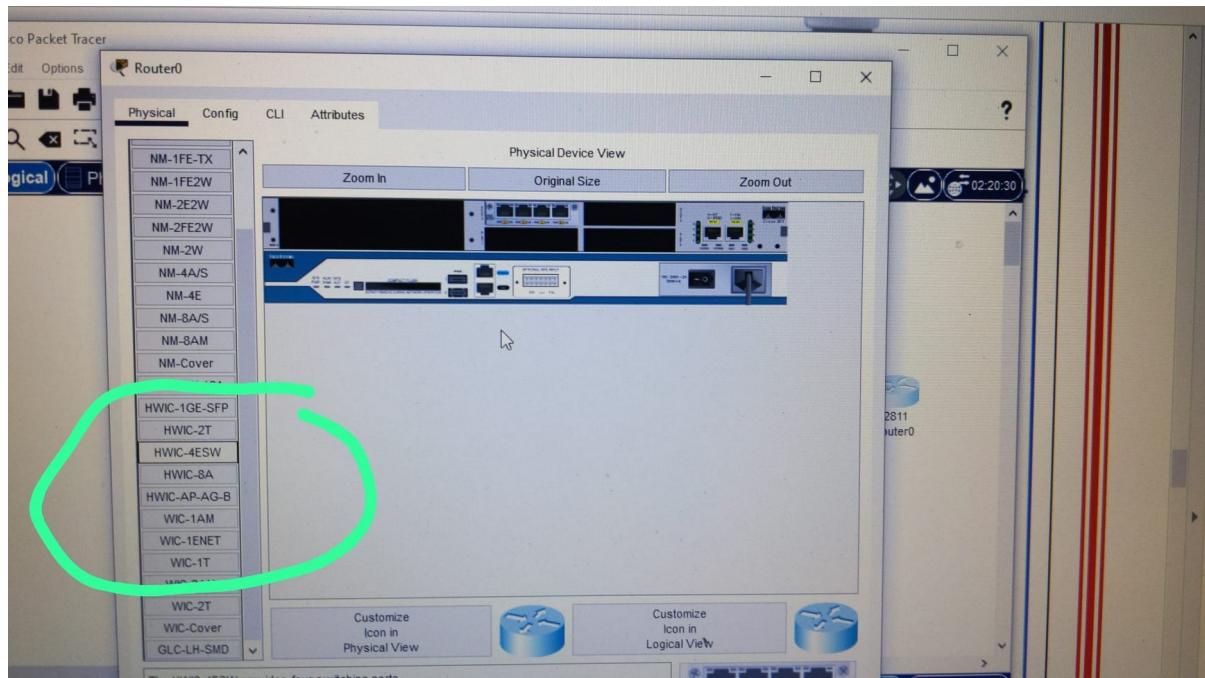
1. En s'appuyant sur le schéma de la figure 2, sur la table d'adressage données dans la figure 3 et aussi des modèles des équipements précisés dans le tableau de la figure 4, utiliser le logiciel **Packet Tracer** pour créer et configurer la topologie.



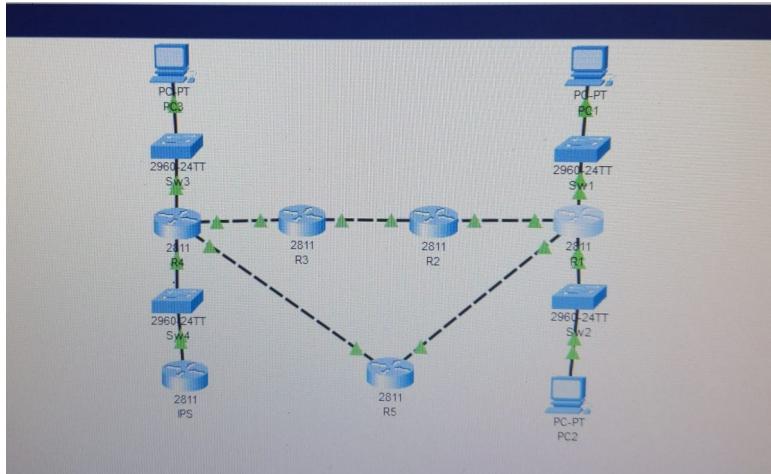
1. Mise en place des équipements



2. Configuration des équipements



3. On rajoute le module HWIC car le routeur a par défaut 2 ports.



4.Topologie finale

B. Partie 2 : configuration OSPF

- Activer une interface de bouclage (Loopback) sur chaque routeur. Utilisez l'adresse IP 192.168.0.x/32, où 'x' est le numéro du routeur. Par exemple **192.168.0.3/32 sur R3**

```
R1>en
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#interface loopback 0
R1(config-if)#ip add 192.168.0.1 255.255.255.255
R1(config-if)#

```

1. Activation de l'interface de loopback pour R1

```
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#interface loopback 0
R2(config-if)#ip add 192.168.0.2 255.255.255.255
R2(config-if)#

```

2. Activation de l'interface de loopback pour R2

```
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#interface loopback 0
R3(config-if)#ip add 192.168.0.3 255.255.255.255
R3(config-if)#

```

3.Activation de l'interface de loopback pour R3

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface loopback 0
Router(config-if)#ip add 192.168.0.4
% Incomplete command.
Router(config-if)#ip add 192.168.0.4 255.255.255.255
Router(config-if)#

```

4. Activation de l'interface de loopback pour R4

```
R5#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R5(config)#interface loopback 0
R5(config-if)#ip add 192.168.0.5 255.255.255.255
R5(config-if)#

```

5. Activation de l'interface de loopback pour R5

3. Activez OSPF mono-area sur chaque routeur. Assurez-vous que tous les réseaux sauf 203.0.113.0/24 sont annoncés

```
R1>en
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router ospf 1
R1(config-router)#network 10.0.0.1 0.0.0.255 area 0
R1(config-router)#network 10.0.1.1 0.0.0.255 area 0
R1(config-router)#network 10.0.2.1 0.0.0.255 area 0
R1(config-router)#network 10.0.3.1 0.0.0.255 area 0
R1(config-router)#

```

1. Activation de OSPF mono-area pour R1

```
R2>en
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router ospf 1
R2(config-router)#network 10.0.0.2 0.0.0.255 area 0
R2(config-router)#network 10.1.0.2 0.0.0.255 area 0
R2(config-router)#[
```

2. Activation de OSPF mono-area pour R2

```
R3>en
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 1
R3(config-router)#network 10.1.0.1 0.0.0.255 area 1
R3(config-router)#network 10.1.1.2 0.0.0.255 area 1
R3(config-router)#[
```

3. Activation de OSPF mono-area pour R3

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 10.1.1.1 0.0.0.255 area 0
Router(config-router)#network 10.1.2.1 0.0.0.255 area 0
Router(config-router)#network 10.1.3.1 0.0.0.255 area 0
Router(config-router)#network 203.0.113.1 0.0.0.255 area 0
Router(config-router)#[
```

4. Activation de OSPF mono-area pour R4

```

Press RETURN to get started.

R5>
R5>en
R5#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R5(config)#router ospf 1
R5(config-router)#network 10.1.3.2 0.0.0.255 area 0
R5(config-router)#network 10.0.3.2 0.0.0.255 area 0

```

Copy Paste

5. Activation de OSPF mono-area pour R5

- Rappeler le principe de l'algorithme utilisé pour calculer l'ID de routeur. Quel est le « OSPF » router ID que vous prenez avoir sur R1 ? vérifier ceci.

Pour calculer l'ID du routeur , l'algorithme utilisé est celui de Dijkstra, il vise à trouver le chemin le plus court entre a et b. Il choisit le sommet non visité avec la distance la plus faible, calcule la distance à travers lui à chaque voisin non visité, et met à jour la distance du voisin si elle est plus petite.

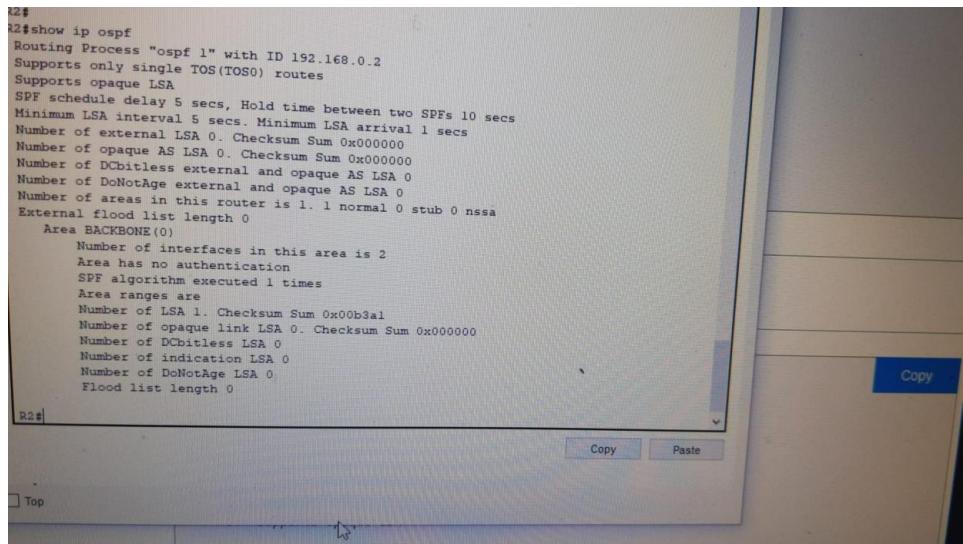
```

R1#show ip ospf interface
OS Command Line Interface
FastEthernet0/1 is up, line protocol is up
Internet address is 10.0.1.1/24, Area 0
Process ID 1, Router ID 192.168.0.1, Network Type BROADCAST, Cost: 1
Transmit Delay is 1 sec, State DR, Priority 1
Designated Router (ID) 192.168.0.1, Interface address 10.0.1.1
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:04
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)
FastEthernet0/0 is up, line protocol is up
Internet address is 10.0.2.1/24, Area 0
Process ID 1, Router ID 192.168.0.1, Network Type BROADCAST, Cost: 1
Transmit Delay is 1 sec, State DR, Priority 1
Designated Router (ID) 192.168.0.1, Interface address 10.0.2.1
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:04
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)
FastEthernet0/0 is up, line protocol is up
Internet address is 10.0.0.1/24, Area 0
Process ID 1, Router ID 192.168.0.1, Network Type BROADCAST, Cost: 1
Transmit Delay is 1 sec, State DR, Priority 1
Designated Router (ID) 192.168.0.1, Interface address 10.0.0.1
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Index 3/3, flood queue length 0

```

Le OSPF Router ID sur R1 est 192.168.0.1

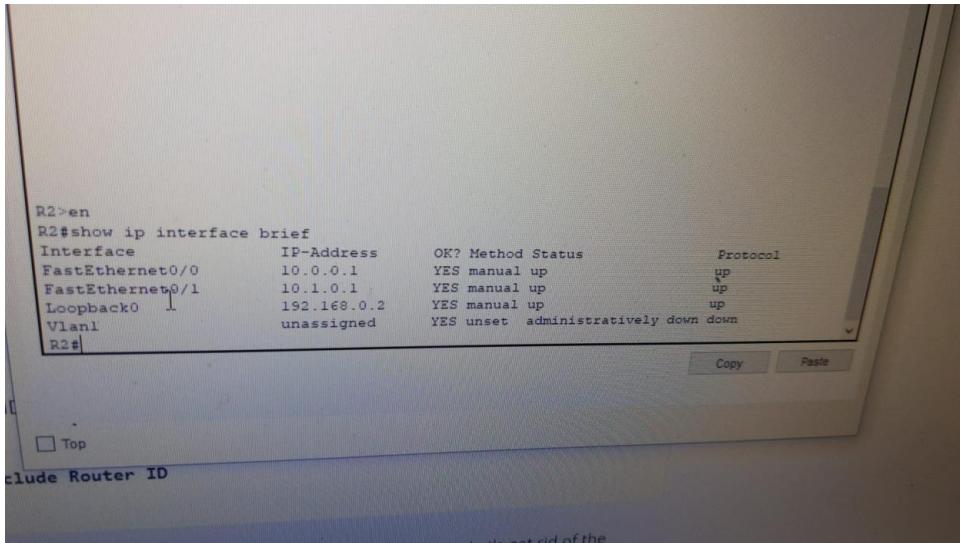
5. Vérifiez que les routeurs R1 à R5 ont formé des contiguités les uns avec les autres.



```
R2#show ip ospf
Routing Process "ospf 1" with ID 192.168.0.2
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 2
  Area has no authentication
  SPF algorithm executed 1 times
  Area ranges are
    Number of LSA 1. Checksum Sum 0x00b3a1
    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#
```

The terminal window shows the output of the 'show ip ospf' command. It provides detailed information about the OSPF process, including the number of LSAs, SPF calculations, and area ranges.

1. Affichage des interfaces activées dans le processus OSPF



```
R2>en
R2#show ip interface brief
Interface          IP-Address      OK? Method Status       Protocol
FastEthernet0/0    10.0.0.1        YES manual up        up
FastEthernet0/1    10.1.0.1        YES manual up        up
Loopback0          192.168.0.2     YES manual up        up
Vlan1              unassigned      YES unset administratively down down
R2#
```

The terminal window shows the output of the 'show ip interface brief' command. It lists the active interfaces, their IP addresses, and their current status.

2. Affichage des interfaces sur le routeur et leur adresse IP

```

1$ 
2$ 
3$ 
4$ 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 192.168.0.2
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    10.0.0.0 0.0.0.255 area 0
    10.1.0.0 0.0.0.255 area 0
  Routing Information Sources:
    Gateway         Distance      Last Update
    192.168.0.2          110          00:03:00
  Distance: (default is 110)

R2#

```

3. Affichage des protocoles configurés

```

IOS Command Line Interface
Designated Router (ID) 192.168.0.2, Interface No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40,
  Hello due in 00:00:03
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)
R1#
R2# sh 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

  10.0.0.0/8 is variably subnetted, 4 subnets
C     10.0.0.0/24 is directly connected, FastEthernet0/0
L     10.0.0.1/32 is directly connected, FastEthernet0/1
C     10.1.0.0/24 is directly connected, FastEthernet1/0
L     10.1.0.1/32 is directly connected, FastEthernet1/1
C     192.168.0.0/32 is subnetted, 1 subnets
C       192.168.0.2/32 is directly connected, Loopback0
R1# sh 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

  10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks
C     10.0.0.0/24 is directly connected, FastEthernet0/0
L     10.0.0.1/32 is directly connected, FastEthernet0/1
C     10.0.0.2/32 is directly connected, FastEthernet0/2
L     10.0.1.1/32 is directly connected, FastEthernet1/0
C     10.0.1.2/32 is directly connected, FastEthernet1/1
L     10.0.2.1/32 is directly connected, FastEthernet2/0
C     10.0.2.2/32 is directly connected, FastEthernet2/1
L     10.0.3.1/32 is directly connected, FastEthernet2/2
C     192.168.0.0/32 is subnetted, 1 subnets
C       192.168.0.1/32 is directly connected, Loopback0

```

4. Affichage de la table de routage

6. Vérifier que tous les réseaux **10.x.x.x** et les réseaux de « rebouclage » sont dans les tables de routage de tous les routeurs

Pour les trois questions suivantes : il est conseillé aussi d'exécuter la commande : **sh ip route** sur le routeur R1 avant et après modification pour comparer le coût avant et après modification

Device Name:	R2				
Custom Device Model:	2811 IOS15				
Hostname:	R2				
Port	Link	VLAN	IP Address	IPv6 Address	MAC Address
FastEthernet0/0	Up	--	10.0.0.2/24	<not set>	0060.3E19.5C01
FastEthernet0/1	Up	--	10.1.0.1/24	<not set>	0060.3E19.5C02
Loopback0	Up	--	192.168.0.2/32	<not set>	0010.117D.D060
Vlan1	Down	1	<not set>	<not set>	0009.7C67.2516
Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > R2					
PC-PT PC2					

1. Table de routage de R1

Device Name:	R1				
Custom Device Model:	2811 IOS15				
Hostname:	R1				
Port	Link	VLAN	IP Address	IPv6 Address	MAC Address
FastEthernet0/0	Up	--	10.0.0.1/24	<not set>	0003.E4EB.0601
FastEthernet0/1	Up	--	10.0.1.1/24	<not set>	0003.E4EB.0602
FastEthernet1/0	Up	--	10.0.2.1/24	<not set>	0001.422E.3D01
FastEthernet1/1	Up	--	10.0.3.1/24	<not set>	0001.422E.3D02
Loopback0	Up	--	192.168.0.1/32	<not set>	000C.CFBE.2C03
Vlan1	Down	1	<not set>	<not set>	000A.4105.109B
Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > R1					
PC-PT PC2					

2. Table de routage de R2

Device Name:	R3				
Custom Device Model:	2811 IOS15				
Hostname:	R3				
Port	Link	VLAN	IP Address	IPv6 Address	MAC Addr
FastEthernet0/0	Up	--	10.1.0.1/24	<not set>	0060.70A
FastEthernet0/1	Up	--	10.1.1.2/24	<not set>	0060.70A
Loopback0	Up	--	192.168.0.3/32	<not set>	0060.5CA
Vlan1	Down	1	<not set>	<not set>	0001.C70
Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > R3					
0044					

3. Table de routage de R3

```

Device Name: R4
Custom Device Model: 2811 IOS15
Hostname: Router

Port      Link  VLAN   IP Address      IPv6 Address      MAC Address
FastEthernet0/0 Up    --    10.1.1.1/24  <not set>        00D0.5829.1701
FastEthernet0/1 Up    --    10.1.2.1/24  <not set>        00D0.5829.1702
FastEthernet1/0 Up    --    10.1.3.1/24  <not set>        00E0.A398.2D01
FastEthernet1/1 Up    --    203.0.113.1/24 <not set>        00E0.A398.2D02
Loopback0   Up    --    192.168.0.4/32  <not set>        0003.E425.59A1
Vlan1      Down   1     <not set>       <not set>        0002.1718.1D15

Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > R4

```

4. Table de routage de R4

```

Device Name: R5
Custom Device Model: 2811 IOS15
Hostname: R5

Port      Link  VLAN   IP Address      IPv6 Address      MAC Address
FastEthernet0/0 Up    --    10.1.3.2/24  <not set>        00E0.A31A.5301
FastEthernet0/1 Up    --    10.0.3.2/24  <not set>        00E0.A31A.5302
Loopback0   Up    --    192.168.0.5/32  <not set>        000A.F3BB.B835
Vlan1      Down   1     <not set>       <not set>        0001.6327.D70A

Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > R5

```

5. Table de routage de R5

The image shows two terminal windows side-by-side. The left window is for Router R1 and the right window is for Router R2. Both routers are running Cisco IOS version 15.0 (as indicated by the banner at the top of each screen).

R1#

IOS Command Line Interface

```

Designated Router (ID) 192.168.0.2, Interface
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40,
  Hello due in 00:00:03
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)

R2#
R2#sh ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, I - 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 - CGRP
      P - periodic downloaded static route

Gateway of last resort is not set

          10.0.0.0/8 is variably subnetted, 4 subnets
C        10.0.0.0/24 is directly connected, FastEthernet0/0
L        10.0.0.1/32 is directly connected, FastEthernet0/1
C        10.1.0.0/24 is directly connected, FastEthernet1/0
L        10.1.0.1/32 is directly connected, FastEthernet1/1
          192.168.0.0/32 is subnetted, 1 subnets
C        192.168.0.2/32 is directly connected, Loopback0

R2#
R2#sh ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, I - 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 - CGRP
      P - periodic downloaded static route

Gateway of last resort is not set

          10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks
C        10.0.0.0/24 is directly connected, FastEthernet0/0
L        10.0.0.1/32 is directly connected, FastEthernet0/1
C        10.0.1.0/24 is directly connected, FastEthernet1/0
L        10.0.1.1/32 is directly connected, FastEthernet1/1
C        10.0.2.0/24 is directly connected, FastEthernet2/0
L        10.0.2.1/32 is directly connected, FastEthernet2/1
C        10.0.3.0/24 is directly connected, FastEthernet3/0
L        10.0.3.1/32 is directly connected, FastEthernet3/1
          192.168.0.0/32 is subnetted, 1 subnets
C        192.168.0.1/32 is directly connected, Loopback0

```

6. Show ip route sur R1 avant

7. Configurer la bande passante de référence de sorte que l'interface 100 Gbps ait un coût de 1.

```

R1(config-router)#
R1(config-router)#
R1(config-router) #auto-cost reference-bandwidth 10000
R1(config-router) #auto-cost reference-bandwidth 10000
R1(config-router)#
R1(config-router)#
R1(config-router)#
R1(config-router)#
R1(config-router)#
R1(config-router) #auto-cost reference-bandwidth 10000
R1(config-router)#
R1(config-router)#
R1(config-router)#
R1(config-router)#
R1(config-router)#
R1(config-router)#

```

Copy Paste

config
config#
config-r
SPF: Ref
Ple
(config-router)#end
#

active 2. -- Verify your configuration by viewing the routing table and manually calculating the metric for a T1
show ip route static, R - RIP, M - mobile, B - BGP
S - static, C - Connected, IA - OSPF inter-area
O - OSPF external, E - EIGRP external, * - candidate default

1. Configuration du cout de l'interface

8. Quel sera le coût OSPF sur les liaisons Fast Ethernet ? vérifier ceci

Fast Ethernet 100 Mbit/s	1,000,000,000 ÷ 100,000,000	10
-----------------------------	-----------------------------	----

Le cout OSPF sera de 10.

9. Quel effet cela a-t-il sur le coût de R1 vers le réseau 10.1.2.0/24 ?

```

R2#
R2#
R2#
R2#show ip ospf interface

FastEthernet0/1 is up, line protocol is up
  Internet address is 10.1.0.1/24, Area 0
  Process ID 1, Router ID 192.168.0.2, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 192.168.0.2, Interface address 10.1.0.1
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:03
  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)
FastEthernet0/0 is up, line protocol is up
  Internet address is 10.0.0.1/24, Area 0
  Process ID 1, Router ID 192.168.0.2, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 192.168.0.2, Interface address 10.0.0.1
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:03
  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)

```

Le cout de R1 sera alors de 1.

7. Base de données topologique OSPF

- Afficher le contenu de la base de données topologiques des routeurs R1 à R5. Que constatez-vous ? justifier vos observations

```

R1 - X

Physical Config CLI Attributes

IOS Command Line Interface

A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wl/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.

cisco 2811 (MPC860) processor (revision 0x200) with 60416K/5120K bytes of memory
Processor board ID JAD05190MTZ (4292891495)
4 FastEthernet interface(s)
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

Press RETURN to get started!

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/1, changed state to up

R1>en
R1#show ip ospf database
      OSPF Router with ID (192.168.0.1) (Process ID 1)

      Router Link States (Area 0)

      Link ID          ADV Router       Age           Seq#           Checksum Link count
      192.168.0.1      192.168.0.1     743           0x80000005  0x00ec9f 4
R1#

```

1. Contenu de la base de données topologiques de R1

```
R2 con0 is now available

Press RETURN to get started.

R2>en
R2#show ip database
^
% Invalid input detected at '^' marker.

R2#show ip ospf database
    OSPF Router with ID (192.168.0.2) (Process ID 1)

        Router Link States (Area 0)

Link ID      ADV Router      Age       Seq#      Checksum Link count
192.168.0.2  192.168.0.2  523       0x80000006 0x00ada4 2
R2#
```

2. Contenu de la base de données topologiques de R2

R3

Physical Config **CLI** Attributes

IOS Command Line Interface

```

compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wlv/export/crypto/tool/stqrg.html

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2 FastEthernet interface(s)
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

Press RETURN to get started!

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

R3>en
R3#show ip ospf database
R3#show ip ospf database
      OSPF Router with ID (192.168.0.3) (Process ID 1)

      Router Link States (Area 0)

Link ID      ADV Router      Age      Seq#      Checksum Link count
192.168.0.3  192.168.0.3  605      0x80000003 0x00c090 2
R3#

```

Top

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3. Contenu de la base de données topologiques de R3

R4

Physical Config **CLI** Attributes

IOS Command Line Interface

```

A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wlv/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.

cisco 2811 (MPC860) processor (revision 0x200) with 60416K/5120K bytes of memory
Processor board ID JAD0S190MTZ (4292891495)
4 FastEthernet interface(s)
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

Press RETURN to get started!

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router>en
Router#show ip ospf database
      OSPF Router with ID (192.168.0.4) (Process ID 1)

      Router Link States (Area 0)

Link ID      ADV Router      Age      Seq#      Checksum Link count
192.168.0.4  192.168.0.4  680      0x80000005 0x00f6e6 4
Router#

```

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4. Contenu de la base de données topologiques de R4

```

R5
Physical Config CLI Attributes

IOS Command Line Interface

third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/w处处/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.

cisco 2811 (MPC860) processor (revision 0x200) with 60416K/5120K bytes of memory
Processor board ID JAD05190MTZ (4292891495)
2 FastEthernet interface(s)
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

Press RETURN to get started!

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

R5>show ip ospf database
    OSPF Router with ID (192.168.0.5) (Process ID 1)

        Router Link States (Area 0)

Link ID      ADV Router      Age      Seq#      Checksum Link count
192.168.0.5  192.168.0.5  792      0x80000003 0x00e95f 2
R5>

```

Copy Paste

Top

5. Contenu de la base de données topologiques de R5

11. Combien de type d'annonces d'état de liens identifiez-vous dans la base de données topologiques.
Justifier

Il y'a 5 types d'annonces d'état de liens dans la base de données topologiques:

-Les paquets Hello. Ils permettent d'établir et de maintenir la relation avec d'autres routeurs OSPF.

-Les paquets DBD qui signifie Database Description – ils contiennent une liste abrégée de la LSDB du routeur expéditeur et est utilisé par les routeurs destinataires pour comparer leur LSDB locale.

-Les paquet LSR – qui permettent au routeur destinataire de demander plus d'information sur la base de données.

-Les paquet LSU– ils sont utilisés pour répondre aux paquets LSR et pour annoncer de nouvelles informations.

-Les paquets LSAck – lorsqu'un paquet LSU est reçu, le routeur envoie un paquet LSAck pour confirmer la réception du paquet LSU.

8. Coût OSPF

12. Il existe deux chemins possibles que R1 pourrait utiliser pour atteindre le réseau **10.1.2.0/24** - via R2 ou R5. Quelle route est dans la table de routage ?

```
D - EIGRP, EX - EIGRP external
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

  10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks
C        10.0.0.0/24 is directly connected, FastEthernet0/0
L        10.0.0.1/32 is directly connected, FastEthernet0/0
C        10.0.1.0/24 is directly connected, FastEthernet0/1
L        10.0.1.1/32 is directly connected, FastEthernet0/1
C        10.0.2.0/24 is directly connected, FastEthernet1/0
L        10.0.2.1/32 is directly connected, FastEthernet1/0
C        10.0.3.0/24 is directly connected, FastEthernet1/1
L        10.0.3.1/32 is directly connected, FastEthernet1/1
  192.168.0.0/32 is subnetted, 1 subnets
C        192.168.0.1/32 is directly connected, Loopback0
```

R1#

13. Table de routage de R1

13. Changez ceci pour que le trafic de R1 à **10.1.2.0/24** soit équilibré en charge via R2 et R5 (**question optionnel**)

14. Vérifier que le trafic vers le réseau **10.1.2.0/24** à partir de R1 est équilibré en charge via R2 et R5
(question optionnel)

Réponse

9. Injection de route par défaut

15. Assurez-vous que tous les routeurs ont une route vers le réseau **203.0.113.0/24**. Les routes internes doivent être annoncés au fournisseur de services sur l'interface **203.0.113.2**

```
R1#show ip route 203.0.113.0
Routing entry for 203.0.113.0/24
Known via "static", distance 1, metric 0
  Routing Descriptor Blocks:
    * 10.0.0.0
      Route metric is 0, traffic share count is 1
    10.1.3.1
      Route metric is 0, traffic share count is 1
R1#
```

1. Route de R1 vers 203.0.113.0

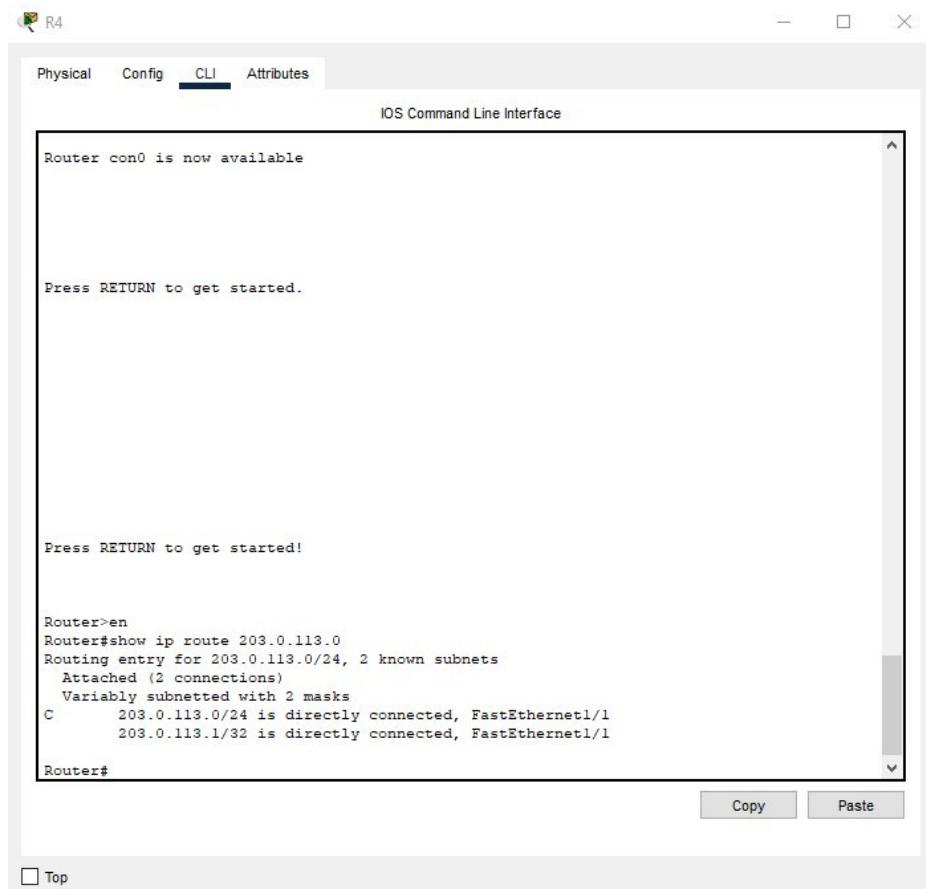
```
R2#show ip route 203.0.113.0
Routing entry for 203.0.113.0/24
Known via "static", distance 1, metric 0
  Routing Descriptor Blocks:
    * 10.0.0.0
      Route metric is 0, traffic share count is 1
    10.1.3.1
      Route metric is 0, traffic share count is 1
R2#
```

2. Route de R2 vers 203.0.113.0

```
R3#show ip route 203.0.113.0
Routing entry for 203.0.113.0/24
Known via "static", distance 1, metric 0
  Routing Descriptor Blocks:
    * 10.0.0.0
      Route metric is 0, traffic share count is 1
    10.1.3.1
      Route metric is 0, traffic share count is 1

R3#
```

3. Route de R3 vers 203.0.113.0

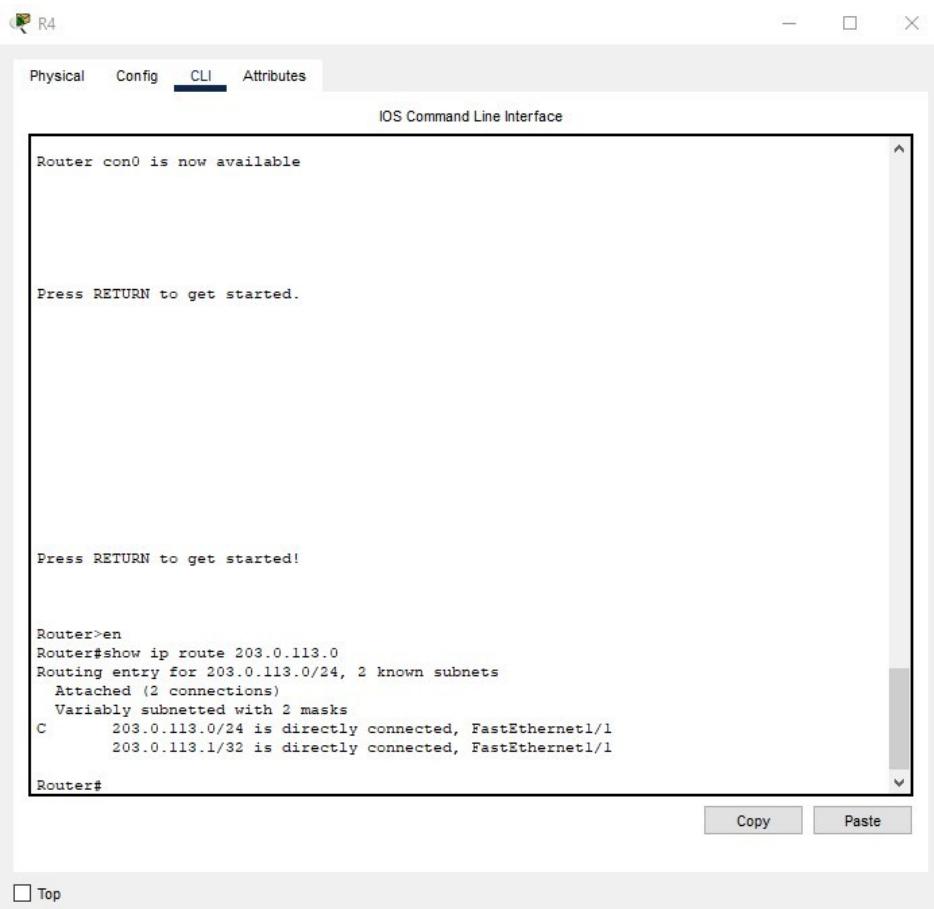


4. Route de R4 vers 203.0.113.0

```
R5#show ip route 203.0.113.0
Routing entry for 203.0.113.0/24
Known via "static", distance 1, metric 0
  Routing Descriptor Blocks:
    * 10.1.3.1
      Route metric is 0, traffic share count is 1

R5#
```

5. Route de R5 vers 203.0.113.0



6. Route de Internet (Service Provider) vers 203.0.113.0

```

Physical Config CLI Attributes

IOS Command Line Interface

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

  203.0.113.0/24 is variably subnetted, 2 subnets, 2 masks
C        203.0.113.0/24 is directly connected, FastEthernet0/0
L        203.0.113.2/32 is directly connected, FastEthernet0/0

Rips#
Rips#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Rips(config)#
Rips(config)#ip route 10.0.0.0 255.255.255.0 10.0.0.1
Rips(config)#ip route 10.0.1.0 255.255.255.0 10.0.0.1
Rips(config)#ip route 10.0.2.0 255.255.255.0 10.0.3.1
Rips(config)#ip route 10.0.0.0 255.255.255.0 10.1.0.2
Rips(config)#ip route 10.1.0.0 255.255.255.0 10.0.0.2
Rips(config)#ip route 10.0.3.0 255.255.255.0 10.0.2.1
Rips(config)#ip route 10.1.0.0 255.255.255.0 10.1.1.2
Rips(config)#ip route 10.1.1.0 255.255.255.0 10.1.0.1
Rips(config)#ip route 10.1.1.0 255.255.255.0 10.1.2.1
Rips(config)#ip route 10.1.1.0 255.255.255.0 10.1.2.1
Rips(config)#ip route 10.1.1.0 255.255.255.0 10.1.2.1
Rips(config)#ip route 10.1.2.0 255.255.255.0 10.1.1.1
Rips(config)#ip route 10.1.3.0 255.255.255.0 203.0.113.1
Rips(config)#ip route 203.0.113.0 255.255.255.0 10.1.3.1
Rips(config)#ip route 10.1.3.0 255.255.255.0 10.0.3.2
Rips(config)#ip route 10.0.3.0 255.255.255.0 10.1.3.2
Rips(config)#

```

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7. Annonce des routes internes au fournisseur de service sur l'interface 203.0.113.2

16. Vérifiez que les routeurs R1 à R5 ont un chemin vers le réseau 203.0.113.0/24

```

R1#traceroute 203.0.113.0
Type escape sequence to abort.
Tracing the route to 203.0.113.0
  1  *       *
  2  *       *
  3  *       *
  4  *       *
  5  *       *
  6  *       *
  7  *       *
  8  *       *
  9  *       *
 10  *       *
 11  *       *
 12  *       *
 13  *
 14  *
 15  *
 16  *
 17  *
 18  *
 19  *
 20  *
 21  *
 22  *
 23  *
 24  *
 25  *
 26  *
 27  *
 28  *
 29  *
 30  *

R1#

```

1. Traceroute de R1 vers 203.0.113.0

```
R2#traceroute 203.0.113.0
Type escape sequence to abort.
Tracing the route to 203.0.113.0

 1 * *
 2 * *
 3 * *
 4 * *
 5 * *
 6 * *
 7 * *
 8 * *
 9 * *
10 * *
11 * *
12 * *
13 * *
14 * *
15 * *
16 * *
17 * *
18 * *
19 * *
20 * *
21 * *
22 * *
23 * *
24 * *
25 * *
26 * *
27 * *
28 * *
29 * *
30 * *

R2#
```

2. Traceroute de R2 vers 203.0.113.0

R3

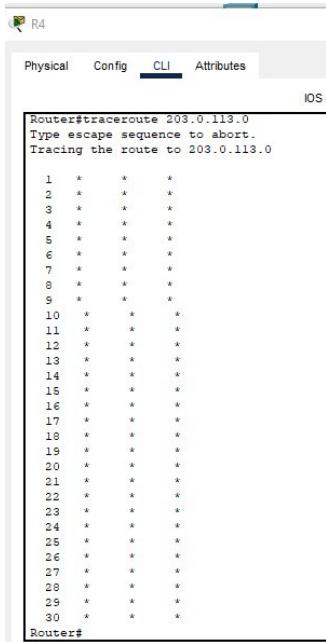
Physical	Config	CLI	Attributes
IO:			

```
R3#traceroute 203.0.113.0
Type escape sequence to abort.
Tracing the route to 203.0.113.0

 1 * *
 2 * *
 3 * *
 4 * *
 5 * *
 6 * *
 7 * *
 8 * *
 9 * *
10 * *
11 * *
12 * *
13 * *
14 * *
15 * *
16 * *
17 * *
18 * *
19 * *
20 * *
21 * *
22 * *
23 * *
24 * *
25 * *
26 * *
27 * *
28 * *
29 * *
30 * *

R3#
```

3. Traceroute de R3 vers 203.0.113.0



R4

Physical Config **CLI** Attributes

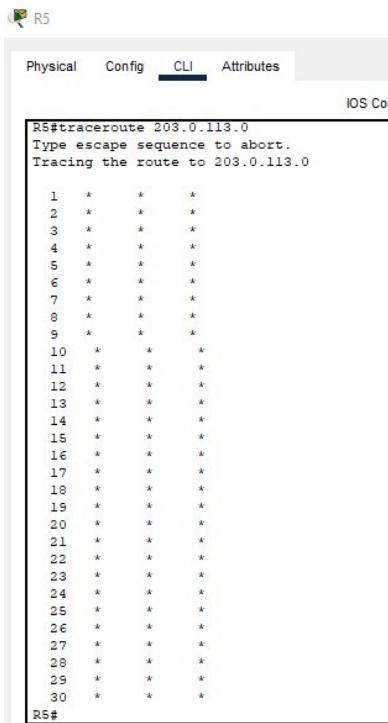
IOS

```
Router#traceroute 203.0.113.0
Type escape sequence to abort.
Tracing the route to 203.0.113.0

 1 * * *
 2 * * *
 3 * * *
 4 * * *
 5 * * *
 6 * * *
 7 * * *
 8 * * *
 9 * * *
10 * * *
11 * * *
12 * * *
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 * * *
26 * * *
27 * * *
28 * * *
29 * * *
30 * * *

Router#
```

4. Traceroute de R4 vers 203.0.113.0



R5

Physical Config **CLI** Attributes

IOS Cor

```
R5#traceroute 203.0.113.0
Type escape sequence to abort.
Tracing the route to 203.0.113.0

 1 * * *
 2 * * *
 3 * * *
 4 * * *
 5 * * *
 6 * * *
 7 * * *
 8 * * *
 9 * * *
10 * * *
11 * * *
12 * * *
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 * * *
26 * * *
27 * * *
28 * * *
29 * * *
30 * * *

R5#
```

5. Traceroute de R5 vers 203.0.113.0

17. Configurer une **route statique par défaut** sur R4 vers Internet via le fournisseur de services à 203.0.113.2

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 203.0.113.0 255.255.255.0 203.0.113.2
```

1. Configuration d'une route statique

18. Exécuter sur le routeur R4 les commandes permettant de s'assurer que les routeurs R1 à R5 apprennent via OSPF comment accéder à Internet

Réponse

19. Vérifier que les routeurs R1 à R5 ont une route vers Internet

Réponse

fin