



UNIVERSITE DE FIANARANTSOA

ECOLE NATIONALE D'INFORMATIQUE

RAPPORT DE TRAVAUX DIRIGÉS : ROUTAGE IP

Mention : INFORMATIQUE

Parcours : ADMINISTRATION DE SYSTEMES ET RÉSEAUX

Intitulé :

**SIMULATION DES PROTOCOLES DE
ROUTAGE RIPV2 ET OSPF SUR GNS3**

Présenté le 19 avril 2024 par :

- Monsieur HALIOTIS NTSOA Randriambololona, N° Matricule : 2936 ;
- Monsieur RANDRIANIRINA Stephan Hernandez, N° Matricule : 3006.

Encadrés par : Monsieur RAZAFINDRAMONJA Clément Aubert .

Année Universitaire : 2023-2024

CURRICULUM VITÆ

ETAT CIVIL :

Nom : RANDRIANIRINA

Prénoms : Stephan Hernandez

Age : 18 ans

Situation Matrimoniale : Célibataire

Sexe : Masculin

Nationalité : Malagasy

Adresse : Cité N°3 Antanambao Fianarantsoa

Email : randrianirinahernandezstephan@gmail.com

Contact : +261342125883



FORMATION ET DIPLOME OBTENU :

- **2022-2023** : Etudiant en Première de Formation en Licence Professionnelle à l'Ecole Nationale d'Informatique, Université de Fianarantsoa.
- **2021-2022** : Obtention du Baccalauréat en série D au lycée Catholique Saint Antoine de Padoue, Soanierana-IVONGO.

EXPERIENCES PROFESSIONNELLES

- Juillet 2023 : Programmation d'un Système embarqué en Arduino.
Développement de Site Web avec JavaScript.
- Avril 2023 : Développement de Site Web avec Html, CSS.
- Octobre 2023 : Développement d'application GUI avec QT.
- Avril 2024 : Développement d'application Web avec PHP et MySQL.

COMPETENCES EN INFORMATIQUE

- Systèmes d'exploitation : Windows, Linux (Kali Linux, Manjaro Linux, MX Linux).
- Langages de programmation : C, C++.
- Script : Script Shell, Python.
- Langage de requête et de gestion de base de données : SQL.
- SGBD : MySQL, SQLite.
- Technologies web : HTML5, CSS, JavaScript, PHP.
- Framework : QT, jQuery.
- Conception et mise en œuvre d'une Base de données.
- Maîtrise de l'Informatique Bureautique : Word, Excel, Power Point.

CONNAISSANCES LINGUISTIQUES :

Langues	Lire	Ecrire	Parler	Comprendre
Anglais	Bien	Bien	Bien	Bien
Français	Bien	Bien	Bien	Bien

DIVERS :

- Atouts : Sérieux, Dynamique, Rigoureux, Organisé, Capable de travailler en équipe et Autonome.

Avoir notion en : Comptabilité Générale avec utilisation du PCG-2005.

- Loisirs : Lire, Ecouter de la musique, Jouer au Basketball.

ETAT CIVIL :

Noms : HALIOTIS NTSOA

Prénom : Randriambololona

Age : 20 ans

Situation Matrimoniale : Célibataire

Sexe : Masculin

Nationalité : Malagasy

Adresse : Logement IV Cité Hary ISAHA Fianarantsoa

Email : hatixntsoa@gmail.com

Contact : +261387757069



FORMATION ET DIPLOME OBTENU :

- **2022-2023** : Etudiante en Première de Formation en Licence Professionnelle à l'Ecole Nationale d'Informatique, Université de Fianarantsoa.
- **2021-2022** : Obtention du Baccalauréat en série C au Lycée Sainte Jeanne d'Arc, MAHAJANGA-I.

EXPERIENCES PROFESSIONNELLES

- Août 2023 : programmation en JavaScript.
- Juillet 2023 : Programmation d'un Système embarqué en Arduino.
Développement de Site Web avec JavaScript.
- Avril 2023 : Développement de Site Web avec Html, CSS.
- Octobre 2023 : Développement d'application GUI avec QT.
- Avril 2024 : Développement d'application Web avec PHP et MySQL.

COMPETENCES EN INFORMATIQUE

- Systèmes d'exploitation : Windows, Linux (Kali Linux, WSL).
- Langages de programmation : C, C++.
- Script : Shell, Python.
- Langage de requête et de gestion de base de données : SQL.
- SGBD: MySQL, SQLite.
- Technologies web: HTML5, CSS, JavaScript, PHP.
- Framework : QT, jQuery.
- Conception et mise en œuvre d'une Base de données.
- Maîtrise de l'Informatique Bureautique : Word, Excel, Power Point.

CONNAISSANCES LINGUISTIQUES :

Langues	Lire	Ecrire	Parler	Comprendre
Anglais	Bien	Bien	Bien	Bien
Français	Bien	Bien	Bien	Bien

DIVERS :

- Atouts : Sérieux, Dynamique, Rigoureux, Organisé, Capable de travailler en équipe et Autonome.

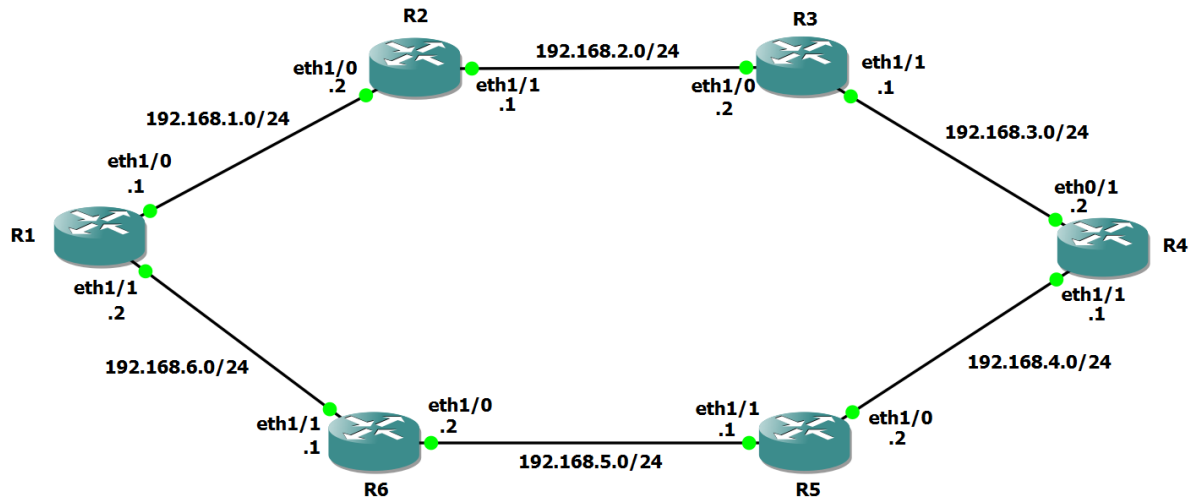
Avoir notion en : Comptabilité Générale avec utilisation du PCG-2005.

- Loisirs : Lire, Ecouter et Jouer de la musique, Jouer au basketball.

PARTIE RIP

1 – Installation des routeurs et 2 – Réalisation de topologie

3 – Plan d'adressage :



4 – Configuration des routeurs :

```
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#interface ethernet1/0
R1(config-if)#ip add 192.168.1.1 255.255.255.0
R1(config-if)#no shutdown
R1(config-if)#end
R1#
*Apr 13 08:33:03.759: %SYS-5-CONFIG_I: Configured from console by console
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#interface ethernet1/1
R1(config-if)#ip add 192.168.6.1 255.255.255.0
R1(config-if)#no shutdown
R1(config-if)#end
R1#
```

Routeur R1

```
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#interface ethernet1/0
R2(config-if)#ip add 192.168.1.2 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#end
R2#
*Apr 13 08:50:37.835: %SYS-5-CONFIG_I: Configured from console by console
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#interface ethernet1/1
R2(config-if)#ip add 192.168.2.1 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#end
R2#
*Apr 13 08:52:01.375: %SYS-5-CONFIG_I: Configured from console by console
R2#
```

Routeur R2

```
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#interface ethernet1/0
R3(config-if)#ip add 192.168.2.2 255.255.255.0
R3(config-if)#no shutdown
R3(config-if)#end
R3#
*Apr 13 09:04:34.003: %SYS-5-CONFIG_I: Configured from console by console
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#interface ethernet1/1
R3(config-if)#ip add 192.168.3.1 255.255.255.0
R3(config-if)#no shutdown
R3(config-if)#end
R3#
```

Routeur R3

```
R4#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R4(config)#interface ethernet1/0
R4(config-if)#ip add 192.168.3.2 255.255.255.0
R4(config-if)#no shutdown
R4(config-if)#end
R4#
*Apr 13 09:15:58.931: %SYS-5-CONFIG_I: Configured from console by console
R4#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R4(config)#interface ethernet1/1
R4(config-if)#ip add 192.168.4.1 255.255.255.0
R4(config-if)#no shutdown
R4(config-if)#end
R4#
```

Routeur R4

```

R5#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R5(config)#interface ethernet1/0
R5(config-if)#ip add 192.168.4.2 255.255.255.0
R5(config-if)#no shutdown
R5(config-if)#end
R5#
*Apr 13 09:22:15.295: %SYS-5-CONFIG_I: Configured from console by console
R5#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R5(config)#interface ethernet1/1
R5(config-if)#ip add 192.168.5.1 255.255.255.0
R5(config-if)#no shutdown
R5(config-if)#end
R5#

```

Routeur R5

```

R6#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R6(config)#interface ethernet1/0
R6(config-if)#ip add 192.168.5.2 255.255.255.0
R6(config-if)#no shutdown
R6(config-if)#end
R6#
*Apr 13 09:29:08.367: %SYS-5-CONFIG_I: Configured from console by console
R6#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R6(config)#interface ethernet1/1
R6(config-if)#ip add 192.168.6.1 255.255.255.0
R6(config-if)#no shutdown
R6(config-if)#end
R6#

```

Routeur R6

4 – Activation du protocole RIP sur les routeurs :

```

R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router rip
R1(config-router)#version 2
R1(config-router)#network 192.168.1.0
R1(config-router)#network 192.168.6.0
R1(config-router)#no auto-summary
R1(config-router)#exit
R1(config)#exit
R1#
*Apr 13 09:51:21.943: %SYS-5-CONFIG_I: Configured from console by console
R1#copy running-config startup-config
Destination filename [startup-config]?
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]y
Building configuration...
[OK]

```

Routeur R1

```

R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router rip
R2(config-router)#version 2
R2(config-router)#network 192.168.1.0
R2(config-router)#network 192.168.2.0
R2(config-router)#no auto-summary
R2(config-router)#exit
R2(config)#exit
R2#
*Apr 13 10:00:26.483: %SYS-5-CONFIG_I: Configured from console by console
R2#copy running-config startup-config
Destination filename [startup-config]?
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]y
Building configuration...
[OK]

```

Routeur R1

```

R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router rip
R3(config-router)#version 2
R3(config-router)#network 192.168.2.0
R3(config-router)#network 192.168.3.0
R3(config-router)#no auto-summary
R3(config-router)#exit
R3(config)#exit
R3#
*Apr 13 10:07:43.687: %SYS-5-CONFIG_I: Configured from console by console
R3#copy running-config startup-config
Destination filename [startup-config]?
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]y
Building configuration...
[OK]

```

Routeur R3

```

R4#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R4(config)#router rip
R4(config-router)#version 2
R4(config-router)#network 192.168.3.0
R4(config-router)#network 192.168.4.0
R4(config-router)#no auto-summary
R4(config-router)#exit
R4(config)#exit
R4#
*Apr 13 10:14:28.591: %SYS-5-CONFIG_I: Configured from console by console
R4#copy running-config startup-config
Destination filename [startup-config]?
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]y
Building configuration...
[OK]

```

Routeur R3

```

R5#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R5(config)#router rip
R5(config-router)#version 2
R5(config-router)#network 192.168.4.0
R5(config-router)#network 192.168.5.0
R5(config-router)#no auto-summary
R5(config-router)#exit
R5(config)#exit
R5#
*Apr 13 10:18:34.383: %SYS-5-CONFIG_I: Configured from console by console
R5#copy running-config startup-config
Destination filename [startup-config]?
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]y
Building configuration...
[OK]

```

Routeur R3

```

R6#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R6(config)#router rip
R6(config-router)#version 2
R6(config-router)#network 192.168.5.0
R6(config-router)#network 192.168.6.0
R6(config-router)#no auto-summary
R6(config-router)#exit
R6(config)#exit
R6#
*Apr 13 10:24:05.043: %SYS-5-CONFIG_I: Configured from console by console
R6#copy running-config startup-config
Destination filename [startup-config]?
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]y
Building configuration...
[OK]

```

Routeur R6

5 – Observation du routeur 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
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       + - replicated route, % - next hop override

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, Ethernet1/0
L       192.168.1.1/32 is directly connected, Ethernet1/0
R       192.168.2.0/24 [120/1] via 192.168.1.2, 00:00:06, Ethernet1/0
R       192.168.3.0/24 [120/3] via 192.168.6.1, 00:00:03, Ethernet1/1
R       192.168.4.0/24 [120/2] via 192.168.6.1, 00:00:11, Ethernet1/1
R       192.168.5.0/24 [120/1] via 192.168.6.1, 00:00:11, Ethernet1/1
    192.168.6.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.6.0/24 is directly connected, Ethernet1/1
L       192.168.6.2/32 is directly connected, Ethernet1/1
R1#
```

Table de routage de R1

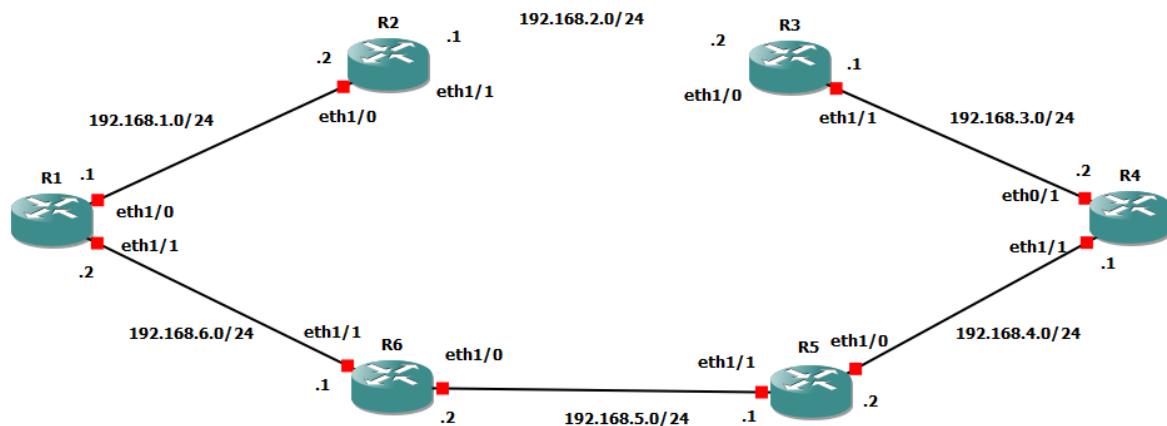
```
R1#ping 192.168.1.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/6/8 ms
R1#ping 192.168.1.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 40/61/88 ms
R1#ping 192.168.2.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.2.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 64/96/132 ms
R1#ping 192.168.2.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.2.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 108/136/152 ms
R1#ping 192.168.3.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.3.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 72/132/156 ms
R1#ping 192.168.3.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.3.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 196/212/224 ms
```

Ping R1, R2, R3, R4

```
R6#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R6(config)#interface ethernet1/0
R6(config-if)#ip add 192.168.5.2 255.255.255.0
R6(config-if)#no shutdown
R6(config-if)#end
R6#
*Apr 13 09:29:08.367: %SYS-5-CONFIG_I: Configured from console by console
R6#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R6(config)#interface ethernet1/1
R6(config-if)#ip add 192.168.6.1 255.255.255.0
R6(config-if)#no shutdown
R6(config-if)#end
R6#
```

Ping R4, R6

6 – Enlever les liens entre les routeurs R2 et R3 :



7 – Encapsulation du protocole RIP :

Les paquets RIP sont encapsulés dans le protocole UDP.

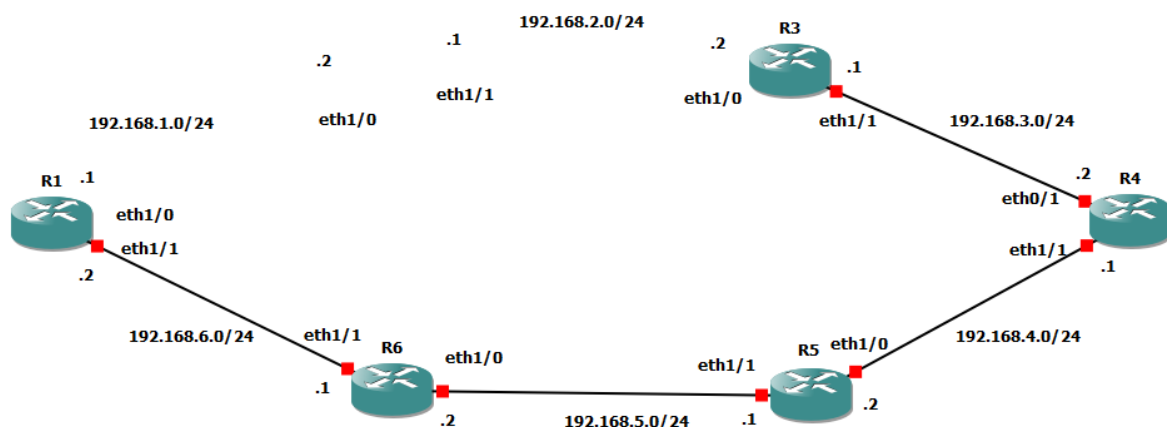
Le numéro de port est 520.

8 – Messages entre R2 et R3 après remise des liens :

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	ca:03:12:30:00:1c	CDP/VTP/DTP/PAgP/UD...	CDP	362	Device ID: R3 Port ID: Ethernet1/0
2	0.015627	192.168.2.1	224.0.0.9	RIPv2	66	Response
3	0.140657	ca:02:1d:dc:00:1d	CDP/VTP/DTP/PAgP/UD...	CDP	362	Device ID: R2 Port ID: Ethernet1/1
4	0.940933	192.168.2.2	224.0.0.9	RIPv2	66	Response
5	1.003440	ca:03:12:30:00:1c	CDP/VTP/DTP/PAgP/UD...	CDP	362	Device ID: R3 Port ID: Ethernet1/0

R2 et R3 peuvent maintenant échanger des messages selon la capture wireshark ci-dessus, après reconfiguration le protocole utilisé entre les deux routeurs est RIP.

9 – Suppression de R2 :



Observation au niveau de R1

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	ca:01:26:08:00:1d	Broadcast	ARP	60	Gratuitous ARP for 192.168.6.2 (Reply)
2	1.212997	ca:06:27:98:00:1d	Broadcast	ARP	60	Gratuitous ARP for 192.168.6.1 (Reply)
3	1.860138	ca:01:26:08:00:1d	Broadcast	ARP	60	Gratuitous ARP for 192.168.6.2 (Reply)
4	1.936647	ca:01:26:08:00:1d	Broadcast	ARP	60	Gratuitous ARP for 192.168.6.2 (Reply)
5	2.038496	192.168.6.2	224.0.0.9	RIPv2	66	Request
6	2.090367	192.168.6.2	224.0.0.9	RIPv2	66	Request

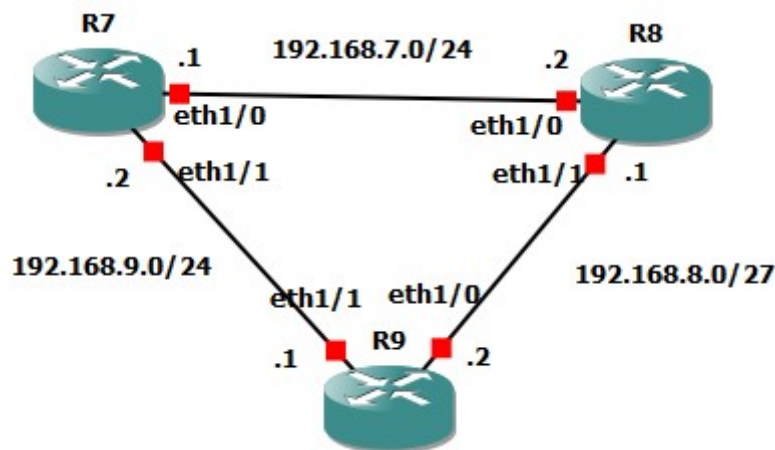
Observation au niveau de R2

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	ca:04:13:c4:00:1c	Broadcast	ARP	60	Gratuitous ARP for 192.168.3.2 (Reply)
2	0.349030	ca:03:12:30:00:1d	Broadcast	ARP	60	Gratuitous ARP for 192.168.3.1 (Reply)
3	6.082162	ca:03:12:30:00:1d	Broadcast	ARP	60	Gratuitous ARP for 192.168.3.1 (Reply)
4	8.582300	ca:04:13:c4:00:1c	Broadcast	ARP	60	Gratuitous ARP for 192.168.3.2 (Reply)
5	8.695664	ca:03:12:30:00:1d	Broadcast	ARP	60	Gratuitous ARP for 192.168.3.1 (Reply)
6	8.890330	192.168.3.1	224.0.0.9	RIPv2	66	Request
7	8.890330	ca:03:12:30:00:1d	DEC-MOP-Remote-Cons...	0x6002	77	DEC DNA Remote Console
8	8.890330	ca:03:12:30:00:1d	CDP/VTP/DTP/PagP/UD...	CDP	362	Device ID: R3 Port ID: Ethernet1/1
9	9.294819	ca:03:12:30:00:1d	CDP/VTP/DTP/PagP/UD...	CDP	362	Device ID: R3 Port ID: Ethernet1/1

Comme on peut l'observer sur les paquets capturés au niveau de R1 et R3 le protocole ARP est effectué afin de mettre à jour leurs tables de routage car il n'y a plus de chemin disponible vers R2. Une fois leurs tables de routage mises à jour le protocole RIP peut enfin reprendre normalement.

PARTIE OSPF

1 – Topologie des routeurs R7, R8 et R9



Ajout de d'interface loopback sur chacun des routeurs

```
R7#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R7(config)#interface loopback 0
R7(config-if)#no shutdown
R7(config-if)#ip add 192.168.30.1 255.255.255.0
R7(config-if)#end
R7#
*Apr 14 13:06:04.771: %SYS-5-CONFIG_I: Configured from console by console
R7#copy running-config startup-config
Destination filename [startup-config]?
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]
Building configuration...
[OK]
R7#
```

Routeur R7

```
R8#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R8(config)#interface loopback 0
R8(config-if)#no shutdown
*Apr 14 13:17:44.683: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
R8(config-if)#ip add 192.168.31.1 255.255.255.0
R8(config-if)#end
R8#
*Apr 14 13:18:34.231: %SYS-5-CONFIG_I: Configured from console by console
R8#copy running-config startup-config
Destination filename [startup-config]?
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]
Building configuration...
[OK]
R8#
```

Routeur R8

```
R9#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R9(config)#interface loopback 0
R9(config-if)#no shutdown
*Apr 14 13:22:39.259: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
R9(config-if)#ip add 192.168.32.1 255.255.255.0
R9(config-if)#end
R9#
*Apr 14 13:23:32.103: %SYS-5-CONFIG_I: Configured from console by console
R9#copy running-config startup-config
Destination filename [startup-config]?
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]
Building configuration...
[OK]
R9#
```

Routeur R9

2 - Plan d'adressage des routeurs R7, R8 et R9

```
R7#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R7(config)#interface ethernet1/0
R7(config-if)#ip add 192.168.7.1 255.255.255.0
R7(config-if)#no shutdown
R7(config-if)#end
R7#
*Apr 14 17:06:40.835: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
*Apr 14 17:06:49.835: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up
R7#
*Apr 14 17:06:49.807: %SYS-5-CONFIG_I: Configured from console by console
R7#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R7(config)#interface ethernet1/1
R7(config-if)#ip add 192.168.9.2 255.255.255.0
R7(config-if)#end
R7#
*Apr 14 17:07:40.363: %SYS-5-CONFIG_I: Configured from console by console
R7#copy running-config startup-config
Destination filename [startup-config]?
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]
Building configuration...
[OK]
R7#
```

Routeur R7

```
R8#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R8(config)#interface ethernet1/0
R8(config-if)#ip add 192.168.7.2 255.255.255.0
R8(config-if)#no shutdown
R8(config-if)#end
R8#
*Apr 14 17:30:50.575: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
*Apr 14 17:30:51.575: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up
R8(config-if)#exit
R8(config)#interface ethernet1/1
R8(config-if)#ip add 192.168.8.1 255.255.255.224
R8(config-if)#no shutdown
R8(config-if)#end
R8#
*Apr 14 17:32:13.547: %LINK-3-UPDOWN: Interface Ethernet1/1, changed state to up
*Apr 14 17:32:14.547: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to up
R8(config-if)#end
R8#
*Apr 14 17:32:16.651: %SYS-5-CONFIG_I: Configured from console by console
R8#
```

Routeur R8

```
R9#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R9(config)#interface loopback 0
R9(config-if)#no shutdown
*Apr 14 13:22:39.259: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
R9(config-if)#ip add 192.168.32.1 255.255.255.0
R9(config-if)#end
R9#
*Apr 14 13:23:32.103: %SYS-5-CONFIG_I: Configured from console by console
R9#copy running-config startup-config
Destination filename [startup-config]?
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]
Building configuration...
[OK]
R9#
```

Routeur R9

3 – Activation du protocole OSPF sur les routeurs R7, R8 et R9

```
R7#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R7(config)#router ospf 1
R7(config-router)#network 192.168.7.0 0.0.0.255 area 0
R7(config-router)#network 192.168.9.0 0.0.0.255 area 0
R7(config-router)#network 192.168.30.0 0.0.0.255 area 0
R7(config-router)#end
R7#
*Apr 15 00:21:47.723: %SYS-5-CONFIG I: Configured from console by console
R7#copy running-config startup-config
Destination filename [startup-config]?
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]y
Building configuration...
[OK]
R7#
```

Routeur R7

```
R8#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R8(config)#router ospf 1
R8(config-router)#network 192.168.7.0 0.0.0.255 area 0
R8(config-router)#network 192.168.8.0 0.0.0.31 area 0
R8(config-router)#network 192.168.31.0 0.0.0.255 area 0
R8(config-router)#end
R8#
*Apr 15 19:54:43.259: %SYS-5-CONFIG I: Configured from console by console
R8#copy running-config startup-config
Destination filename [startup-config]?
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]y
Building configuration...
[OK]
R8#
```

Routeur R8

```
R9#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R9(config)#router ospf 1
R9(config-router)#network 192.168.9.0 0.0.0.255 area 0
R9(config-router)#network 192.168.8.0 0.0.0.31 area 0
R9(config-router)#network 192.168.32.0 0.0.0.255 area 0
R9(config-router)#end
R9#
*Apr 16 15:05:02.611: %SYS-5-CONFIG I: Configured from console by console
R9#copy running-config startup-config
Destination filename [startup-config]?
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]y
Building configuration...
[OK]
R9#
```

Routeur R9

4 – Paquets Hello entre les routeurs R7, R8 et R9

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	192.168.7.1	224.0.0.5	OSPF	94	Hello Packet
3	4.978099	192.168.7.2	224.0.0.5	OSPF	94	Hello Packet
5	9.315421	192.168.7.1	224.0.0.5	OSPF	94	Hello Packet
6	12.204194	192.168.7.1	192.168.7.2	OSPF	78	DB Description
8	14.890752	192.168.7.2	224.0.0.5	OSPF	94	Hello Packet
10	16.917261	192.168.7.1	192.168.7.2	OSPF	78	DB Description
11	18.972433	192.168.7.1	224.0.0.5	OSPF	94	Hello Packet
12	21.636007	192.168.7.1	192.168.7.2	OSPF	78	DB Description
14	24.868545	192.168.7.2	224.0.0.5	OSPF	94	Hello Packet

5 – RID des routeurs R7, R8 et R9

```
R7#show ip ospf route

OSPF Router with ID (192.168.30.1) (Process ID 1)
```

Routeur R7

```
R8#show ip ospf route

OSPF Router with ID (192.168.31.1) (Process ID 1)
```

Routeur R8

```
R9#show ip ospf route

OSPF Router with ID (192.168.32.1) (Process ID 1)
```

Routeur R9

Comme OSPF nécessite une configuration manuelle du RID, ce qui n'est pas le cas ci-contre, il assigne alors automatiquement le «default gateway» de chaque routeur en tant que leur RID respectifs .

6 – Tests de connectivités par PING

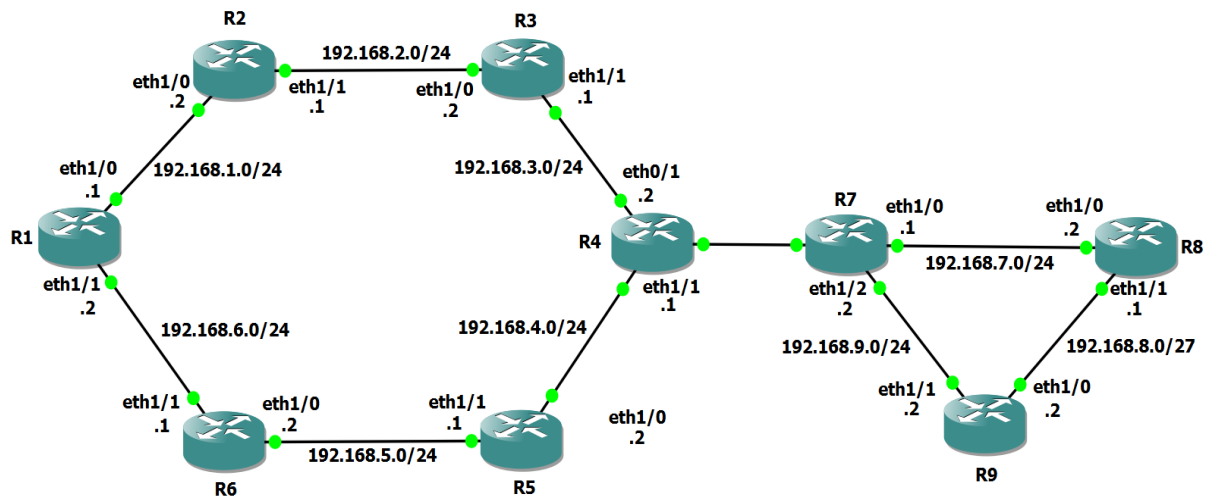
```
R7#ping 192.168.7.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.1, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
R7#ping 192.168.7.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.2, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/19/32 ms
R7#ping 192.168.8.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.8.1, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 20/27/40 ms
R7#ping 192.168.8.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.8.2, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 20/24/32 ms
R7#ping 192.168.9.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.1, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/12/20 ms
R7#ping 192.168.9.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.2, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/3/8 ms
R7#
```

PING sur les autres routeurs depuis R7

```
R7#ping 192.168.30.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.30.1, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
R7#ping 192.168.31.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.31.1, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/10/12 ms
R7#ping 192.168.32.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.32.1, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/12/16 ms
R7#
```

PING des interfaces Loopback

7 – Redistribution des routes entre les protocoles RIP et OSPF



8 – Table de routage d'un routeur dans le réseau RIP

```
R4#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
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is not set

R    192.168.1.0/24 [120/2] via 192.168.3.1, 00:00:10, Ethernet1/0
R    192.168.2.0/24 [120/1] via 192.168.3.1, 00:00:10, Ethernet1/0
     192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C     192.168.3.0/24 is directly connected, Ethernet1/0
L     192.168.3.2/32 is directly connected, Ethernet1/0
     192.168.4.0/24 is variably subnetted, 2 subnets, 2 masks
C     192.168.4.0/24 is directly connected, Ethernet1/1
L     192.168.4.1/32 is directly connected, Ethernet1/1
R    192.168.5.0/24 [120/1] via 192.168.4.2, 00:00:01, Ethernet1/1
R    192.168.6.0/24 [120/2] via 192.168.4.2, 00:00:01, Ethernet1/1
R4#show ip int br
Interface                IP-Address      OK? Method Status      Protocol
FastEthernet0/0          unassigned      YES NVRAM    administratively down down
Ethernet1/0              192.168.3.2     YES NVRAM    up          up
Ethernet1/1              192.168.4.1     YES NVRAM    up          up
Ethernet1/2              unassigned      YES NVRAM    administratively down down
Ethernet1/3              unassigned      YES NVRAM    administratively down down
Ethernet1/4              unassigned      YES NVRAM    administratively down down
Ethernet1/5              unassigned      YES NVRAM    administratively down down
Ethernet1/6              unassigned      YES NVRAM    administratively down down
Ethernet1/7              unassigned      YES NVRAM    administratively down down
R4#
```

Table de routage du routeur R4 reliant les réseaux RIP et OSPF

9 – Configuration des routeurs R4 et R7

```
R4#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R4(config)#interface ethernet1/2
R4(config-if)#ip add 10.0.0.1 255.255.255.0
R4(config-if)#no shutdown
R4(config-if)#
*Apr 16 19:58:43.667: %LINK-3-UPDOWN: Interface Ethernet1/2, changed state to up
*Apr 16 19:58:44.667: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to up
R4(config-if)#
```

Routeur R4

```
R7#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R7(config)#interface ethernet1/2
R7(config-if)#ip add 10.0.0.2 255.255.255.0
R7(config-if)#no shutdown
R7(config-if)#
*Apr 16 20:01:06.979: %LINK-3-UPDOWN: Interface Ethernet1/2, changed state to up
*Apr 16 20:01:07.979: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to up
R7(config-if)#
```

Routeur R7

10 – Activation du protocole OSPF sur le routeur R4

```
R4#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R4(config)#router ospf 1
R4(config-router)#network 10.0.0.0 0.0.0.255 area 1
R4(config-router)#end
R4#
*Apr 18 23:51:53.747: %SYS-5-CONFIG_I: Configured from console by console
R4#copy running-config startup-config
Destination filename [startup-config]?
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]y
Building configuration...
[OK]
R4#
```

11 – Connectivité R4 / R8

R4 peut pinger l'interface loopback de R8 car on a configuré OSPF sur toutes les adresses de l'interfaces de R8 en incluant son adresse loopback dans la table de routage de tous les routeurs utilisant OSPF .

12 – Connectivité R8 / R4

R8 ne peut pas pinger l'interface de R4 connecté à R3 parce que on a pas ajouté l'adresse réseau de l'interface de R4 connecté à R3 lors de la configuration OSPF de R4 .

13 – Connectivité R1

R1 ne peut pas pinger R8 parce que les adresses IP de l'interface de R8 ne sont pas encore dans la table de routage de R1 et inversement R8 ne peut non plus pinger R1 pour la même raison .

14 – Table de routage des routeurs R1, R4 et R8

```
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
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       + - replicated route, % - next hop override

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, Ethernet1/0
L    192.168.1.1/32 is directly connected, Ethernet1/0
R    192.168.2.0/24 [120/1] via 192.168.1.2, 00:00:10, Ethernet1/0
R    192.168.3.0/24 [120/2] via 192.168.1.2, 00:00:10, Ethernet1/0
R    192.168.4.0/24 [120/2] via 192.168.6.1, 00:00:08, Ethernet1/1
R    192.168.5.0/24 [120/1] via 192.168.6.1, 00:00:08, Ethernet1/1
R    192.168.6.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.6.0/24 is directly connected, Ethernet1/1
L    192.168.6.2/32 is directly connected, Ethernet1/1
R1#
```

Routeur R1

```
R4#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
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C    10.0.0.0/24 is directly connected, Ethernet1/2
L    10.0.0.1/32 is directly connected, Ethernet1/2
R    192.168.1.0/24 [120/2] via 192.168.3.1, 00:00:09, Ethernet1/0
R    192.168.2.0/24 [120/1] via 192.168.3.1, 00:00:09, Ethernet1/0
R    192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.3.0/24 is directly connected, Ethernet1/0
L    192.168.3.2/32 is directly connected, Ethernet1/0
R    192.168.4.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.4.0/24 is directly connected, Ethernet1/1
L    192.168.4.1/32 is directly connected, Ethernet1/1
R    192.168.5.0/24 [120/1] via 192.168.4.2, 00:00:24, Ethernet1/1
R    192.168.6.0/24 [120/2] via 192.168.4.2, 00:00:24, Ethernet1/1
O IA 192.168.7.0/24 [110/20] via 10.0.0.2, 00:07:32, Ethernet1/2
R    192.168.8.0/27 is subnetted, 1 subnets
O IA 192.168.8.0 [110/30] via 10.0.0.2, 00:07:21, Ethernet1/2
O IA 192.168.9.0/24 [110/20] via 10.0.0.2, 00:07:32, Ethernet1/2
R    192.168.30.0/32 is subnetted, 1 subnets
O IA 192.168.30.1 [110/11] via 10.0.0.2, 00:07:32, Ethernet1/2
R    192.168.31.0/32 is subnetted, 1 subnets
O IA 192.168.31.1 [110/21] via 10.0.0.2, 00:07:21, Ethernet1/2
R    192.168.32.0/32 is subnetted, 1 subnets
O IA 192.168.32.1 [110/21] via 10.0.0.2, 00:07:21, Ethernet1/2
R4#
```

Routeur R4

```
R8#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
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is not set

10.0.0.0/24 is subnetted, 1 subnets
O IA 10.0.0.0 [110/20] via 192.168.7.1, 00:06:48, Ethernet1/0
O IA 192.168.3.0/24 [110/30] via 192.168.7.1, 00:06:48, Ethernet1/0
O IA 192.168.4.0/24 [110/30] via 192.168.7.1, 00:06:48, Ethernet1/0
R    192.168.7.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.7.0/24 is directly connected, Ethernet1/0
L    192.168.7.2/32 is directly connected, Ethernet1/0
R    192.168.8.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.8.0/27 is directly connected, Ethernet1/1
L    192.168.8.1/32 is directly connected, Ethernet1/1
O    192.168.9.0/24 [110/20] via 192.168.8.2, 00:06:48, Ethernet1/1
    [110/20] via 192.168.7.1, 00:06:48, Ethernet1/0
R    192.168.30.0/32 is subnetted, 1 subnets
O    192.168.30.1 [110/11] via 192.168.7.1, 00:06:48, Ethernet1/0
R    192.168.31.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.31.0/24 is directly connected, Loopback0
L    192.168.31.1/32 is directly connected, Loopback0
R    192.168.32.0/32 is subnetted, 1 subnets
O    192.168.32.1 [110/11] via 192.168.8.2, 00:06:48, Ethernet1/1
R8#
```

Routeur R8

15 – Redistribution de RIP sur OSPF au niveau de R4

```
R4#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R4(config)#router ospf 1
R4(config-router)#redistribute rip subnets
R4(config-router)#end
R4#
*Apr 19 00:09:01.055: %SYS-5-CONFIG_I: Configured from console by console
R4#
```

16 – Table de routage de R8

```
R8#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
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is not set

10.0.0.0/24 is subnetted, 1 subnets
O IA 10.0.0.0 [110/20] via 192.168.7.1, 00:06:05, Ethernet1/0
O E2 192.168.1.0/24 [110/20] via 192.168.7.1, 00:04:55, Ethernet1/0
O E2 192.168.2.0/24 [110/20] via 192.168.7.1, 00:04:55, Ethernet1/0
O IA 192.168.3.0/24 [110/30] via 192.168.7.1, 00:06:05, Ethernet1/0
O IA 192.168.4.0/24 [110/30] via 192.168.7.1, 00:06:05, Ethernet1/0
O E2 192.168.5.0/24 [110/20] via 192.168.7.1, 00:04:55, Ethernet1/0
O E2 192.168.6.0/24 [110/20] via 192.168.7.1, 00:04:55, Ethernet1/0
R    192.168.7.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.7.0/24 is directly connected, Ethernet1/0
L    192.168.7.2/32 is directly connected, Ethernet1/0
R    192.168.8.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.8.0/27 is directly connected, Ethernet1/1
L    192.168.8.1/32 is directly connected, Ethernet1/1
O    192.168.9.0/24 [110/20] via 192.168.8.2, 00:06:00, Ethernet1/1
    [110/20] via 192.168.7.1, 00:06:05, Ethernet1/0
R    192.168.30.0/32 is subnetted, 1 subnets
O    192.168.30.1 [110/11] via 192.168.7.1, 00:06:05, Ethernet1/0
R    192.168.31.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.31.0/24 is directly connected, Loopback0
L    192.168.31.1/32 is directly connected, Loopback0
R    192.168.32.0/32 is subnetted, 1 subnets
O    192.168.32.1 [110/11] via 192.168.8.2, 00:06:00, Ethernet1/1
R8#
```

Une route apparait dans la table de routage de R8 .

17 – Connectivité R8 / R1

No.	Time	Source	Destination	Protocol
18	47.185996	192.168.7.2	192.168.1.1	ICMP

```
▼ Internet Control Message Protocol
  Type: 8 (Echo (ping) request)
  Code: 0
  Checksum: 0x0cf5 [correct]
  [Checksum Status: Good]
  Identifier (BE): 0 (0x0000)
  Identifier (LE): 0 (0x0000)
  Sequence Number (BE): 2 (0x0002)
  Sequence Number (LE): 512 (0x0200)
  ▼ [No response seen]
```

Le ping ne fonctionne pas parce qu'il y a aucune réponse venant de R1

18 – Connectivité R1 / R8

R1 ne peut pas pinger R8 car R1 ne sait pas quel route il faut prendre pour joindre R8 .

19 – Redistribution des routes OSPF sur RIP au niveau de R4

```
R4#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R4(config)#router rip
R4(config-router)#version 2
R4(config-router)#redistribute OSPF 1
R4(config-router)#end
R4#
```

20 – Connectivité R1 / R8

```
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
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       + - replicated route, % - next hop override

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, Ethernet1/0
L       192.168.1.1/32 is directly connected, Ethernet1/0
R       192.168.2.0/24 [120/1] via 192.168.1.2, 00:00:13, Ethernet1/0
R       192.168.3.0/24 [120/2] via 192.168.1.2, 00:00:13, Ethernet1/0
R       192.168.4.0/24 [120/2] via 192.168.6.1, 00:00:13, Ethernet1/1
R       192.168.5.0/24 [120/1] via 192.168.6.1, 00:00:13, Ethernet1/1
    192.168.6.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.6.0/24 is directly connected, Ethernet1/1
L       192.168.6.2/32 is directly connected, Ethernet1/1
```

Les routes OSPF n'apparaissent pas sur les routeurs RIP car la commande pour la redistribution est incomplète .

21 – Correction de connectivité de tous les routeurs

Afin de corriger le problème ,on ajouté "metric 1 " à la commande en mode configuration du router rip "redistribute ospf [n processus] " pour obtenir la commande suivante :

```
R4#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R4(config)#router rip
R4(config-router)#version 2
R4(config-router)#redistribute OSPF 1 metric 1
R4(config-router)#end
R4#
*Apr 18 18:24:41.135: %SYS-5-CONFIG_I: Configured from console by console
```

Tout est connecté car R1 peut pinger R8

```
R1#ping 192.168.8.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.8.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
```