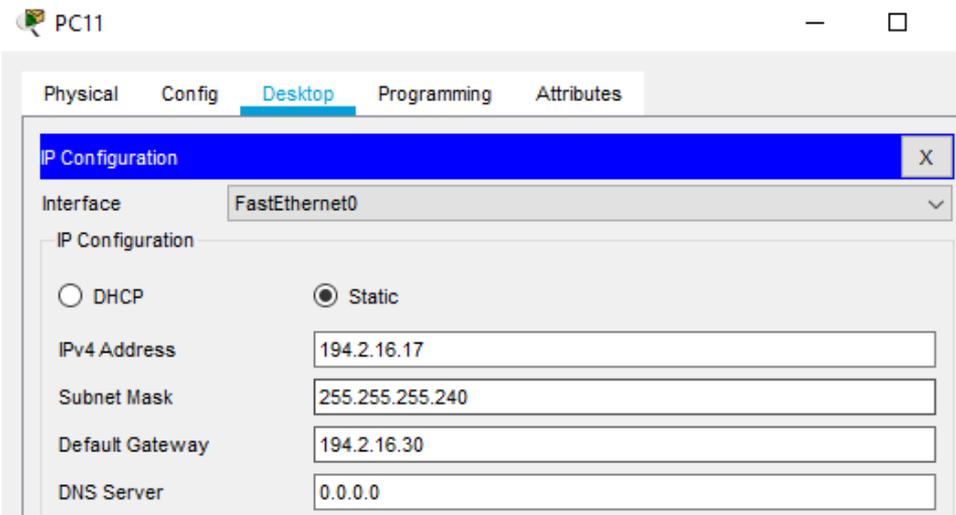


Compte-Rendu TP8 : Routage et sous-réseaux

1. Visualisation des tables de routage

- On vérifie la configuration IP des interfaces de PC11 et de R11 (R11 avec la commande **show ip brief**).



```
R11>show ip interface brief
Interface          IP-Address      OK? Method Status
Protocol
FastEthernet0/0    194.2.16.33     YES manual up
up
FastEthernet0/1    194.2.16.30     YES manual up
up
Vlan1              unassigned      YES unset  administratively
down down
```

- On vérifie les tables de routages de R1 et R11 avec la commande **show ip route**.

```
R1>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B -
BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route
```

Gateway of last resort is not set

```
194.2.16.0/28 is subnetted, 10 subnets
D    194.2.16.16 [90/2174976] via 194.2.16.97, 00:06:52,
Serial0/0/0
D    194.2.16.32 [90/2172416] via 194.2.16.97, 00:07:15,
Serial0/0/0
D    194.2.16.48 [90/2174976] via 194.2.16.97, 00:06:52,
Serial0/0/0
C    194.2.16.96 is directly connected, Serial0/0/0
D    194.2.16.112 [90/2172416] via 194.2.16.146, 00:07:18,
Serial0/0/1
                               [90/2172416] via 194.2.16.97, 00:07:15,
Serial0/0/0
D    194.2.16.128 [90/2681856] via 194.2.16.146, 00:07:16,
Serial0/0/1
                               [90/2681856] via 194.2.16.97, 00:07:15,
Serial0/0/0
C    194.2.16.144 is directly connected, Serial0/0/1
D    194.2.16.192 [90/2174976] via 194.2.16.146, 00:06:52,
Serial0/0/1
D    194.2.16.208 [90/2172416] via 194.2.16.146, 00:07:18,
Serial0/0/1
D    194.2.16.224 [90/2174976] via 194.2.16.146, 00:06:52,
Serial0/0/1
```

R11>show ip route

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

```
S    192.168.2.0/24 [1/0] via 194.2.16.35
194.2.16.0/28 is subnetted, 10 subnets
C    194.2.16.16 is directly connected, FastEthernet0/1
C    194.2.16.32 is directly connected, FastEthernet0/0
D    194.2.16.48 [90/30720] via 194.2.16.34, 00:08:12,
FastEthernet0/0
D    194.2.16.96 [90/2172416] via 194.2.16.35, 00:08:12,
FastEthernet0/0
D    194.2.16.112 [90/30720] via 194.2.16.35, 00:08:12,
FastEthernet0/0
D    194.2.16.128 [90/2172416] via 194.2.16.35, 00:08:12,
FastEthernet0/0
D    194.2.16.144 [90/2174976] via 194.2.16.35, 00:08:12,
FastEthernet0/0
D    194.2.16.192 [90/35840] via 194.2.16.35, 00:08:12,
FastEthernet0/0
D    194.2.16.208 [90/33280] via 194.2.16.35, 00:08:12,
FastEthernet0/0
D    194.2.16.224 [90/35840] via 194.2.16.35, 00:08:12,
FastEthernet0/0
```

- Pour vérifier la connectivité entre les PC, on se place sur le PC11 et on **ping 194.12.16.49** puis **194.2.16.193** et **194.2.16.225**.

```
C:\>ping 194.2.16.49

Pinging 194.2.16.49 with 32 bytes of data:

Reply from 194.2.16.49: bytes=32 time<1ms TTL=126
Reply from 194.2.16.49: bytes=32 time=1ms TTL=126
Reply from 194.2.16.49: bytes=32 time<1ms TTL=126
Reply from 194.2.16.49: bytes=32 time=1ms TTL=126

Ping statistics for 194.2.16.49:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

```
C:\>ping 194.2.16.193

Pinging 194.2.16.193 with 32 bytes of data:

Reply from 194.2.16.193: bytes=32 time=1ms TTL=124
Reply from 194.2.16.193: bytes=32 time=1ms TTL=124
Reply from 194.2.16.193: bytes=32 time=1ms TTL=124
Reply from 194.2.16.193: bytes=32 time<1ms TTL=124

Ping statistics for 194.2.16.193:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

```
C:\>ping 194.2.16.225

Pinging 194.2.16.225 with 32 bytes of data:

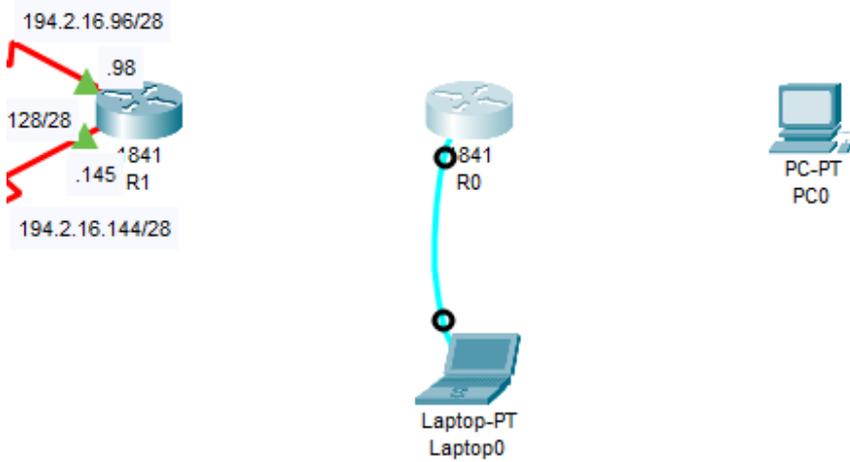
Reply from 194.2.16.225: bytes=32 time<1ms TTL=124
Reply from 194.2.16.225: bytes=32 time=11ms TTL=124
Reply from 194.2.16.225: bytes=32 time<1ms TTL=124
Reply from 194.2.16.225: bytes=32 time<1ms TTL=124

Ping statistics for 194.2.16.225:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 11ms, Average = 2ms
```

2. Ajout du routeur R0 et de l'ordinateur PC0

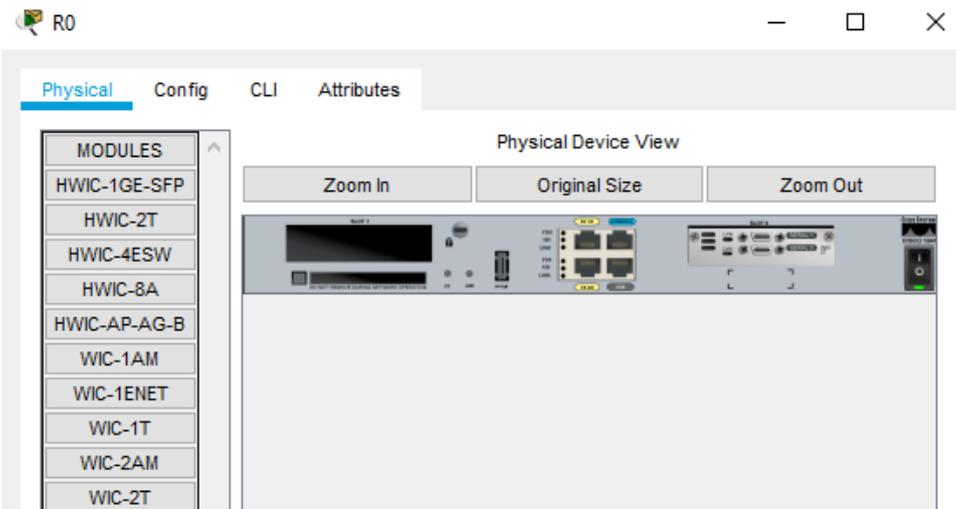
2.1 Placements des périphériques dans la topologie

- On glisse un routeur 1841 que l'on appelle R0 à droite de R1, un PC portable en-dessous de lui ainsi qu'un PC à droite de R0 que l'on appelle PC0. On relie R0 et le portable avec un câble console.



2.2 Ajout du module WIC-2T au routeur

- On met dans un premier temps R0 hors tension, puis on glisse le module WIC-2T vers l’emplacement ouvert à droite, on remet alors le routeur sous tension.



2.3 Configuration de base du routeur : utilisation du mode “setup”

- On configure le routeur en mode setup en suivant les instructions, voici le résultat :

```

!
hostname R0
enable secret 5 $l$mERr$QnY/64E5ClF2j8H8iL28G0
enable password mdp2
line vty 0 4
password mdp3
!
interface Vlan1
shutdown
no ip address
!
interface FastEthernet0/0
no shutdown
ip address 192.168.2.1 255.255.255.0
!
interface FastEthernet0/1
shutdown
no ip address
!
interface Serial0/0/0
shutdown
no ip address
!
interface Serial0/0/1
shutdown
no ip address
!
end

```

```

[0] Go to the IOS command prompt without saving this config.
[1] Return back to the setup without saving this config.
[2] Save this configuration to nvram and exit.

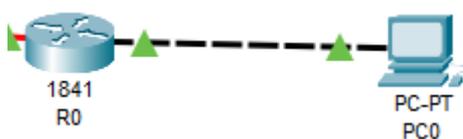
Enter your selection [2]: 2
Building configuration...
[OK]
Use the enabled mode 'configure' command to modify this
configuration.

Press RETURN to get started!

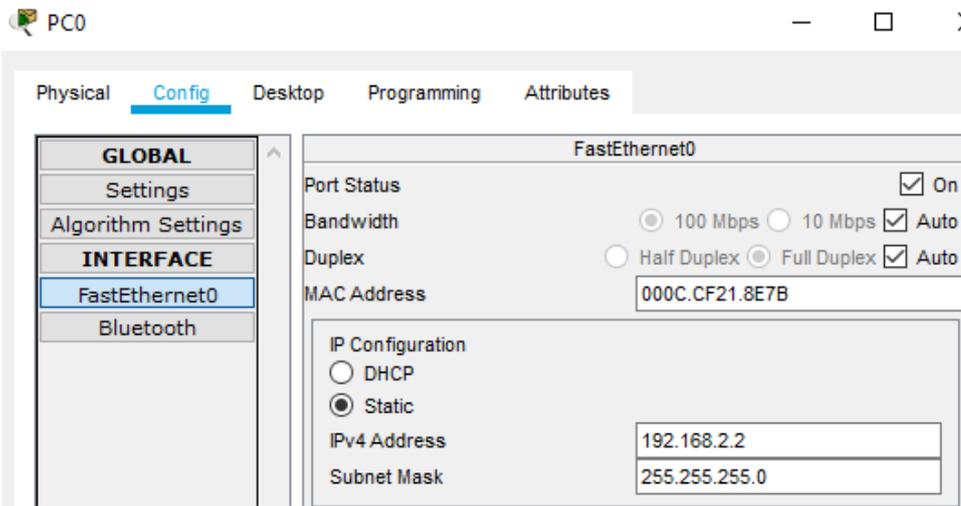
```

2.4 Configuration de l'ordinateur et connexion au routeur

- On connecte l'ordinateur PC0 au routeur R0 avec un câble croisé.



- On rentre l'adresse IPv4 et le masque de sous-réseau de PC0.



2.5 Observez le fonctionnement ARP et vérifiez la connectivité entre PC0 et R0

- On entre la commande **arp -a** dans l'invite de commandes de PC0, cela ne fonctionne pas.

```
C:\>arp -a
No ARP Entries Found
```

- On saisit la commande **show arp** sur R0.

```
R0>show arp
Protocol Address      Age (min)  Hardware Addr  Type
Interface
Internet 192.168.2.1      -         00E0.8F89.2B01  ARPA
FastEthernet0/0
```

- On **ping 192.168.2.1** depuis l'invite de commandes de PC0, la connectivité est effective.

```
C:\>ping 192.168.2.1

Pinging 192.168.2.1 with 32 bytes of data:

Reply from 192.168.2.1: bytes=32 time<lms TTL=255

Ping statistics for 192.168.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

- On entre la commande **arp -a**.

```
C:\>arp -a
Internet Address      Physical Address  Type
192.168.2.1          00e0.8f89.2b01   dynamic
```

- On saisit la commande **show –arp** sur R0.

```
R0>show arp
Protocol Address          Age (min) Hardware Addr  Type
Interface
Internet 192.168.2.1          -    00E0.8F89.2B01  ARPA
FastEthernet0/0
R0>show arp
Protocol Address          Age (min) Hardware Addr  Type
Interface
Internet 192.168.2.1          -    00E0.8F89.2B01  ARPA
FastEthernet0/0
Internet 192.168.2.2          0    000C.CF21.8E7B  ARPA
FastEthernet0/0
```

2.6 Test de la connexion Telnet au routeur

- On entre la commande **telnet 192.168.2.1** à partir de l'invite de commandes.

```
C:\>telnet 192.168.2.1
Trying 192.168.2.1 ...Open

User Access Verification

Password:
R0>
```

- On supprime le PC portable et le câble console qui le lie avec R0.

2.7 Connexion du routeur R0 au routeur R1

- On utilise la commande **show ip brief** sur R1. Il possède bien 4 interfaces séries.

```
R1>show ip interface brief
Interface          IP-Address      OK? Method Status
Protocol
FastEthernet0/0    unassigned     YES unset  administratively
down down
FastEthernet0/1    unassigned     YES unset  administratively
down down
Serial0/0/0        194.2.16.98    YES manual  up
up
Serial0/0/1        194.2.16.145   YES manual  up
up
Serial0/1/0        192.168.1.1    YES manual  down
down
Serial0/1/1        unassigned     YES unset  administratively
down down
Vlan1              unassigned     YES unset  administratively
down down
```

- On connecte les deux routeurs R0 et R1 avec un câble série DCE.



2.8 Configuration de l'interface série du routeur R0

- A partir d'une connexion Telnet depuis PC0, on passe en mode privilégié avec la commande **en** puis en mode configuration avec la commande **conf t** et enfin en mode de configuration interface grâce à la commande **interface s0/0/0**. On configure l'adresse ip avec **ip address 192.168.1.2 255.255.255.0**.

```
R0>en
Password:
Password:
Password:
R0#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R0(config)#interface s0/0/0
R0(config-if)#ip address 192.168.1.2 255.255.255.0
```

- On configure la synchronisation en modifiant le clock rate à 64 000.

```
R0(config-if)#clock rate 64000
```

- On active l'interface en utilisant la commande **no shutdown**.

```
R0(config-if)#no shutdown
```

```
R0(config-if)#
```

```
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
```

- On quitte le mode configuration avec **CTRL+Z** et on enregistre la configuration avec **copy run start**.

```
R0(config-if)#^Z
```

```
R0#
```

```
%SYS-5-CONFIG_I: Configured from console by console
```

```
R0#copy run start
```

```
Destination filename [startup-config]?
```

```
Building configuration...
```

```
[OK]
```

- On vérifie la configuration IP de R0 avec la commande **show ip interface brief**.

```
R0#show ip interface brief
Interface          IP-Address      OK? Method Status
Protocol
FastEthernet0/0    192.168.2.1     YES manual up
up
FastEthernet0/1    unassigned      YES unset  administratively
down down
Serial0/0/0        192.168.1.2     YES manual up
up
Serial0/0/1        unassigned      YES unset  administratively
down down
Vlan1              unassigned      YES unset  administratively
down down
```

- On ping l'interface S0/1/0 du routeur R1 à partir de R0.

```
R0>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 = 1/4/16 ms
R0>
```

3. Ajout de routes

- On consulte la table de routage de R0 avec **sh ip route**.

```
R0>sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B -
BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
        * - candidate default, U - per-user static route, o - ODR
        P - periodic downloaded static route

Gateway of last resort is not set

C    192.168.1.0/24 is directly connected, Serial0/0/0
C    192.168.2.0/24 is directly connected, FastEthernet0/0
```

- Même opération pour R1.

```

C    192.168.1.0/24 is directly connected, Serial0/1/0
S    192.168.2.0/24 [1/0] via 192.168.1.2
    194.2.16.0/28 is subnetted, 10 subnets
D    194.2.16.16 [90/2174976] via 194.2.16.97, 00:03:22,
Serial0/0/0
D    194.2.16.32 [90/2172416] via 194.2.16.97, 00:03:47,
Serial0/0/0
D    194.2.16.48 [90/2174976] via 194.2.16.97, 00:03:22,
Serial0/0/0
C    194.2.16.96 is directly connected, Serial0/0/0
D    194.2.16.112 [90/2172416] via 194.2.16.97, 00:03:47,
Serial0/0/0
    [90/2172416] via 194.2.16.146, 00:03:47,
Serial0/0/1
D    194.2.16.128 [90/2681856] via 194.2.16.97, 00:03:47,
Serial0/0/0
    [90/2681856] via 194.2.16.146, 00:03:47,
Serial0/0/1
C    194.2.16.144 is directly connected, Serial0/0/1
D    194.2.16.192 [90/2174976] via 194.2.16.146, 00:03:22,
Serial0/0/1
D    194.2.16.208 [90/2172416] via 194.2.16.146, 00:03:47,
Serial0/0/1
D    194.2.16.224 [90/2174976] via 194.2.16.146, 00:03:22,
Serial0/0/1

```

-> On remarque que R0 ne possède pas de route vers R1.

- Afin d'assurer la connectivité de PC0 avec PC11, PC12, PC21 et PC22, il existe 3 solutions :
 1. Ajouter les routes une à une.
 2. Ajouter une route par défaut.
 3. Ajouter une route avec une adresse de réseau globale.

- On va donc saisir une route par défaut sur R0 qui passe par 192.168.1.1 pour que PC0 puisse communiquer avec les autres.

```
R0#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B -
BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route
```

Gateway of last resort is 192.168.1.1 to network 0.0.0.0

```
C   192.168.1.0/24 is directly connected, Serial10/0/0
C   192.168.2.0/24 is directly connected, FastEthernet0/0
S*  0.0.0.0/0 [1/0] via 192.168.1.1
```

- Désormais, il faut maintenant ajouter des routes par défaut sur R1 pour communiquer avec PC11, PC12, PC21 et PC22. La première route se terminant par .97, servira à joindre PC11 et PC12 tandis que l'autre se terminant par .146, servira à joindre PC21 et PC22.

```
R1(config)#ip route 0.0.0.0 0.0.0.0 194.2.16.97
R1(config)#ip route 0.0.0.0 0.0.0.0 194.2.13.146
```

- Il faut également rajouter des routes par défaut sur R11, R12, R21, R22, R8 et R16 vers le routeur suivant.

-> R11 vers R8.

```
R11(config)#ip route 0.0.0.0 0.0.0.0 194.2.16.35
```

-> R12 vers R8.

```
R12(config)#ip route 0.0.0.0 0.0.0.0 194.2.16.35
```

-> R8 vers R1.

```
R8(config)#ip route 0.0.0.0 0.0.0.0 194.2.16.145
```

-> R21 vers R16.

```
R21(config)#ip route 0.0.0.0 0.0.0.0 194.2.16.211
```

-> R22 vers R16.

```
R22(config)#ip route 0.0.0.0 0.0.0.0 194.2.16.211
```

-> R16 vers R1.

```
R16(config)#ip route 0.0.0.0 0.0.0.0 194.2.16.145
```

- Désormais, nous pouvons réaliser les pings. On se place donc sur PC0, et on ping tous les autres PC. Les pings ne fonctionnent pas et je ne comprends pas pourquoi.

```
C:\>ping 194.2.16.17

Pinging 194.2.16.17 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 194.2.16.17:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

```
C:\>ping 194.2.16.49

Pinging 194.2.16.49 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 194.2.16.49:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

```
C:\>ping 194.2.16.193

Pinging 194.2.16.193 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 194.2.16.193:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

```
C:\>ping 194.2.16.225

Pinging 194.2.16.225 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 194.2.16.225:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

- On affiche la table de routage R0 avec la commande **sh ip route**.

```
R0#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B -
BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is 192.168.1.1 to network 0.0.0.0

C    192.168.1.0/24 is directly connected, Serial0/0/0
C    192.168.2.0/24 is directly connected, FastEthernet0/0
S*   0.0.0.0/0 [1/0] via 192.168.1.1
```