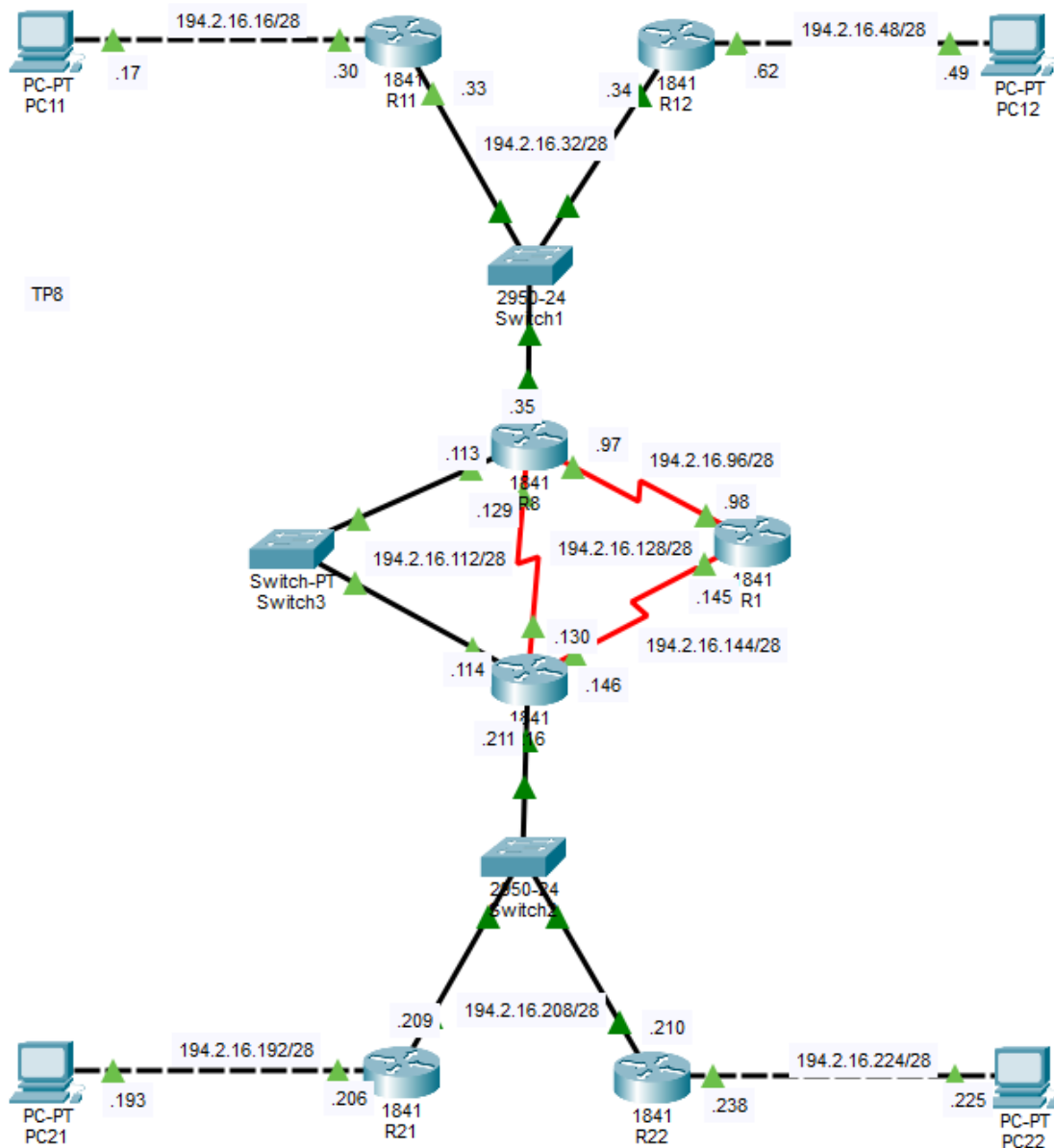# TP 8- Routage et sous-réseaux

Nesrine El Ahmadi
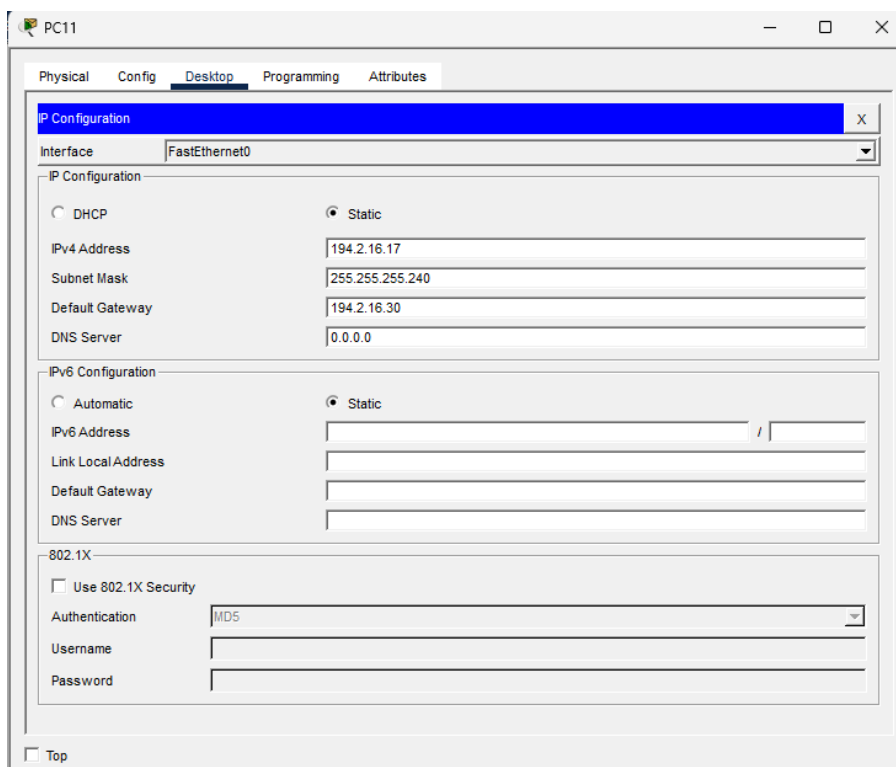
BTS SIO

- On ouvre le fichier Packet Tracer TP8.pkt. On obtient la simulation suivante :

1. Visualisation des tables de routage.

▪ On vérifie la configuration IP des interfaces de PC11 et R11 :

- PC11 : Desktop / IP Configuration ou Config/Interface/FastEthernet ;

- R11 : commande show ip interface brief .

```
R11                                                               —   ☐  ⟩

Physical  Config  CLI  Attributes

                        IOS Command Line Interface

Image text Base: 0x8007D100, Data Base: 0x01400000

Port Statistics for unclassified packets is not turned on.
Cisco 1841 (revision 5.0) with 114688K/16384K bytes of memory.
Processor board ID FTX0947Z18E
M860 processor: part number 0, mask 49
2 FastEthernet/IEEE 802.3 interface(s)
191K bytes of NVRAM.
32768K bytes of ATA CompactFlash (Read/Write)
Cisco IOS Software, 1841 Software (C1841-IPBASE-M), Version 12.3(14)T7, RELEASE SOFTWARE
(fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2006 by Cisco Systems, Inc.
Compiled Mon 15-May-06 14:54 by pt_team

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

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 194.2.16.35 (FastEthernet0/0) is up: new adjacency

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 194.2.16.34 (FastEthernet0/0) is up: new adjacency


R11>enable
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
R11#
```

▪ On vérifie la table de routage de chacun des routeurs (commande show ip route).

R12 :

```
R12>enable
R12#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
D        194.2.16.16 [90/30720] via 194.2.16.33, 00:03:20, FastEthernet0/0
C        194.2.16.32 is directly connected, FastEthernet0/0
C        194.2.16.48 is directly connected, FastEthernet0/1
D        194.2.16.96 [90/2172416] via 194.2.16.35, 00:03:20, FastEthernet0/0
D        194.2.16.112 [90/30720] via 194.2.16.35, 00:03:20, FastEthernet0/0
D        194.2.16.128 [90/2172416] via 194.2.16.35, 00:03:20, FastEthernet0/0
D        194.2.16.144 [90/2174976] via 194.2.16.35, 00:03:19, FastEthernet0/0
D        194.2.16.192 [90/35840] via 194.2.16.35, 00:03:18, FastEthernet0/0
D        194.2.16.208 [90/33280] via 194.2.16.35, 00:03:19, FastEthernet0/0
D        194.2.16.224 [90/35840] via 194.2.16.35, 00:03:18, FastEthernet0/0
```

R8 :

```
R8>enable
R8#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 194.2.16.98
     194.2.16.0/28 is subnetted, 10 subnets
D       194.2.16.16 [90/30720] via 194.2.16.33, 00:04:06, FastEthernet0/1
C       194.2.16.32 is directly connected, FastEthernet0/1
D       194.2.16.48 [90/30720] via 194.2.16.34, 00:04:06, FastEthernet0/1
C       194.2.16.96 is directly connected, Serial0/0/1
C       194.2.16.112 is directly connected, FastEthernet0/0
C       194.2.16.128 is directly connected, Serial0/0/0
D       194.2.16.144 [90/2172416] via 194.2.16.114, 00:04:05, FastEthernet0/0
D       194.2.16.192 [90/33280] via 194.2.16.114, 00:04:04, FastEthernet0/0
D       194.2.16.208 [90/30720] via 194.2.16.114, 00:04:05, FastEthernet0/0
D       194.2.16.224 [90/33280] via 194.2.16.114, 00:04:04, FastEthernet0/0

R8#
```

R1 :

```
R1>enable
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, 00:05:00, Serial0/0/0
D       194.2.16.32 [90/2172416] via 194.2.16.97, 00:05:27, Serial0/0/0
D       194.2.16.48 [90/2174976] via 194.2.16.97, 00:05:00, 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, 00:05:27, Serial0/0/0
                     [90/2172416] via 194.2.16.146, 00:05:25, Serial0/0/1
D       194.2.16.128 [90/2681856] via 194.2.16.97, 00:05:27, Serial0/0/0
                     [90/2681856] via 194.2.16.146, 00:05:23, 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, 00:05:00, Serial0/0/1
D       194.2.16.208 [90/2172416] via 194.2.16.146, 00:05:25, Serial0/0/1
D       194.2.16.224 [90/2174976] via 194.2.16.146, 00:05:00, Serial0/0/1

R1#
```

R16 :

```
R16>enable
R16#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 194.2.16.145
     194.2.16.0/28 is subnetted, 10 subnets
D       194.2.16.16 [90/33280] via 194.2.16.113, 00:05:55, FastEthernet0/0
D       194.2.16.32 [90/30720] via 194.2.16.113, 00:05:56, FastEthernet0/0
D       194.2.16.48 [90/33280] via 194.2.16.113, 00:05:55, FastEthernet0/0
D       194.2.16.96 [90/2172416] via 194.2.16.113, 00:05:56, FastEthernet0/0
C       194.2.16.112 is directly connected, FastEthernet0/0
C       194.2.16.128 is directly connected, Serial0/0/0
C       194.2.16.144 is directly connected, Serial0/0/1
D       194.2.16.192 [90/30720] via 194.2.16.209, 00:05:57, FastEthernet0/1
C       194.2.16.208 is directly connected, FastEthernet0/1
D       194.2.16.224 [90/30720] via 194.2.16.210, 00:05:57, FastEthernet0/1

R16#
```

R21 :

```
R21>enable
R21#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 194.2.16.211
     194.2.16.0/28 is subnetted, 10 subnets
D       194.2.16.16 [90/35840] via 194.2.16.211, 00:06:40, FastEthernet0/0
D       194.2.16.32 [90/33280] via 194.2.16.211, 00:06:41, FastEthernet0/0
D       194.2.16.48 [90/35840] via 194.2.16.211, 00:06:40, FastEthernet0/0
D       194.2.16.96 [90/2174976] via 194.2.16.211, 00:06:41, FastEthernet0/0
D       194.2.16.112 [90/30720] via 194.2.16.211, 00:06:42, FastEthernet0/0
D       194.2.16.128 [90/2172416] via 194.2.16.211, 00:06:42, FastEthernet0/0
D       194.2.16.144 [90/2172416] via 194.2.16.211, 00:06:42, FastEthernet0/0
C       194.2.16.192 is directly connected, FastEthernet0/1
C       194.2.16.208 is directly connected, FastEthernet0/0
D       194.2.16.224 [90/30720] via 194.2.16.210, 00:06:42, FastEthernet0/0

R21#
```

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R22 :

```
R22>enable
R22#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 194.2.16.211
     194.2.16.0/28 is subnetted, 10 subnets
D       194.2.16.16 [90/35840] via 194.2.16.211, 00:07:27, FastEthernet0/0
D       194.2.16.32 [90/33280] via 194.2.16.211, 00:07:28, FastEthernet0/0
D       194.2.16.48 [90/35840] via 194.2.16.211, 00:07:27, FastEthernet0/0
D       194.2.16.96 [90/2174976] via 194.2.16.211, 00:07:28, FastEthernet0/0
D       194.2.16.112 [90/30720] via 194.2.16.211, 00:07:29, FastEthernet0/0
D       194.2.16.128 [90/2172416] via 194.2.16.211, 00:07:29, FastEthernet0/0
D       194.2.16.144 [90/2172416] via 194.2.16.211, 00:07:29, FastEthernet0/0
D       194.2.16.192 [90/30720] via 194.2.16.209, 00:07:29, FastEthernet0/0
C       194.2.16.208 is directly connected, FastEthernet0/0
C       194.2.16.224 is directly connected, FastEthernet0/1

R22#
```

▪ On vérifie la connectivité de chacun des 4 PC avec les 3 autres à l'aide de la commande ping .

@IP PC11 :   IP Address
              194.2.16.17/28

@IP PC12 :   IPv4 Address   194.2.16.49

@IP PC21 :   IPv4 Address   194.2.16.193

@IP PC22 :   IPv4 Address   194.2.16.225

A partir du PC 11 :

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 194.2.16.49

Pinging 194.2.16.49 with 32 bytes of data:

Request timed out.
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 = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 194.2.16.193

Pinging 194.2.16.193 with 32 bytes of data:

Request timed out.
Reply from 194.2.16.193: bytes=32 time=10ms TTL=124
Reply from 194.2.16.193: bytes=32 time=10ms 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 = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 10ms, Average = 6ms

C:\>ping 194.2.16.225

Pinging 194.2.16.225 with 32 bytes of data:

Request timed out.
Reply from 194.2.16.225: bytes=32 time=10ms TTL=124
Reply from 194.2.16.225: bytes=32 time=10ms TTL=124
Reply from 194.2.16.225: bytes=32 time=10ms TTL=124

Ping statistics for 194.2.16.225:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 10ms, Maximum = 10ms, Average = 10ms

C:\>
```

Le premier Request timed out est du a une arp request qui est envoyé . Si on refet les ping pour chacune des adresse on aura 0 paquets perdue. ICI on consière que le ping a focnitonné pour les 3.

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A partir de PC12 :

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 194.2.16.17

Pinging 194.2.16.17 with 32 bytes of data:

Reply from 194.2.16.17: bytes=32 time<1ms TTL=126
Reply from 194.2.16.17: bytes=32 time=2ms TTL=126
Reply from 194.2.16.17: bytes=32 time<1ms TTL=126
Reply from 194.2.16.17: bytes=32 time<1ms TTL=126

Ping statistics for 194.2.16.17:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 2ms, 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=10ms TTL=124
Reply from 194.2.16.193: bytes=32 time=16ms 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 = 1ms, Maximum = 16ms, Average = 7ms

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<1ms 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 = 0ms, Average = 0ms

C:\>
```

A partir du PC 21 :

```
Cisco Packet Tracer PC Command Line 1.0
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=124
Reply from 194.2.16.49: bytes=32 time<1ms TTL=124
Reply from 194.2.16.49: bytes=32 time<1ms TTL=124
Reply from 194.2.16.49: bytes=32 time=1ms TTL=124

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 194.2.16.17

Pinging 194.2.16.17 with 32 bytes of data:

Reply from 194.2.16.17: bytes=32 time<1ms TTL=124
Reply from 194.2.16.17: bytes=32 time=3ms TTL=124
Reply from 194.2.16.17: bytes=32 time=11ms TTL=124
Reply from 194.2.16.17: bytes=32 time=1ms TTL=124

Ping statistics for 194.2.16.17:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 11ms, Average = 3ms

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=126
Reply from 194.2.16.225: bytes=32 time<1ms TTL=126
Reply from 194.2.16.225: bytes=32 time<1ms TTL=126
Reply from 194.2.16.225: bytes=32 time<1ms TTL=126

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 = 0ms, Average = 0ms

C:\>
```

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A partir du PC22 :

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 194.2.16.17

Pinging 194.2.16.17 with 32 bytes of data:

Reply from 194.2.16.17: bytes=32 time=12ms TTL=124
Reply from 194.2.16.17: bytes=32 time=20ms TTL=124
Reply from 194.2.16.17: bytes=32 time=10ms TTL=124
Reply from 194.2.16.17: bytes=32 time=11ms TTL=124

Ping statistics for 194.2.16.17:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 10ms, Maximum = 20ms, Average = 13ms

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=124
Reply from 194.2.16.49: bytes=32 time<1ms TTL=124
Reply from 194.2.16.49: bytes=32 time<1ms TTL=124
Reply from 194.2.16.49: bytes=32 time=1ms TTL=124

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 194.2.16.225

Pinging 194.2.16.225 with 32 bytes of data:

Reply from 194.2.16.225: bytes=32 time=2ms TTL=128
Reply from 194.2.16.225: bytes=32 time<1ms TTL=128
Reply from 194.2.16.225: bytes=32 time=5ms TTL=128
Reply from 194.2.16.225: bytes=32 time<1ms TTL=128

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 = 5ms, Average = 1ms

C:\>
```

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

- On compléte la topologie initiale et on obtient la configuartion suivante. On a ajoutée un routeur
(R0) et un PC.

## 2.1. Placement des périphériques dans la topologie

- On fait glisser un routeur 1841 depuis l'emplacement des périphériques vers la droite du routeur R1. On procéde de même pour ajouter un portable sous le routeur ainsi qu'un PC à droite du routeur.

- On relie le portable au routeur avec un câble console :
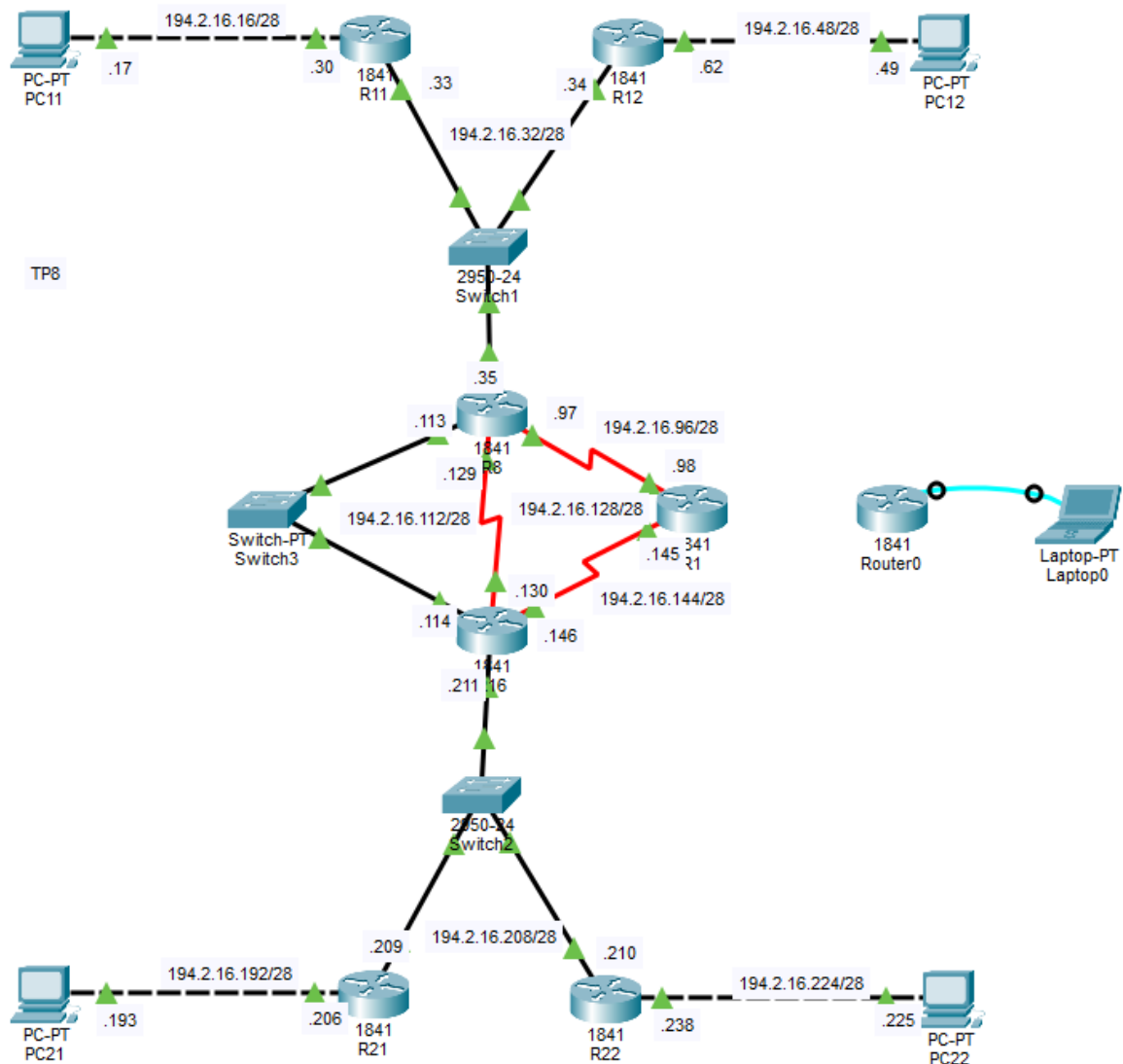
- On sélectionne le câble console
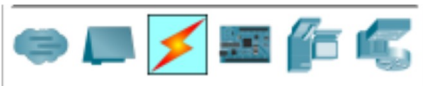
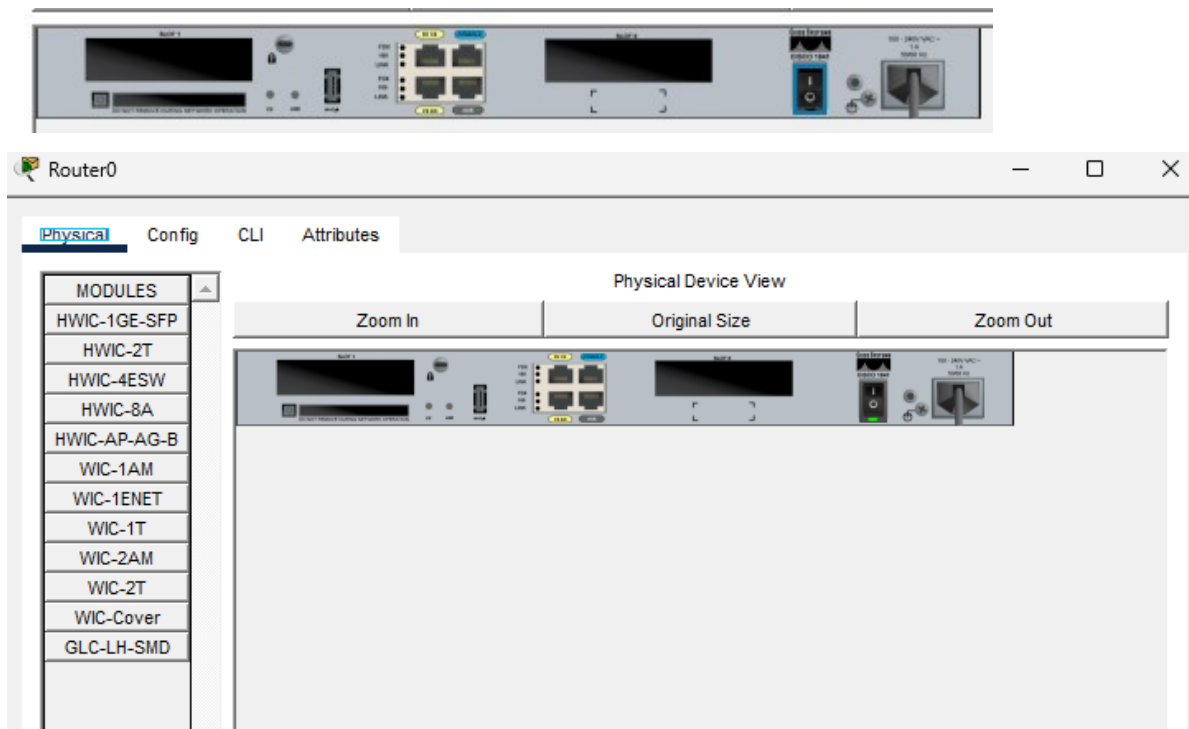- On clique sur le portable et sélectionnez le port RS232 ;
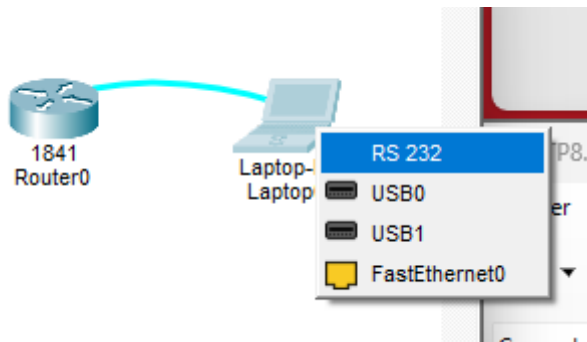
- On clique sur le routeur et on sélectionne le port console
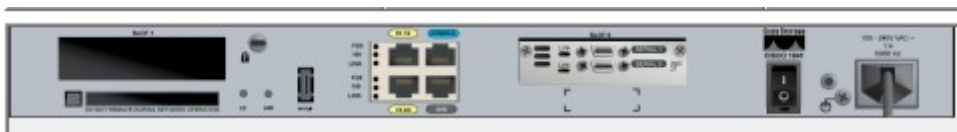
On obtines la configuration suivante :

2.2. Ajout du module WIC-2T au routeur

▪ On clique sur le routeur. La fenêtre de configuration du routeur s'affiche et présente l'onglet Physique.

- On met le routeur hors tension.

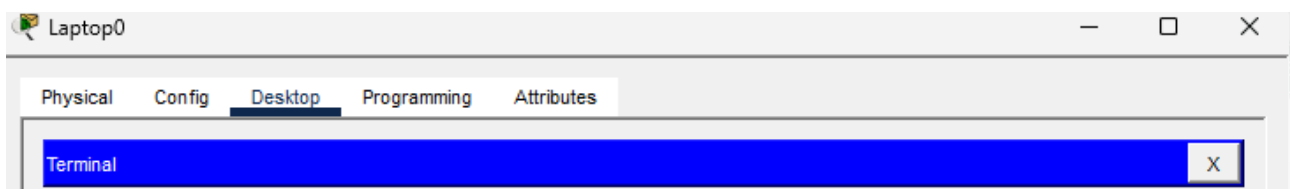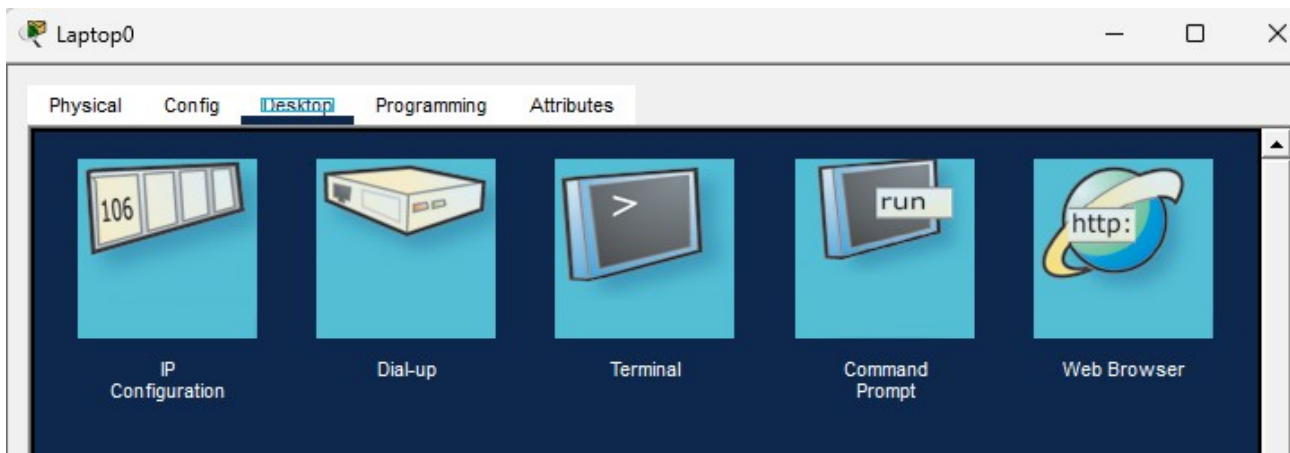▪ On fait glisser un module WIC-2T vers l'emplacement ouvert à droite.

▪ On remette le routeur sous tension.

2.3. Configuration de base du routeur : utilisation du mode « setup »

-On clique sur le portable, et on sélectionne Desktop puis l'émulateur de terminal (Terminal)

- Voici les messages du mode setup qui apparaît les réponses que l'on a entré son en **gras.** Les réponses obtenues sont en rouge.

```
Would you like to enter the initial configuration dialog? [yes/no]: yes

At any point you may enter a question mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.


Basic management setup configures only enough connectivity
for management of the system, extended setup will ask you
to configure each interface on the system

Would you like to enter basic management setup? [yes/no]: yes
Configuring global parameters:

  Enter host name [Router]: R0

  The enable secret is a password used to protect access to
  privileged EXEC and configuration modes. This password, after
  entered, becomes encrypted in the configuration.
  Enter enable secret: mdp1

  The enable password is used when you do not specify an
  enable secret password, with some older software versions, and
  some boot images.
  Enter enable password: mdp2

  The virtual terminal password is used to protect
  access to the router over a network interface.
  Enter virtual terminal password: mdp3
Configure SNMP Network Management? [no]:no

Current interface summary

Interface              IP-Address      OK? Method Status                Protocol

FastEthernet0/0        unassigned      YES manual administratively down down

FastEthernet0/1        unassigned      YES manual administratively down down

Serial0/0/0            unassigned      YES manual administratively down down

Serial0/0/1            unassigned      YES manual administratively down down

Vlan1                  unassigned      YES manual administratively down down

Enter interface name used to connect to the
management network from the above interface summary:
```

```
Enter interface name used to connect to the
management network from the above interface summary: fastethernet0/0

Configuring interface FastEthernet0/0:
  Configure IP on this interface? [yes]: yes
    IP address for this interface: 192.168.2.1
```

```
      Subnet mask for this interface [255.255.255.0] :

The following configuration command script was created:

!
hostname R0
enable secret 5 $1$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]:
```

2.4. Configuration de l'ordinateur et connexion au routeur

-On connecte l'ordinateur au routeur avec un câble croisé (on relie l'interface FastEthernet de l'ordinateur à l'interface FastEthernet0/0 du routeur).
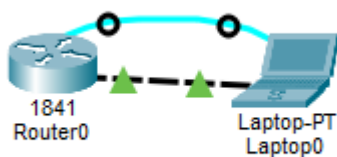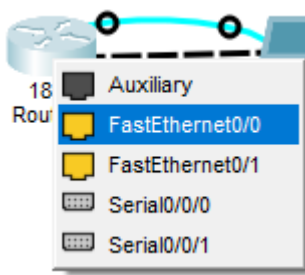
- On clique sur l'ordinateur, on modifie le nom si nécessaire et renseignez la configuration IP dans Config/Global/Settings et Config/Interface/FastEthernet (ou Desktop/IP Configuration).

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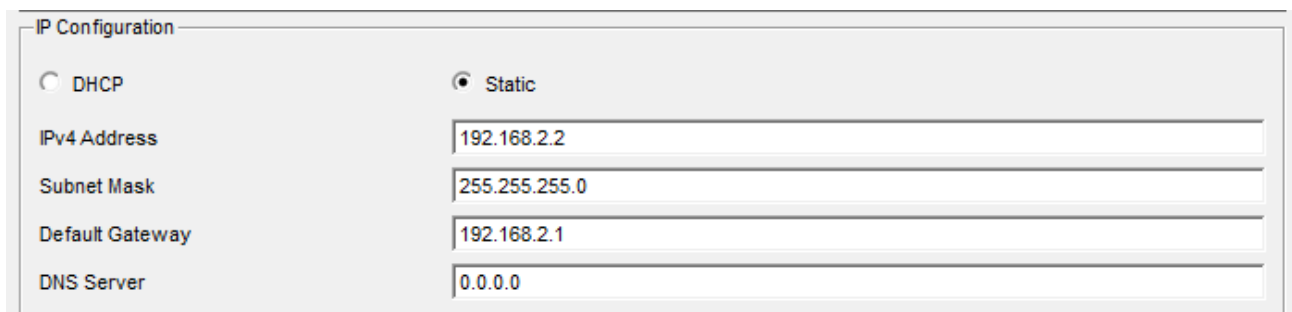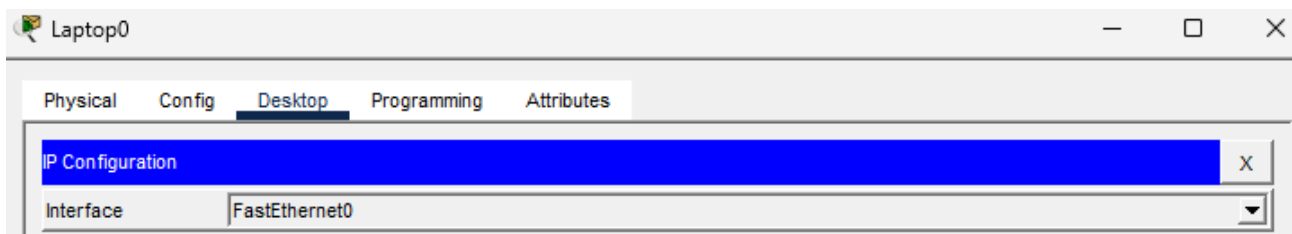
2.5. Observez le fonctionnement ARP et vérifiez la connectivité entre PC0 et R0

- On entre la commande arp –a depuis l'invite de commandes de PC0.

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

- On entre la commande show arp sur le routeur R0 à partir de l'émulateur de terminal du portable toujours relié par câble console au routeur (ou, ce qui revient au même dans le simulateur CPT, à partir de l'onglet CLI du routeur R0).

```
R0>show arp
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  192.168.2.1            -     0001.9647.E201  ARPA   FastEthernet0/0
Internet  192.168.2.2            1     000C.8533.D578  ARPA   FastEthernet0/0
R0>
```

- On entre la commande ping 192.168.2.1 depuis l'invite de commandes de PC0. La connectivité entre les deux périphériques doit être 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<1ms TTL=255
Reply from 192.168.2.1: bytes=32 time<1ms TTL=255
Reply from 192.168.2.1: bytes=32 time<1ms TTL=255
Reply from 192.168.2.1: bytes=32 time<1ms 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

C:\>
```

- On entre ensuite la commande arp –a.

```
C:\>arp -a
  Internet Address      Physical Address      Type
  192.168.2.1           0001.9647.e201        dynamic

C:\>
```

- On entre enfin la commande show arp sur le routeur R0. Les deux périphériques ont désormais une entrée de l'autre périphérique dans sa table ARP.

```
R0>show arp
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  192.168.2.1            -    0001.9647.E201  ARPA   FastEthernet0/0
Internet  192.168.2.2            2    000C.8533.D578  ARPA   FastEthernet0/0
R0>
```

2.6. Test de la connexion Telnet au routeur

- On teste la connexion Telnet au routeur R0 à partir de PC0 : 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>show arp
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  192.168.2.1            -    0001.9647.E201  ARPA   FastEthernet0/0
Internet  192.168.2.2            6    000C.8533.D578  ARPA   FastEthernet0/0
R0>
```

```
R0>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 = 0/4/8 ms
```

On supprime donc le cable console.

2.7. Connexion du routeur R0 au routeur R1

- Le routeur R1 dispose de deux modules WIC-2T et donc de 4 interfaces série. Vous pouvez visualiser ces dernières en passant le curseur de la souris sur le routeur ou à l'aide la commande show ip interface brief (ou encore par le biais de l'onglet Config/Interface).

```
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
R1>
```

-On utilise un câble série DCE pour connecter l'interface Serial0/0/0 du routeur R0 à l'interface Serial0/1/0 du routeur R1 : le premier routeur sur lequel vous allez cliquer est considéré comme connecté à l'extrémité DCE du câble avec l'outil de simulation Cisco Packet Tracer. Le routeur connecté à l'extrémité DCE du câble émet le signal d'horloge.
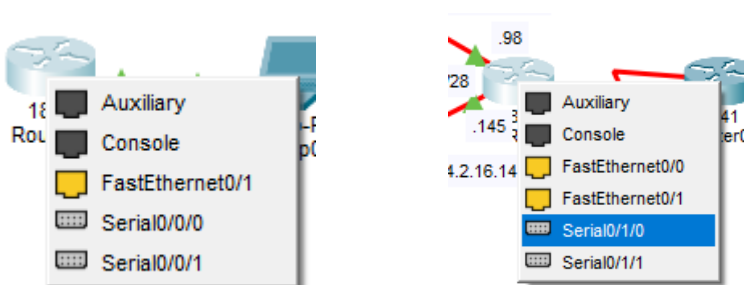
2.8. Configuration de l'interface série du routeur R0

- Configuration IP de l'interface Serial0/0/0 :

depuis l'onglet CLI du routeur R0, on passe en mode privilégié (commande en) puis en mode configuration globale (commande conf t) et enfin en mode de configuration interface (commande interface s0/0/0). On configure l'adresse IP en entrant la commande ip address 192.168.1.2 255.255.255.0.

- Configuration de la synchronisation :

L'extrémité DCE du câble étant connectée à cette interface, configurez la synchronisation en entrant la commande clock rate 64000.

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

- On quitte le mode de configuration en utilisant le raccourci Ctrl+Z et enregistrez la configuration en lançant la commande copy run start (abrégé de la commande copy running-config startup config).

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- On vérifie la configuration IP des interfaces du routeur R0 à l'aide de la commande show ip interface brief et effectuez un ping vers l'interface S0/1/0 du routeur R1 à partir de PC0.

```
C:\>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time=17ms TTL=254
Reply from 192.168.1.1: bytes=32 time=1ms TTL=254
Reply from 192.168.1.1: bytes=32 time=3ms TTL=254
Reply from 192.168.1.1: bytes=32 time=1ms TTL=254

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 17ms, Average = 5ms

C:\>
R0#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R0(config)#int s0/0/0
R0(config-if)#ip address 192.168.1.2 255.255.255.0
R0(config-if)#clock rate 64000
R0(config-if)#no shutdown
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]
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
R0#
```

Le ping fonctionne bien.

3. Ajout de routes.

- On consulte la table de routage des routeurs R1 et R0.

R0 :

```
R0#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

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

R0#
```

R1 :

```
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

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, 01:10:05, Serial0/0/0
D       194.2.16.32 [90/2172416] via 194.2.16.97, 01:10:30, Serial0/0/0
D       194.2.16.48 [90/2174976] via 194.2.16.97, 01:10:05, 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, 01:10:30, Serial0/0/1
                     [90/2172416] via 194.2.16.97, 01:10:30, Serial0/0/0
D       194.2.16.128 [90/2681856] via 194.2.16.97, 01:10:30, Serial0/0/0
                     [90/2681856] via 194.2.16.146, 01:10:28, 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, 01:10:04, Serial0/0/1
D       194.2.16.208 [90/2172416] via 194.2.16.146, 01:10:30, Serial0/0/1
D       194.2.16.224 [90/2174976] via 194.2.16.146, 01:10:04, Serial0/0/1

R1#
```

- On ajoute, sur le routeur R0, la ou les routes qui conviennent afin d'assurer la connectivité de PC0 avec PC11, PC12, PC21 et PC22. Vous avez 3 possibilités.

- On les liste et choisi la plus opportune.

- On teste la connectivité entre PC0 et les autres PC.

- On effectue une capture d'écran de la table de routage de R0.

- On enregistre la configuration avec la commande copy run start.