

## TP8 : Routage et sous-réseaux

---

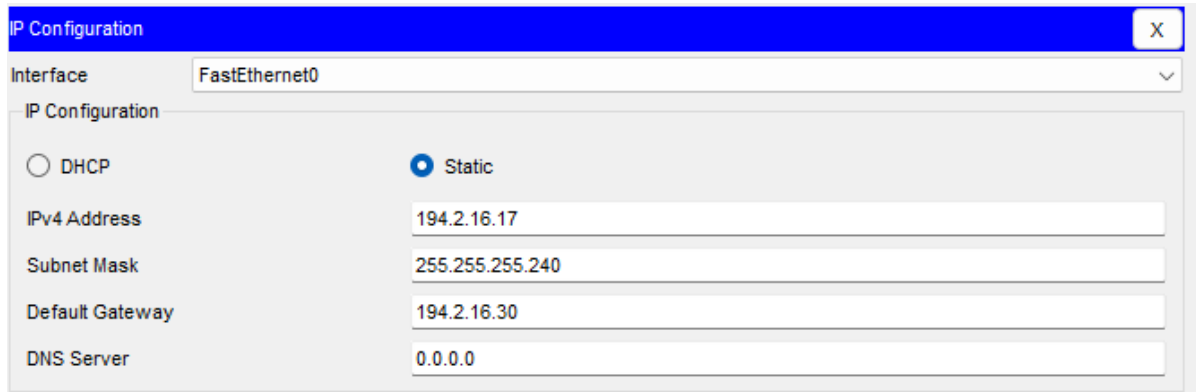
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## 1 Visualisation des tables de routage.

---

- Pour commencer on vérifie la configuration IP des interfaces de PC11 et R11 :
- Pour le PC11 on se rend dans la rubrique **IP configuration** dans le **Desktop**



- Ensuite pour R11 on fait un **show ip interface brief** afin de visualiser les IP de R11

```
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 constate que R11 et PC11 sont dans le même réseau (194.2.16.16)

- On vérifie à présent les configuration de tout les routeurs avec **sh ip route** :
- R1

```
R1#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

194.2.16.0/28 is subnetted, 10 subnets
D       194.2.16.16 [90/2174976] via 194.2.16.97, 00:15:00, Serial0/0/0
D       194.2.16.32 [90/2172416] via 194.2.16.97, 00:15:23, Serial0/0/0
D       194.2.16.48 [90/2174976] via 194.2.16.97, 00:15:00, Serial0/0/0
C       194.2.16.96 is directly connected, Serial0/0/0
D       194.2.16.112 [90/2172416] via 194.2.16.146, 00:15:26, Serial0/0/1
          [90/2172416] via 194.2.16.97, 00:15:23, Serial0/0/0
D       194.2.16.128 [90/2681856] via 194.2.16.146, 00:15:26, Serial0/0/1
          [90/2681856] via 194.2.16.97, 00:15:23, 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, 00:15:00, Serial0/0/1
D       194.2.16.208 [90/2172416] via 194.2.16.146, 00:15:26, Serial0/0/1
D       194.2.16.224 [90/2174976] via 194.2.16.146, 00:15:00, Serial0/0/1
```

→ R11

```
R11#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

```
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, 00:16:50, FastEthernet0/0
D 194.2.16.96 [90/2172416] via 194.2.16.35, 00:16:50, FastEthernet0/0
D 194.2.16.112 [90/30720] via 194.2.16.35, 00:16:50, FastEthernet0/0
D 194.2.16.128 [90/2172416] via 194.2.16.35, 00:16:50, FastEthernet0/0
D 194.2.16.144 [90/2174976] via 194.2.16.35, 00:16:50, FastEthernet0/0
D 194.2.16.192 [90/35840] via 194.2.16.35, 00:16:50, FastEthernet0/0
D 194.2.16.208 [90/33280] via 194.2.16.35, 00:16:50, FastEthernet0/0
D 194.2.16.224 [90/35840] via 194.2.16.35, 00:16:50, FastEthernet0/0
```

→ On vérifie maintenant la connectivité de chacun des 4 PC avec les 3 autres à l'aide de la commande **ping**

→ PC11

→ PC11 vers PC12

```
C:\>ping 194.2.16.48

Pinging 194.2.16.48 with 32 bytes of data:

Reply from 194.2.16.34: bytes=32 time<1ms TTL=254
Reply from 194.2.16.34: bytes=32 time=7ms TTL=254
Reply from 194.2.16.34: bytes=32 time<1ms TTL=254
Reply from 194.2.16.34: bytes=32 time<1ms TTL=254

Ping statistics for 194.2.16.48:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 7ms, Average = 1ms
```

→ PC11 vers PC21

```
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
```

→ PC11 vers PC22

```
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 = 1ms, Average = 0ms
```

→ PC12

→ PC12 vers PC11

```
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<1ms 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 = 1ms, Average = 0ms
```

→ PC12 vers PC21

```
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 = 0ms, Average = 0ms
```

→ PC12 vers PC22

```
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=8ms 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 = 8ms, Average = 2ms
```

→ PC21

→ PC21 vers PC11

```
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<1ms TTL=124
Reply from 194.2.16.17: bytes=32 time=4ms 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 = 4ms, Average = 1ms
```

→ PC21 vers PC12

```
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=9ms 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 = 9ms, Average = 2ms
```

→ PC21 vers PC22

```
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<lms TTL=126
Reply from 194.2.16.225: bytes=32 time<lms TTL=126
Reply from 194.2.16.225: bytes=32 time<lms TTL=126
Reply from 194.2.16.225: bytes=32 time<lms 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
```

→ PC22

→ PC22 vers PC11

```
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<lms TTL=124
Reply from 194.2.16.17: bytes=32 time<lms TTL=124
Reply from 194.2.16.17: bytes=32 time<lms TTL=124
Reply from 194.2.16.17: bytes=32 time<lms 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 = 0ms, Average = 0ms
```

→ PC22 vers "PC12

```
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<lms TTL=124
Reply from 194.2.16.49: bytes=32 time<lms TTL=124
Reply from 194.2.16.49: bytes=32 time=lms TTL=124
Reply from 194.2.16.49: bytes=32 time=25ms 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 = 25ms, Average = 6ms
```

→ PC22 vers PC21

```
C:\>ping 194.2.16.193

Pinging 194.2.16.193 with 32 bytes of data:

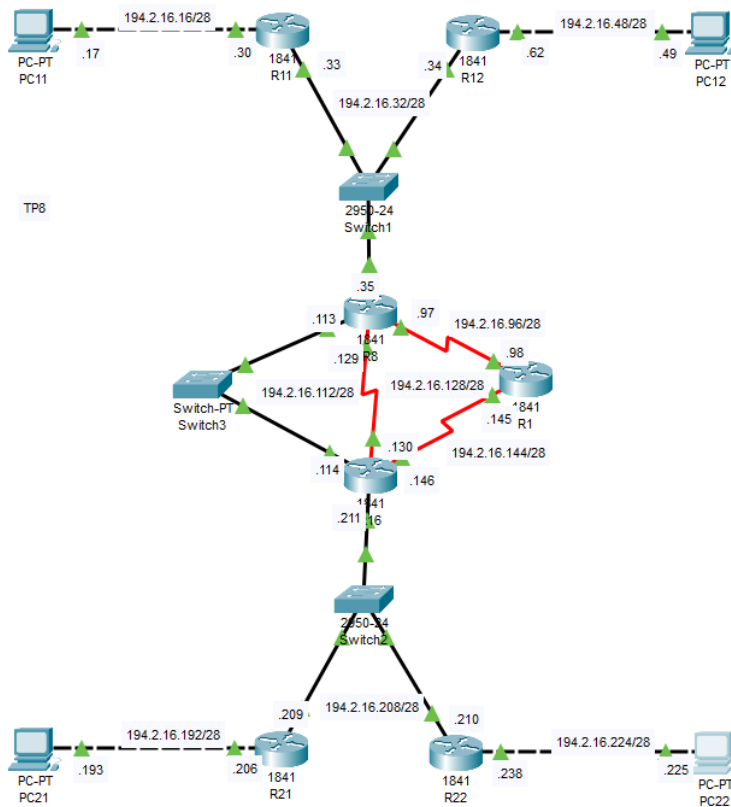
Reply from 194.2.16.193: bytes=32 time<lms TTL=126
Reply from 194.2.16.193: bytes=32 time<lms TTL=126
Reply from 194.2.16.193: bytes=32 time<lms TTL=126
Reply from 194.2.16.193: bytes=32 time<lms TTL=126

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 = 0ms, Average = 0ms
```

Après analyse de tout les **ping** on en conclue qu'ils sont bien tous connecté entre eux et peuvent de ce fait tous communiquer

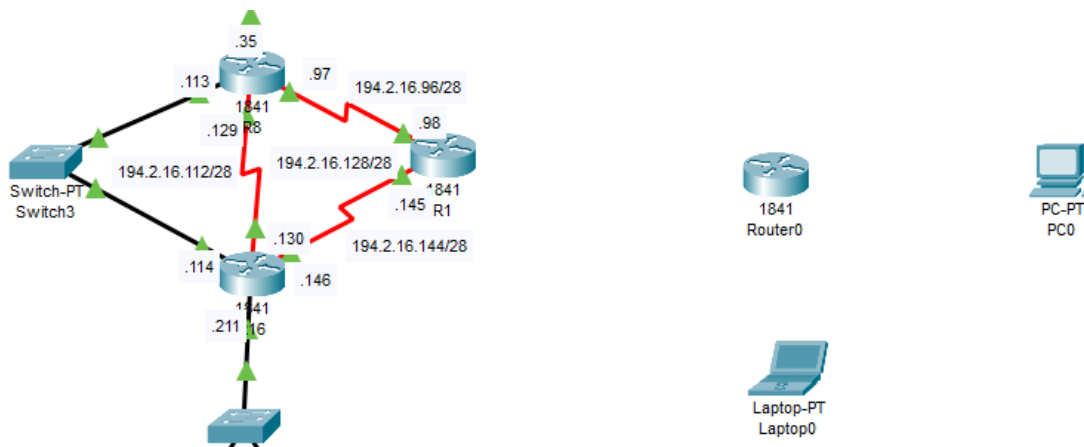
## 2 Ajout du routeur R0 et de l'ordinateur PC0.

→ Par la suite nous allons compléter la topologie actuel :



## A. Placement des périphériques dans la topologie

→ On commence par installer à droite du R1 un routeur 1840, un portable et un PC



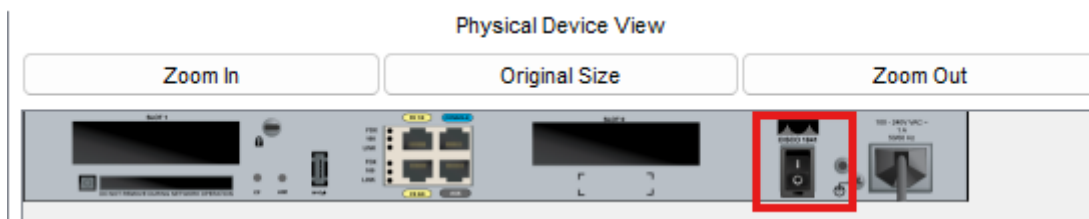
→ On fait maintenant les liaisons

→ On branche le portable avec un câble console sur le Router 0 sur le port console

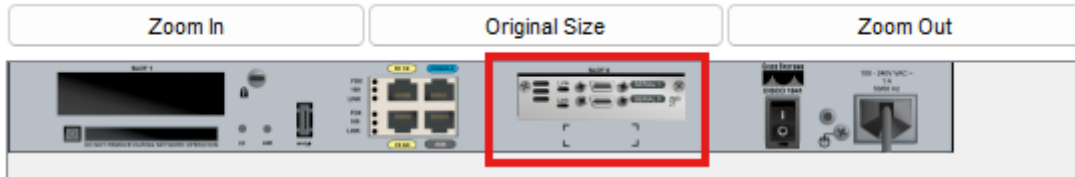


## B. Ajout du module WIC-2T au routeur

→ à présent on doit configurer le module WIC-2T au Router 0 pour pouvoir le brancher en serial. On met donc le router 0 hors tension :



→ On ajoute ensuite le module WIC-2T au Router



→ Puis on remet le Router en tension



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

→ Des messages du mode setup s'affiche on y répond comme ci-dessous

```
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
Serial10/0/0       unassigned      YES manual administratively down down
Serial10/0/1       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: 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] :

```

notre R0 est maintenant configuré :

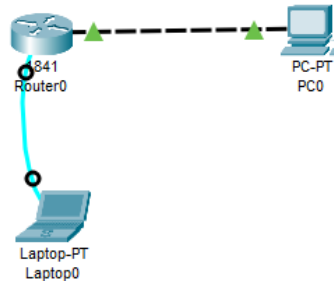
```

!
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 Serial10/0/0
shutdown
no ip address
!
interface Serial10/0/1
shutdown
no ip address
!
end

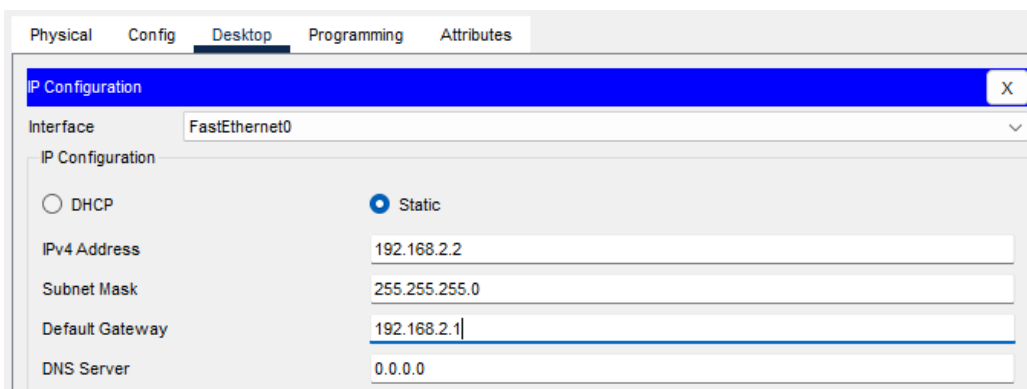
```

## D. Configuration de l'ordinateur et connexion au routeur

→ On relie le PC0 avec le R0 à l'aide d'un câble croisé de son port fastethernet au fastethernet0/0 du R0



→ Par la suite on configure l'IP du PC0 et sa passerelle par défaut



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

→ On effectue la commande **arp -a** depuis le PC0 et on effectue la commande **show arp** sur le R0 grâce à l'émulateur de terminal présent sur le portable  
→ PC0

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

→ R0

```
R0#sh arp
Protocol Address      Age (min)  Hardware Addr  Type   Interface
Internet 192.168.2.1      -          0001.648D.0501 ARPA   FastEthernet0/0
```

Les deux machine ne se connaissent pas encore vu qu'ils n'ont jamais communiqué

→ Pour arranger ca on effectue un **ping de 192.168 .2.1**

```
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=8ms 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 = 8ms, Average = 2ms
```

Cela nous permet aussi de vérifier leurs connectivité (ils le sont bien comme nous l'indique ce **ping**)

→ On revérifie maintenant leurs tables ARP à l'aide des mêmes commandes que précédemment

→ PC0

```
C:\>arp -a
Internet Address      Physical Address      Type
192.168.2.1           0001.648d.0501       dynamic
```

→ R0

```
R0#sh arp
Protocol Address      Age (min)  Hardware Addr  Type   Interface
Internet 192.168.2.1      -          0001.648D.0501 ARPA   FastEthernet0/0
Internet 192.168.2.2      6          0060.5C97.CBEC ARPA   FastEthernet0/0
```

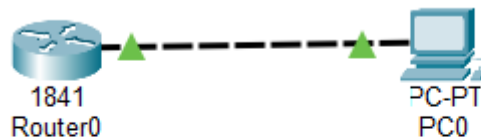
Effectivement les tables ARP sont maintenant complété par les adresse des machines

## F. Test de la connexion Telnet au routeur

→ On veut tester la connexion telnet entre le R0 et le PC0 avec la commande **telnet 192.168.2.1**

```
R0>telnet 192.168.2.1
Trying 192.168.2.1 ...Open
```

→ A présent on peut retirer le câble console et le portable



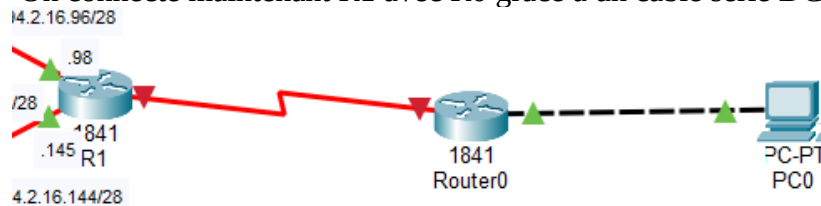
## G. Connexion du routeur R0 au routeur R1

2

→ Grâce à la commande **show ip interface brief** on se rend compte que R1 possède modules WIC-2T donc 2 interfaces série

```
R1>en
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 maintenant R1 avec R0 grâce à un câble série DCE



## H. Configuration de l'interface série du routeur R0

→ On va configurer l'IP de l'interface Serial0/0/0. Pour se faire on passe en mode privilège avec la commande **en** puis en mode de configuration avec **conf t** et pour finir en mode configuration interface avec **interface s0/0/0**

```
R0(config-if)#ip address 192.168.1.2 255.255.255.0
```

→ On configure de la synchronisation avec la commande **clock rate 64000**

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

→ On active l'interface avec **no shutdown**

→ Pour finir on vérifie la configuration avec un **sh ip interface brief**

```
R0#sh 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 voit bien ici que l'IP est bien configuré

## 3 Ajout de routes.

→ Pour commencer, on visualise les tables de routage de R0 et R1

→ R0

```
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
```

→ R1

```
R1#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, Serial0/1/0
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, 00:04:01, Serial0/0/0
D 194.2.16.32 [90/2172416] via 194.2.16.97, 00:04:25, Serial0/0/0
D 194.2.16.48 [90/2174976] via 194.2.16.97, 00:04:01, 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, 00:04:28, Serial0/0/1
[90/2172416] via 194.2.16.97, 00:04:25, Serial0/0/0
D 194.2.16.128 [90/2681856] via 194.2.16.146, 00:04:26, Serial0/0/1
[90/2681856] via 194.2.16.97, 00:04:25, 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, 00:04:00, Serial0/0/1
D 194.2.16.208 [90/2172416] via 194.2.16.146, 00:04:28, Serial0/0/1
D 194.2.16.224 [90/2174976] via 194.2.16.146, 00:04:00, Serial0/0/1
```

→ A présent, on ajoutera toutes les routes nécessaire afin de connecter le PC0 avec le PC11, PC12, PC21 et PC 22. On a 3 possibilités :

- on configure dans R0 toutes les 4 routes vers les autres PC
- on configure les autres routes grâce à une route abrégé
- on configure R0 avec une route par défaut ce qui est le plus simple et rapide quand le routeur n'a qu'une seule passerelle

On procédera donc à la configuration avec une route par défaut

```
R0#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R0(config)#ip route 0.0.0.0 0.0.0.0 192.168.1.1
R0(config)#exit
R0#
%SYS-5-CONFIG_I: Configured from console by console

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
```

→ On teste ici la connexion des PC :

→ PC0 vers PC11

```
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=13ms TTL=124
Reply from 194.2.16.17: bytes=32 time=16ms TTL=124
Reply from 194.2.16.17: bytes=32 time=19ms TTL=124
Reply from 194.2.16.17: bytes=32 time=12ms 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 = 12ms, Maximum = 19ms, Average = 15ms
```

→ PC0 vers PC12

```
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=13ms TTL=124
Reply from 194.2.16.49: bytes=32 time=15ms TTL=124
Reply from 194.2.16.49: bytes=32 time=2ms TTL=124
Reply from 194.2.16.49: bytes=32 time=5ms 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 = 2ms, Maximum = 15ms, Average = 8ms
```

→ PC0 vers PC21

```
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=12ms TTL=124
Reply from 194.2.16.193: bytes=32 time=11ms TTL=124
Reply from 194.2.16.193: bytes=32 time=12ms TTL=124
Reply from 194.2.16.193: bytes=32 time=3ms 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 = 3ms, Maximum = 12ms, Average = 9ms
```

→ PC0 vers PC22

```
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=12ms TTL=124
Reply from 194.2.16.225: bytes=32 time=8ms TTL=124
Reply from 194.2.16.225: bytes=32 time=15ms TTL=124
Reply from 194.2.16.225: bytes=32 time=2ms 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 = 2ms, Maximum = 15ms, Average = 9ms
```

→ Notre table de routage de R0 finit comme ceci

```
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
```

→ Puis on finit par enregistrer toutes nos modifications avec **copy run start**