



**Compte rendu de T.P. N°3 et N°4 :**

**ROUTAGE LINUX  
ROUTAGE CISCO**



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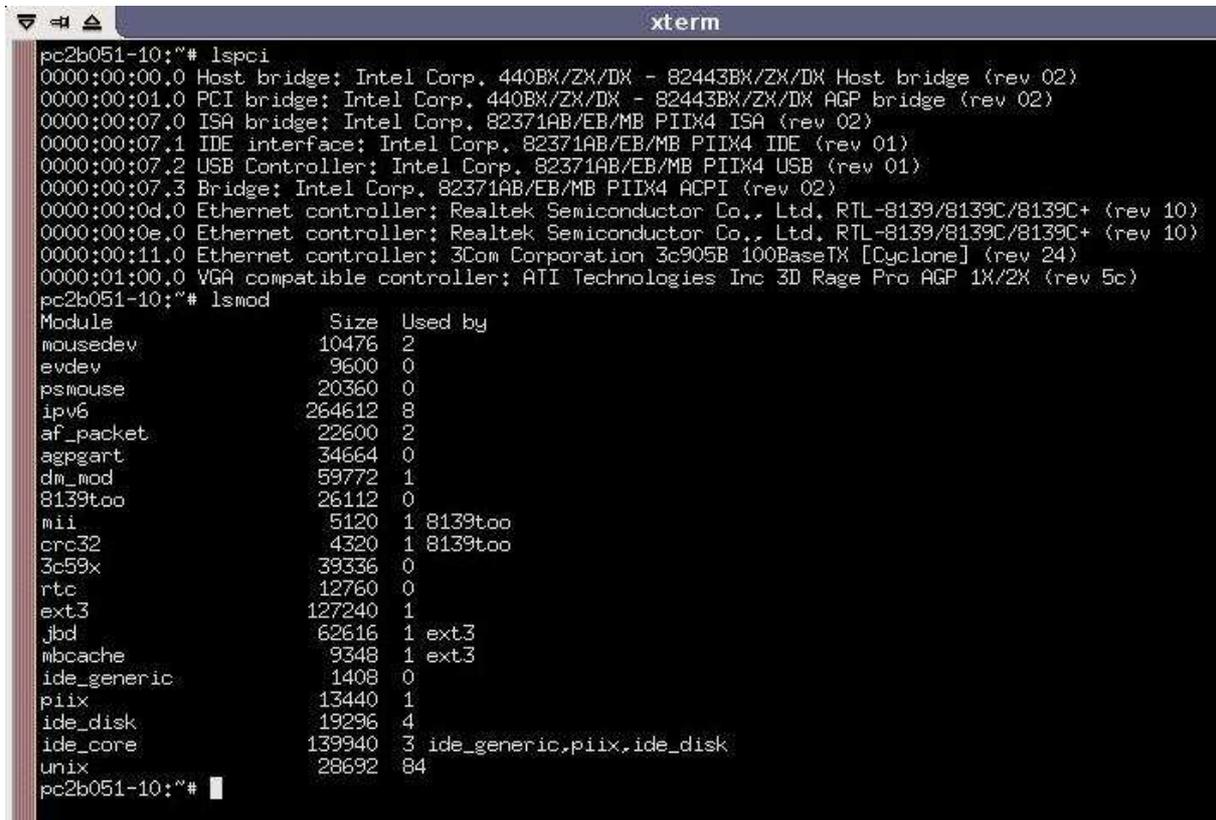
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## I°) Routage Linux :

### A°) Couche physique :

- Sur l'invite de commandes, on peut taper les commandes *scanpci* et *lspci*: Elles nous indiquent les cartes présentes sur les ports PCI.



```
pc2b051-10:~# lspci
0000:00:00.0 Host bridge: Intel Corp. 440BX/ZX/DX - 82443BX/ZX/DX Host bridge (rev 02)
0000:00:01.0 PCI bridge: Intel Corp. 440BX/ZX/DX - 82443BX/ZX/DX AGP bridge (rev 02)
0000:00:07.0 ISA bridge: Intel Corp. 82371AB/EB/MB PIIX4 ISA (rev 02)
0000:00:07.1 IDE interface: Intel Corp. 82371AB/EB/MB PIIX4 IDE (rev 01)
0000:00:07.2 USB Controller: Intel Corp. 82371AB/EB/MB PIIX4 USB (rev 01)
0000:00:07.3 Bridge: Intel Corp. 82371AB/EB/MB PIIX4 ACPI (rev 02)
0000:00:0d.0 Ethernet controller: Realtek Semiconductor Co., Ltd. RTL-8139/8139C/8139C+ (rev 10)
0000:00:0e.0 Ethernet controller: Realtek Semiconductor Co., Ltd. RTL-8139/8139C/8139C+ (rev 10)
0000:00:11.0 Ethernet controller: 3Com Corporation 3c905B 100BaseTX [Cyclone] (rev 24)
0000:01:00.0 VGA compatible controller: ATI Technologies Inc 3D Rage Pro AGP 1X/2X (rev 5c)
pc2b051-10:~# lsmod
Module                Size  Used by
mousedev              10476  2
evdev                  9600   0
psmouse              20360   0
ipv6                  264612  8
af_packet             22600   2
agpgart               34664   0
dm_mod                59772   1
8139too               26112   0
mii                   5120   1 8139too
crc32                  4320   1 8139too
3c59x                 39336   0
rtc                   12760   0
ext3                  127240  1
jbd                   62616  1 ext3
mbcache               9348   1 ext3
ide_generic           1408   0
piix                  13440  1
ide_disk              19296  4
ide_core              139940  3 ide_generic,piix,ide_disk
unix                  28692  84
pc2b051-10:~# █
```

On remarque alors que trois cartes réseaux sont présentes sur l'ordinateur :

- 3Com Corporation 3c905B 100 Base Tx
- Ethernet controller. Realtek Semiconductor
- Ethernet controller. Realtek Semiconductor

- Afin de lister les modules qui contiennent les drivers de ces cartes, on utilise la commande *lsmod* :

On remarque alors que pour les cartes realtek, le driver est : *8139too* et pour la carte 3Com, le driver est *3c59x*

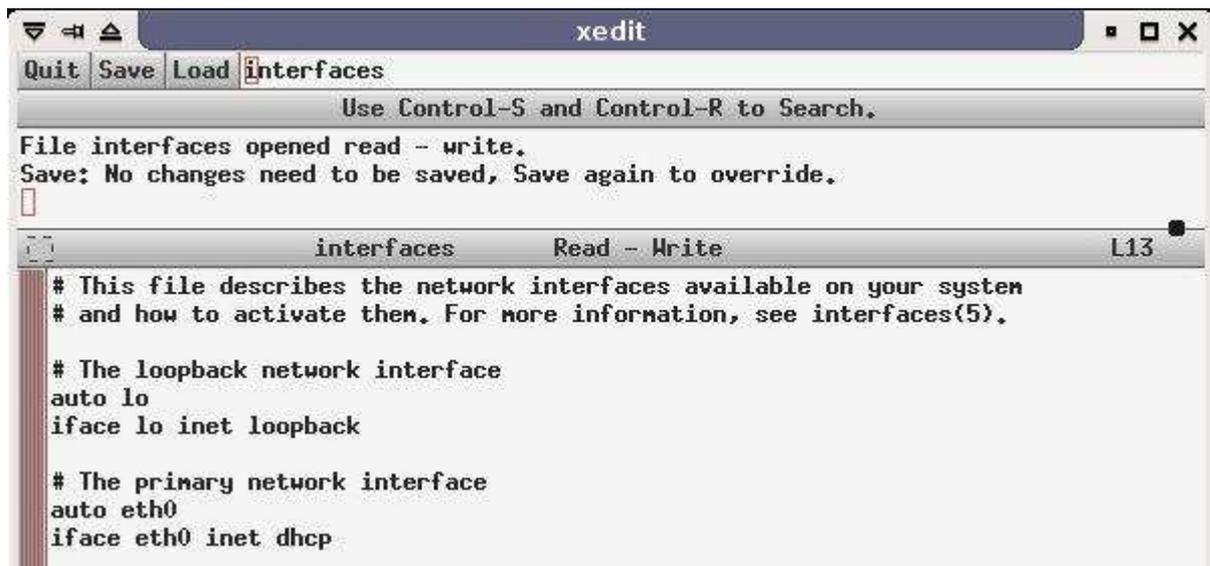
### B°) Configuration réseau :

- Pour déterminer la configuration actuelle de nos interfaces, on tape la commande *ifconfig* :

On remarque que deux informations sont présentes :

- lo : Pour l'adresse de loopback
- eth0 : Pour une carte réseau

- Pour configurer notre interface statiquement, on modifie le fichier : `/etc/network/interfaces` :



```
xedit
Quit Save Load interfaces
Use Control-S and Control-R to Search.
File interfaces opened read - write.
Save: No changes need to be saved, Save again to override.
interfaces Read - Write L13
# This file describes the network interfaces available on your system
# and how to activate them. For more information, see interfaces(5).

# The loopback network interface
auto lo
iface lo inet loopback

# The primary network interface
auto eth0
iface eth0 inet dhcp
```

Ainsi, on remplace la ligne : `iface eth0 inet dhcp` par : `iface eth0 inet static`

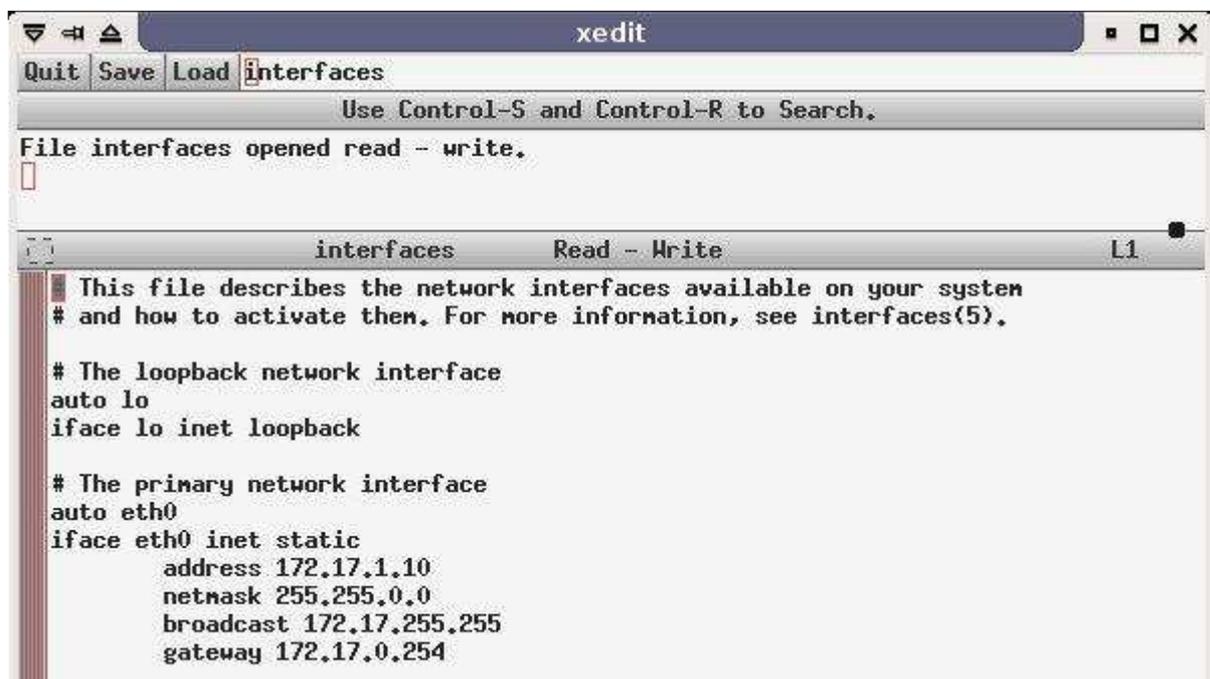
`iface` : Indique l'interface sur laquelle on travaille

`eth0` : Nom de l'interface

`inet` : Configuration internet

`static` : configuration statique

et on lui indique statiquement qu'elle est son adresse IP (*address*), son masque de sous-réseau (*netmask*), son adresse de broadcast (*broadcast*) et sa passerelle (*gateway*), ce qui donne :



```
xedit
Quit Save Load interfaces
Use Control-S and Control-R to Search.
File interfaces opened read - write.
interfaces Read - Write L1
# This file describes the network interfaces available on your system
# and how to activate them. For more information, see interfaces(5).

# The loopback network interface
auto lo
iface lo inet loopback

# The primary network interface
auto eth0
iface eth0 inet static
    address 172.17.1.10
    netmask 255.255.0.0
    broadcast 172.17.255.255
    gateway 172.17.0.254
```

- Une fois que ce fichier est modifié, on tape ces commandes dans le shell :

```
ifdown eth0
```

```
ifup eth0
```

Ceci permet de réinitialiser la carte eth0.

Puis, on tape *ifconfig* afin de voir si les modifications ont bien été prises en compte :

```
xterm
pc2b051-10:~# cd etc/
bash: cd: etc/: No such file or directory
pc2b051-10:~# cd /etc/network/
pc2b051-10:/etc/network# cd interfaces
bash: cd: interfaces: Not a directory
pc2b051-10:/etc/network# kwrite interfaces
bash: kwrite: command not found
pc2b051-10:/etc/network# kedit
bash: kedit: command not found
pc2b051-10:/etc/network# xedit interfaces
pc2b051-10:/etc/network# xedit interfaces
pc2b051-10:/etc/network# xedit interfaces
pc2b051-10:/etc/network# ifdown eth0
pc2b051-10:/etc/network# ifup eth0
SIOCADDRT: File exists
Failed to bring up eth0.
pc2b051-10:/etc/network# ifconfig
eth0      Link encap:Ethernet  HWaddr 00:C0:4F:8A:4B:05
          inet addr:172.17.1.10  Bcast:172.17.255.255  Mask:255.255.0.0
          inet6 addr: fe80::2c0:4fff:fe8a:4b05/64 Scope:Link
          UP BROADCAST NOTRAILERS RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:1071 errors:0 dropped:0 overruns:0 frame:0
          TX packets:706 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:393710 (384.4 KiB)  TX bytes:103304 (100.8 KiB)
          Interrupt:11 Base address:0xdc00

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:16436  Metric:1
          RX packets:8 errors:0 dropped:0 overruns:0 frame:0
          TX packets:8 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:560 (560.0 b)  TX bytes:560 (560.0 b)
```

Enfin, on tape la commande *route -n* :

```
xterm
pc2b051-10:~# route -n
Kernel IP routing table
Destination      Gateway         Genmask         Flags Metric Ref    Use Iface
172.17.0.0        0.0.0.0         255.255.0.0     U        0      0      0 eth0
0.0.0.0           172.17.0.254   0.0.0.0         UG       0      0      0 eth0
pc2b051-10:~#
```

- Ensuite, on veut renommer la carte réseau 3Com, qui est eth0, en eth-bas.  
Pour réaliser ceci, il faut installer la commande ifrename. Afin de l'installer, on tape les commandes :

```
apt-get update  
apt-get install ifrename
```

Ce qui nous permettra de faire l'association:

eth-bas avec le driver 3C59x

eth-haut avec l'adresse MAC de la carte, ce qui permet de différencier les deux cartes réseau Realtek car elles utilisent le même driver.

Pour réaliser ceci, on crée un fichier `/etc/network/conf` dans lequel on rentrera l'information suivante : `eth-bas driver 3c59x`



```
xedit  
Quit Save Load /etc/network/conf  
Use Control-S and Control-X  
File /etc/network/conf opened read - write.  
/etc/network/conf Read - Write  
eth-bas driver 3c59x  
# eth-haut mac
```

Enfin, on tape la commande `ifrename -c /etc/network/conf` afin d'appliquer ces modifications.

- Après, on veut modifier une adresse MAC à l'aide de la commande `ifconfig`.

Tout d'abord, pour obtenir l'adresse MAC d'une interface, on tape la commande `ifconfig -a`

Ensuite, pour modifier l'adresse MAC d'une interface, on tape les commandes :

```
ifconfig eth-bas down  
ifconfig eth-bas hw ether 00 :00: F0:79:38:12  
ifconfig eth-bas up
```

Et enfin on tape `ifconfig` pour vérifier que l'adresse MAC a bien été changée.

- Puis on peut vérifier au moyen de la commande *ping* que l'on peut joindre les autres machines :

On tape la commande *ping -b 172.17.255.255*

```
xterm
64 bytes from 172.17.0.71: icmp_seq=4 ttl=64 time=1,13 ms (DUP!)
64 bytes from 172.17.0.72: icmp_seq=4 ttl=64 time=1,16 ms (DUP!)
64 bytes from 172.17.1.10: icmp_seq=5 ttl=64 time=0,062 ms
64 bytes from 172.17.1.3: icmp_seq=5 ttl=64 time=0,206 ms (DUP!)
64 bytes from 172.17.1.5: icmp_seq=5 ttl=64 time=0,213 ms (DUP!)
64 bytes from 172.17.1.8: icmp_seq=5 ttl=64 time=0,223 ms (DUP!)
64 bytes from 172.17.1.6: icmp_seq=5 ttl=64 time=0,240 ms (DUP!)
64 bytes from 172.17.1.9: icmp_seq=5 ttl=64 time=0,246 ms (DUP!)
64 bytes from 172.17.1.1: icmp_seq=5 ttl=64 time=0,251 ms (DUP!)
64 bytes from 172.17.2.12: icmp_seq=5 ttl=64 time=0,262 ms (DUP!)
64 bytes from 172.17.1.11: icmp_seq=5 ttl=64 time=0,278 ms (DUP!)
64 bytes from 172.17.2.6: icmp_seq=5 ttl=64 time=0,284 ms (DUP!)
64 bytes from 172.17.3.14: icmp_seq=5 ttl=64 time=0,293 ms (DUP!)
64 bytes from 172.17.0.254: icmp_seq=5 ttl=64 time=0,302 ms (DUP!)
64 bytes from 172.17.2.3: icmp_seq=5 ttl=64 time=0,318 ms (DUP!)
64 bytes from 172.17.1.2: icmp_seq=5 ttl=64 time=0,323 ms (DUP!)
64 bytes from 172.17.2.4: icmp_seq=5 ttl=64 time=0,328 ms (DUP!)
64 bytes from 172.17.2.8: icmp_seq=5 ttl=64 time=0,339 ms (DUP!)
64 bytes from 172.17.2.9: icmp_seq=5 ttl=64 time=0,355 ms (DUP!)
64 bytes from 172.17.2.10: icmp_seq=5 ttl=64 time=0,360 ms (DUP!)
64 bytes from 172.17.2.7: icmp_seq=5 ttl=64 time=0,370 ms (DUP!)
64 bytes from 172.17.2.5: icmp_seq=5 ttl=64 time=0,379 ms (DUP!)
64 bytes from 172.17.0.71: icmp_seq=5 ttl=64 time=1,13 ms (DUP!)
64 bytes from 172.17.0.72: icmp_seq=5 ttl=64 time=1,14 ms (DUP!)
64 bytes from 172.17.1.10: icmp_seq=6 ttl=64 time=0,065 ms
64 bytes from 172.17.1.3: icmp_seq=6 ttl=64 time=0,205 ms (DUP!)
64 bytes from 172.17.1.8: icmp_seq=6 ttl=64 time=0,211 ms (DUP!)
64 bytes from 172.17.0.254: icmp_seq=6 ttl=64 time=0,217 ms (DUP!)
64 bytes from 172.17.1.1: icmp_seq=6 ttl=64 time=0,227 ms (DUP!)
64 bytes from 172.17.1.11: icmp_seq=6 ttl=64 time=0,244 ms (DUP!)
64 bytes from 172.17.1.9: icmp_seq=6 ttl=64 time=0,250 ms (DUP!)
64 bytes from 172.17.1.6: icmp_seq=6 ttl=64 time=0,259 ms (DUP!)
64 bytes from 172.17.1.5: icmp_seq=6 ttl=64 time=0,268 ms (DUP!)
64 bytes from 172.17.1.2: icmp_seq=6 ttl=64 time=0,277 ms (DUP!)
64 bytes from 172.17.2.12: icmp_seq=6 ttl=64 time=0,294 ms (DUP!)
64 bytes from 172.17.2.3: icmp_seq=6 ttl=64 time=0,299 ms (DUP!)
64 bytes from 172.17.2.6: icmp_seq=6 ttl=64 time=0,305 ms (DUP!)
64 bytes from 172.17.3.14: icmp_seq=6 ttl=64 time=0,315 ms (DUP!)
64 bytes from 172.17.2.4: icmp_seq=6 ttl=64 time=0,332 ms (DUP!)
64 bytes from 172.17.2.9: icmp_seq=6 ttl=64 time=0,337 ms (DUP!)
64 bytes from 172.17.2.8: icmp_seq=6 ttl=64 time=0,347 ms (DUP!)
64 bytes from 172.17.2.10: icmp_seq=6 ttl=64 time=0,356 ms (DUP!)
64 bytes from 172.17.2.7: icmp_seq=6 ttl=64 time=0,372 ms (DUP!)
64 bytes from 172.17.2.5: icmp_seq=6 ttl=64 time=0,377 ms (DUP!)
64 bytes from 172.17.0.71: icmp_seq=6 ttl=64 time=1,08 ms (DUP!)
64 bytes from 172.17.0.72: icmp_seq=6 ttl=64 time=1,11 ms (DUP!)

--- 172.17.255.255 ping statistics ---
6 packets transmitted, 6 received, +126 duplicates, 0% packet loss, time 5004ms
rtt min/avg/max/mdev = 0,059/0,584/7,809/0,923 ms
pc2b051-10:~#
```

Puis on tape `arp -an` et on remarque que les ping remplissent les tables arp.  
Par conséquent on observe des requêtes arp avec les ping et on voit les adresses MAC des cartes.

```
xterm
64 bytes from 172.17.1.5: icmp_seq=7 ttl=64 time=0,208 ms (DUP!)
64 bytes from 172.17.1.1: icmp_seq=7 ttl=64 time=0,214 ms (DUP!)
64 bytes from 172.17.1.3: icmp_seq=7 ttl=64 time=0,220 ms (DUP!)
64 bytes from 172.17.1.6: icmp_seq=7 ttl=64 time=0,230 ms (DUP!)
64 bytes from 172.17.1.6: icmp_seq=7 ttl=64 time=0,246 ms (DUP!)
64 bytes from 172.17.1.2: icmp_seq=7 ttl=64 time=0,253 ms (DUP!)
64 bytes from 172.17.1.4: icmp_seq=7 ttl=64 time=0,259 ms (DUP!)
64 bytes from 172.17.1.8: icmp_seq=7 ttl=64 time=0,269 ms (DUP!)
64 bytes from 172.17.3.14: icmp_seq=7 ttl=64 time=0,287 ms (DUP!)
64 bytes from 172.17.0.254: icmp_seq=7 ttl=64 time=0,293 ms (DUP!)
64 bytes from 172.17.1.11: icmp_seq=7 ttl=64 time=0,298 ms (DUP!)
64 bytes from 172.17.2.12: icmp_seq=7 ttl=64 time=0,309 ms (DUP!)
64 bytes from 172.17.2.3: icmp_seq=7 ttl=64 time=0,324 ms (DUP!)
64 bytes from 172.17.1.9: icmp_seq=7 ttl=64 time=0,330 ms (DUP!)
64 bytes from 172.17.2.8: icmp_seq=7 ttl=64 time=0,339 ms (DUP!)
64 bytes from 172.17.2.10: icmp_seq=7 ttl=64 time=0,348 ms (DUP!)
64 bytes from 172.17.2.4: icmp_seq=7 ttl=64 time=0,364 ms (DUP!)
64 bytes from 172.17.2.9: icmp_seq=7 ttl=64 time=0,370 ms (DUP!)
64 bytes from 172.17.2.5: icmp_seq=7 ttl=64 time=0,375 ms (DUP!)
64 bytes from 172.17.2.7: icmp_seq=7 ttl=64 time=0,386 ms (DUP!)
64 bytes from 172.17.2.6: icmp_seq=7 ttl=64 time=0,401 ms (DUP!)
64 bytes from 172.17.0.71: icmp_seq=7 ttl=64 time=1,12 ms (DUP!)
64 bytes from 172.17.0.72: icmp_seq=7 ttl=64 time=1,16 ms (DUP!)

--- 172.17.255.255 ping statistics ---
7 packets transmitted, 7 received, +161 duplicates, 0% packet loss, time 6005ms
rtt min/avg/max/mdev = 0,057/0,509/5,160/0,609 ms
pc2b051-10:~# apr -a
bash: apr: command not found
pc2b051-10:~# arp -a
pc2b051-8.labir.umlv.nx (172.17.1.8) at 00:C0:4F:8A:4A:DF [ether] on eth-bas
pc2b059-10.labir.umlv.nx (172.17.2.10) at 00:01:02:B2:E3:12 [ether] on eth-bas
pc2b051-9.labir.umlv.nx (172.17.1.9) at 00:00:FD:AA:AA:AA [ether] on eth-bas
pc2b059-9.labir.umlv.nx (172.17.2.9) at 00:01:03:42:CE:5D [ether] on eth-bas
pc2b059-8.labir.umlv.nx (172.17.2.8) at 00:01:03:42:CE:5B [ether] on eth-bas
pc2b051-11.labir.umlv.nx (172.17.1.11) at 00:00:C0:8A:2B:8A [ether] on eth-bas
pc2b100-14.labir.umlv.nx (172.17.3.14) at 00:D0:59:36:88:BA [ether] on eth-bas
pc2b059-12.labir.umlv.nx (172.17.2.12) at 00:01:02:B3:63:2A [ether] on eth-bas
pc2b051-1.labir.umlv.nx (172.17.1.1) at 00:C0:4F:8A:4A:EF [ether] on eth-bas
the-wall.umlv.nx (172.17.0.254) at 00:D0:09:65:4A:02 [ether] on eth-bas
pc2b059-3.labir.umlv.nx (172.17.2.3) at 00:01:03:42:CD:E4 [ether] on eth-bas
pc2b051-3.labir.umlv.nx (172.17.1.3) at 00:C0:4F:8A:4A:CC [ether] on eth-bas
pc2b051-2.labir.umlv.nx (172.17.1.2) at 00:C0:4F:8A:4A:E8 [ether] on eth-bas
pc2b059-6.labir.umlv.nx (172.17.2.6) at 00:01:03:42:DD:05 [ether] on eth-bas
pc2b051-5.labir.umlv.nx (172.17.1.5) at 00:55:55:55:55:55 [ether] on eth-bas
pc2b051-4.labir.umlv.nx (172.17.1.4) at 00:BE:BE:BE:00:21 [ether] on eth-bas
pc2b059-7.labir.umlv.nx (172.17.2.7) at 00:01:03:42:CE:79 [ether] on eth-bas
pc2b059-4.labir.umlv.nx (172.17.2.4) at 00:01:03:42:CE:61 [ether] on eth-bas
pc2b059-5.labir.umlv.nx (172.17.2.5) at 00:01:03:42:CD:F1 [ether] on eth-bas
pc2b051-6.labir.umlv.nx (172.17.1.6) at 00:10:A7:1B:71:B0 [ether] on eth-bas
pc2b051-10:~#
```

- Ensuite on tape la commande ***ifconfig eth-bas -arp*** :  
On remarque que ça ne répond plus quand on fait une requête arp.

Pour créer sa propre table arp statique, on tape :  
`Arp -s 172.17.0.12 00 : C0 : 4F : 8A : 4A : CC`  
Avec l'adresse IP du destinataire son adresse MAC.

Le destinataire de son côté fait la même chose avec mes adresses et là on remarque que l'on peut se répondre à deux.  
Enfin on fait ***arp -an*** pour voir les adresses que l'on a mis en static

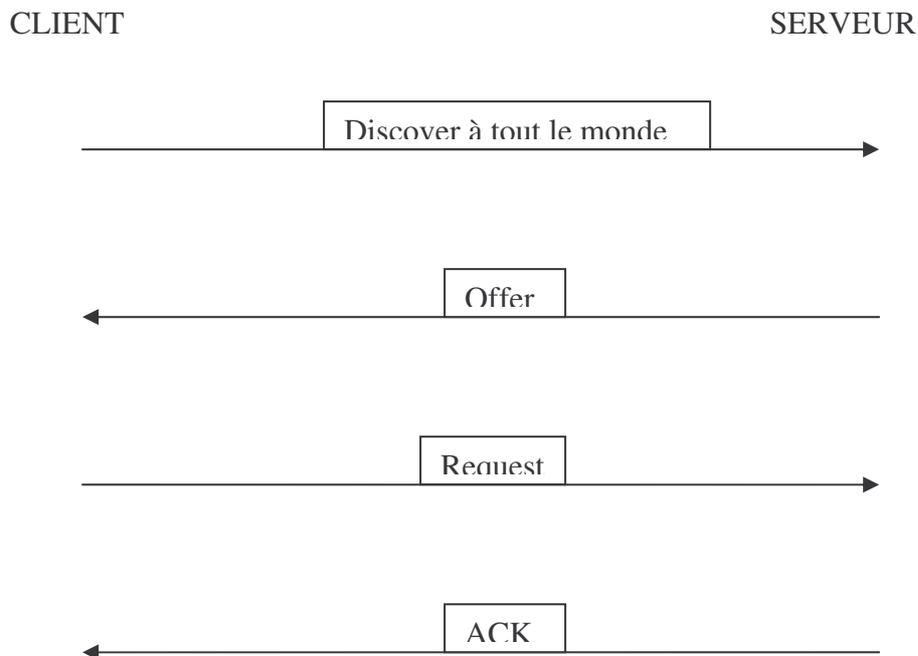


```
pc2b051-10:~# arp -an
? (172.17.0.12) at 00:C0:4F:8A:4A:CC [ether] PERM on eth-bas
pc2b051-10:~#
```

### C°) DHCP :

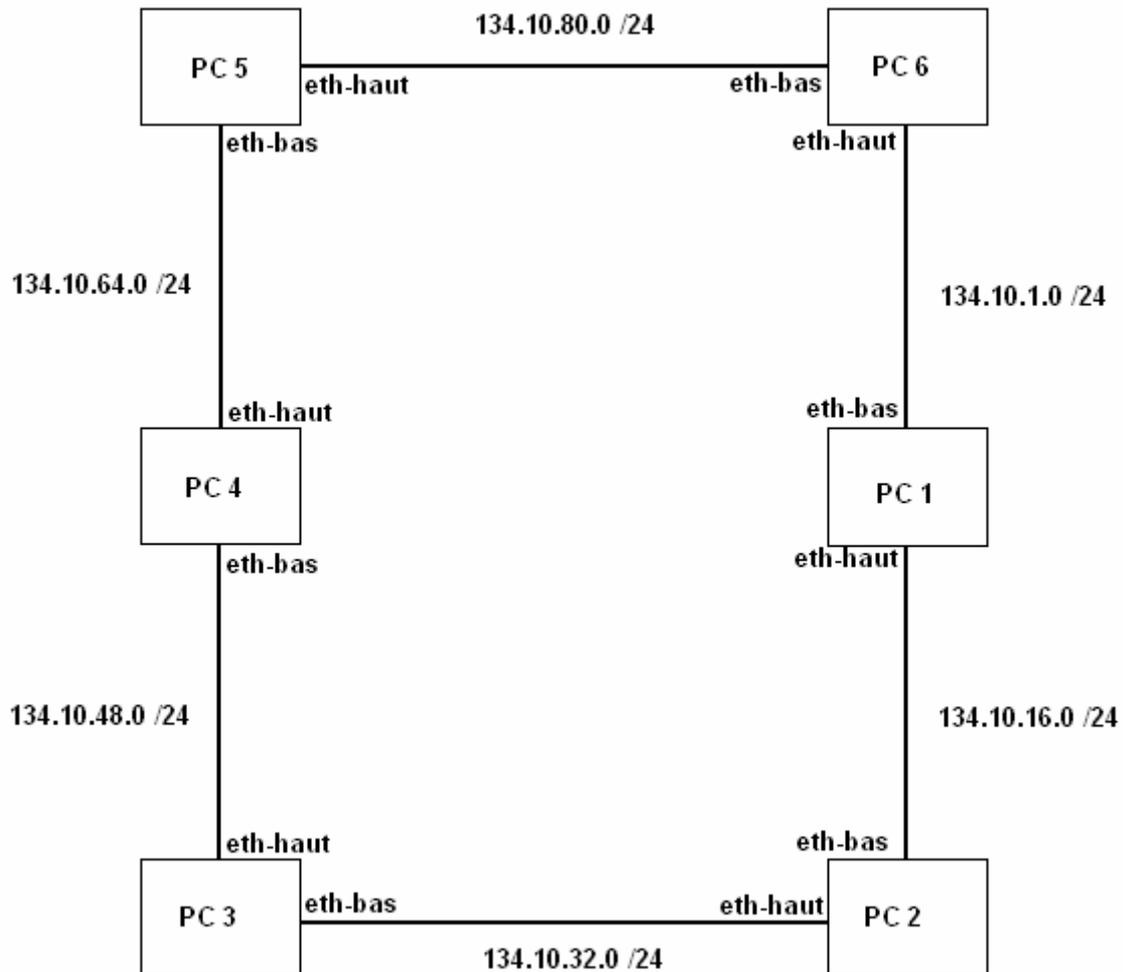
- On tape les commandes :  
***ifconfig eth-bas down***  
***dhcpcp-bin eth-bas*** : ce qui permet de up avec DHCP pour configurer l'interface  
***dhcpcd-bin -n*** : permet de faire une DHCP REQUEST, donc de renouveler notre bail DHCP

- Les différentes étapes du DHCP :



### D°) Routage :

- On désire réaliser le réseau suivant :



Avec : - les adresses IP de la forme :

134.10.X.1 pour les eth-bas

134.10.X.2 pour les eth-haut

- le masque de sous-réseau pour chaque adresse :

255.255.255.0

- l'adresse de broadcast :

134.10.255.255

- Pour réaliser ceci, étant le PC 3, on configure nos cartes réseau à l'aide des commandes :  
ifconfig eth-bas 134.10.32.1 netmask 255.255.255.0  
ifconfig eth-haut 134.10.48.2 netmask 255.255.255.0

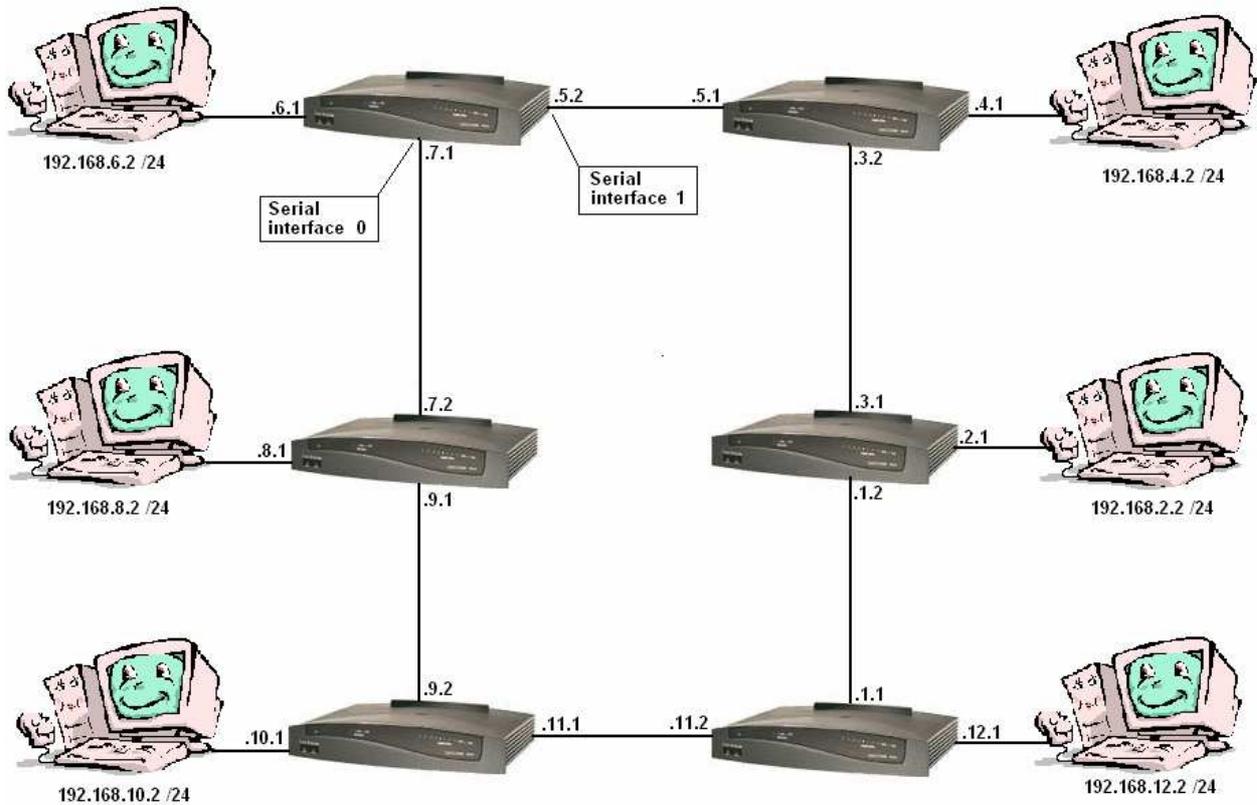
- Ensuite, pour ajouter la route par défaut vers un réseau, on tape la commande :  
***route add default gw 134.10.48.2***

- Enfin, pour que notre machine accepte des datagrammes qui ne lui sont pas destinés, on tape :

```
echo 1 > /proc/sys/net/ipv4/ip_forward  
for i in /proc/sys/net/ipv4/conf*/rp_filter;  
do  
    echo 0 > $i  
done
```

## II°) Routage Cisco :

### A°) Plan d'adressage :



### B°) Configuration sortie d'usine :

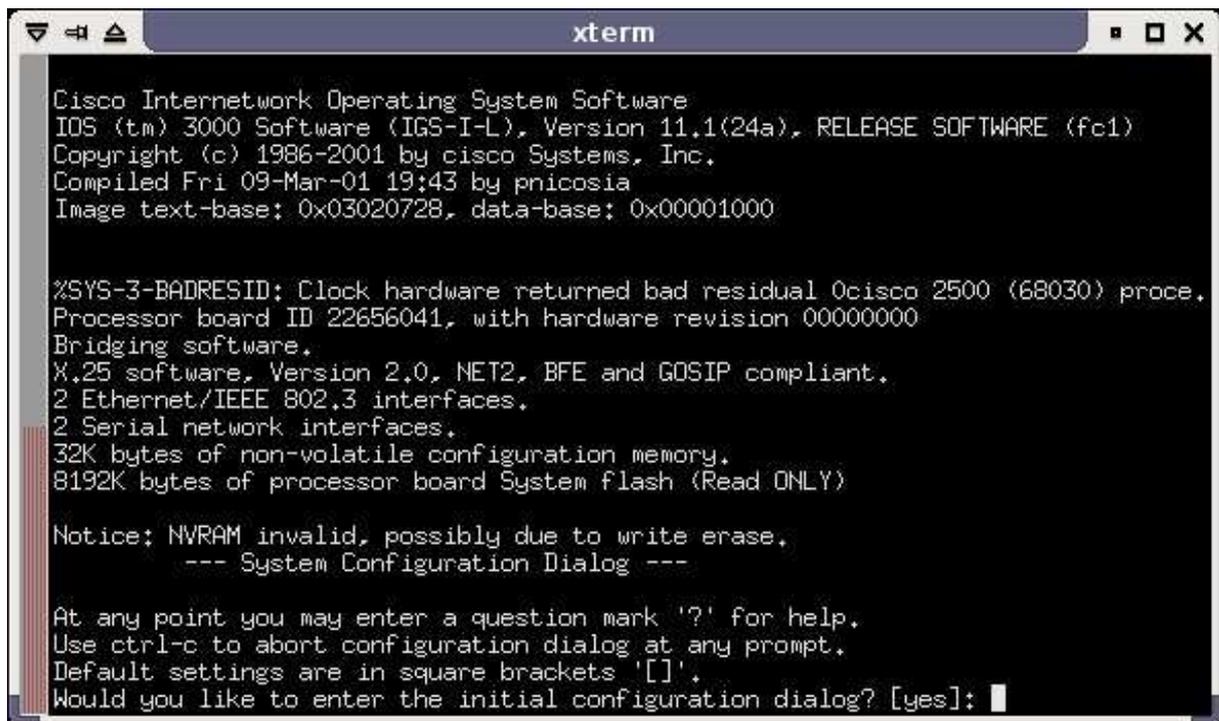
- Tout d'abord, pour faire communiquer le PC et le routeur, on utilise le port série 1.

- Ensuite on veut accéder au menu du routeur par le minicom. Pour ceci, on tape dans l'invite de commande : **minicom -o** puis on attend quelques secondes.

Lorsque le message ' Appuyez sur Ctrl A-Z pour de l'aide ' apparaît, on met le routeur sous tension.

```
xterm
Welcome to minicom 2.1
OPTIONS: History Buffer, F-key Macros, Search History Buffer, I18n
Compiled on Nov 12 2003, 19:21:57.
Press CTRL-A Z for help on special keys
█
```

A la question, 'Would you like to enter the initial configuration', on répond 'yes'.



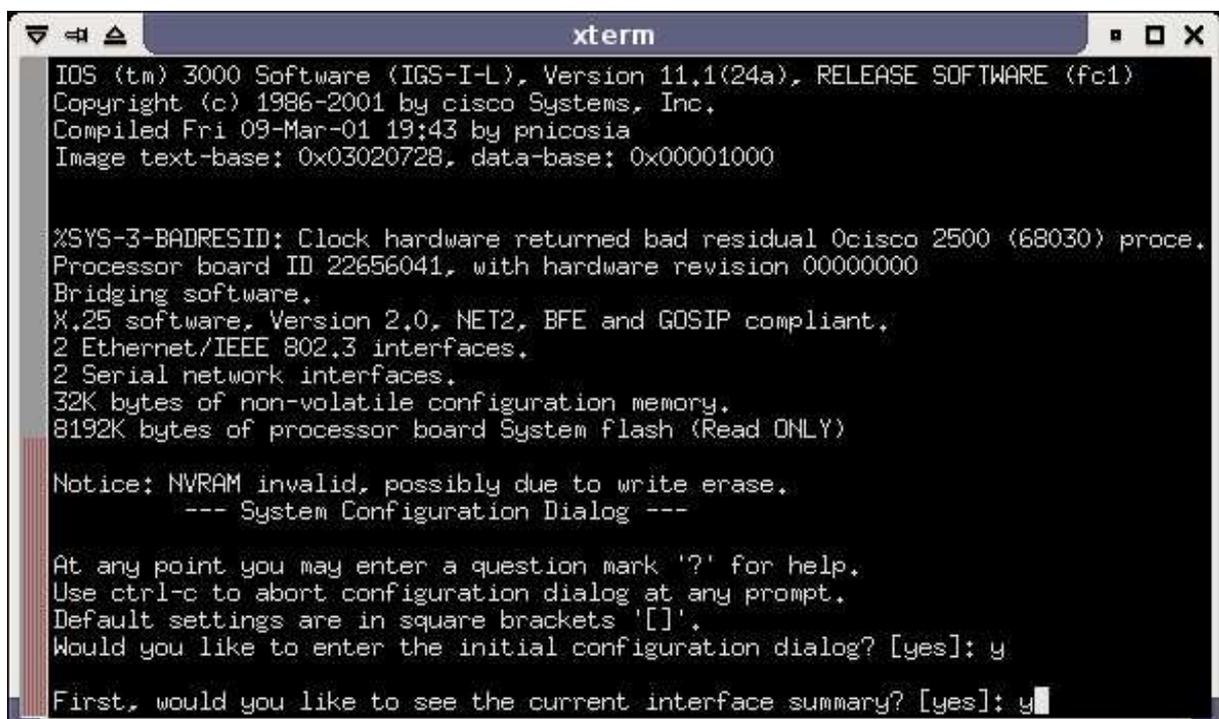
```
xterm
Cisco Internetwork Operating System Software
IOS (tm) 3000 Software (IGS-I-L), Version 11.1(24a), RELEASE SOFTWARE (fc1)
Copyright (c) 1986-2001 by cisco Systems, Inc.
Compiled Fri 09-Mar-01 19:43 by pnicosia
Image text-base: 0x03020728, data-base: 0x00001000

%SYS-3-BADRESID: Clock hardware returned bad residual 0cisco 2500 (68030) proce.
Processor board ID 22656041, with hardware revision 00000000
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
2 Ethernet/IEEE 802.3 interfaces.
2 Serial network interfaces.
32K bytes of non-volatile configuration memory.
8192K bytes of processor board System flash (Read ONLY)

Notice: NVRAM invalid, possibly due to write erase.
--- System Configuration Dialog ---

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 '['].
Would you like to enter the initial configuration dialog? [yes]: █
```

Ensuite, à la deuxième question 'Would you like to see the current interface summary' on répond 'yes'.



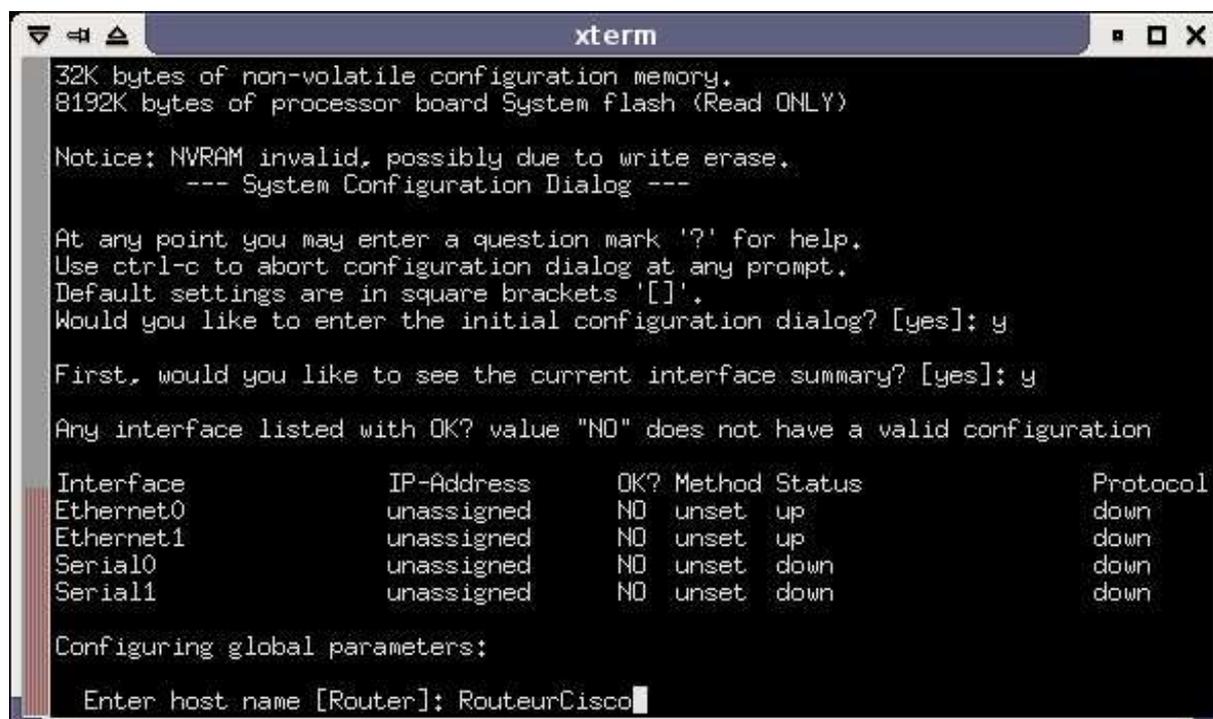
```
xterm
IOS (tm) 3000 Software (IGS-I-L), Version 11.1(24a), RELEASE SOFTWARE (fc1)
Copyright (c) 1986-2001 by cisco Systems, Inc.
Compiled Fri 09-Mar-01 19:43 by pnicosia
Image text-base: 0x03020728, data-base: 0x00001000

%SYS-3-BADRESID: Clock hardware returned bad residual 0cisco 2500 (68030) proce.
Processor board ID 22656041, with hardware revision 00000000
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
2 Ethernet/IEEE 802.3 interfaces.
2 Serial network interfaces.
32K bytes of non-volatile configuration memory.
8192K bytes of processor board System flash (Read ONLY)

Notice: NVRAM invalid, possibly due to write erase.
--- System Configuration Dialog ---

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 '['].
Would you like to enter the initial configuration dialog? [yes]: y
First, would you like to see the current interface summary? [yes]: y █
```

Puis on nous demande le nom '*host name*' du routeur. On décide l'appeler tout simplement : « **RouteurCisco** » .



```
32K bytes of non-volatile configuration memory.
8192K bytes of processor board System flash (Read ONLY)

Notice: NVRAM invalid, possibly due to write erase.
--- System Configuration Dialog ---

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 '['.
Would you like to enter the initial configuration dialog? [yes]: y

First, would you like to see the current interface summary? [yes]: y

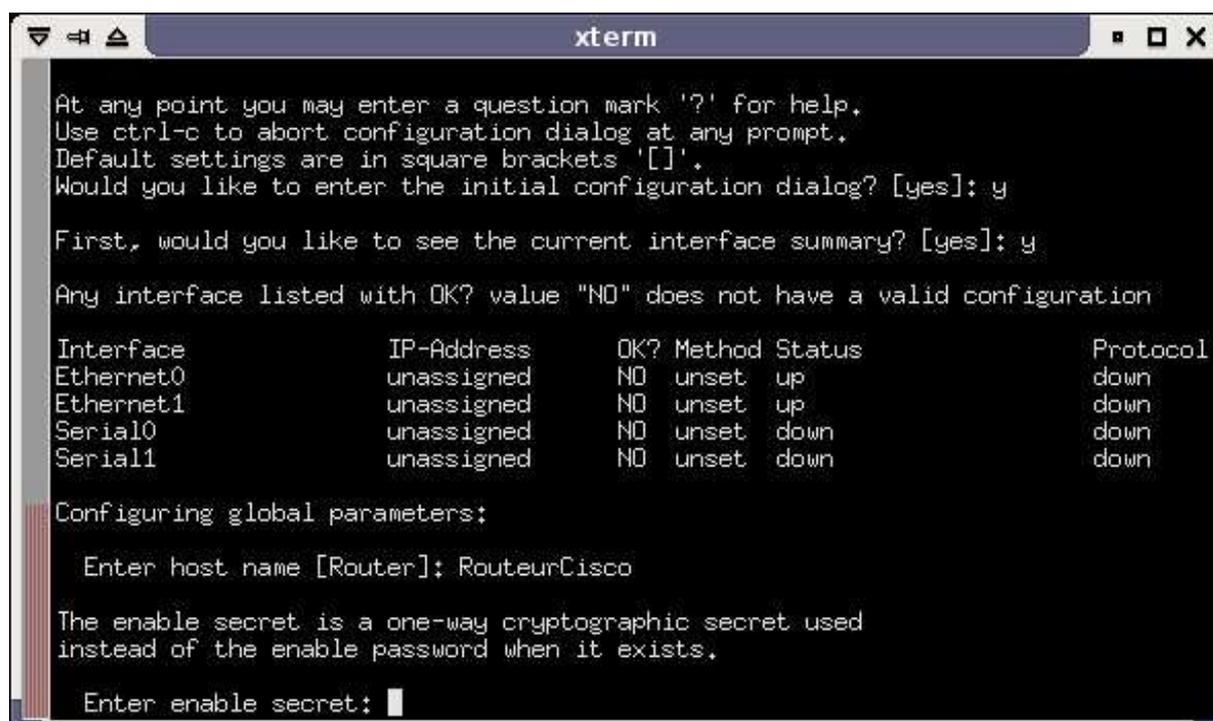
Any interface listed with OK? value "NO" does not have a valid configuration

Interface          IP-Address      OK? Method Status Protocol
Ethernet0          unassigned     NO  unset  up      down
Ethernet1          unassigned     NO  unset  up      down
Serial0            unassigned     NO  unset  down    down
Serial1            unassigned     NO  unset  down    down

Configuring global parameters:

Enter host name [Router]: RouteurCisco
```

Ensuite on rentre le '*enable secret password*' qui est « *cisco* ». Ce sera le mot de passe des consoles.



```
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 '['.
Would you like to enter the initial configuration dialog? [yes]: y

First, would you like to see the current interface summary? [yes]: y

Any interface listed with OK? value "NO" does not have a valid configuration

Interface          IP-Address      OK? Method Status Protocol
Ethernet0          unassigned     NO  unset  up      down
Ethernet1          unassigned     NO  unset  up      down
Serial0            unassigned     NO  unset  down    down
Serial1            unassigned     NO  unset  down    down

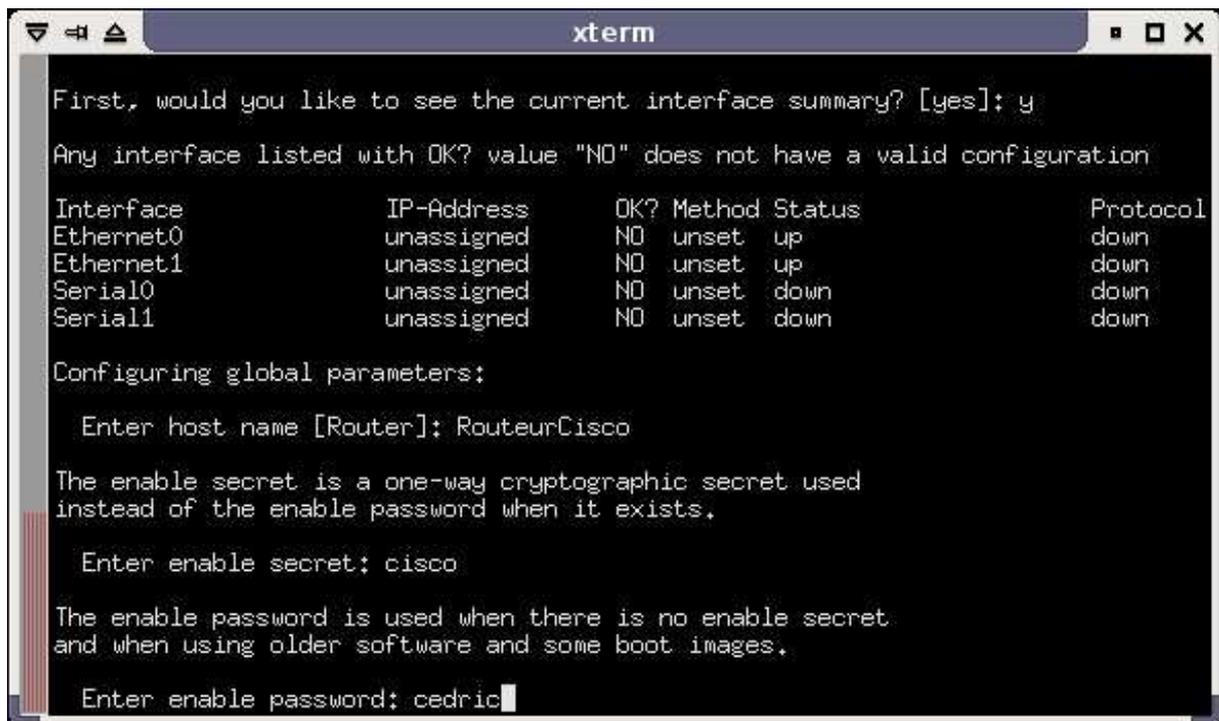
Configuring global parameters:

Enter host name [Router]: RouteurCisco

The enable secret is a one-way cryptographic secret used
instead of the enable password when it exists.

Enter enable secret: cisco
```

Après on nous demande le 'enable password'. On choisit « cedric ».



```
xterm
First, would you like to see the current interface summary? [yes]: y
Any interface listed with OK? value "NO" does not have a valid configuration

Interface          IP-Address      OK? Method Status Protocol
Ethernet0          unassigned     NO  unset  up    down
Ethernet1          unassigned     NO  unset  up    down
Serial0            unassigned     NO  unset  down  down
Serial1            unassigned     NO  unset  down  down

Configuring global parameters:

Enter host name [Router]: RouteurCisco

The enable secret is a one-way cryptographic secret used
instead of the enable password when it exists.

Enter enable secret: cisco

The enable password is used when there is no enable secret
and when using older software and some boot images.

Enter enable password: cedric
```

Puis on nous demande le 'virtual terminal password'. On rentre « cisco ».



```
xterm
First, would you like to see the current interface summary? [yes]: y
Any interface listed with OK? value "NO" does not have a valid configuration

Interface          IP-Address      OK? Method Status Protocol
Ethernet0          unassigned     NO  unset  up    down
Ethernet1          unassigned     NO  unset  up    down
Serial0            unassigned     NO  unset  down  down
Serial1            unassigned     NO  unset  down  down

Configuring global parameters:

Enter host name [Router]: RouteurCisco

The enable secret is a one-way cryptographic secret used
instead of the enable password when it exists.

Enter enable secret: cisco

The enable password is used when there is no enable secret
and when using older software and some boot images.

Enter enable password: cedric
Enter virtual terminal password: 
```

Ensuite on nous demande 'Configure SNMP Network Management'. On répond 'no' afin de ne pas démarrer le service SNMP.



```
xterm
Any interface listed with OK? value "NO" does not have a valid configuration

Interface          IP-Address      OK? Method Status Protocol
Ethernet0         unassigned     NO  unset  up    down
Ethernet1         unassigned     NO  unset  up    down
Serial0           unassigned     NO  unset  down  down
Serial1           unassigned     NO  unset  down  down

Configuring global parameters:

Enter host name [Router]: RouteurCisco

The enable secret is a one-way cryptographic secret used
instead of the enable password when it exists.

Enter enable secret: cisco

The enable password is used when there is no enable secret
and when using older software and some boot images.

Enter enable password: cedric
Enter virtual terminal password: cisco
Configure SNMP Network Management? [yes]:
```

Puis on nous demande 'Configure IP'. On répond 'yes', afin de configurer manuellement l'interface Ethernet 0.



```
xterm
Any interface listed with OK? value "NO" does not have a valid configuration

Interface          IP-Address      OK? Method Status Protocol
Ethernet0         unassigned     NO  unset  up    down
Ethernet1         unassigned     NO  unset  up    down
Serial0           unassigned     NO  unset  down  down
Serial1           unassigned     NO  unset  down  down

Configuring global parameters:

Enter host name [Router]: RouteurCisco

The enable secret is a one-way cryptographic secret used
instead of the enable password when it exists.

Enter enable secret: cisco

The enable password is used when there is no enable secret
and when using older software and some boot images.

Enter enable password: cedric
Enter virtual terminal password: cisco
Configure SNMP Network Management? [yes]: no
Configure IP? [yes]: y
```

Ensuite on nous demande 'Configure IGRP routing' et 'RIP routing'. On répond 'no'.



```
Interface      IP-Address    OK? Method Status Protocol
Ethernet0     unassigned   NO  unset  up      down
Ethernet1     unassigned   NO  unset  up      down
Serial0       unassigned   NO  unset  down    down
Serial1       unassigned   NO  unset  down    down

Configuring global parameters:

  Enter host name [Router]: RouteurCisco

The enable secret is a one-way cryptographic secret used
instead of the enable password when it exists.

  Enter enable secret: cisco

The enable password is used when there is no enable secret
and when using older software and some boot images.

  Enter enable password: cedric
  Enter virtual terminal password: cisco
  Configure SNMP Network Management? [yes]: no
  Configure IP? [yes]: y
    Configure IGRP routing? [yes]: no
    Configure RIP routing? [no]: no
```

Après on nous demande de rentrer l'adresse IP de l'interface Ethernet 0. On rentre alors l'adresse **192.168.6.1**, choisie d'après notre plan d'adressage.



```
Enter host name [Router]: RouteurCisco

The enable secret is a one-way cryptographic secret used
instead of the enable password when it exists.

  Enter enable secret: cisco

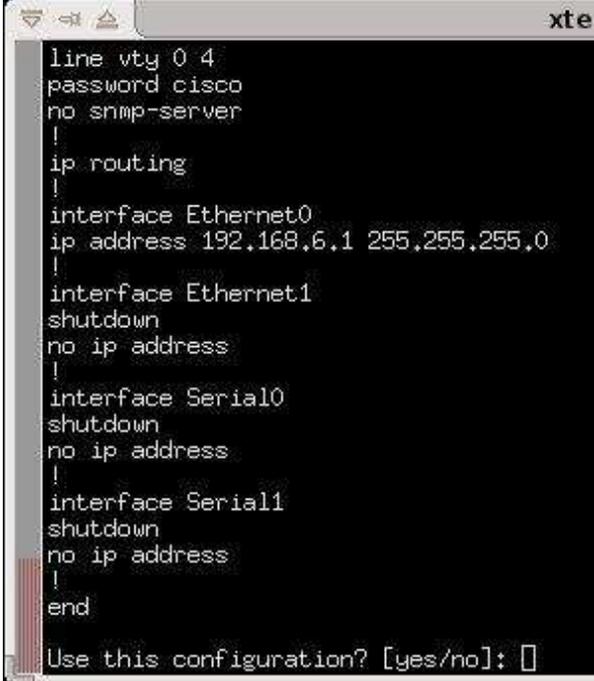
The enable password is used when there is no enable secret
and when using older software and some boot images.

  Enter enable password: cedric
  Enter virtual terminal password: cisco
  Configure SNMP Network Management? [yes]: no
  Configure IP? [yes]: y
    Configure IGRP routing? [yes]: no
    Configure RIP routing? [no]: no

Configuring interface parameters:

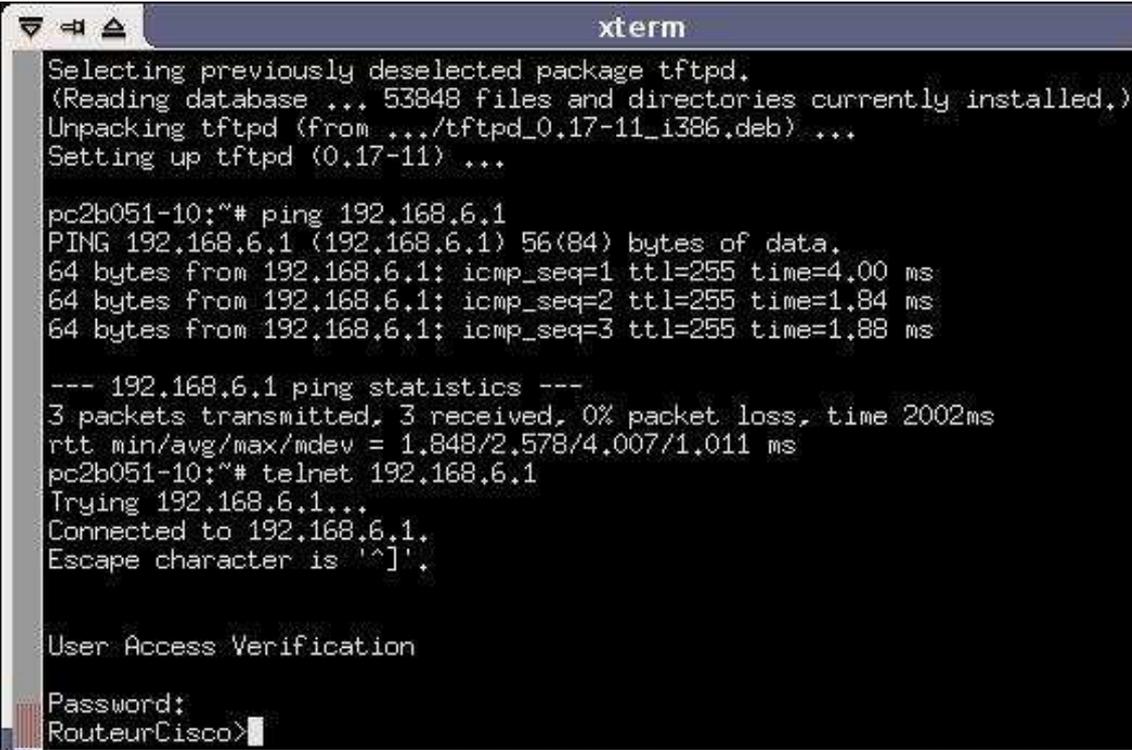
Configuring interface Ethernet0:
  Is this interface in use? [yes]: y
  Configure IP on this interface? [yes]: y
    IP address for this interface: 192.168.6.1
```

Puis on nous demande de rentrer le 'Number of byte' : On répond '0'.  
Ensuite on répond 'no' pour la configuration des autres interfaces, que l'on configurera plus tard.  
Et enfin on confirme par 'yes' pour utiliser cette configuration.



```
line vty 0 4
password cisco
no snmp-server
!
ip routing
!
interface Ethernet0
ip address 192.168.6.1 255.255.255.0
!
interface Ethernet1
shutdown
no ip address
!
interface Serial0
shutdown
no ip address
!
interface Serial1
shutdown
no ip address
!
end
Use this configuration? [yes/no]:
```

- Ensuite, nous devons nous connecter en mode telnet. Pour cela, on branche la carte Ethernet du PC qui n'est pas utilisée sur l'interface Ethernet 0 du routeur que l'on vient de configurer. Puis on tape sur une nouvelle invite de commande : **telnet 192.168.6.1** et je rentre le mot de passe approprié : « cisco ».



```
Selecting previously deselected package tftpd.
(Reading database ... 53848 files and directories currently installed.)
Unpacking tftpd (from ../tftpd_0.17-11_i386.deb) ...
Setting up tftpd (0.17-11) ...

pc2b051-10:~# ping 192.168.6.1
PING 192.168.6.1 (192.168.6.1) 56(84) bytes of data:
64 bytes from 192.168.6.1: icmp_seq=1 ttl=255 time=4.00 ms
64 bytes from 192.168.6.1: icmp_seq=2 ttl=255 time=1.84 ms
64 bytes from 192.168.6.1: icmp_seq=3 ttl=255 time=1.88 ms

--- 192.168.6.1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2002ms
rtt min/avg/max/mdev = 1.848/2.578/4.007/1.011 ms
pc2b051-10:~# telnet 192.168.6.1
Trying 192.168.6.1...
Connected to 192.168.6.1.
Escape character is '^]'.

User Access Verification

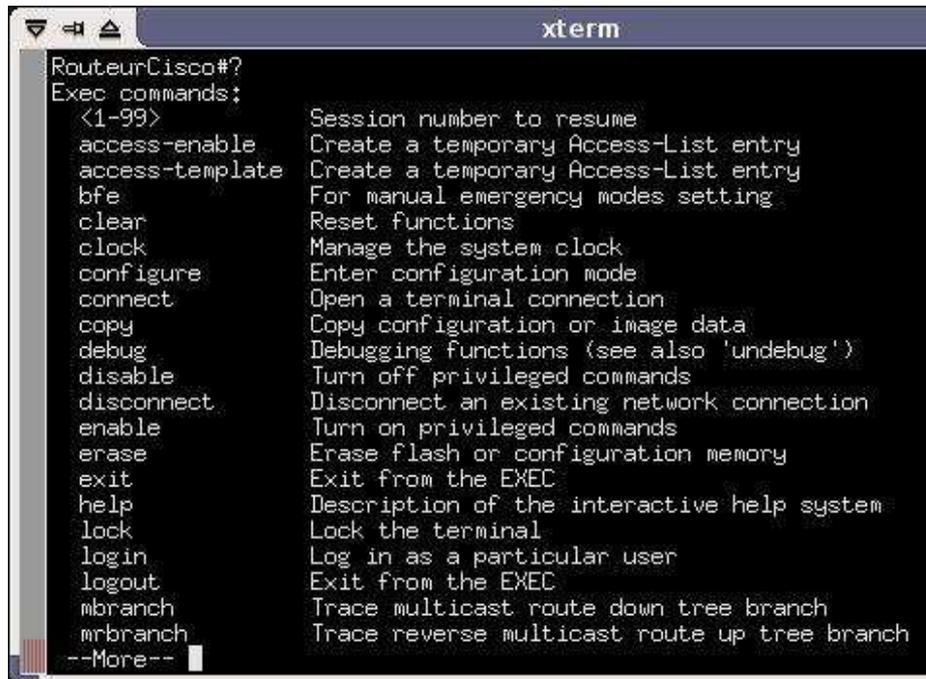
Password:
RouteurCisco>
```

## C°) Sauvegarde de la configuration :

- Tout d'abord, on passe en mode « super utilisateur » afin de pouvoir, par exemple, changer ou sauvegarder la configuration du routeur.

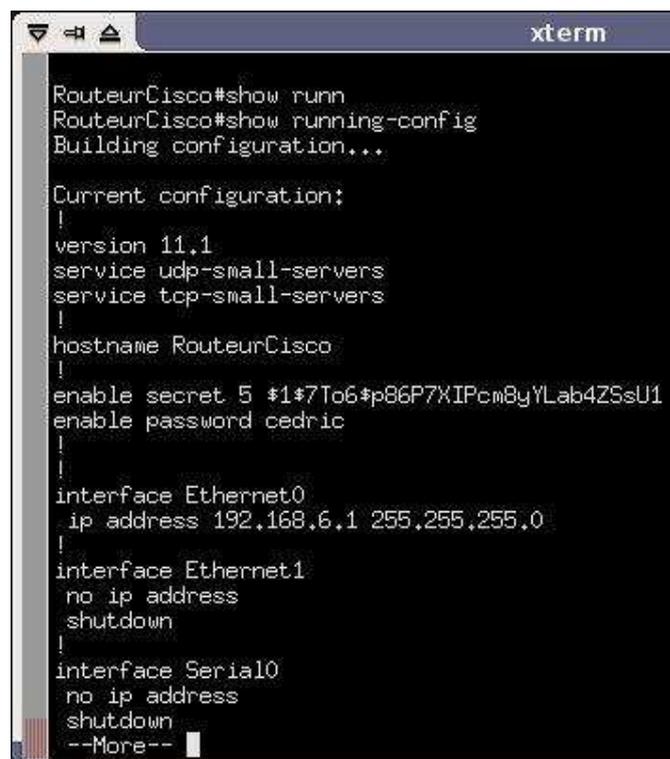
Afin de réaliser ceci, on tape *enable* et le mot de passe « *cisco* » dans le shell.

Ensuite on peut taper ' ? ' afin d'obtenir de l'aide et de pouvoir visualiser les différentes commandes qui s'offrent à nous.



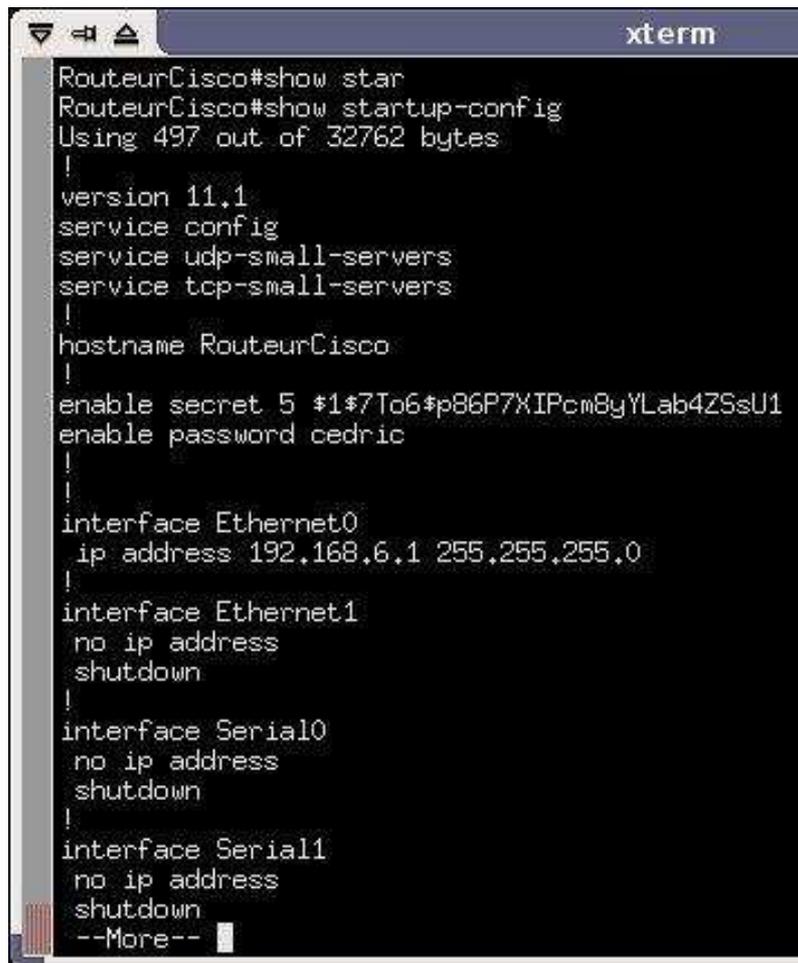
```
RouteurCisco#?  
Exec commands:  
<1-99>          Session number to resume  
access-enable   Create a temporary Access-List entry  
access-template Create a temporary Access-List entry  
bfe             For manual emergency modes setting  
clear           Reset functions  
clock           Manage the system clock  
configure       Enter configuration mode  
connect         Open a terminal connection  
copy            Copy configuration or image data  
debug           Debugging functions (see also 'undebug')  
disable         Turn off privileged commands  
disconnect      Disconnect an existing network connection  
enable          Turn on privileged commands  
erase           Erase flash or configuration memory  
exit            Exit from the EXEC  
help            Description of the interactive help system  
lock            Lock the terminal  
login           Log in as a particular user  
logout          Exit from the EXEC  
mbranch         Trace multicast route down tree branch  
mrbranch        Trace reverse multicast route up tree branch  
--More--
```

- Ensuite, pour visualiser la configuration courante, on tape : *show running-config*



```
RouteurCisco#show runn  
RouteurCisco#show running-config  
Building configuration...  
  
Current configuration:  
!  
version 11.1  
service udp-small-servers  
service tcp-small-servers  
!  
hostname RouteurCisco  
!  
enable secret 5 #1#7To6#p86P7XIPcm8yYLab4ZSsU1  
enable password cedric  
!  
!  
interface Ethernet0  
 ip address 192.168.6.1 255.255.255.0  
!  
interface Ethernet1  
 no ip address  
 shutdown  
!  
interface Serial0  
 no ip address  
 shutdown  
--More--
```

Puis pour visualiser la configuration secondaire, on tape :  
*show startup-config*



```
RouteurCisco#show star
RouteurCisco#show startup-config
Using 497 out of 32762 bytes
!
version 11.1
service config
service udp-small-servers
service tcp-small-servers
!
hostname RouteurCisco
!
enable secret 5 #1#7To6#p86P7XIPcm8yYLab4ZSsU1
enable password cedric
!
!
interface Ethernet0
 ip address 192.168.6.1 255.255.255.0
!
interface Ethernet1
 no ip address
 shutdown
!
interface Serial0
 no ip address
 shutdown
!
interface Serial1
 no ip address
 shutdown
--More--
```

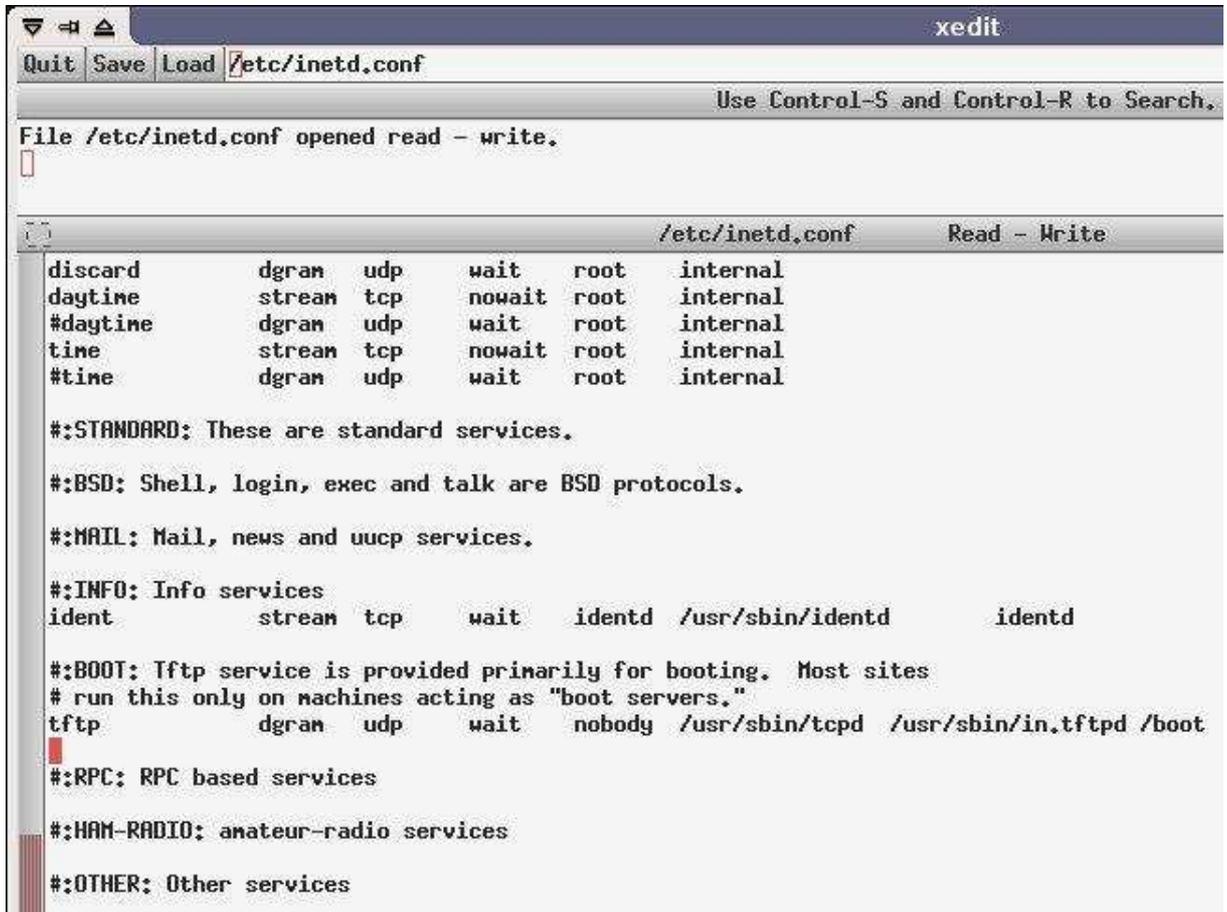
Apparemment ces deux configurations sont identiques. Si elles ne l'étaient pas, on aurait pu taper la commande suivante :

*copy running-config startup config*

- Ensuite nous devons modifier le fichier */etc/inetd.conf*.

On repère la ligne :

```
tftp dgram udp wait nobody /usr/sbin/tcpd
/usr/sbin/in.tftpd /boot
```



```
File /etc/inetd.conf opened read - write.
/etc/inetd.conf Read - Write
discard dgram udp wait root internal
daytime stream tcp nowait root internal
#daytime dgram udp wait root internal
time stream tcp nowait root internal
#time dgram udp wait root internal

#STANDARD: These are standard services.
#BSD: Shell, login, exec and talk are BSD protocols.
#MAIL: Mail, news and uucp services.
#INFO: Info services
ident stream tcp wait identd /usr/sbin/identd identd
#BOOT: Tftp service is provided primarily for booting. Most sites
# run this only on machines acting as "boot servers."
tftp dgram udp wait nobody /usr/sbin/tcpd /usr/sbin/in.tftpd /boot

#RPC: RPC based services
#HAM-RADIO: amateur-radio services
#OTHER: Other services
```

Puis on crée un répertoire nommé "tftpd" dans */root/tftpd*

Dans ce répertoire, on crée un fichier vide nommé *config* et on lui donne comme droits d'accès *'a+w'*. Pour ceci on tape la commande, qui donne les droits de lecture et d'écriture pour tout le monde :

```
chmod a+w config
```

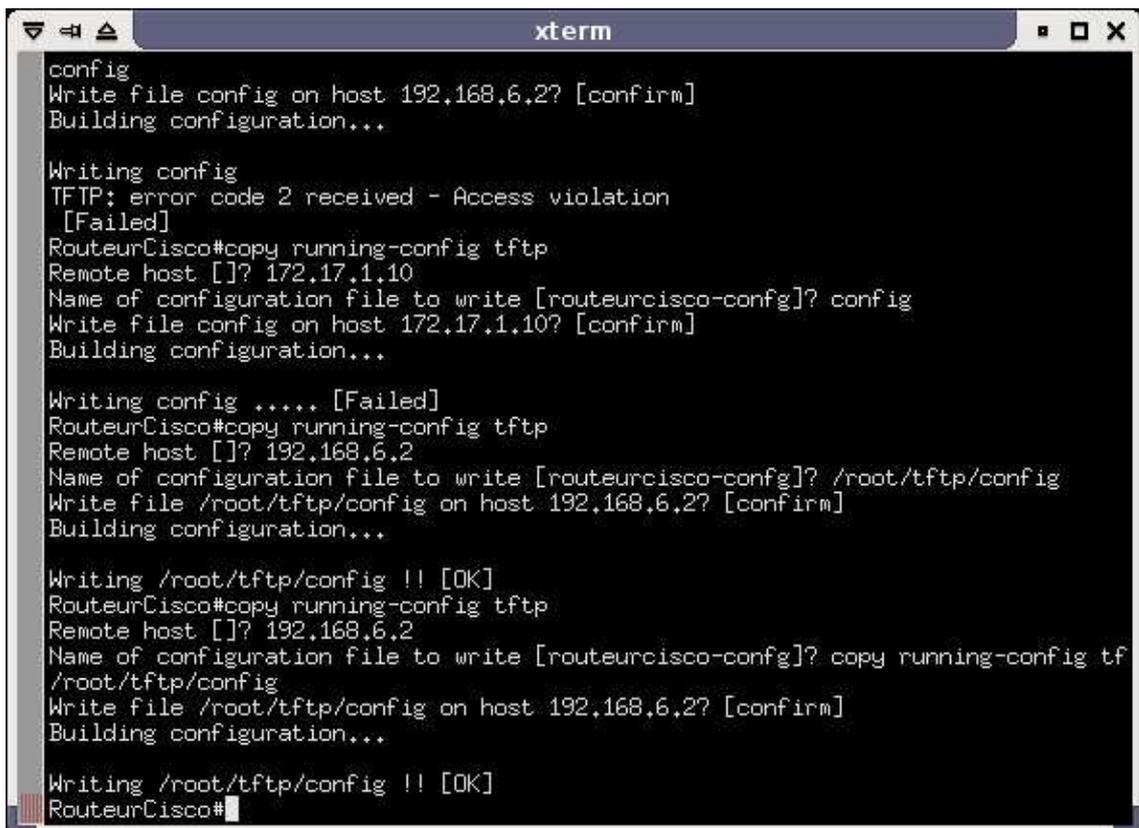
Une fois ceci effectué, on fait : */etc/init.d restart*

Puis sur la ligne de commande du routeur on tape :

```
copy running-config tftp
```

On nous demande l'adresse IP de la machine. On rentre : *192.168.6.2*

Puis on nous demande 'Name of configuration...' On rentre : `/root/tftp/config`



```
config
Write file config on host 192.168.6.2? [confirm]
Building configuration...

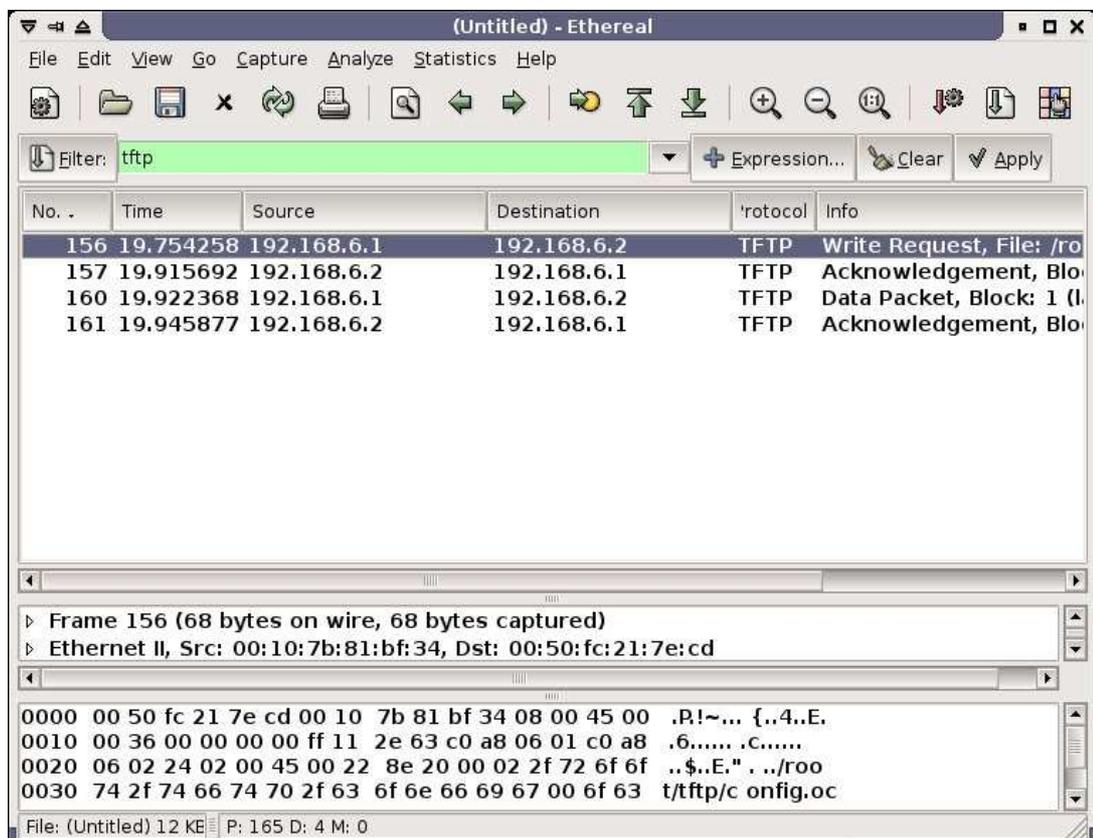
Writing config
TFTP: error code 2 received - Access violation
[Failed]
RouteurCisco#copy running-config tftp
Remote host []? 192.168.6.2
Name of configuration file to write [routeurcisco-config]? config
Write file config on host 192.168.6.2? [confirm]
Building configuration...

Writing config ..... [Failed]
RouteurCisco#copy running-config tftp
Remote host []? 192.168.6.2
Name of configuration file to write [routeurcisco-config]? /root/tftp/config
Write file /root/tftp/config on host 192.168.6.2? [confirm]
Building configuration...

Writing /root/tftp/config !! [OK]
RouteurCisco#copy running-config tftp
Remote host []? 192.168.6.2
Name of configuration file to write [routeurcisco-config]? copy running-config tftp
/root/tftp/config
Write file /root/tftp/config on host 192.168.6.2? [confirm]
Building configuration...

Writing /root/tftp/config !! [OK]
RouteurCisco#
```

Lorsque l'on fait une capture de cette opération avec ethereal, on obtient ceci :



No.	Time	Source	Destination	Protocol	Info
156	19.754258	192.168.6.1	192.168.6.2	TFTP	Write Request, File: /ro
157	19.915692	192.168.6.2	192.168.6.1	TFTP	Acknowledgement, Blo
160	19.922368	192.168.6.1	192.168.6.2	TFTP	Data Packet, Block: 1 (l
161	19.945877	192.168.6.2	192.168.6.1	TFTP	Acknowledgement, Blo

Frame 156 (68 bytes on wire, 68 bytes captured)  
Ethernet II, Src: 00:10:7b:81:bf:34, Dst: 00:50:fc:21:7e:cd

```
0000 00 50 fc 21 7e cd 00 10 7b 81 bf 34 08 00 45 00  .P!~... {..4..E.
0010 00 36 00 00 00 00 ff 11 2e 63 c0 a8 06 01 c0 a8  .6..... .C.....
0020 06 02 24 02 00 45 00 22 8e 20 00 02 2f 72 6f 6f  ..$.E." ./root
0030 74 2f 74 66 74 70 2f 63 6f 6e 66 69 67 00 6f 63  t/tftp/c onfig.oc
```

- L'utilité du super-daemon inetd :

Le super-daemon inetd, toujours actif, permet à lui tout seul de lancer des autres daemons (ou services) tels que telnet, rlogin, ftp, ... . Ces services, qui s'exécutent sur la machine, sont accessibles depuis les machines du réseau. Seuls les services déclarés dans le fichier /etc/inetd.conf répondront aux machines distantes.

### D°) Configuration manuelle :

- On tape **configure** puis **terminal**. On choisit **interface serial 1** car on rentre sur l'interface 0 et on sort sur l'interface 1 du routeur, d'après le plan d'adressage.

On lui fournit ensuite l'adresse IP correspondante avec '**ip adress 192.168.5.2 255.255.255.0**'  
Puis on place l'horloge à 2Mb/s en faisant '**clock rate 2000000**'

Ensuite on passe l'interface en mode actif grâce à '**no shutdown**'

Après on tape deux fois **exit** pour sortir de la configuration de l'interface et du terminal.

Enfin on vérifie que l'interface est active grâce à :

**show interface serial 1**

Enfin, on fait un ping : **ping 192.168.5.1** et on s'aperçoit que l'on a une réponse.

```
RouteurCisco#configure
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
RouteurCisco(config)#interface serial 1
RouteurCisco(config-if)#ip address 192.168.5.2 255.255.255.0
RouteurCisco(config-if)#clock rate 2000000
RouteurCisco(config-if)#no shutdown
RouteurCisco(config-if)#exit
RouteurCisco(config)#exit
RouteurCisco#show interface serial 1
^
% Invalid input detected at '^' marker.

RouteurCisco#show interface serial 1
Serial1 is up, line protocol is up
  Hardware is HD64570
  Internet address is 192.168.5.2/24
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input 00:00:07, output 00:00:00, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/64/0 (size/threshold/drops)
    Conversations 0/1 (active/max active)
    Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    2 packets input, 48 bytes, 0 no buffer
    Received 2 broadcasts, 0 runts, 0 giants
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    5 packets output, 640 bytes, 0 underruns
    0 output errors, 0 collisions, 32 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions
  DCD=up DSR=up DTR=up RTS=up CTS=up
RouteurCisco#ping 192.168.5.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 192.168.5.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/3/4 ms
RouteurCisco#
```

- Significations de DTE et DCE :

DTE : Data Terminal Emulation : cela se rapporte à un PC, un serveur, un firewall, un routeur, une station.

DCE : Data Communication Equipement : cela se rapporte à un switch ou un hub.

A noter qu'un switch peut être considéré comme un élément actif du réseau, et se transformer en DTE et non DCE, suivant de quel point de vue on le regarde.

- Pourquoi faut il placer une horloge sur la liaison série :

C'est pour que les registres à décalage qui sont utilisés de chaque côté de la liaison fonctionnent rigoureusement à la même vitesse.

- Dans la commande *show interface*, on retrouve deux états :

administratively : indique si le port est configuré (up) ou non configuré (down).

line protocol : indique si le cable est branché (up) ou débranché (down).

## E°) Routage statique :

- Pour rajouter une route statique sur le routeur, on tape en mode configuration depuis le terminal la commande :

```
ip route 192.168.0.0 255.255.0.0 192.168.7.2
```



```
xterm
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
0 packets output, 0 bytes, 0 underruns
0 output errors, 0 collisions, 98 interface resets
0 output buffer failures, 0 output buffers swapped out
0 carrier transitions
DCD=up DSR=up DTR=down RTS=down CTS=up
RouteurCisco#show interface serial 0
Serial0 is up, line protocol is down
Hardware is HD64570
Internet address is 192.168.7.1/24
MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
Encapsulation HDLC, loopback not set, keepalive set (10 sec)
Last input never, output 00:00:08, output hang never
Last clearing of "show interface" counters never
Input queue: 0/75/0 (size/max/drops); Total output drops: 0
Queueing strategy: weighted fair
Output queue: 0/64/0 (size/threshold/drops)
Conversations 0/0 (active/max active)
Reserved Conversations 0/0 (allocated/max allocated)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
0 packets input, 0 bytes, 0 no buffer
Received 0 broadcasts, 0 runts, 0 giants
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
6 packets output, 664 bytes, 0 underruns
0 output errors, 0 collisions, 101 interface resets
0 output buffer failures, 0 output buffers swapped out
0 carrier transitions
DCD=up DSR=up DTR=up RTS=up CTS=up
RouteurCisco#ping 192.168.7.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 192.168.7.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/4/4 ms
RouteurCisco#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
       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, * - candidate default
       U - per-user static route

Gateway of last resort is not set

C    192.168.5.0/24 is directly connected, Serial1
C    192.168.6.0/24 is directly connected, Ethernet0
C    192.168.7.0/24 is directly connected, Serial0
RouteurCisco#
```

On obtient ainsi les routes présentes dans la table de routage, par exemple :

```
xterm
C 192.168.6,0/24 is directly connected, Ethernet0
C 192.168.7,0/24 is directly connected, Serial0
RouteurCisco#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
RouteurCisco(config)#ip route 192.168.0,0 255,255,255,0 7,2
% Incomplete command.

RouteurCisco(config)#ip route 192.168.0,0 255,255,255,0 192,168,7,2
RouteurCisco(config)#ip route
% Incomplete command.

RouteurCisco(config)#exit
RouteurCisco#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
       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, * - candidate default
       U - per-user static route

Gateway of last resort is not set

S 192.168.8,0/24 [1/0] via 192.168.7,2
S 192.168.0,0/24 [1/0] via 192.168.7,2
C 192.168.5,0/24 is directly connected, Serial1
C 192.168.6,0/24 is directly connected, Ethernet0
C 192.168.7,0/24 is directly connected, Serial0
RouteurCisco#no ip route 192.168.8,0 255,255,255,0 192,168,7,2
^
% Invalid input detected at '^' marker.

RouteurCisco#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
RouteurCisco(config)#no ip route 192.168.8,0 255,255,255,0 192,168,7,2
RouteurCisco(config)#exit
RouteurCisco#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
       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, * - candidate default
       U - per-user static route

Gateway of last resort is not set

S 192.168.0,0/24 [1/0] via 192.168.7,2
C 192.168.5,0/24 is directly connected, Serial1
C 192.168.6,0/24 is directly connected, Ethernet0
C 192.168.7,0/24 is directly connected, Serial0
RouteurCisco#
```