TP2 : Routage statique sur matériel Cisco et Packet Tracer.
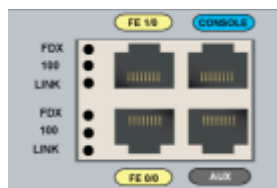
Caumes Clément – Gonthier Maxime – Hequet Jonathan – Merimi Mehdi

Pour ce TD, la configuration sur Packet Tracer a été faite avant de réaliser la manipulation avec les vrais équipements. Le compte rendu a été fait en fonction de Packet Tracer pour avoir une trace des manipulations à faire.

PREMIERE PARTIE (CONFIG1_CAUMES_GONTHIER_HEQUET_MERIMI.pkt)

CONFIGURATION DU ROUTEUR EN MODE CONSOLE :

Identification des éléments

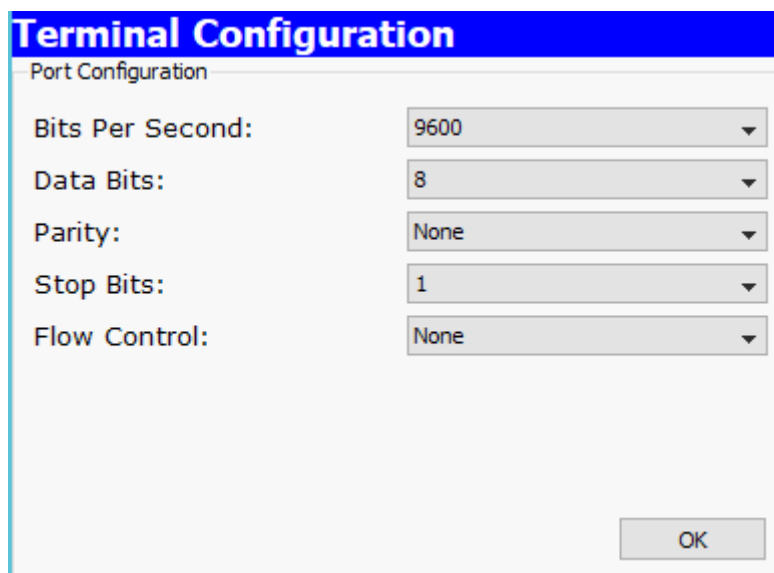Le port Console permet d'accéder à l'interface du routeur par le biais d'un ordinateur terminal.
Le port FE 0/0 et le port FE 0/1 permettent de connecter le routeur à d'autres appareils. Cela permet d'interconnecter un ou plusieurs appareils.
Les ports Serial0 et Serial1 permettent de connecter le routeur à un autre routeur.
Ce sont des port série asynchrones.

Configuration d'un routeur à l'aide du setup

On démarre le programme HyperTerminal et on configure correctement l'interface.

On démarre le routeur et on lance le mode setup.

```
Router>en
Router#erase startup-config
Erasing the nvram filesystem will remove all configuration files! Continue? [con
firm]
[OK]
Erase of nvram: complete
%SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
Router#reload
Proceed with reload? [confirm]
System Bootstrap, Version 12.3(8r)T8, RELEASE SOFTWARE (fc1)
Cisco 1841 (revision 5.0) with 114688K/16384K bytes of memory.

Self decompressing the image :
######################################################################### [OK]
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            San Jose, California 95134-1706

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If you require further assistance please contact us by sending email to
export@cisco.com.

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)
2 Low-speed serial(sync/async) network interface(s)
191K bytes of NVRAM.
63488K bytes of ATA CompactFlash (Read/Write)
Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M), Version 12.4(15)T1,
 RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 18-Jul-07 04:52 by pt_team

        --- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]: n

Press RETURN to get started!
```

[Principes fondamentaux de la ligne de commande](#)

Le monde utilisateur avec la fonction d'aide propose ces commandes :

```
Router>?
Exec commands:
  <1-99>      Session number to resume
  connect     Open a terminal connection
  disable     Turn off privileged commands
  disconnect  Disconnect an existing network connection
  enable      Turn on privileged commands
  exit        Exit from the EXEC
  logout      Exit from the EXEC
  ping        Send echo messages
  resume      Resume an active network connection
  show        Show running system information
  ssh         Open a secure shell client connection
  telnet      Open a telnet connection
  terminal    Set terminal line parameters
  traceroute  Trace route to destination
```

Le monde privilégié avec la fonction d'aide propose ces commandes :

```
Router>en
Router#?
Exec commands:
  <1-99>      Session number to resume
  auto        Exec level Automation
  clear       Reset functions
  clock       Manage the system clock
  configure   Enter configuration mode
  connect     Open a terminal connection
  copy        Copy from one file to another
  debug       Debugging functions (see also 'undebug')
  delete      Delete a file
  dir         List files on a filesystem
  disable     Turn off privileged commands
  disconnect  Disconnect an existing network connection
  enable      Turn on privileged commands
  erase       Erase a filesystem
  exit        Exit from the EXEC
  logout      Exit from the EXEC
  mkdir       Create new directory
  more        Display the contents of a file
  no          Disable debugging informations
  ping        Send echo messages
  reload      Halt and perform a cold restart
  resume      Resume an active network connection
  rmdir       Remove existing directory
  setup       Run the SETUP command facility
  show        Show running system information
  ssh         Open a secure shell client connection
  telnet      Open a telnet connection
  terminal    Set terminal line parameters
  traceroute  Trace route to destination
  undebug     Disable debugging functions (see also 'debug')
  vlan        Configure VLAN parameters
  write       Write running configuration to memory, network, or terminal
```

Le mode enable a plus de privilèges que le mode utilisateur. Le mode utilisateur est le mode classique et le mode privilégié est le mode enable.

Utilisation des commandes show d'un routeur

On examine la configuration courante :

```
Router#show running-config
Building configuration...

Current configuration : 548 bytes
!
version 12.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Router
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
interface FastEthernet0/0
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown

interface FastEthernet0/0
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/0/0
 no ip address
 shutdown
!
interface Serial0/0/1
 no ip address
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
ip classless
!
!
!
!
!
!
!
line con 0
line vty 0 4
 login
!
!
!
end
```

On quitte le monde privilégié avec la commande exit :

```
Router#exit
```

Configuration d'une interface Ethernet

On configure le nom du routeur en mode privilégié :

```
Router>
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R1
```

On configure l'interface FastEthernet0/0 avec l'adresse IP 192.168.1.254 et le mask 255.255.255.0 :

```
Router>
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R1
R1(config)#interface fa0/0
R1(config-if)#ip address 192.168.1.254 255.255.255.0
R1(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
R1(config-if)#exit
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console
```

On enregistre la configuration courante avec copy run start :

```
R1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```
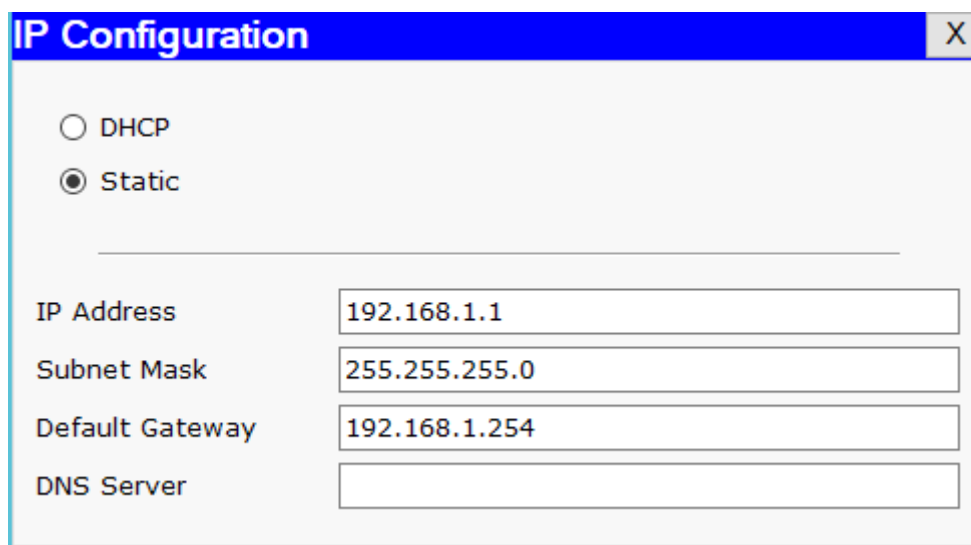
On affiche les informations sur l'interface Fa0/0 :
- FastEthernet 0/0 est up. Le protocole de ligne est down.
- L'adresse IP est 192.168.1.254. Son masque est 255.255.255.0.
- L'encapsulation est ARPA et correspond à la couche Réseau.

CONNEXION DU ROUTEUR A UN RESEAU

On connecte le PC avec un câble RJ45 croisé.
On configure le PC connecté au routeur avec l'adresse IP 192.168.1.1 et le mask 255.255.255.0. La passerelle est l'adresse de l'interface du routeur connecté à ce PC, soit 192.168.1.254.

On teste la connection en envoyant un ping du PC au routeur :

```
PC>ping 192.168.1.254

Pinging 192.168.1.254 with 32 bytes of data:

Reply from 192.168.1.254: bytes=32 time=31ms TTL=255
Reply from 192.168.1.254: bytes=32 time=31ms TTL=255
Reply from 192.168.1.254: bytes=32 time=18ms TTL=255
Reply from 192.168.1.254: bytes=32 time=31ms TTL=255

Ping statistics for 192.168.1.254:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 18ms, Maximum = 31ms, Average = 27ms
```
                      PC2   Router1

On envoie aussi un ping du routeur au PC : La configuration est donc réussie.

```
R1#ping 192.168.1.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 31/31/32 ms
```

On va configurer un autre routeur connecté à un autre PC. Ce routeur sera connecté au premier. Ce 2ème routeur aura une adresse IP 192.168.2.254 et un mask de 255.255.255.0 pour l'interface fa0/0 où sera connecté le 2ème PC :

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R2
R2(config)#interface fa0/0
R2(config-if)#ip address 192.168.2.254 255.255.255.0
R2(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state t
o up

R2(config-if)#exit
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#copy running-config startu-config
                              ^
% Invalid input detected at '^' marker.

R2#copy running-config start-config
                              ^
% Invalid input detected at '^' marker.

R2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R2#
```
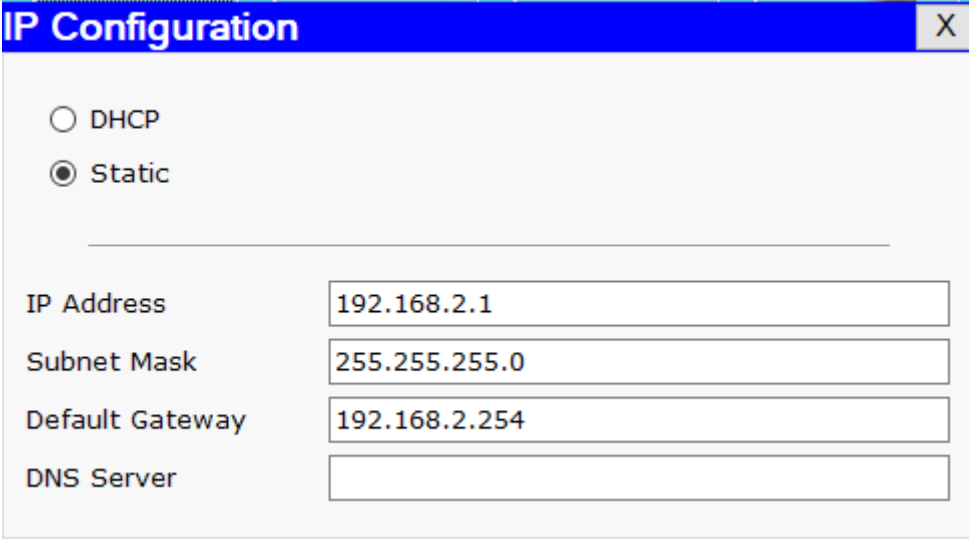
On configure également le 2ème PC avec une adresse IP 192.168.2.1 et un mask 255.255.255.0. De plus, sa passerelle par défaut est 192.168.2.254 qui est l'adresse IP de l'interface fa0/0 du 2ème routeur.

```
IP Configuration                                    X

   O DHCP
   ● Static


   IP Address          192.168.2.1
   Subnet Mask         255.255.255.0
   Default Gateway     192.168.2.254
   DNS Server
```

On vérifie la connection avec un ping du PC au routeur et du routeur au PC : la configuration est réussie.

```
PC>ping 192.168.2.254

Pinging 192.168.2.254 with 32 bytes of data:

Reply from 192.168.2.254: bytes=32 time=78ms TTL=255
Reply from 192.168.2.254: bytes=32 time=15ms TTL=255
Reply from 192.168.2.254: bytes=32 time=31ms TTL=255
Reply from 192.168.2.254: bytes=32 time=16ms TTL=255

Ping statistics for 192.168.2.254:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 15ms, Maximum = 78ms, Average = 35ms
```

```
R2#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 = 31/31/32 ms
```

ROUTAGE STATIQUE ENTRE DEUX RESEAUX

Maintenant, on configure les interfaces routeur-routeur de ces derniers :
R1 fa0/1 est : 200.0.12.1/24
R2 fa0/1 est : 200.0.12.2/24

```
R1>en
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#interface fa0/1
R1(config-if)#ip address 200.0.12.1 255.255.255.0
R1(config-if)#no shutdown


%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
R1(config-if)#exit
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]


R2>en
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#interface fa0/1
R2(config-if)#ip address 200.0.12.2 255.255.255.0
R2(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state t
o up

R2(config-if)#
R2(config-if)#exit
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```

On va créer une route statique entre les deux routeurs pour que les hôtes puissent mutuellement s'envoyer des requêtes ping.
Pour cela, on utilise la commande sur le routeur 1 : ip route [Adresse B] [Mask B] [Adresse C] avec Adresse B l'adresse IP du destinataire du paquet à envoyer par le routeur1. Mask B est le mask du destinataire du paquet à envoyer par le routeur1.
Adresse C est l'adresse IP de l'interface du routeur2 à qui le routeur1 doit lui envoyer.

On peut voir qu'il y a un problème au niveau du routeur puisque les routes statiques ne sont pas établies.

```
PC>tracert 192.168.2.1

Tracing route to 192.168.2.1 over a maximum of 30 hops:

  1    32 ms     31 ms     31 ms     192.168.1.254
  2    31 ms     *         31 ms     192.168.1.254
  3    *         31 ms     *         Request timed out.
  4    31 ms     *         31 ms     192.168.1.254
  5    *         31 ms     *         Request timed out.
  6    32 ms     *         31 ms     192.168.1.254
```

Une route statique est requise sur les deux routeurs pour que le ping fonctionne car un ping est un écho. Donc il faut que l'écho puisse arriver à sa destination (émetteur primaire du ping).

```
R1#en
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#ip route 192.168.2.0 255.255.255.0 200.0.12.2
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]


R2>en
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#ip route 192.168.1.0 255.255.255.0 200.0.12.1
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```

On vérifie que les pings d'un PC à un autre fonctionne correctement.

```
PC>ping 192.168.2.1

Pinging 192.168.2.1 with 32 bytes of data:

Reply from 192.168.2.1: bytes=32 time=93ms TTL=126
Reply from 192.168.2.1: bytes=32 time=94ms TTL=126
Reply from 192.168.2.1: bytes=32 time=94ms TTL=126
Reply from 192.168.2.1: bytes=32 time=78ms TTL=126

Ping statistics for 192.168.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 78ms, Maximum = 94ms, Average = 89ms
```

```
PC>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time=93ms TTL=126
Reply from 192.168.1.1: bytes=32 time=94ms TTL=126
Reply from 192.168.1.1: bytes=32 time=93ms TTL=126
Reply from 192.168.1.1: bytes=32 time=94ms TTL=126

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 93ms, Maximum = 94ms, Average = 93ms
```

On vérifie également avec la commandes tracert :
Du PC1 au PC2 :

```
PC>tracert 192.168.2.1

Tracing route to 192.168.2.1 over a maximum of 30 hops:

  1   63 ms      16 ms      31 ms      192.168.1.254
  2   *          63 ms      8 ms       200.0.12.2
  3   *          93 ms      93 ms      192.168.2.1

Trace complete.
```
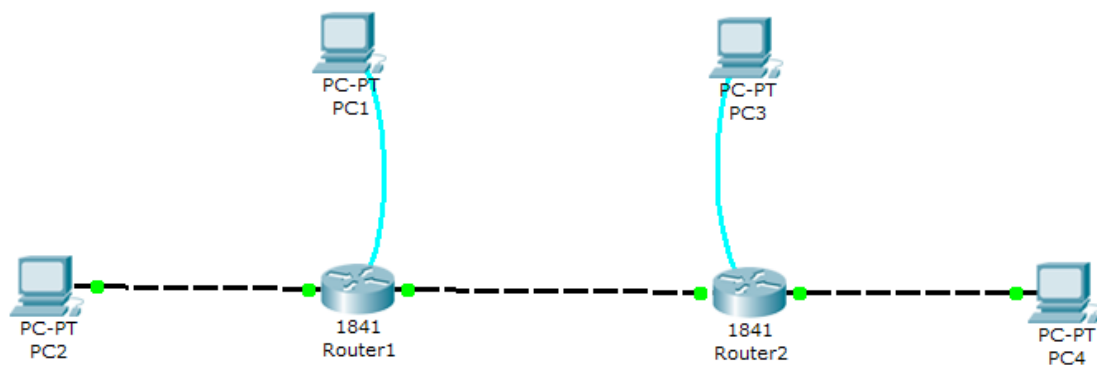
Du PC2 au PC1 :

```
PC>tracert 192.168.1.1

Tracing route to 192.168.1.1 over a maximum of 30 hops:

  1   31 ms      31 ms      31 ms      192.168.2.254
  2   47 ms      62 ms      63 ms      200.0.12.1
  3   94 ms      94 ms      94 ms      192.168.1.1

Trace complete.
```

DEUXIEME PARTIE (CONFIG1_CAUMES_GONTHIER_HEQUET_MERIMI.pkt)

Première configuration :

Le premier groupe configure les adresses IP, mask et passerelles par défaut des PC1 et 2 :

Ensuite, on configure les deux routeurs avec les bonnes interfaces :

```
R1(config)#interface fa0/0
R1(config-if)#ip address 192.168.1.254 255.255.255.0
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#interface fa0/1
R1(config-if)#ip address 200.0.12.1 255.255.255.0
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```

```
R2(config)#interface fa0/0
R2(config-if)#ip address 192.168.2.254 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#interface fa0/1
R2(config-if)#ip address 200.0.12.2255.255.255.0
                                    ^
% Invalid input detected at '^' marker.

R2(config-if)#ip address 200.0.12.2 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```

Enfin, on crée les routes statiques entre les routeurs 1 et 2 :

```
R1(config)#ip route 192.168.2.0 255.255.255.0 200.0.12.2
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```

```
R2(config)#ip route 192.168.1.0 255.255.255.0 200.0.12.1
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```

On vérifie grâce à la commande tracert et ping de la bonne configuration des routeurs et des Pcs du PC1 au PC2 :

```
Tracing route to 192.168.2.1 over a maximum of 30 hops:

  1    63 ms       32 ms       31 ms       192.168.1.254
  2    *           *           63 ms       200.0.12.2
  3    63 ms       *           62 ms       192.168.1.254
  4    93 ms       78 ms       94 ms       200.0.12.2

Trace complete.

PC>ping 192.168.2.1

Pinging 192.168.2.1 with 32 bytes of data:

Reply from 192.168.2.1: bytes=32 time=109ms TTL=126
Reply from 192.168.2.1: bytes=32 time=125ms TTL=126
Reply from 192.168.2.1: bytes=32 time=125ms TTL=126
Reply from 192.168.2.1: bytes=32 time=109ms TTL=126

Ping statistics for 192.168.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 109ms, Maximum = 125ms, Average = 117ms
```

On fait de même du PC2 vers le PC1 :

```
PC>tracert 192.168.1.1

Tracing route to 192.168.1.1 over a maximum of 30 hops:

  1    32 ms       31 ms       15 ms       192.168.2.254
  2    *           47 ms       *           Request timed out.
  3    78 ms       125 ms      110 ms      192.168.1.1

Trace complete.

PC>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time=109ms TTL=124
Reply from 192.168.1.1: bytes=32 time=110ms TTL=124
Reply from 192.168.1.1: bytes=32 time=115ms TTL=124
Reply from 192.168.1.1: bytes=32 time=125ms TTL=124

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 109ms, Maximum = 125ms, Average = 114ms
```
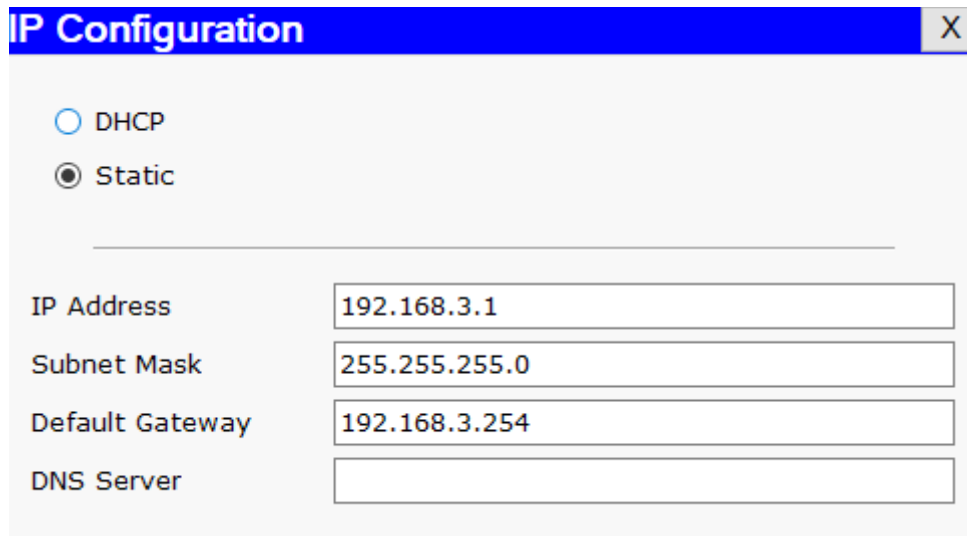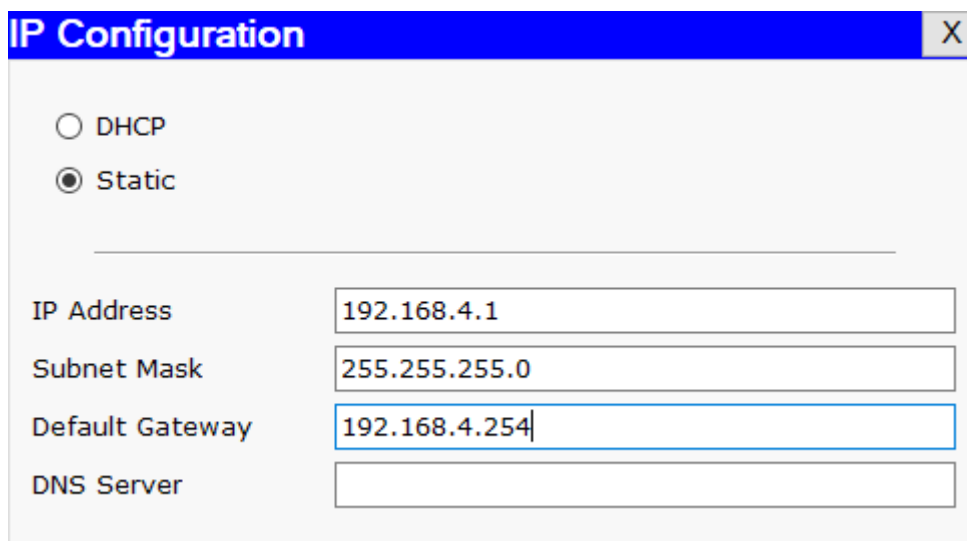
Deuxième configuration :

Le deuxième groupe configure les adresses IP, mask et passerelles par défaut des PC3 et 4 :

```
IP Configuration                                    X

  ○ DHCP
  ◉ Static
  _____

  IP Address          192.168.3.1
  Subnet Mask         255.255.255.0
  Default Gateway     192.168.3.254
  DNS Server          
```

```
IP Configuration                                    X

  ○ DHCP
  ◉ Static
  _____

  IP Address          192.168.4.1
  Subnet Mask         255.255.255.0
  Default Gateway     192.168.4.254
  DNS Server          
```

Ensuite, on configure les deux routeurs avec les bonnes interfaces :

```
R3(config)#interface fa0/0
R3(config-if)#ip address 192.168.3.254 255.255.255.0
R3(config-if)#no shutdown
R3(config-if)#exit
R3(config)#interface fa0/1
R3(config-if)#ip address 200.0.34.1 255.255.255.0
R3(config-if)#no shutdown
R3(config-if)#exit
R3(config)#
R3(config)#exit
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```

```
R4(config)#interface fa0/0
R4(config-if)#ip address 192.168.4.254 255.255.255.0
R4(config-if)#no shutdown
R4(config-if)#exit
R4(config)#interface fa0/1
R4(config-if)#ip address 200.0.34.2 255.255.255.0
R4(config-if)#no shutdown
R4(config-if)#exit
R4(config)#exit
R4#
%SYS-5-CONFIG_I: Configured from console by console

R4#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```

Enfin, on crée les routes statiques entre les routeurs 3 et 4 :

```
R3(config)#ip route 192.168.4.0 255.255.255.0 200.0.34.2
R3(config)#exit
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]

R4(config)#ip route 192.168.3.0 255.255.255.0 200.0.34.1
R4(config)#exit
R4#
%SYS-5-CONFIG_I: Configured from console by console

R4#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```

On vérifie grâce à la commande tracert et ping de la bonne configuration des routeurs et des Pcs du PC3 au PC4 :

```
PC>tracert 192.168.4.1

Tracing route to 192.168.4.1 over a maximum of 30 hops:

  1   62 ms      31 ms      32 ms      192.168.3.254
  2   *          47 ms      63 ms      200.0.34.2
  3   *          93 ms      78 ms      192.168.4.1

Trace complete.

PC>ping 192.168.4.1

Pinging 192.168.4.1 with 32 bytes of data:

Reply from 192.168.4.1: bytes=32 time=94ms TTL=126
Reply from 192.168.4.1: bytes=32 time=94ms TTL=126
Reply from 192.168.4.1: bytes=32 time=108ms TTL=126
Reply from 192.168.4.1: bytes=32 time=94ms TTL=126

Ping statistics for 192.168.4.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 94ms, Maximum = 108ms, Average = 97ms
```

On fait de même du PC4 au PC3 :

```
PC>tracert 192.168.3.1

Tracing route to 192.168.3.1 over a maximum of 30 hops:

  1    31 ms      18 ms      31 ms      192.168.4.254
  2    63 ms      47 ms      63 ms      200.0.34.1
  3    50 ms      94 ms      94 ms      192.168.3.1

Trace complete.

PC>ping 192.168.3.1

Pinging 192.168.3.1 with 32 bytes of data:

Reply from 192.168.3.1: bytes=32 time=94ms TTL=126
Reply from 192.168.3.1: bytes=32 time=87ms TTL=126
Reply from 192.168.3.1: bytes=32 time=98ms TTL=126
Reply from 192.168.3.1: bytes=32 time=78ms TTL=126

Ping statistics for 192.168.3.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 78ms, Maximum = 98ms, Average = 89ms
```

<u>Connexion entre les deux configurations :</u>

On configure les interfaces adéquates pour les routeurs 1 et 3 :

```
R1(config)#interface ethernet 0/1/0
R1(config-if)#ip address 200.1.13.2 255.255.255.0
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]

R3(config)#interface Ethernet 0/1/0
R3(config-if)#ip address 200.1.13.1 255.255.255.0
R3(config-if)#no shutdown
R3(config-if)#exit
R3(config)#exit
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```

On configure maintenant les routes statiques pour chaque routeur R1, R2, R3, R4 :

```
R1(config)#ip route 192.168.3.0 255.255.255.0 200.1.13.1
R1(config)#ip route 192.168.4.0 255.255.255.0 200.1.13.1
R1(config)#exit

%SYS-5-CONFIG_I: Configured from console by console
R1#
R1#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]

R2(config)#ip route 192.168.3.0 255.255.255.0 200.0.12.1
R2(config)#ip route 192.168.4.0 255.255.255.0 200.0.12.1
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]


R3(config)#ip route 192.168.1.0 255.255.255.0 200.1.13.2
R3(config)#ip route 192.168.2.0 255.255.255.0 200.1.13.2
R3(config)#exit
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]

R4(config)#ip route 192.168.1.0 255.255.255.0 200.0.34.1
R4(config)#ip route 192.168.2.0 255.255.255.0 200.0.34.1
R4(config)#exit
R4#
%SYS-5-CONFIG_I: Configured from console by console

R4#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```

On vérifie par exemple pour PC2 qu'on peut ping PC4 :

```
PC>ping 192.168.4.1

Pinging 192.168.4.1 with 32 bytes of data:

Reply from 192.168.4.1: bytes=32 time=187ms TTL=122
Reply from 192.168.4.1: bytes=32 time=188ms TTL=122
Reply from 192.168.4.1: bytes=32 time=154ms TTL=122
Reply from 192.168.4.1: bytes=32 time=172ms TTL=122

Ping statistics for 192.168.4.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 154ms, Maximum = 188ms, Average = 175ms
```

On peut voir les différentes routes statiques des 4 routeurs :

Table de routage de 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, FastEthernet0/0
S    192.168.2.0/24 [1/0] via 200.0.12.2
                    [1/0] via 200.1.13.1
S    192.168.3.0/24 [1/0] via 200.1.13.1
S    192.168.4.0/24 [1/0] via 200.1.13.1
C    200.0.12.0/24 is directly connected, FastEthernet0/1
C    200.1.13.0/24 is directly connected, Ethernet0/1/0
```

Table de routage de R2 :

```
R2#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    192.168.1.0/24 [1/0] via 200.0.12.1
C    192.168.2.0/24 is directly connected, FastEthernet0/0
S    192.168.3.0/24 [1/0] via 200.0.12.1
S    192.168.4.0/24 [1/0] via 200.0.12.1
C    200.0.12.0/24 is directly connected, FastEthernet0/1
```

Table de routage de R3 :

```
R3#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    192.168.1.0/24 [1/0] via 200.1.13.2
S    192.168.2.0/24 [1/0] via 200.1.13.2
C    192.168.3.0/24 is directly connected, FastEthernet0/0
S    192.168.4.0/24 [1/0] via 200.0.34.2
C    200.0.34.0/24 is directly connected, FastEthernet0/1
C    200.1.13.0/24 is directly connected, Ethernet0/1/0
```

Table de routage de R4 :

```
R4#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    192.168.1.0/24 [1/0] via 200.0.34.1
S    192.168.2.0/24 [1/0] via 200.0.34.1
S    192.168.3.0/24 [1/0] via 200.0.34.1
C    192.168.4.0/24 is directly connected, FastEthernet0/0
C    200.0.34.0/24 is directly connected, FastEthernet0/1
```