

Cours réseaux et protocoles

TP4

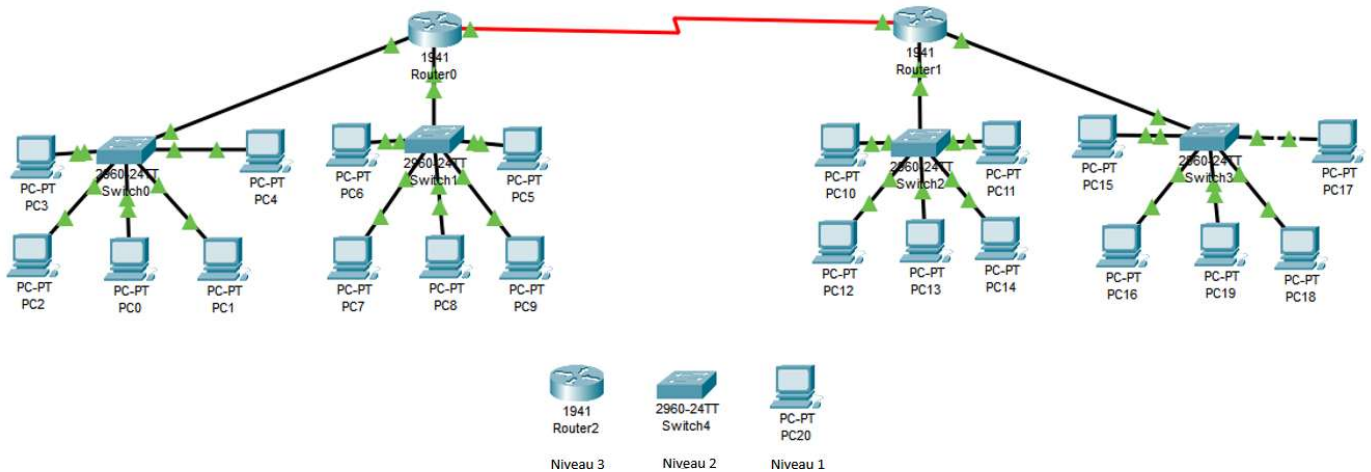
CONFIGURATION DE
ROUTAGE STATIQUE avec
CISCO PACKET TRACER
(Noté)

Lucas BAURY
Jacques KATUNGA MUKENDI

Exercice 1 :

Une solution technique pour cette entreprise serait de mettre leurs deux LAN en réseau WAN avec une architecture hiérarchique.

Les équipements nécessaires sont deux switches représentant des réseaux Locaux (LAN1 et LAN 2) ainsi que 4 switch représentant les sous réseaux.



Exercice 2 :

GigabitEthernet0/1 Schéma de l'architecture hiérarchique utilisée :

Equipement	Interface	Ipaddress/ Mask	Default GTW
Router1	S0/0/0	192.168.30.1/25	N.A
Router1	GigaEth 0/0	192.168.10.1/25	N.A
Router1	GigaEth 0/1	192.168.10.129/25	N.A
Router2	S0/0/0	192.168.30.2/25	N.A
Router2	GigaEth 0/0	192.168.20.1/25	N.A
Router2	GigaEth 0/1	192.168.20.129/25	N.A
PC1 (Subnet1)	FastETH0	192.168.10.3/25	192.168.10.1
PC2 (Subnet1)	FastETH0	192.168.10.4/25	192.168.10.1
PC1 (Subnet2)	FastETH0	192.168.10.131/25	192.168.10.129
PC2 (Subnet2)	FastETH0	192.168.10.132/25	192.168.10.129
PC1 (Subnet3)	FastETH0	192.168.20.3/25	192.168.20.1
PC2 (Subnet3)	FastETH0	192.168.20.4/25	192.168.20.1
PC1 (Subnet4)	FastETH0	192.168.20.131/25	192.168.20.129
PC2 (Subnet4)	FastETH0	192.168.20.132/25	192.168.20.129

Exercice 3 :

1) En tapant la commande « show interfaces » on obtient :

```
GigabitEthernet0/0 is administratively down, line protocol is down (disabled)
  Hardware is CN Gigabit Ethernet, address is 000d.bdee.7901 (bia 000d.bdee.7901)
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, media type is RJ45
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: fifo
  Output queue :0/40 (size/max)
  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 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 watchdog, 1017 multicast, 0 pause input
    0 input packets with dribble condition detected
    0 packets output, 0 bytes, 0 underruns
    0 output errors, 0 collisions, 2 interface resets
    0 unknown protocol drops
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier
    0 output buffer failures, 0 output buffers swapped out
```

```
Serial0/0/0 is up, line protocol is up (connected)
```

```
FastEthernet0/1/0 is up, line protocol is down (disabled)
```

On peut voir qu'il y'a les interfaces GigabitEth / Serial et FastEthernet de disponibles.

2) Les propriétés par défaut sont : Addr MAC, Débit, Mode de transmission

```
FastEthernet0/1/0 is up, line protocol is down (disabled)
  Hardware is Lance, address is 0001.6319.ab01 (bia 0001.6319.ab01)
  BW 100000 Kbit, DLY 1000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Half-duplex, 100Mb/s
  input flow-control is off, output flow-control is off
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    956 packets input, 193351 bytes, 0 no buffer
      Received 956 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 watchdog, 0 multicast, 0 pause input
    0 input packets with dribble condition detected
  2357 packets output, 263570 bytes, 0 underruns
    0 output errors, 0 collisions, 10 interface resets
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier
    0 output buffer failures, 0 output buffers swapped out
```

Exemple :

Adresse MAC 0001.6319. ab01

Vitesse = 100Mb / s

Mode de transmission : Half – Duplex

3) Il faut utiliser des câbles droits. Car ce sont des équipements différents.

Après avoir connecté les deux pc on peut ping comme suit

Sous réseau 1 :

```
C:\>ping 192.128.10.4

Pinging 192.128.10.4 with 32 bytes of data:

Reply from 192.128.10.4: bytes=32 time<1ms TTL=128
Reply from 192.128.10.4: bytes=32 time<1ms TTL=128
Reply from 192.128.10.4: bytes=32 time<1ms TTL=128
Reply from 192.128.10.4: bytes=32 time<1ms TTL=128

Ping statistics for 192.128.10.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ipconfig

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address.....: FE80::2E0:B0FF:FE45:6A50
    IPv6 Address.....: ::
    IPv4 Address.....: 192.128.10.3
    Subnet Mask.....: 255.255.255.128
    Default Gateway.....: ::
                                0.0.0.0
```


5) La table de commutation du switch est :

```
Switch>show mac-address-table
      Mac Address Table
-----
Vlan    Mac Address      Type        Ports
----    -
1       000a.f382.9a35    DYNAMIC     Fa0/1
1       000d.bdee.7901    DYNAMIC     Gig0/1
1       00e0.b045.6a50    DYNAMIC     Fa0/3
Switch>
```

Exercice 4 :

Sous réseau 2 :

```
C:\>ipconfig

FastEthernet0 Connection: (default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::20A:F3FF:FEB4:7238
    IPv6 Address . . . . .: ::
    IPv4 Address. . . . .: 192.168.10.134
    Subnet Mask . . . . .: 255.255.255.128
    Default Gateway . . . . .: ::
                                192.168.10.129

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: ::
    IPv6 Address . . . . .: ::
    IPv4 Address. . . . .: 0.0.0.0
    Subnet Mask . . . . .: 0.0.0.0
    Default Gateway . . . . .: ::
                                0.0.0.0

C:\>ping 192.168.10.132

Pinging 192.168.10.132 with 32 bytes of data:

Reply from 192.168.10.132: bytes=32 time<1ms TTL=128
Reply from 192.168.10.132: bytes=32 time<1ms TTL=128
Reply from 192.168.10.132: bytes=32 time<1ms TTL=128
Reply from 192.168.10.132: bytes=32 time=1ms TTL=128

Ping statistics for 192.168.10.132:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

```
Switch>show mac-address-table
Mac Address Table
-----
Vlan    Mac Address      Type    Ports
-----
1       000a.f3b4.7238   DYNAMIC Fa0/2
1       000d.bdee.7902   DYNAMIC Gig0/1
1       0040.0b71.6db1   DYNAMIC Fa0/4
1       00d0.bc68.b9a7   DYNAMIC Fa0/5
```

Le test de connectivité fonctionne aussi entre les deux réseaux, parce que le routeur(équipement de 3 -ème niveau) agit comme lien entre les deux :

```
C:\>ipconfig

FastEthernet0 Connection: (default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::2E0:B0FF:FE45:6A50
    IPv6 Address . . . . .: ::
    IPv4 Address. . . . .: 192.168.10.3
    Subnet Mask . . . . .: 255.255.255.128
    Default Gateway . . . . .: ::
                                192.168.10.1

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: ::
    IPv6 Address . . . . .: ::
    IPv4 Address. . . . .: 0.0.0.0
    Subnet Mask . . . . .: 0.0.0.0
    Default Gateway . . . . .: ::
                                0.0.0.0

C:\>ping 192.168.10.131

Pinging 192.168.10.131 with 32 bytes of data:

Reply from 192.168.10.131: bytes=32 time<1ms TTL=127
Reply from 192.168.10.131: bytes=32 time<1ms TTL=127
Reply from 192.168.10.131: bytes=32 time=5ms TTL=127
Reply from 192.168.10.131: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.10.131:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 5ms, Average = 1ms
```

Le fichier running-config ne change pas vraiment car les ports du switch sont configurés dynamiquement en fonction de l'équipement qui y es connecté et il apprend automatiquement les adresses mac. Donc il n'y a pas besoin de le configurer explicitement.

Exercice 5 :

2) On utilise toujours un câble droit car il s'agit d'équipements différents.

3) Il s'agit du fichier Running-config, fichier de configuration du routeur.

La commande pour l'afficher comme pour le switch est :

« show running-config »

4) La commande est « show ip interface brief »

```
Router#show ip interface brief
Interface                IP-Address      OK? Method Status        Protocol
GigabitEthernet0/0       192.168.10.1    YES manual up            up
GigabitEthernet0/1       192.168.10.129 YES manual up            up
Serial0/0/0              192.168.30.1    YES manual up            up
Serial0/0/1              unassigned      YES unset  administratively down down
FastEthernet0/1/0        unassigned      YES unset  up            down
FastEthernet0/1/1        unassigned      YES unset  up            down
FastEthernet0/1/2        unassigned      YES unset  up            down
FastEthernet0/1/3        unassigned      YES unset  up            down
Vlan1                    unassigned      YES unset  administratively down down
Router#
```

Interfaces :

Gigabit / FastEthernet : Servent à connecter en LAN

Serial : Sert à connecter deux routeurs entre eux

Chaque interface doit être configurée avec une adresse IP et activée.

5) La commande pour afficher toutes les interfaces est

« Enable » suivie de « show interfaces »

Interface GigaBitEthernet0/1 :

```
Router#show interfaces GigabitEthernet0/1
GigabitEthernet0/1 is up, line protocol is up (connected)
  Hardware is CN Gigabit Ethernet, address is 000d.bdee.7902 (bia 000d.bdee.7902)
  Internet address is 192.168.10.129/25
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, media type is RJ45
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    20 packets input, 2560 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 watchdog, 1017 multicast, 0 pause input
    0 input packets with dribble condition detected
    20 packets output, 2784 bytes, 0 underruns
    0 output errors, 0 collisions, 2 interface resets
    0 unknown protocol drops
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier
    0 output buffer failures, 0 output buffers swapped out
```

Interface Serial0/0/0 :

```
Router#show interfaces Serial0/0/0
Serial0/0/0 is up, line protocol is up (connected)
Hardware is HD64570
Internet address is 192.168.30.1/24
MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
Encapsulation HDLC, loopback not set, keepalive set (10 sec)
Last input never, output never, 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: 0/1000/64/0 (size/max total/threshold/drops)
    Conversations 0/0/256 (active/max active/max total)
    Reserved Conversations 0/0 (allocated/max allocated)
    Available Bandwidth 1158 kilobits/sec
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 throttles
    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, 2 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions
DCD=up DSR=up DTR=up RTS=up CTS=up
```

Caractéristiques qu'on peut observer :

État : up ou administratively down

Bande passante (BW) :

GigaBitEthernet = 1000000 Kbit/sec

Serial = 1544 Kbit/sec

MTU : 1500 octets (par défaut)

Encapsulation :

Ethernet : ARPA

Serial : HDLC

Délai (DLY) : Serial(2000µsec) plus lent que GigaBitEthernet(10µsec)

6) Les types de routages disponibles sont :

Routage statique

RIP (Routing Information Protocol)

7)

Table de routage :

- Contient les chemins (routes) vers chaque réseau connu.
- Permet au routeur de décider vers quelle interface ou passerelle envoyer un paquet.

```
Router#show ip route
Codes: L - local, C - connected, S - static, 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

    192.168.10.0/24 is variably subnetted, 4 subnets, 2 masks
C       192.168.10.0/25 is directly connected, GigabitEthernet0/0
L       192.168.10.1/32 is directly connected, GigabitEthernet0/0
C       192.168.10.128/25 is directly connected, GigabitEthernet0/1
L       192.168.10.129/32 is directly connected, GigabitEthernet0/1
```

Table ARP (Address Resolution Protocol) :

- Fait la correspondance entre adresse IP et adresse MAC dans le LAN.
- Permet de trouver l'adresse MAC d'un hôte à partir de son IP.

```
Router#show arp
Protocol Address      Age (min)  Hardware Addr  Type   Interface
Internet 192.168.10.1      -         000D.BDEE.7901 ARPA   GigabitEthernet0/0
Internet 192.168.10.129   -         000D.BDEE.7902 ARPA   GigabitEthernet0/1
Router#
```

Exercice 6 :

2) Configuration Serial 0/0/0 :

Serial0/0/0	
Port Status	<input checked="" type="checkbox"/> On
Duplex	<input type="radio"/> Full Duplex
Clock Rate	2000000
IP Configuration	
IPv4 Address	192.168.30.1
Subnet Mask	255.255.255.0
Tx Ring Limit	10

Avant le routage : LAN1 -> LAN2

```
C:\>ping 192.168.20.131

Pinging 192.168.20.131 with 32 bytes of data:

Request timed out.
Reply from 192.168.10.1: Destination host unreachable.
```

4)

The screenshot shows the configuration window for Router0. The 'Config' tab is active, and the 'Static Routes' section is expanded. The 'Network' field is set to 192.168.20.0, the 'Mask' is 255.255.255.128, and the 'Next Hop' is 192.168.30.2. The 'Add' button is visible. In the 'Network Address' field, the text '192.168.20.0/25 via 192.168.30.2' is highlighted in yellow.

The screenshot shows the configuration window for Router1. The 'Config' tab is active, and the 'Static Routes' section is expanded. The 'Network' field is set to 192.168.10.0, the 'Mask' is 255.255.255.128, and the 'Next Hop' is 192.168.30.1. The 'Add' button is visible. In the 'Network Address' field, the text '192.168.10.0/25 via 192.168.30.1' is highlighted in yellow.

5) La connectivité entre les LAN's est bien vérifiée :

```
C:\>ipconfig

FastEthernet0 Connection: (default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::2E0:B0FF:FE45:6A50
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 192.168.10.3
    Subnet Mask . . . . .: 255.255.255.128
    Default Gateway . . . . .: ::
                                   192.168.10.1

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: ::
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 0.0.0.0
    Subnet Mask . . . . .: 0.0.0.0
    Default Gateway . . . . .: ::
                                   0.0.0.0

C:\>ping 192.168.20.3

Pinging 192.168.20.3 with 32 bytes of data:

Reply from 192.168.20.3: bytes=32 time=14ms TTL=126
Reply from 192.168.20.3: bytes=32 time=2ms TTL=126
Reply from 192.168.20.3: bytes=32 time=2ms TTL=126
Reply from 192.168.20.3: bytes=32 time=5ms TTL=126

Ping statistics for 192.168.20.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 14ms, Average = 5ms
```

La table ARP affiche l'adresse du PC à partir duquel le ping a été émis :

```
Router>enable
Router#show arp
Protocol Address          Age (min)  Hardware Addr  Type   Interface
-----
Internet 192.168.10.1             -    000D.BDEE.7901  ARPA   GigabitEthernet0/0
Internet 192.168.10.3            17    00E0.B045.6A50  ARPA   GigabitEthernet0/0
Internet 192.168.10.129          -    000D.BDEE.7902  ARPA   GigabitEthernet0/1
Router#
```

6) Voici la table de routage qui affiche bien 4 sous réseaux :

```
Router#show ip route
Codes: L - local, C - connected, S - static, 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

    192.168.10.0/24 is variably subnetted, 4 subnets, 2 masks
C       192.168.10.0/25 is directly connected, GigabitEthernet0/0
L       192.168.10.1/32 is directly connected, GigabitEthernet0/0
C       192.168.10.128/25 is directly connected, GigabitEthernet0/1
L       192.168.10.129/32 is directly connected, GigabitEthernet0/1
    192.168.20.0/25 is subnetted, 1 subnets
S       192.168.20.0/25 [1/0] via 192.168.30.2
    192.168.30.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.30.0/24 is directly connected, Serial0/0/0
L       192.168.30.1/32 is directly connected, Serial0/0/0
```