

COMPRENDRE ET CONFIGURER LE NAT & PAT SUR CISCO

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I. Introduction

Dans un réseau IP, la traduction d'adresses (NAT) est un mécanisme qui permet à des équipements internes utilisant des adresses IP privées d'accéder à l'extérieur via des adresses IP publiques.

Le PAT, variante du NAT, permet quant à lui à plusieurs hôtes de partager une seule adresse IP publique grâce à la différenciation des numéros de port.

Ce document présente la mise en œuvre de trois formes de NAT dans un environnement Cisco Packet Tracer :

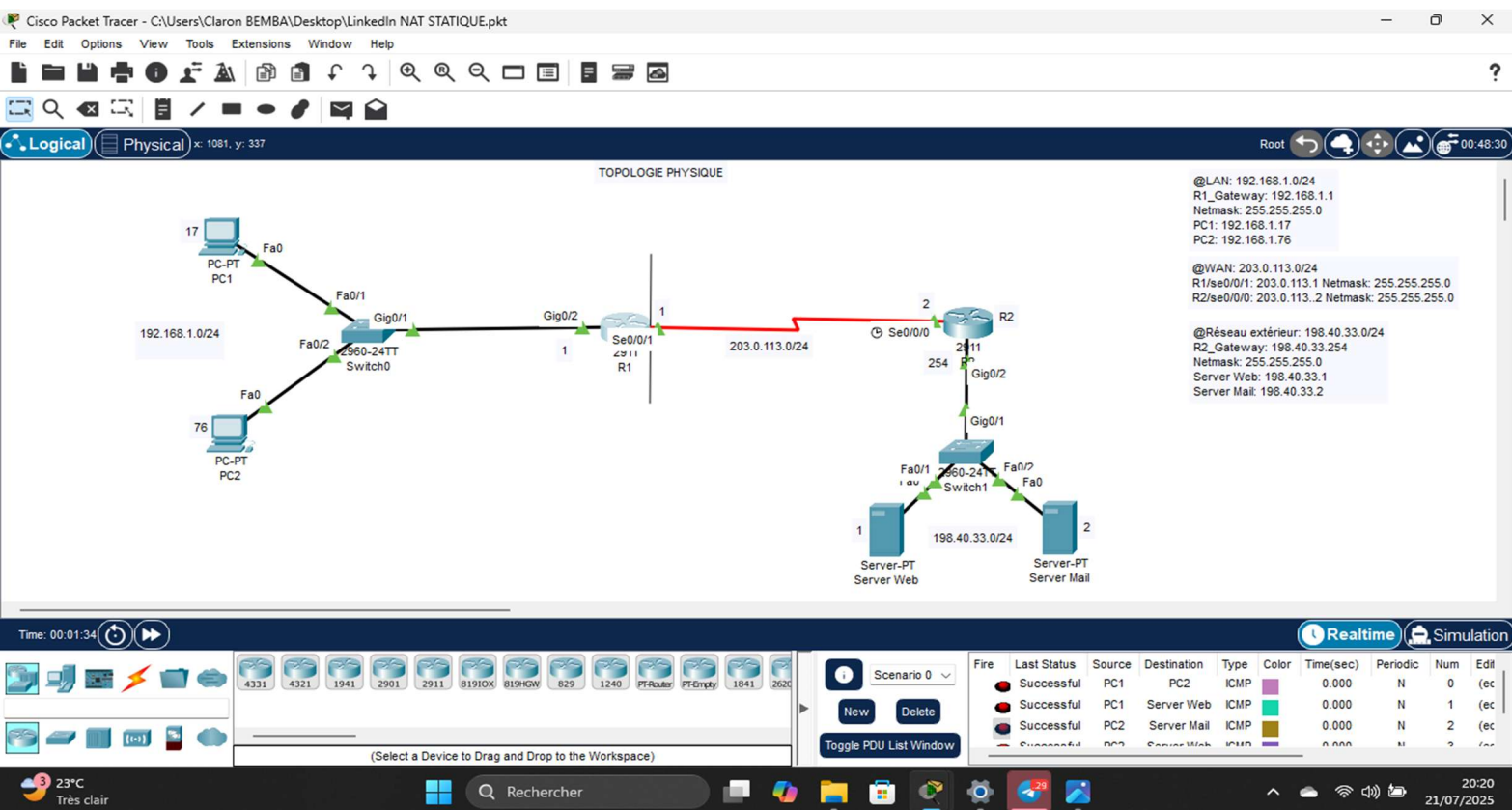
- NAT Statique
- NAT Dynamique
- PAT (NAT surcharge)

II. NAT Statique

1. Présentation

Le NAT statique établit une relation fixe entre une adresse IP privée et une adresse IP publique. Il est souvent utilisé pour permettre un accès externe permanent à un serveur interne (ex : serveur web, FTP, DNS, etc.).

2. Topologie



3. Configuration

- Configuration des interfaces
 - Routeur R1

```

R1(config)#interface G0/2
R1(config-if)#ip add 192.168.1.1 255.255.255.0
R1(config-if)#NO shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to up

R1(config-if)#
R1(config-if)#EXIT
R1(config)#interface Se0/0/1
R1(config-if)#ip address 203.0.113.1 255.255.255.0
R1(config-if)#no sh

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
R1(config-if)#

```

➤ Routeur R2

```

R2(config)#interface G0/2
R2(config-if)#ip address 198.40.33.254 255.255.255.0
R2(config-if)#no shutdown

R2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to up

R2(config-if)#exit
R2(config)#interface Se0/0/0
R2(config-if)#ip address 203.0.113.2 255.255.255.0
R2(config-if)#no shutdown

R2(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

R2(config-if)#

```

• Configuration du routage statique

➤ Routeur R1

```

R1(config)#
R1(config)#
R1(config)#ip route 198.40.33.0 255.255.255.0 203.0.113.2
R1(config)#

```

➤ Routeur R2

```

R2(config-if)#exit
R2(config)#ip route 192.168.1.0 255.255.255.0 203.0.113.1
R2(config)#

```

- *Vérification*

```
R1(config)#do 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

    192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/2
L       192.168.1.1/32 is directly connected, GigabitEthernet0/2
S       198.40.33.0/24 [1/0] via 203.0.113.2
    203.0.113.0/24 is variably subnetted, 2 subnets, 2 masks
C       203.0.113.0/24 is directly connected, Serial0/0/1
L       203.0.113.1/32 is directly connected, Serial0/0/1

R1(config)#
```

```
R2(config)#do 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

S       192.168.1.0/24 [1/0] via 203.0.113.1
    198.40.33.0/24 is variably subnetted, 2 subnets, 2 masks
C       198.40.33.0/24 is directly connected, GigabitEthernet0/2
L       198.40.33.254/32 is directly connected, GigabitEthernet0/2
    203.0.113.0/24 is variably subnetted, 2 subnets, 2 masks
C       203.0.113.0/24 is directly connected, Serial0/0/0
L       203.0.113.2/32 is directly connected, Serial0/0/0

R2(config)#
```

- *Configuration du NAT Statique*

```
R1(config)#ip nat inside source static 192.168.1.17 203.0.113.5
R1(config)#ip nat inside source static 192.168.1.76 203.0.113.36
R1(config)#interface G0/2
R1(config-if)#ip nat inside
R1(config-if)#exit
R1(config)#interface Se0/0/1
R1(config-if)#ip nat outside
```

4. Commandes de vérification

```
R1#show ip nat translations
Pro Inside global      Inside local      Outside local      Outside global
icmp 203.0.113.36:3     192.168.1.76:3   198.40.33.1:3     198.40.33.1:3
icmp 203.0.113.36:4     192.168.1.76:4   198.40.33.2:4     198.40.33.2:4
icmp 203.0.113.5:5      192.168.1.17:5   198.40.33.2:5     198.40.33.2:5
--- 203.0.113.36        192.168.1.76     ---               ---
--- 203.0.113.5         192.168.1.17     ---               ---
```

```

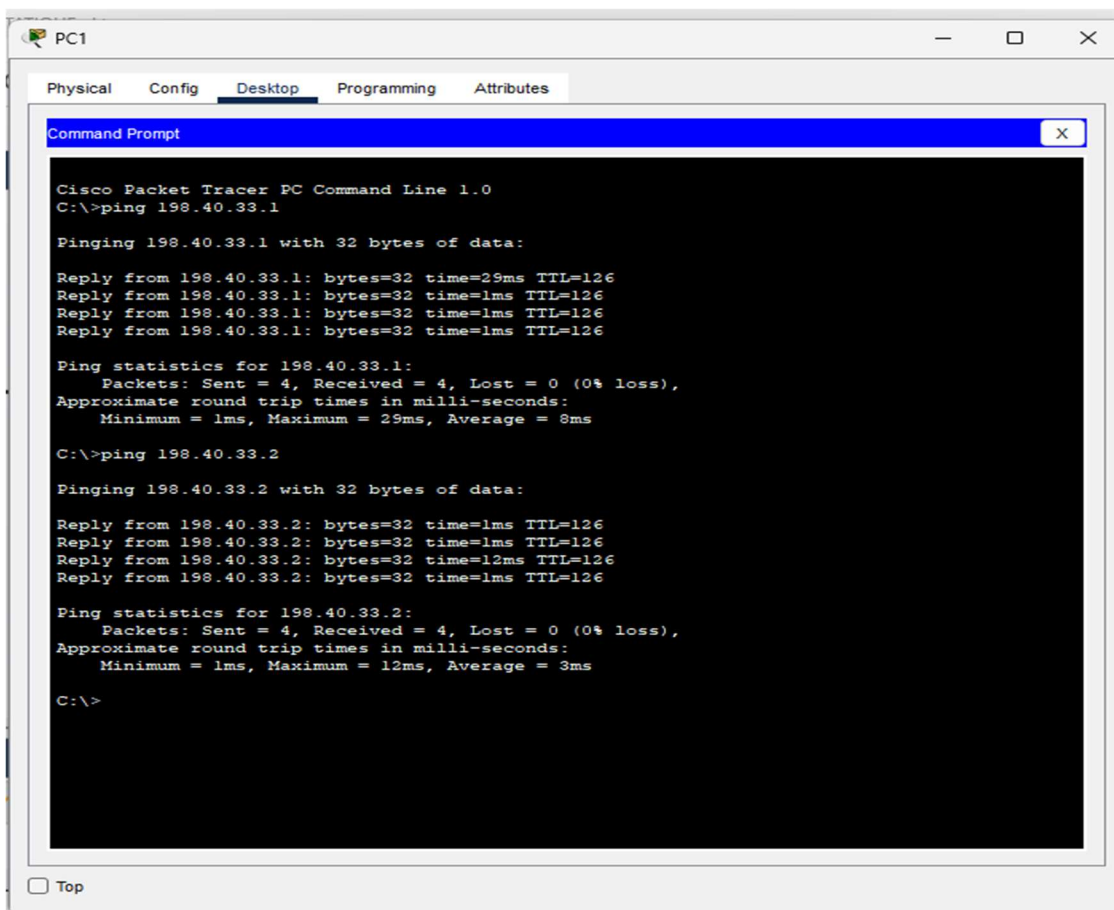
R1#show ip nat statistics
Total translations: 2 (2 static, 0 dynamic, 0 extended)
Outside Interfaces: Serial0/0/1
Inside Interfaces: GigabitEthernet0/2
Hits: 4 Misses: 4
Expired translations: 4
Dynamic mappings:
R1#clear ip nat translation *
R1#show ip nat statistics
Total translations: 2 (2 static, 0 dynamic, 0 extended)
Outside Interfaces: Serial0/0/1
Inside Interfaces: GigabitEthernet0/2
Hits: 4 Misses: 4
Expired translations: 4
Dynamic mappings:

```

```

R1#
R1#show running-config | include ip nat
ip nat inside
ip nat outside
ip nat inside source static 192.168.1.17 203.0.113.5
ip nat inside source static 192.168.1.76 203.0.113.36
R1#

```



PC2

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 198.40.33.1

Pinging 198.40.33.1 with 32 bytes of data:

Reply from 198.40.33.1: bytes=32 time=1ms TTL=126
Reply from 198.40.33.1: bytes=32 time=2ms TTL=126
Reply from 198.40.33.1: bytes=32 time=12ms TTL=126
Reply from 198.40.33.1: bytes=32 time=12ms TTL=126

Ping statistics for 198.40.33.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 12ms, Average = 6ms

C:\>ping 198.40.33.2

Pinging 198.40.33.2 with 32 bytes of data:

Reply from 198.40.33.2: bytes=32 time=1ms TTL=126
Reply from 198.40.33.2: bytes=32 time=1ms TTL=126
Reply from 198.40.33.2: bytes=32 time=1ms TTL=126
Reply from 198.40.33.2: bytes=32 time=1ms TTL=126

Ping statistics for 198.40.33.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\>
```

```
C:\>tracert 198.40.33.1

Tracing route to 198.40.33.1 over a maximum of 30 hops:

  1  23 ms    0 ms     0 ms    192.168.1.1
  2  13 ms    0 ms     1 ms    203.0.113.2
  3   0 ms    1 ms     2 ms    198.40.33.1

Trace complete.

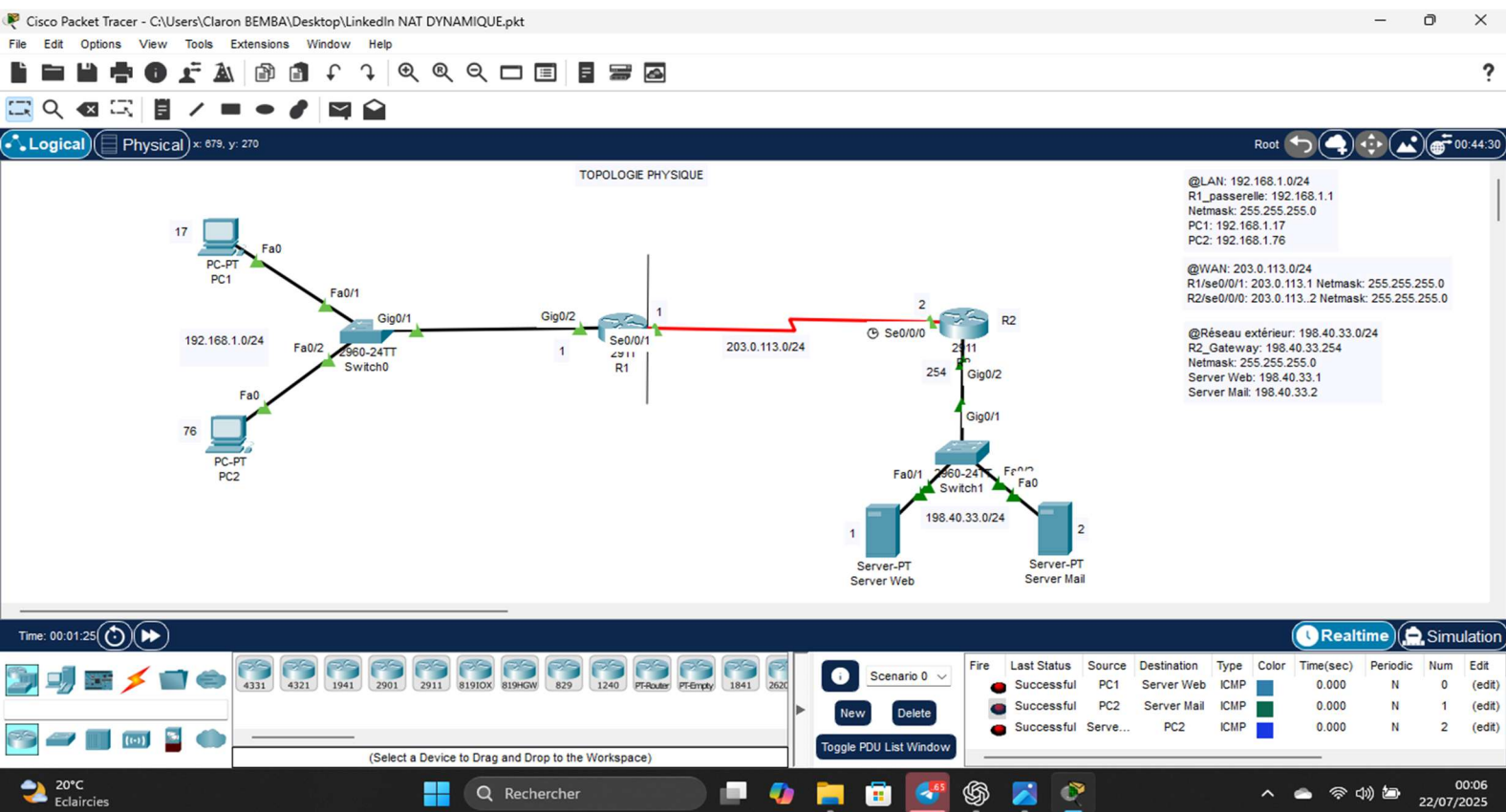
C:\>|
```


III. NAT DYNAMIQUE

1. Présentation

Le NAT dynamique permet de mapper dynamiquement une plage d'adresses privées à une plage d'adresses publiques. La correspondance n'est pas fixe.

2. Topologie



3. Configuration

Configuration du NAT Dynamique

```
R1(config)#ip nat pool NAT_POOL 203.0.113.3 203.0.113.10 netmask 255.255.255.0
R1(config)#access-list 1 permit 192.168.1.0 0.0.0.255
R1(config)#ip nat inside source list 1 pool NAT_POOL
R1(config)#interface G0/2
R1(config-if)#ip nat inside
R1(config-if)#exit
R1(config)#interface Se0/0/1
R1(config-if)#ip nat outside
R1(config-if)#
```

Commandes de vérification

```

R1(config)#do show ip nat translations
Pro Inside global      Inside local      Outside local      Outside global
icmp 203.0.113.3:1      192.168.1.17:1    198.40.33.2:1      198.40.33.2:1
icmp 203.0.113.3:3      192.168.1.17:3    198.40.33.1:3      198.40.33.1:3
icmp 203.0.113.4:3      192.168.1.76:3    198.40.33.1:3      198.40.33.1:3

R1(config)#do show ip nat statistics
Total translations: 2 (0 static, 2 dynamic, 2 extended)
Outside Interfaces: Serial0/0/1
Inside Interfaces: GigabitEthernet0/2
Hits: 2 Misses: 4
Expired translations: 1
Dynamic mappings:
-- Inside Source
access-list 1 pool NAT_POOL refCount 2
pool NAT_POOL: netmask 255.255.255.0
start 203.0.113.3 end 203.0.113.10
type generic, total addresses 8 , allocated 1 (12%), misses 0
R1(config)#

```

```

R1#show running-config | section nat
ip nat inside
ip nat outside
ip nat pool NAT_POOL 203.0.113.3 203.0.113.10 netmask 255.255.255.0
ip nat inside source list 1 pool NAT_POOL
R1#

```

PC1

Physical Config Desktop Programming Attributes

Command Prompt

```

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 198.40.33.1

Pinging 198.40.33.1 with 32 bytes of data:

Reply from 198.40.33.1: bytes=32 time=1ms TTL=126
Reply from 198.40.33.1: bytes=32 time=27ms TTL=126
Reply from 198.40.33.1: bytes=32 time=22ms TTL=126
Reply from 198.40.33.1: bytes=32 time=1ms TTL=126

Ping statistics for 198.40.33.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 27ms, Average = 12ms

C:\>198.40.33.2
Invalid Command.

C:\>ping 198.40.33.2

Pinging 198.40.33.2 with 32 bytes of data:

Reply from 198.40.33.2: bytes=32 time=1ms TTL=126
Reply from 198.40.33.2: bytes=32 time=1ms TTL=126
Reply from 198.40.33.2: bytes=32 time=2ms TTL=126
Reply from 198.40.33.2: bytes=32 time=21ms TTL=126

Ping statistics for 198.40.33.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 21ms, Average = 6ms

C:\>|

```

```
PC2
Physical  Config  Desktop  Programming  Attributes
Command Prompt X

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 198.40.33.2

Pinging 198.40.33.2 with 32 bytes of data:

Reply from 198.40.33.2: bytes=32 time=1ms TTL=126
Reply from 198.40.33.2: bytes=32 time=31ms TTL=126
Reply from 198.40.33.2: bytes=32 time=2ms TTL=126
Reply from 198.40.33.2: bytes=32 time=26ms TTL=126

Ping statistics for 198.40.33.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 31ms, Average = 15ms

C:\>ping 198.40.33.1

Pinging 198.40.33.1 with 32 bytes of data:

Reply from 198.40.33.1: bytes=32 time=1ms TTL=126
Reply from 198.40.33.1: bytes=32 time=1ms TTL=126
Reply from 198.40.33.1: bytes=32 time=24ms TTL=126
Reply from 198.40.33.1: bytes=32 time=10ms TTL=126

Ping statistics for 198.40.33.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 24ms, Average = 9ms

C:\>
```

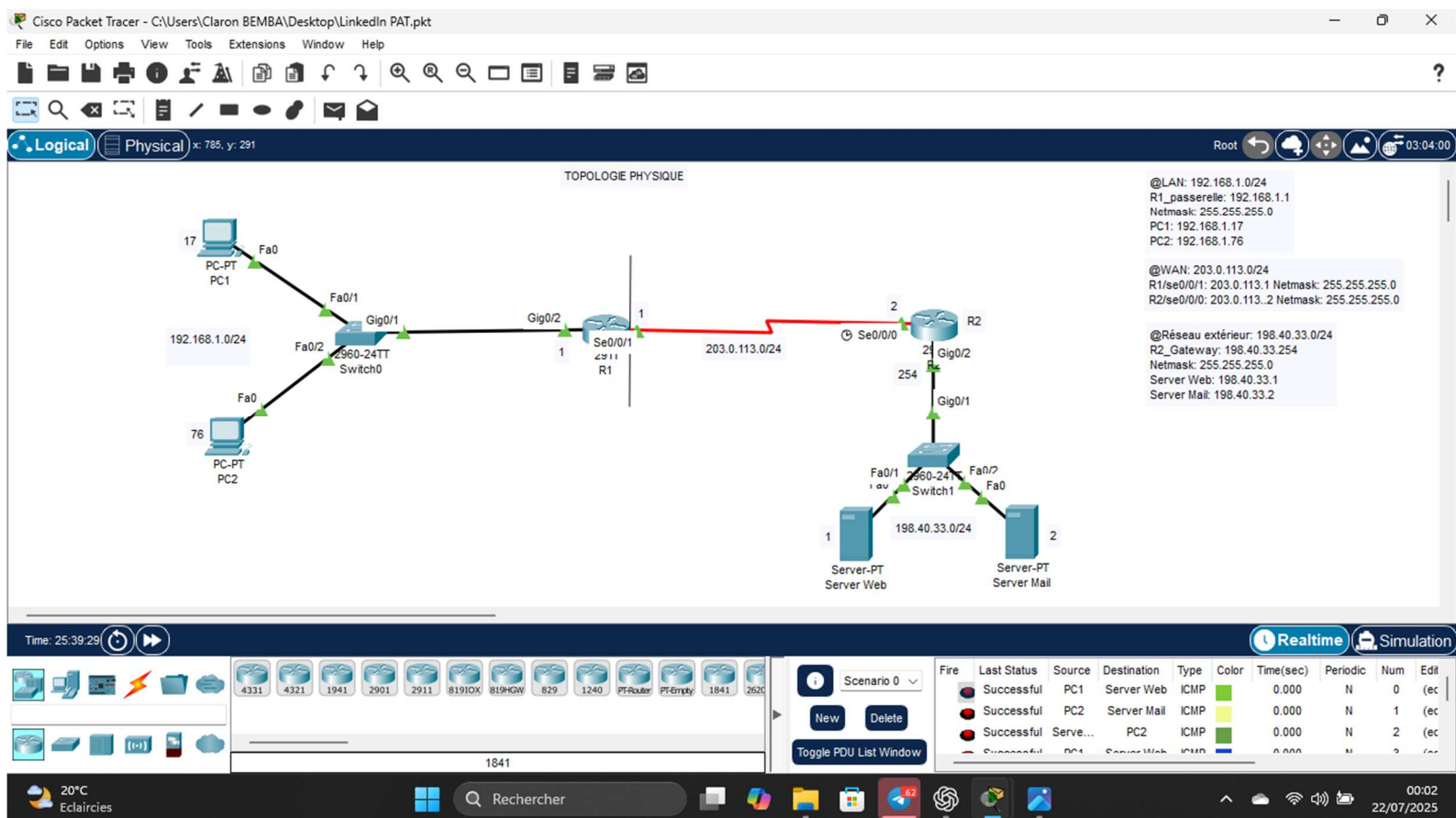
IV. PAT (Port Address Translation)

1. Présentation

Le PAT (aussi appelé NAT surcharge) permet à plusieurs hôtes du réseau local de partager une seule adresse IP publique.

Chaque connexion est différenciée à l'aide du numéro de port source.

2. Topologie



3. Configuration du PAT

```
R1(config)#Access-list 1 permit 192.168.1.0 0.0.0.255
R1(config)#ip nat inside source list 1 interface Se0/0/1 overload
R1(config)#interface G0/2
R1(config-if)#ip nat inside
R1(config-if)#exit
R1(config)#interface Se0/0/1
R1(config-if)#ip nat outside
R1(config-if)#exit
R1(config)#
```

4. Commandes de vérification

```

R1#sh ip nat translations
Pro  Inside global      Inside local      Outside local      Outside global
icmp 203.0.113.1:1024    192.168.1.76:5    198.40.33.2:5      198.40.33.2:1024
icmp 203.0.113.1:2      192.168.1.17:2    198.40.33.1:2      198.40.33.1:2
icmp 203.0.113.1:5      192.168.1.17:5    198.40.33.1:5      198.40.33.1:5

R1#

```

PC1

Physical Config Desktop Programming Attributes

Command Prompt

```

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 198.40.33.1

Pinging 198.40.33.1 with 32 bytes of data:

Reply from 198.40.33.1: bytes=32 time=2ms TTL=126
Reply from 198.40.33.1: bytes=32 time=1ms TTL=126
Reply from 198.40.33.1: bytes=32 time=1ms TTL=126
Reply from 198.40.33.1: bytes=32 time=1ms TTL=126

Ping statistics for 198.40.33.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 2ms, Average = 1ms

C:\>ping 198.40.33.2

Pinging 198.40.33.2 with 32 bytes of data:

Reply from 198.40.33.2: bytes=32 time=1ms TTL=126
Reply from 198.40.33.2: bytes=32 time=1ms TTL=126
Reply from 198.40.33.2: bytes=32 time=2ms TTL=126
Reply from 198.40.33.2: bytes=32 time=1ms TTL=126

Ping statistics for 198.40.33.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 2ms, Average = 1ms

C:\>

```

PC2

Physical Config Desktop Programming Attributes

Command Prompt

```

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 198.40.33.2

Pinging 198.40.33.2 with 32 bytes of data:

Reply from 198.40.33.2: bytes=32 time=2ms TTL=126
Reply from 198.40.33.2: bytes=32 time=1ms TTL=126
Reply from 198.40.33.2: bytes=32 time=10ms TTL=126
Reply from 198.40.33.2: bytes=32 time=31ms TTL=126

Ping statistics for 198.40.33.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 31ms, Average = 11ms

C:\>ping 198.40.33.1

Pinging 198.40.33.1 with 32 bytes of data:

Reply from 198.40.33.1: bytes=32 time=1ms TTL=126
Reply from 198.40.33.1: bytes=32 time=33ms TTL=126
Reply from 198.40.33.1: bytes=32 time=2ms TTL=126
Reply from 198.40.33.1: bytes=32 time=2ms TTL=126

Ping statistics for 198.40.33.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 33ms, Average = 9ms

C:\>

```

V. CONCLUSION

La mise en œuvre de ces différentes techniques de NAT permet une meilleure gestion des adresses IP publiques, une dissimulation des adresses privées internes, et contribue à limiter l'exposition directe du réseau local, tout en assurant une connectivité efficace vers Internet.

Grâce à Cisco Packet Tracer, nous avons pu simuler et comprendre :

- Comment fonctionne chaque type de NAT
- Comment les configurer et les vérifier
- Dans quels cas les utiliser en production