

DHCP

ATELIER 1

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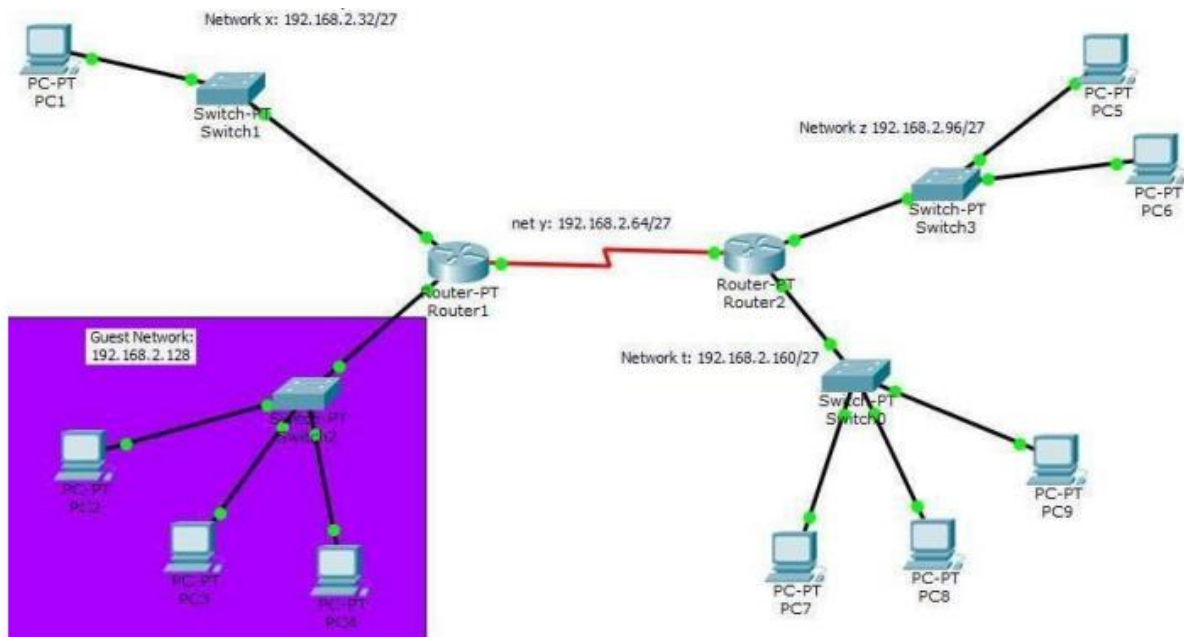
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1-Introduction

L'objectif de cet atelier est d'apprendre à configurer un serveur DHCP afin de distribuer automatiquement des adresses IP aux périphériques

Nous allons tout d'abord réaliser la maquette suivante sur Cisco Packet Tracer :



Nous ferons ensuite la configuration des différents équipements notamment l'attribution des adresses IP ainsi que les tables de routage.

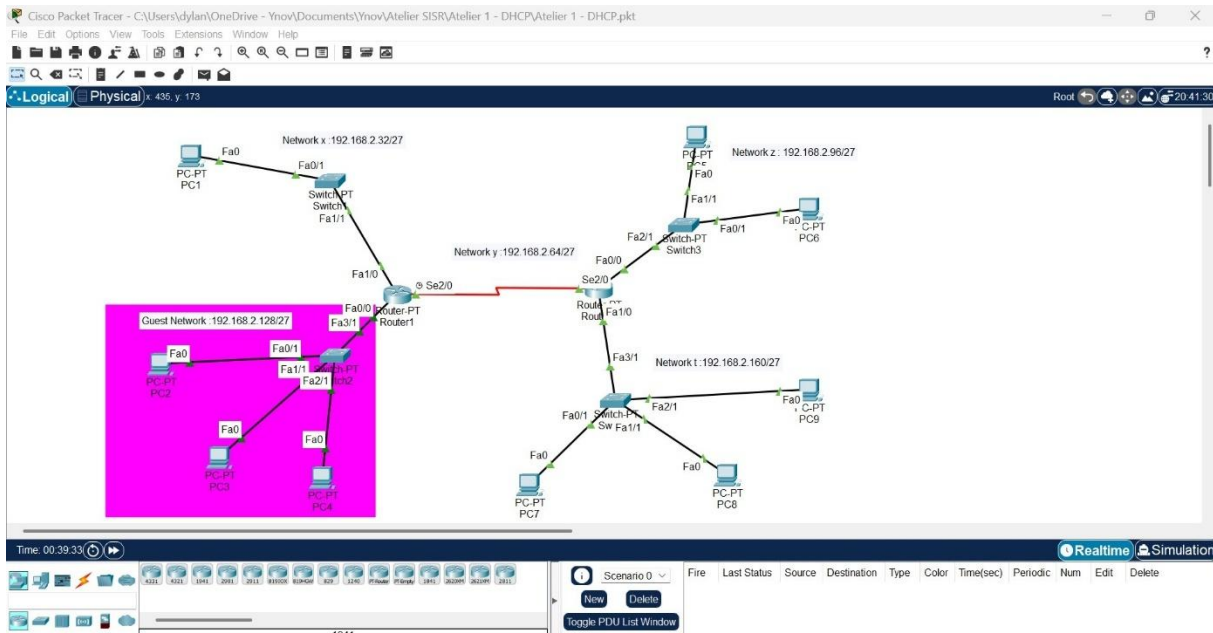
Dans un second temps, nous intégrerons un serveur DHCP au réseau. Il faudra ensuite configurer ce serveur DHCP afin d'automatiser l'attribution des adresses IP.

Nous terminerons par une phase de tests afin de valider notre infrastructure.

2-Réalisation de la maquette dans Cisco Packet Tracer

Tracer

Voici la maquette réalisée dans Cisco Packet Tracer :



Notre infrastructure est composée de 5 réseaux reliés entre eux par 2 routeurs.

L'ensemble du réseau utilise un masque de sous-réseau à longueur fixe (FLSM) en **/27**, ce qui correspond au masque décimal **255.255.255.224**. La première adresse disponible de chaque sous-réseau est systématiquement attribuée à l'interface du routeur (Passerelle par défaut)

Si plusieurs routeurs sont connectés sur un sous-réseau, le routeur ayant l'identifiant le plus bas se voit attribuer la première adresse disponible.

Chaque fois qu'une adresse doit être attribuée, la première adresse disponible est utilisée

Nom du Réseau	Adresse Réseau	CIDR	Masque	Passerelle (Routeur)
Network x	192.168.2.32	/27	255.255.255.224	192.168.2.33
Network y	192.168.2.64	/27	255.255.255.224	N/A (Lien)
Network z	192.168.2.96	/27	255.255.255.224	192.168.2.97
Guest Network	192.168.2.128	/27	255.255.255.224	192.168.2.129

Nom du Réseau	Adresse Réseau	CIDR	Masque	Passerelle (Routeur)
Network t	192.168.2.160	/27	255.255.255.224	192.168.2.161

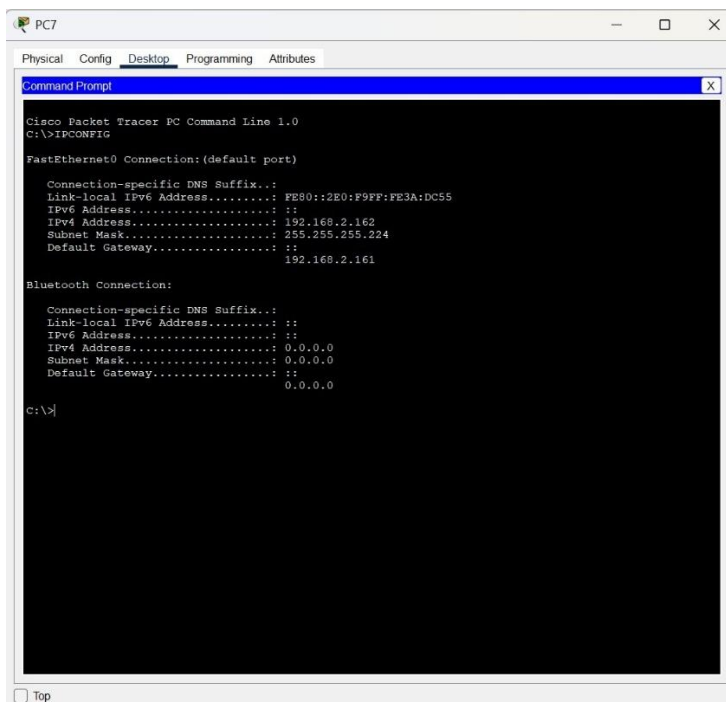
3-Configuration statique

Pour cette infrastructure, nous allons configurer un Sous-réseau FLSM /27

Voici le Masque de sous-réseau correspondant : 255.255.255.224

On configure les équipements en réservant la première adresse de chaque sous-réseau pour le routeur

Configuration du PC7 :



The screenshot shows a Cisco Packet Tracer window for PC7. The 'Desktop' tab is active, displaying a 'Command Prompt' window. The command prompt shows the following configuration for the FastEthernet0 interface:

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

FastEthernet0 Connection: (default port)

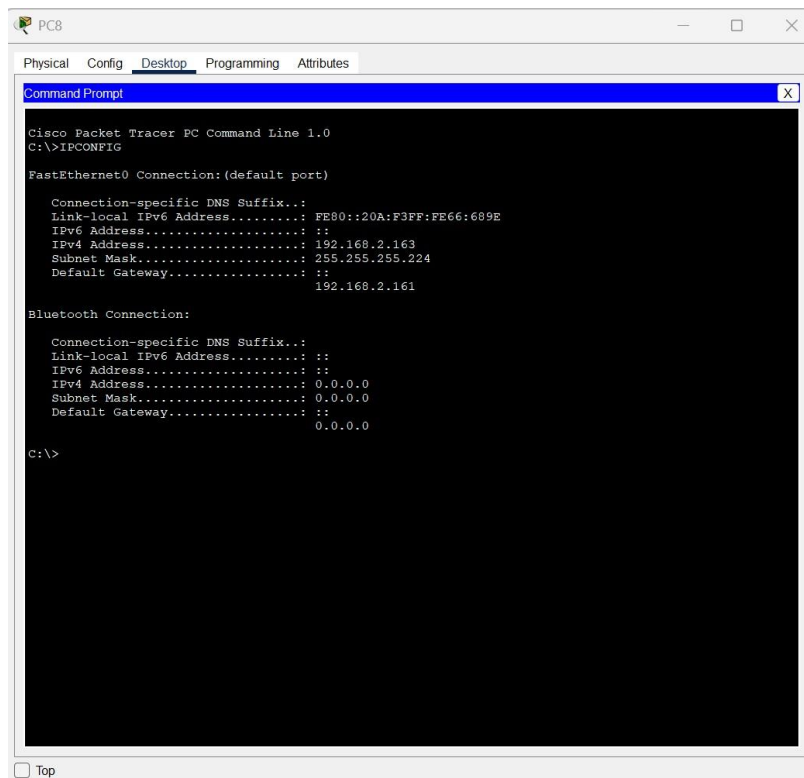
    Connection-specific DNS Suffix...:
    Link-local IPv6 Address...: FE80::2E0:F9FF:FE3A:DC55
    IPv6 Address...: ::
    IPv4 Address...: 192.168.2.162
    Subnet Mask...: 255.255.255.224
    Default Gateway...: ::
    192.168.2.161

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:\>
```

Configuration du PC8 :



The screenshot shows the configuration window for PC8 in Cisco Packet Tracer. The window has tabs for Physical, Config, Desktop, Programming, and Attributes. The Desktop tab is active, showing a Command Prompt window. The Command Prompt displays the output of the 'show ipconfig' command, showing the configuration for the FastEthernet0 interface. The configuration includes a Link-local IPv6 Address of FE80::20A:F3FF:FE66:689E, an IPv6 Address of ::, an IPv4 Address of 192.168.2.163, a Subnet Mask of 255.255.255.224, and a Default Gateway of 192.168.2.161. The Bluetooth connection is also shown with a Link-local IPv6 Address of ::, an IPv6 Address of ::, an IPv4 Address of 0.0.0.0, a Subnet Mask of 0.0.0.0, and a Default Gateway of 0.0.0.0.

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

FastEthernet0 Connection:(default port)

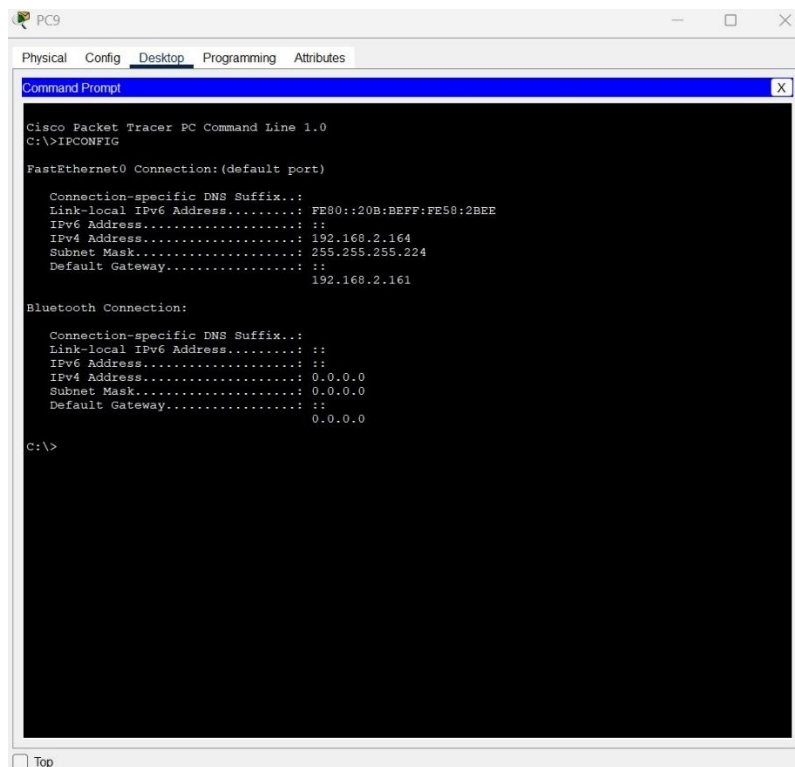
    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::20A:F3FF:FE66:689E
    IPv6 Address . . . . . : ::
    IPv4 Address . . . . . : 192.168.2.163
    Subnet Mask . . . . . : 255.255.255.224
    Default Gateway . . . . . :
                                192.168.2.161

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:\>
```

Configuration du PC9 :



The screenshot shows the configuration window for PC9 in Cisco Packet Tracer. The window has tabs for Physical, Config, Desktop, Programming, and Attributes. The Desktop tab is active, showing a Command Prompt window. The Command Prompt displays the output of the 'show ipconfig' command, showing the configuration for the FastEthernet0 interface. The configuration includes a Link-local IPv6 Address of FE80::20B:BEFF:FE58:2BEE, an IPv6 Address of ::, an IPv4 Address of 192.168.2.164, a Subnet Mask of 255.255.255.224, and a Default Gateway of 192.168.2.161. The Bluetooth connection is also shown with a Link-local IPv6 Address of ::, an IPv6 Address of ::, an IPv4 Address of 0.0.0.0, a Subnet Mask of 0.0.0.0, and a Default Gateway of 0.0.0.0.

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

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::20B:BEFF:FE58:2BEE
    IPv6 Address . . . . . : ::
    IPv4 Address . . . . . : 192.168.2.164
    Subnet Mask . . . . . : 255.255.255.224
    Default Gateway . . . . . :
                                192.168.2.161

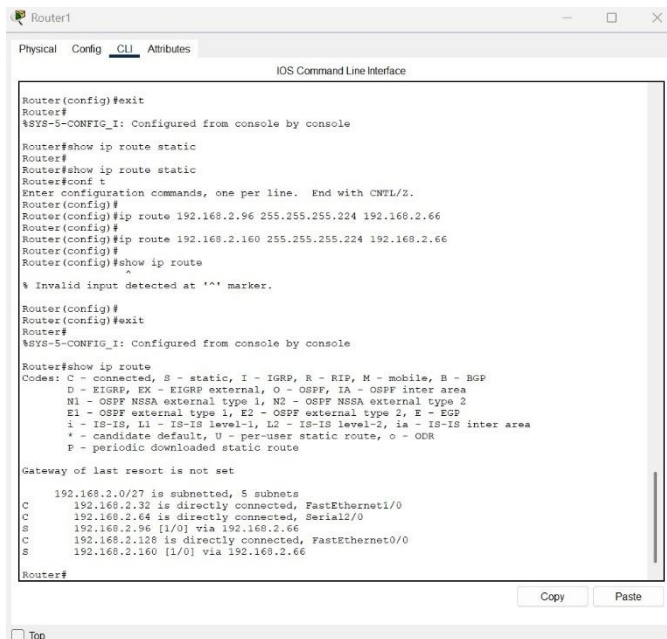
Bluetooth Connection:

    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:\>
```

Nous allons ensuite configurer les tables de routages statiques :

Routeur 1 :



```
Router1
Physical Config CLI Attributes
IOS Command Line Interface

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

Router#show ip route static
Router#
Router#show ip route static
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#ip route 192.168.2.96 255.255.255.224 192.168.2.66
Router(config)#
Router(config)#ip route 192.168.2.160 255.255.255.224 192.168.2.66
Router(config)#
Router(config)#show ip route

% Invalid input detected at '^' marker.

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

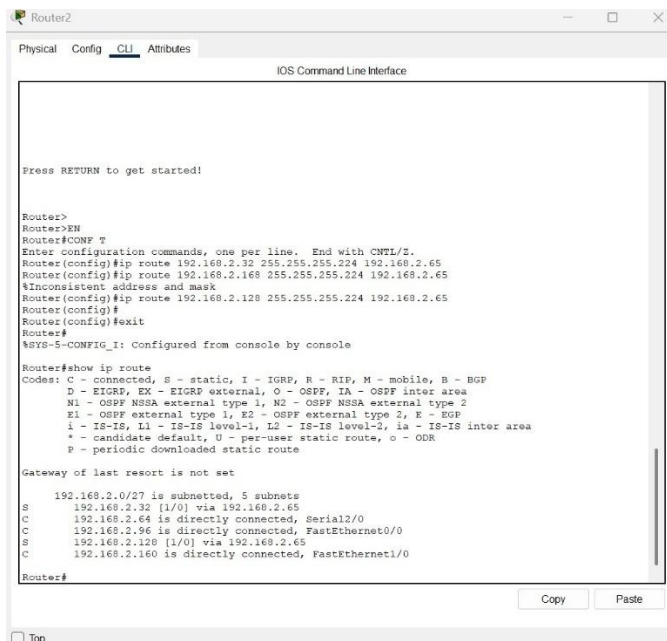
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - 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

192.168.2.0/27 is subnetted, 5 subnets
C      192.168.2.32 is directly connected, FastEthernet1/0
C      192.168.2.64 is directly connected, Serial2/0
S      192.168.2.96 [1/0] via 192.168.2.66
C      192.168.2.128 is directly connected, FastEthernet0/0
S      192.168.2.160 [1/0] via 192.168.2.66

Router#
```

Routeur 2 :



```
Router2
Physical Config CLI Attributes
IOS Command Line Interface

Press RETURN to get started!

Router>
Router>EN
Router#CONF T
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 192.168.2.32 255.255.255.224 192.168.2.65
Router(config)#ip route 192.168.2.168 255.255.255.224 192.168.2.65
%Inconsistent address and mask
Router(config)#ip route 192.168.2.128 255.255.255.224 192.168.2.65
Router(config)#
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#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
        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

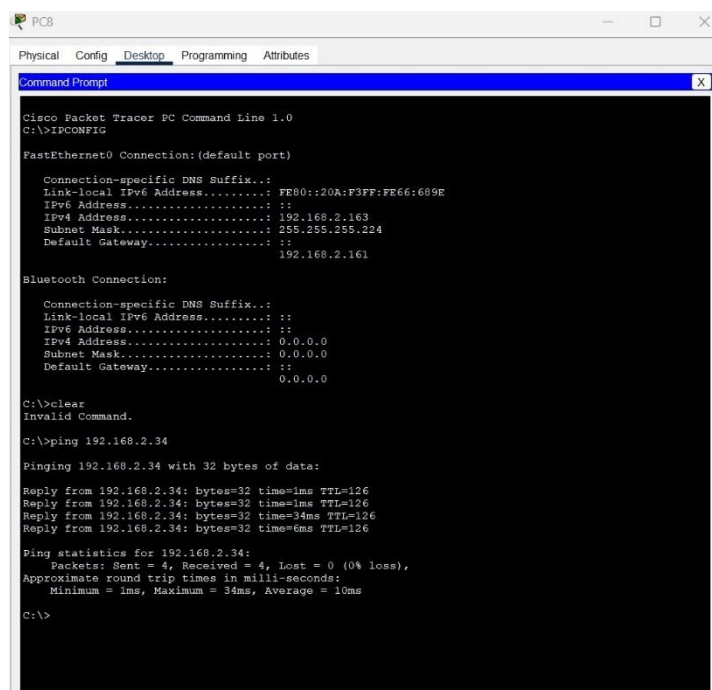
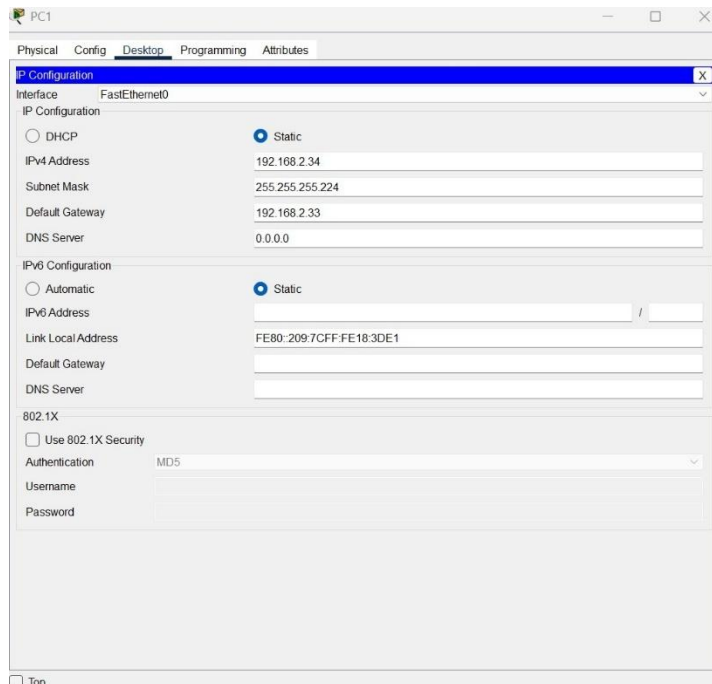
Gateway of last resort is not set

192.168.2.0/27 is subnetted, 5 subnets
S      192.168.2.32 [1/0] via 192.168.2.65
C      192.168.2.64 is directly connected, Serial2/0
C      192.168.2.96 is directly connected, FastEthernet0/0
S      192.168.2.128 [1/0] via 192.168.2.65
C      192.168.2.160 is directly connected, FastEthernet1/0

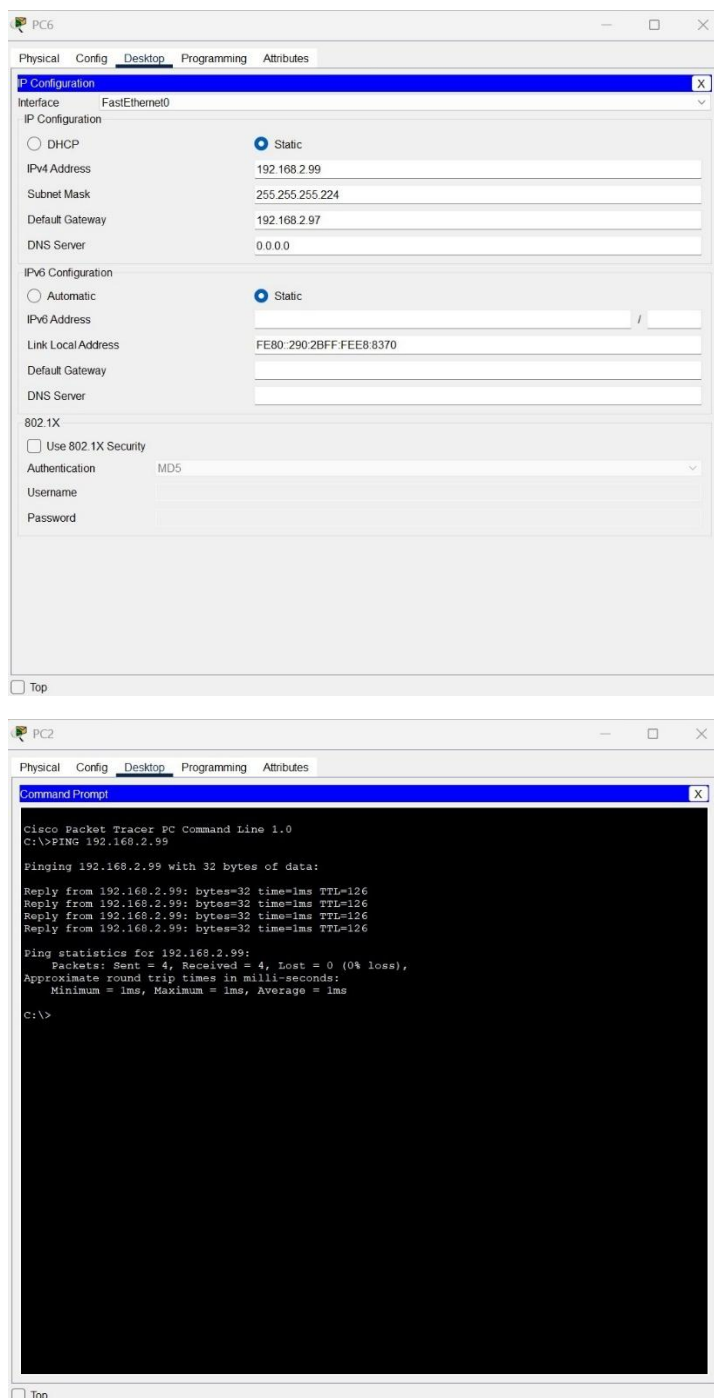
Router#
```


Effectuons quelques tests de notre configuration

Test Ping de PC1 depuis PC8 :



Test Ping de PC6 depuis PC2 :



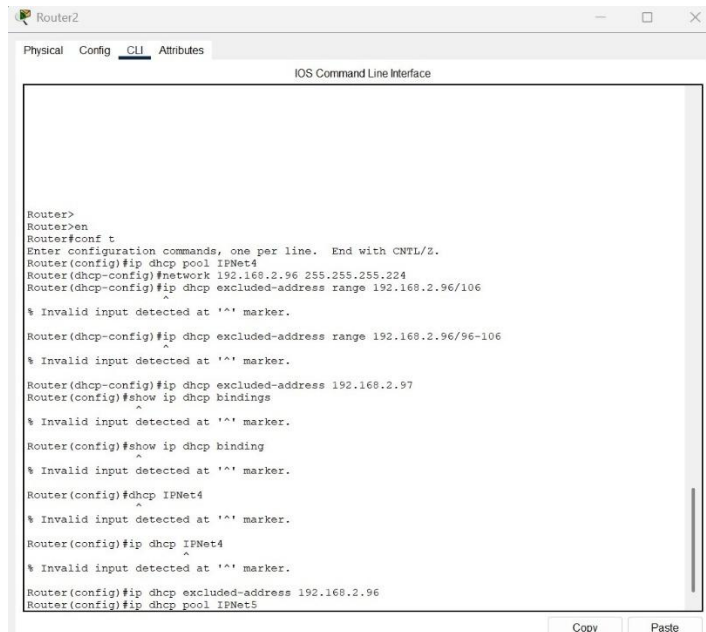
Les PC peuvent bien communiquer entre eux. Les routes ont bien été configurées

4-Configuration DHCP sur un routeur

Nous allons désormais configurer le DHCP sur le routeur 2

On configure deux pools d'adresses DHCP pour 2 réseaux :

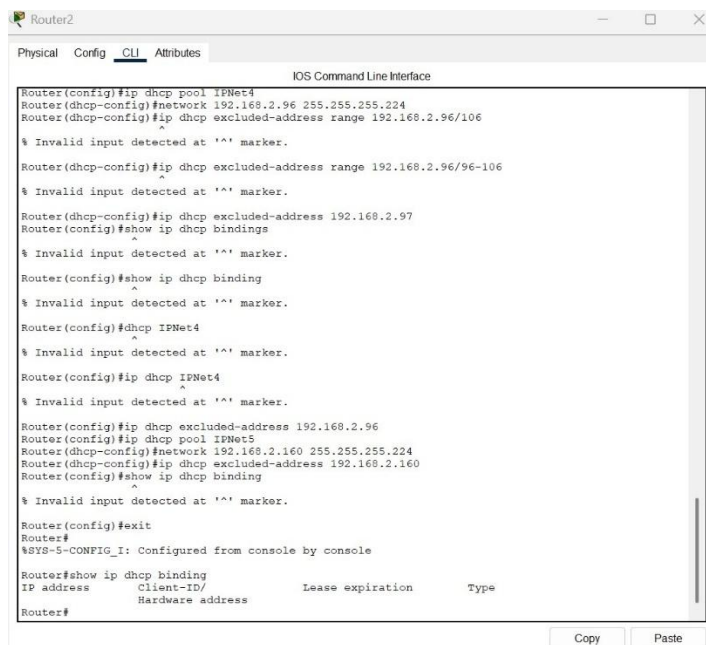
IPNet4 : 192.168.2.96/27



```
Router2
Physical Config CLI Attributes
IOS Command Line Interface

Router>
Router>en
Router>conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip dhcp pool IPNet4
Router(dhcp-config)#network 192.168.2.96 255.255.255.224
Router(dhcp-config)#ip dhcp excluded-address range 192.168.2.96/106
^
% Invalid input detected at '^' marker.
Router(dhcp-config)#ip dhcp excluded-address range 192.168.2.96/96-106
^
% Invalid input detected at '^' marker.
Router(dhcp-config)#ip dhcp excluded-address 192.168.2.97
Router(config)#show ip dhcp bindings
^
% Invalid input detected at '^' marker.
Router(config)#show ip dhcp binding
^
% Invalid input detected at '^' marker.
Router(config)#dhcp IPNet4
^
% Invalid input detected at '^' marker.
Router(config)#ip dhcp IPNet4
^
% Invalid input detected at '^' marker.
Router(config)#ip dhcp excluded-address 192.168.2.96
Router(config)#ip dhcp pool IPNet5
```

IPNet5 : 192.168.2.160/27

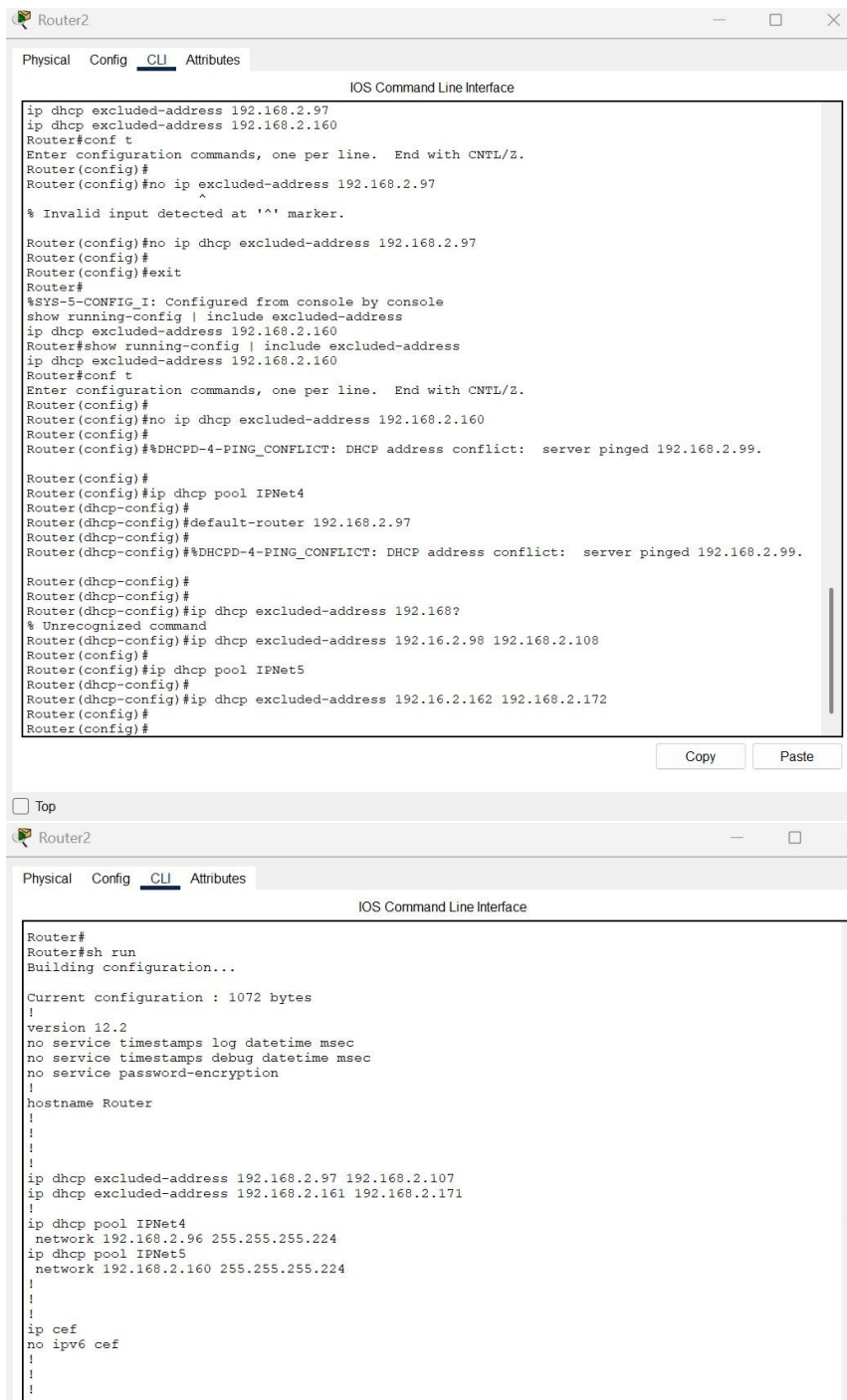


```
Router2
Physical Config CLI Attributes
IOS Command Line Interface

Router(config)#ip dhcp pool IPNet4
Router(dhcp-config)#network 192.168.2.96 255.255.255.224
Router(dhcp-config)#ip dhcp excluded-address range 192.168.2.96/106
^
% Invalid input detected at '^' marker.
Router(dhcp-config)#ip dhcp excluded-address range 192.168.2.96/96-106
^
% Invalid input detected at '^' marker.
Router(dhcp-config)#ip dhcp excluded-address 192.168.2.97
Router(config)#show ip dhcp bindings
^
% Invalid input detected at '^' marker.
Router(config)#show ip dhcp binding
^
% Invalid input detected at '^' marker.
Router(config)#dhcp IPNet4
^
% Invalid input detected at '^' marker.
Router(config)#ip dhcp IPNet4
^
% Invalid input detected at '^' marker.
Router(config)#ip dhcp excluded-address 192.168.2.96
Router(config)#ip dhcp pool IPNet5
Router(dhcp-config)#network 192.168.2.160 255.255.255.224
Router(dhcp-config)#ip dhcp excluded-address 192.168.2.160
Router(config)#show ip dhcp binding
^
% Invalid input detected at '^' marker.
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#show ip dhcp binding
IP address      Client-ID/      Lease expiration        Type
                Hardware address
Router#
```

On décide d'exclure les 10 premières adresses du Pool d'adresses disponibles dans chaque DHCP



The image displays two screenshots of a Cisco Router2 CLI interface, showing the configuration of DHCP pools and excluded addresses.

Top Screenshot:

```
Router2
Physical Config CLI Attributes
IOS Command Line Interface

ip dhcp excluded-address 192.168.2.97
ip dhcp excluded-address 192.168.2.160
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#no ip excluded-address 192.168.2.97
^
% Invalid input detected at '^' marker.

Router(config)#no ip dhcp excluded-address 192.168.2.97
Router(config)#
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
show running-config | include excluded-address
ip dhcp excluded-address 192.168.2.160
Router#show running-config | include excluded-address
ip dhcp excluded-address 192.168.2.160
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#no ip dhcp excluded-address 192.168.2.160
Router(config)#
Router(config)#%DHCPD-4-PING_CONFLICT: DHCP address conflict: server pinged 192.168.2.99.

Router(config)#
Router(config)#ip dhcp pool IPNet4
Router(dhcp-config)#
Router(dhcp-config)#default-router 192.168.2.97
Router(dhcp-config)#
Router(dhcp-config)#%DHCPD-4-PING_CONFLICT: DHCP address conflict: server pinged 192.168.2.99.

Router(dhcp-config)#
Router(dhcp-config)#
Router(dhcp-config)#ip dhcp excluded-address 192.168.2.97
% Unrecognized command
Router(dhcp-config)#ip dhcp excluded-address 192.168.2.98 192.168.2.108
Router(config)#
Router(config)#ip dhcp pool IPNet5
Router(dhcp-config)#
Router(dhcp-config)#
Router(dhcp-config)#ip dhcp excluded-address 192.168.2.162 192.168.2.172
Router(config)#
Router(config)#
```

Bottom Screenshot:

```
Router2
Physical Config CLI Attributes
IOS Command Line Interface

Router#
Router#sh run
Building configuration...

Current configuration : 1072 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Router
!
!
!
!
ip dhcp excluded-address 192.168.2.97 192.168.2.107
ip dhcp excluded-address 192.168.2.161 192.168.2.171
!
ip dhcp pool IPNet4
 network 192.168.2.96 255.255.255.224
ip dhcp pool IPNet5
 network 192.168.2.160 255.255.255.224
!
!
!
ip cef
no ipv6 cef
!
!
!
```

On modifie l'attribution d'adresse IP du PC5 et PC7. Elle sera désormais attribuée automatiquement par le DHCP

Nouvelle adresse DHCP sur le PC5 :

The screenshot shows the configuration window for PC5. The 'Desktop' tab is selected. Under 'IP Configuration', the 'Interface' is 'FastEthernet0'. The 'IP Configuration' section has 'DHCP' selected. The 'IPv6 Configuration' section has 'Static' selected. The '802.1X' section has 'Use 802.1X Security' unchecked.

Field	Value
IPv4 Address	192.168.2.108
Subnet Mask	255.255.255.224
Default Gateway	192.168.2.97
DNS Server	0.0.0.0
IPv6 Address	
Link Local Address	FE80::207:ECFF:FE30:CD95
Default Gateway	
DNS Server	
Use 802.1X Security	<input type="checkbox"/>
Authentication	MD5
Username	
Password	

Nouvelle IP du PC7 :

The screenshot shows the configuration window for PC7. The 'Desktop' tab is selected. Under 'IP Configuration', the 'Interface' is 'FastEthernet0'. The 'IP Configuration' section has 'DHCP' selected. The 'IPv6 Configuration' section has 'Static' selected. The '802.1X' section has 'Use 802.1X Security' unchecked.

Field	Value
IPv4 Address	192.168.2.172
Subnet Mask	255.255.255.224
Default Gateway	192.168.2.161
DNS Server	0.0.0.0
IPv6 Address	
Link Local Address	FE80::2E0:F9FF:FE3A:DC55
Default Gateway	
DNS Server	
Use 802.1X Security	<input type="checkbox"/>
Authentication	MD5
Username	
Password	

5-Configuration réseau avec serveur DHCP

On rajoute un nouveau routeur et on configure un nouveau réseau 192.168.2.192 :

The screenshot shows the configuration window for Router2, specifically the 'Config' tab for the 'Serial3/0' interface. The left sidebar shows a tree view with 'GLOBAL' and 'INTERFACE' sections. Under 'INTERFACE', 'Serial3/0' is selected. The main area displays the configuration for 'Serial3/0' with the following settings:

- Port Status: On
- Duplex: Full Duplex
- Clock Rate: 2000000
- IP Configuration:
 - IPv4 Address: 192.168.2.193
 - Subnet Mask: 255.255.255.224
- Tx Ring Limit: 10

Below the configuration area, the 'Equivalent IOS Commands' section shows the following commands:

```
Router(config)#ip address 192.168.2.193 255.255.255.224
Router(config)#
Router(config)#interface Serial3/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#interface Serial3/0
Router(config-if)#
```

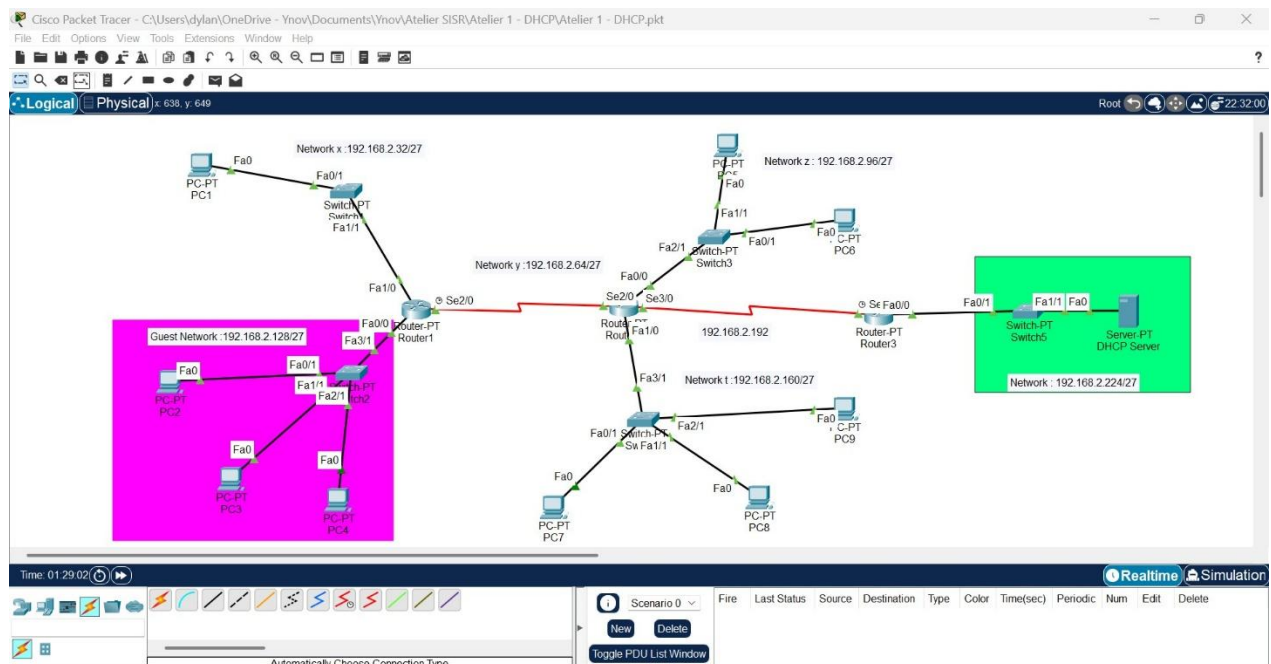
The screenshot shows the configuration window for Router3, specifically the 'Config' tab for the 'Serial2/0' interface. The left sidebar shows a tree view with 'GLOBAL' and 'INTERFACE' sections. Under 'INTERFACE', 'Serial2/0' is selected. The main area displays the configuration for 'Serial2/0' with the following settings:

- Port Status: On
- Duplex: Full Duplex
- Clock Rate: 2000000
- IP Configuration:
 - IPv4 Address: 192.168.2.194
 - Subnet Mask: 255.255.255.224
- Tx Ring Limit: 10

Below the configuration area, the 'Equivalent IOS Commands' section shows the following commands:

```
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#ip address 192.168.2.194 255.255.255.224
Router(config-if)#ip address 192.168.2.194 255.255.255.224
Router(config-if)#
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
```

Puis on rajoute un switch et un serveur DHCP dans un nouveau réseau 192.168.2.224/27 :



Nom du Réseau	Adresse Réseau	CIDR	Masque	Passerelle (Routeur)
Network x	192.168.2.32	/27	255.255.255.224	192.168.2.33
Network y	192.168.2.64	/27	255.255.255.224	N/A (Lien)
Network z	192.168.2.96	/27	255.255.255.224	192.168.2.97
Guest Network	192.168.2.128	/27	255.255.255.224	192.168.2.129
Network t	192.168.2.160	/27	255.255.255.224	192.168.2.161
Lien R2-R3	192.168.2.192	/27	255.255.255.224	N/A (Lien)
Server DHCP	192.168.2.224	/27	255.255.255.224	192.168.2.225

On configure une nouvelle Pool “GuestsPool” dans le serveur DHCP pour le réseau Guest (en violet sur la maquette) :

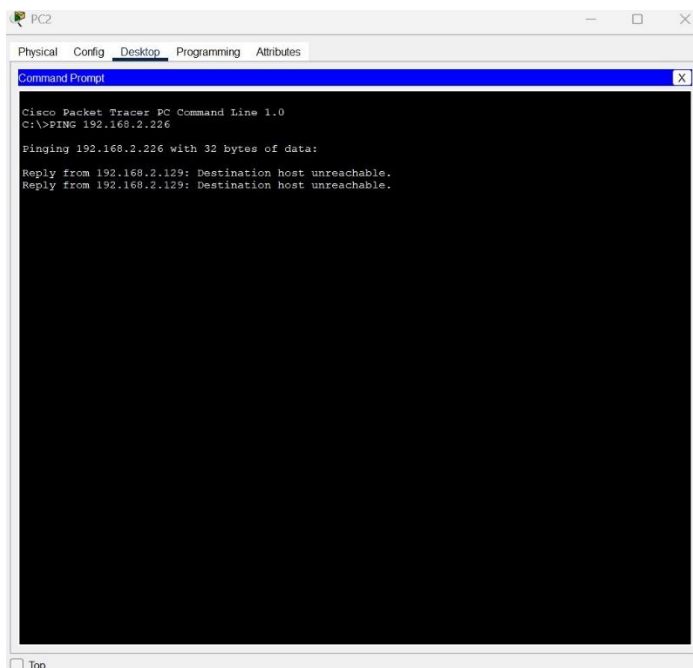
The screenshot shows the 'DHCP Server' configuration window. The 'Services' tab is selected. On the left, a list of services includes HTTP, DHCP (highlighted), DHCPv6, TFTP, DNS, SYSLOG, AAA, NTP, EMAIL, FTP, IoT, VM Management, and Radius EAP. The main area is titled 'DHCP' and shows the configuration for the 'FastEthernet0' interface. The 'Service' is set to 'On'. The 'Pool Name' is 'guestsPool'. The 'Default Gateway' is '192.168.2.129'. The 'DNS Server' is '0.0.0.0'. The 'Start IP Address' is '192.168.2.192' and the 'Subnet Mask' is '255.255.255.224'. The 'Maximum Number of Users' is '21'. The 'TFTP Server' and 'WLC Address' are both '0.0.0.0'. Below the configuration fields, there are 'Add', 'Save', and 'Remove' buttons. At the bottom, a table lists the configured pools:

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
guestsPool	192.168.2.129	0.0.0.0	192.168.2.192	255.255.255.224	21	0.0.0.0	0.0.0.0
serverPool	0.0.0.0	0.0.0.0	192.168.2.192	255.255.255.224	512	0.0.0.0	0.0.0.0

Voici l’adresse IP du serveur DHCP :

The screenshot shows the 'DHCP Server' configuration window. The 'Config' tab is selected. On the left, a list of configuration options includes GLOBAL (Settings, Algorithm Settings), INTERFACE (FastEthernet0), and a 'Top' button. The main area is titled 'FastEthernet0' and shows the configuration for the 'FastEthernet0' interface. The 'Port Status' is 'On'. The 'Bandwidth' is '100 Mbps'. The 'Duplex' is 'Full Duplex'. The 'MAC Address' is '000C.8559.DEC0'. The 'IP Configuration' is set to 'Static'. The 'IPv4 Address' is '192.168.2.226' and the 'Subnet Mask' is '255.255.255.224'. The 'IPv6 Configuration' is set to 'Static'. The 'IPv6 Address' is 'FE80::20C:85FF:FE59:DEC0' and the 'Link Local Address' is 'FE80::20C:85FF:FE59:DEC0'.

On fait un Test ping du serveur DHCP depuis PC2 :



```
PC2
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>PING 192.168.2.226
Pinging 192.168.2.226 with 32 bytes of data:
Reply from 192.168.2.129: Destination host unreachable.
Reply from 192.168.2.129: Destination host unreachable.
```

Ping impossible car la route vers le réseau du serveur DHCP n'a pas été configurée

On configure les routes sur les routeurs :



```
Router1
Physical Config CLI Attributes
IOS Command Line Interface
Router#show ip binding
% Invalid input detected at '^' marker.
Router#show ip dhcp binding
IP address      Client-ID/      Lease expiration        Type
-----
Router#

Router con0 is now available

Press RETURN to get started.

Router>
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 192.168.2.224 255.255.255.224 192.168.2.66
Router(config)#
```

Router2

Physical Config CLI Attributes

IOS Command Line Interface

```
Router(config)#interface Serial3/0
Router(config-if)#ip address 192.168.2.225 255.255.255.224
Router(config-if)#ip address 192.168.2.225 255.255.255.224
Router(config-if)#Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#interface Serial3/0
Router(config-if)#ip address 192.168.2.225 255.255.255.224
Router(config-if)#Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#interface Serial3/0
Router(config-if)#ip address 192.168.2.225 255.255.255.224
Router(config-if)#ip address
% Incomplete command.
Router(config-if)#Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#ip address 192.168.2.193 255.255.255.224
Router(config-if)#ip address 192.168.2.193 255.255.255.224
Router(config-if)#Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#interface Serial3/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#interface Serial3/0
Router(config-if)#Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#
Router(config)#ip route 192.168.2.224 255.255.255.224 192.168.2.194
Router#
$SYS-5-CONFIG_I: Configured from console by console

Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 192.168.2.224 255.255.255.224 192.168.2.194
Router(config)#
Router(config)#
```

Copy Paste

Router3

Physical Config CLI Attributes

IOS Command Line Interface

```
Press RETURN to get started!

Router>
Router>
Router>EN
Router#CONF T
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route
% Incomplete command.
Router(config)#
Router(config)#exit
Router#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
       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

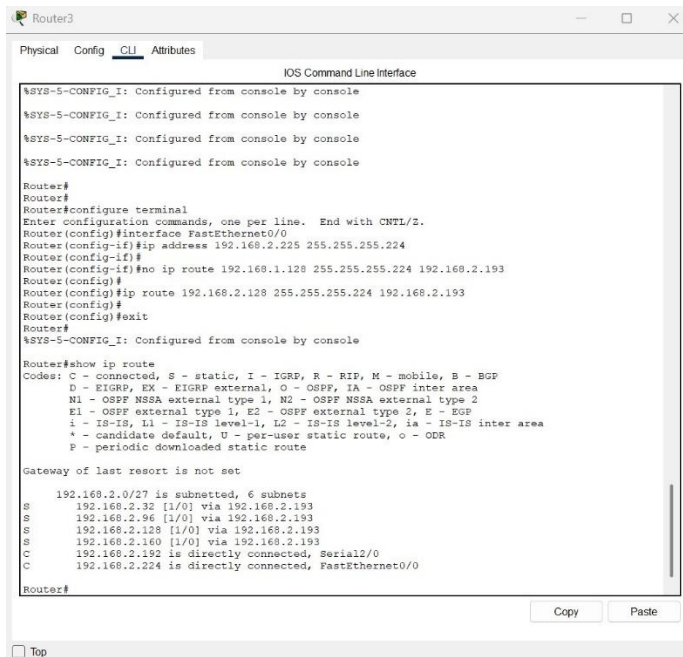
Gateway of last resort is not set

  192.168.2.0/27 is subnetted, 2 subnets
  C      192.168.2.192 is directly connected, Serial2/0
  C      192.168.2.224 is directly connected, FastEthernet0/0

Router#
Router#ip route 192.168.1.128 255.255.255.224 192.168.2.193
% Invalid input detected at '^' marker.

Router#
Router#CONF T
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#
Router#CONF T
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 192.168.1.128 255.255.255.224 192.168.2.193
Router(config)#
Router(config)#
```

Copy Paste



```
Router3
Physical Config CLI Attributes
IOS Command Line Interface

%SYS-5-CONFIG_I: Configured from console by console
%SYS-5-CONFIG_I: Configured from console by console
%SYS-5-CONFIG_I: Configured from console by console
%SYS-5-CONFIG_I: Configured from console by console

Router#
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.2.225 255.255.255.224
Router(config-if)#
Router(config-if)#no ip route 192.168.1.128 255.255.255.224 192.168.2.193
Router(config)#
Router(config)#ip route 192.168.2.128 255.255.255.224 192.168.2.193
Router(config)#
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

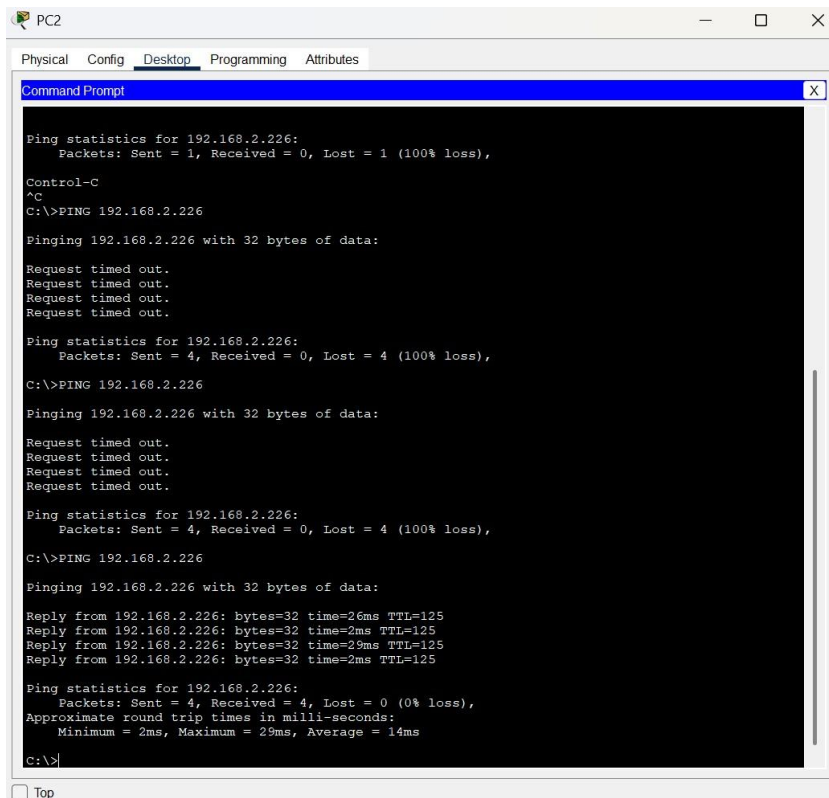
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - 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
        F - periodic downloaded static route

Gateway of last resort is not set

192.168.2.0/27 is subnetted, 6 subnets
S      192.168.2.32 [1/0] via 192.168.2.193
S      192.168.2.96 [1/0] via 192.168.2.193
S      192.168.2.128 [1/0] via 192.168.2.193
S      192.168.2.160 [1/0] via 192.168.2.193
C      192.168.2.192 is directly connected, Serial2/0
C      192.168.2.224 is directly connected, FastEthernet0/0

Router#
```

On re teste le ping depuis PC2 vers le serveur DHCP :



```
PC2
Physical Config Desktop Programming Attributes
Command Prompt

Ping statistics for 192.168.2.226:
    Packets: Sent = 1, Received = 0, Lost = 1 (100% loss),

Control-C
^C
C:\>PING 192.168.2.226

Pinging 192.168.2.226 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.2.226:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>PING 192.168.2.226

Pinging 192.168.2.226 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.2.226:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>PING 192.168.2.226

Pinging 192.168.2.226 with 32 bytes of data:

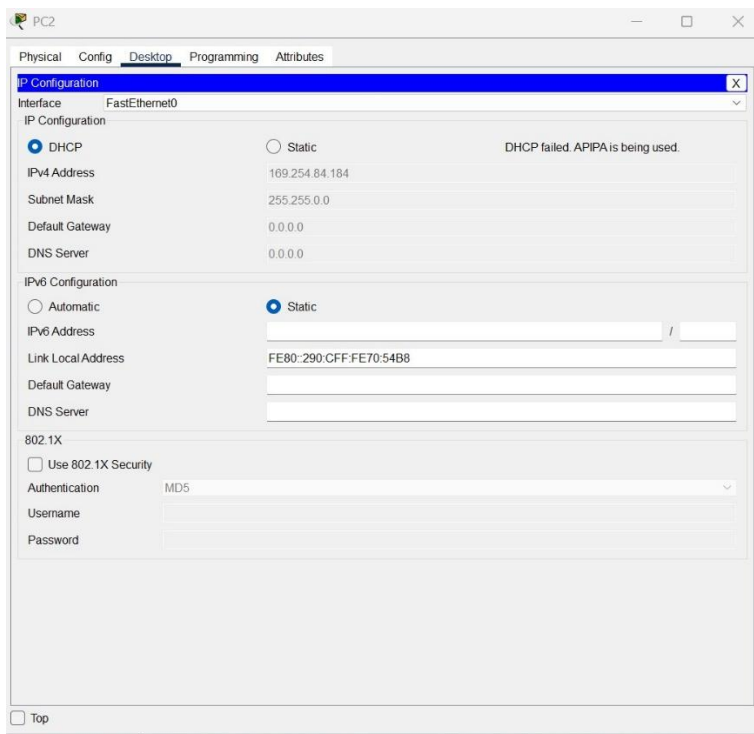
Reply from 192.168.2.226: bytes=32 time=26ms TTL=125
Reply from 192.168.2.226: bytes=32 time=2ms TTL=125
Reply from 192.168.2.226: bytes=32 time=29ms TTL=125
Reply from 192.168.2.226: bytes=32 time=2ms TTL=125

Ping statistics for 192.168.2.226:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 29ms, Average = 14ms

C:\>
```

Le ping fonctionne correctement désormais, le PC2 peut communiquer avec le serveur DHCP

Test de l'attribution automatique d'une adresse IP sur le PC2 :

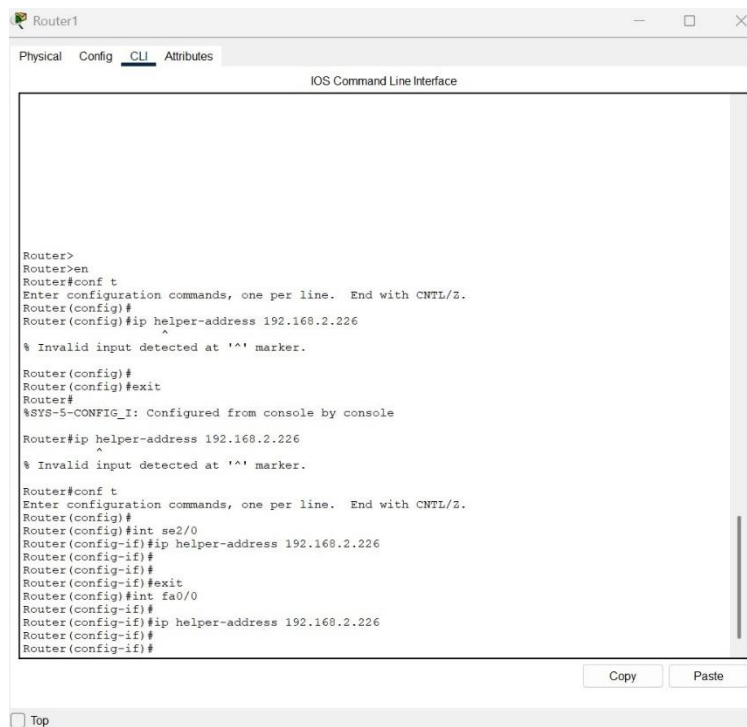


Le serveur DHCP n'a pas attribué une bonne adresse IP a PC2.

Après avoir déplacé le service DHCP sur un serveur dédié (192.168.2.226) situé dans un réseau différent, nous constatons que les PC du réseau "Guest" (192.168.2.128) ne reçoivent plus d'adresse IP. Cela s'explique par le fonctionnement du protocole DHCP : les requêtes initiales (DHCP DISCOVER) sont des **diffusions (Broadcasts)**. Par défaut, les routeurs bloquent les diffusions et ne les transmettent pas aux autres réseaux

Pour permettre aux clients de communiquer avec le serveur DHCP distant, nous devons configurer le routeur faisant office de passerelle (Routeur 1) comme un **Agent Relais**. La commande **ip helper-address** permet d'intercepter les diffusions DHCP reçues sur l'interface du client et de les transformer en paquets **Unicast** dirigés spécifiquement vers l'adresse IP du serveur DHCP.

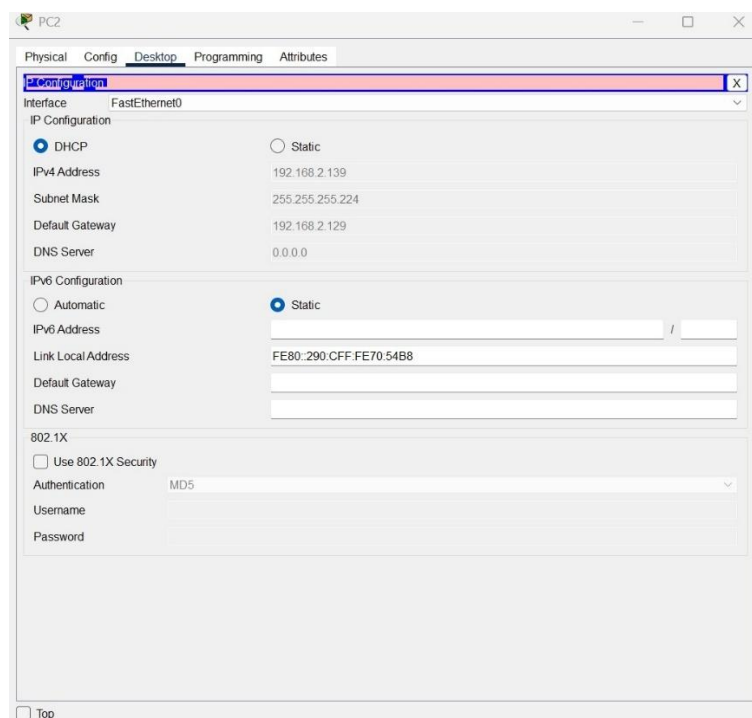
Il faut configurer le passage du DHCP sur les interfaces des 3 routeurs :



The screenshot shows the CLI of Router1 with the following configuration commands entered:

```
Router>
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#ip helper-address 192.168.2.226
Router#
% Invalid input detected at '^' marker.
Router(config)#
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#ip helper-address 192.168.2.226
Router#
% Invalid input detected at '^' marker.
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#int s2/0
Router(config-if)#ip helper-address 192.168.2.226
Router(config-if)#
Router(config-if)#exit
Router(config)#int fa0/0
Router(config-if)#
Router(config-if)#ip helper-address 192.168.2.226
Router(config-if)#
Router(config-if)#
```

Désormais, le DHCP fonctionne correctement sur le PC2 :



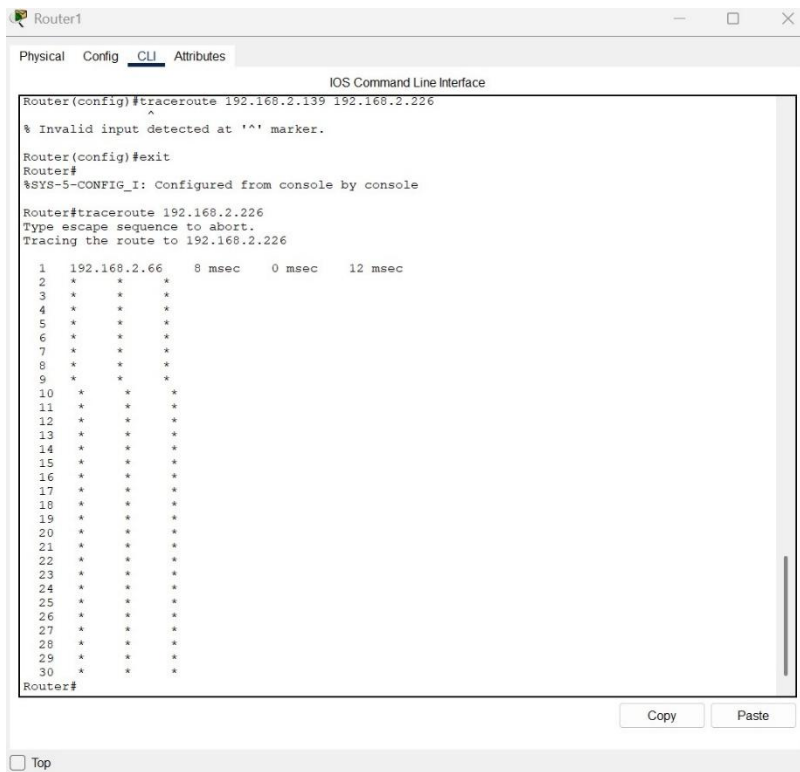
The screenshot shows the configuration window for PC2, specifically the 'Configuration' tab. The 'Interface' is set to 'FastEthernet0'. The 'IP Configuration' section shows 'DHCP' selected. The 'IPv6 Configuration' section shows 'Static' selected. The '802.1X' section shows 'Use 802.1X Security' unchecked and 'Authentication' set to 'MD5'.

IP Configuration	
<input checked="" type="radio"/> DHCP	<input type="radio"/> Static
IPv4 Address	192.168.2.139
Subnet Mask	255.255.255.224
Default Gateway	192.168.2.129
DNS Server	0.0.0.0

IPv6 Configuration	
<input type="radio"/> Automatic	<input checked="" type="radio"/> Static
IPv6 Address	
Link Local Address	FE80::290:CFF:FE70:54B8
Default Gateway	
DNS Server	

802.1X	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MD5
Username	
Password	

Traceroute entre le routeur 1 et le serveur DHCP



The screenshot shows a Cisco Router CLI window titled "Router1". The window has tabs for "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is active, displaying the "IOS Command Line Interface". The command history shows the following sequence of commands and outputs:

```
Router(config)#traceroute 192.168.2.139 192.168.2.226
^
% Invalid input detected at '^' marker.
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#traceroute 192.168.2.226
Type escape sequence to abort.
Tracing the route to 192.168.2.226

 0  192.168.2.66      8 msec    0 msec    12 msec
 1  * * *
 2  * * *
 3  * * *
 4  * * *
 5  * * *
 6  * * *
 7  * * *
 8  * * *
 9  * * *
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *
```

At the bottom of the CLI window, there are "Copy" and "Paste" buttons. Below the CLI window, there is a "Top" button.

6-Conclusion

Cet atelier nous a permis de mettre en œuvre et de comparer différentes méthodes d'adressage IP au sein d'une infrastructure réseau hiérarchisée sous Cisco Packet Tracer.

Nous avons débuté par une **configuration statique**, utile pour comprendre les bases du sous-réseau (subnetting) et du routage, mais fastidieuse à maintenir. Nous avons ensuite évolué vers une **automatisation avec le protocole DHCP**.

Les points clés de cet apprentissage sont :

- **Le DHCP sous IOS Cisco** : Nous avons appris à transformer un routeur en serveur DHCP, en gérant les pools d'adresses et, point crucial, en excluant les adresses statiques pour éviter les conflits IP.
- **Le Routage Statique** : L'interconnexion des différents réseaux a nécessité une configuration rigoureuse des tables de routage pour assurer la communication de bout en bout.
- **L'architecture Client/Serveur et Relais DHCP** : La dernière partie a mis en évidence une contrainte majeure des réseaux segmentés : les requêtes DHCP (Broadcast) ne traversent pas les routeurs. La mise en place de l'agent relais via la commande `ip helper-address` a été indispensable pour permettre aux clients du réseau "Guest" d'obtenir une configuration IP depuis un serveur dédié situé dans un autre réseau.

En conclusion, ce projet valide ma capacité à déployer une infrastructure réseau fonctionnelle, évolutive et automatisée, tout en résolvant les problématiques de routage et de distribution d'adresses.