

Institut Universitaire des Sciences

Faculté des Sciences et Technologies

Td5 dans le cadre du cours de Réseaux 2

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Mai 2025 # Reproduction de la topologie en implémentant le Protocole de Routage OSPF dans un Réseau

Introduction

Ce rapport documente la configuration et l'implémentation du protocole de routage **OSPF** dans un réseau, illustrée par une série de captures d'écran. L'objectif est de montrer les différentes étapes de mise en place des éléments réseaux et leur interaction.

1. Architecture du réseau

Voici la topologie du réseau utilisée pour l'implémentation du protocole **OSPF** :

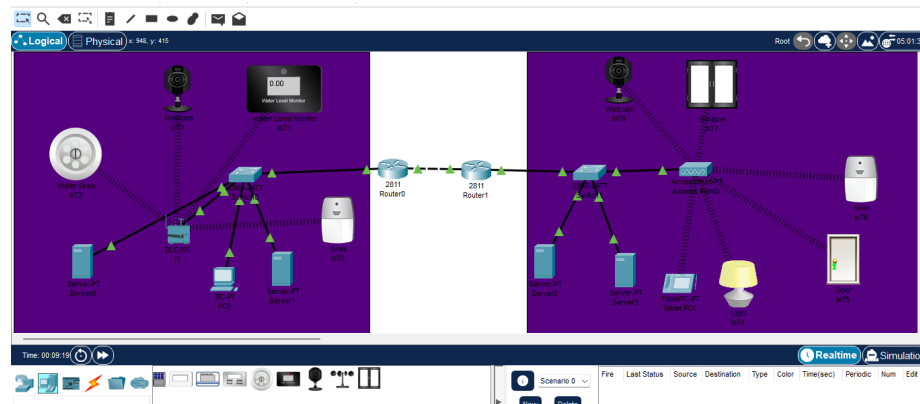


Figure 1: image 1

2. Configuration des réseaux sans fil

La configuration des points d'accès sans fil et des paramètres SSID est représentée ci-dessous :

3. Paramétrage du DHCP

Le serveur DHCP est configuré pour l'attribution dynamique des adresses IP aux périphériques IoT et autres équipements réseau :

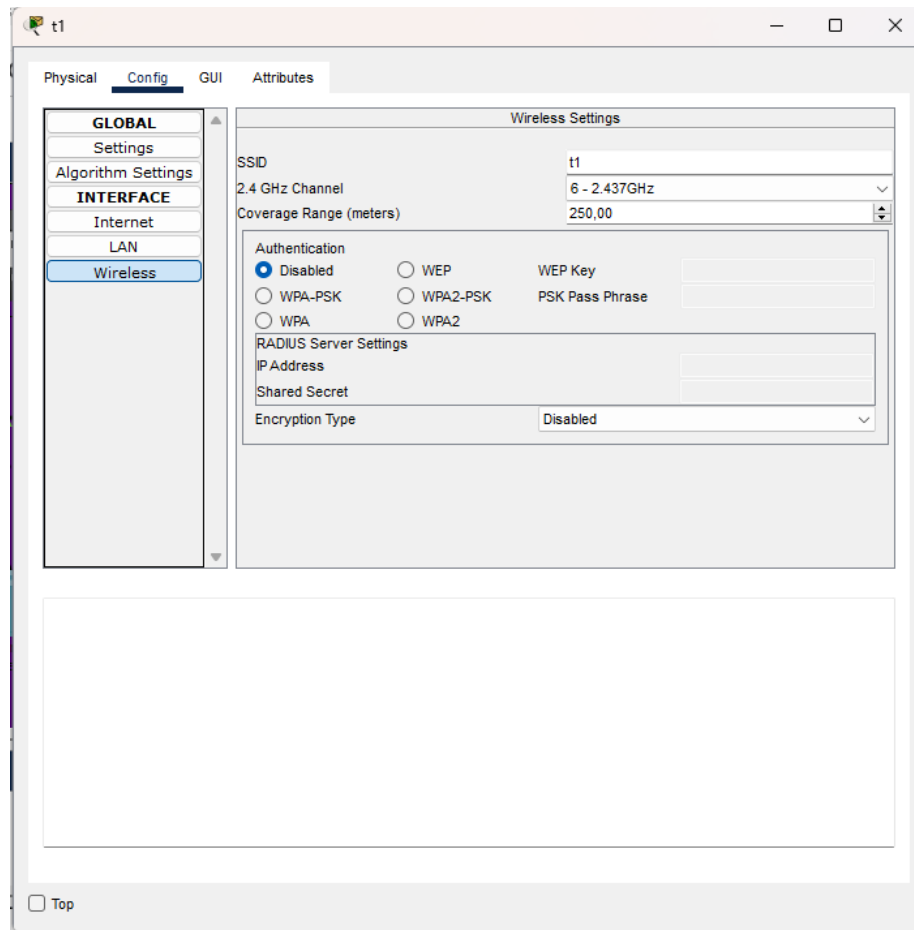


Figure 2: image 2

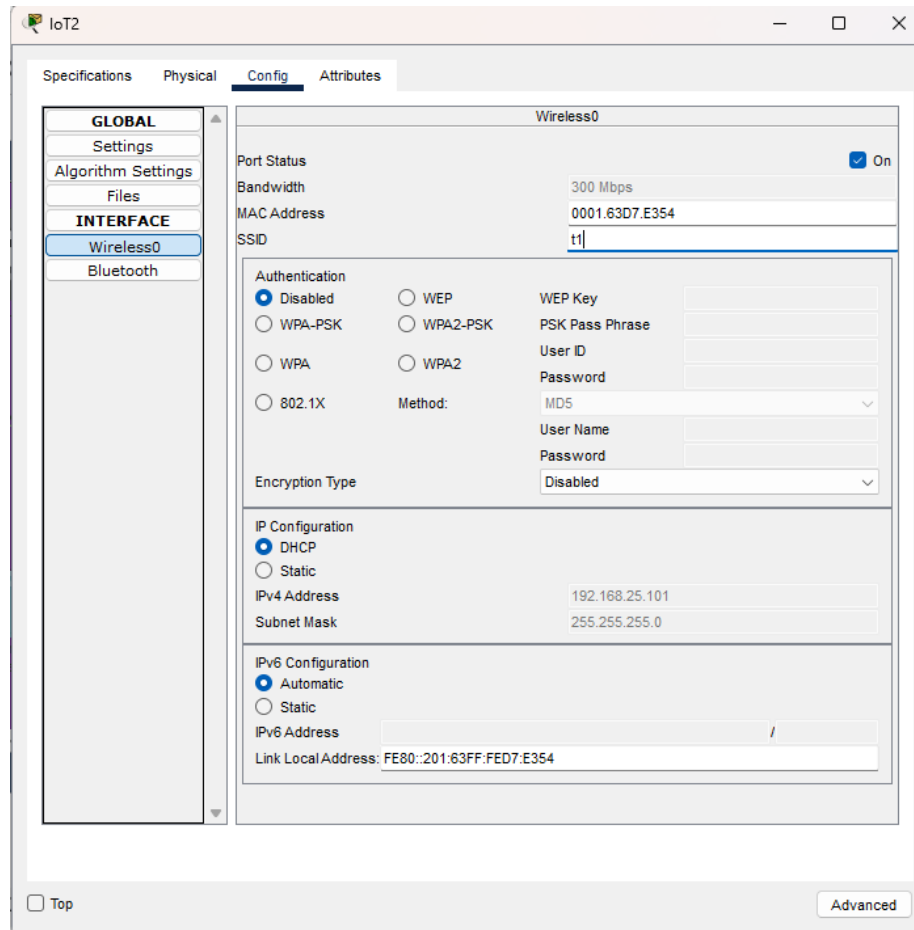


Figure 3: image 3

4. Configuration des appareils IoT

Chaque appareil IoT est intégré au réseau via des paramètres spécifiques, incluant les configurations sans fil et d'adressage :

4.1 IoT1

The screenshot shows the configuration window for an IoT device named 'IoT1'. The 'Config' tab is active, displaying settings for the 'Wireless0' interface. The left sidebar shows a tree view with 'GLOBAL' (Settings, Algorithm Settings, Files) and 'INTERFACE' (Wireless0, Bluetooth). The 'Wireless0' interface settings are as follows:

- Port Status:** ☒ On
- Bandwidth:** 300 Mbps
- MAC Address:** 00D0.FF07.9430
- SSID:** t1
- Authentication:**
 - ☒ Disabled
 - ☐ WPA-PSK
 - ☐ WPA
 - ☐ 802.1X
 - ☐ WEP
 - ☐ WPA2-PSK
 - ☐ WPA2
 - Method:** MD5
- Encryption Type:** Disabled
- IP Configuration:**
 - ☒ DHCP
 - ☐ Static
 - IPv4 Address:** 192.168.25.103
 - Subnet Mask:** 255.255.255.0
- IPv6 Configuration:**
 - ☒ Automatic
 - ☐ Static
 - IPv6 Address:** /
 - Link Local Address:** FE80::2D0:FFFF:FE07:9430

At the bottom, there is a 'Top' button and an 'Advanced' button.

Figure 4: image 4

4.2 IoT8

Access Point0

Physical

Config

Attributes

GLOBAL

Settings

INTERFACE

Port 0

Port 1

Port 1

Port Status

SSID

2.4 GHz Channel

Coverage Range (meters)

Authentication

WEP Key

PSK Pass Phrase

User ID

Password

Encryption Type

On

admin

6

140,00

☒ Disabled

☐ WEP

☐ WPA-PSK

☐ WPA2-PSK

WEP Key

PSK Pass Phrase

User ID

Password

Encryption Type

Disabled

Top

IoT8

Specifications

Physical

Config

Attributes

GLOBAL

Settings

Algorithm Settings

Files

INTERFACE

Wireless0

Bluetooth

Wireless0

Port Status

Bandwidth

MAC Address

SSID

Authentication

WEP Key

PSK Pass Phrase

User ID

Password

Encryption Type

IP Configuration

IPv4 Address

Subnet Mask

IPv6 Configuration

IPv6 Address

Link Local Address

On

300 Mbps

0001.64B2.D2ED

admin

☒ Disabled

☐ WEP

☐ WPA-PSK

☐ WPA

☐ 802.1X

☐ WPA2-PSK

☐ WPA2

Method:

WEP Key

PSK Pass Phrase

User ID

Password

Encryption Type

Disabled

☒ DHCP

☐ Static

5

IPv4 Address

Subnet Mask

192.168.25.108

255.255.255.0

☒ Automatic

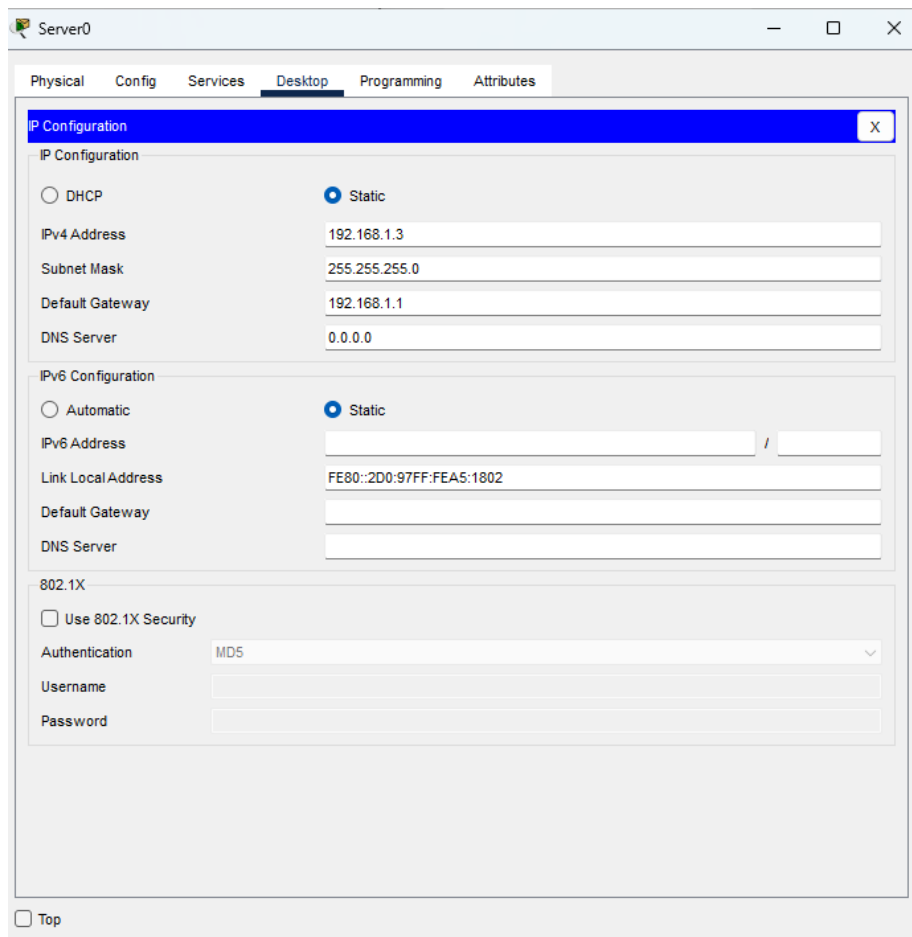
☐ Static

IPv6 Address

Link Local Address

/

FE80::201:64FF:FE82:D2ED



5. Paramétrage des serveurs

Les serveurs du réseau sont configurés avec des adresses statiques et intégrés au protocole OSPF pour assurer la redondance et l'interconnexion :

5.1 ServerIoT – Adressage et authentification

5.2 Configuration DHCP du serveur

5.3 Statique IPv4 et IPv6 sur ServerIoT

6. Sécurité et optimisation

L'authentification et le chiffrement sont des éléments essentiels à la sécurisation du réseau. Voici les configurations de **IoT8** montrant les paramètres de sécurité actuels et les éventuelles améliorations :

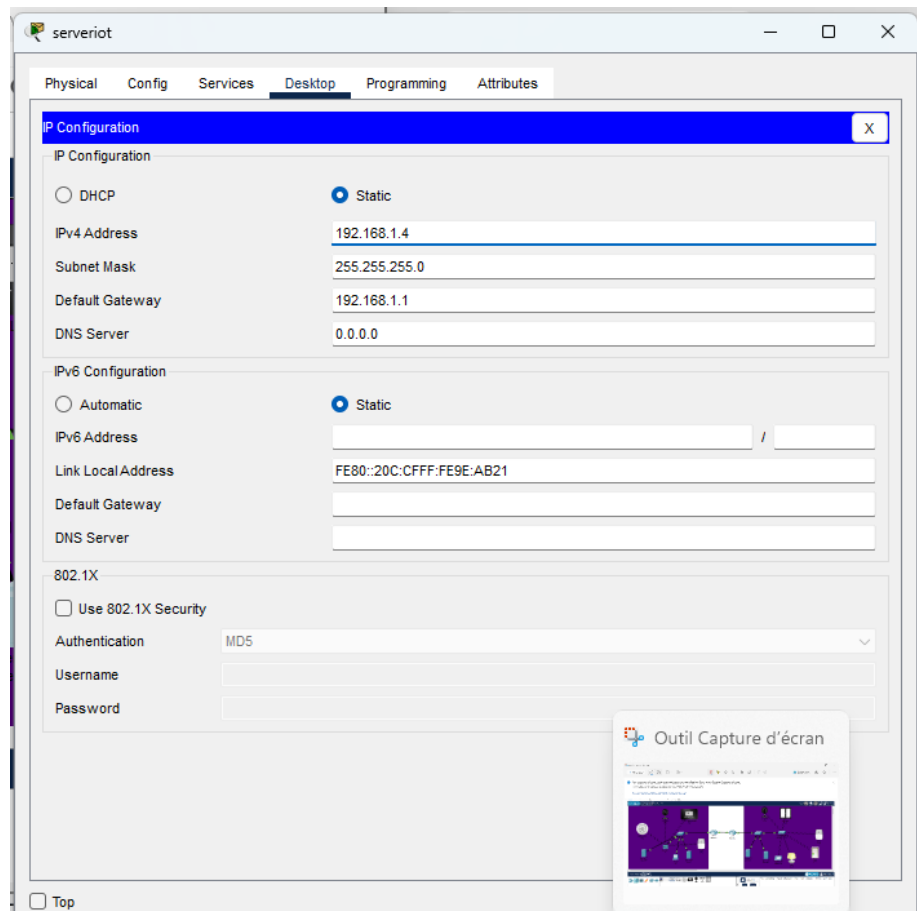


Figure 5: image 8

serverdhcp1

Physical Config **Services** Desktop Programming Attributes

SERVICES

HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoT
VM Management
Radius EAP

DHCP

Interface
FastEthernet0
Service
☒ On
☐ Off

Pool Name
serverPool

Default Gateway
192.168.1.1

DNS Server
0.0.0.0

Start IP Address :
192
168
1
5

Subnet Mask:
255
255
255
0

Maximum Number of Users :
512

TFTP Server:
0.0.0.0

WLC Address:
0.0.0.0

Add
Save
Remove

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
serverPool	0.0.0.0	0.0.0.0	192.168....	255.255....	512	0.0.0.0	0.0.0.0

☐ Top

Figure 6: image 9

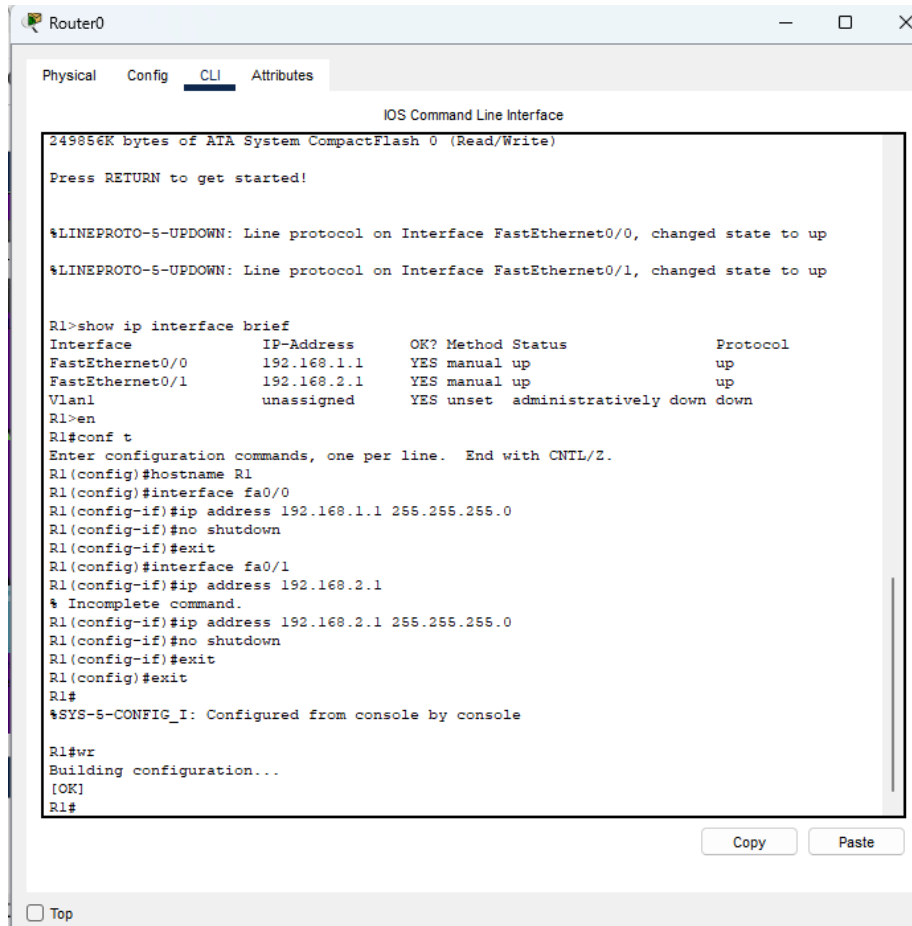


Figure 7: image 10

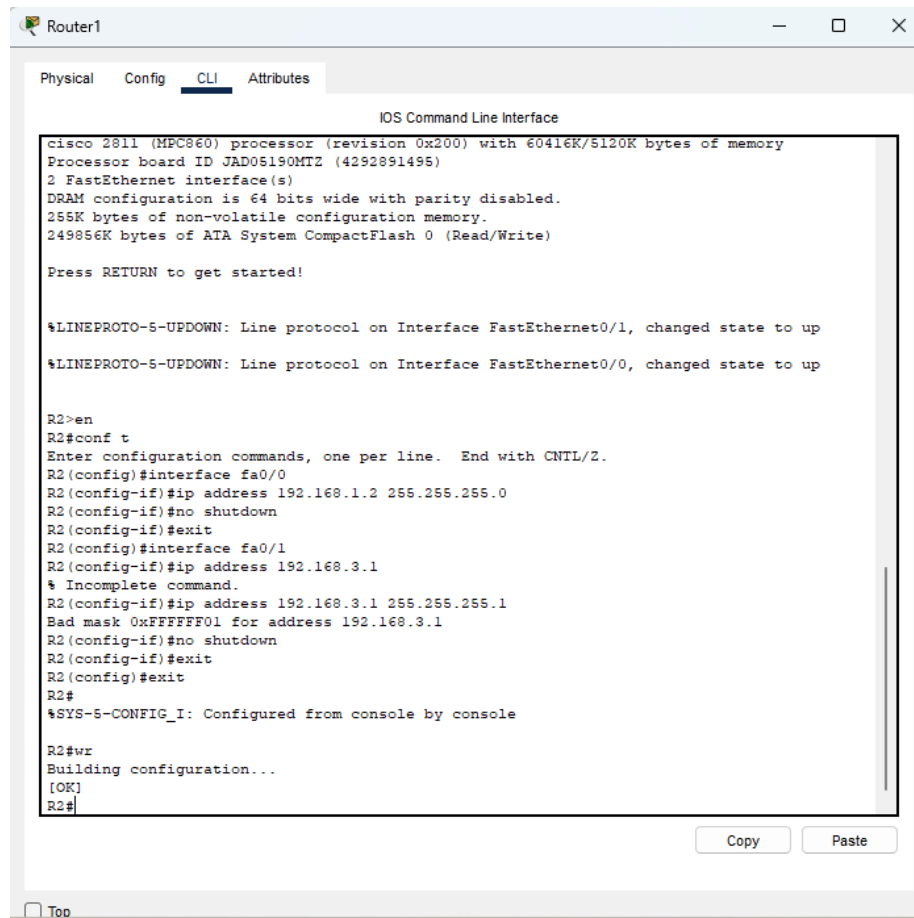
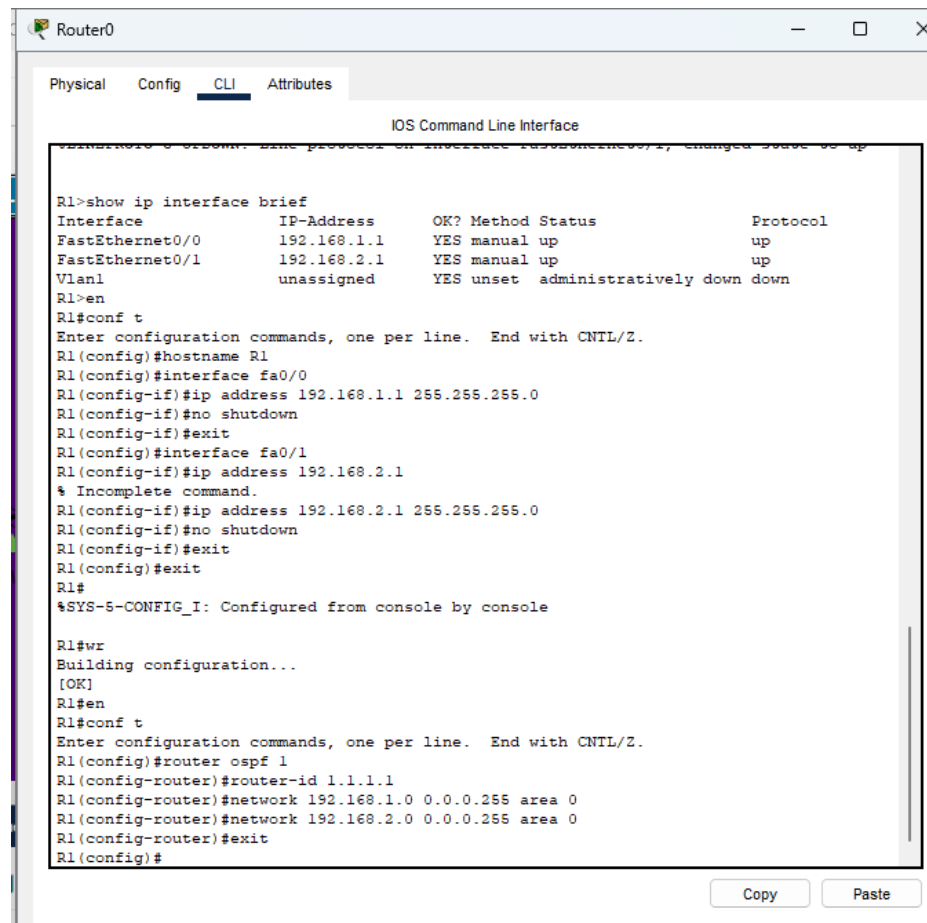


Figure 8: image 11

7. Analyse et amélioration

L'implémentation actuelle de **OSPF** garantit une connectivité robuste et évolutive. Des améliorations peuvent être apportées en intégrant un mécanisme de **segmentation VLAN** et en optimisant les méthodes de routage pour améliorer l'efficacité du réseau.



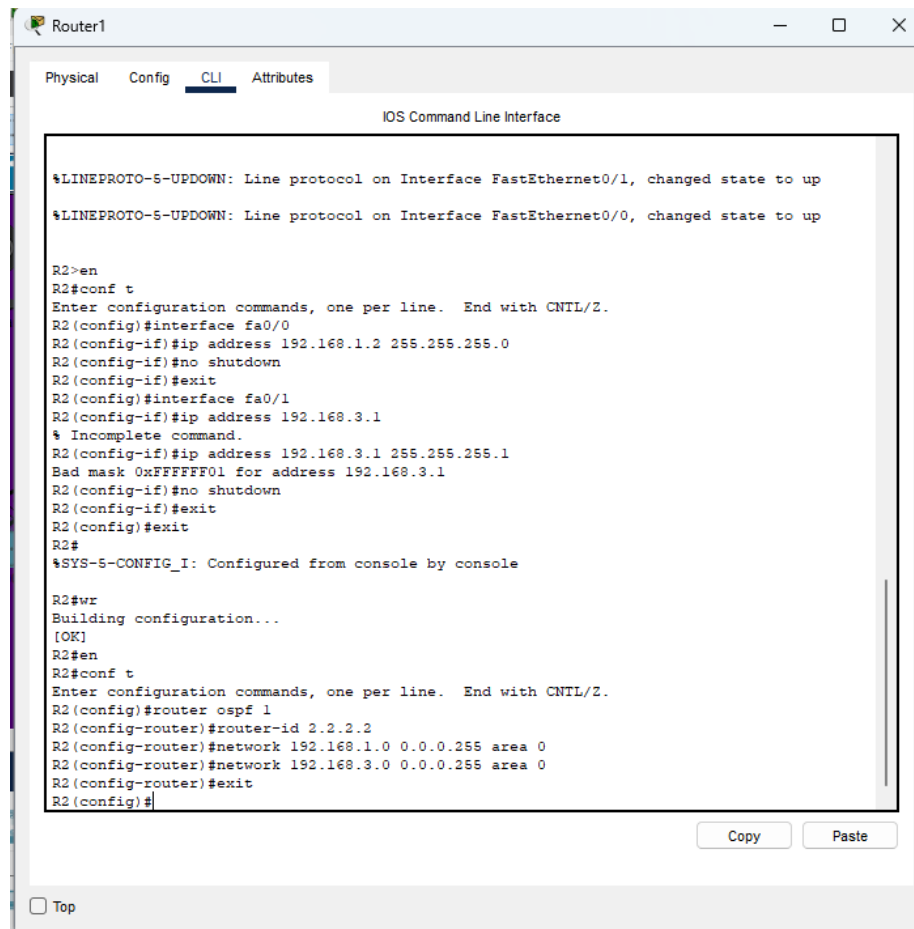
The screenshot shows a Cisco Packet Tracer window titled "Router0" with tabs for Physical, Config, CLI, and Attributes. The CLI tab is active, displaying the "IOS Command Line Interface". The console output shows the following commands and their results:

```
Router0>show ip interface brief
Interface          IP-Address      OK? Method Status      Protocol
FastEthernet0/0    192.168.1.1     YES manual up          up
FastEthernet0/1    192.168.2.1     YES manual up          up
Vlan1               unassigned      YES unset  administratively down down

Router0#en
Router0#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router0(config)#hostname R1
Router0(config)#interface fa0/0
Router0(config-if)#ip address 192.168.1.1 255.255.255.0
Router0(config-if)#no shutdown
Router0(config-if)#exit
Router0(config)#interface fa0/1
Router0(config-if)#ip address 192.168.2.1
% Incomplete command.
Router0(config-if)#ip address 192.168.2.1 255.255.255.0
Router0(config-if)#no shutdown
Router0(config-if)#exit
Router0(config)#exit
Router0#
%SYS-5-CONFIG_I: Configured from console by console

Router0#wr
Building configuration...
[OK]
Router0#en
Router0#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router0(config)#router ospf 1
Router0(config-router)#router-id 1.1.1.1
Router0(config-router)#network 192.168.1.0 0.0.0.255 area 0
Router0(config-router)#network 192.168.2.0 0.0.0.255 area 0
Router0(config-router)#exit
Router0(config)#
```

At the bottom of the window, there are "Copy" and "Paste" buttons.



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

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

R2>en
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#interface fa0/0
R2(config-if)#ip address 192.168.1.2 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#interface fa0/1
R2(config-if)#ip address 192.168.3.1
% Incomplete command.
R2(config-if)#ip address 192.168.3.1 255.255.255.1
Bad mask 0xFFFFF01 for address 192.168.3.1
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#wr
Building configuration...
[OK]
R2#en
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router ospf 1
R2(config-router)#router-id 2.2.2.2
R2(config-router)#network 192.168.1.0 0.0.0.255 area 0
R2(config-router)#network 192.168.3.0 0.0.0.255 area 0
R2(config-router)#exit
R2(config)#
```

Conclusion

L'implémentation du **protocole OSPF** dans un réseau permet d'assurer une **gestion dynamique des routes**, améliorant ainsi la redondance et la performance globale. Une sécurisation renforcée via **WPA2-PSK** et des **authentifications plus robustes** serait un axe d'amélioration majeur, en particulier dans un environnement intégrant des **appareils IoT**.

Configuration d'un réseau IoT dans Cisco Packet Tracer

Introduction

Ce rapport décrit la mise en place et la configuration d'un réseau **IoT** dans **Cisco Packet Tracer**, incluant l'architecture réseau, les paramètres des appareils, la gestion DHCP, et l'intégration du routage dynamique. Chaque section est accompagnée des **captures d'écran** illustrant les étapes clés.

1. Topologie du réseau

La configuration générale du réseau est illustrée ci-dessous :

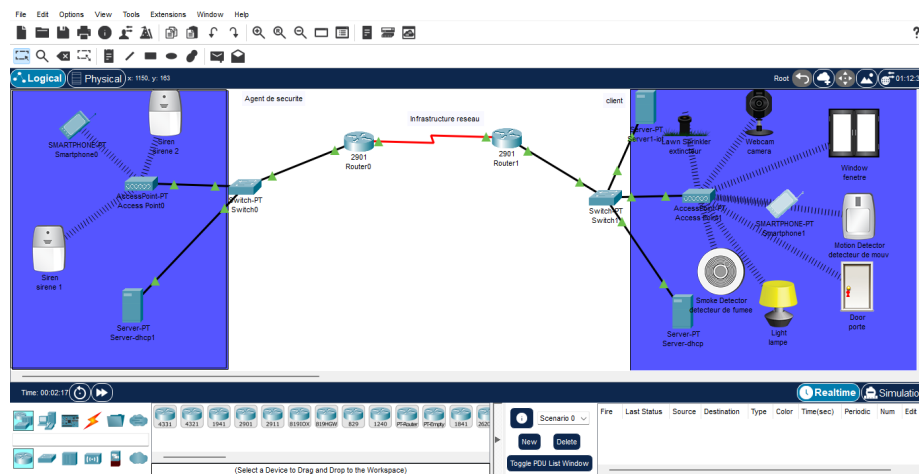


Figure 9: image 14

2. Configuration des points d'accès

Les **points d'accès Wi-Fi** sont configurés pour permettre aux **périphériques IoT** de se connecter :

3. Paramétrage des serveurs DHCP

Les **serveurs DHCP** sont mis en place pour distribuer les adresses IP aux différents équipements du réseau :

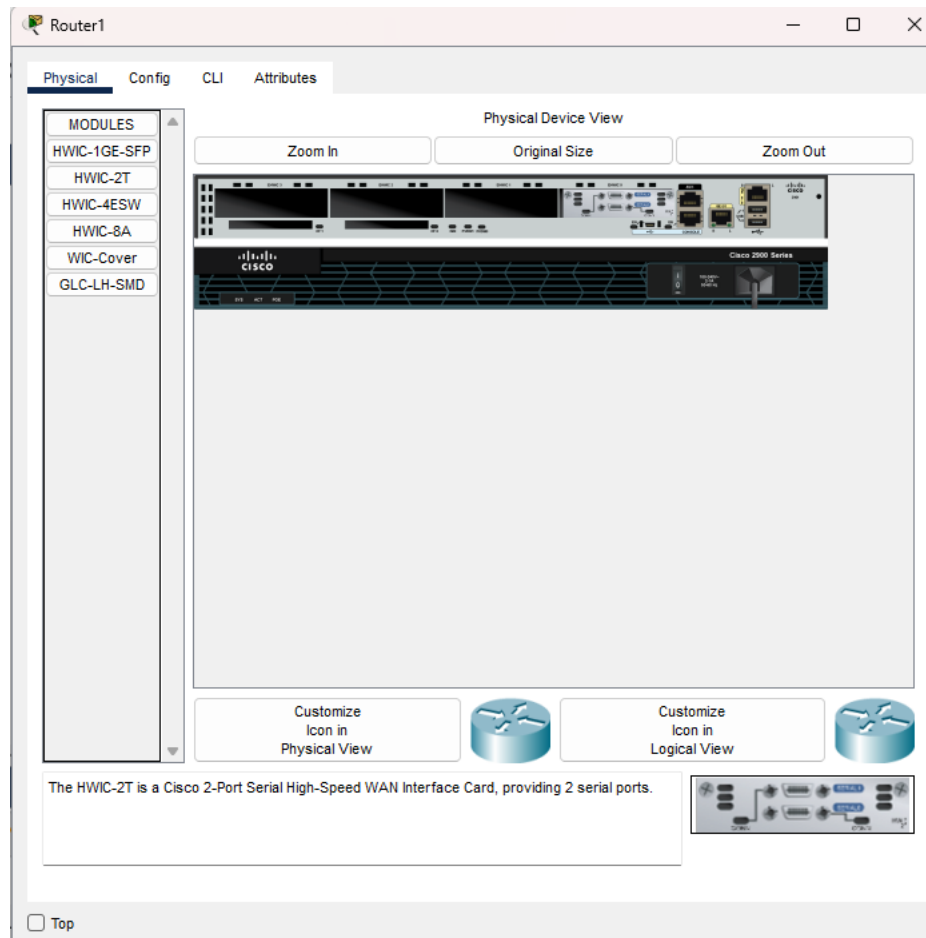


Figure 10: image 15

Server-dhcp

PhysicalConfigServicesDesktopProgrammingAttributes

IP Configuration

IP Configuration

DHCP

Static

IPv4 Address

192.168.1.13

Subnet Mask

255.255.255.0

Default Gateway

192.168.1.1

DNS Server

0.0.0.0

IPv6 Configuration

Automatic

Static

IPv6 Address

Link Local Address

FE80::20C:85FF:FECE:7C90

Default Gateway

DNS Server

802.1X

Use 802.1X Security

Authentication

MDS

Username

Password

Top

Server-dhcp

Physical Config **Services** Desktop Programming Attributes

SERVICES

- HTTP
- DHCP**
- DHCPv6
- TFTP
- DNS
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP
- IoT
- VM Management
- Radius EAP

DHCP

Interface: FastEthernet0 Service: ☒ On ☐ Off

Pool Name: serverPool

Default Gateway: 192.168.1.1

DNS Server: 0.0.0.0

Start IP Address: 192 168 1 14

Subnet Mask: 255 255 255 0

Maximum Number of Users: 512

TFTP Server: 0.0.0.0

WLC Address: 0.0.0.0

Add Save Remove

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
serverPool	0.0.0.0	0.0.0.0	192.168.1.14	255.255.255.0	512	0.0.0.0	0.0.0.0

☐ Top

4. Configuration des appareils IoT

Les **périphériques IoT** sont configurés avec leurs paramètres réseau et authentification.

4.1 IoT0

4.2 IoT3

4.3 IoT8

5. Sécurisation des accès et authentification

Les paramètres de sécurité et d'authentification des **appareils IoT et points d'accès** sont examinés :

Server-dhcp1

Physical Config Services **Desktop** Programming Attributes

IP Configuration [X]

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 192.168.2.13

Subnet Mask 255.255.255.0

Default Gateway 192.168.2.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::20C:85FF:FEE2:AB8

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

Figure 11: image 18

Server-dhcp1

Physical
Config
Services
Desktop
Programming
Attributes

SERVICES

HTTP

DHCP

DHCPv6

TFTP

DNS

SYSLOG

AAA

NTP

EMAIL

FTP

IoT

VM Management

Radius EAP

DHCP

Interface
FastEthernet0
Service
☒ On
☐ Off

Pool Name
serverPool

Default Gateway
192.168.2.1

DNS Server
0.0.0.0

Start IP Address :
192
168
2
14

Subnet Mask:
255
255
255
0

Maximum Number of Users :
242

TFTP Server:
0.0.0.0

WLC Address:
0.0.0.0

Add

Save

Remove

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
serverPool	192.168....	0.0.0.0	192.168....	255.255....	242	0.0.0.0	0.0.0.0

☐ Top

Figure 12: image 19

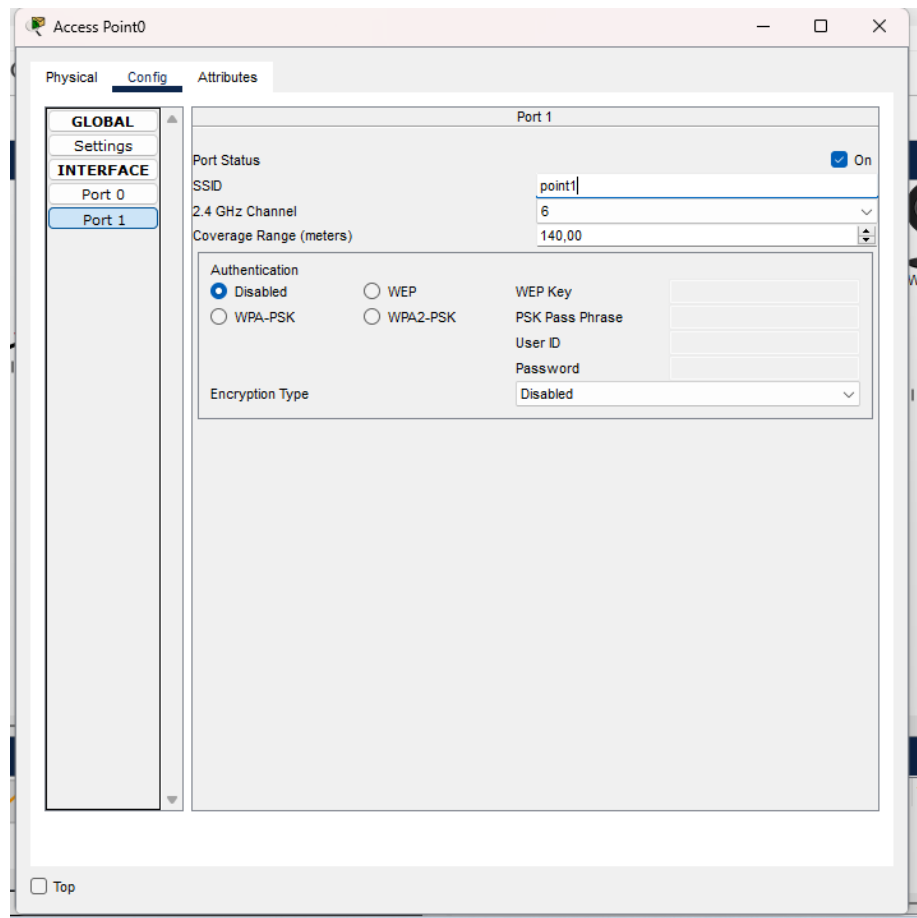


Figure 13: image 20

Access Point1

Physical

Config

Attributes

GLOBAL

Settings

INTERFACE

Port 0

Port 1

Port 1

Port Status

On

SSID

point2

2.4 GHz Channel

6

Coverage Range (meters)

140,00

Authentication

Disabled

WPA-PSK

WEP

WPA2-PSK

WEP Key

PSK Pass Phrase

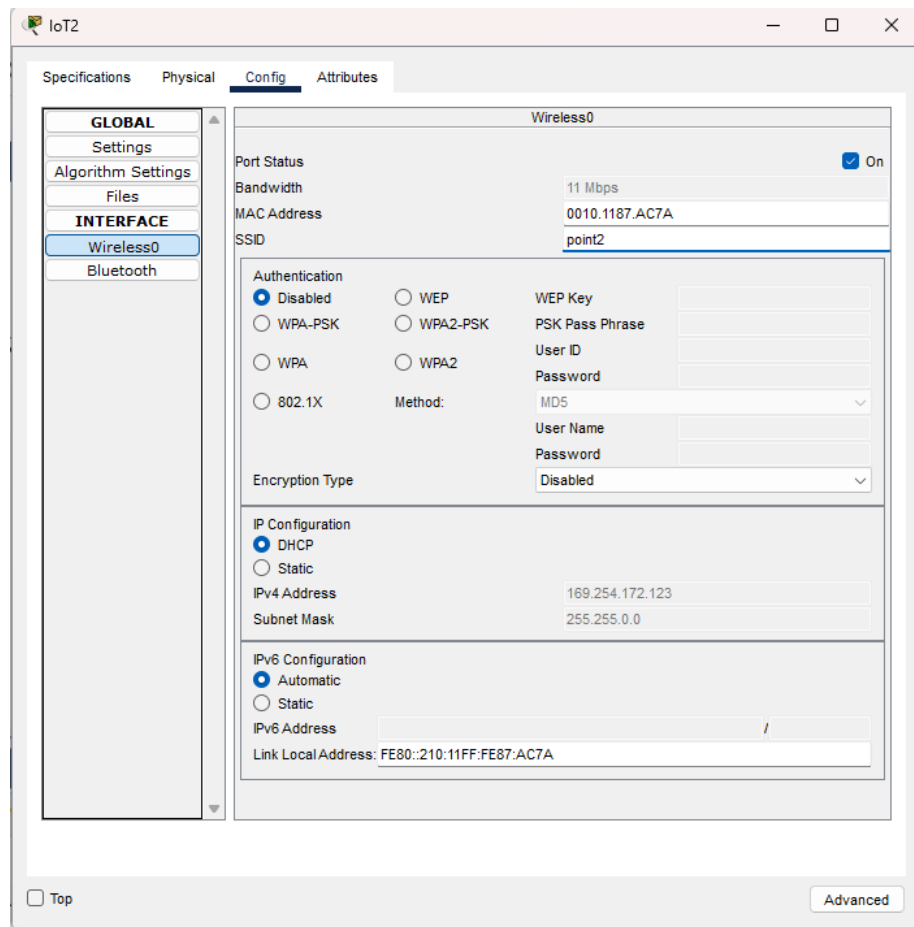
User ID

Password

Encryption Type

Disabled

Top



6. Configuration OSPF sur les routeurs

Les **routeurs** sont configurés avec le **protocole de routage OSPF**, assurant une **connectivité dynamique** et une **résilience du réseau**.

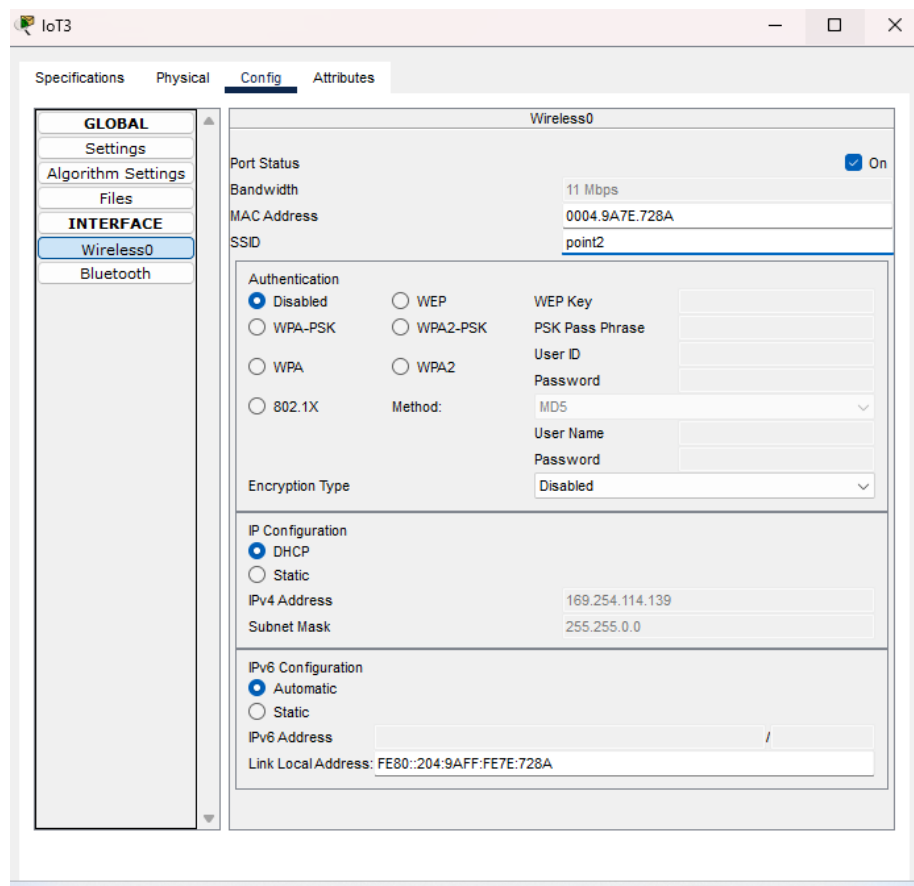


Figure 14: image 23

6.1 Routeur R1 - Configuration OSPF

6.2 Routeur R2 - Vérification des routes

Smartphone1

Physical **Config** Desktop Programming Attributes

GLOBAL

Settings

Algorithm Settings

INTERFACE

Wireless0

3G/4G Cell1

Bluetooth

Wireless0

Port Status ☒ On

Bandwidth 54 Mbps

MAC Address 00E0.F78D.0085

SSID point2

Authentication

☒ Disabled ☐ WEP ☐ WPA-PSK ☐ WPA2-PSK ☐ WPA ☐ WPA2 ☐ 802.1X

WEP Key

PSK Pass Phrase

User ID

Password

Method: MD5

User Name

Password

Encryption Type Disabled

IP Configuration

☒ DHCP ☐ Static

IPv4 Address 169.254.0.134

Subnet Mask 255.255.0.0

IPv6 Configuration

☒ Automatic ☐ Static

IPv6 Address /

Link Local Address: FE80::2E0:F7FF:FE8D:85

☐ Top

IoT1

Specifications Physical **Config** Attributes

GLOBAL

Settings

Algorithm Settings

Files

INTERFACE

Wireless0

Bluetooth

Wireless0

Port Status ☒ On

Bandwidth 11 Mbps

MAC Address 0010.11C2.9AD1

SSID point2

Authentication

☒ Disabled ☐ WEP ☐ WPA-PSK ☐ WPA2-PSK ☐ WPA ☐ WPA2 ☐ 802.1X

WEP Key

PSK Pass Phrase

User ID

Password

Method: MD5

User Name

Password

Encryption Type Disabled

IP Configuration

☒ DHCP ☐ Static

IPv4 Address 169.254.154.210

Subnet Mask 255.255.0.0

IPv6 Configuration

☒ Automatic ☐ Static

IPv6 Address /

Link Local Address: FE80::210:11FF:FEC2:9AD1

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7. Tests de connectivité

Les **tests ping et traceroute** confirment la stabilité et la bonne communication entre les appareils :

The screenshot shows the configuration window for the IoT0 device, specifically the 'Config' tab for the 'Wireless0' interface. The window has a sidebar on the left with a tree view containing 'GLOBAL' (with sub-items 'Settings', 'Algorithm Settings', 'Files') and 'INTERFACE' (with sub-items 'Wireless0' and 'Bluetooth'). The main area is divided into sections for 'Wireless0' settings, 'Authentication', 'IP Configuration', and 'IPv6 Configuration'.

Wireless0 Settings:

- Port Status: ☒ On
- Bandwidth: 11 Mbps
- MAC Address: 0090.2B08.5054
- SSID: point2

Authentication:

- ☒ Disabled
- ☐ WEP
- ☐ WPA-PSK
- ☐ WPA2-PSK
- ☐ WPA
- ☐ WPA2
- ☐ 802.1X
- Method: (empty)
- WEP Key: (empty)
- PSK Pass Phrase: (empty)
- User ID: (empty)
- Password: (empty)
- Encryption Type: Disabled

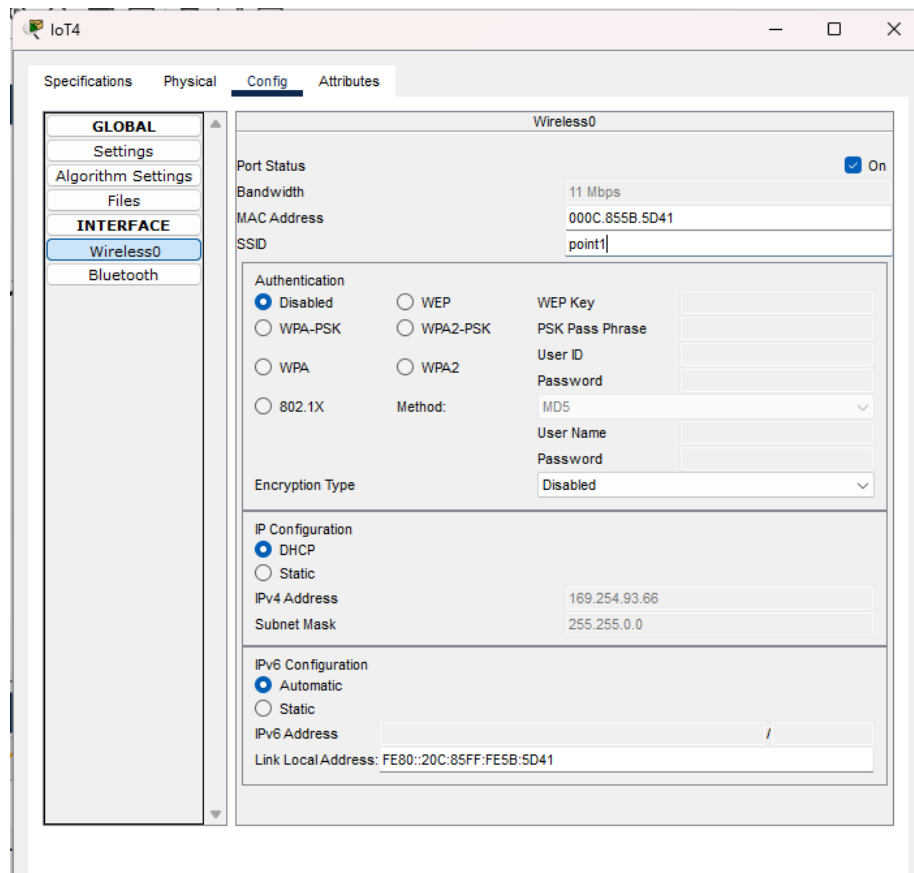
IP Configuration:

- ☒ DHCP
- ☐ Static
- IPv4 Address: 169.254.80.85
- Subnet Mask: 255.255.0.0

IPv6 Configuration:

- ☒ Automatic
- ☐ Static
- IPv6 Address: (empty) / (empty)
- Link Local Address: FE80::290:2BFF:FE08:5054

At the bottom of the window, there is a 'Top' button and an 'Advanced' button.



8. Interface web du serveur IoT

Le **serveur IoT** est accessible via une interface web, permettant de gérer les **appareils connectés** et définir des **règles d'automatisation**.

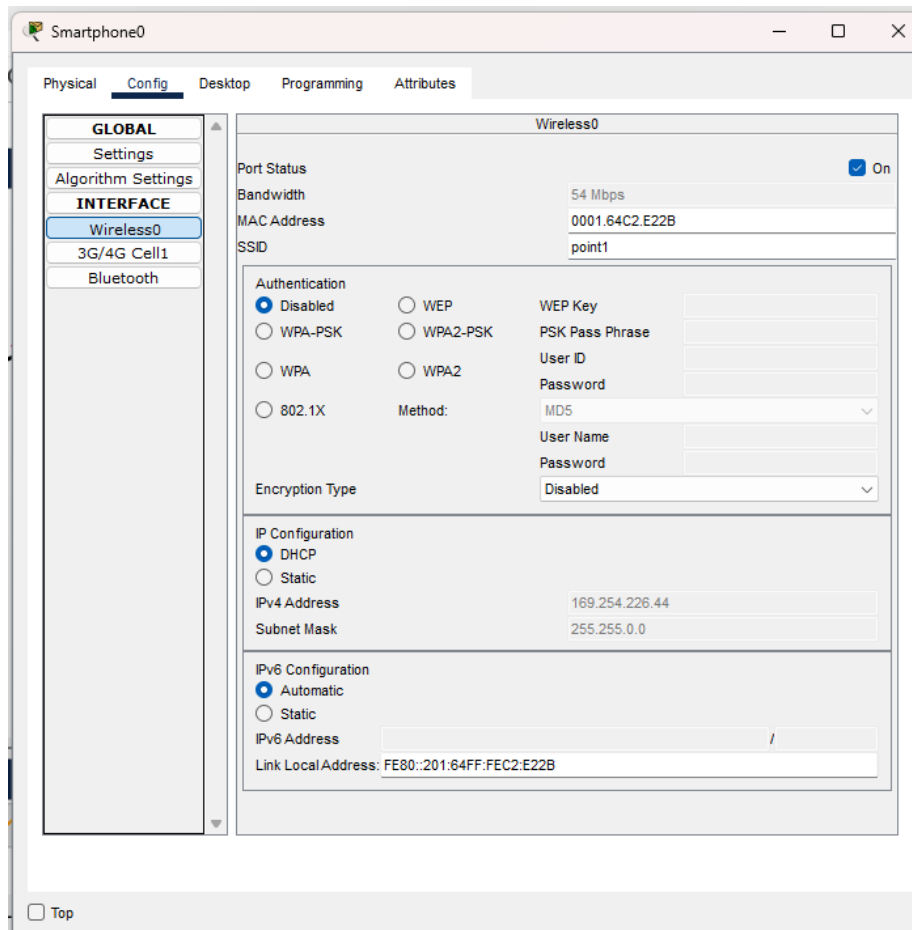


Figure 15: image 28

8.1 Accès au serveur

8.2 Gestion des appareils

Smartphone1

PhysicalConfigDesktopProgrammingAttributes

IP Configuration

InterfaceWireless0

IP Configuration

☒ DHCP

☐ Static

IPv4 Address192.168.1.17

Subnet Mask255.255.255.0

Default Gateway192.168.1.1

DNS Server0.0.0.0

IPv6 Configuration

☒ Automatic

☐ Static

IPv6 Address

Link Local AddressFE80::2E0:F7FF:FE8D:85

Default Gateway

DNS Server

☐ Top

Smartphone0

PhysicalConfigDesktopProgrammingAttributes

IP Configuration

InterfaceWireless0

IP Configuration

☒ DHCP

☐ Static

IPv4 Address192.168.2.17

Subnet Mask255.255.255.0

Default Gateway192.168.2.1

DNS Server0.0.0.0

IPv6 Configuration

☒ Automatic

☐ Static

IPv6 Address

Link Local AddressFE80::201:64FF:FE02:E22B

Default Gateway

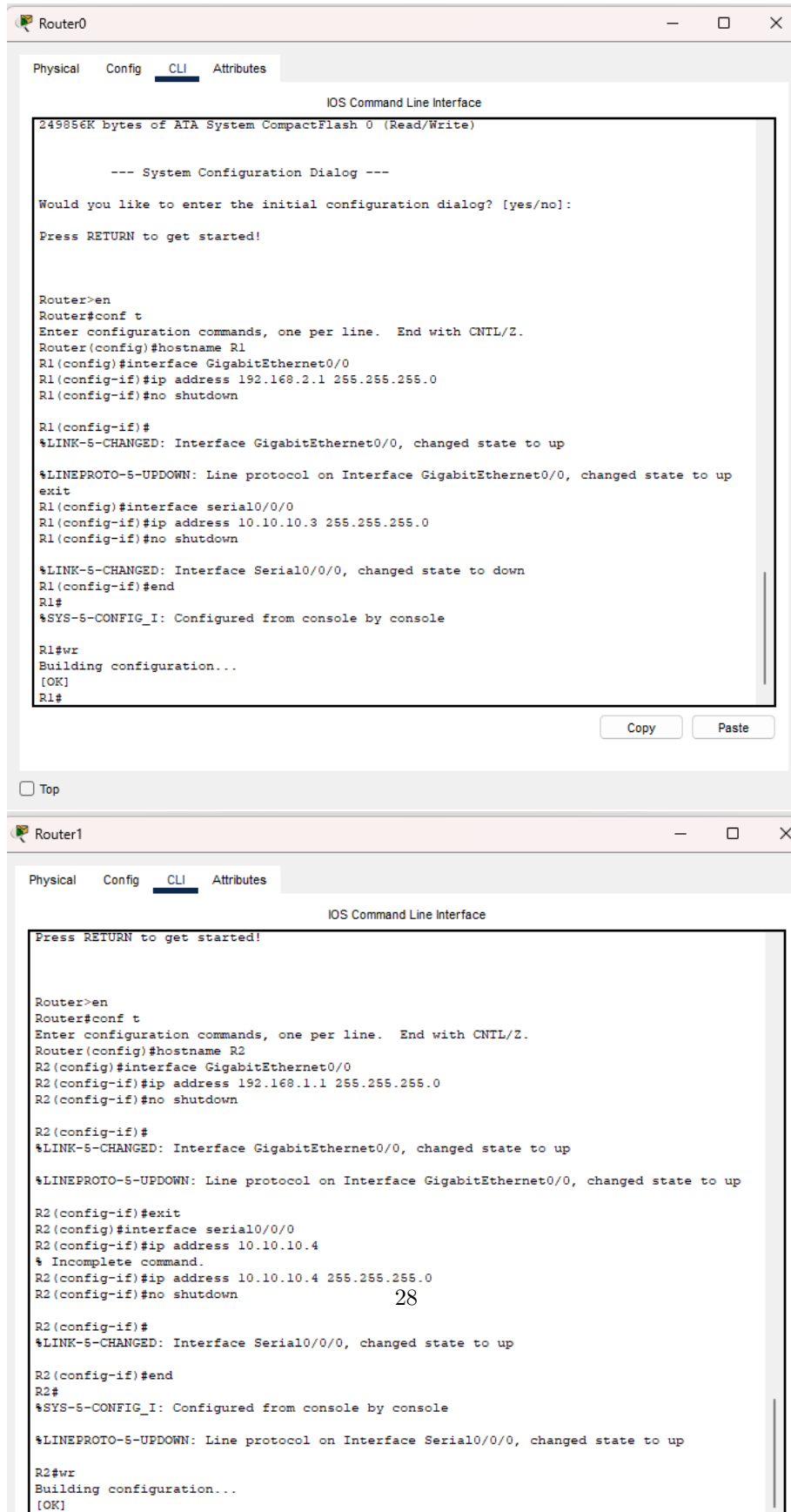
DNS Server

DHCP request successful.

IPv6 request failed.

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8.3 Paramètres de contrôle et automatisation



The image displays two screenshots of the Cisco Packet Tracer interface, showing the configuration of two routers, Router0 and Router1, via their CLI interfaces.

Router0 Screenshot:

- The window title is "Router0".
- The tabs are "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is selected.
- The title bar of the CLI window is "IOS Command Line Interface".
- The text in the CLI window shows the initial configuration dialog and the configuration commands for Router0:

```
249856K bytes of ATA System CompactFlash 0 (Read/Write)

--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]:

Press RETURN to get started!

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R1
R1(config)#interface GigabitEthernet0/0
R1(config-if)#ip address 192.168.2.1 255.255.255.0
R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
exit
R1(config)#interface serial0/0/0
R1(config-if)#ip address 10.10.10.3 255.255.255.0
R1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R1(config-if)#end
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#wr
Building configuration...
[OK]
R1#
```

Router1 Screenshot:

- The window title is "Router1".
- The tabs are "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is selected.
- The title bar of the CLI window is "IOS Command Line Interface".
- The text in the CLI window shows the initial configuration dialog and the configuration commands for Router1:

```
Press RETURN to get started!

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R2
R2(config)#interface GigabitEthernet0/0
R2(config-if)#ip address 192.168.1.1 255.255.255.0
R2(config-if)#no shutdown

R2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

R2(config-if)#exit
R2(config)#interface serial0/0/0
R2(config-if)#ip address 10.10.10.4
% Incomplete command.
R2(config-if)#ip address 10.10.10.4 255.255.255.0
R2(config-if)#no shutdown

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

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

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

R2#wr
Building configuration...
[OK]
```

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9. Configuration avancée des périphériques IoT

Cette section intègre les paramètres détaillés des périphériques IoT.

9.1 IoT4

The image shows two Cisco Packet Tracer routers, Router0 and Router1, with their CLI windows open. Router0's configuration includes setting GigabitEthernet0/0 to up, Serial0/0/0 to down, and then Serial0/0/0 to up. It also configures OSPF with two networks. Router1's configuration includes setting GigabitEthernet0/0 to up, Serial0/0/0 to up, and then Serial0/0/0 to up. It also configures OSPF with two networks. Both routers show the configuration being saved and the OSPF process being loaded.

Router0 CLI Output:

```
R1(config-if)#no shutdown
R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
exit
R1(config)#interface serial0/0/0
R1(config-if)#ip address 10.10.10.3 255.255.255.0
R1(config-if)#no shutdown
R1(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R1(config-if)#end
R1#
%SYS-5-CONFIG_I: Configured from console by console
R1#wr
Building configuration...
[OK]
R1#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router ospf 1
R1(config-router)#network 192.168.0.0 0.0.255.255 area 0
R1(config-router)#network 10.10.10.0 0.0.0.255 area 0
R1(config-router)#end
R1#
%SYS-5-CONFIG_I: Configured from console by console
R1#wr
Building configuration...
[OK]
R1#
```

Router1 CLI Output:

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
R2(config-if)#exit
R2(config)#interface serial0/0/0
R2(config-if)#ip address 10.10.10.4
% Incomplete command.
R2(config-if)#ip address 10.10.10.4 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
R2(config-if)#end
R2#
%SYS-5-CONFIG_I: Configured from console by console
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
R2#wr
Building configuration...
[OK]
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router ospf 1
R2(config-router)#network 192.168.0.0 0.0.255.255 area 0
R2(config-router)#network 10.10.10.0 0.0.0.255 area 0
R2(config-router)#
00:31:01: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on Serial0/0/0 from LOADING to FULL, Loading Done
end
R2#
%SYS-5-CONFIG_I: Configured from console by console
R2#wr
Building configuration...
[OK]
R2#
```

9.2 IoT5

The image shows two Cisco Packet Tracer routers, Router1 and Router0, with their CLI configurations displayed. Both routers are running IOS 15.2(4)M and are configured with OSPF 1. Router1 is configured with interfaces 10.10.10.0/24, 10.10.10.4/32, and 192.168.1.0/24. Router0 is configured with interfaces 10.10.10.0/24, 10.10.10.3/32, and 192.168.2.0/24. Both routers are configured with OSPF 1 and have their interfaces in area 0. The configurations are shown in the CLI window of each router, with the 'CLI' tab selected. The output of the 'show ip route' command is also displayed for both routers.

Router1 CLI Configuration:

```
Building configuration...
[OK]
R2#conf t
Enter configuration commands, one per line. End with CNIL/Z.
R2(config)#router ospf 1
R2(config-router)#network 192.168.0.0 0.0.255.255 area 0
R2(config-router)#network 10.10.10.0 0.0.0.255 area 0
R2(config-router)#
00:31:01: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on Serial0/0/0 from LOADING to FULL, Loading Done
end
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#wr
Building configuration...
[OK]
R2#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

    10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.10.10.0/24 is directly connected, Serial0/0/0
L       10.10.10.4/32 is directly connected, Serial0/0/0
C       192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/0
L       192.168.1.1/32 is directly connected, GigabitEthernet0/0
O       192.168.2.0/24 [110/65] via 10.10.10.3, 00:00:32, Serial0/0/0
R2#
```

Router0 CLI Configuration:

```
R1(config)#router ospf 1
R1(config-router)#network 192.168.0.0 0.0.255.255 area 0
R1(config-router)#network 10.10.10.0 0.0.0.255 area 0
R1(config-router)#end
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#wr
Building configuration...
[OK]
R1#
00:31:30: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.1.1 on Serial0/0/0 from LOADING to FULL, Loading Done

R1#wr
Building configuration...
[OK]
R1#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

    10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.10.10.0/24 is directly connected, Serial0/0/0
L       10.10.10.3/32 is directly connected, Serial0/0/0
O       192.168.1.0/24 [110/65] via 10.10.10.4, 00:01:04, Serial0/0/0
C       192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.2.0/24 is directly connected, GigabitEthernet0/0
L       192.168.2.1/32 is directly connected, GigabitEthernet0/0
R1#
```

9.3 IoT6

The image shows two windows from the Cisco Packet Tracer application. The top window, titled 'Smartphone0', 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 a ping command to 192.168.1.1, showing successful results with 0% loss and round trip times between 25ms and 46ms. The bottom window, titled 'Server1-iot', also has tabs for Physical, Config, Services, Desktop, Programming, and Attributes. The 'Desktop' tab is active, showing the 'IP Configuration' window. This window is divided into IPv4 and IPv6 configuration sections. The IPv4 section shows 'Static' configuration with IP address 192.168.1.5, subnet mask 255.255.255.0, default gateway 192.168.1.1, and DNS server 0.0.0.0. The IPv6 section shows 'Static' configuration with a link local address FE80::2D0:FFFF:FE33:3E11. Below these sections, the '802.1X' section is visible, showing 'Use 802.1X Security' is unchecked, and the 'Authentication' dropdown is set to 'MD5'. A large number '32' is overlaid on the right side of the 802.1X section.

Smartphone0

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time=46ms TTL=254
Reply from 192.168.1.1: bytes=32 time=25ms TTL=254
Reply from 192.168.1.1: bytes=32 time=34ms TTL=254
Reply from 192.168.1.1: bytes=32 time=34ms TTL=254

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 25ms, Maximum = 46ms, Average = 34ms

C:\>
```

Server1-iot

Physical Config Services Desktop Programming Attributes

IP Configuration

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 192.168.1.5

Subnet Mask 255.255.255.0

Default Gateway 192.168.1.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::2D0:FFFF:FE33:3E11

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security 32

Authentication MD5

Username

Password

9.4 IoT7

The image shows two overlapping windows from a network management application.

The top window, titled "Server1-iot", has tabs for Physical, Config, Services, Desktop, Programming, and Attributes. The "Services" tab is active. On the left, a "SERVICES" list includes HTTP, DHCP, DHCPv6, TFTP, DNS, SYSLOG, AAA, NTP, EMAIL, FTP, IoT (highlighted), VM Management, and Radius EAP. The main area shows the "Registration Server" configuration. It states "This service runs on top of the HTTP or HTTPS service." and has a "Service" toggle set to "On" (radio button selected). Below this is a large empty box and a "Delete" button.

The bottom window, titled "Smartphone1", shows a "Web Browser" with the URL "http://192.168.1.5". The browser displays the "Registration Server Login" page. It has fields for "Username:" and "Password:", a "Sign In" button, and a link: "Don't have an IoT account? [Sign up now](#)".

9.5 IoT9

The image displays two screenshots of a Smartphone1 emulator. The top screenshot shows a 'Web Browser' window with the URL 'http://192.168.1.5/create_account.html'. The page title is 'Registration Server Account Creation'. It features a 'Username:' field with the text 'wendy' and a 'Password:' field with masked characters '....'. A 'Create' button is positioned below the password field. The bottom screenshot shows the same emulator with the URL 'http://192.168.1.5/home.html'. The page title is 'IoT Server - Devices'. The navigation bar includes links for 'Home', 'Conditions', 'Editor', and 'Log Out'.

Smartphone1

Physical Config **Desktop** Programming Attributes

Web Browser X

< > URL http://192.168.1.5/create_account.html Go Stop

Registration Server Account Creation

Username: wendy

Password:

Create

Top

Smartphone1

Physical Config **Desktop** Programming Attributes

Web Browser X

< > URL http://192.168.1.5/home.html Go Stop

IoT Server - Devices Home | Conditions | Editor | Log Out

10. Optimisation du réseau

Cette section analyse les **paramètres réseaux avancés** et propose des améliorations.

10.1 Configuration du serveur IoT

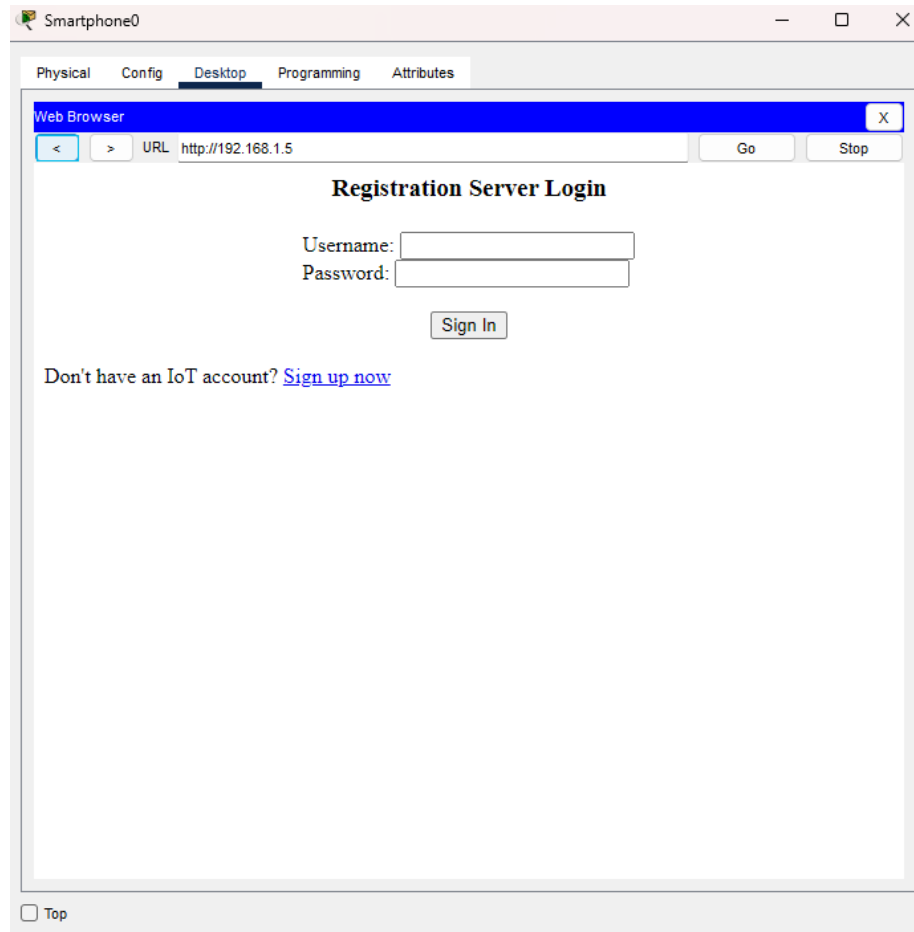
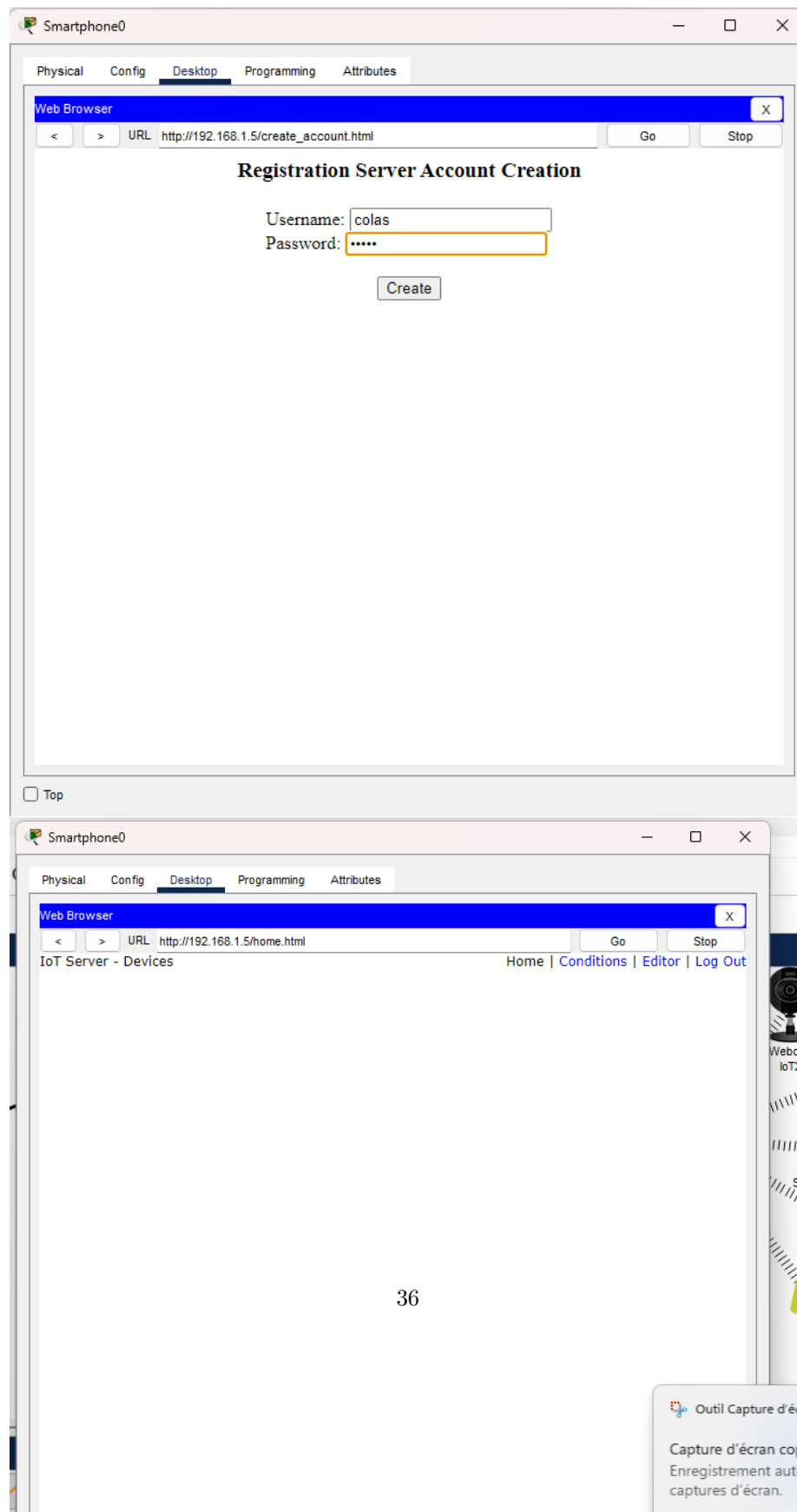
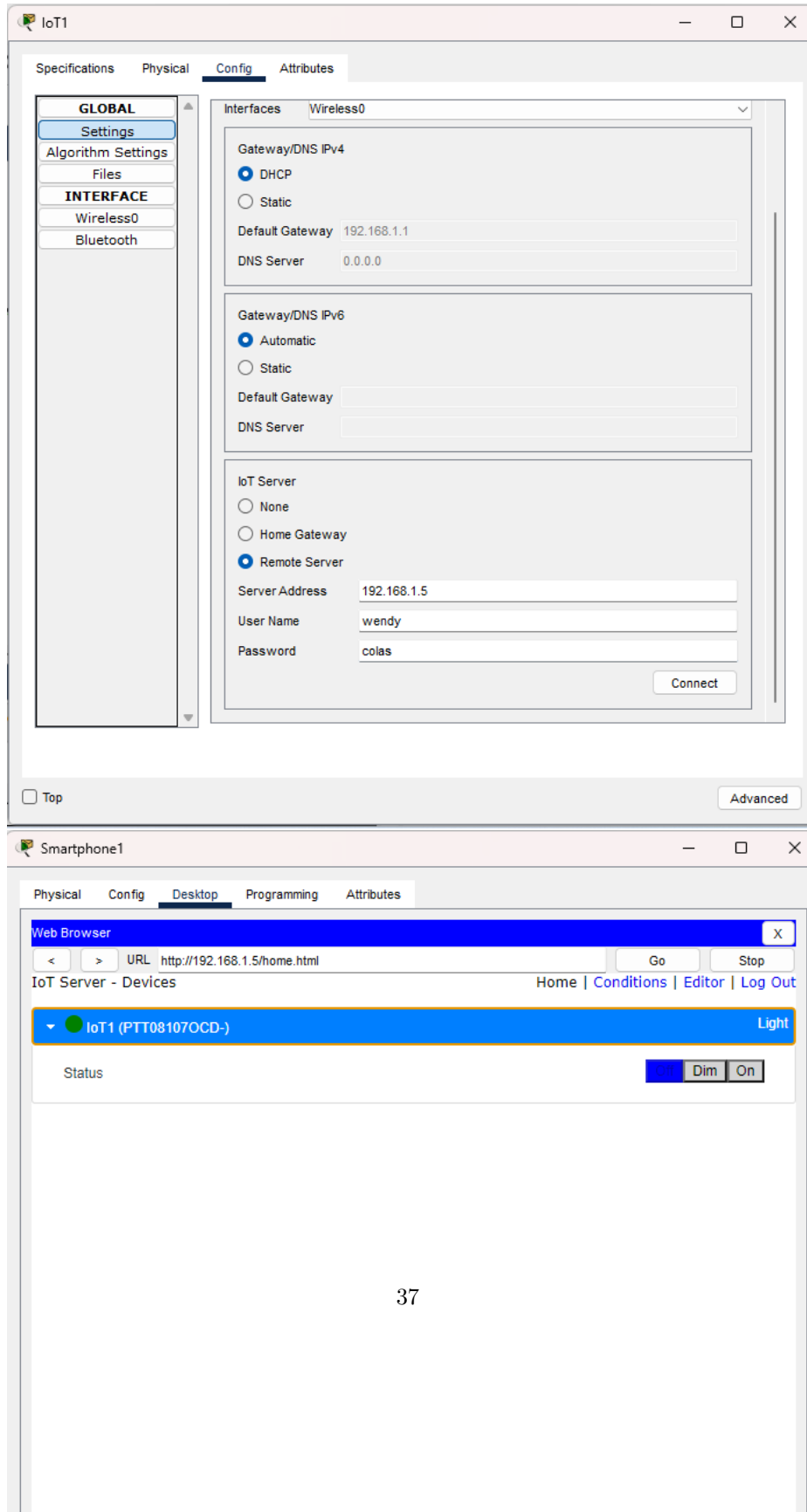


Figure 16: image 43

10.2 Vérification des adresses IP



10.3 Analyse des performances réseau



10.4 Tests complémentaires

IoT3

Specifications Physical **Config** Attributes

GLOBAL

- Settings
- Algorithm Settings
- Files

INTERFACE

- Wireless0
- Bluetooth

Interfaces: Wireless0

Gateway/DNS IPv4

☒ DHCP

☐ Static

Default Gateway: 192.168.1.1

DNS Server: 0.0.0.0

Gateway/DNS IPv6

☒ Automatic

☐ Static

Default Gateway:

DNS Server:

IoT Server

☐ None

☐ Home Gateway

☒ Remote Server

Server Address: 192.168.1.5

User Name: wendy

Password: colas

Connect

☐ Top

Advanced

IoT0

Specifications Physical **Config** Attributes

GLOBAL

- Settings
- Algorithm Settings
- Files

INTERFACE

- Wireless0
- Bluetooth

Interfaces: Wireless0

Gateway/DNS IPv4

☒ DHCP

☐ Static

Default Gateway: 192.168.1.1

DNS Server: 0.0.0.0

Gateway/DNS IPv6

☒ Automatic

☐ Static

Default Gateway:

DNS Server:

IoT Server

☐ None

☐ Home Gateway

☒ Remote Server

Server Address: 192.168.1.5

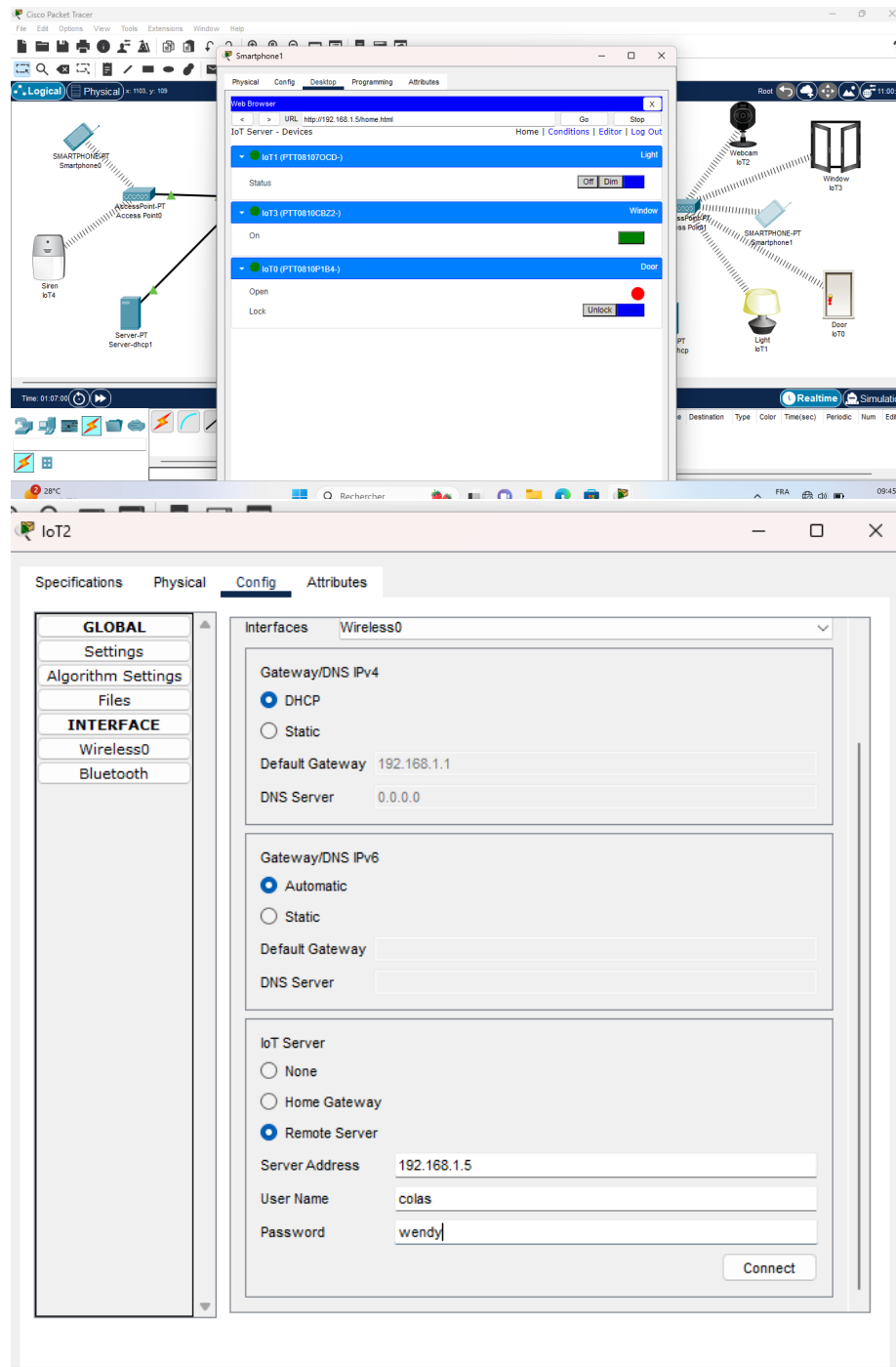
User Name: wendy

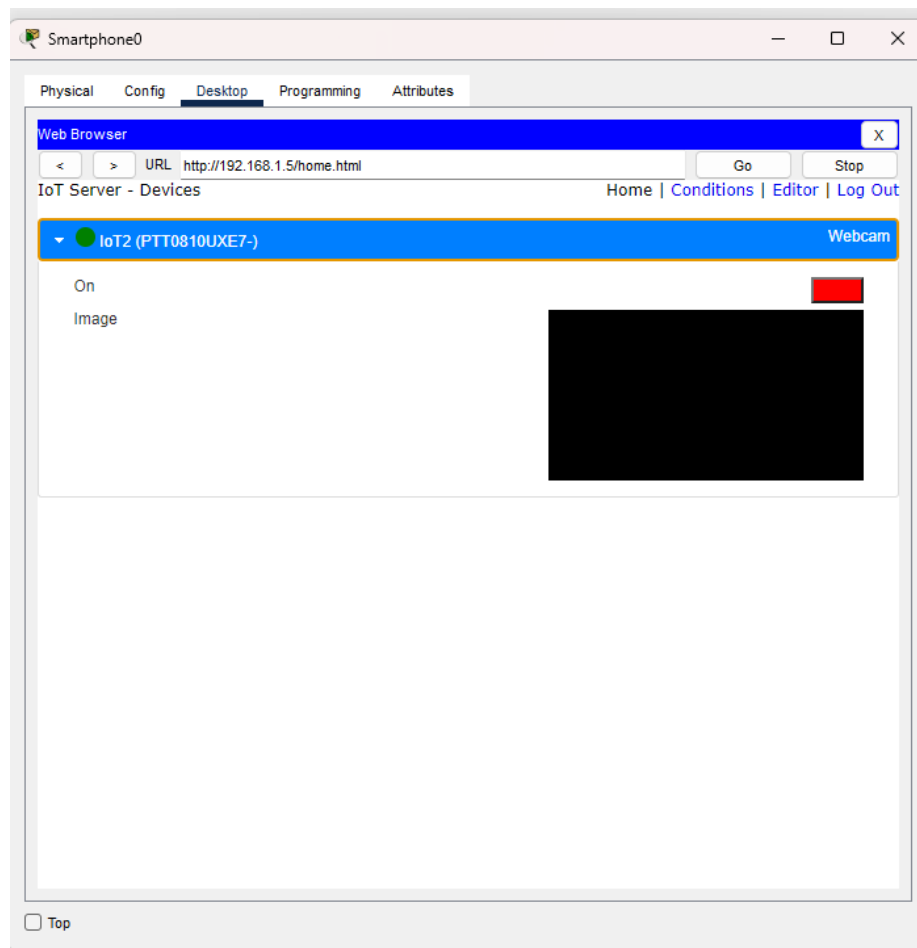
Password: colas

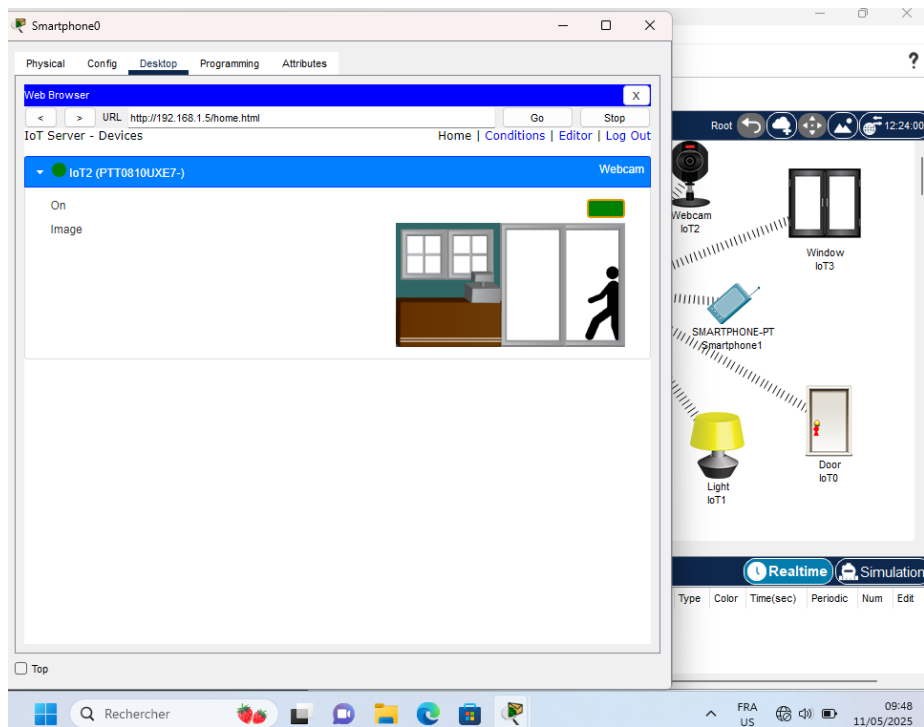
Connecting

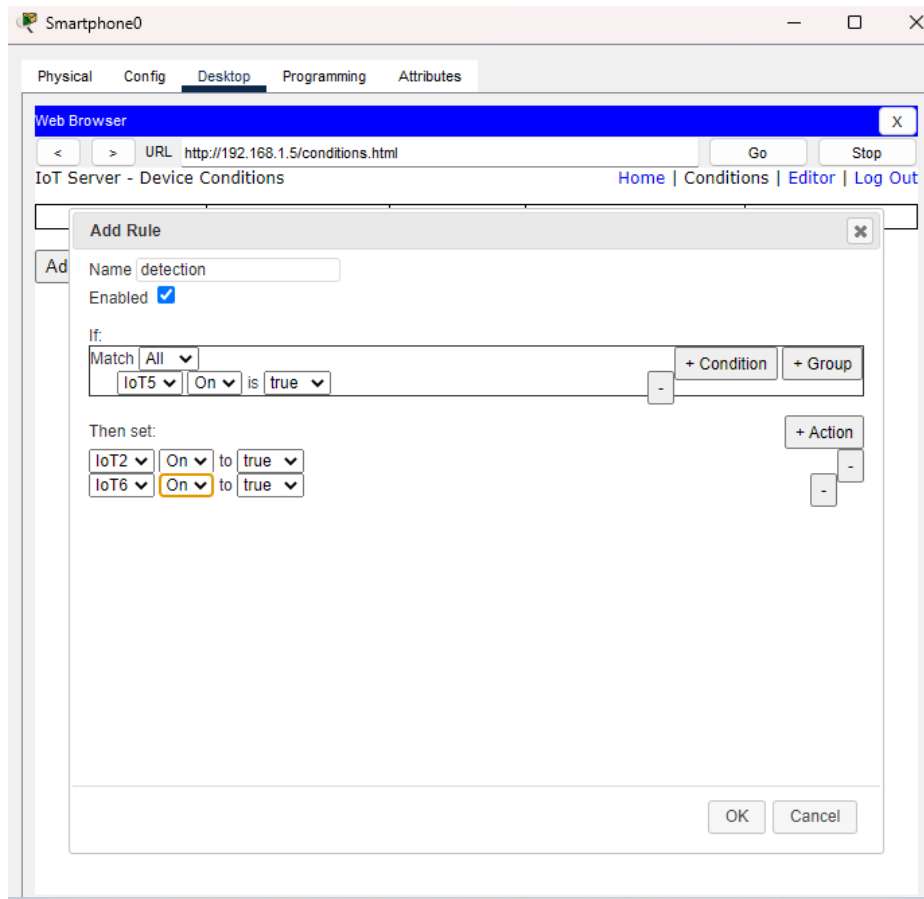
38

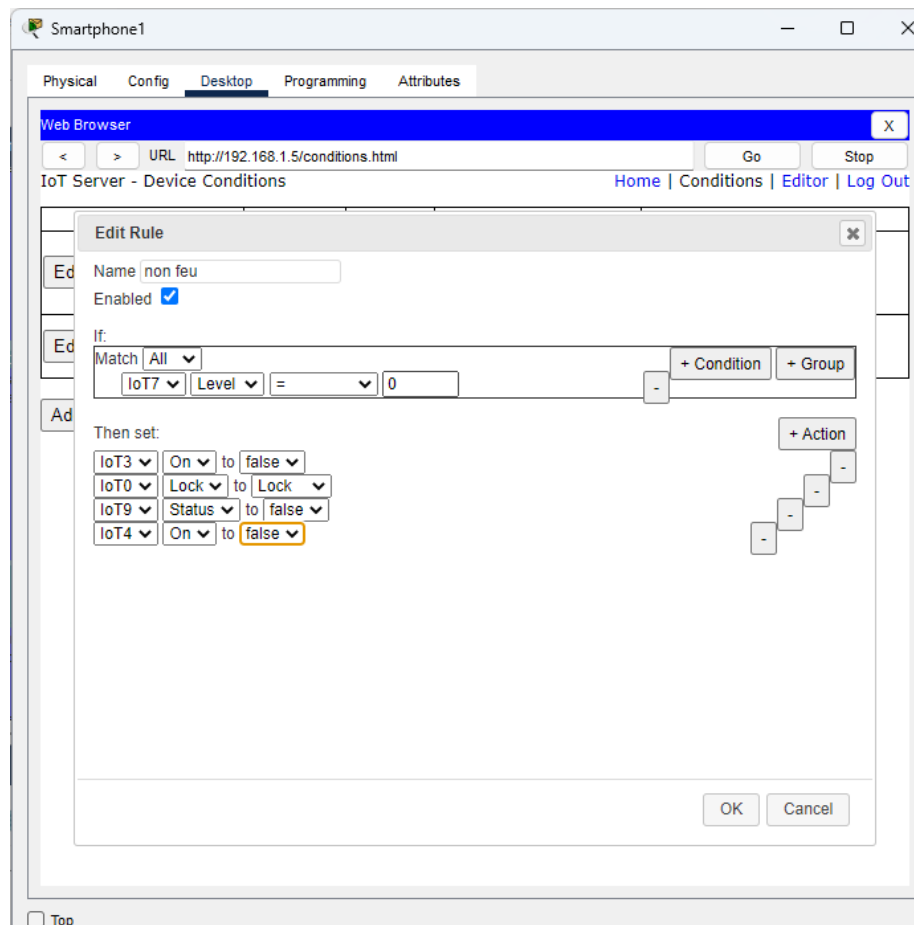
10.5 Finalisation des tests et ajustements











Conclusion

Ce rapport documente l'ensemble du **processus de configuration d'un réseau IoT** dans **Cisco Packet Tracer**, illustrant la mise en place des **serveurs DHCP**, des **routeurs OSPF**, des **points d'accès Wi-Fi** et des **appareils IoT**. Il met en avant la nécessité de sécuriser les **connexions IoT** et d'optimiser la **gestion des équipements** pour garantir un **réseau performant et résilient**.