



Communication and Networking Fundamentals(CIS 315)



Term 1, 2023-2024

Topology 5

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Abstract :

This report presents the planning and design process for implementing a network based on Topology 5, aimed at improving student transfer management within the university. Our goal is to establish a robust network that connects the Cybersecurity department on the first floor with the Computer Science department on the second, facilitating smooth communication and efficient data sharing. Utilizing Cisco Packet Tracer, we have crafted a scalable network infrastructure that addresses the inefficiencies of the existing paper-based transfer system. This digital solution enables real-time updates, minimizes errors, and streamlines the student transfer process. Ultimately, this project aligns with the institution's mission to deliver high-quality education and fosters innovation, marking a significant enhancement in operational effectiveness within the university.

Introduction:

Managing student transfers is essential for smooth academic operations, yet many universities rely on outdated paper-based systems that cause delays and inefficiencies. This project aims to replace the manual system with a real-time digital solution to streamline the transfer process between the Cybersecurity and Computer Science departments. By upgrading the network infrastructure and integrating departmental systems, this solution will enhance communication, reduce errors, and improve overall efficiency. The proposed improvements align with the university's commitment to innovation and delivering high-quality education.

Requirements of The Topology:

DEVICE NAME	QUANTITY
PC's	9
Laptop	5
Switch	6
Router	4
Printer	4
IP Phone	3
Access Point	2
Modem	1
Cloud	1
Server	1
Serial Cable	3
Phone Cable	1
Straight-through Cable	24

Table 1: Requirements of The Topology

Setting up the topology

The Basic Topology:

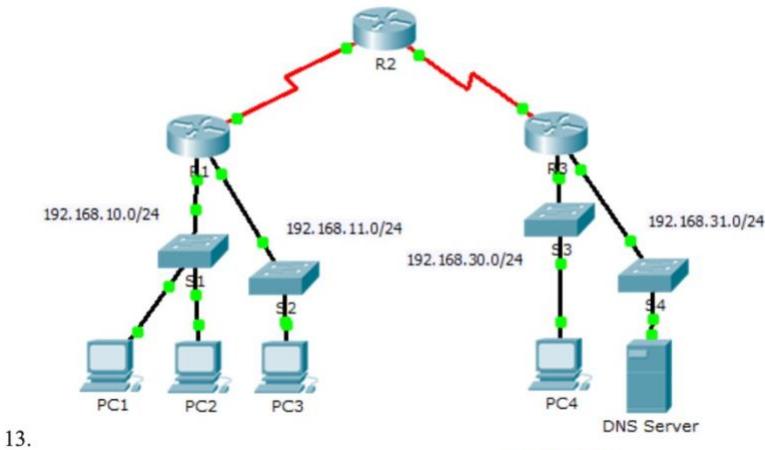


Figure 1: The Basic Topology

Our Final Topology:

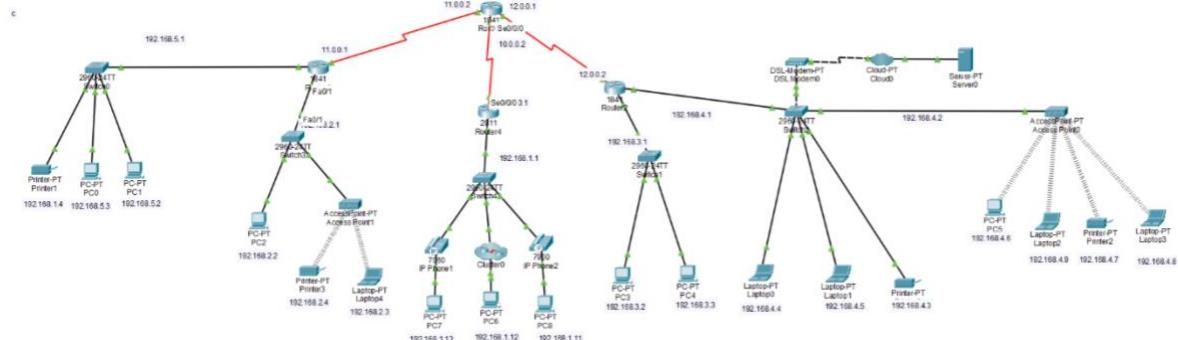


Figure 2

Addressing Table:

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Serial 0/0/0	10.0.0.2	255.0.0.0	N/A
	Serial 0/1/0	11.0.0.2	255.0.0.0	
	Serial 0/1/1	12.0.0.1	255.0.0.0	
R2	Serial 0/1/0	11.0.0.1	255.0.0.0	N/A
	FastEthernet0/0	192.168.5.1	255.255.255.0	
	FastEthernet0/1	192.168.2.1	255.255.255.0	
R3	FastEthernet0/0	192.168.4.1	255.255.255.0	N/A
	FastEthernet0/1	192.168.3.1	255.255.255.0	
	Serial 0/1/1	12.0.0.2	255.0.0.0	
R4	Serial 0/0/0	10.0.0.1	255.0.0.0	192.168.5.1
	FastEthernet0/1	192.168.1.1	255.255.255.0	
	FastEthernet0/0	192.168.5.3	255.255.255.0	
PC0	FastEthernet0/0	192.168.5.2	255.255.255.0	192.168.2.1
PC1		192.168.5.4	255.255.255.0	
Printer1		192.168.2.2	255.255.255.0	
PC2	FastEthernet0/0	192.168.2.4	255.255.255.0	192.168.3.1
Printer3		192.168.2.3	255.255.255.0	
Laptop4		192.168.3.2	255.255.255.0	
PC3	FastEthernet0/0	192.168.3.3	255.255.255.0	192.168.4.1
PC4		192.168.4.4	255.255.255.0	
Laptop0		192.168.4.5	255.255.255.0	
Laptop1	FastEthernet0/0	192.168.4.3	255.255.255.0	192.168.4.2
Printer0		192.168.4.6	255.255.255.0	
PC5		192.168.4.9	255.255.255.0	
Laptop2	Wireless0	192.168.4.8	255.255.255.0	192.168.1.1
Laptop3		192.168.4.7	255.255.255.0	
Printer2		192.168.1.12	255.255.255.0	
PC6	FastEthernet0/0			

PC7	FastEthernet0/0	192.168.1.13	255.255.255.0	192.168.1.1
PC8	FastEthernet0/0	192.168.1.11	255.255.255.0	

Table 2: Addressing Table

PC & Laptop Configuration

To assign IP addresses to the PC's & Laptop's:

1. Click on PC, Laptop.
2. Choose the Desktop option.
3. Choose IP Configuration.
4. Assign the IP address and the default Gateway.

Note : Same steps with other Devices.

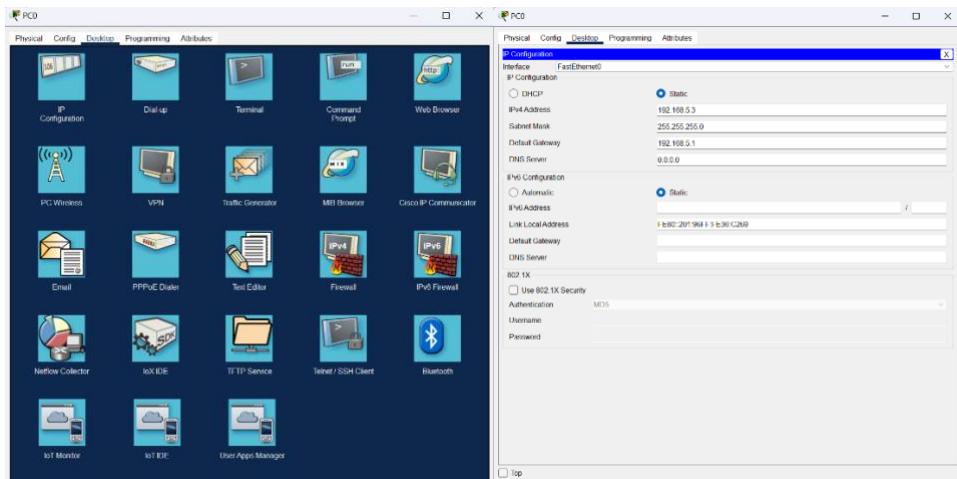


Figure 3

Figure 4

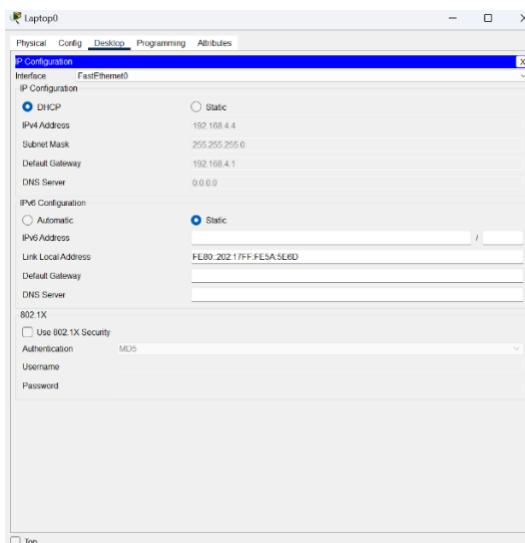


Figure 5

Printer Configuration

To assign IP addresses to the Printers:

1. Assign the IP address, subnet mask, and the default gateway.

Note : Same steps with other printers.

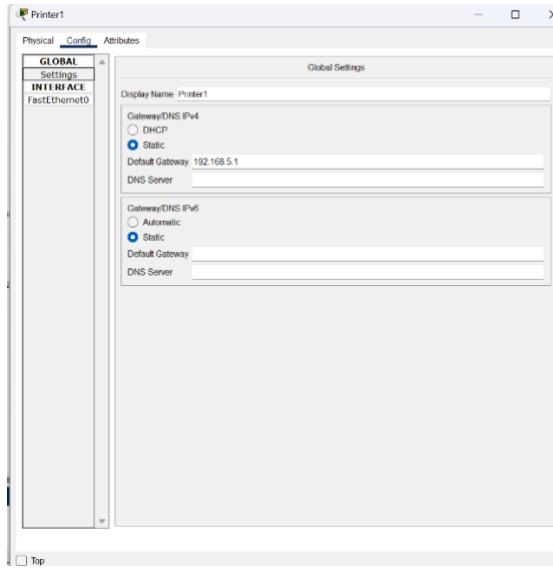


Figure 6

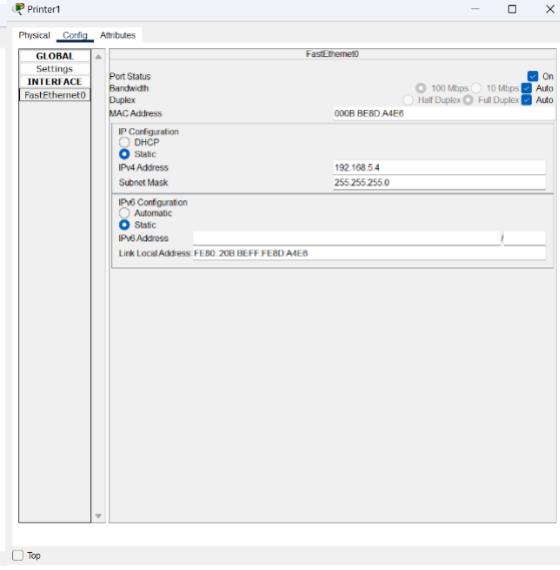


Figure 7

Router Configuration

1. Access the Router: Begin by logging into the router's interface.
2. Navigate to Configuration: Click on the "Config" section to access the settings.
3. Select Interface: Choose the desired interface from the list.
4. Set IP Address and Subnet Mask: Enter the appropriate IP address and subnet mask for the selected interface.

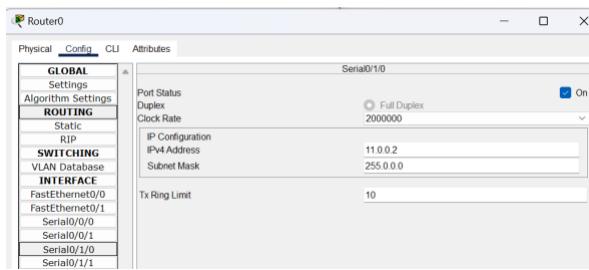


Figure 8

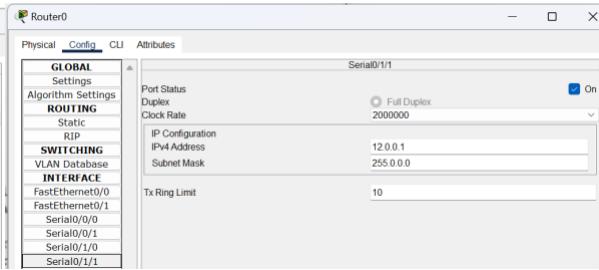


Figure 9

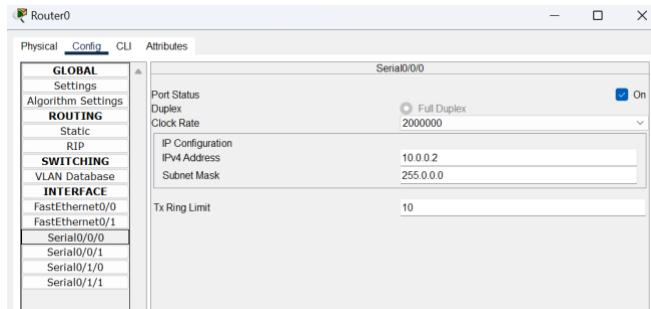


Figure 10

Switch Configuration

Switch 0:

```

Hardware Board Revision Number : 0x01
Switch Port Model      SW Version      SW Image
* 1 26  WS-C2960-24TT-L  15.0(2)SE4   C2960-LANBASEK9-M

Cisco IOS Software, C2960 Software (C2960-LANBASEK9-M), Version 15.0(2)SE4, RELEASE SOFTWARE
(fcl)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1996-2013 by Cisco Systems, Inc.
Compiled Wed Jun 26 2013 02:14:59 by mnnguyen

Press RETURN to get started!

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to up

Switch>
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname S1
Switch(config)#line console 0
Switch(config-line)#password 1100
Switch(config-line)#login
Switch(config-line)#exit
Switch(config)#end
%SYS-5-CONFIG_I: Configured from console by console

Switch>en
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname S1
Switch(config)#line console 0
Switch(config-line)#password 1100
Switch(config-line)#login
Switch(config-line)#exit
Switch(config)#end
%SYS-5-CONFIG_I: Configured from console by console

Switch>copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
%SYS-5-CONFIG_I: Configured from console by console

```

Figure 11

Switch 1:

```

Hardware Board Revision Number : 0x01
Switch Port Model      SW Version      SW Image
* 1 26  WS-C2960-24TT-L  15.0(2)SE4   C2960-LANBASEK9-M

Cisco IOS Software, C2960 Software (C2960-LANBASEK9-M), Version 15.0(2)SE4, RELEASE SOFTWARE
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Compiled Wed Jun 26 2013 02:14:59 by mnnguyen

Switch con0 is now available

Press RETURN to get started.

Switch>
Switch#en
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname S1
Switch(config)#line console 0
Switch(config-line)#password 1111
Switch(config-line)#login
Switch(config-line)#exit
Switch(config)#end
%SYS-5-CONFIG_I: Configured from console by console
%run star
% Invalid input detected at `***` marker.

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

Switch>copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
%SYS-5-CONFIG_I: Configured from console by console

```

Figure 12

Switch 2:

```

Hardware Board Revision Number : 0x01
Switch Port Model      SW Version      SW Image
* 1 26  WS-C2960-24TT-L  15.0(2)SE4   C2960-LANBASEK9-M

Cisco IOS Software, C2960 Software (C2960-LANBASEK9-M), Version 15.0(2)SE4, RELEASE SOFTWARE
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Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1996-2013 by Cisco Systems, Inc.
Compiled Wed Jun 26 2013 02:14:59 by mnnguyen

Press RETURN to get started!

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/5, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/5, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to up

Switch>
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname S2
Switch(config)#line console 0
Switch(config-line)#password 2222
Switch(config-line)#login
Switch(config-line)#exit
Switch(config)#end
%SYS-5-CONFIG_I: Configured from console by console
copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
%SYS-5-CONFIG_I: Configured from console by console

```

Figure 13

Switch 3:

```

Hardware Board Revision Number : 0x01
Switch Port Model      SW Version      SW Image
* 1 26  WS-C2960-24TT-L  15.0(2)SE4   C2960-LANBASEK9-M

Cisco IOS Software, C2960 Software (C2960-LANBASEK9-M), Version 15.0(2)SE4, RELEASE SOFTWARE
(fcl)
Technical Support: http://www.cisco.com/techsupport
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Compiled Wed Jun 26 2013 02:14:59 by mnnguyen

Press RETURN to get started!

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up

Switch>
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname S3
Switch(config)#line console 0
Switch(config-line)#password 1133
Switch(config-line)#login
Switch(config-line)#exit
Switch(config)#end
%SYS-5-CONFIG_I: Configured from console by console
copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
%SYS-5-CONFIG_I: Configured from console by console

```

Figure 14

Switch 4:

The screenshot shows a Cisco Switch CLI interface titled "Switch4". The window has tabs for Physical, Config, CLI, and Attributes, with "CLI" selected. The title bar also displays "IOS Command Line Interface".

The main area of the window shows the following configuration commands:

```
Switch>en
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname S4
S4(config)#line console 0
S4(config-line)#password 11444
S4(config-line)#login
S4(config-line)#exit
S4(config)#exit
S4#
$SYS-5-CONFIG_I: Configured from console by console
copy run star
Destination filename [startup-config]?
```

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

Figure 15

Routing Table

Router 1

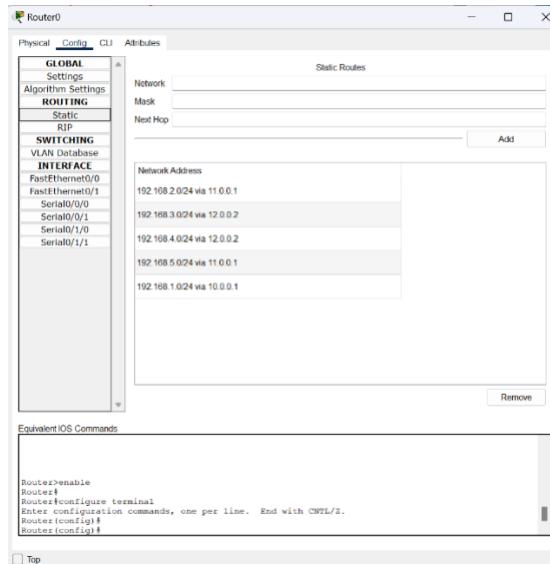


Figure 16

Router 2

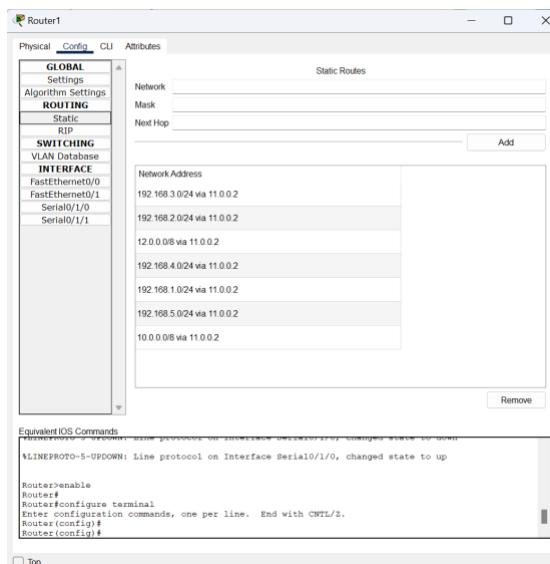


Figure 17

Router 3

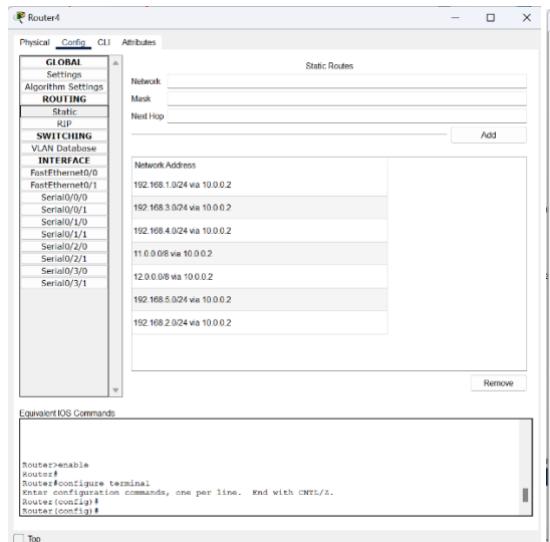


Figure 18

Router 4

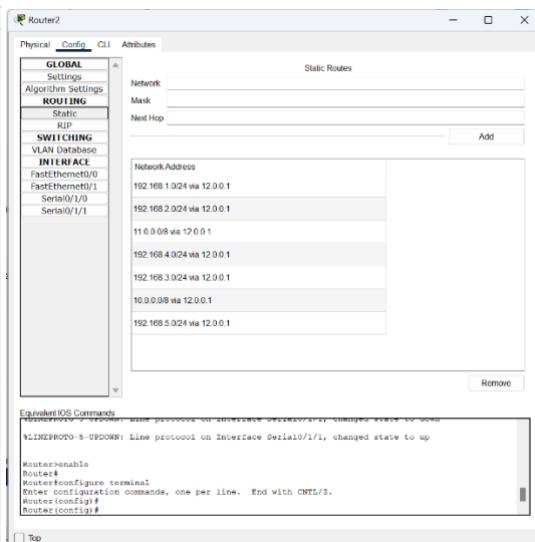


Figure 19

Modem and Cloud Configuration

1. Open cloud.
2. Turn off cloud.
3. Drag the modules to the empty box and turn on cloud.
4. Turn on cloud.

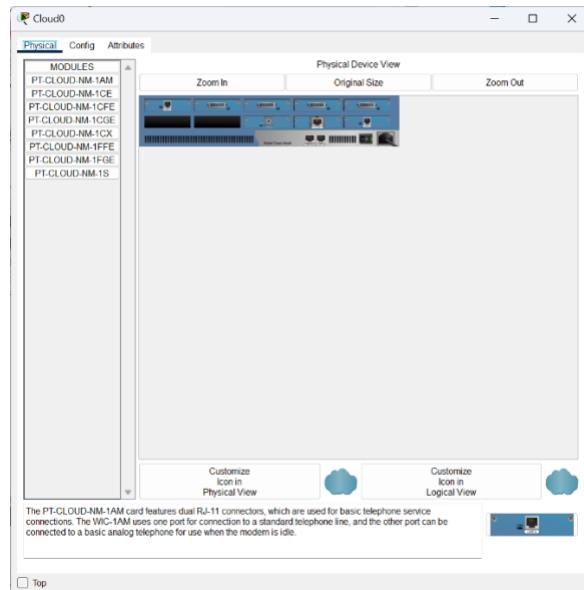


Figure 20

DSL modem Configuration Cloud Configuration

1. Click on cloud.
2. Choose config.
3. Choose DSL.
4. Click on add.

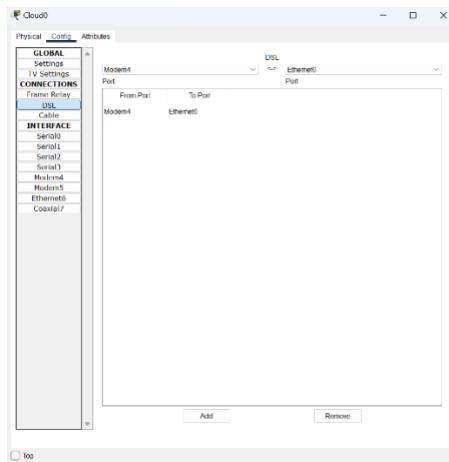


Figure 21

5. Click on Etherent6.
6. Activate the DSL network provider.

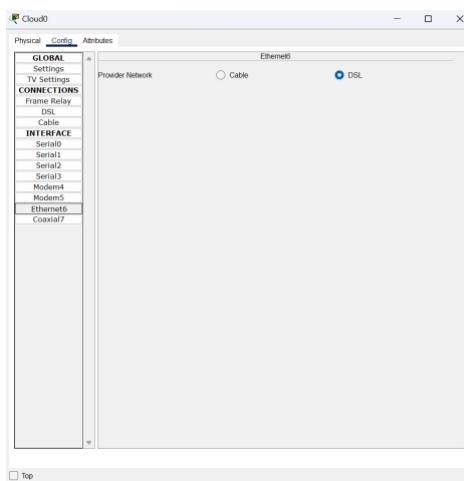


Figure 22

The modem is set

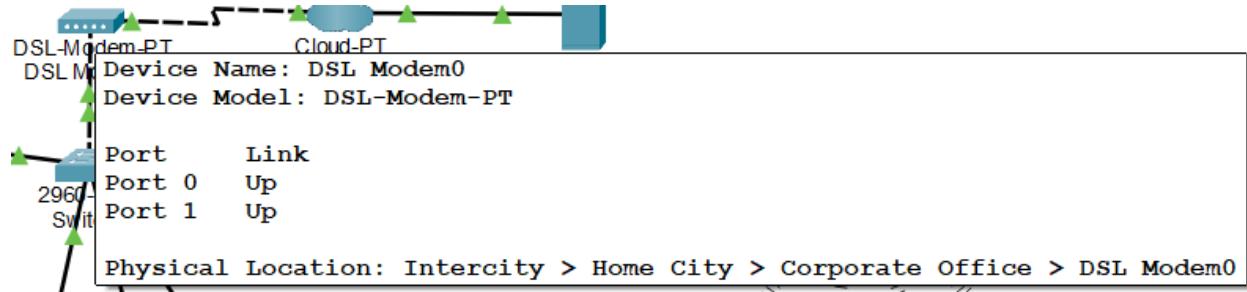


Figure 23

Creating VOIP

Configuration of IP-voice for phones

1. power up the phone.

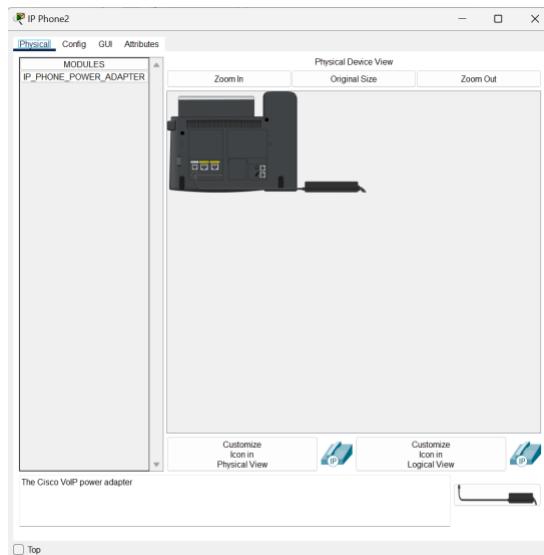


Figure 24

2. configure interface on router.

Figure 25

Figure 26

- Configure a voice Vlan on switch

Figure 27

- **Check the Configure connection**

Call and receive the call from IP phone2 to IP phone1.

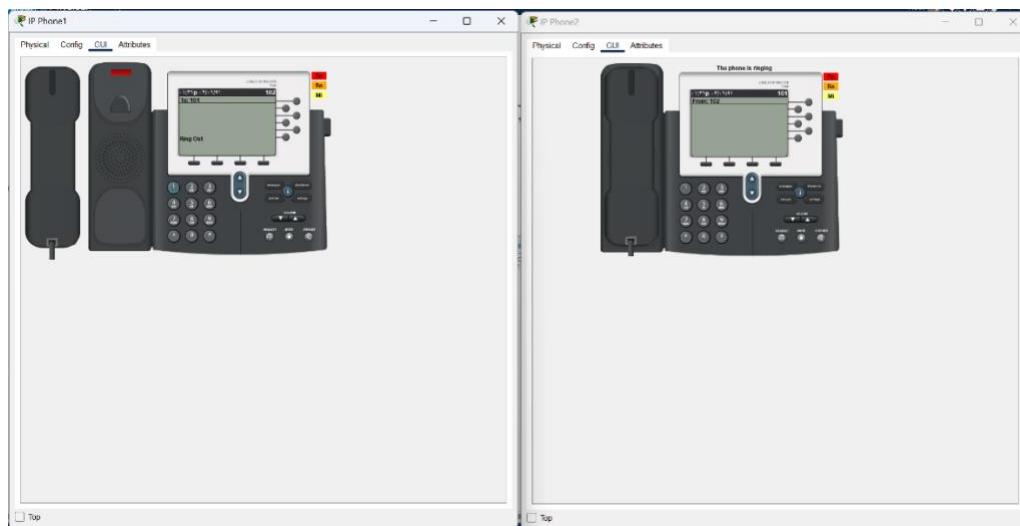


Figure 28

- Call and receive the call from IP phone1 to IP phone0.



Figure 29

- Call and receive the call from IP phone0 to IP phone1.



Figure 30

Access Point Configuration

1. Assign SSID and password.

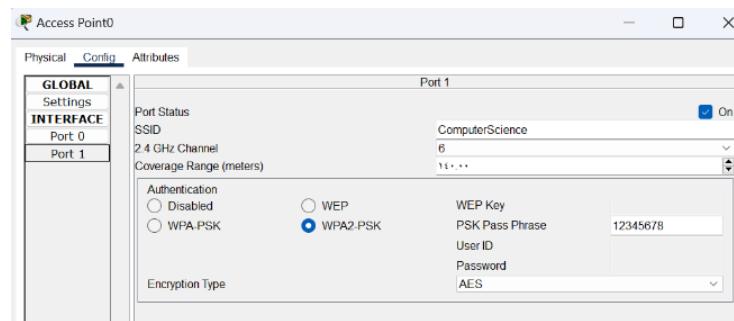


Figure 31

2. Connect PC5 & Laptop2 & Laptop3 & Printer2 to access point.
- Click on the pc, laptop or printer.
- Choose desktop.

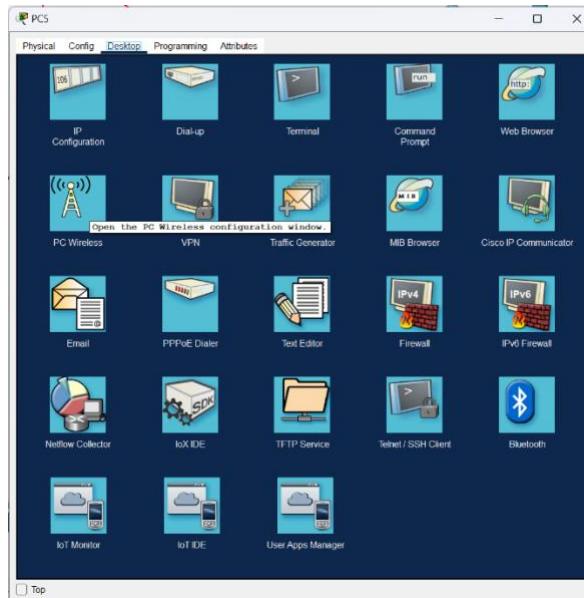


Figure 32

3. Click refresh.
4. Choose the wireless network name.
5. Enter password.
6. Click connect.

Note: The same steps will be applied for connecting Laptop4 & Printer3 on the other Access point

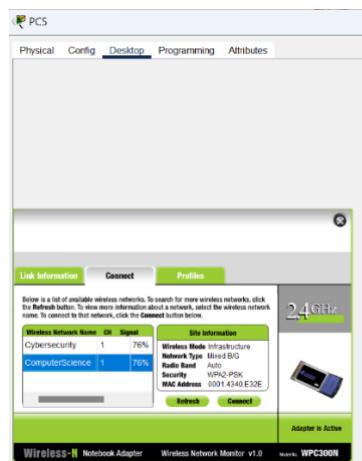


Figure 33

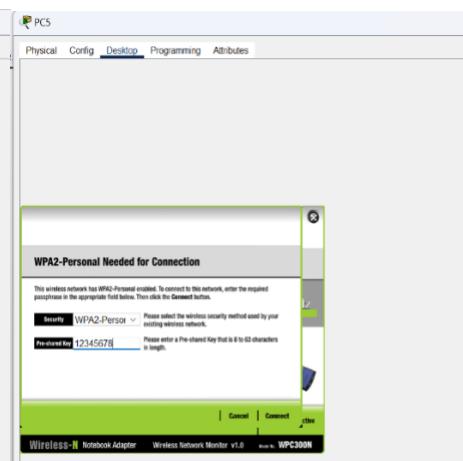


Figure 34

- Connect printer access point.

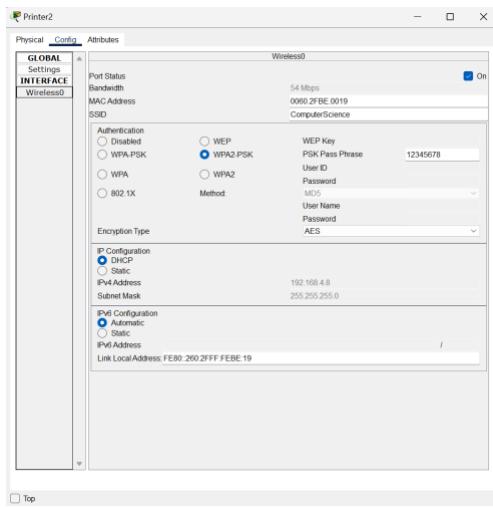


Figure 35

DNS Server Configuration

1. Click Desktop.
2. Add DNS Server IP Address, Subnet Mask and the default gateway.

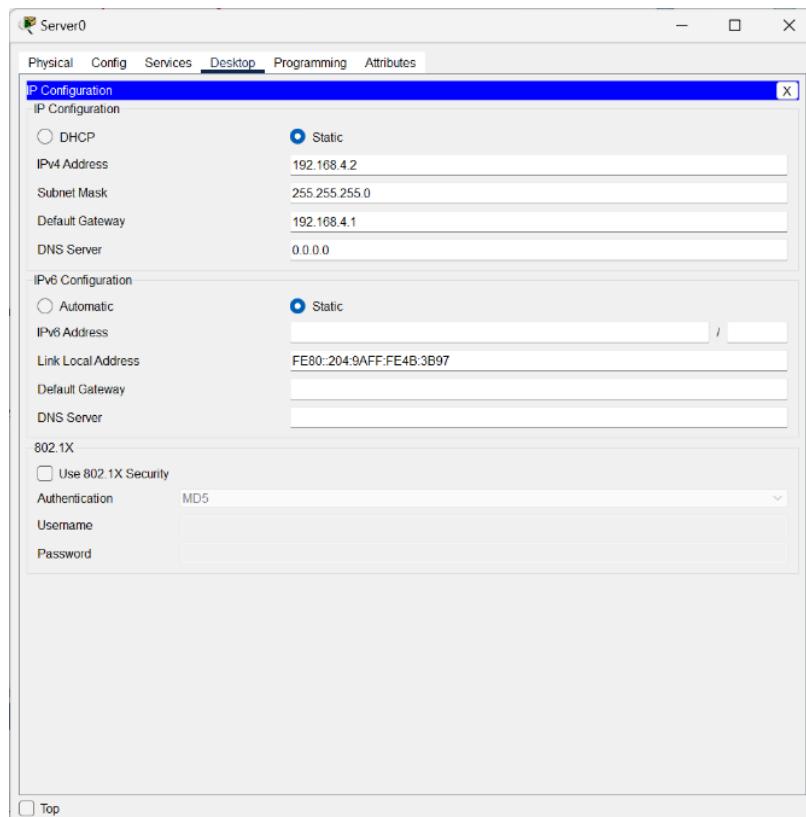


Figure 36

Verification of Devices

To verify the configuration and to check connectivity between the devices:

1. Click on any pc.
2. Choose desktop.
3. Choose command prompt.
4. Type "ping" and IP address of the other PC.

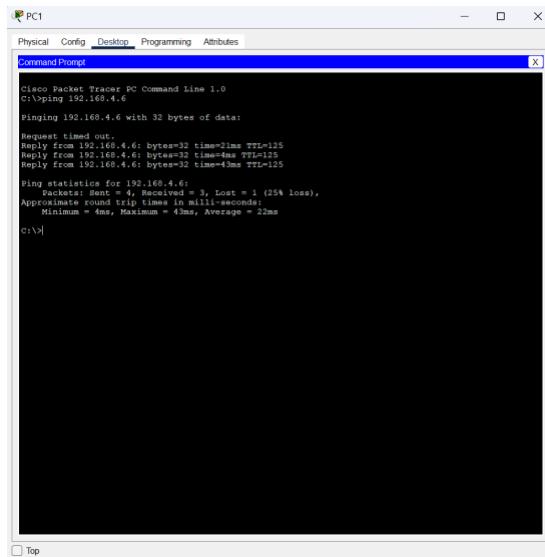


Figure 37

Another way:

- Use message icon

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit
	Successful	PC4	PC8	ICMP		0.000	N	0	(edit)
	Successful	IP Ph...	IP Phone2	ICMP		0.000	N	1	(edit)
	Successful	PC1	PC5	ICMP		0.000	N	2	(edit)
	Successful	Printer3	PC1	ICMP		0.000	N	3	(edit)

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit
	Successful	PC4	Printer2	ICMP		0.000	N	4	(edit)
	Successful	PC8	Router4	ICMP		0.000	N	5	(edit)
	Successful	IP Ph...	PC8	ICMP		0.000	N	6	(edit)
	Successful	Laptop3	Printer0	ICMP		0.000	N	7	(edit)

Figure 38

Conclusion :

In conclusion, this project describes the planning and designing of a network infrastructure to enhance university student transfer procedures. The first-floor cybersecurity department and the second-floor computer science department are successfully connected by the network, allowing for smooth communication and effective data exchange between the two divisions. Through the use of Cisco Packet Tracer, a digital solution to replace the paper-based system, this effort guarantees real-time updates across departments, lowers errors, and expedites workflows. This development satisfies the university's objectives and goals of encouraging innovation and operational excellence and is a major step toward improving the effectiveness of the institution and the educational experience for students.