



**Communications & Network
Fundamentals CIS 315
Academic Year (2022-2021) – First Semester
BY**

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Smart Library using Packet Tracer

Project Goals:

A smart library can be defined as libraries that use technology to become more operationally efficient, improve management, enhance innovation, protect visitors and employees, improve productivity, and reduce their environmental impact. As health and security protection is important in the library because it aims to protect people from accidents that may cause injuries or damage to property.

For example, providing a secured network in the library that allows visitors to search for the information they want through protected servers, Also, when people want to share information from one device to another, we ensure that it does not go to the wrong device.

Finally, our library model depends on technology, where all the scientific resources that a person wants will be available on the devices, and there are also some robots that will help visitors.

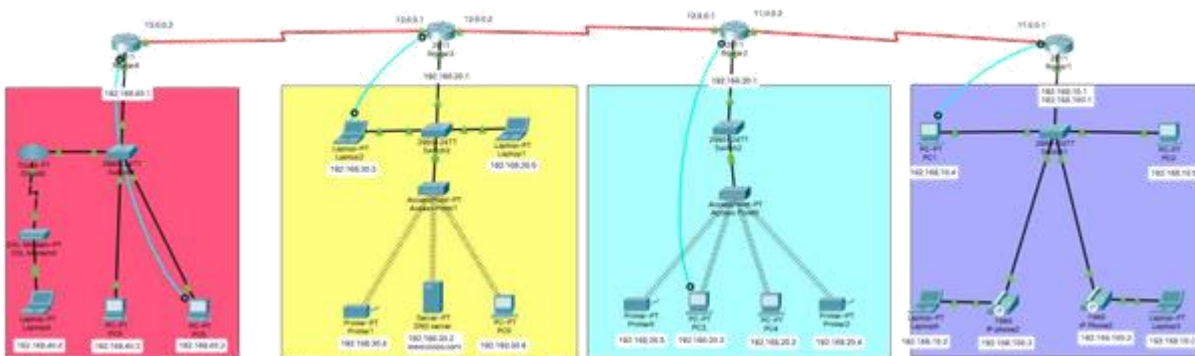
Problem Statement:

Some libraries face challenges in the design of the network in terms of data loss or lack of access, so the visitor is always looking for security from a technical point of view to ensure that he is not spying and stealing his information, and backups to avoid losing his information. It also faces insecurity in terms of not having a fire alarm. Also, pressure on the libraries sometimes may lead to the lack of full access to the information due to the weakness of the network.

ABSTRACT:

We'll demonstrate a library network setup using mesh topology, which has the advantage of providing each system with a dedicated point-to-point connection to every other device. This helps us preserve patients' privacy by ensuring that only the intended receiver sees each communication as it travels down a dedicated line, reducing traffic congestion. Mesh is resilient because if one link fails, the system as a whole is not affected.

Topology



1- Topology Requirements

Device	Quantity
Laptop	5
printer	3
Access point	1
PC	7
Switches	4
Routers	4
Serial cables	3
Straight-through cables	13
IP Phone	2
Phone cable	1
Consul cable	2
Server	1
DSL modem	1
Cloud	1

2- Addressing table:

We began by configuring our equipment to fit the topology of our network. After that, we completed the network's addressing table. Following the completion of the addressing table, we began configuring our routers and other devices in accordance with it.

Device	Interface	IP Address	Subnet Mask	Default Gateway
Router1	Serial 1/0	11.0.0.1	255.255.255.0	-
Router1	F0/0.10	192.168.10.1	255.255.255.0	-
Router1	F0/0.100	192.168.100.1	255.255.255.0	-
Router2	Serial 1/0	11.0.0.2	255.255.255.0	-
Router2	Serial 1/1	12.0.0.1	255.255.255.0	-
Router2	F0/0.20	192.168.20.1	255.255.255.0	-
Router3	Serial 1/0	12.0.0.2	255.255.255.0	-
Router3	F0/0.30	192.168.30.1	255.255.255.0	-
Router3	Serial 1/1	13.0.0.1	255.255.255.0	-
Router4	Serial 1/0	13.0.0.2	255.255.255.0	-
Router4	F1/0	192.168.40.12	255.255.255.0	-

PC0	F0	192.168.30.6	255.255.255.0	192.168.30.1
PC1	F0	192.168.10.4	255.255.255.0	192.168.10.1
PC2	F0	192.168.10.5	255.255.255.0	192.168.10.1
PC3	Wireless	192.168.20.3	255.255.255.0	192.168.20.1
PC4	Wireless	192.168.20.2	255.255.255.0	192.168.20.1
PC5	F0	192.168.40.2	255.255.255.0	192.168.40.1
PC6	F0	192.168.40.3	255.255.255.0	192.168.40.1
Laptop0	F0	192.168.10.2	255.255.255.0	192.168.10.1
Laptop1	F0	192.168.30.5	255.255.255.0	192.168.30.1
Laptop2	F0	192.168.30.3	255.255.255.0	192.168.30.1
Laptop3	F0	192.168.10.3	255.255.255.0	192.168.10.1
Printer0	Wireless	192.168.20.5	255.255.255.0	192.168.20.1
Printer1	F0	192.168.30.4	255.255.255.0	192.168.30.1
Printer2	Wireless	192.168.20.4	255.255.255.0	192.168.20.1
DNS server	F0	192.168.30.2	255.255.255.0	192.168.30.1
IP phone1	Switch	192.168.100.2	-	192.168.100.1

Switch	192.168.100.3	-	192.168.100.1
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IP phone2

3- Assign static IP Address to the PC's.

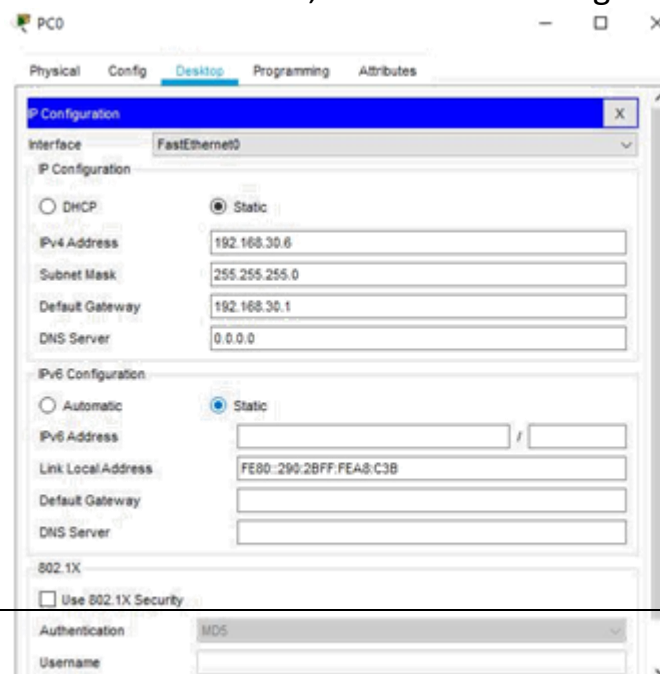
Configure the IP Address Subnet mask and Default gateway setting on PC's:

Open the PC

And click IP configuration



Set the IP address, subnet mask and gateway.



4- Creating the VOIP

Configure DHCP pool on Router1



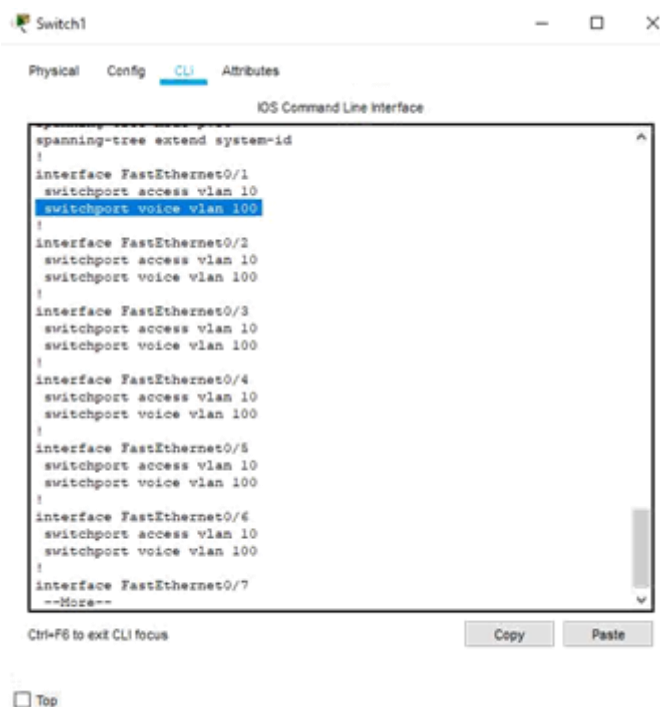
The screenshot shows the CLI window for Router1. The configuration is as follows:

```
Router1>en
Router1#sh x
Building configuration...

Current configuration : 1699 bytes
!
version 12.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Router1
!
!
!
ip dhcp pool voice
network 192.168.100.0 255.255.255.0
default-router 192.168.100.1
option 150 ip 10.0.0.1
!
!
--More--
```

At the bottom of the window, there is a 'Ctrl+F6 to exit CLI focus' message and 'Copy' and 'Paste' buttons.

Assign Voice VLAN in switch1:



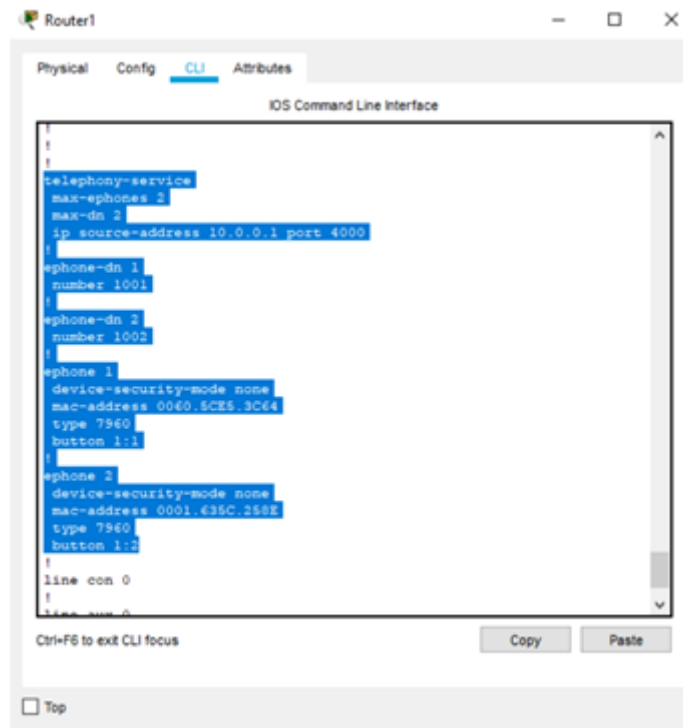
The screenshot shows the CLI window for Switch1. The configuration is as follows:

```
Switch1>en
Switch1#sh x
Building configuration...

Current configuration : 1699 bytes
!
spanning-tree extend system-id
!
interface FastEthernet0/1
switchport access vlan 10
switchport voice vlan 100
!
interface FastEthernet0/2
switchport access vlan 10
switchport voice vlan 100
!
interface FastEthernet0/3
switchport access vlan 10
switchport voice vlan 100
!
interface FastEthernet0/4
switchport access vlan 10
switchport voice vlan 100
!
interface FastEthernet0/5
switchport access vlan 10
switchport voice vlan 100
!
interface FastEthernet0/6
switchport access vlan 10
switchport voice vlan 100
!
interface FastEthernet0/7
switchport access vlan 10
switchport voice vlan 100
!
--More--
```

At the bottom of the window, there is a 'Ctrl+F6 to exit CLI focus' message and 'Copy' and 'Paste' buttons.

Configure the Call Manager on Router3.



Sample Call



5- Configure Static Routes

Router1:

Using Static route:

```
Router1(config)#ip route 192.168.20.0 255.255.255.0 11.0.0.2
Router1(config)#ip route 192.168.30.0 255.255.255.0 11.0.0.2
Router1(config)#ip route 192.168.40.0 255.255.255.0 11.0.0.2
```

Router2:

```
Router2(config)#ip route 192.168.10.0 255.255.255.0 11.0.0.1
Router2(config)#ip route 192.168.30.0 255.255.255.0 12.0.0.2
Router2(config)#ip route 192.168.40.0 255.255.255.0 12.0.0.2
Router2(config)#ip route 192.168.100.0 255.255.255.0 12.0.0.2
```

Router3:

```
Router3(config)#ip route 192.168.10.0 255.255.255.0 12.0.0.1
Router3(config)#ip route 192.168.100.0 255.255.255.0 12.0.0.1
Router3(config)#ip route 192.168.20.0 255.255.255.0 12.0.0.1
Router3(config)#ip route 192.168.40.0 255.255.255.0 13.0.0.2
```

Router4:

```
Router4(config)#ip route 192.168.30.0 255.255.255.0 13.0.0.1
Router4(config)#ip route 192.168.20.0 255.255.255.0 13.0.0.1
Router4(config)#ip route 192.168.10.0 255.255.255.0 13.0.0.1
Router4(config)#ip route 192.168.100.0 255.255.255.0 13.0.0.1
```

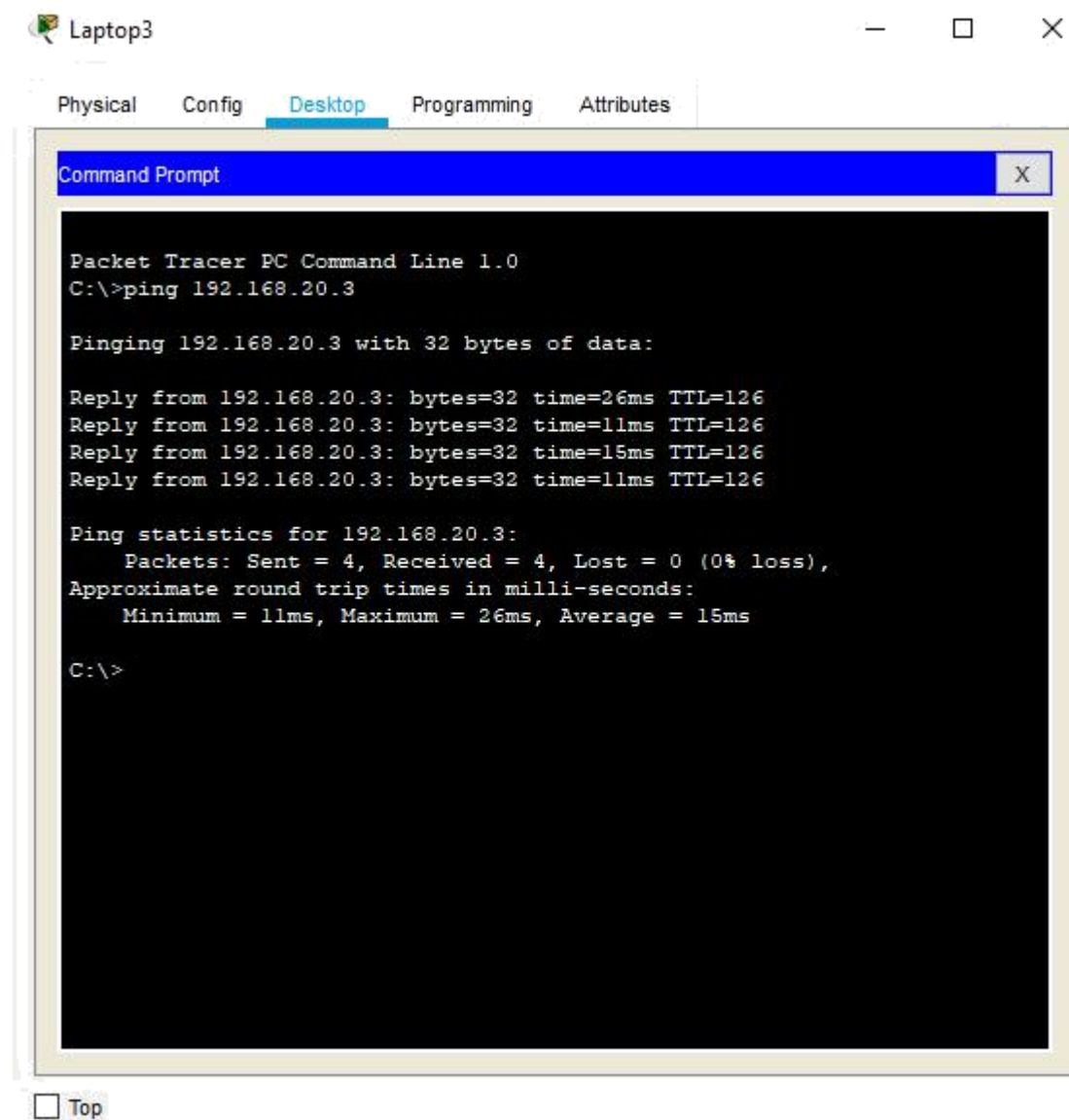
Show routing table for router1:



We will do the same for
router 2 ,3and4

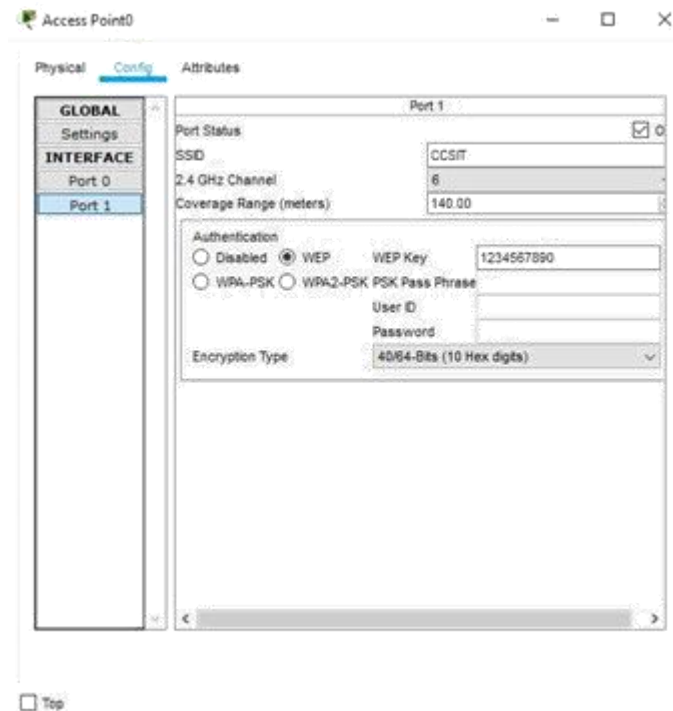
Test connection:

Ping laptop3 with IP 192.168.10.3 and PC5 with IP 192.168.20.3



6- Configure Access point

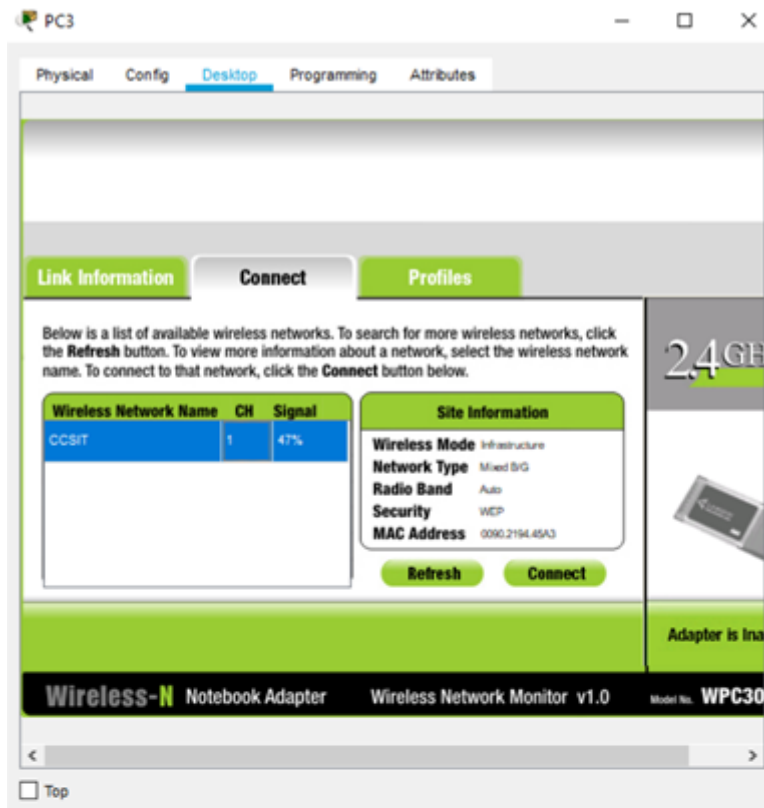
assign the SSID name and password:



Open the PC and click wireless

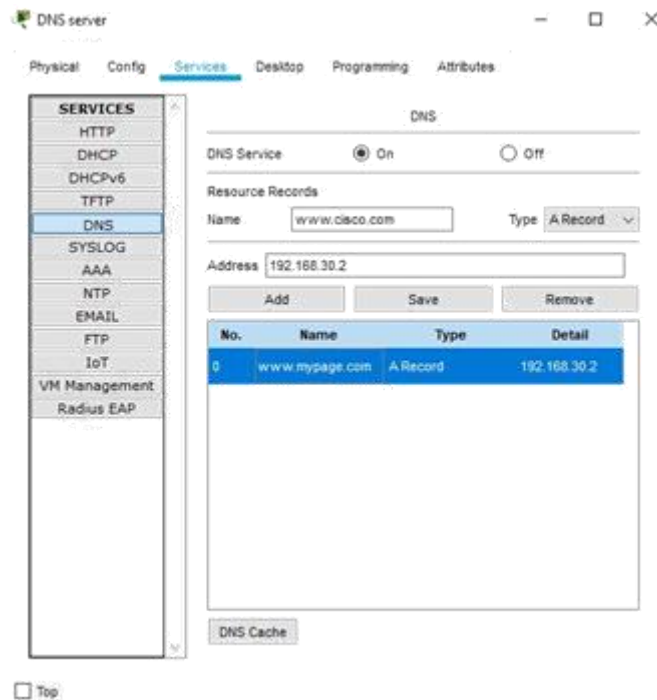


Enter the SSID name and password:



7- Configure DNS server

Click services and choose DNS:



Add the name for the DNS

Set the IP address

And click add then click on

Open the Browser

And type <http://192.168.30.2>



the web site its work.

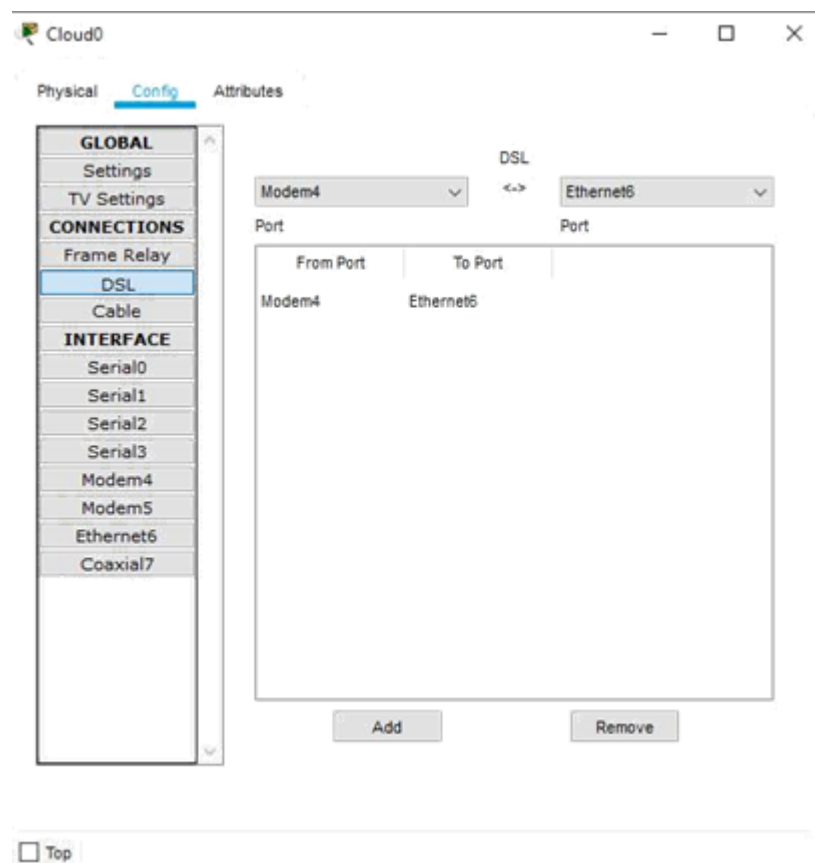
8- Configure DSL modem



First connect the cloud to the switch Next connect the DSL modem to the cloud

And connect any device to the DSL modem

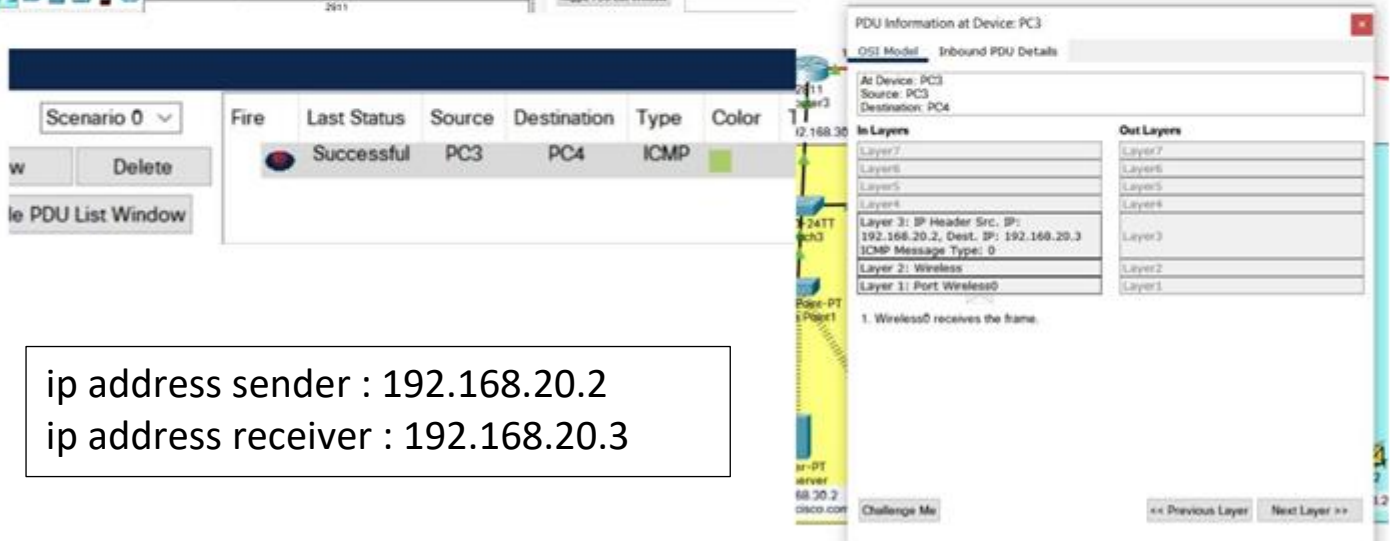
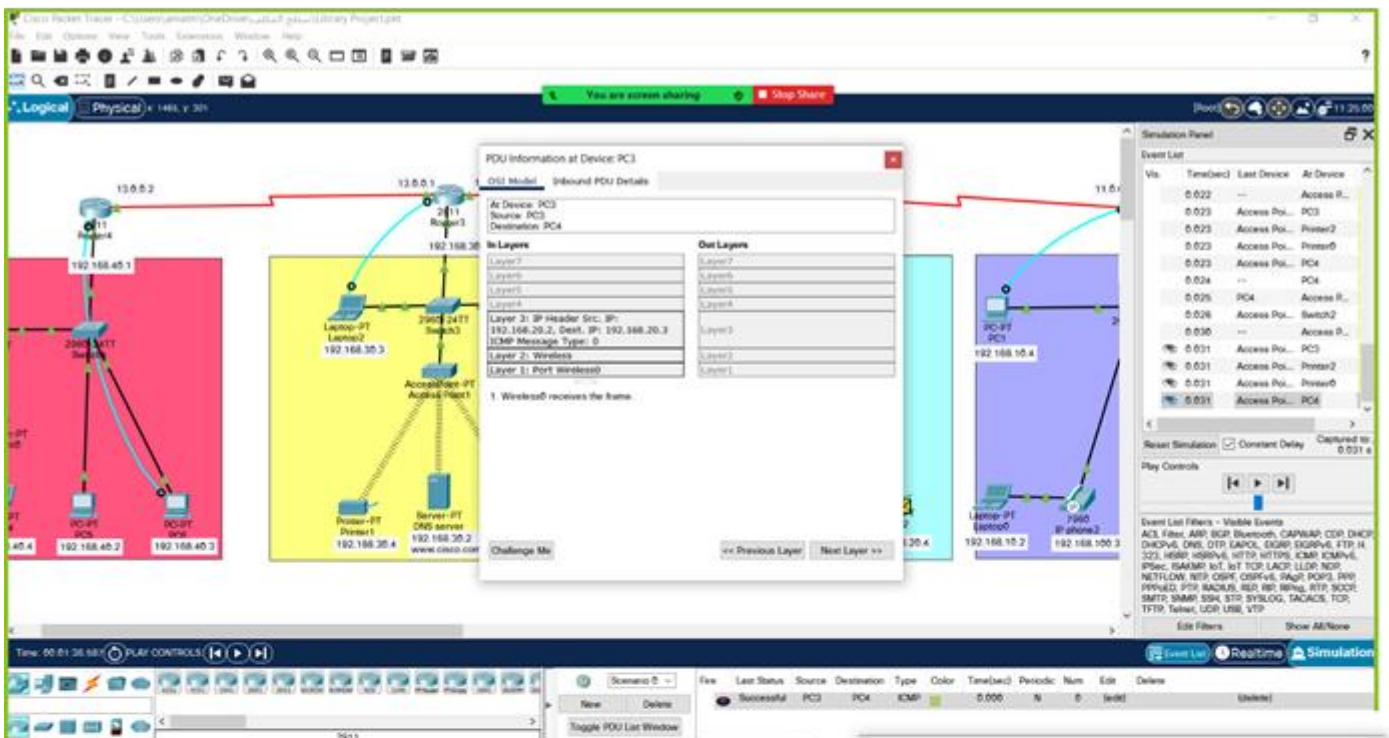
Open the cloud



Click on DSL and click add

Now the DSL modem work

9- capture



ip address sender : 192.168.20.2
ip address receiver : 192.168.20.3

