



# **The Title of the book**

## **Networking Fundamentals**

### **(Networking Basics Practical)**

**Submitted by :**

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# Introduction

I offer this explanation to anyone who loves networks and wants to learn the basics and know them practically, to help him at the beginning of your path, I wish success to all.

I dedicate this book to everyone who helped me in my educational career and at the end invited me to succeed in my educational career.

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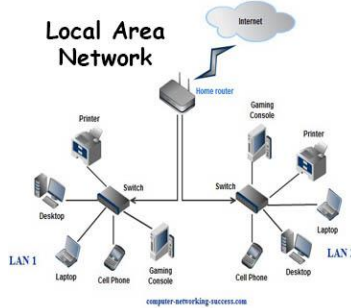
## what is the network?

allowing a group of computers to access internet and share set of files stored on a computer designated as a file server , with contact high-speed, highly redundant .

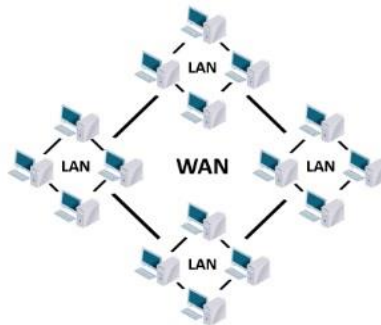


## Types Networks Geography?

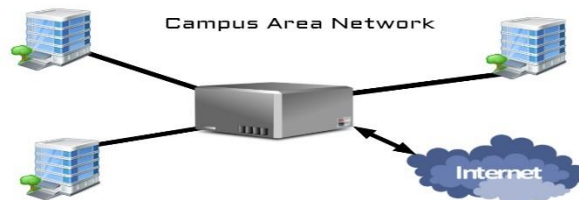
### ■ Local-area network (LAN)



### ■ Wide-area network (WAN)

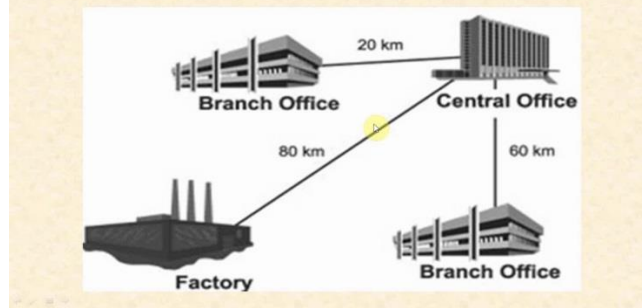


### ■ Campus-area network (CAN)

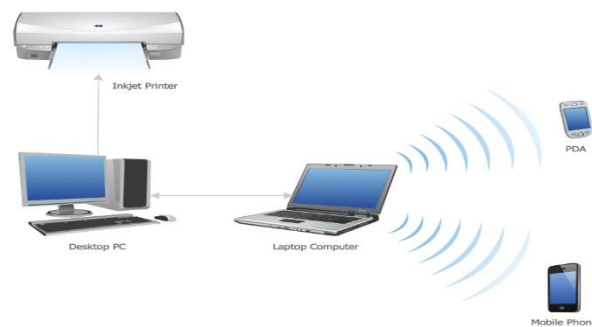


### ■ Metropolitan-area network (MAN)

## Metropolitan Area Networks (MANs)



## ■ Personal-area network (PAN)



## ■ Topology

Physical Topology

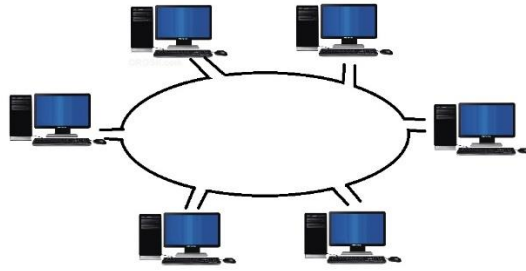
Logical Topology

## Topology Types

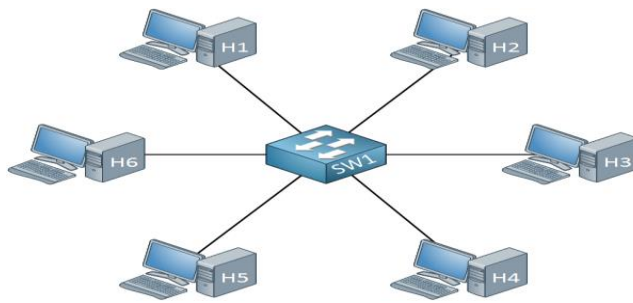
### ■ Bus Topology



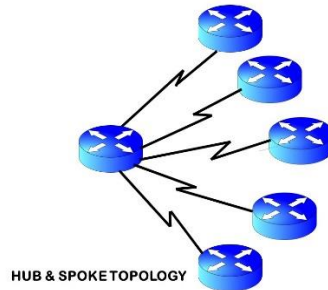
### ■ Ring Topology



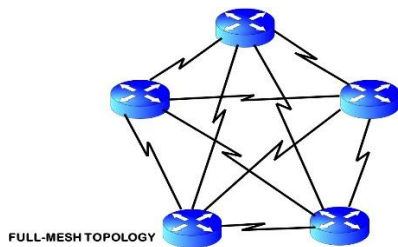
- **Star Topology**



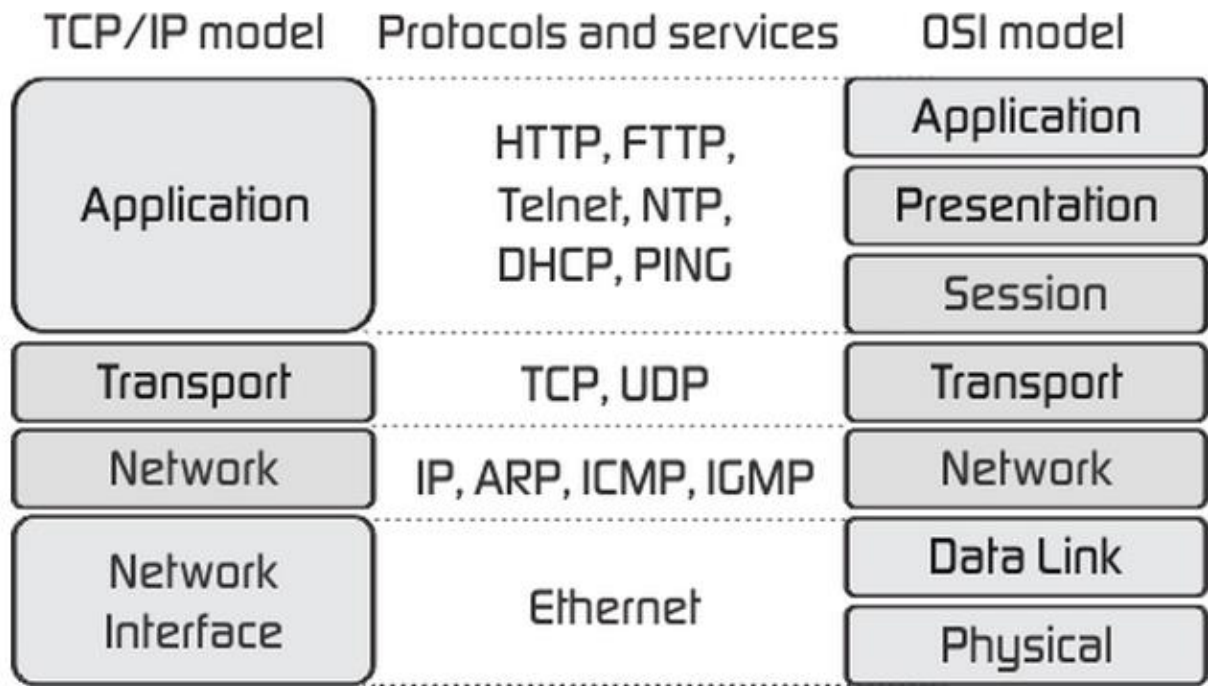
- **Hub-and-spoke Topology**



- **Full-Mesh Topology**



- **Models**
  - **OSI Model**
  - **Tcp/Ip Model**



## Cabling

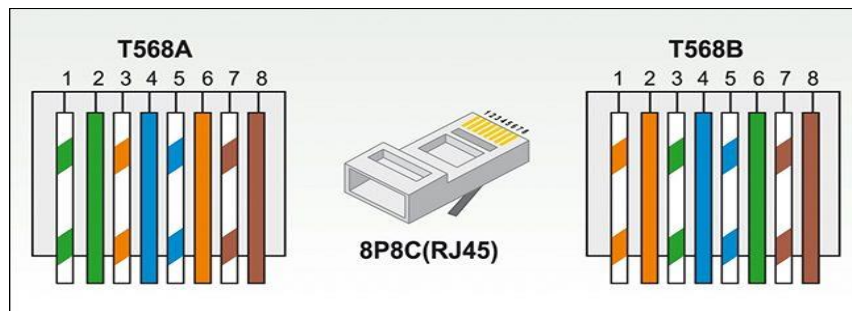
- Twisted pair Cable Types
  - UTP(Unshieled Twisted pair)



- STP (Shielded Twisted pair)
  - 4Pairs (8 wires)
  - RJ-45 connector
  - wall plates

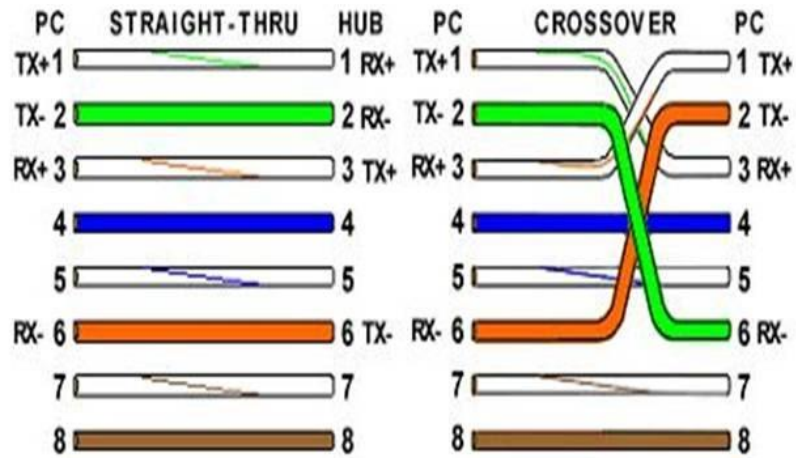


- Wiring Standards
  - Straight through vs. cross-over
  - 568A vs. 568B





Basic Theory:



○ Console



▪ **Fiber Optic**

○ **Benefits**

- use light instead electricity
- more secure
- very fast
- long distances

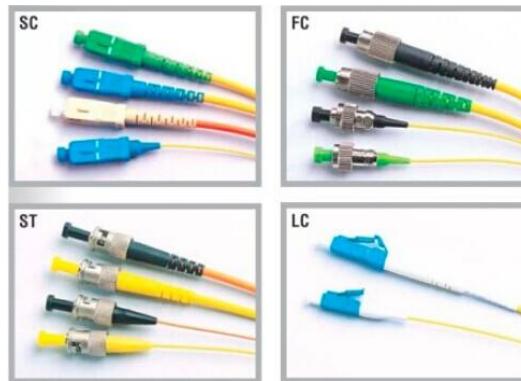
○ **Drawbacks**

- difficult to install and maintenance
- More Expensive

▪ **Fiber Optic cable types**

- Multimode fiber (MMF)

- **Single-mode fiber (SMF)**



- **Device**

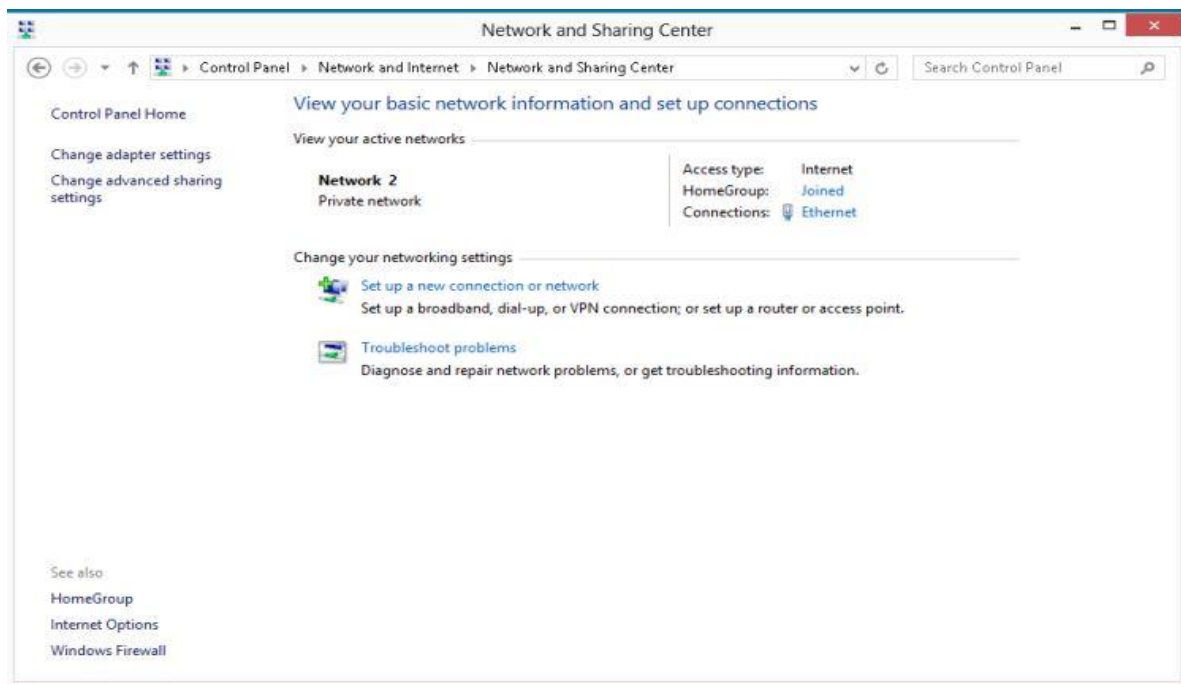


## - How Share Works

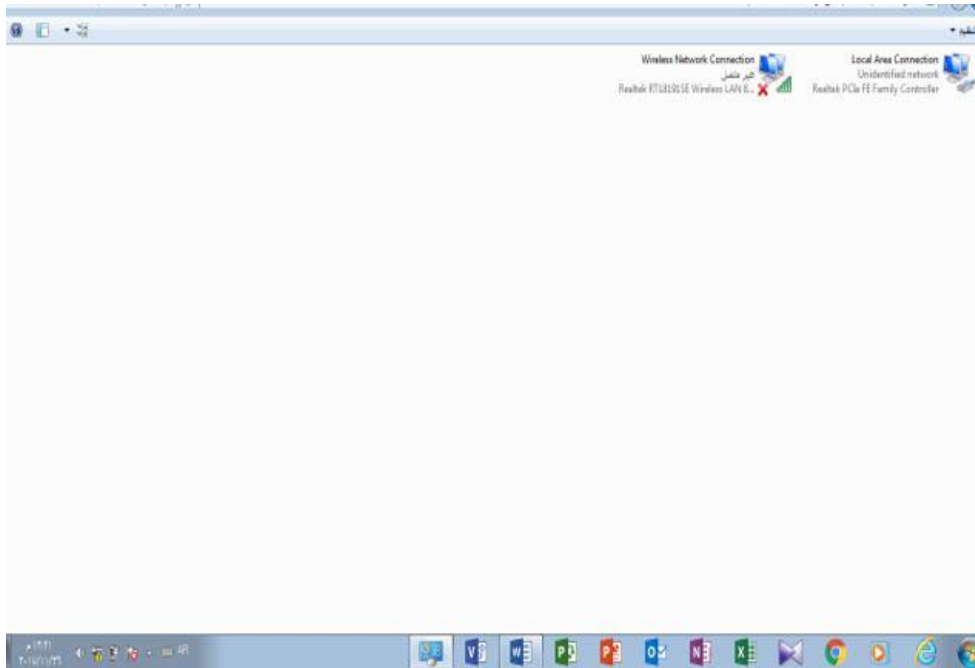
# Steps to create a network for two devices and share files and printers

### ▪ step one: link between pcs

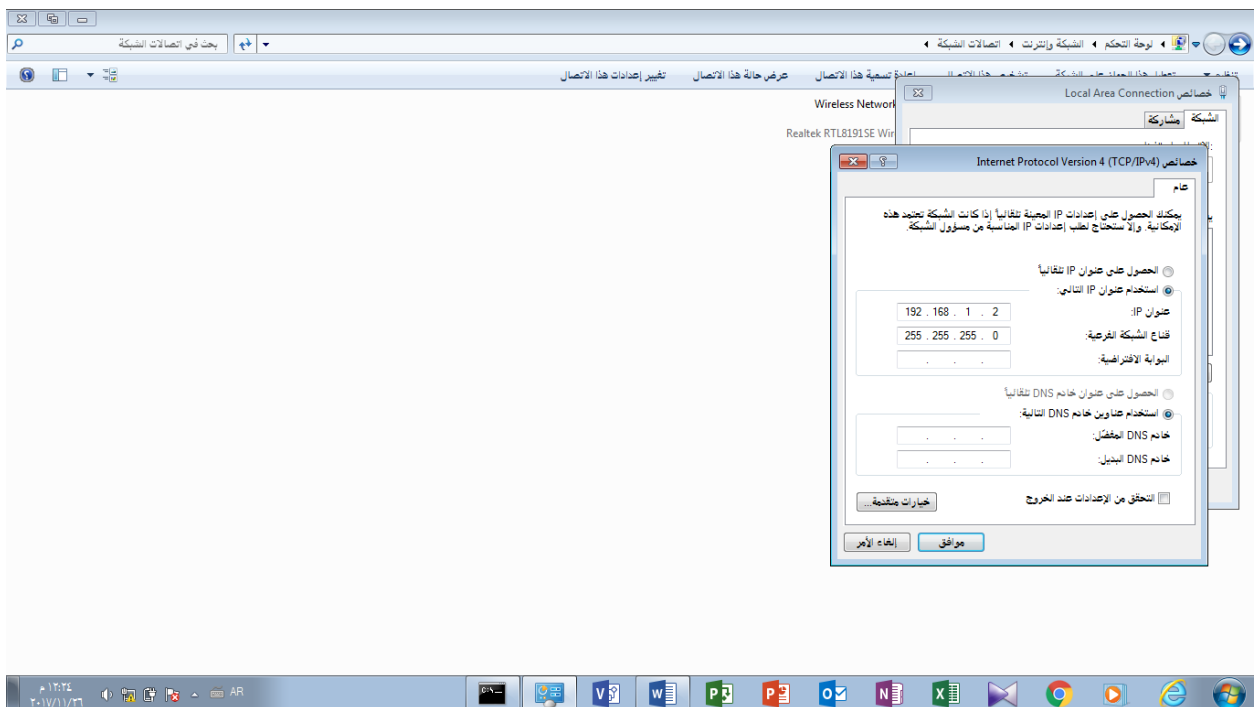
1. control panel > Network and Internet > Network and Sharing Center.



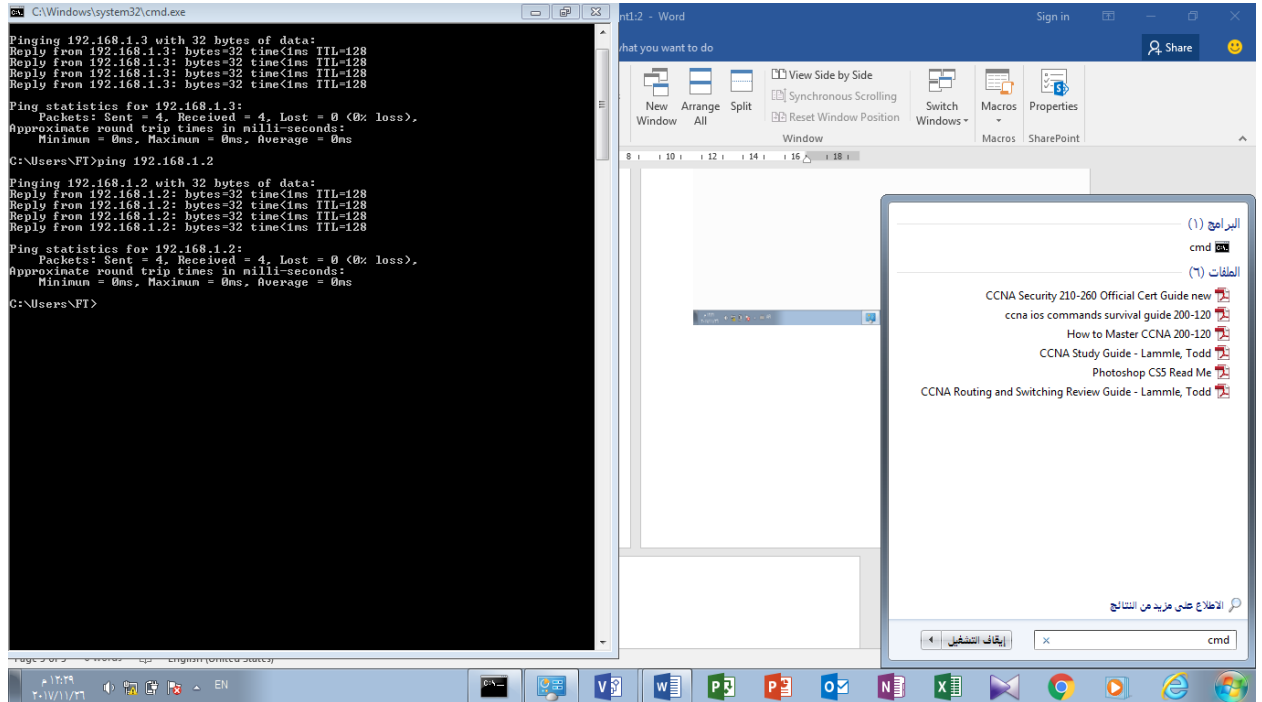
2. Click on **adapter settings > Local Area Connection**



3. **click on Local Area Connection put ip address and subnet mask > Then press OK**



4. click on list start > CMD > Then we write an order ping for host 192.168.1.3

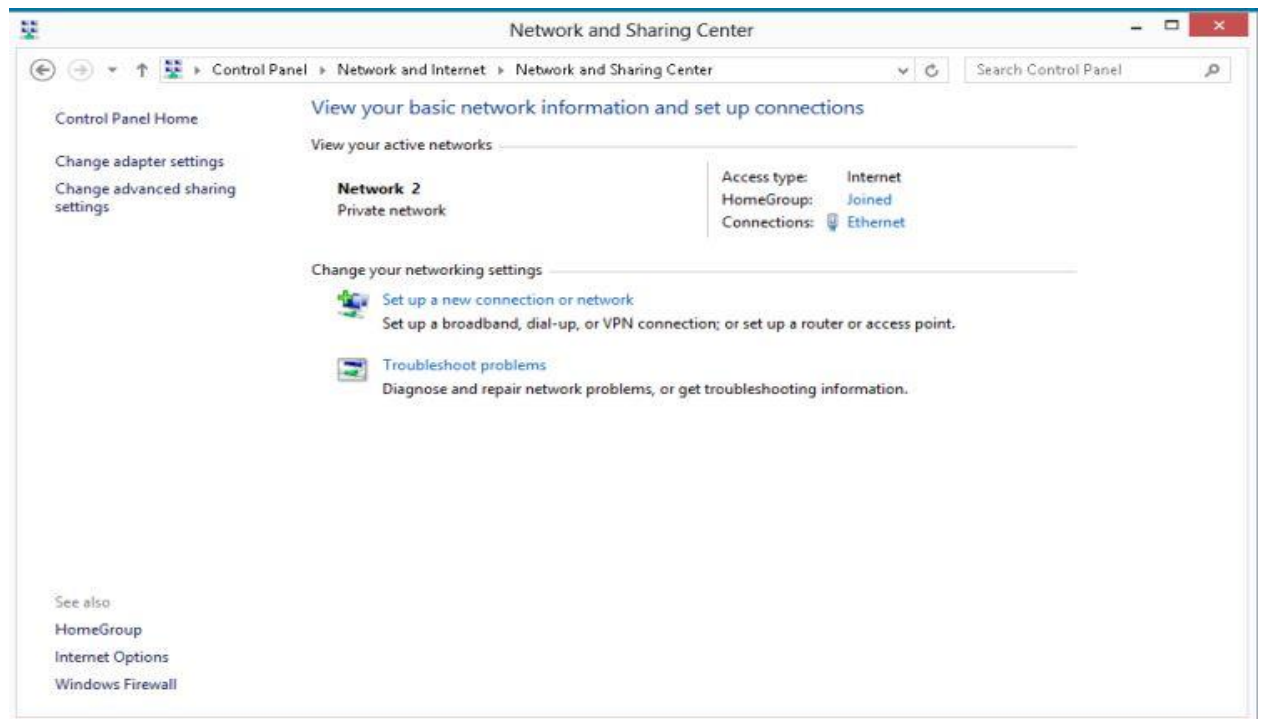


▪ **step Two : share file between pcs**

1: Go to the computer where the files or folders are being shared from or shared to.

2: Get into the Windows "Control Panel".

3: Get into the "Network and Sharing Center".



4. Click on "Change advanced sharing settings".

5: An "Advanced sharing settings" box will be displayed

6: For the "Private (current profile)" section:  
Select the "Turn on network discovery" option, if it is not already selected.

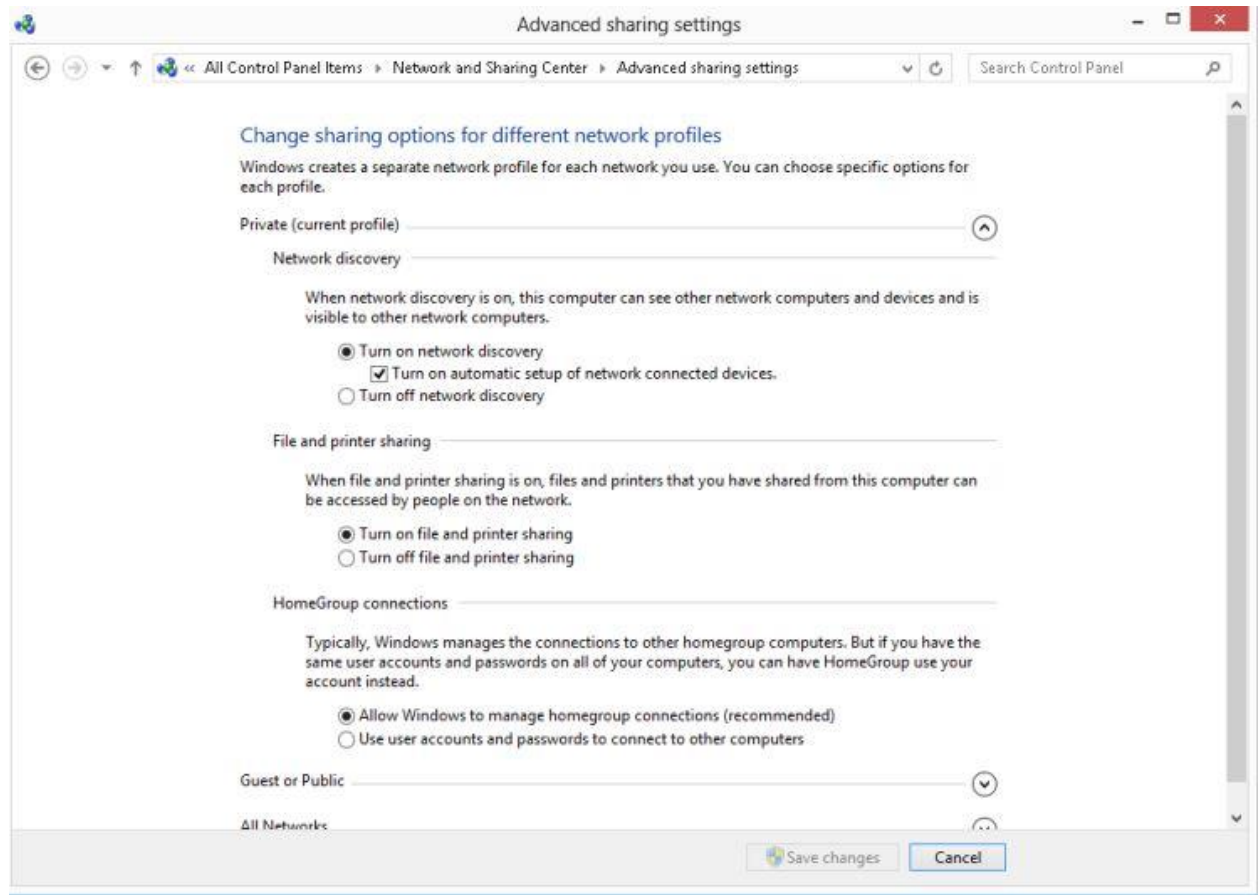
**7: For the "Private (current profile)" section: Put in a checkmark for "Turn on automatic setup of network connected devices", if no checkmark is already their.**

**8: For the "Private (current profile)" section: Select the "Turn on file and printer sharing" option, if it is not already selected.**

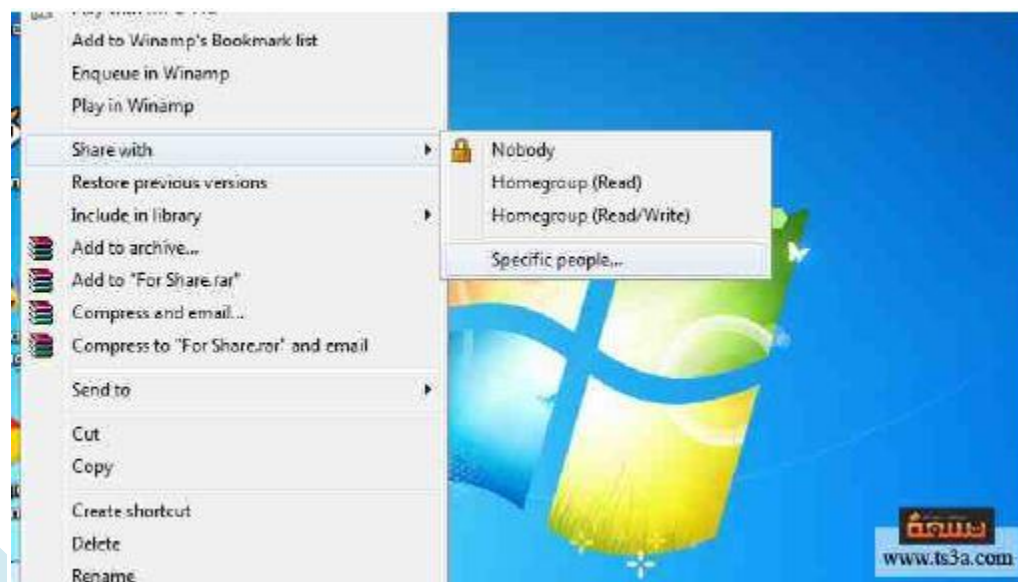
**9: Click on the "Save changes" button in the lower right-hand corner, if it is not grayed out.**

**10: Close the "Network and Sharing Center" window.**

**11: Perform Steps 1 through 10 for all other "Windows" computer with which you wish to do conventional file sharing.**



12. Click on the left file you want to share and then choose Share with Specific people .





13. As it is clear in this picture, we are close to knowing how to share files. We choose everyone - then click Add, it is best if you want to preserve your file from editing anyone, choose Read, or if you want to read the file and modify it, choose Read / Write

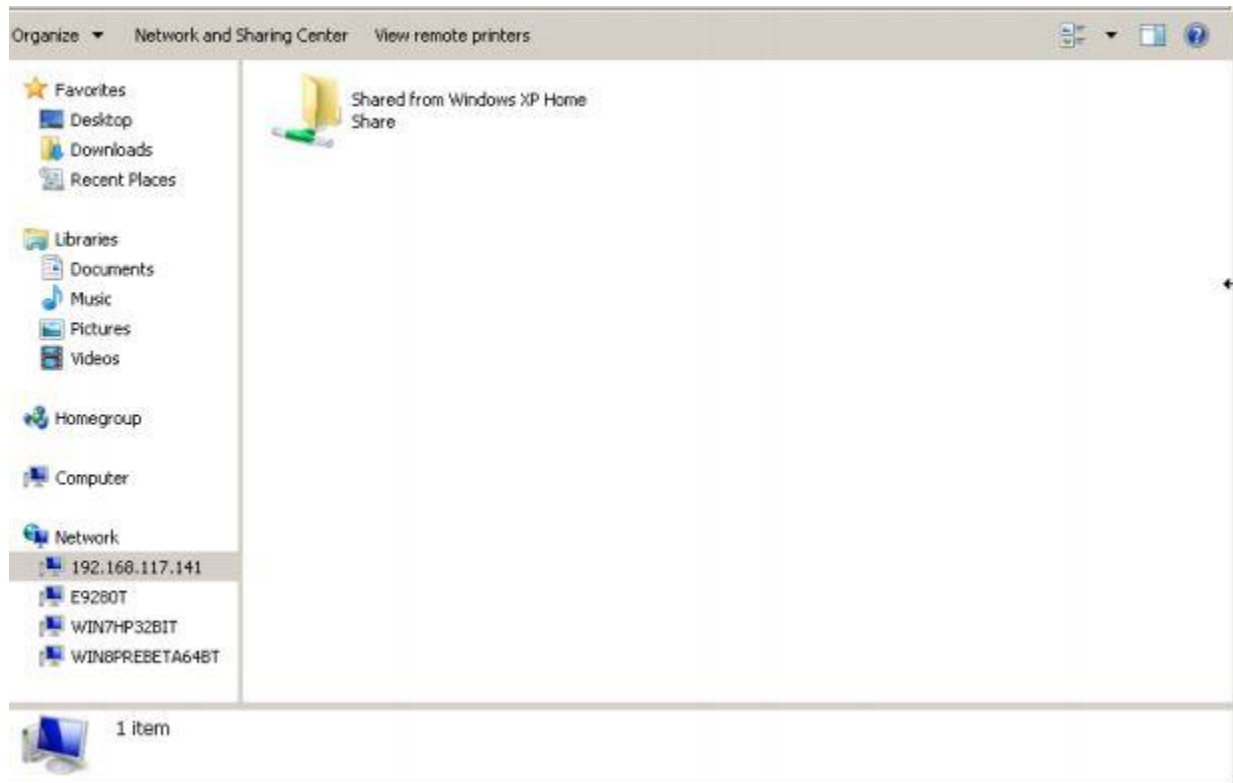


14. Right click on the file you want to share, select Properties, click the Share tab, click Advanced Share, and select Share this folder on click ok.



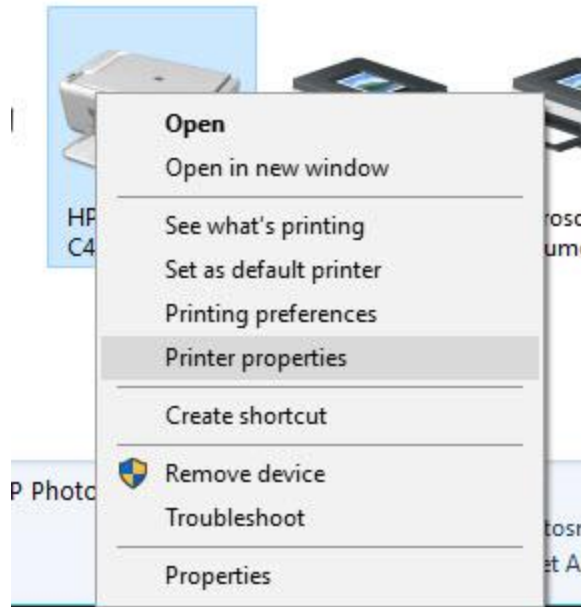
15. The shared folder(s) in the target computer will be displayed:

List start – Run \_ example write ip address pc \\192.168.117.1

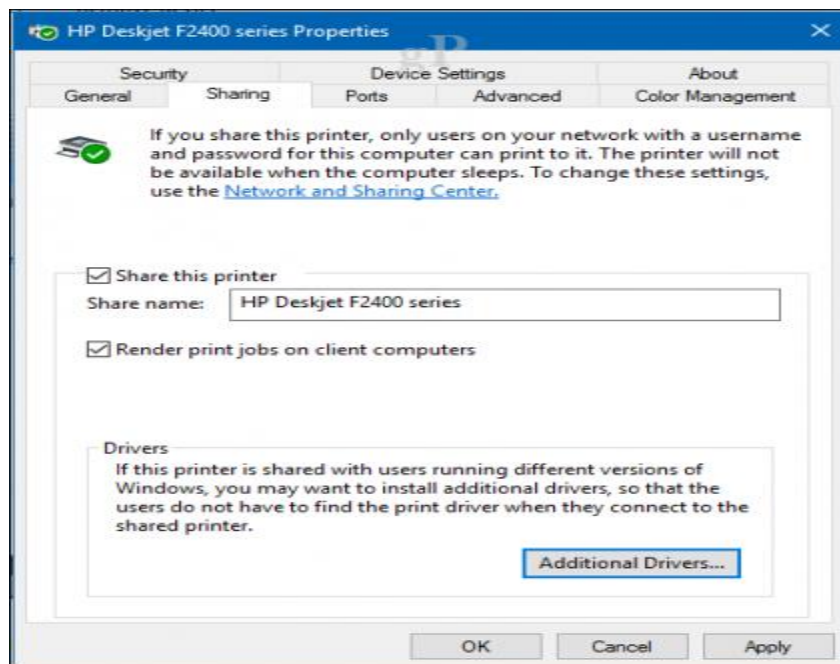


### Step three : share printer

- 1- Make sure a printer you want to share is properly set up, connected to your computer, and powered on.
- 2- Go to the Control Panel and select 'View devices and printers'. Right-click the printer you'd like to share and choose 'Printer properties' from the context menu.



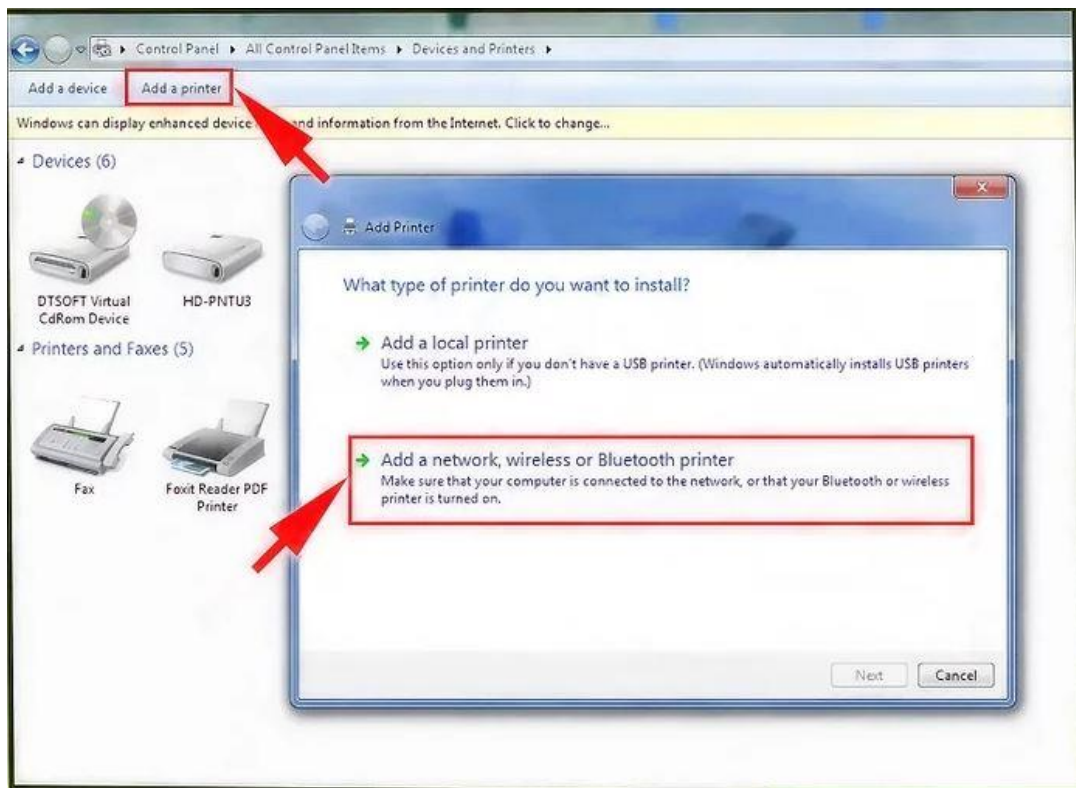
- 3- Head to the Sharing tab and enable the option 'Share this printer' there. You can also change the name for the printer you're going to share, if necessary. After that, simply click 'Apply' and make your printer available for access on your network. So, these are the simple steps to share printer on Windows



Now, when the USB printer attached to your computer is shared, it's time to consider the way of connecting to it from other network devices.

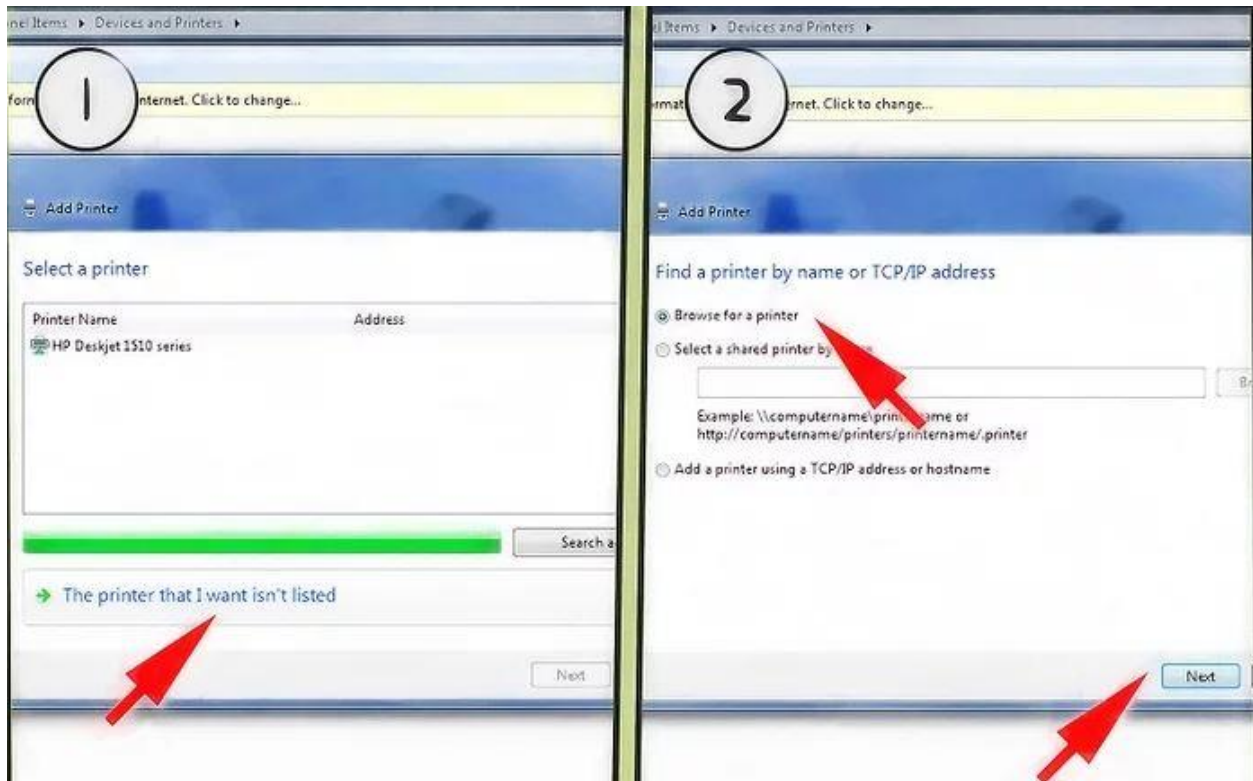
Here's one of the simplest methods. To access a shared printer, on a remote machine go to 'Devices and Printers' and hit the 'Add Printer' button. Then click the link 'The printer that I want isn't listed'. After that, enable the 'Select a shared printer by name' option and browse to the printer on your network. Click open. As a result, you will be prompted to install the driver. Hit 'Next' to finish the installation. Now, the printer will be recognized as a local device and displayed in 'Devices and printers'.

**Read the directions for the USB server.** Follow the proper order for plugging in power, network and USB connections.



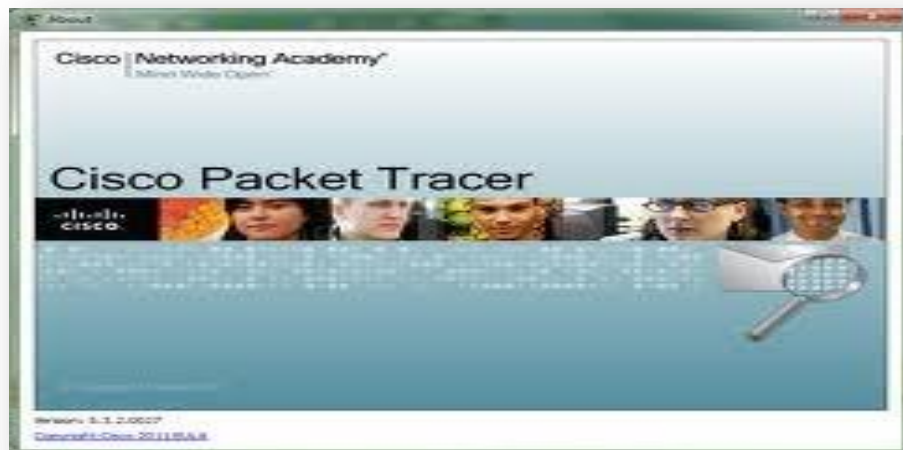
**Go to each computer to add the printer.** Navigate to the printers folder. Right click "add printer" and select "printer"

**Allow Windows to search the network for printers.** If a printer is not found, select "the printer I want is not listed." Select "browse for printers" and find the USB server that is attached to the USB printer. Click the plus sign to expand it, and then select the printer. Follow the prompts to install the printer.



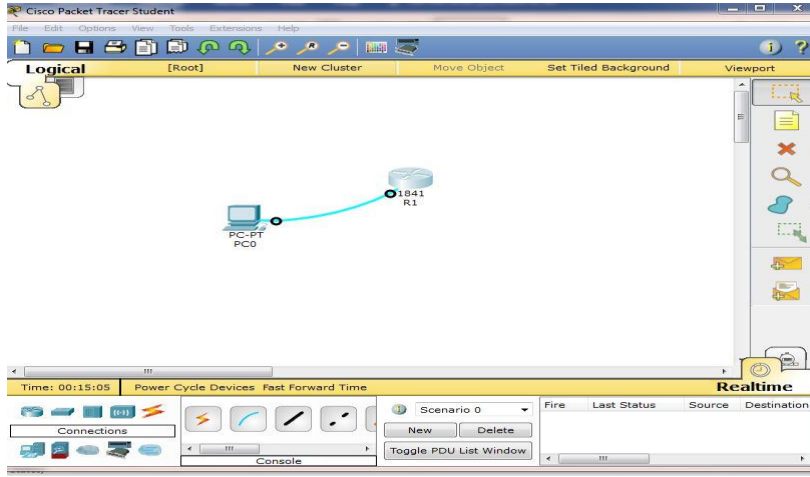
## What is Packet Tracer?

Program Packet Tracer supplements physical equipment in the classroom by allowing students to create a network with an almost unlimited number of devices, encouraging practice, discovery, and troubleshooting. The simulation-based learning



## Basic configuration & Verification Lab

- Make basic commands on the router.



```
Router> enable
Router#configure terminal
Router(config)#
Router(config)#exit
Router#disable
Router>
```

- Initial configurations :

### Hostname Command :

```
Router (config)# hostname R1
R1(config)#
Or
R1(config)#No hostname
Router (config)#
```

### Enable password command :

R1(config)#enable password Cisco  
Or  
R1(config)#enable secret Cisco

**Line password command :**

R1(config)#line Console 0  
R1(config-line)#password Cisco  
R1(config-line)#login

**Saving configuration :**

R1#copy running-configure startup-configure **OR** R1#Write

**Verifying commands:**

R1# Show running-configure  
R1#Show version  
R1# Show flash  
R1# Show ip interface brief  
R1# Show interface gigabitethernet 0/0

At the end of our practical lesson, we take the same orders on the switch .

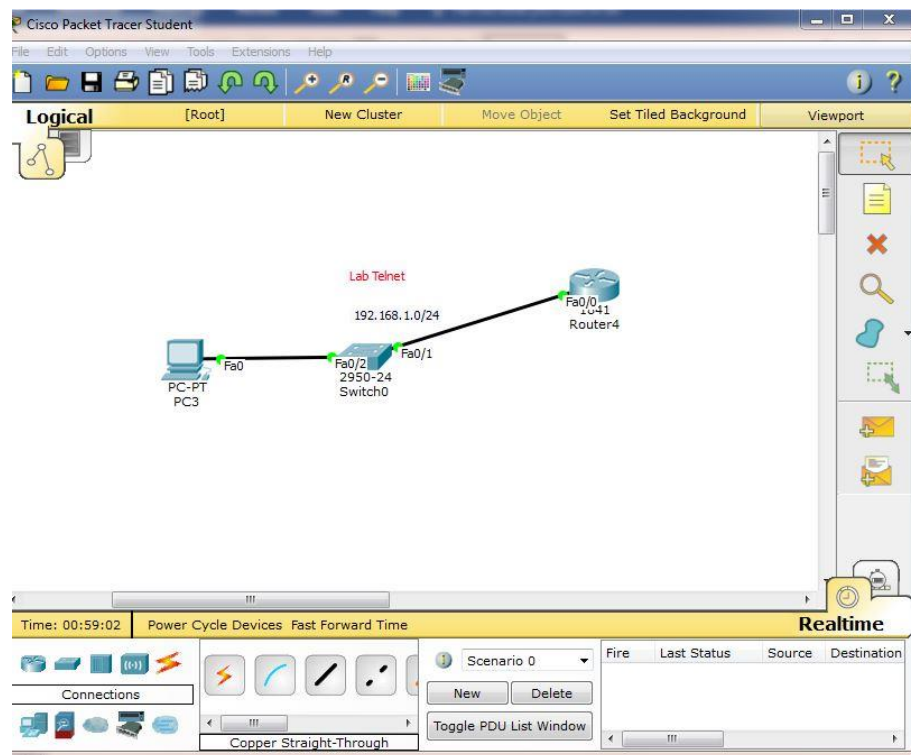


## - Make a remote connection to the network

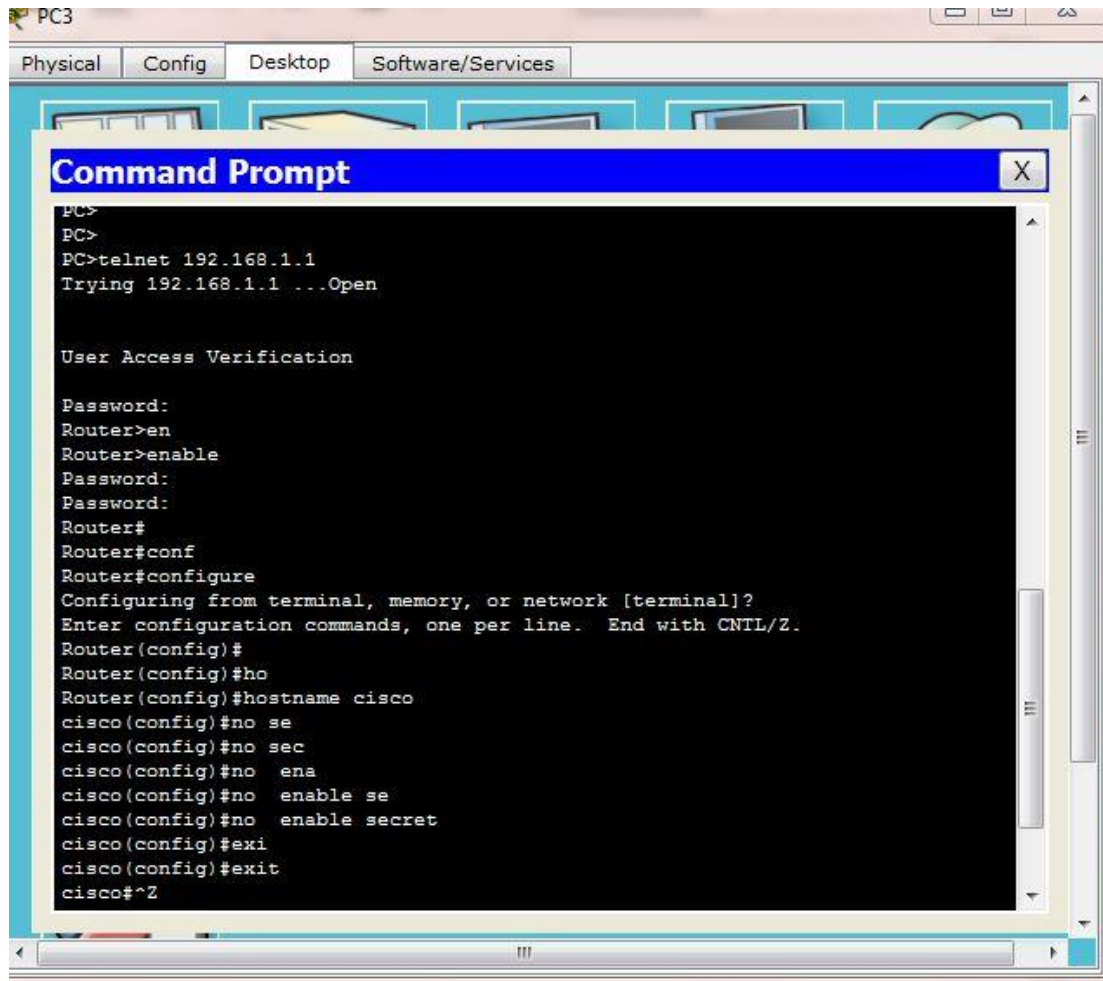
Right now we can connect to it Remotely using telnet or ssh :

### - Enable Telnet Command :

Let's Configure telnet so that we can access the Device remotely:



```
Router>en
Router#configure
Router(config)#interface fastEthernet 0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown
Router(config)#enable secret Cisco
Router(config)#line vty 0 15 OR line vty 0 4
Router(config-line)#password 123
Router(config-line)#login
```



## - Enable SSH commands

Here is how configure SSH :

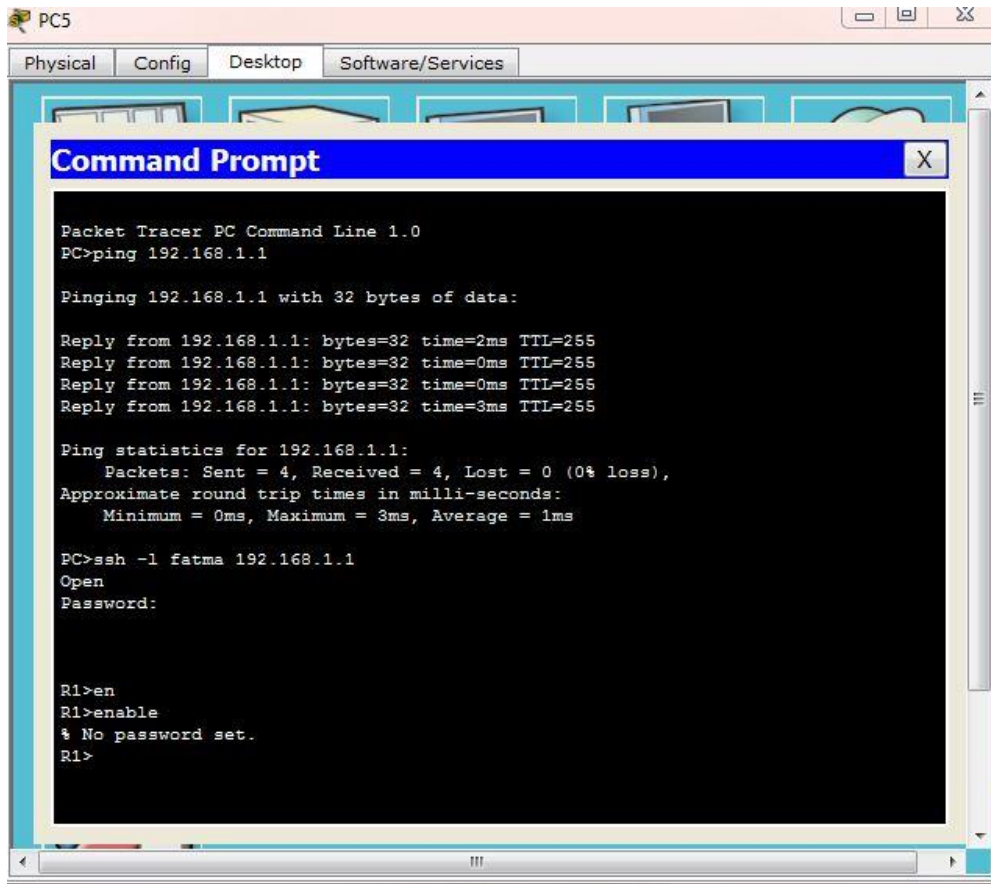
```
Router(config)#hostname R1
R1(config)#username fatma password cisco

R1(config)#ip domain-name cisco.com

R1(config)#crypto key generate rsa modulus [512]: 1024

R1(config)#ip ssh version 2

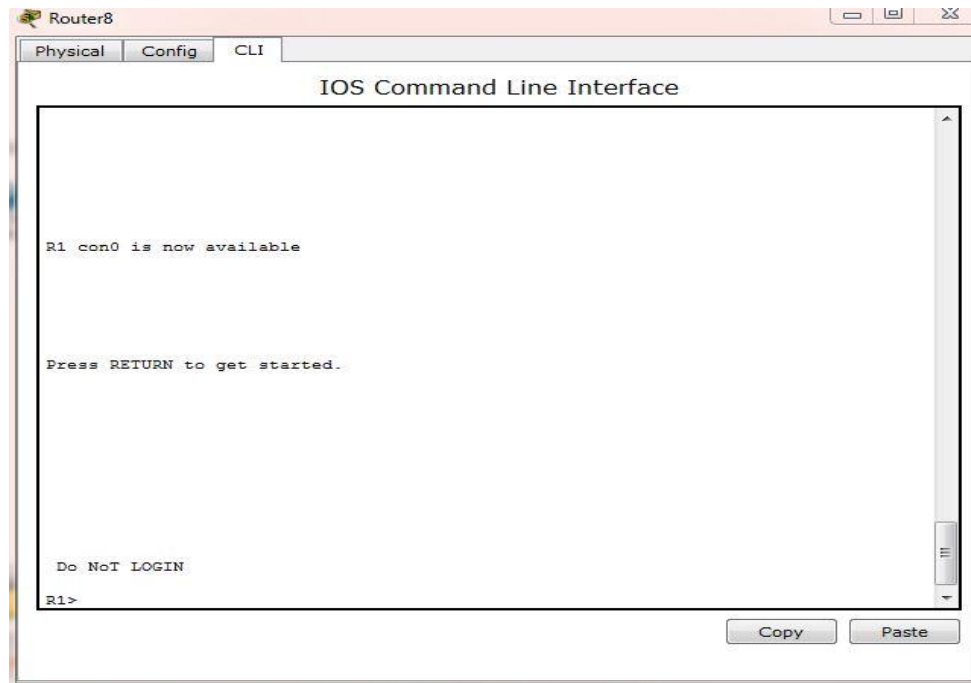
R1(config)#line vty 0 4
Router(config)#login local
R1(config-line)#transport input ssh
R1(config-line)#exit
```



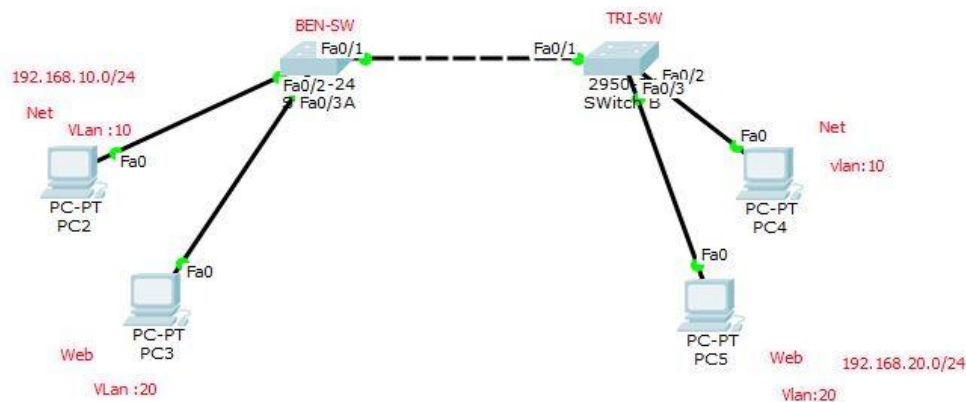
- **Login Banner command :**

Welcome message to anyone who logs in to the device

R1(config)#banner motd # Do NoT LOGIN #



- Virtual LAN(VLAN) :  
**Configure Vlans on Switches :**



### Create VLANs :

```
BEN-SW(config)#vlan 10
BEN-SW(config-vlan)#name net
BEN-SW(config)#vlan 20
BEN-SW(config-vlan)#name web
```

```
TRI-SW(config)#vlan 10
TRI-SW(config-vlan)#name net
TRI-SW(config)#vlan 20
TRI-SW(config-vlan)#name web
```

### VLAN ports Assignments:

```
BEN-SW(config)#interface range fastEthernet 0/1 - 10
BEN-SW(config-if-range)#switchport mode access
BEN-SW(config-if-range)#switchport access vlan 10
BEN-SW(config)#interface range fastEthernet 0/11 - 20
BEN-SW(config-if-range)#switchport mode access
BEN-SW(config-if-range)#switchport access vlan 20
```

```
TRI-SW(config)#interface range fastEthernet 0/1 - 10
```

```
TRI-SW(config-if-range)#switchport mode access
TRI-SW(config-if-range)#switchport access vlan 10
TRI-SW(config)#interface range fastEthernet 0/11 - 20
TRI-SW(config-if-range)#switchport mode access
TRI-SW(config-if-range)#switchport access vlan 20
```

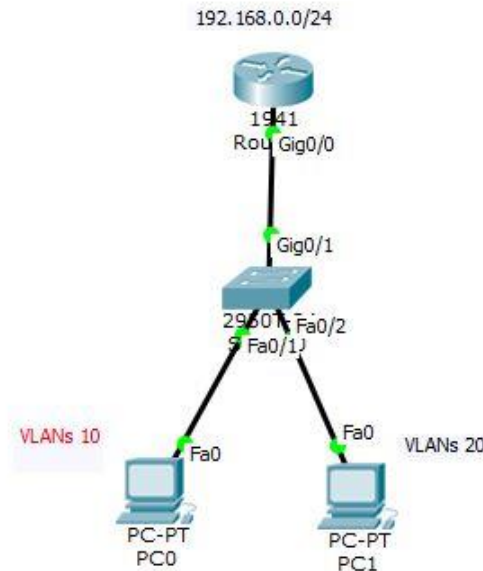
## **Trunking port between Switchs**

```
BEN-SW(config)#interface fastEthernet 0/24
BEN-SW(config-if)#switchport mode trunk
```

```
TRI-SW(config)#interface fastEthernet 0/24
TRI-SW(config-if)#switchport mode trunk
```

# - Inter-VLAN Routing

## Let's do Lab VLANs with router



### Create VLANs :

```
BEN-SW(config)#vlan 10
BEN-SW(config-vlan)#name net
BEN-SW(config)#vlan 20
BEN-SW(config-vlan)#name web
```

### VLAN ports Assignments:

```
BEN-SW(config)#interface range fastEthernet 0/1 - 10
BEN-SW(config-if-range)#switchport mode access
BEN-SW(config-if-range)#switchport access vlan 10
```

```
BEN-SW(config)#interface range fastEthernet 0/11 - 20
BEN-SW(config-if-range)#switchport mode access
BEN-SW(config-if-range)#switchport access vlan 20
```

**BEN-SW#show vlan brief**

```
BEN-SW#show vlan
BEN-SW#show interface trunk
```

## **Trunking port on BEN-SW**

```
BEN-SW(config)#interface gigaehternet 0/1
BEN-SW(config-if)#switchport mode trunk
```

## **Configure Router on R1**

```
R1(config)#interface gigaehternet 0/0
R1(config-if)#no ip address
```

```
R1(config-if)#no shutdown
```

```
R1(config)#interface gig0/0.10
```

```
R1(config-if)#encapsulation dot1q 10
```

```
R1(config-if)# ip address 192.168.10.1 255.255.255.0
```

```
R1(config)#interface gig0/0.20
```

```
R1(config-if)#encapsulation dot1q 20
```

```
R1(config-if)# ip address 192.168.20.1 255.255.255.0
```

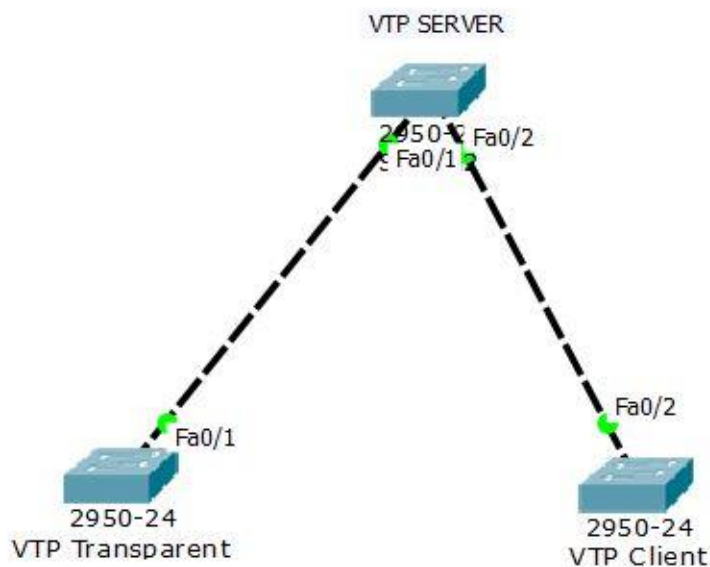


## - VTP(VLAN Trunking Protocol)

Our VTP Transparent will forward advertisements but will not synchronize itself.

You can create VLANs locally though which is impossible on the VTP client. Let's say you create VLAN 20 on our VTP server, this is what will happen:

1. You create VLAN 20 on the VTP server.
2. The revision number will increase.
3. The VTP server will forward the latest advertisement which will reach the VTP transparent switch.
4. The VTP transparent will not synchronize itself but will forward the advertisement to the VTP client.
5. The VTP client will synchronize itself with the latest information



### Commands VTP :

## **configure ports mode trunking**

```
server(config)#interface range fastEthernet 0/1 - 2  
server(config-if-range)#switchport mode trunk
```

```
Client(config)#interface fastEthernet 0/2  
Client(config-if)#switchport mode trunk
```

```
Transparent(config)# #interface fastEthernet 0/1
```

```
Transparent (config-if-range)#switchport mode trunk
```

## **We specify the type of vtp on switch**

```
Transparent(config)#vtp mode transparent
```

```
Client(config)#vtp mode client
```

## **Configure on Server**

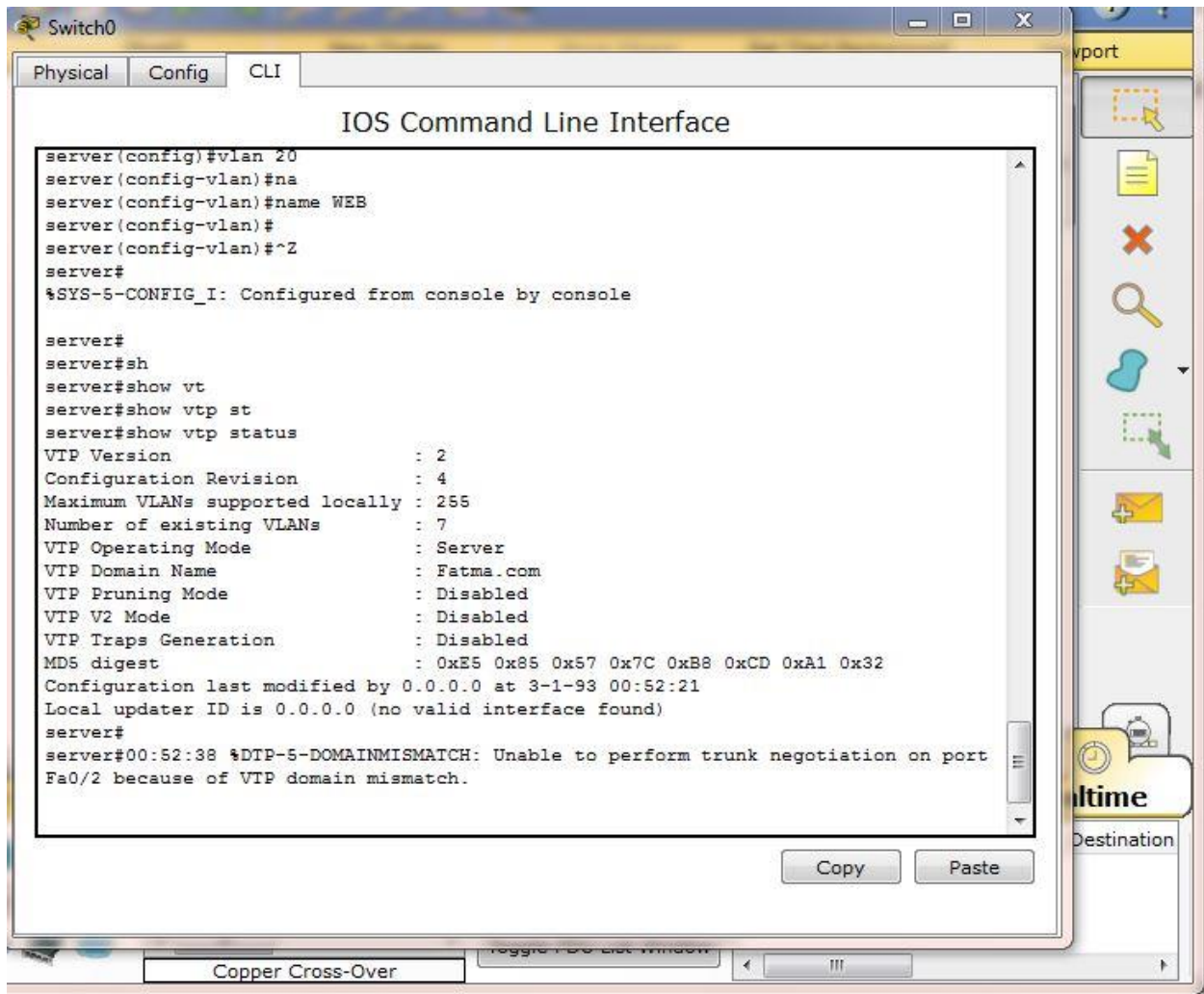
```
server (config)#vlan 10  
server (config-vlan)#name net  
server (config)#vlan 20  
server (config-vlan)#name web
```

```
server(config)#vtp domain Fatma.com  
server(config)#vtp password 1234
```

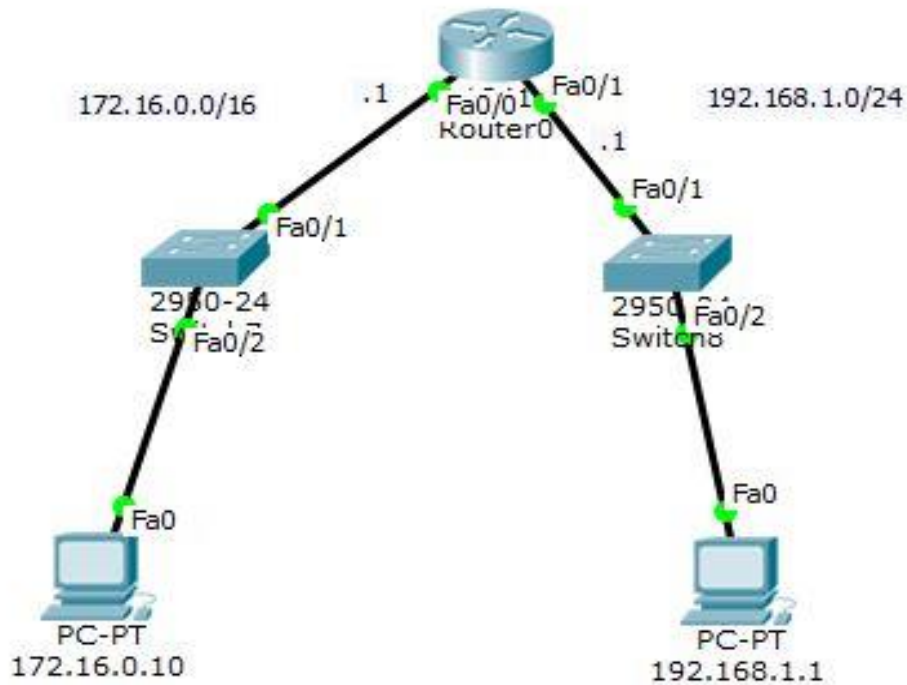
## **Configure On Client**

```
Client(config)#vtp domain Fatma.com  
Client (config)#vtp password 1234
```

```
Server# show vtp status
```



## - link between different networks:



### Configure Router :

```
Router(config)#interface fastEthernet 0/0
Router(config-if)#ip address 172.16.0.1 255.255.0.0
Router(config-if)#no shutdown

Router(config)#interface fastEthernet 0/1
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown
```

```
Router#show running-config
```

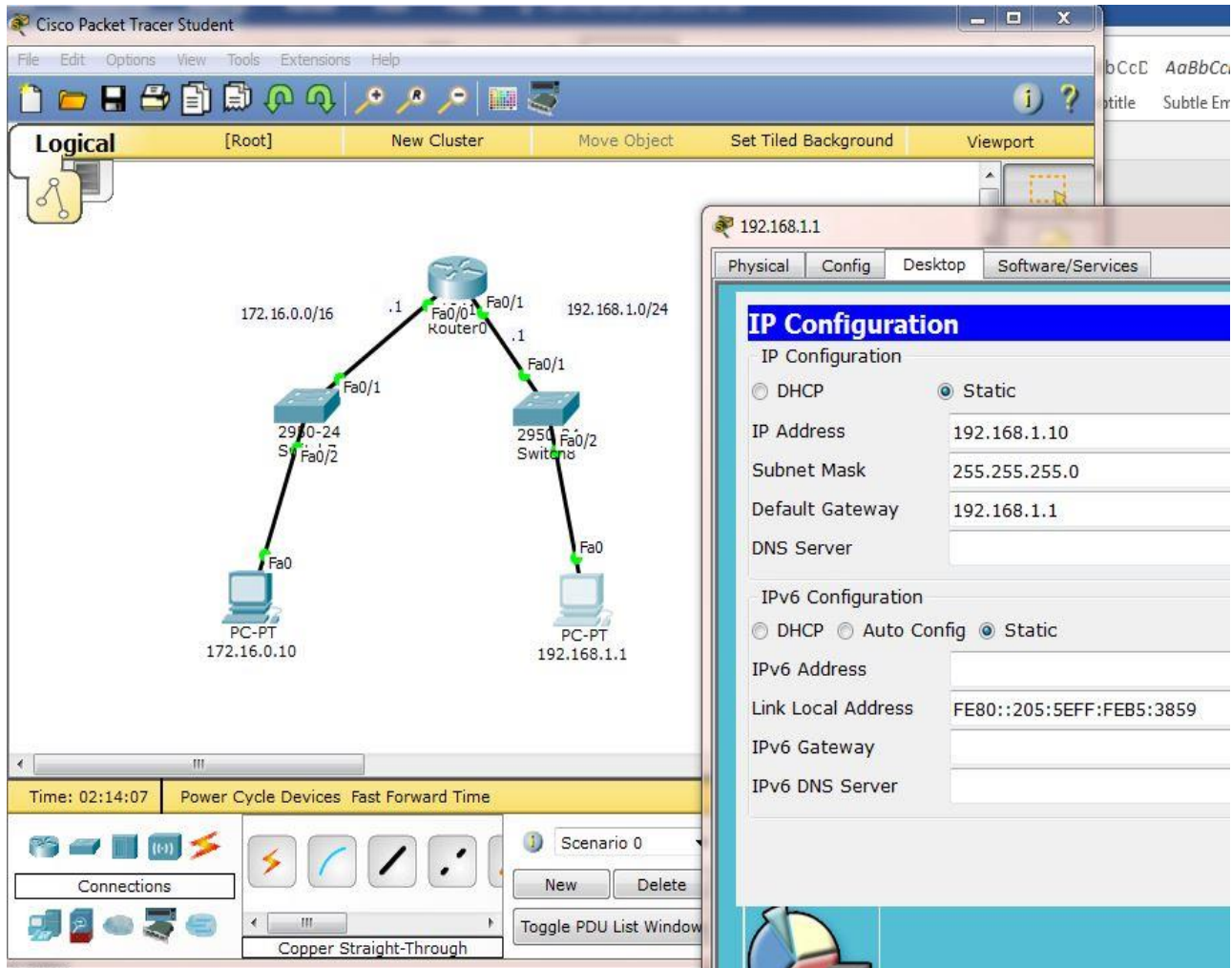
```
Router#show ip interface brief
```

- We put Addresses And Default-gateway for devices:

The screenshot displays the Cisco Packet Tracer Student interface. The main workspace shows a network topology with a router (R01) and a switch (S01) connected to a PC-PT (172.16.0.10). The router's Fa0/0 interface is connected to the switch's Fa0/1 interface, and the router's Fa0/1 interface is connected to the PC-PT's Fa0 interface. The network address 172.16.0.0/16 is assigned to the switch's Fa0/1 interface, and the network address 192.168.1.0/24 is assigned to the router's Fa0/1 interface. The PC-PT's IP address is 172.16.0.10.

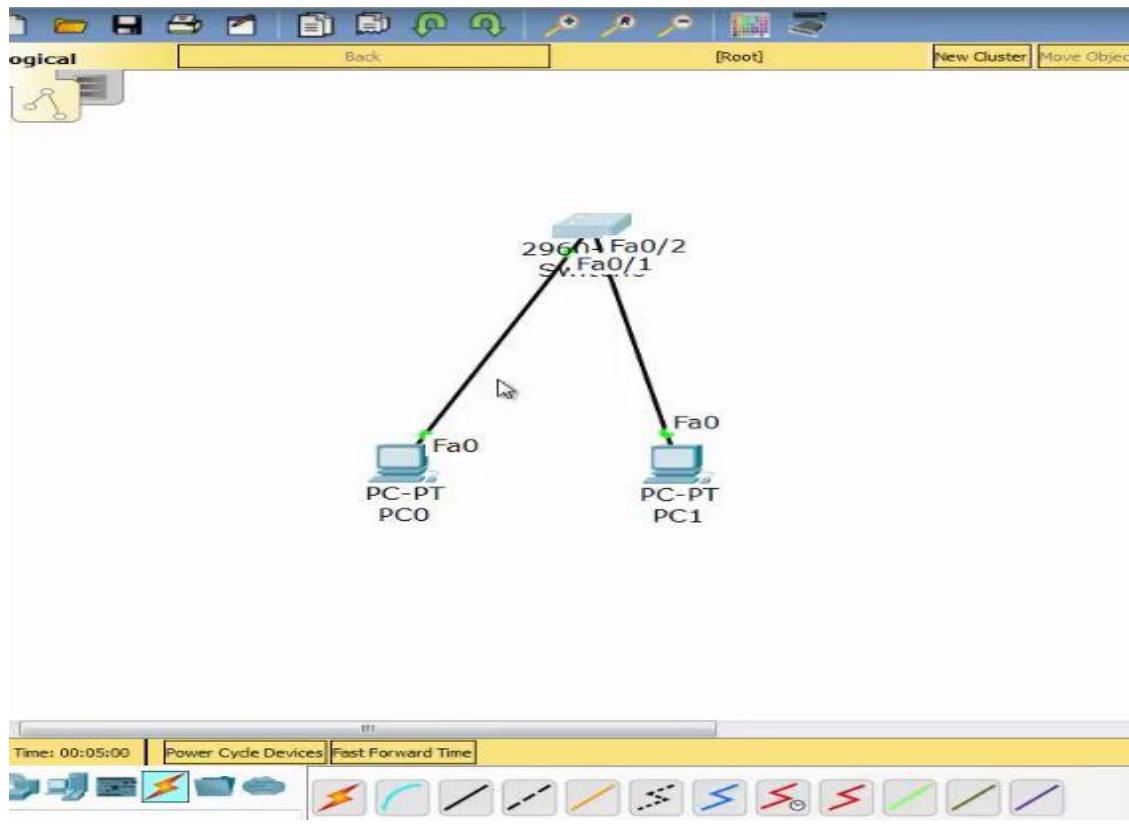
The IP Configuration window for the PC-PT (172.16.0.10) is open, showing the following configuration:

IP Configuration		
IP Configuration		
<input type="radio"/> DHCP	<input checked="" type="radio"/> Static	
IP Address	172.16.0.10	
Subnet Mask	255.255.0.0	
Default Gateway	172.16.0.1	
DNS Server		
IPv6 Configuration		
<input type="radio"/> DHCP	<input type="radio"/> Auto Config	<input checked="" type="radio"/> Static
IPv6 Address		
Link Local Address	FE80::20A:F3FF:FE41:4B0E	
IPv6 Gateway		
IPv6 DNS Server		



We then process the connection between the devices and the verification process will be successfully connected to the ping method .

## Port Security:



```
Switch(config)#interface fastEthernet 0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport port-security maximum 1
Switch(config-if)#switchport port-security mac-address sticky
Switch(config-if)#switchport port-security violation shutdown
Switch(config-if)#switchport port-security
```

```
Switch(config)#interface fastEthernet 0/2
Switch(config-if)#switchport mode access
Switch(config-if)#switchport port-security maximum 1
Switch(config-if)#switchport port-security mac-address sticky
Switch(config-if)#switchport port-security violation shutdown
Switch(config-if)#switchport port-security
```

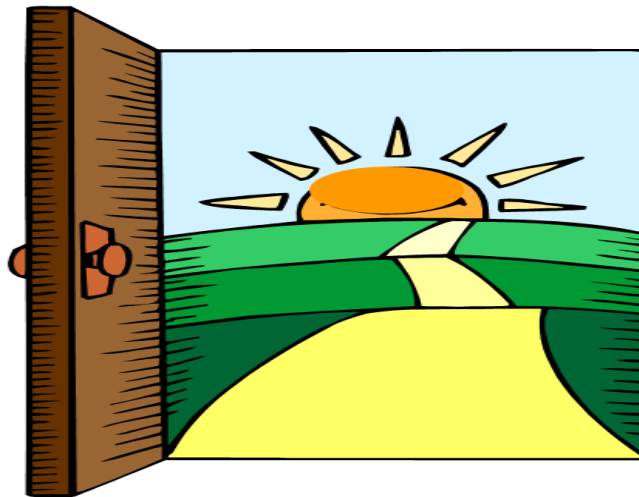
Shutting the interface after a security violation is a good idea (security-wise) but the problem is that the interface will **stay in err-disable state**. This probably means another call to the helpdesk and *you* bringing the interface back to the land of the living! Let's activate it again:

```
Switch(config)#interface fa0/1-2
Switch(config-if)#shutdown
Switch(config-if)#no shutdown

Switch#Show port-security
Switch#Show port-security interface fa0/1
Switch#Show interface fa0/1
```

**Let it be your logo :**

**""Every Day it New Day""**





## Conclusion

In the end, I would like to thank all the readers of this scientific book and wish the content to be clear.

أتمني منكم خالص الدعاء لي في ظهر الغيب  
السلام عليكم ورحمة الله وبركاته