Micro-Project (Part-2)

For partial fulfillment of Activity Based Learning

for Course

Data Communication & Networking (3028)

Network Design Task-02

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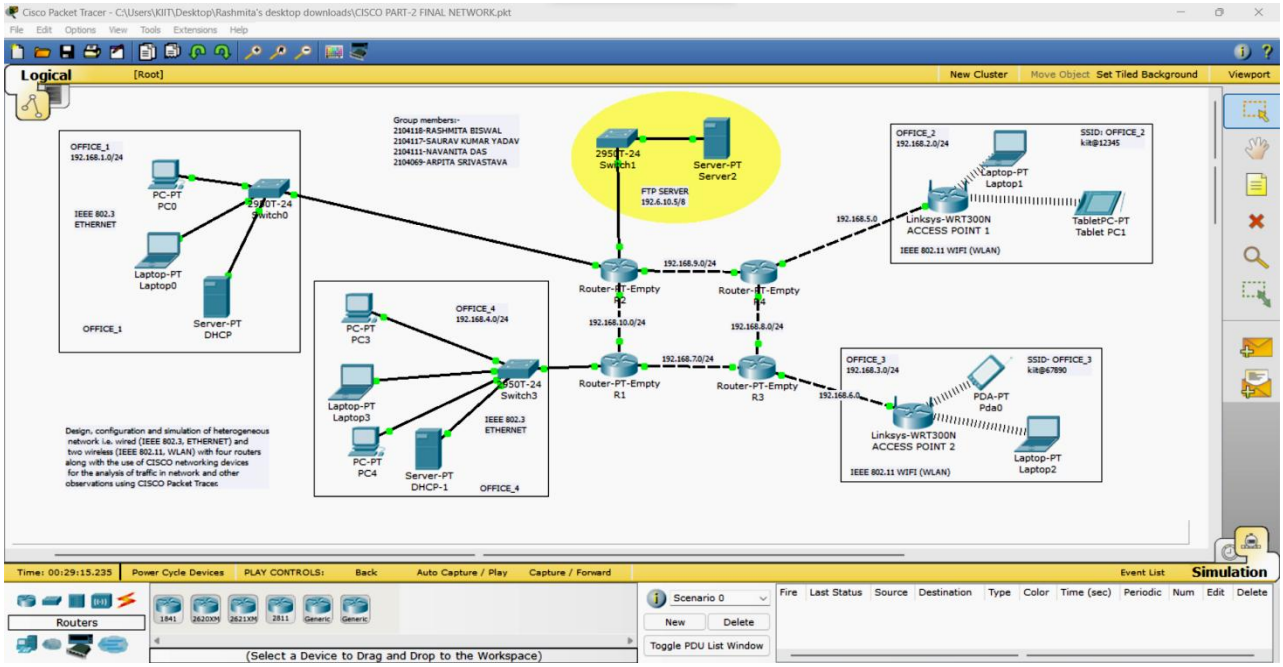
Aim :

Design, configuration and simulation of heterogeneous network i.e. wired (**IEEE 802.3, ETHERNET**) and two wireless (**IEEE 802.11, WLAN**) with four routers **using FTP SERVER** along with the use of **CISCO** networking devices for the analysis of traffic in network and other observations using **CISCO Packet Tracer**.

Network Scenario :



Software used:

CISCO Packet Tracer

Network Specifications :

➢ ***Heterogeneous Network*** ***(Table. 1)***

Name	Network Address	IP Configurations	Gateway
OFFICE_1	192.168.1.0/24	192.168.1.2/24 - 192.168.1.254/24	**192.168.1.1/24**
OFFICE_2	192.168.2.0/24	192.168.2.2/24 - 192.168.2.254/24	**192.168.2.1/24**
FTP SERVER	192.6.10.0/8	192.6.10.2/8 - 255.255.255.254/8	**192.6.10.1/8**
OFFICE_3	192.168.3.0/24	192.168.3.2/24 - 192.168.3.254/24	**192.168.3.1/24**
OFFICE_4	192.168.4.0/24	192.168.4.2 - 192.168.4.254/24	**192.168.4.1/24**

* IP Configuration: **Dynamic Host Configuration Protocol (DHCP)**

Note: All are Class-C Networks default subnet mask: **255.255.255.0**

- ***FTP SERVER (Network Address : 192.6.10.0/8)***
  Class-C Networks default subnet mask: 255.255.255.0

- ***Cable Specifications***
  - Connections > Copper Straight -Through
    (Between PC/Laptop/Server to Switch and Switch to Routers)
  - Connections > Copper Cross – Over
    (Between same device like Switch to Switch and Routers to Routers)

- ***Switch Specifications***
  - Type: CISCO 2950T-24 (Switch for Wired LAN)
  - IEEE 802.3 Fast Ethernet (FE-Copper)
  - Standard: 100-Base_TX

- ***Wireless Access Points / Routers***
  - Type: Linksys-WRT300N
  - IEEE 802.11 standard - ISM Band 2.4 GHz
  - Authentication: WPA2-PSK
  - Encryption: AES
  - SSID: OFFICE_2 and OFFICE_3 for respective office location
  - Pass Phrase: kiit@12345 for OFFICE_2 and kiit@67890 for OFFICE_3
  - LAN: IP Configuration: DHCP as per ***Table.1***

- ***Router Specifications***
  - Type: Generic (Router-PT-Empty)
  - Add Hardware interfaces: Fast Ethernet 100 Mbps
  - Network Interface Card (NIC) – Network Adaptor : IEEE 802.3 Fast Ethernet (FE-Copper)
  - Standard: 100-Base_TX
  - 4 NICs for Router 2 (R2)
  - 3 NICs for Router 1 (R1), Router 3 (R3) and Router4 (R4)
  - Routing Protocol: Routing Information Protocol v.1 (RIP v1)

Intermediate Network Specifications :

Between Routers	Network Address	IP Address of Gateways
AP (OFFICE_2) – R4	192.168.5.0/24	192.168.5.1 & 192.168.5.2
AP (OFFICE_3) – R3	192.168.6.0/24	192.168.6.1 & 192.168.6.2
R1-R2	192.168.10.0/24	192.168.10.1 & 192.168.10.2
R1-R3	192.168.7.0/24	192.168.7.1 & 192.168.7.2
R2-R4	192.168.9.0/24	192.168.9.1 & 192.168.9.2
R3-R4	192.168.8.0/24	192.168.8.1 & 192.168.8.2

NB: AP ⟶ Access Point (Linksys-WRT300N)

PC/ Laptop/ Server Specifications :

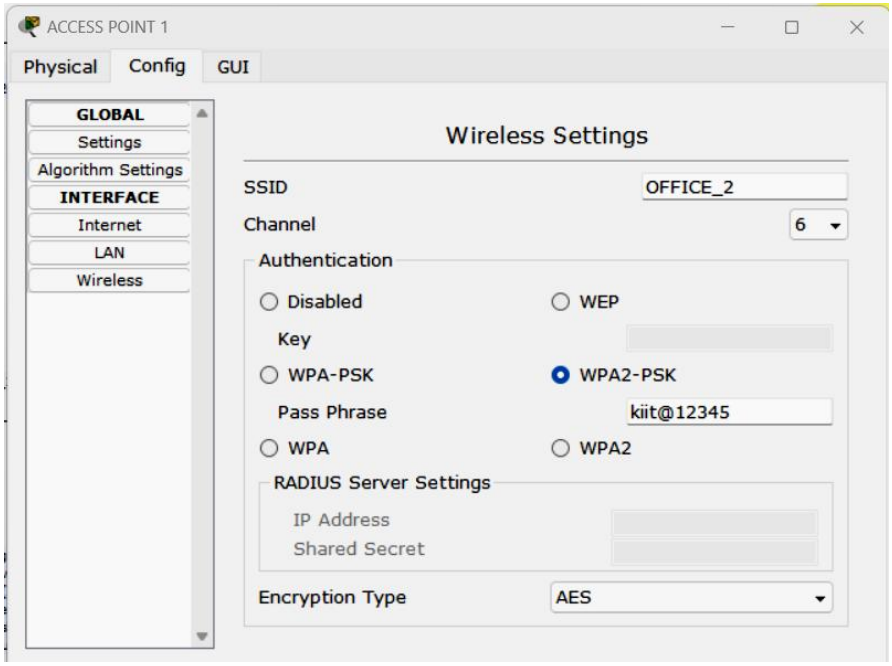
- End Devices > Generic PC/laptop/Server

Procedure:

As per the Network scenario diagram given above, the required networking devices like Wireless Access Points, Routers, Switches, PCs, Laptops, Wireless Tablets and Smart devices (PDA) were placed. The required cable connections were made. All devices were configured as per the specifications given above. Some of the device configuration methods (Screenshots) are given below:

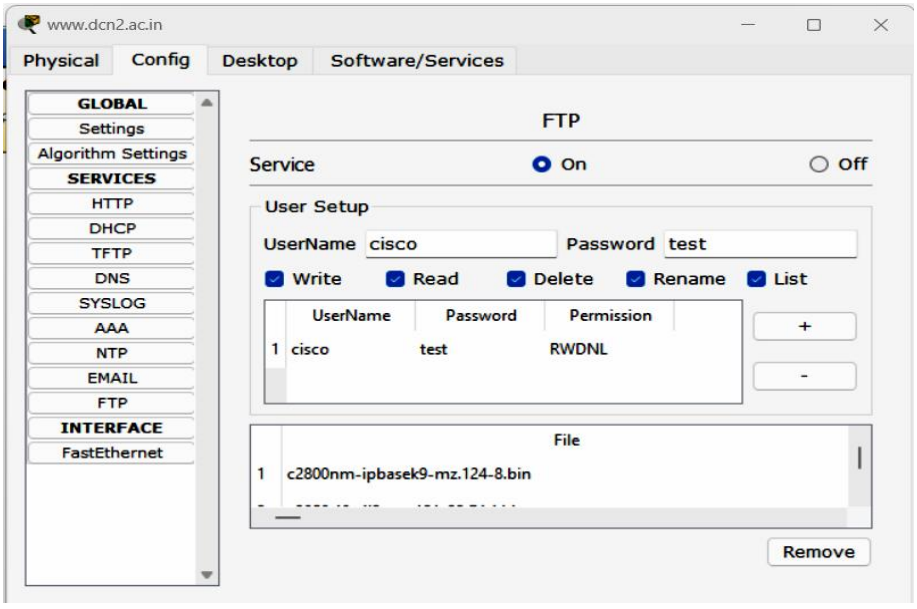
Basic Configuration

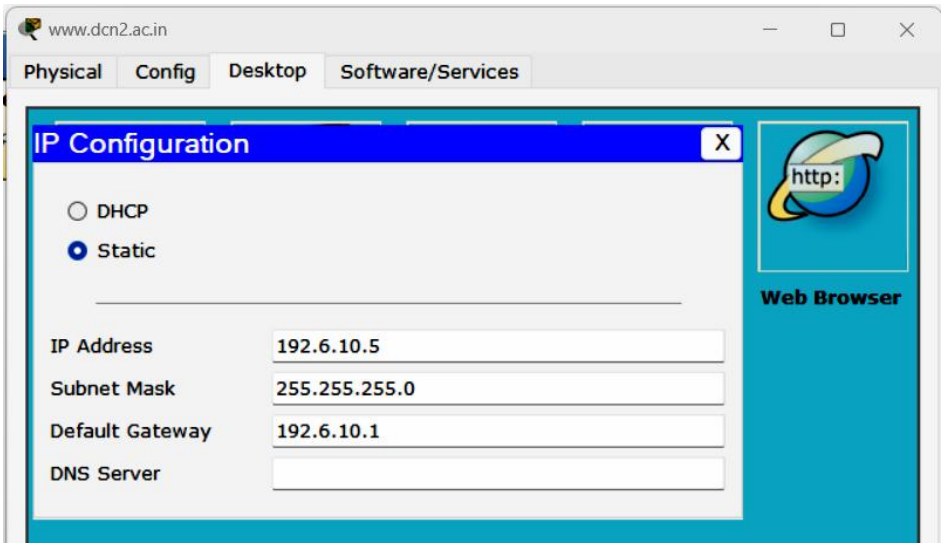
1. Wireless Access Point Configuration (Linksys-WRT300N)



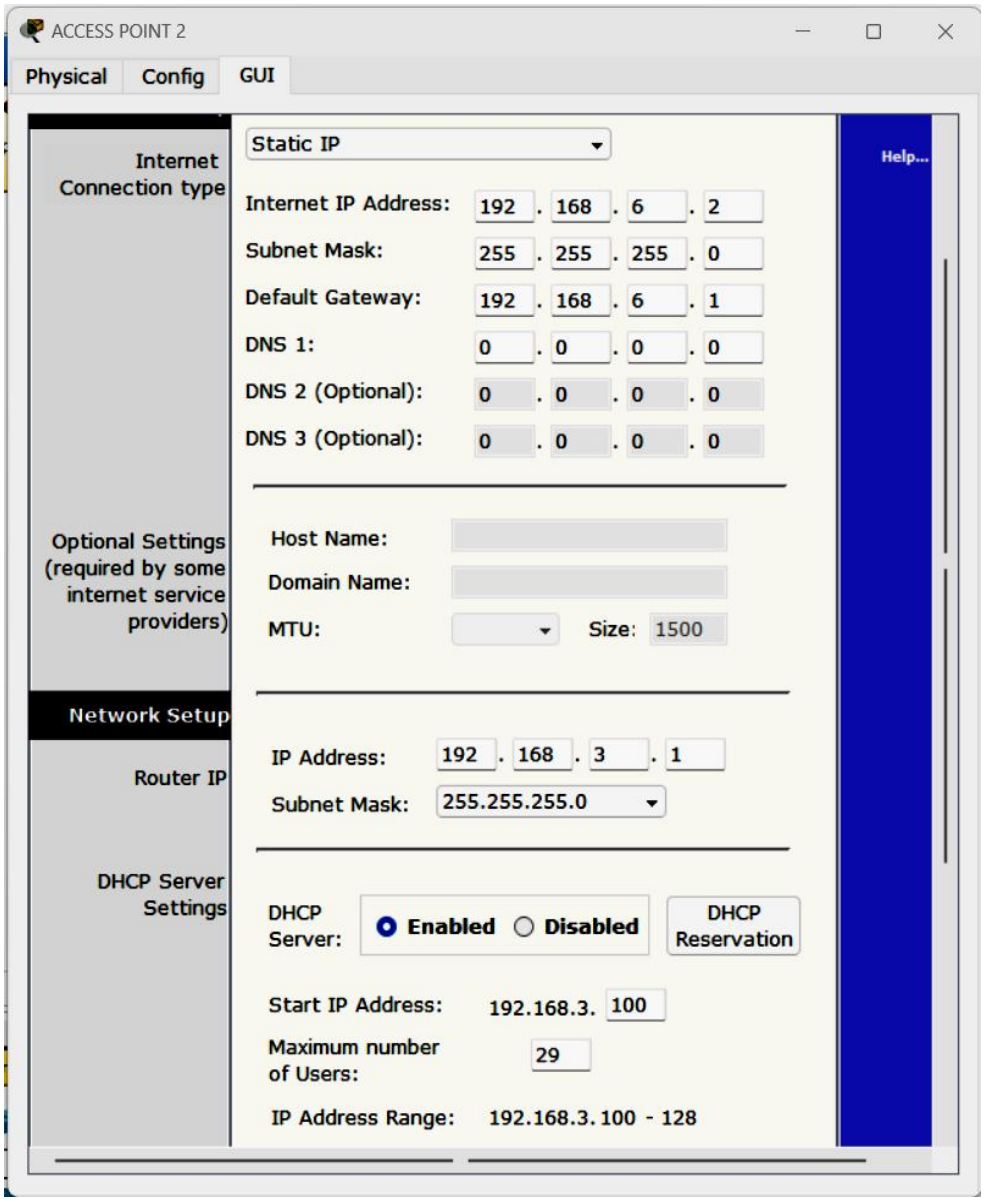
Config > Wireless

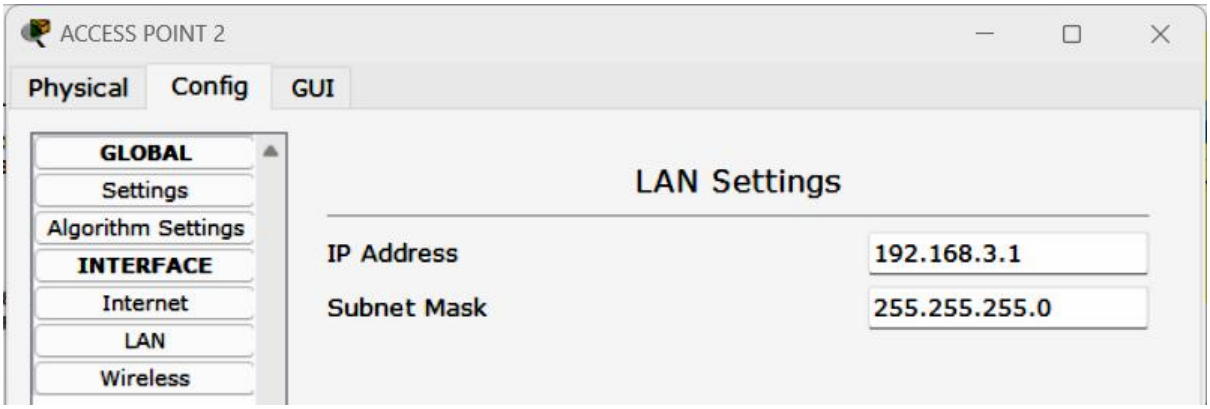
Config > FTP SERVER





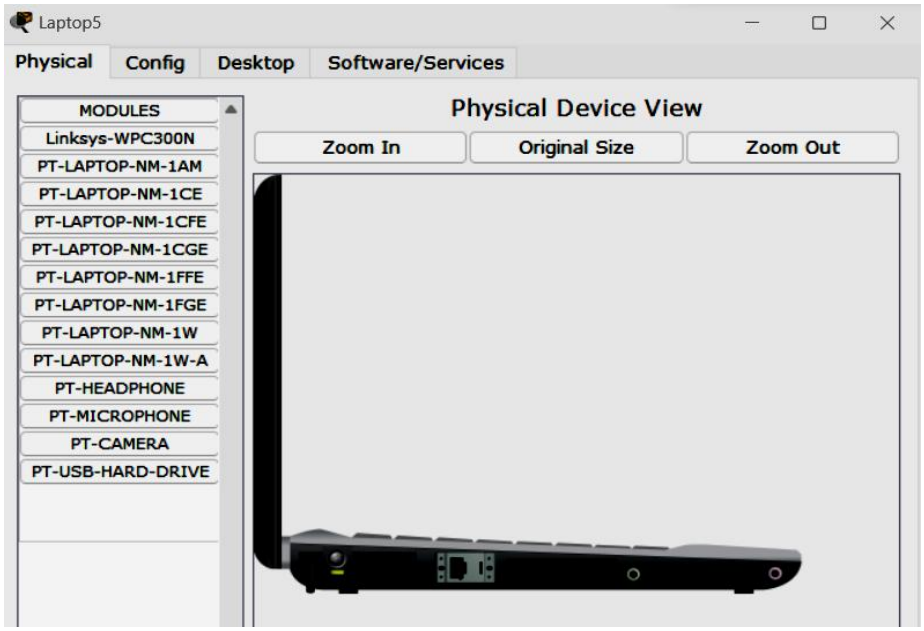
GUI (LAN DHCP Configuration)



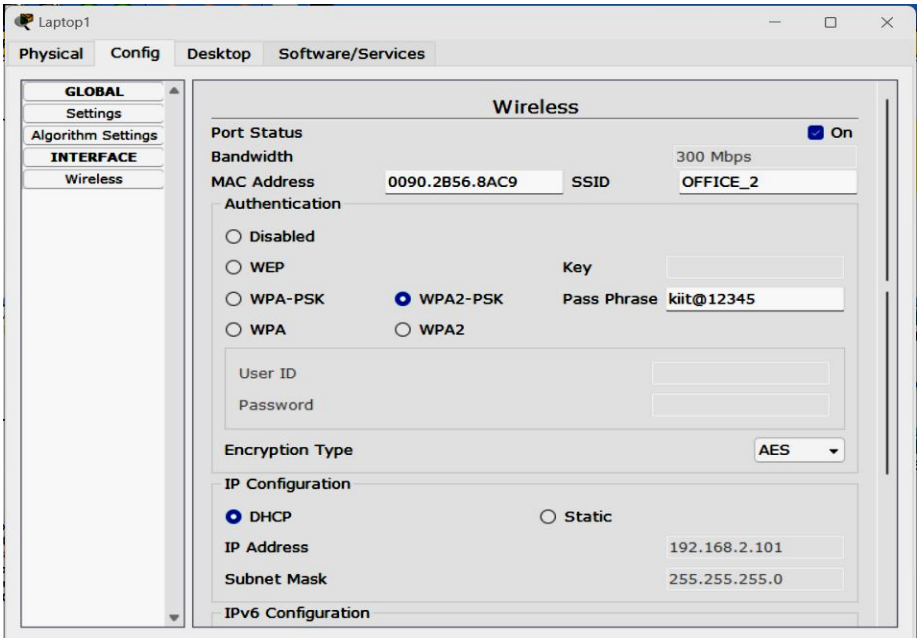


Then, Save Settings.

2. Laptop

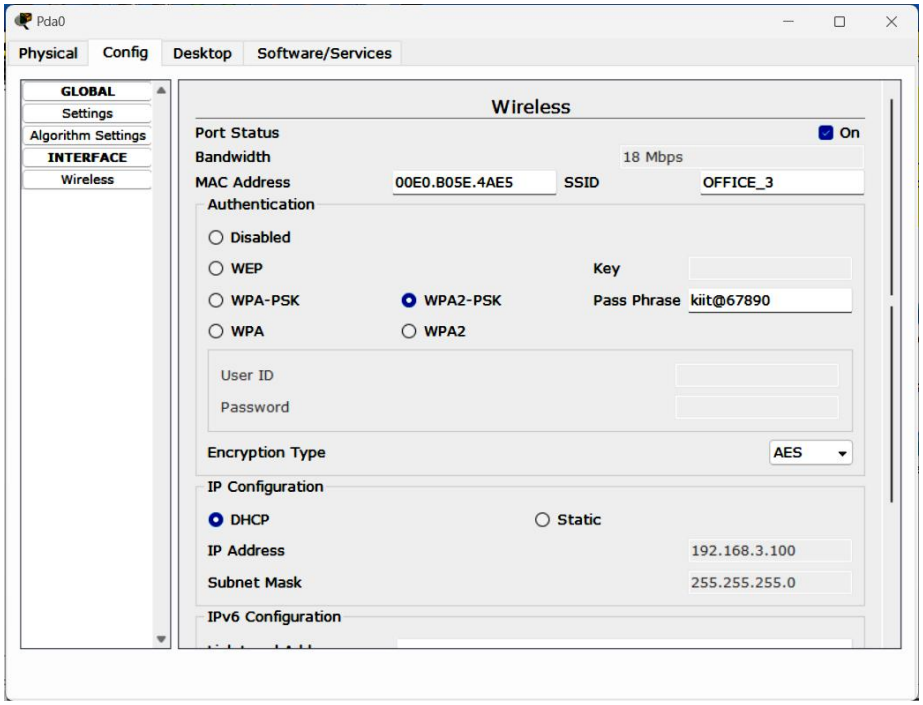


"Linksys-WPC300N" module is inserted into laptop and then it is switched on.

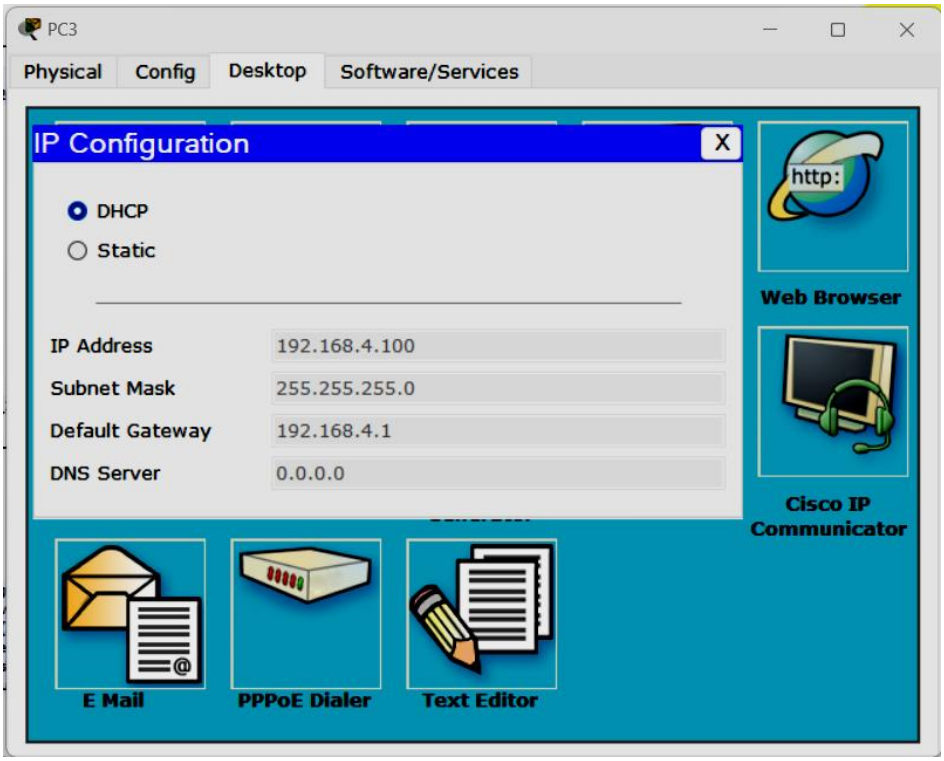


Config > laptop

3. Wireless Tablet/ Smart device (PDA)

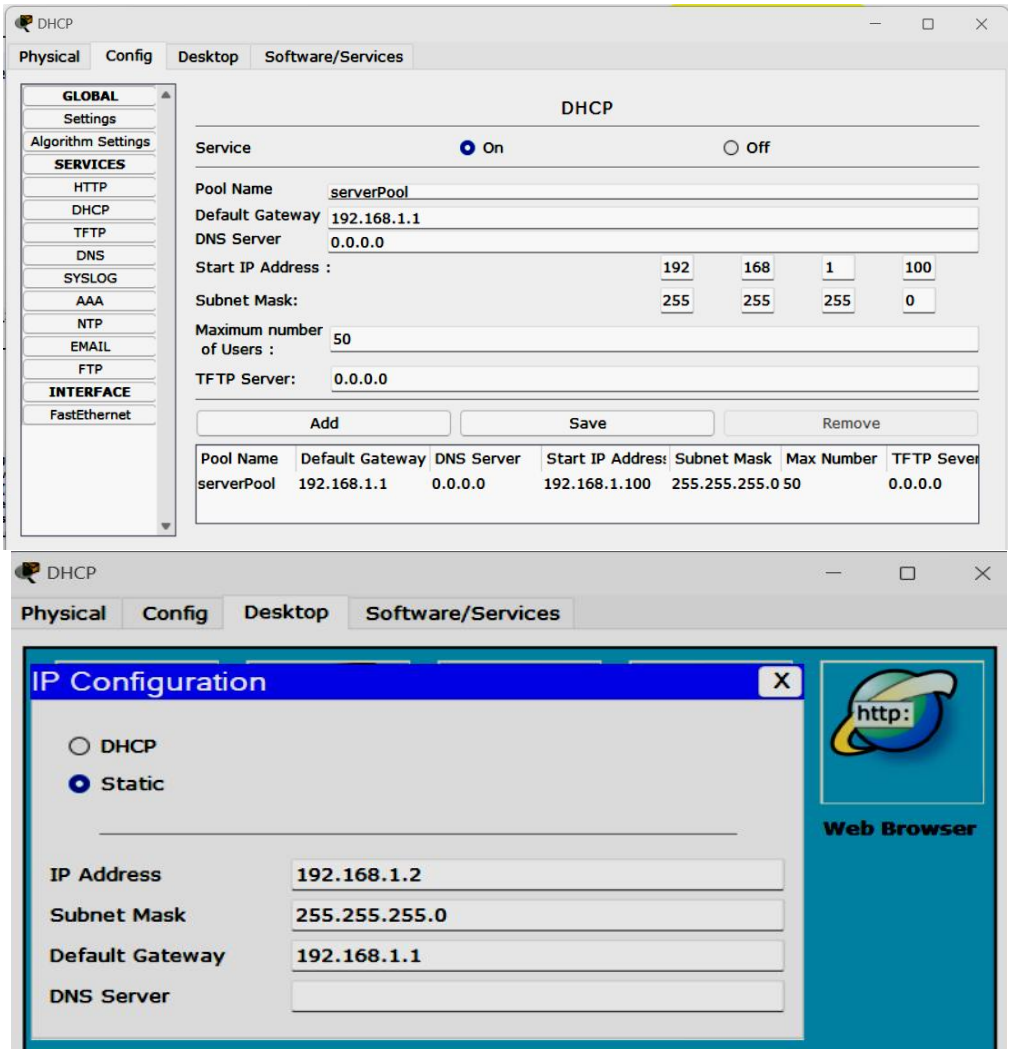


4. Other wired end devices



All PC connected to wired Ethernet Network must be configured as Desktop > IP Configuration > DHCP.

5. DHCP Server



6.Router

- ✓ Place ***Generic Routers*** from the **Router Menu** from the **Lower left corner of the window**.

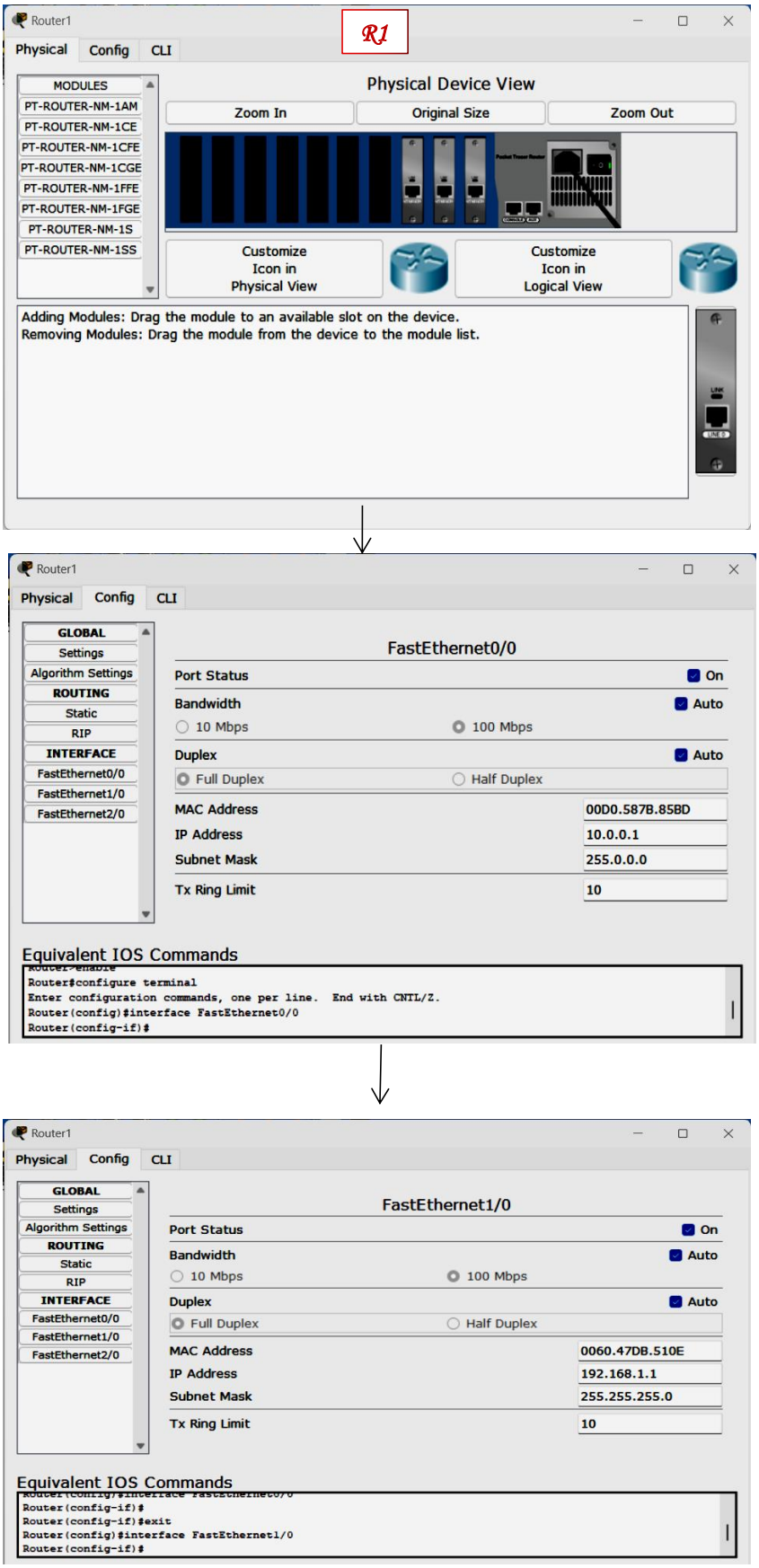
- ✓ **Double-Click** on **Router** to open **Menu**. In **PHYSICAL TAB**.Add a extra **PT-ROUTER NM-1CFE interface** by dragging and dropping at the back panel of the Router.

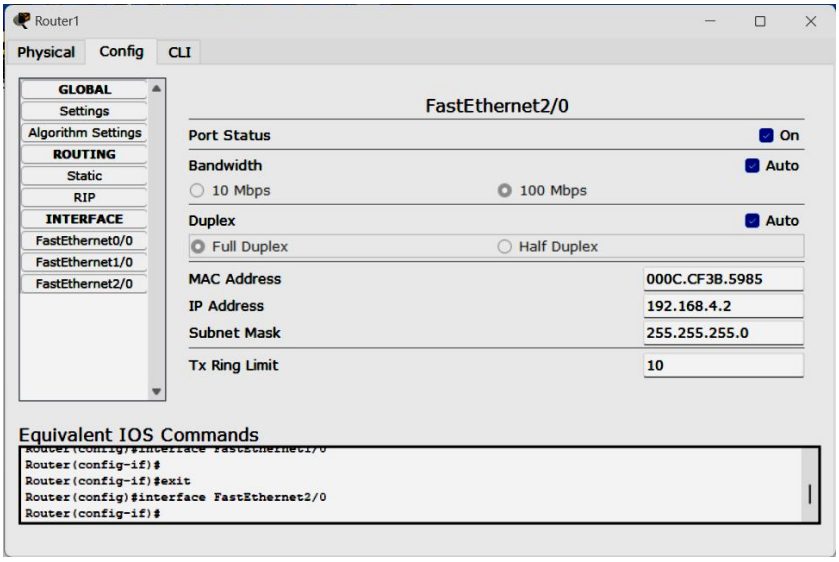
- ✓ Similar to placement of Router, place **CISCO Catalyst 2950T-24 Switches** and End devices like PC and Server as required.

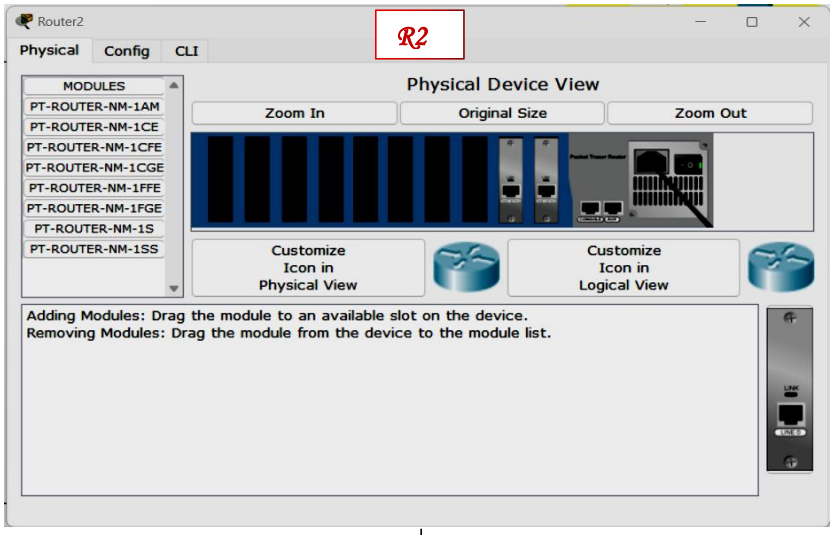
- ✓ Connect **Copper Straight Cable** between **PC-SWITCH, SWITCH-ROUTER**.

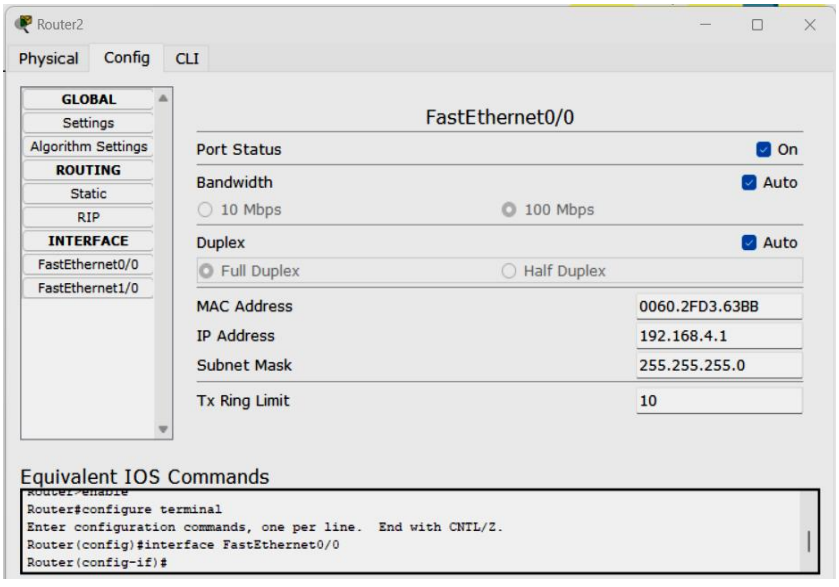
- ✓ Connect Copper Cross Cable between **ROUTER-ROUTER** and **SWITCH-SWICTH** interfaces. Give the suitable IP Address in Router interface by refer by double clicking on **ROUTER > COFIG > Select the suitable interface> Give the IP Address** in the Space given.

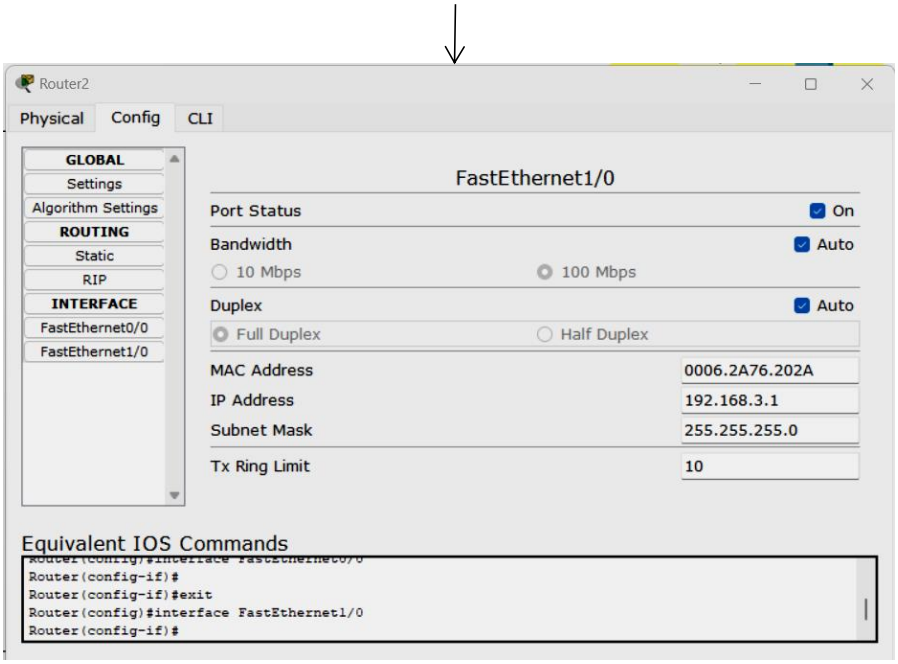
The above mentioned steps are shown in the figures below:



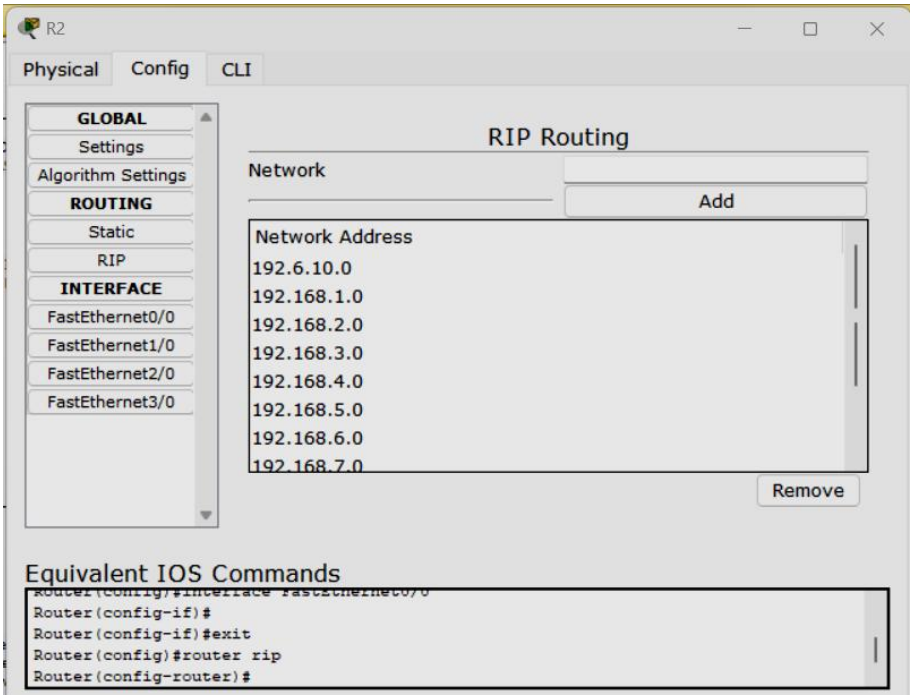

Router1
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
FastEthernet2/0
FastEthernet2/0
Port Status
On
Bandwidth
Auto
10 Mbps
100 Mbps
Duplex
Auto
Full Duplex
Half Duplex
MAC Address
000C.CF3B.5985
IP Address
192.168.4.2
Subnet Mask
255.255.255.0
Tx Ring Limit
10
Equivalent IOS Commands
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet2/0
Router(config-if)#


Router2
R2
Physical
Config
CLI
MODULES
PT-ROUTER-NM-1AM
PT-ROUTER-NM-1CE
PT-ROUTER-NM-1CFE
PT-ROUTER-NM-1CGE
PT-ROUTER-NM-1FFE
PT-ROUTER-NM-1FGE
PT-ROUTER-NM-1S
PT-ROUTER-NM-1SS
Physical Device View
Zoom In
Original Size
Zoom Out
Customize Icon in Physical View
Customize Icon in Logical View
Adding Modules: Drag the module to an available slot on the device.
Removing Modules: Drag the module from the device to the module list.


Router2
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
FastEthernet0/0
Port Status
On
Bandwidth
Auto
10 Mbps
100 Mbps
Duplex
Auto
Full Duplex
Half Duplex
MAC Address
0060.2FD3.63BB
IP Address
192.168.4.1
Subnet Mask
255.255.255.0
Tx Ring Limit
10
Equivalent IOS Commands
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#



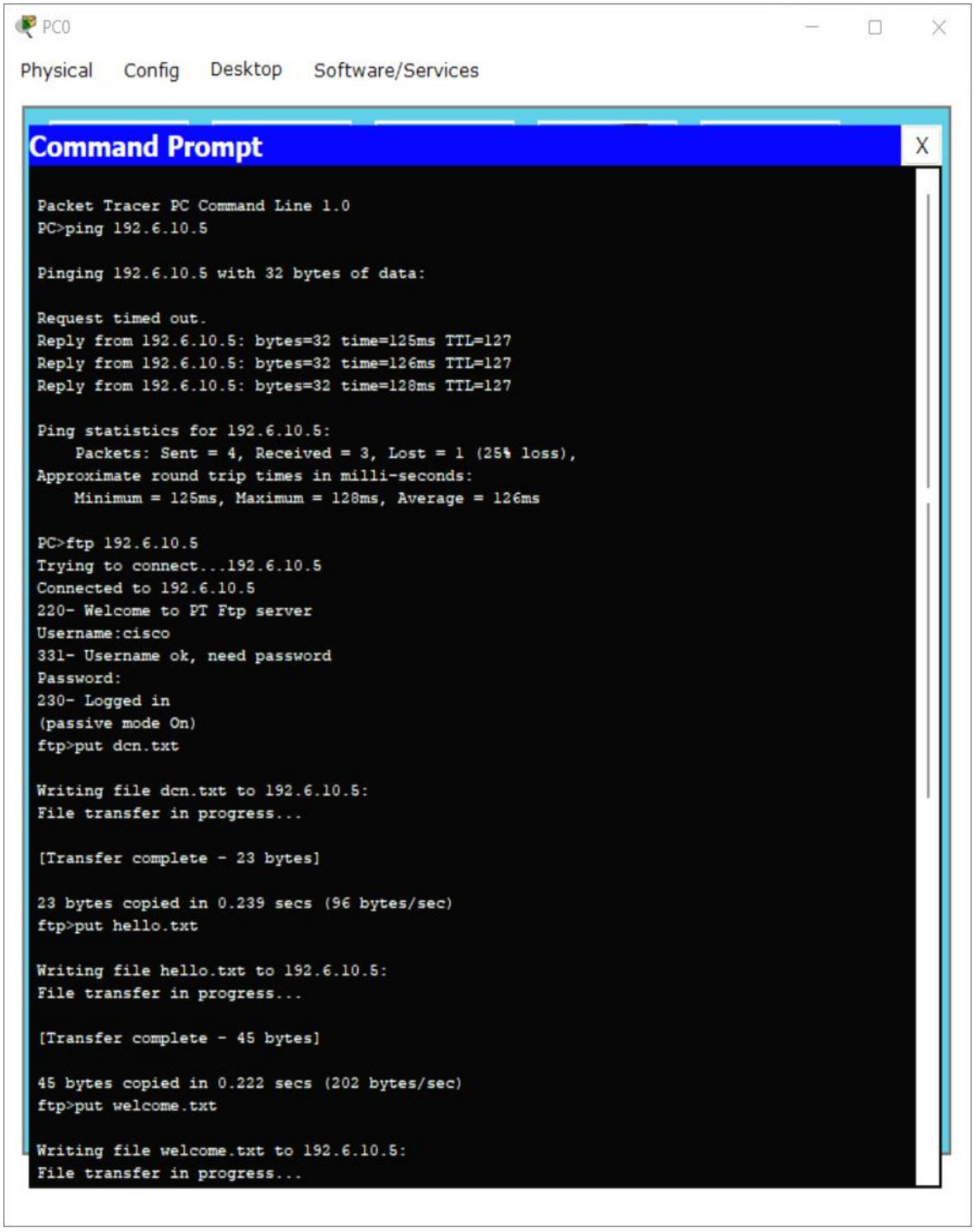
6. Routing Protocol: RIPv1

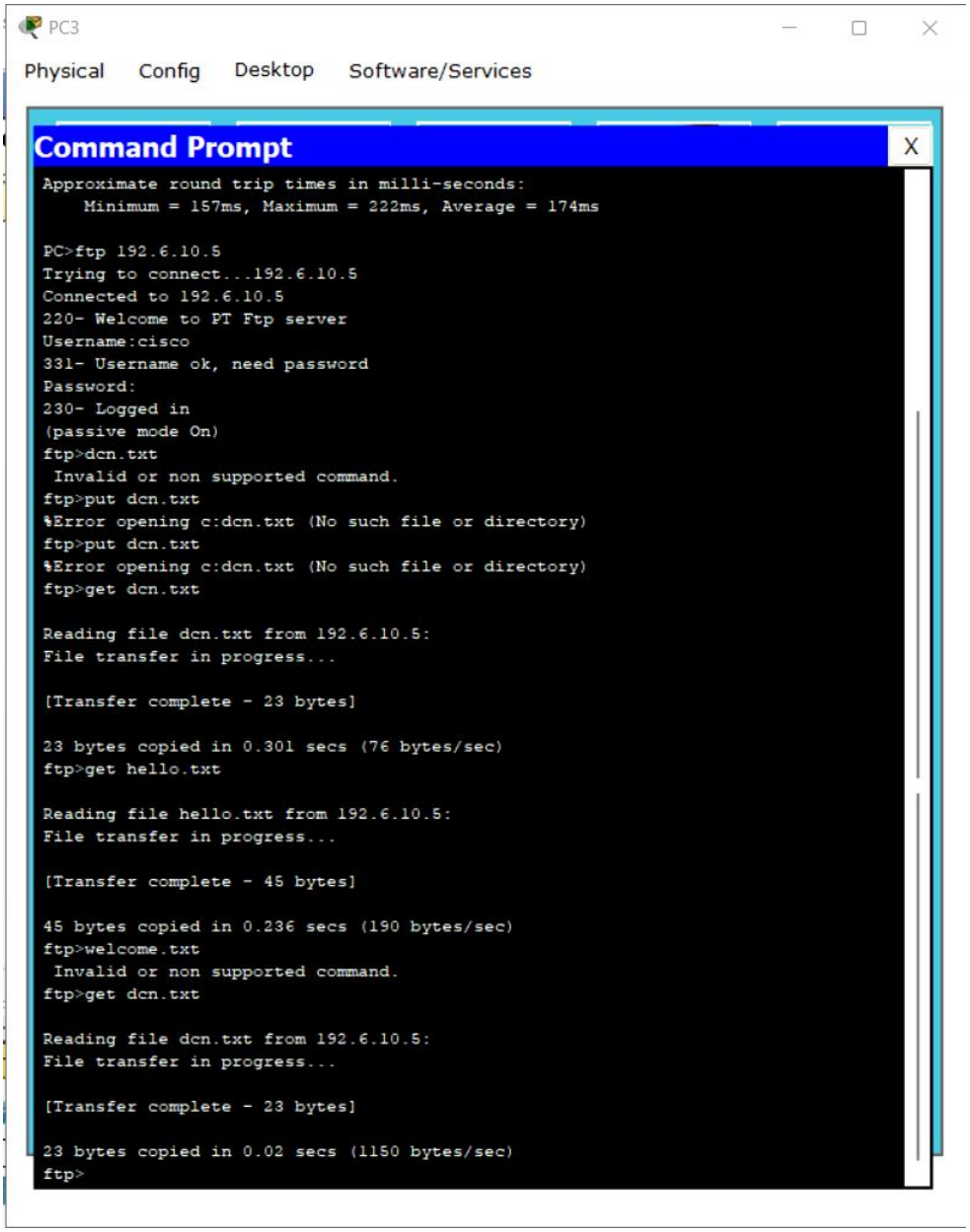


Observations:

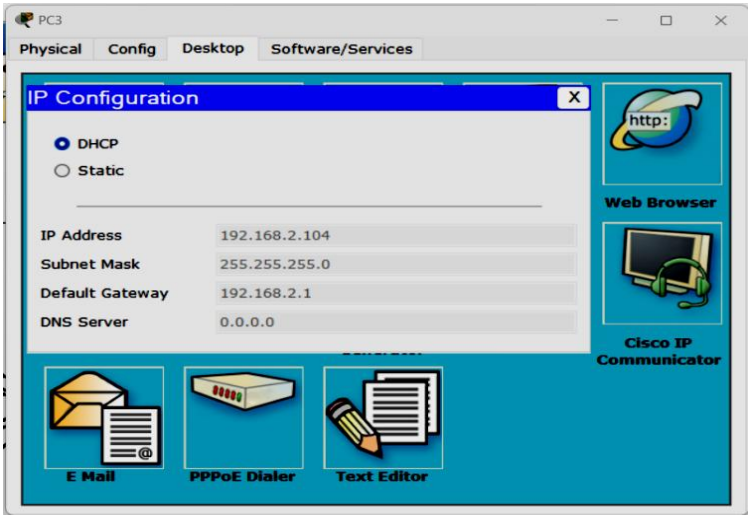
After designing and configuring the complete network, followings can verified and observered:

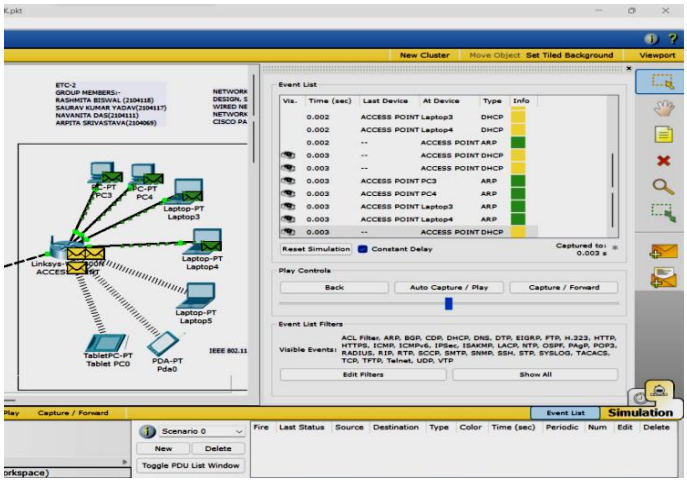
- ***FTP application server configuration. (put and get)***





- ***DHCP messages for automatic assignment of IP Configuration.***

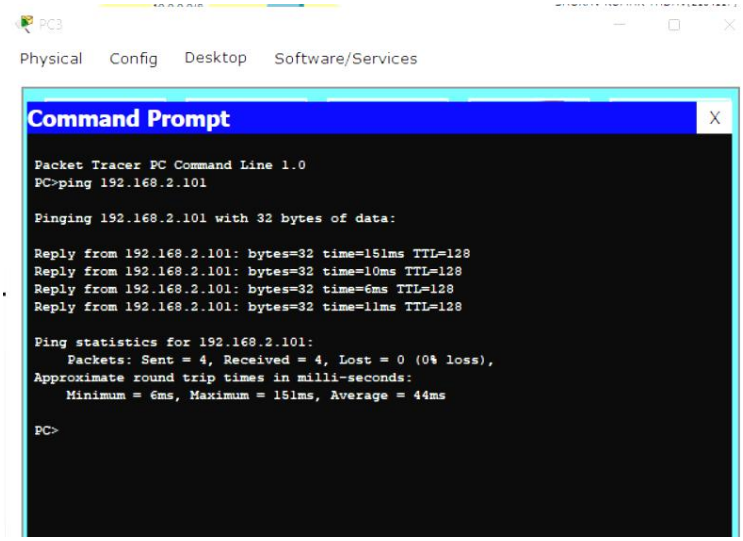




- ***PING Command***

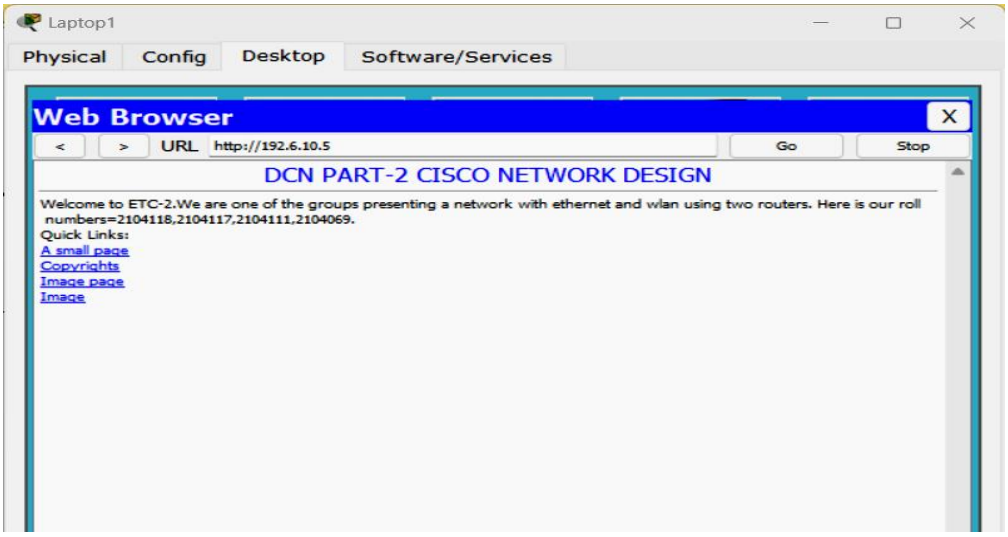
PC > Desktop > Command Prompt:

Ping 192.168.2.101

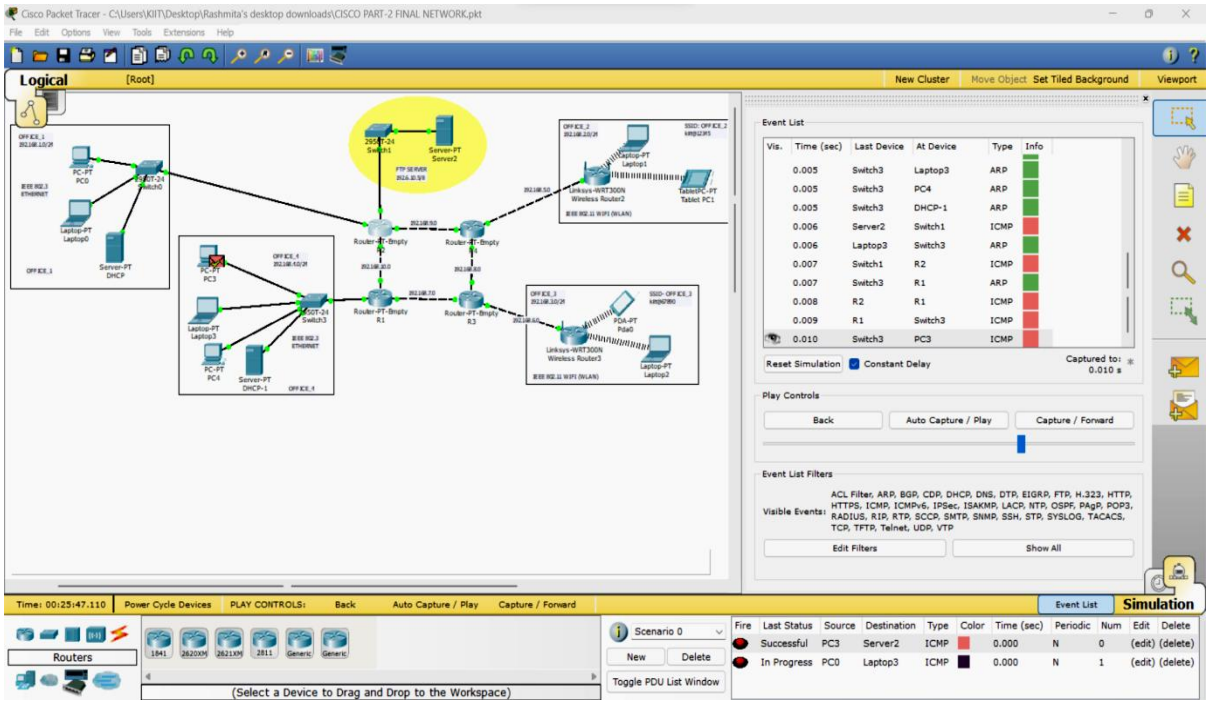


- ***HTTP over TCP Traffic in the Network in Simulation mode***

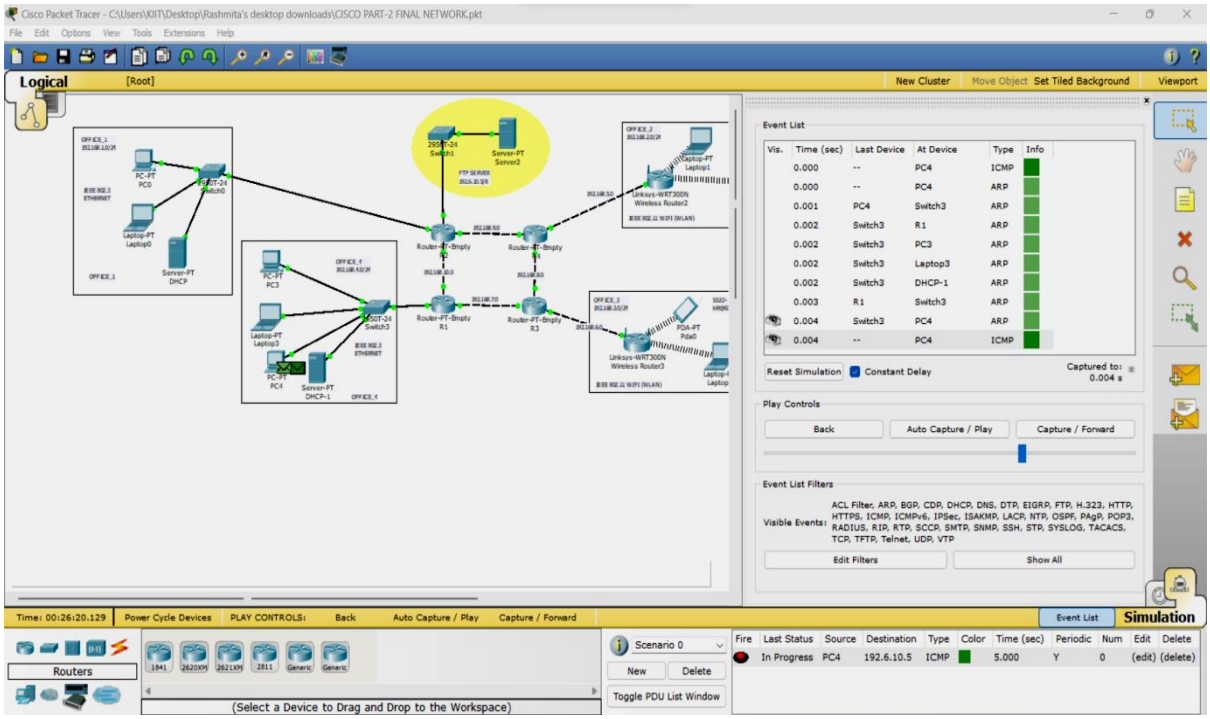
PC > Desktop > Web Browser :

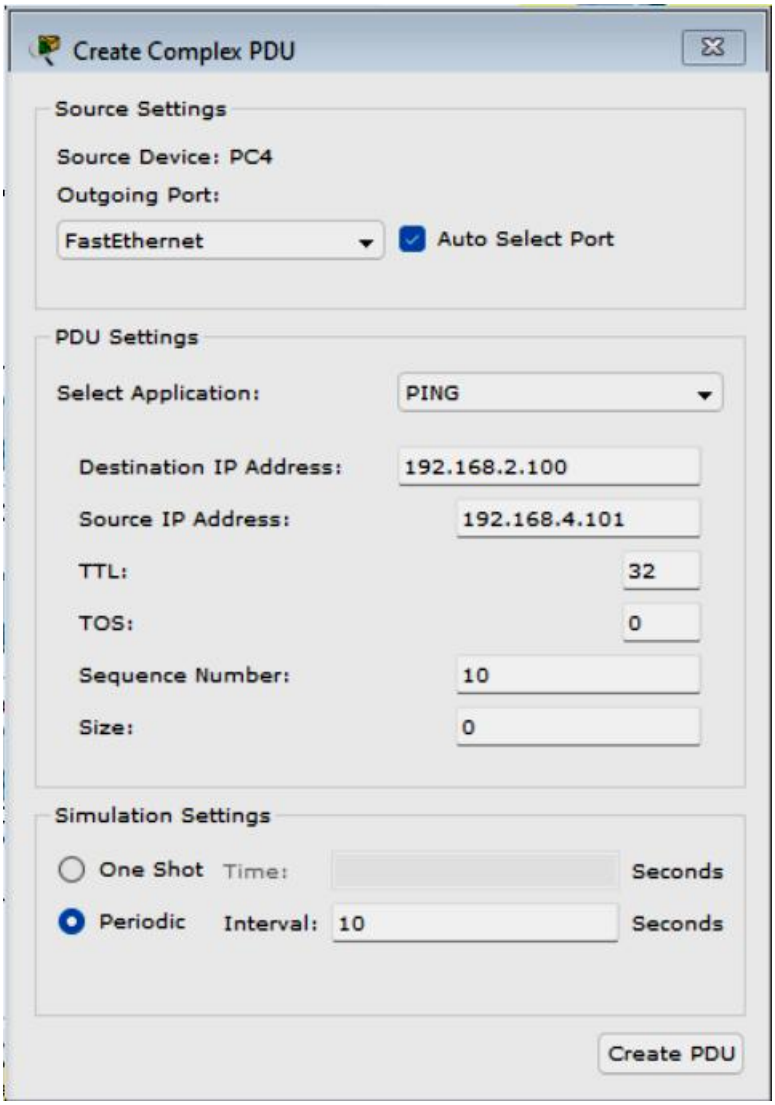


➢ *Packet transfer*



➢ *Complex PDU*





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