Parul University

Faculty of Engineering & Technology
Subject Name: Computer Network
Enrollment no. 2303051051232
B.Tech: **CSE 2nd** Year **4th** Semester

Parul University

FACULTY OF ENGINEERING AND TECHNOLOGY

BACHELOR OF TECHNOLOGY

Computer Network (303105255)

4th Semester

Computer Science Department

Laboratory Manual

2303051051188

Annexure No :

CERTIFICATE

This is to certify that

Mr. Bharat sinh Rathod with enrolment no. .....
2303051051232 *has successfully completed*
his laboratory experiments in the from the **Computer Network(303105255)** *department of Computer Engineering & Science during the academic year .....**2024-25**.....*

Date of Submission: .....

Staff In charge: ….....

Head of Department……

Annexure No :

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3.	**To study behaviour of generic devices used for networking: (CISCO PACKET TRACER)** Design a simple network with multiple nodes and connect via generic devices available in library. Perform simulation and trace communication behaviour of specified network devices. 1: Use only HUB to design a small network having 4 to 6 hosts 2: Use only a Switch to design a small network with 4 to 6 hosts. 3: Use both the device (HUB and SWITCH) for a network and find out functioning difference between switch and hub	13	19				
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Annexure No :

PRACTICAL: 1

Aim: Experiments on Simulation Tools (Cisco Packet Tracer):

TOPOLOGIES:

1. RING

A **ring topology** is a **network** configuration where device connections create a circular data path. Each networked device is connected to two others, like points on a circle. Together, devices in a **ring topology** are referred to as a **ring network**.

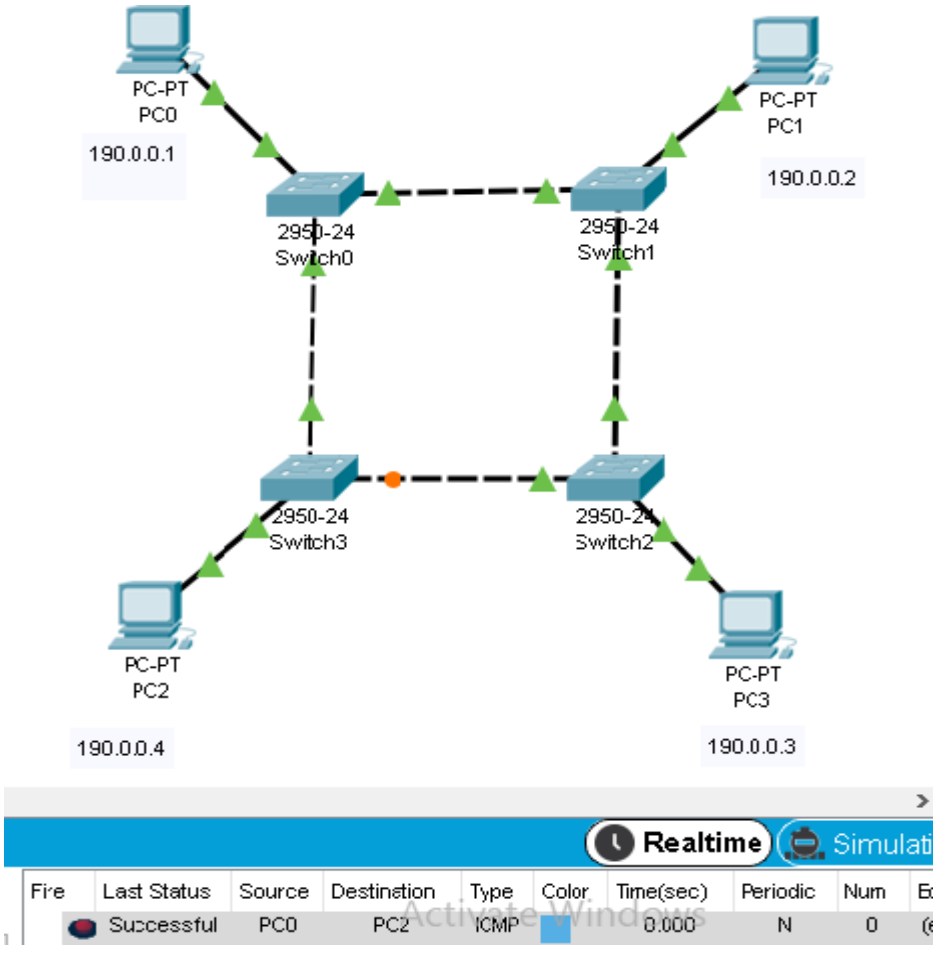


Figure 1.1: RING TOPOLOGY

Annexure No :

Step1: Select pcs and switches(29050-24) then connect pcs to switches with straight-through(straight wire) and switches to switches with crossover(dashed wired) .

Step2: Connect them as shown in the image above. Also give them a proper IP address.

Step3: Pass a message and check simulation.

2. MESH

A **mesh topology** is a network setup where each computer and network device is interconnected with one another. This **topology** setup allows for most transmissions to be distributed even if one of the connections goes down. It is a **topology** commonly used for wireless networks.

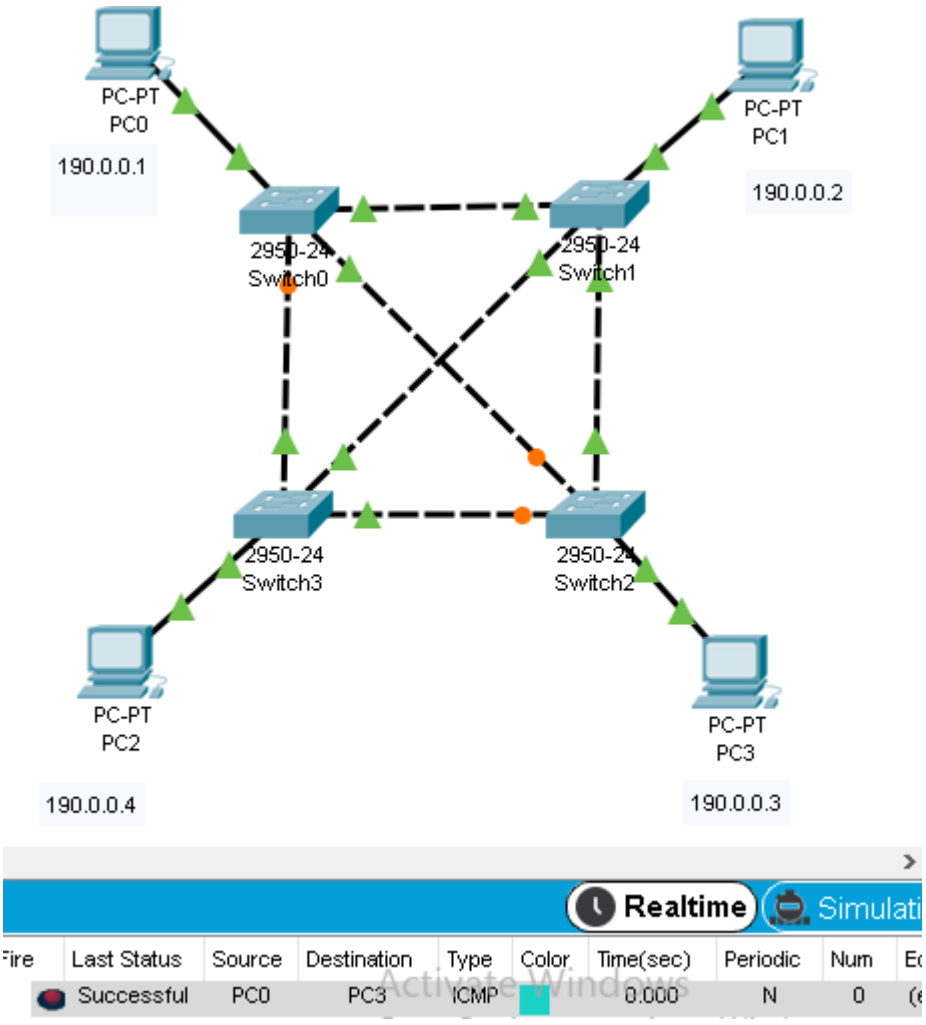


Figure 1.2: MESH TOPOLOGY

Step1: Connect the pcs and switches to one another as shown in image above. Make sure to connect the switches to switches with crossover wires and pc to switches withstraight-through.

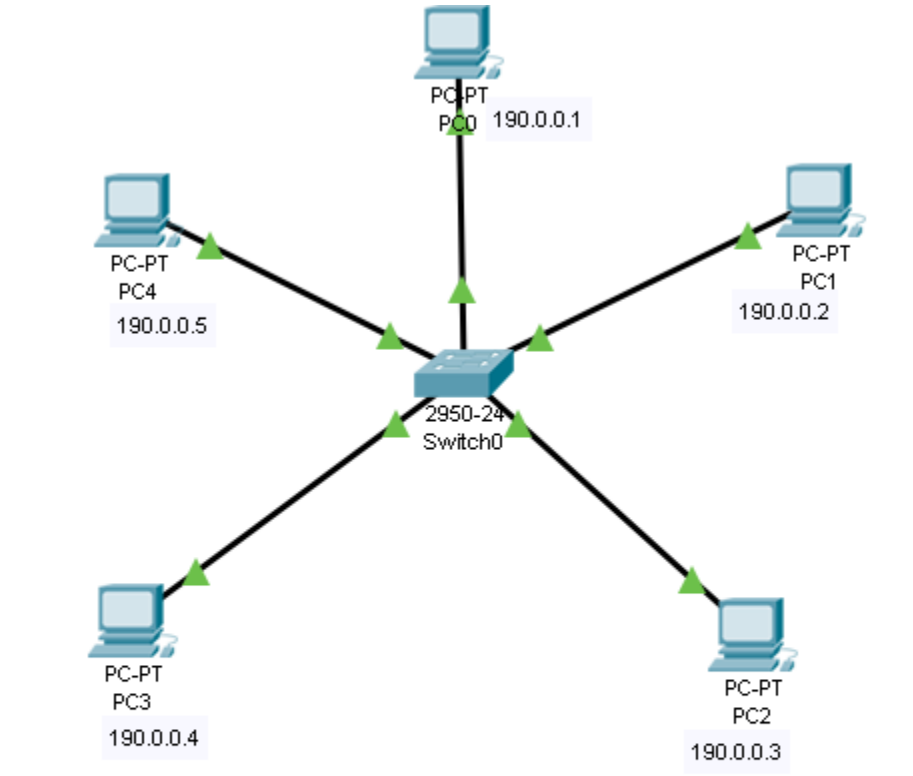
Step2: Connect them as shown in the image above. Also give them a proper IP address.

Step3: Pass a message and check simulation.

3. **Star**

A **star topology** is a **topology** for a Local Area **Network** (LAN) in which all nodes are individually connected to a central connection point, like a hub or a switch. A **star** takes more cable than e.g. a bus, but the benefit is that if a cable fails, only one node will be brought down.

Annexure No :



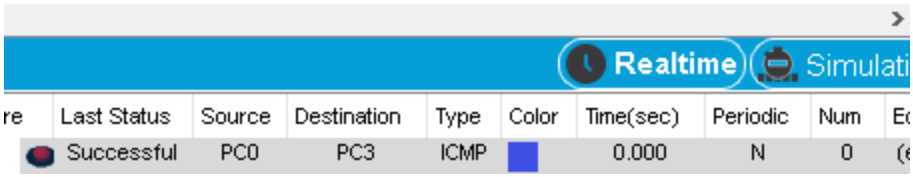


Figure 1.3: STAR TOPOLOGY

Step1: Connect the pcs and switches to one another as shown in image above. Make sure to connect pcs to switch with straight through wires.

Step2: Connect them as shown in the image above. Also give them a proper IP address.

Step3: Pass a message and check simulation.

3. BUS

A **bus topology** is a **topology** for a Local Area **Network** (LAN) in which all the nodes are connected to a single cable. The cable to which the nodes connect is called a "backbone". If the backbone is

broken, the entire segment fails.

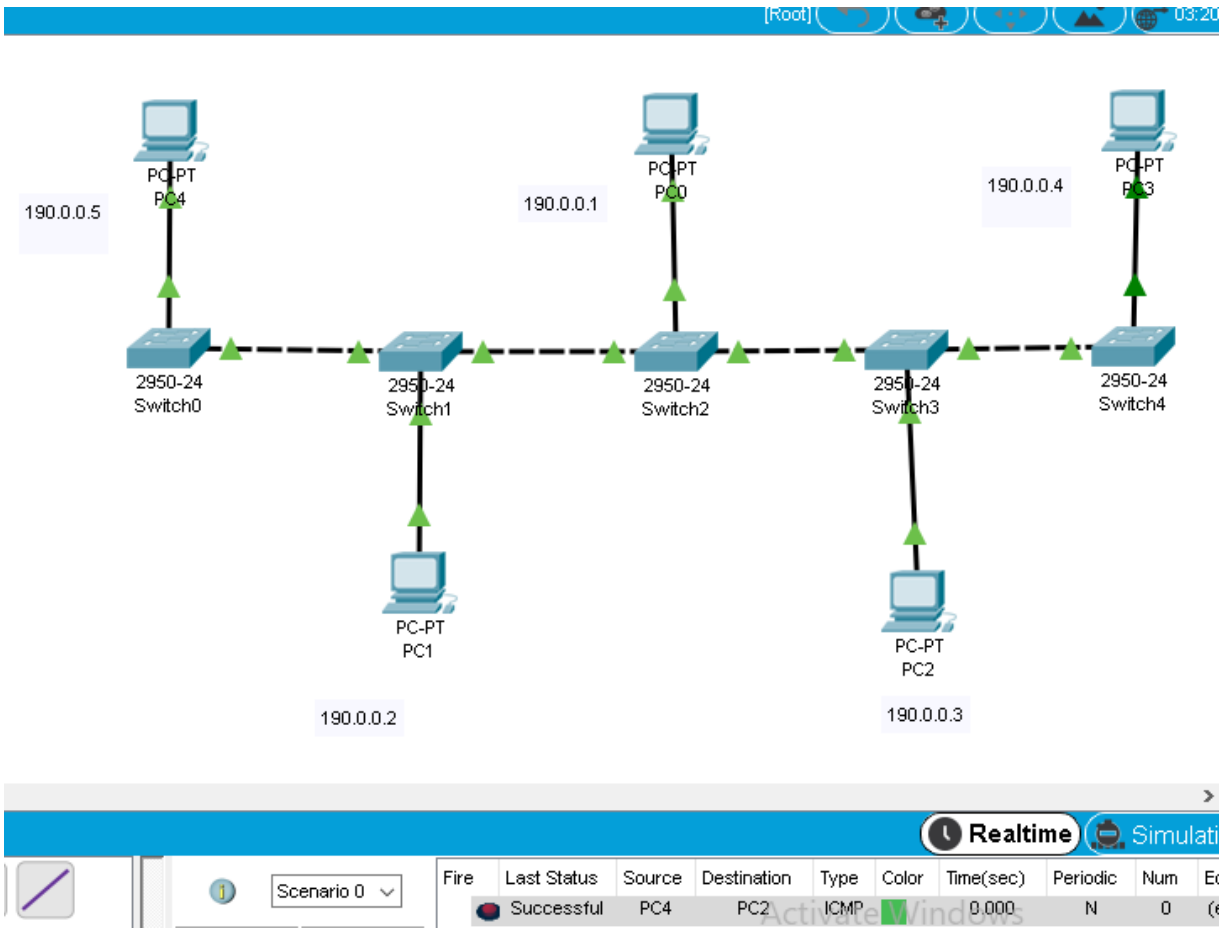


Figure 1.4: BUS TOPOLOGY

Step1: Connect the pcs and switches to one another as shown in image above. Make sure to connect pcs to switch with straight through wires and switches to one another with crossover.

Step2: Connect them as shown in the image above. Also give them a proper IP address.

Step3: Pass a message and check simulation.

4. TREE

A **tree topology** is a special type of structure where many connected elements are arranged like the branches of a **tree**. For example, **tree** topologies are frequently used to organize the computers in a corporate network, or the information in a database.

Annexure No :

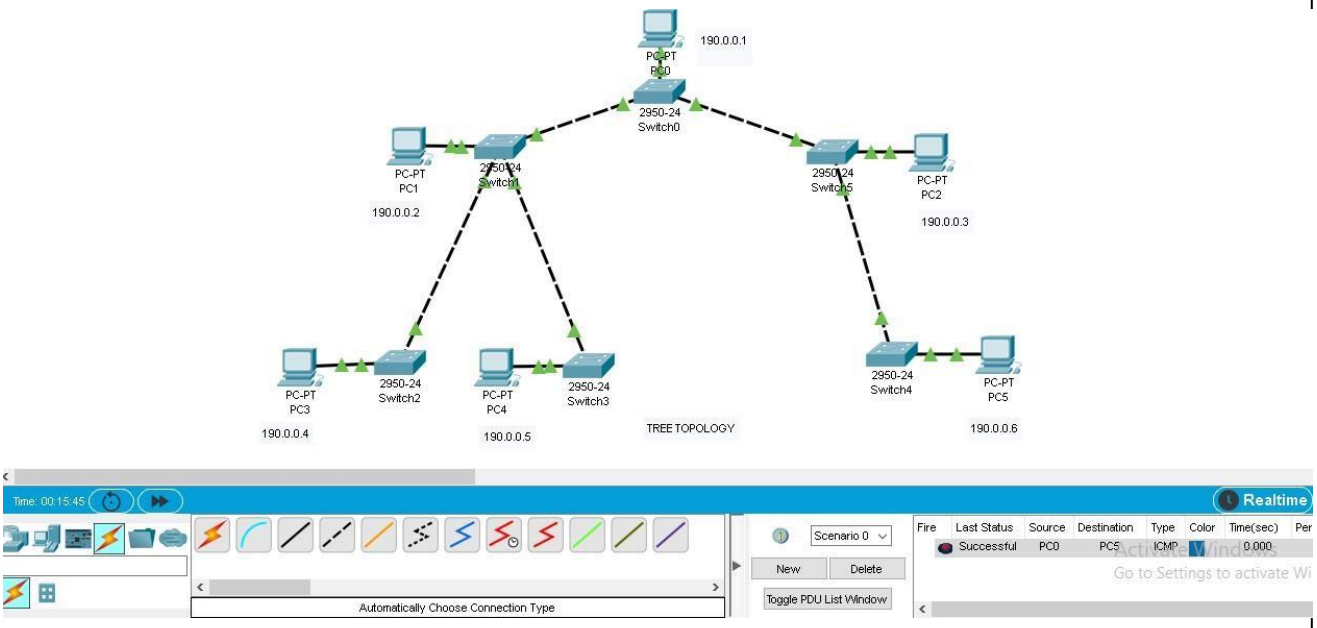


Figure 1.5: TREE TOPOLOGY

Step1: Connect the pcs and switches to one another as shown in image above. Make sure to connect pcs to switch with straight through wires and switches to one another with crossover.

Step2: Connect them as shown in the image above. Also give them a proper IP address.

Step3: Pass a message and check simulation.

5. HYBRID

A **hybrid topology** is a type of **network topology** that uses two or more differing **network topologies**. These **topologies** can include a mix of bus **topology**, mesh **topology**, ring **topology**, star **topology**, and tree **topology**.

Annexure No :

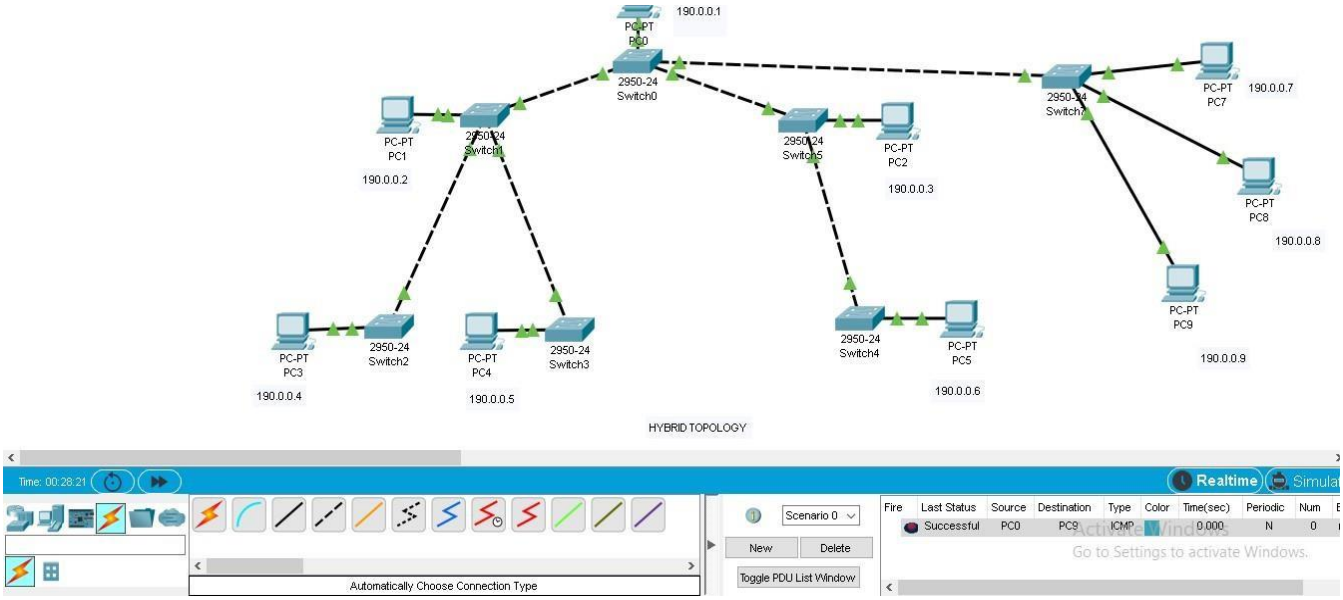


Figure 1.6: HYBIRD TOPOLOGY

Step1: Connect the pcs and switches to one another as shown in image above. Make sure to connect the switches to switches with crossover wires and pc to switches with straight-through.

Step2: Give them a proper IP address.

Step3: Pass a message and check simulation.

Annexure No :

PRACTICAL: 2

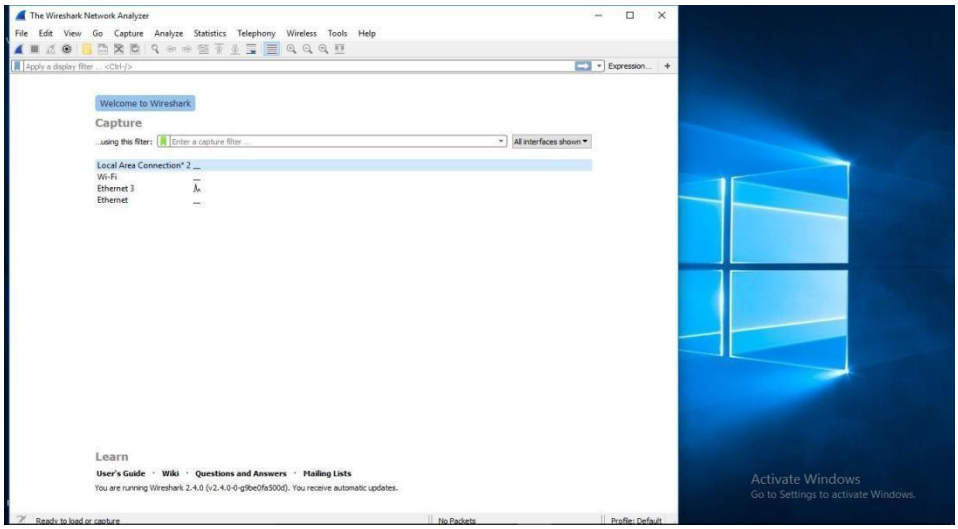
AIM: To understand the features of wireshark as a packet capture tool and understand encapsulation of information. Also study effect of few network commands

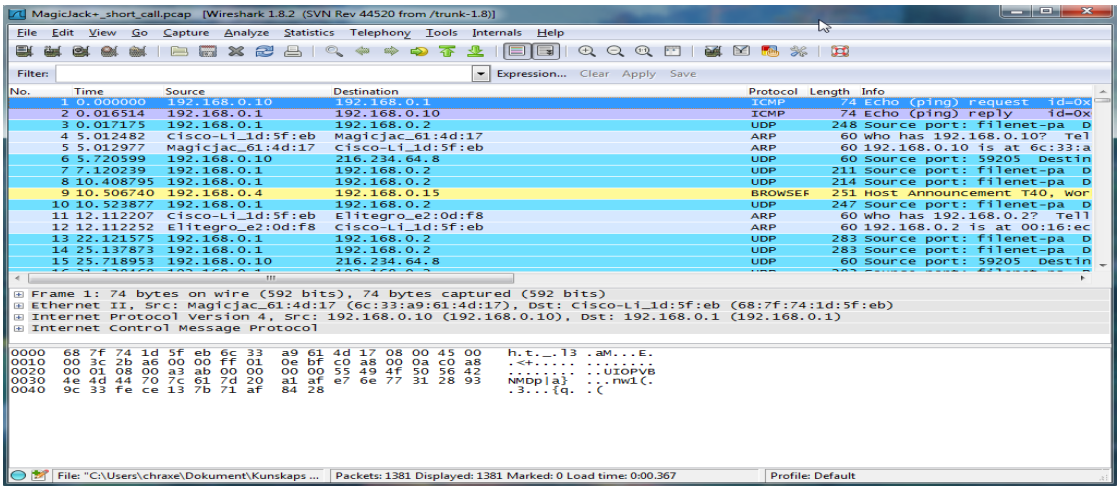
2.1 Purpose:

The main objective of the proposed experiment is to give exposure of wire-shark tool to students so can learn to monitor transmission packets being sent in Wi-Fi and LAN environments.

2.3 TOOLS/SOFTWARE:

Wireshark





Annexure No :

PRACTICAL: 3

AIM: To study behavior of generic devices used for networking: (Cisco packet tracer)

DESCRIPTION:

Web server in Cisco packet trace

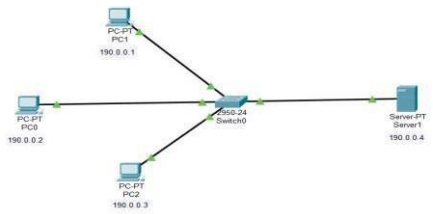
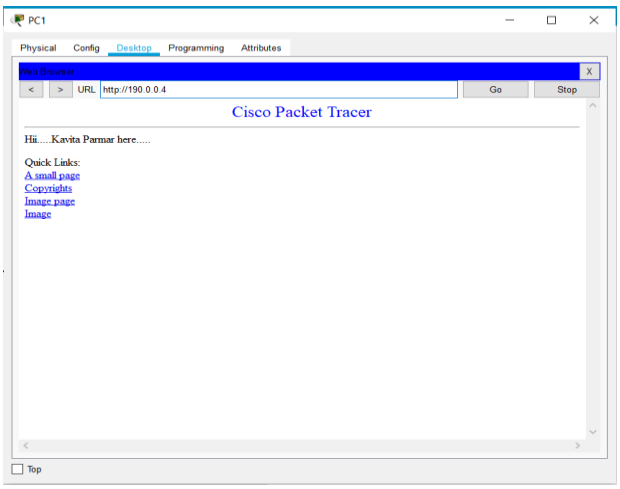


Figure 3.1

- In this lesson we will learn about how to create first web server on cisco packet tracer that can be apply on real time web server.
- So we are taking few PCs and one web server and one switch for connecting all devices. Make sure all devices should be connected by straight through cable because for connecting different devices, straight through cable is required. Assign IPs to each end device (server and PCs) of single network with subnet mask It can different as per your choice.
- Then go in server>services>http in that enable http and https modes.In that go to index.html and edit .In that write the message you want… At the end click on save.and close it .
- Then we go PC1 and in that we select desktop and we write the IP address of server and click on enter.You can see the message which you wrote in server message.



Annexure No :

Figure 3.2

- If you want to see that your connection is proper or not then you want to click on your pc then desktop>command prompt and in that you need to write ping 190.0.0.1(IT_address). And give enter.

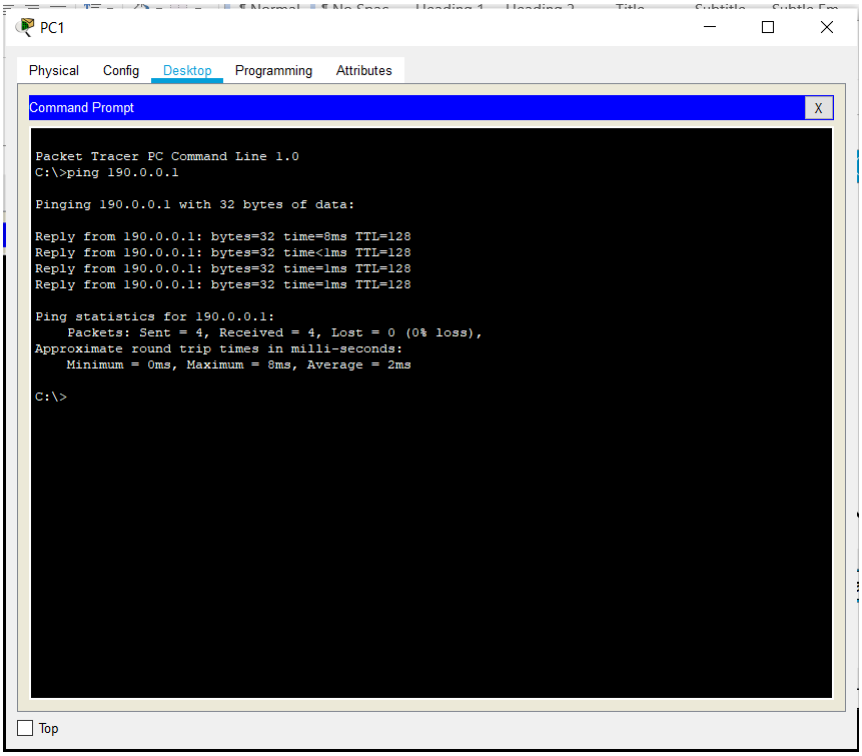


Figure 3.3

Use of switch

A switch is used in a *wired* network to connect to other devices using Ethernet cables. The switch allows each connected device to talk to the others. Wireless-only networks do not use switches because devices such as wireless routers and adapters communicate directly with one another.

Annexure No :

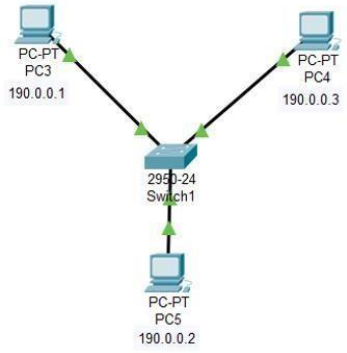


Figure 3.4

- Connect multiple hosts: Normally, a switch provides a large number of ports for cable connections, allowing for star topology routing. It is usually used to connect multiple PCs to the network.
- Forwards a message to a specific host: Like a bridge, a switch uses the same forwarding or filtering logic on each port. When any host on the network or a switch sends a message to another host on the same network or the
- ame switch, the switch receives and decodes the frames to read the physical (MAC) address portion of the message.
- Manage traffic: A switch in networking can manage traffic either coming into or exiting the network and can connect devices like computers and access points with ease.
- Keep electrical signal undistorted: When a switch forwards a frame, it regenerates an undistorted square electrical signal.
- Increase LAN bandwidth: A switch divides a LAN into multiple collision domains with independent broadband, thus greatly increasing the bandwidth of the LAN.

Use of hub

A hub is a physical layer networking device which is used to connect multiple devices in a network. They are generally used to connect computers in a LAN.

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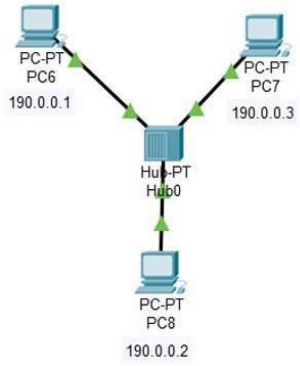


Figure 3.5

A hub has many ports in it. A computer which intends to be connected to the network is plugged in to one of these ports. When a data frame arrives at a port, it is broadcast to every other port, without considering whether it is destined for a particular destination or not.

When a Hub receives data from one of the connected devices, it passes data to all the other ports without checking for the destination device except the port through which it receives the data. Below figure, shows the working of a HUB.

Figure 3.6

Consider, Device A want to send data to device D. When device A sends data, the hub receives it through one port and transfer the data to all the other connected devices instead of passing it to only device D. This feature of hub leads to congestion and extends the collision domain. So, it is considered as an inefficient device and needs more bandwidth for working.

Difference between switch and hub

Annexure No :

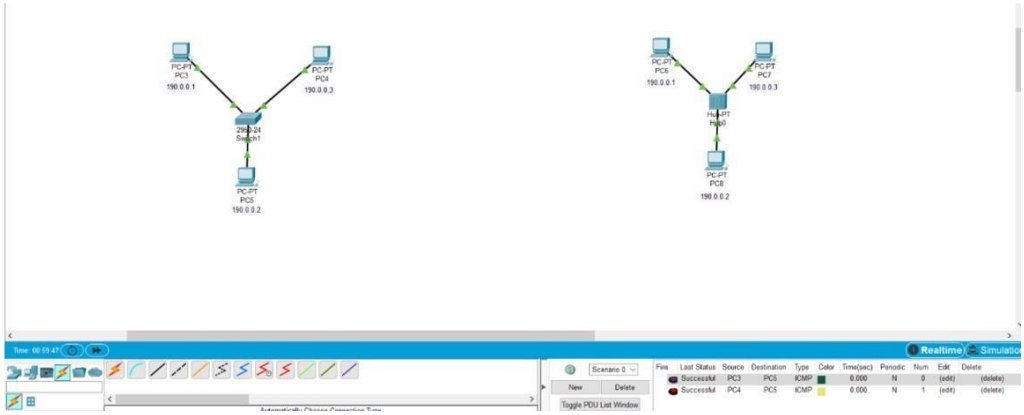


Figure 3.7

HUB	SWITCH
• A hub operates on the physical layer.	• A switch operates on the data link layer.
• Hubs perform frame floodingthat can be unicast, multicast, or broadcast.	• It performs broadcast, then the unicast and multicast as needed.
• Just a singular domain ofcollision is present in a hub.	• Varied ports have separate collision domains.
• Transmission mode is Half-duplex.	• Transmission mode is Full duplex.
• Hubs operates as a Layer 1 devices per the OSI model.	• Network switches help you to operate at Layer 2 of the OSImodel.
• To connect a network ofpersonal computers should be joined through a central hub.	• Allow connecting multiple devices and ports.
• Uses electrical signal orbits.	• Uses frame & packet
• Does not offer Spanning-Tree.	• Multiple Spanning-Tree is possible
• Collisions occur mostly in setups using hubs.	• No collisions occur in a full-duplex switch.
• Hub is a passive device.	• A switch is an active device
• A network hub can't store MAC addresses.	• Switches use CAM (Content Accessible Memory) that can be accessed by ASIC (Application Specific Integrated Chips).
• Not an intelligent device.	• Intelligent device.
• Its speed is up to 10 Mbps.	• 10/100 Mbps, 1 Gbps, 10 Gbps
• Does not use software.	• Has software for administration

Summary of devices we use:

Switch 2950-54:

The Cisco Catalyst 2950C 24 and Catalyst 2950T 24 Switches belong to the Cisco Catalyst 2950 series of high-performance, standalone, 10/100 autosensing Fast Ethernet and Gigabit Ethernet switches. Both products bring intelligent services to the network edge to accommodate the needs of growing workgroups and server connectivity. Embedded in the Cisco Catalyst 2950 Series is Cisco Device Manager software, which allows users to configure and troubleshoot a Cisco Catalyst fixed-configuration switch using a standard Web browser.

Router 4321:

The Cisco 4000 Series Integrated Services Routers (ISR) revolutionize WAN communications in the enterprise branch. With new levels of built-in intelligent network capabilities and convergence, the routers specifically address the growing need for application-aware networking in distributed enterprise sites.

Hub-pt:

Hub is a very simple network device that is used in LANs. It is basicall a multiport repeater. Hubs do not decide anything and forwards any traffic to all of the ports. So, they are not smart devices. They have multiple ports that connects different network equimpments in the same network. But this devices the network bandwith.

Server:

Servers are an entirely different breed when compared to other end devices. They have various functionalities and also have space for two network interfaces. The modules available for servers are the same as PC modules, except that the servers do not have the PC-HOST-NM-1AM module.

Meraki server:

The Meraki cloud solution is a centralized management service that allows users to manage all of their Meraki network devices via a single simple and secure platform. Users are able to deploy, monitor and configure their Meraki devices via the Meraki dashboard web interface or via APIs.

Ip phone:

IP telephony refers to any phone system that uses an internet connection to send and receive voice data. Unlike a regular telephone that uses landlines to transmit analog signals, IP phones connect to the internet via a router and modem.

Voip device:

A VoIP phone or IP phone uses voice over IP technologies for placing and transmitting telephone calls over an IP network, such as the Internet, instead of the traditional public switched telephone network (PSTN).

Copper straight through wire:

This is a standard Ethernet cable that is used to connect two devices that operate in different layers of the OSI model (such as hub to router and switch to PC). It can be used with Ethernet, Fast Ethernet and Gigabit Ethernet port types.

Copper cross over wire:

This Ethernet cable connects devices operating in the same OSI layer (such as hub to hub, PC to PC, PC to router, and PC to printer). This cable can also be used with Ethernet, Fast Ethernet and Gigabit Ethernet port .

Phone:-

The mobile phone network enables wireless communication using mobile devices, such as mobile phones, smart phones or tablets. Mobile phone networks provide the necessary infrastructure and are operated by mobile phone providers.

Automatically choose connection wire:

Connections can be made automatically by choosing the connection type shown below. Router links will be red or not active until you correctly configure the interfaces.

Coaxial wire:

The coaxial cable used to connect the Cisco uBR7200 series universal broadband routers at the headend should be very high-quality cable because imperfections that do not visibly affect video transmissions can significantly affect digital data transmissions. In particular, poor insulation, improperly installed additional outlets, the condition and length of the cable's center conductor, and the quality of the cable can negatively affect the connectivity and performance of the cable access router for digital data transmission

Sniffer:

I have assignment that i need to create full "Network", using all device like switch, hub, server ..etc.The problem that i force that i need to use "Sniffer" its first time to me using that device. I need help how can i configure or connect the Sniffer with my network, Because i search on internet i don't find anythings about configure or connect sniffer on packet tracer.

Smart device:

A smart device is an electronic device, generally connected to other devices or networks via different wireless protocols such as Bluetooth, Zigbee, NFC, Wi-Fi, LiFi, 5G, etc., that can operate to some extent interactively and autonomously.

Mcu-pt board:

Components are physical objects that connect to microcontroller (MCU-PT) or single boarded computers (SBC-PT). They typically does not have a network interface and rely on the MCU-PT or SBC-PT for network access. These are simple devices that only communicate through their analog or digital slots.

PRACTICAL 4

AIM : Data link layer (error detection).

```
#include<stdio.h>
  void main(){
  int data[10];
    int dataatrec[10],c,c1,c2,c3,i;

    printf("Enter 4 bits of data one by one\n");
    scanf("%d",&data[0]);
    scanf("%d",&data[1]);
    scanf("%d",&data[2]);
    scanf("%d",&data[4]);

    //Calculation of even parity
    data[6]=data[0]^data[2]^data[4];
data[5]=data[0]^data[1]^data[4];
data[3]=data[0]^data[1]^data[2];

printf("\nEncoded data is\n");
for(i=0;i<7;i++)
        printf("%d",data[i]);
```

```
    printf("\n\nEnter received data bits one by one\n");
    for(i=0;i<7;i++)
        scanf("%d",&dataatrec[i]);

    c1=dataatrec[6]^dataatrec[4]^dataatrec[2]^dataatrec[0];
  c2=dataatrec[5]^dataatrec[4]^dataatrec[1]^dataatrec[0];
  c3=dataatrec[3]^dataatrec[2]^dataatrec[1]^dataatrec[0];
  c=c3*4+c2*2+c1 ;

    if(c==0) {
   printf("\nNo  error  while  transmission  of  data\n");
    }
  else {
  printf("\nError  on  position  %d",c);

  printf("\nData sent : ");
        for(i=0;i<7;i++)
          printf("%d",data[i]);

  printf("\nData received : ");
        for(i=0;i<7;i++)
          printf("%d",dataatrec[i]);

  printf("\nCorrect message is\n");

  //if errorneous bit is 0 we complement it else vice versa
```

```
if(dataatrec[7-c]==0)
dataatrec[7-c]=1;
    else
dataatrec[7-c]=0;

for (i=0;i<7;i++) {
printf("%d",dataatrec[i]);
}
}
}
```

OUTPUT :

```
Enter 4 bits of data one by one
1
1
0
1

Encoded data is
1100110

Enter received data bits one by one
1
1
0
1
1
1
0

Error on position 4
Data sent : 1100110
Data received : 1101110
Correct message is
1100110
```

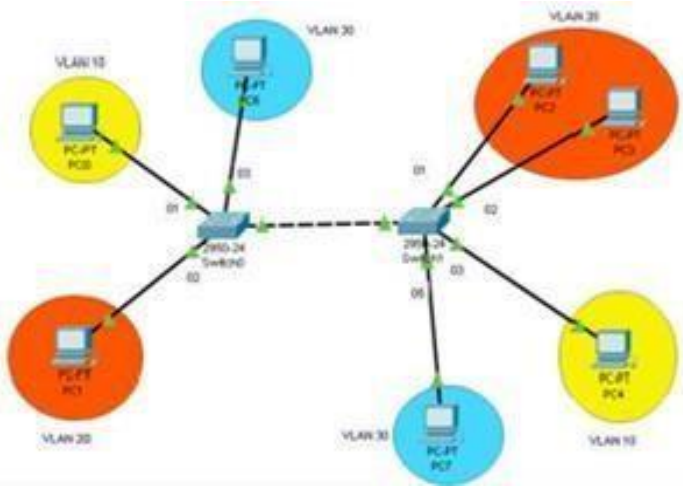
Annexure No :

PRACTICAL: 5

DESCRIPTION:

STEP 1: **Make a network**

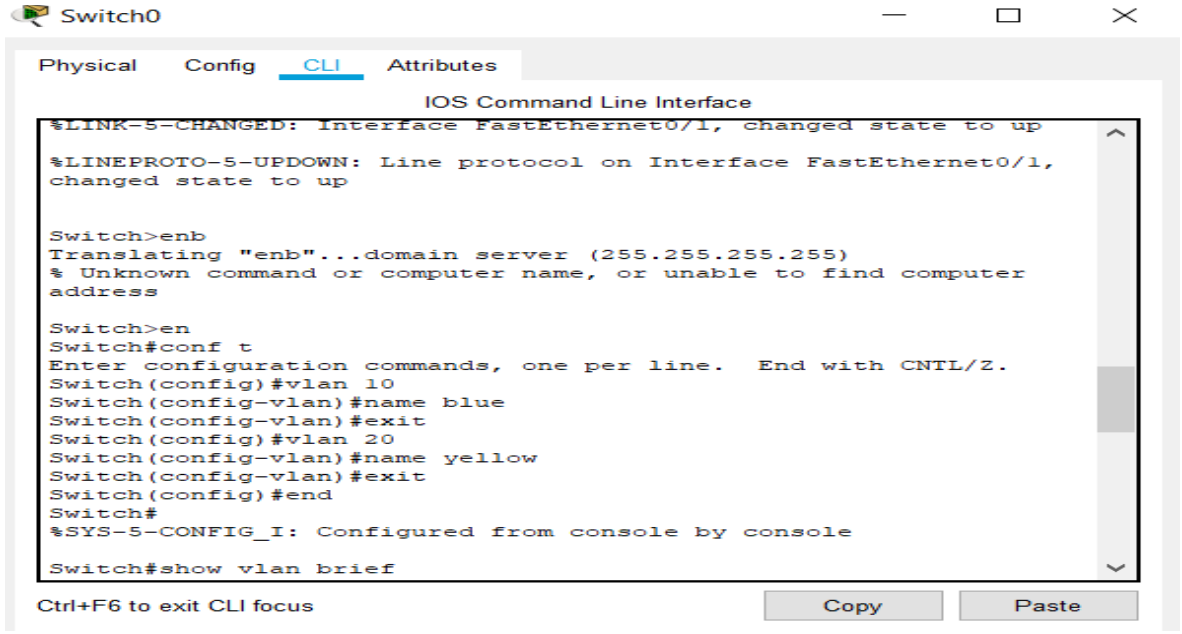
- Connect the pcs and switches shown in the below figure.Give IP address.
- Connect pcs to switches with copper straight through and connect switches to one another with copper cross over.



STEP 2: Configure VLAN on all switches.

- Go to switch0 CLI, enter **ENA** command toenable switch.

Annexure No :



- Write the foll. commands **conf t>vlan 10> name yellow>exit** as shown below.

- Do the same for second Vlan 20 and name it orange.
- Repeat the process for switch1.

To see the vlan the command used is >**show vlan brief.** The output of the command is below,

Annexure No :

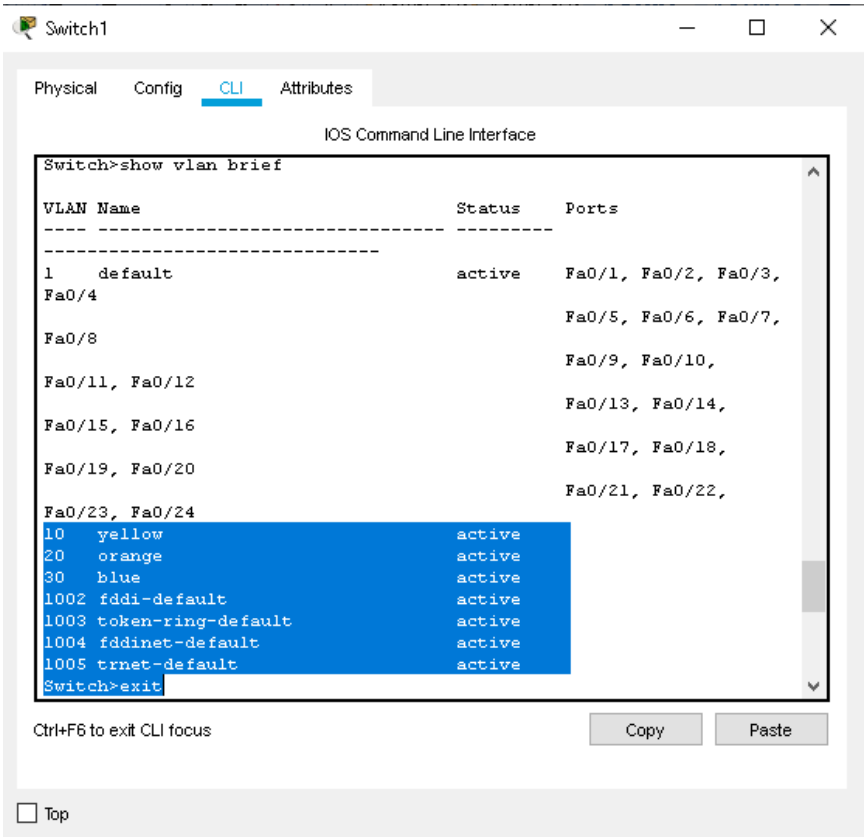


Figure 5.3

STEP 3: Configure TRUNK MODE.

- To enable trunk mode the first go to switch CLI
- The command **ena>conf t>interface fa0/7>switchport mode trunk.**
- This is to be done for every switches ports.
- The below figure shows the command.

Annexure No :

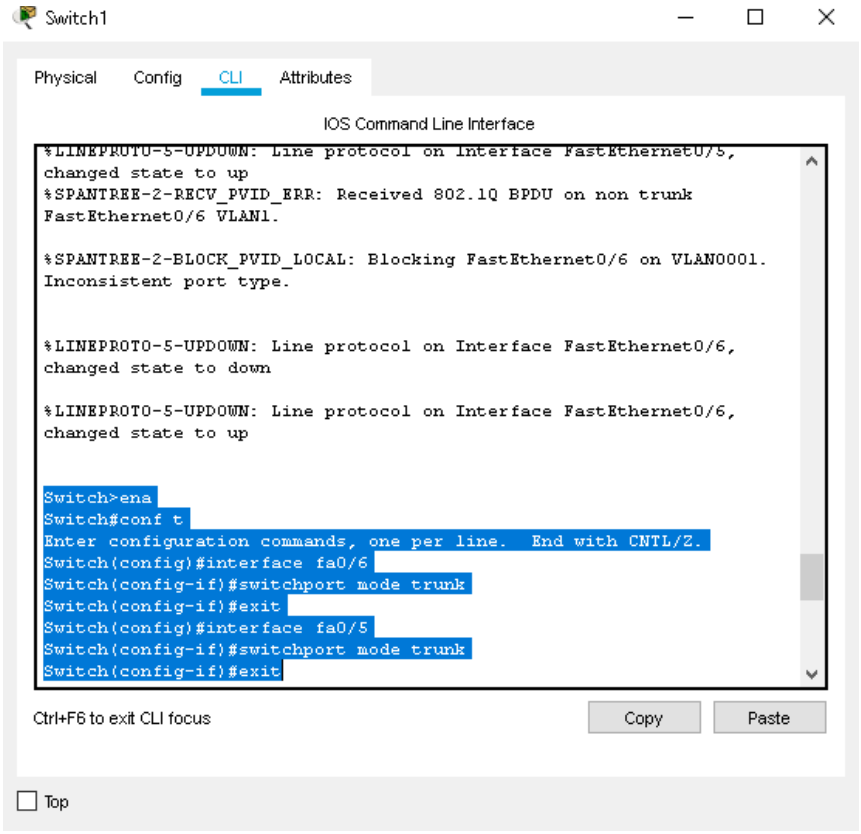


Figure 5.4

STEP 4: Configure ACCESS MODE.

- ACCESS MODE is configued for all the pcs who are connect to the switch
- To configure access mode for pc command **ena>conf t>interface fa0/1>switchport mode access>switchport access vlan10>exit.**

Annexure No :

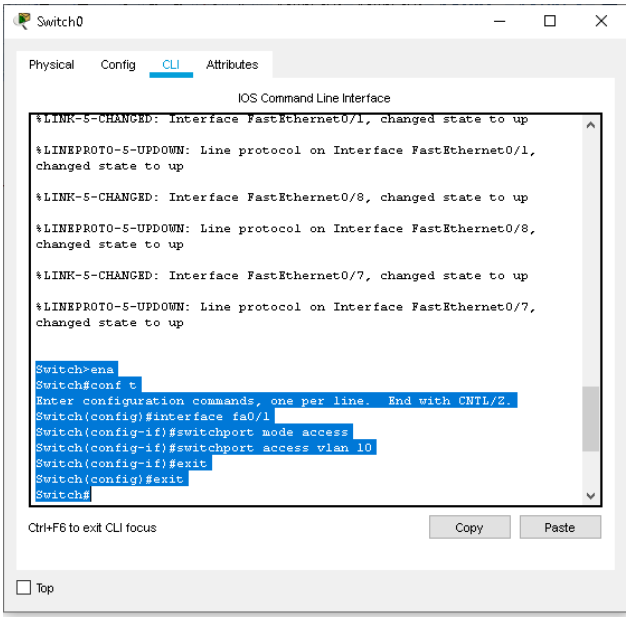


Figure 5.5

- This is to be done with each pc connected to switch.

Communication in **same** and **different vlans** with two switches.

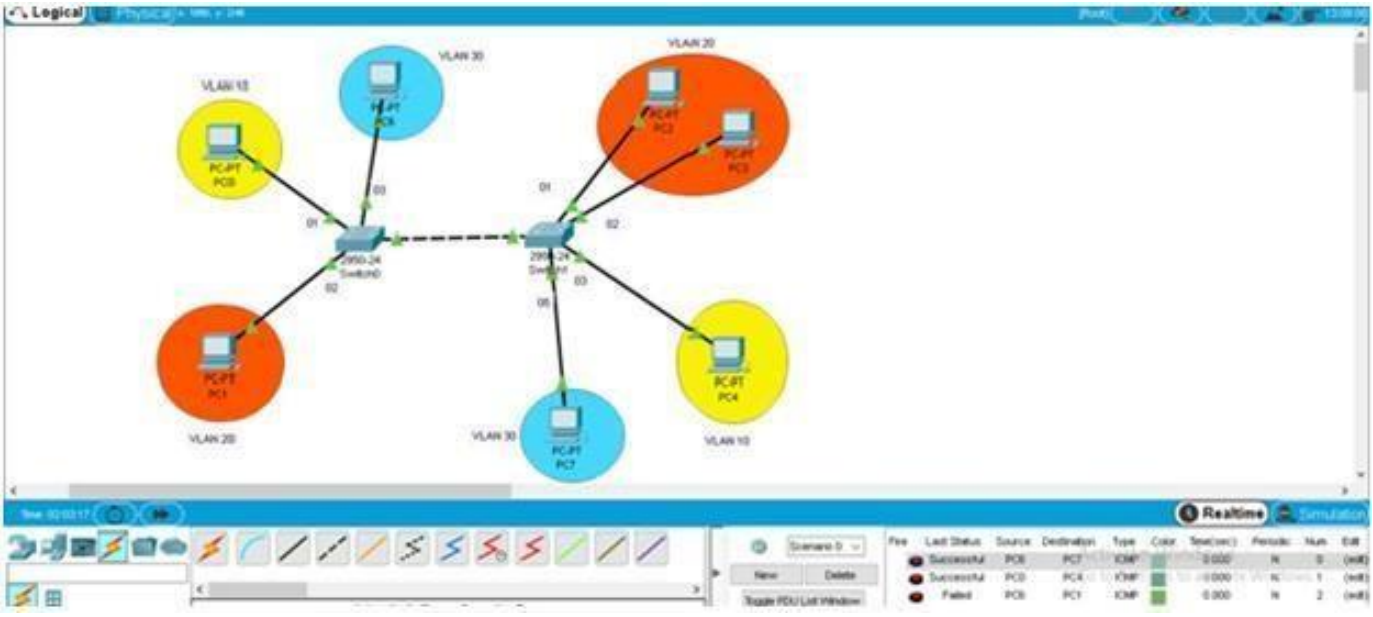


Figure 5.6

Annexure No :

- Communication in **same vlan** with three switches.

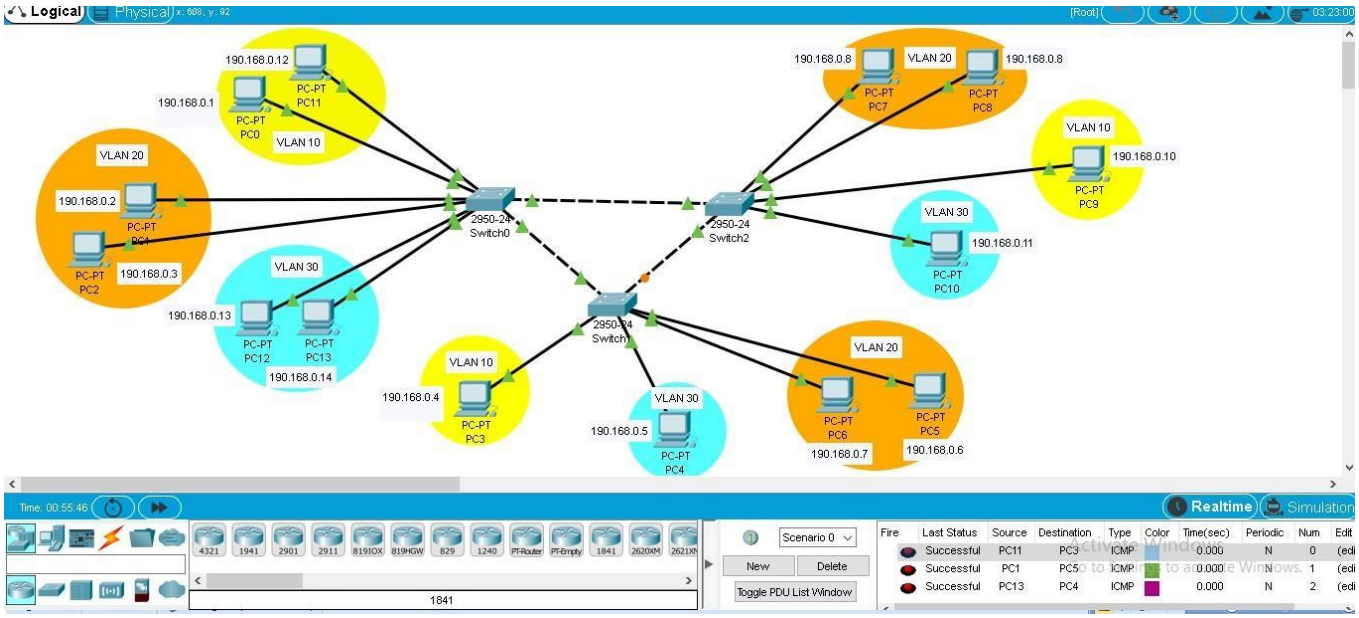
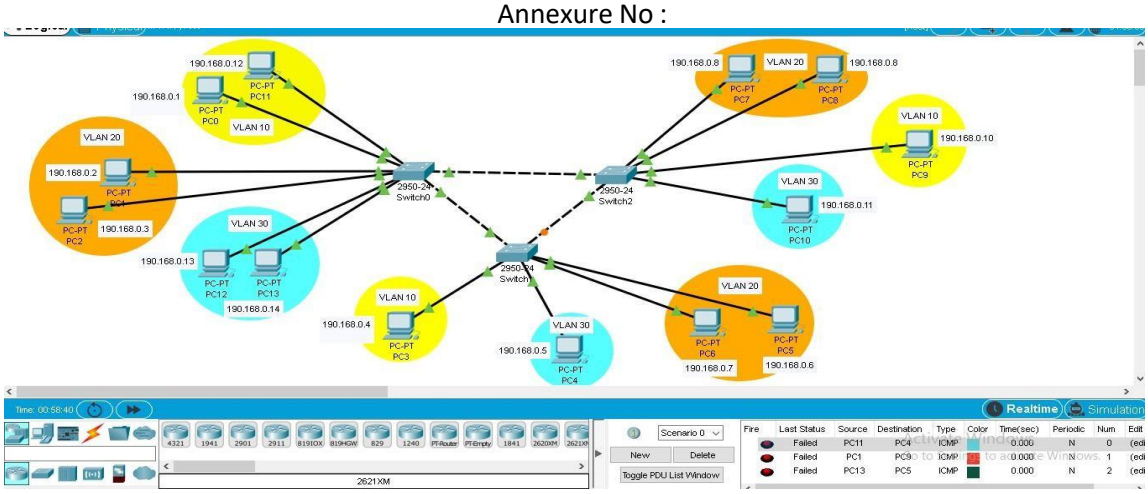


Figure 5.7

Communication in **different vlan** with three switches.

Annexure No :

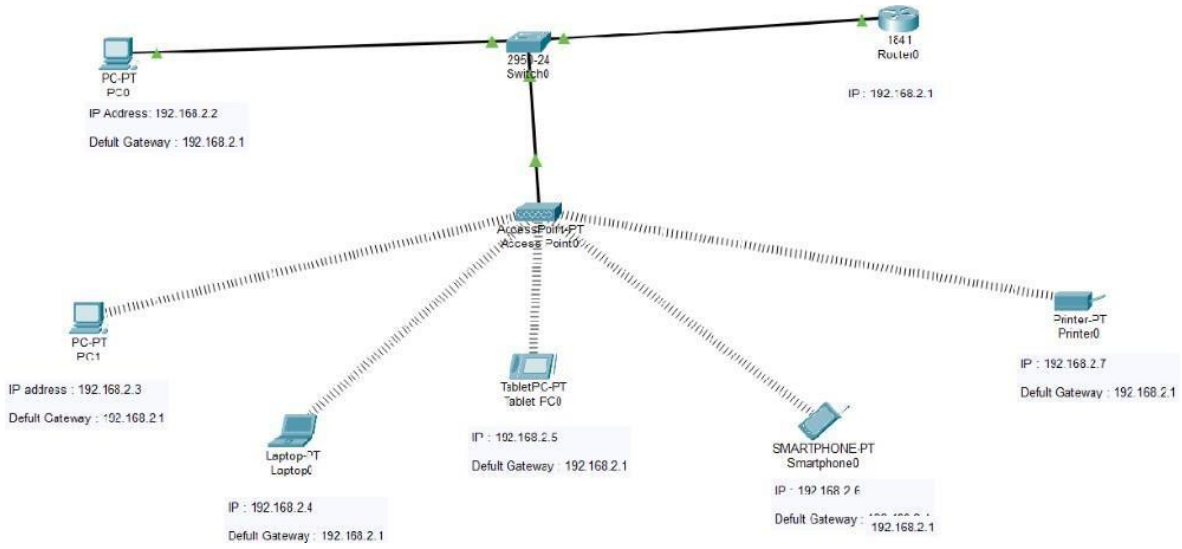

190.168.0.12
PC-PT PC11
190.168.0.1
PC-PT PC0
VLAN 10
VLAN 20
190.168.0.2
PC-PT PC1
PC-PT PC2
190.168.0.3
VLAN 30
190.168.0.13
PC-PT PC12
PC-PT PC13
190.168.0.14
2950-24 Switch0
2950-24 Switch2
2950-24 Switch
190.168.0.8
PC-PT PC7
VLAN 20
PC-PT PC8
190.168.0.8
VLAN 10
190.168.0.10
PC-PT PC9
VLAN 30
190.168.0.11
PC-PT PC10
VLAN 10
190.168.0.4
PC-PT PC3
VLAN 30
190.168.0.5
PC-PT PC4
VLAN 20
PC-PT PC6
190.168.0.7
PC-PT PC5
190.168.0.6
Realtime
Simulation
Scenario 0
New
Delete
Toggle PDU List Window
2621XM
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
Periodic
Num
Edit
Failed PC11 PC4 ICMP 0.000 N 0
Failed PC1 PC9 ICMP 0.000 N 1
Failed PC13 PC5 ICMP 0.000 N 2

Annexure No :

PRACTICAL: 6

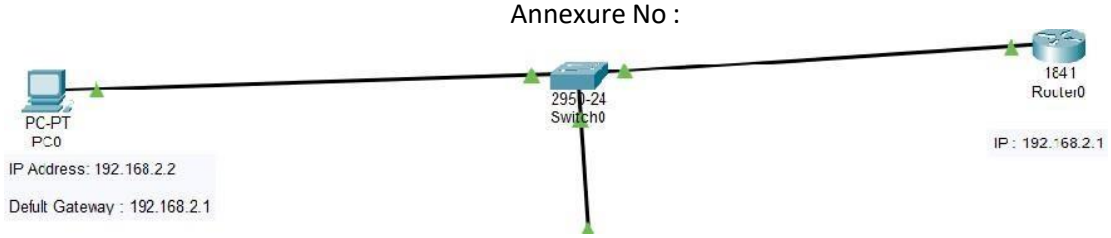
AIM: TO STUDY ABOUT Wireless LAN.

WLAN: - A wireless LAN **(WLAN)** is a wireless computer network that links two or more devices using wireless communication to form a local area network (LAN) within a limited area such as a home, school, computer laboratory, campus, or office building. This gives users the ability to move around within the area and remain connected to the network. Through a gateway, a WLAN can also provide a connection to the wider Internet.

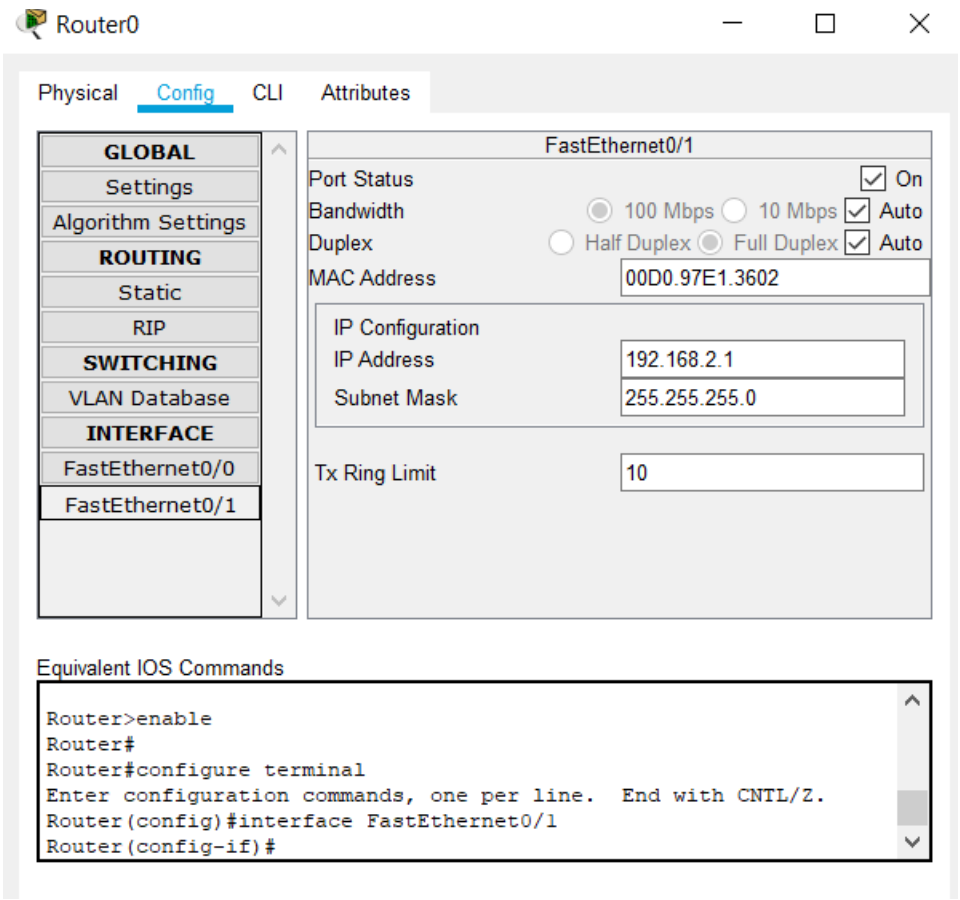


First create a wired topology between router, switch and pc to send message by wired communication. As Shown below. Provide IP address to pc and to router also.

Annexure No :

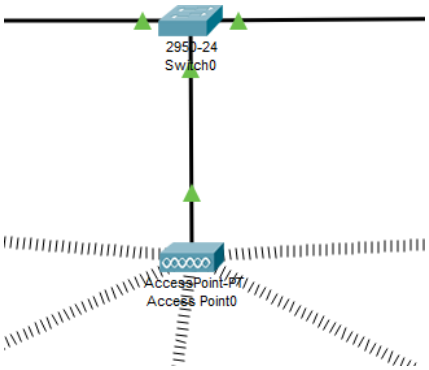


Go to Router configuration and then to the fast Ethernet port on which switch is connected then provide their IP address to it and turn on the port status as shown below.

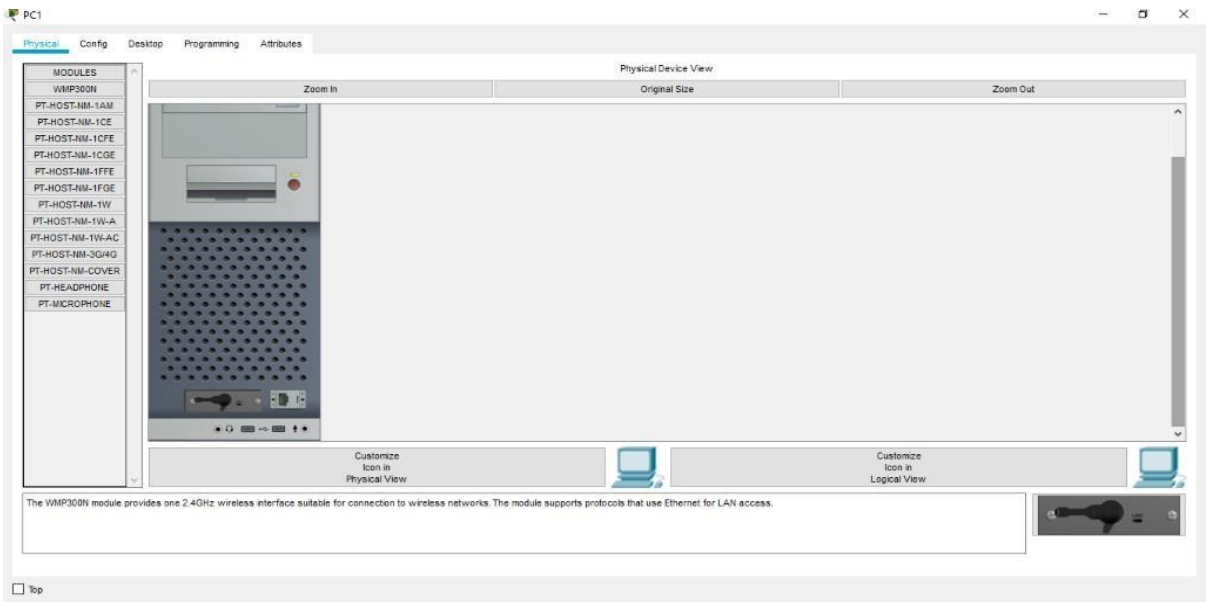


We need access point to connect the other devices wirelessely and give WEP key and SSID to access point to secure the network.

Annexure No :

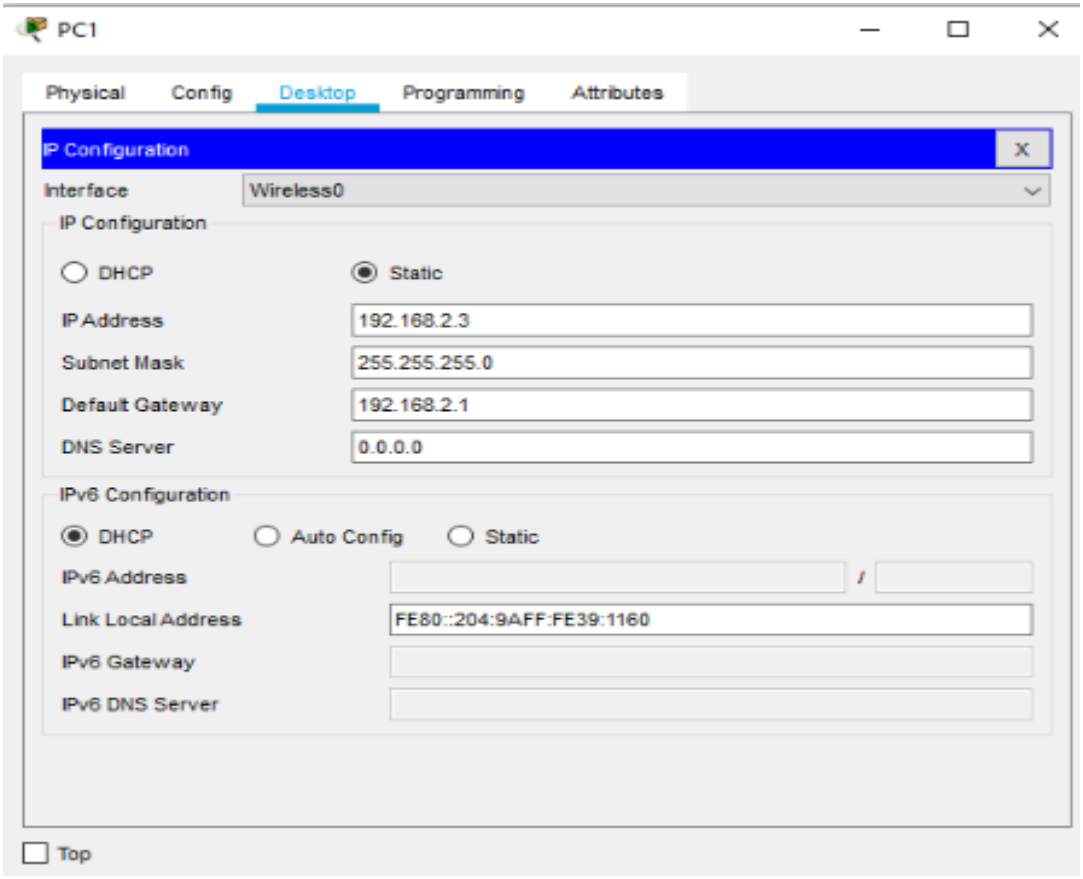


Take another pc then go the physical device view. First turn off the computer then change the existing module with WMP300N which is used to connect device wireless.



Provide IP address and set default gateway as same of router's IP address.

Annexure No :

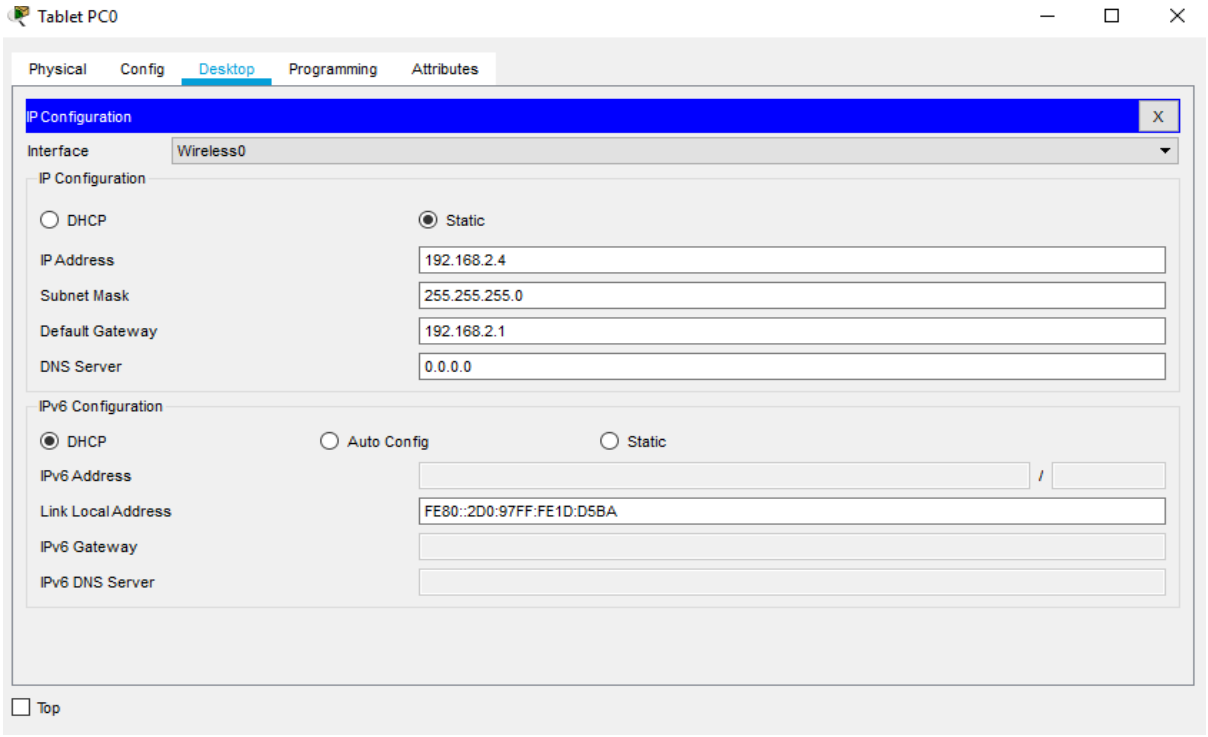


Now go to PC Wireless setting then click on connect tab and select the SSID which you provided to access point after that provide WEP key and then connect it.

Annexure No :

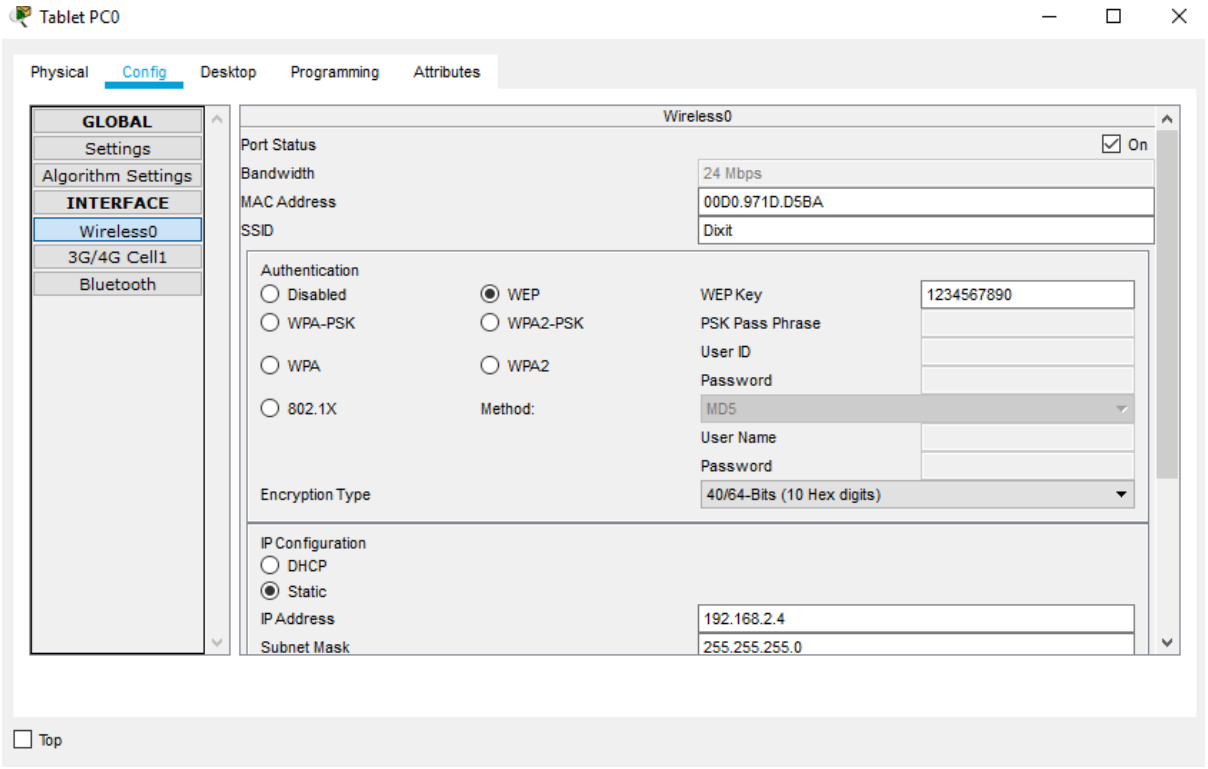
Take Tablet go to IP configuration and provide IP address and default gateway.

Annexure No :



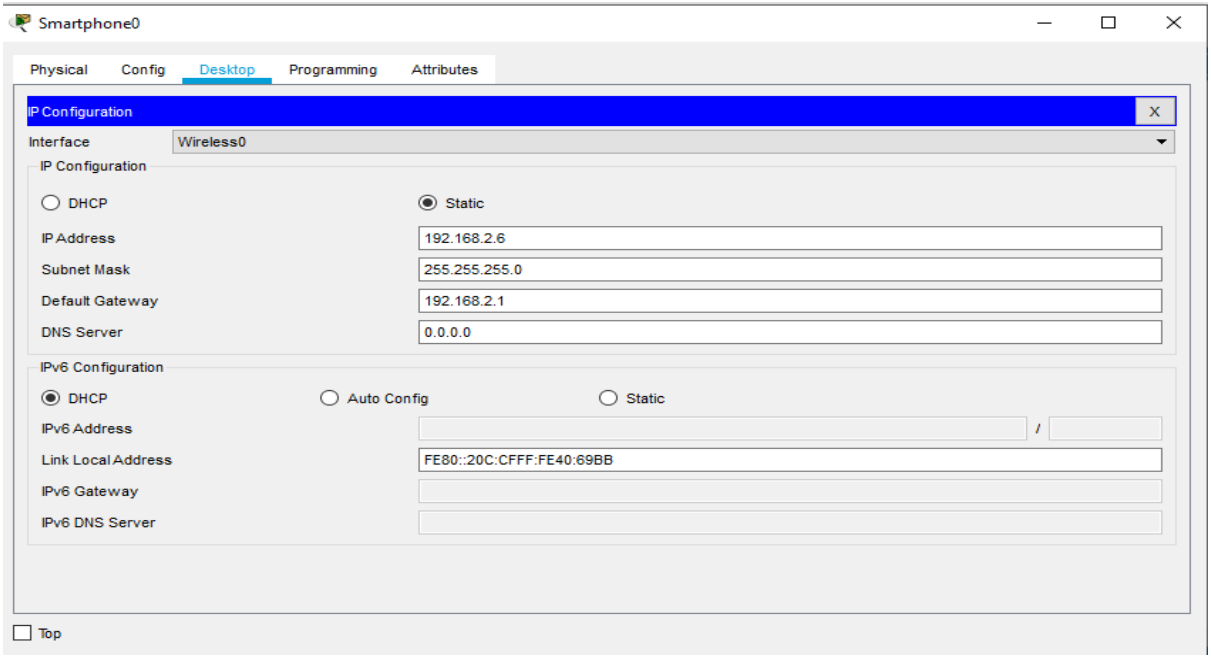
Now go to wireless configuration give WEP key and SSID then close it.

Annexure No :



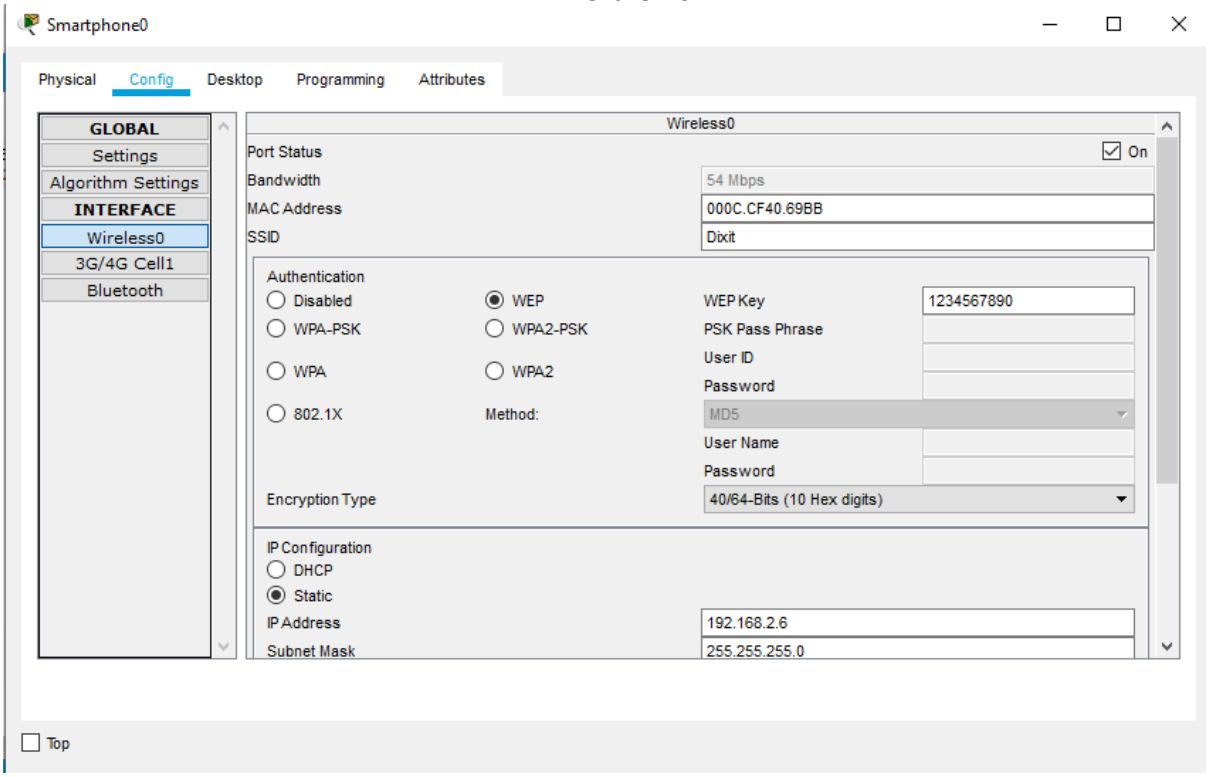
Take smartphone to go IP configuration and provide IP address to it and set router's IP as the default gateway of smartphone.

Annexure No :



Then go to Wireless Configuration setting give WEP key and SSID of access point then close it.

Annexure No :

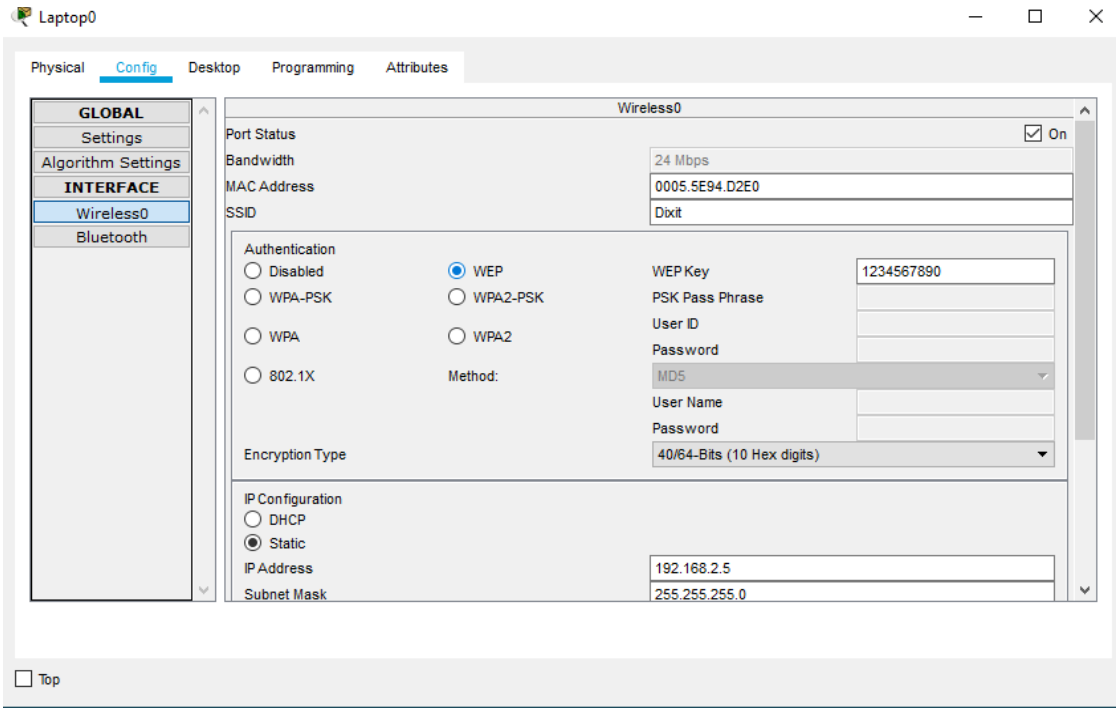


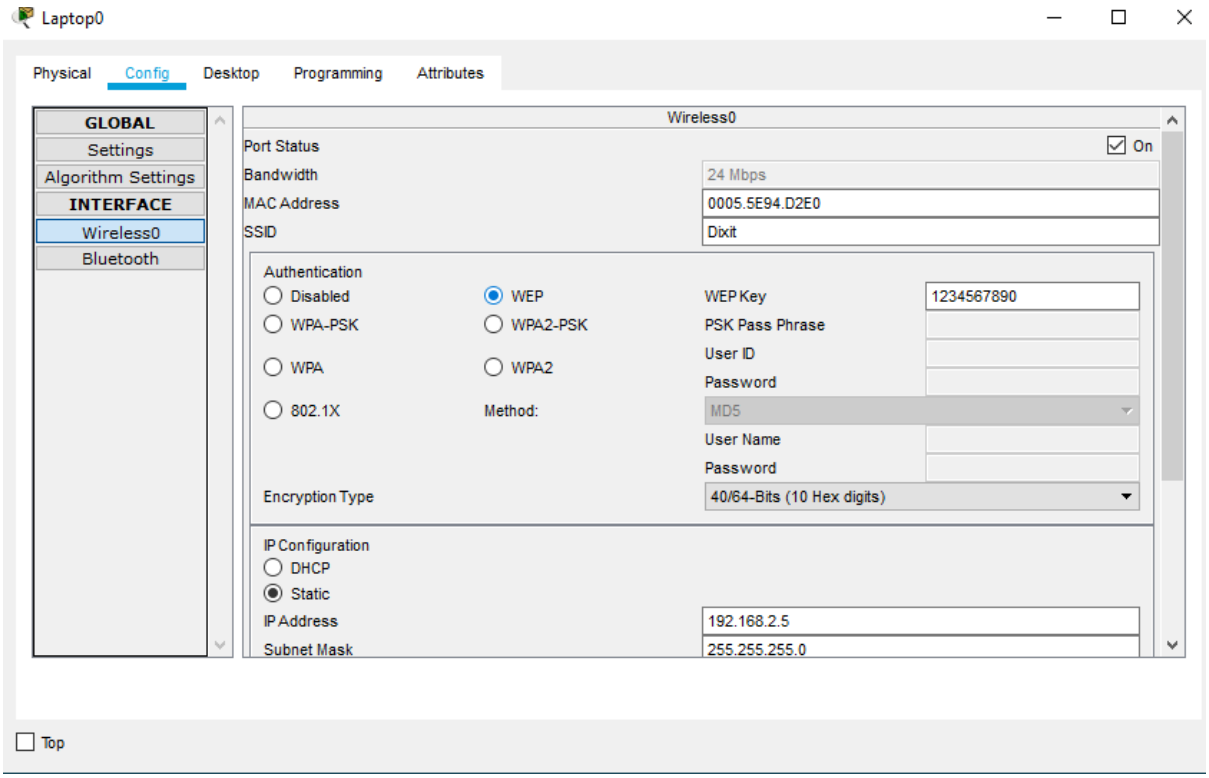
Take a laptop and follow same step as pc

Annexure No :


Laptop0
Physical
Config
Desktop
Programming
Attributes
MODULES
WPC300N
PT-LAPTOP-NM-1AM
PT-LAPTOP-NM-1CE
PT-LAPTOP-NM-1CFE
PT-LAPTOP-NM-1CGE
PT-LAPTOP-NM-1FFE
PT-LAPTOP-NM-1FGE
PT-LAPTOP-NM-1W
PT-LAPTOP-NM-1W-A
PT-LAPTOP-NM-1W-AC
PT-LAPTOP-NM-3G/4G
PT-HEADPHONE
PT-MICROPHONE
Physical Device View
Zoom In
Original Size
Zoom Out
Customize Icon in Physical View
Customize Icon in Logical View
The Linksys-WPC300N module provides one 2.4GHz wireless interface suitable for connection to wireless networks. The module supports protocols that use Ethernet for LAN access.
Top

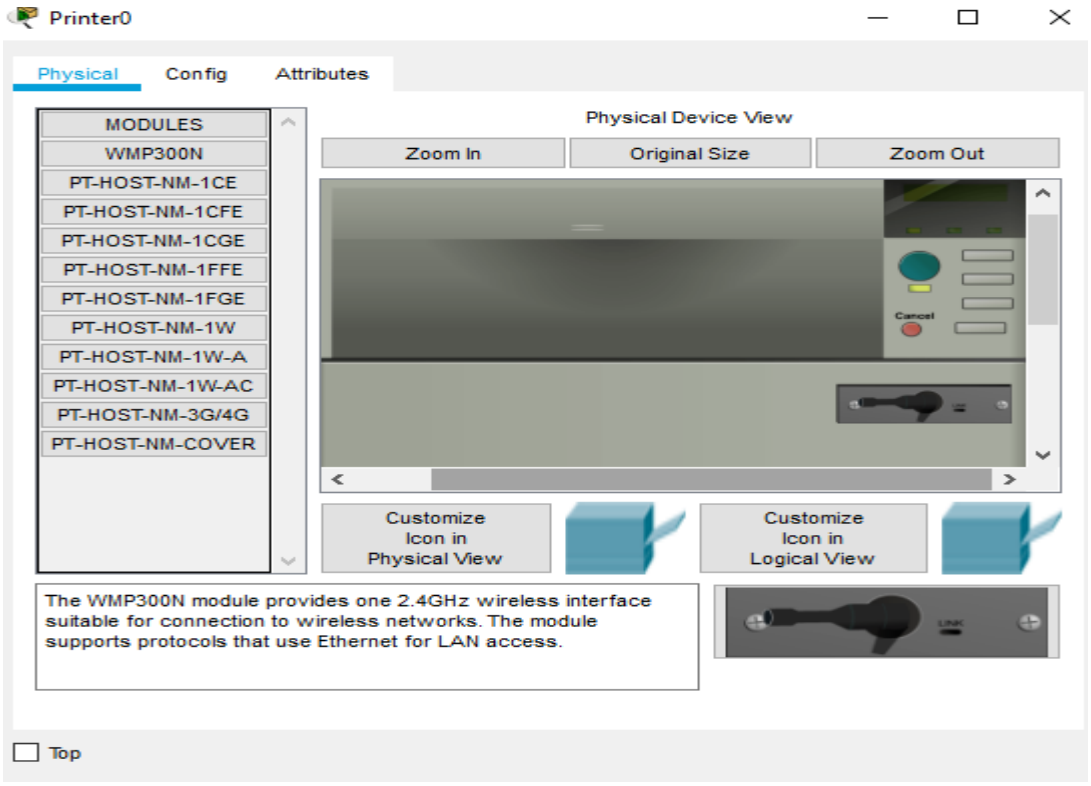
Annexure No :


Laptop0
Physical
Config
Desktop
Programming
Attributes
GLOBAL
Settings
Algorithm Settings
INTERFACE
Wireless0
Bluetooth
Wireless0
Port Status
On
Bandwidth
24 Mbps
MAC Address
0005.5E94.D2E0
SSID
Dixit
Authentication
Disabled
WEP
WPA-PSK
WPA2-PSK
WPA
WPA2
802.1X
Method:
MD5
WEP Key
1234567890
PSK Pass Phrase
User ID
Password
User Name
Password
Encryption Type
40/64-Bits (10 Hex digits)
IP Configuration
DHCP
Static
IP Address
192.168.2.5
Subnet Mask
255.255.255.0
Top

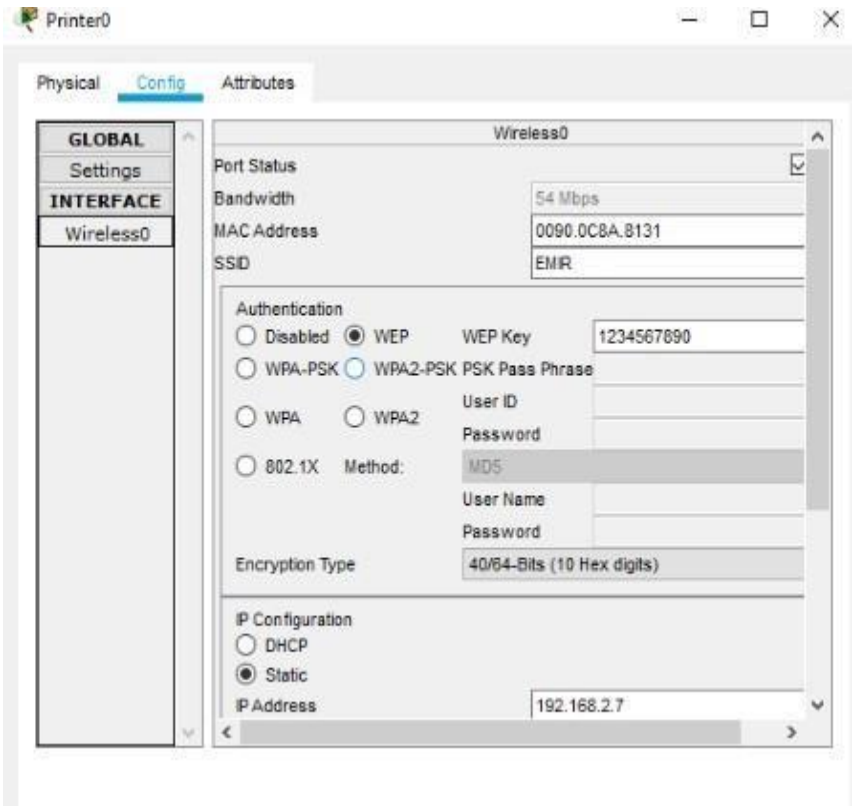

Laptop0
Physical
Config
Desktop
Programming
Attributes
GLOBAL
Settings
Algorithm Settings
INTERFACE
Wireless0
Bluetooth
Wireless0
Port Status
On
Bandwidth
24 Mbps
MAC Address
0005.5E94.D2E0
SSID
Dixit
Authentication
Disabled
WEP
WPA-PSK
WPA2-PSK
WPA
WPA2
802.1X
Method:
MD5
WEP Key
1234567890
PSK Pass Phrase
User ID
Password
User Name
Password
Encryption Type
40/64-Bits (10 Hex digits)
IP Configuration
DHCP
Static
IP Address
192.168.2.5
Subnet Mask
255.255.255.0
Top

Annexure No :

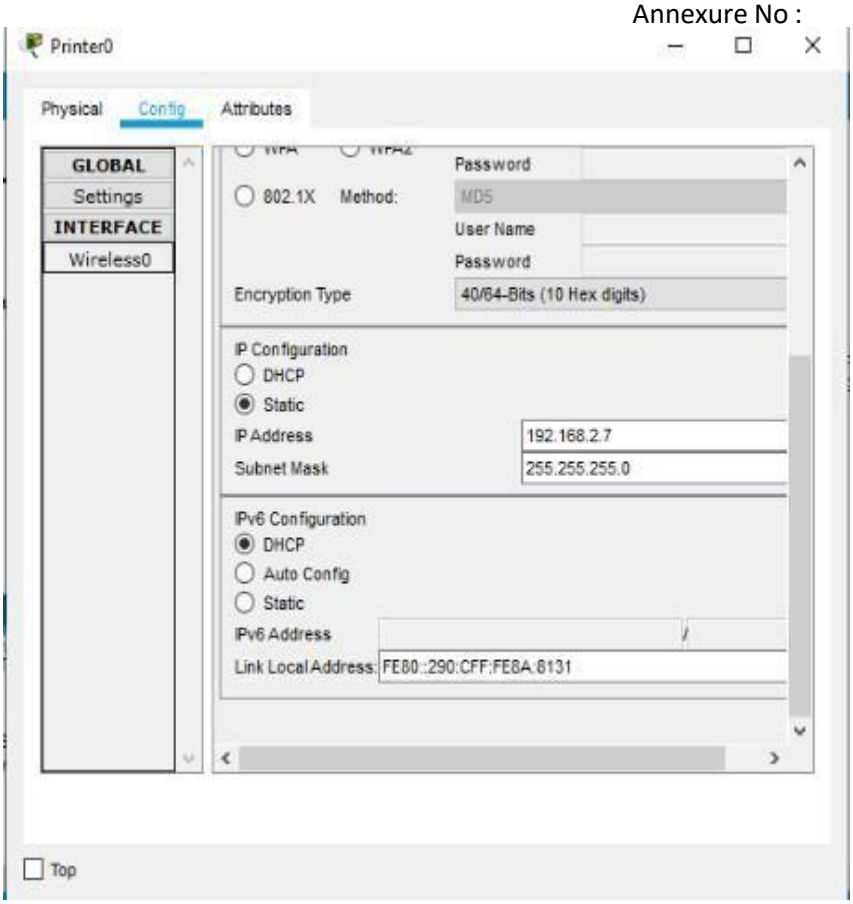
Take a Printer and go to physical device view change existing module with WMP300N.



Annexure No :

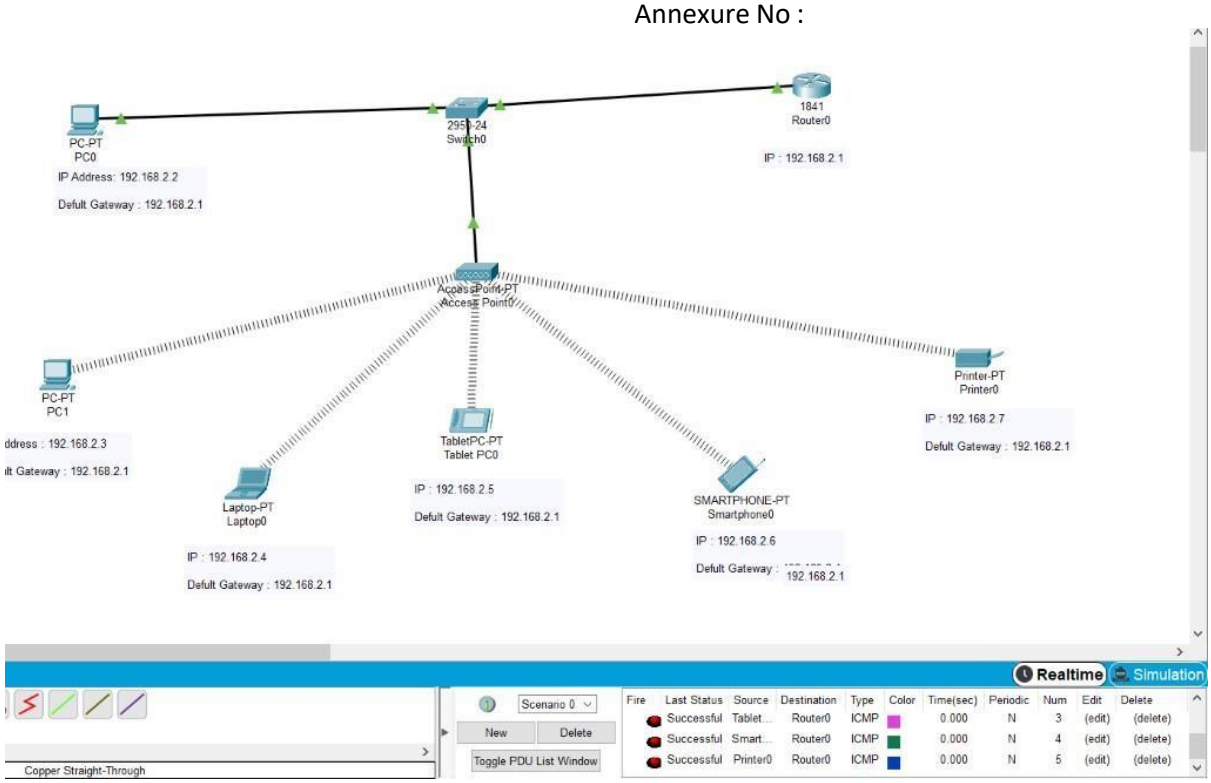

Printer0
Physical
Config
Attributes
GLOBAL
Settings
INTERFACE
Wireless0
Wireless0
Port Status
Bandwidth
54 Mbps
MAC Address
0090.0C8A.8131
SSID
EMR
Authentication
Disabled
WEP
WEP Key
1234567890
WPA-PSK
WPA2-PSK
PSK Pass Phrase
User ID
WPA
WPA2
Password
802.1X
Method:
MD5
User Name
Password
Encryption Type
40/64-Bits (10 Hex digits)
IP Configuration
DHCP
Static
IP Address
192.168.2.7

Annexure No :



Checking connection :

Annexure No :


PC-PT
PC0
IP Address: 192.168.2.2
Defult Gateway : 192.168.2.1
2950-24
Switch0
1841
Router0
IP : 192.168.2.1
Access Point-PT
Access Point0
PC-PT
PC1
ddress : 192.168.2.3
lt Gateway : 192.168.2.1
Laptop-PT
Laptop0
IP : 192.168.2.4
Defult Gateway : 192.168.2.1
TabletPC-PT
Tablet PC0
IP : 192.168.2.5
Defult Gateway : 192.168.2.1
SMARTPHONE-PT
Smartphone0
IP : 192.168.2.6
Defult Gateway : 192.168.2.1
Printer-PT
Printer0
IP : 192.168.2.7
Defult Gateway : 192.168.2.1
Realtime
Simulation
Copper Straight-Through
Scenario 0
New
Delete
Toggle PDU List Window
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
Periodic
Num
Edit
Delete
Successful Tablet... Router0 ICMP 0.000 N 3 (edit) (delete)
Successful Smart... Router0 ICMP 0.000 N 4 (edit) (delete)
Successful Printer0 Router0 ICMP 0.000 N 5 (edit) (delete)

Annexure No :

Practical 7

AIM: Internetworking with routers: Design a three or four simple networks (with 3 to 4 hosts) and connect via Router. Perform simulation and trace how routing is done in packet transmission

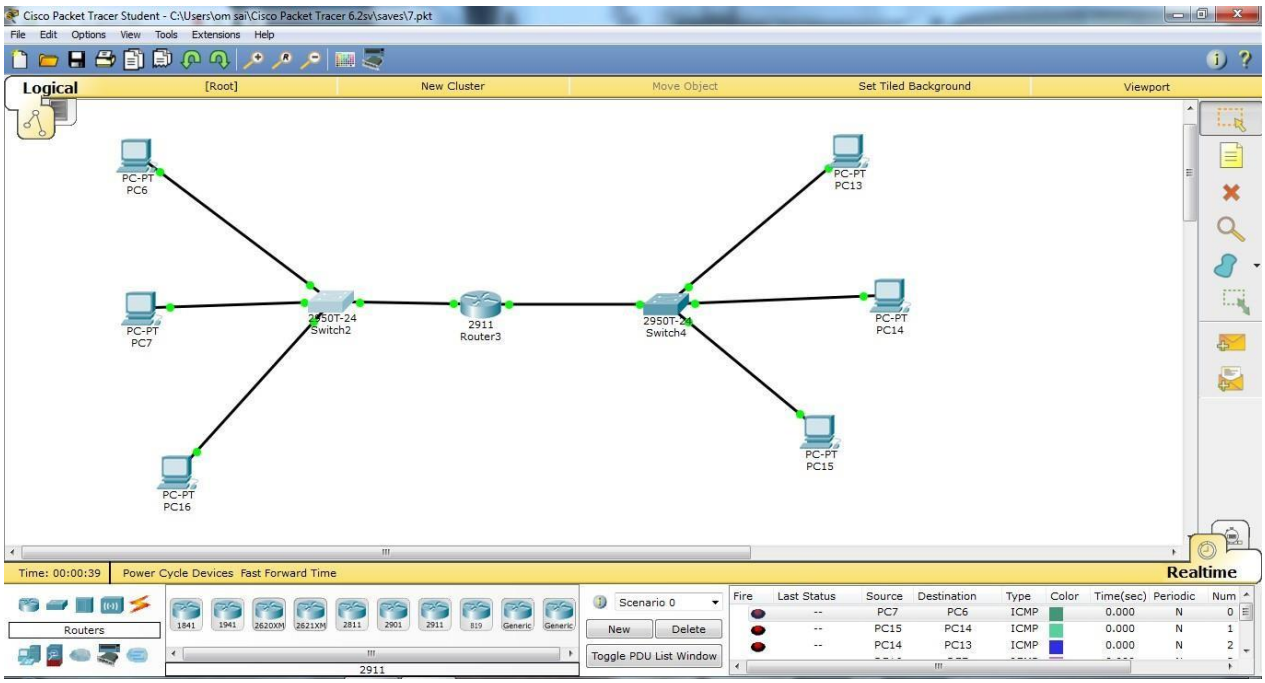
1: Experiment on same subnet
2: Perform Experiment across the subnet and observe functioning of Router via selectingsuitable pair of Source and destination.

7.1 Purpose:

The main objective of the proposed experiment is to connect multiple networks using a router. It alsogives an opportunity to students to learn router configuration in multiple network environments.

7.2 Logical Flow of Practical

OUTPUT



Annexure No :

Practical 8

AIM: Implementation of SUBNETTING:

Design multiple subnet with suitable number of hosts.

Make a plan to assign static IP addressing across all subnet to explain implementation of SUBNETTING **.**

A subnetwork or subnet is a logical subdivision of an IP network.

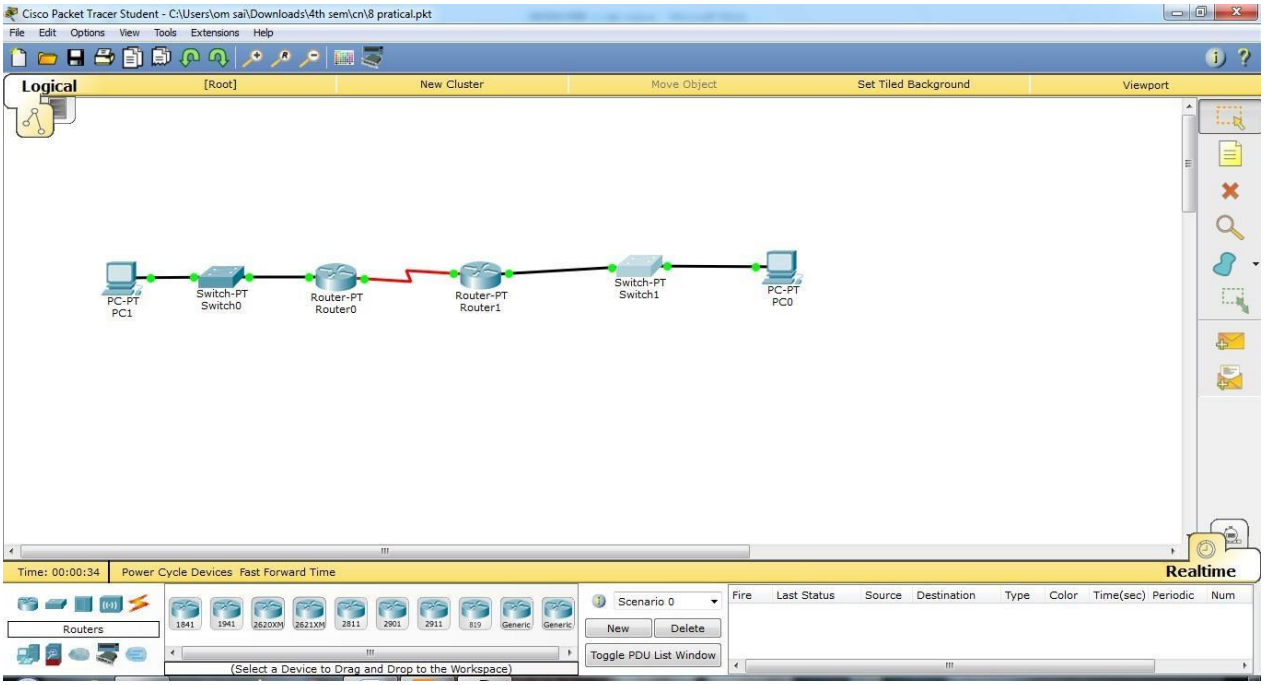
The practice of dividing a network into two or more networks is called subnetting.

Subnetting is the process of stealing bits from the HOST part of an IP address in order to divide the larger network into smaller sub-networks called **subnets**. After **subnetting**, we end up with NETWORK **SUBNET** HOST fields.

8.1 Purpose:

The main objective of the proposed experiment is to divide multiple networks using the concept ofsubnetting and super-netting.

Output:



Annexure No :

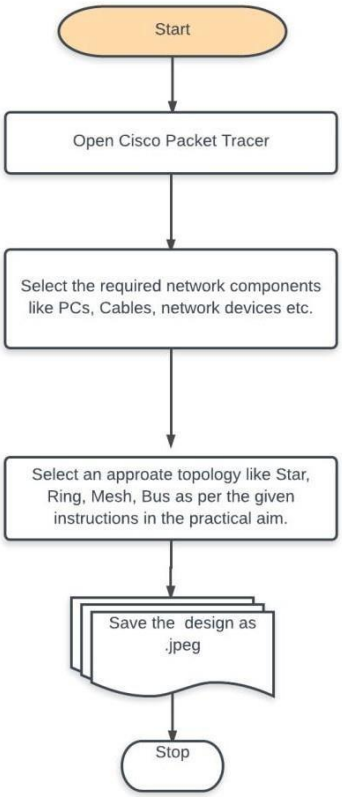
Practical 9

AIM: Routing at Network Layer: Simulate Static and Dynamic Routing Protocol Configuration using CISCO Packet Tracer**.**

9.1 Purpose:

The main objective of the proposed experiment is to implement static and dynamic routing protocolusing serial and parallel routing connections. It also gives an opportunity to students to learn serialand parallel router configuration in multiple network environment

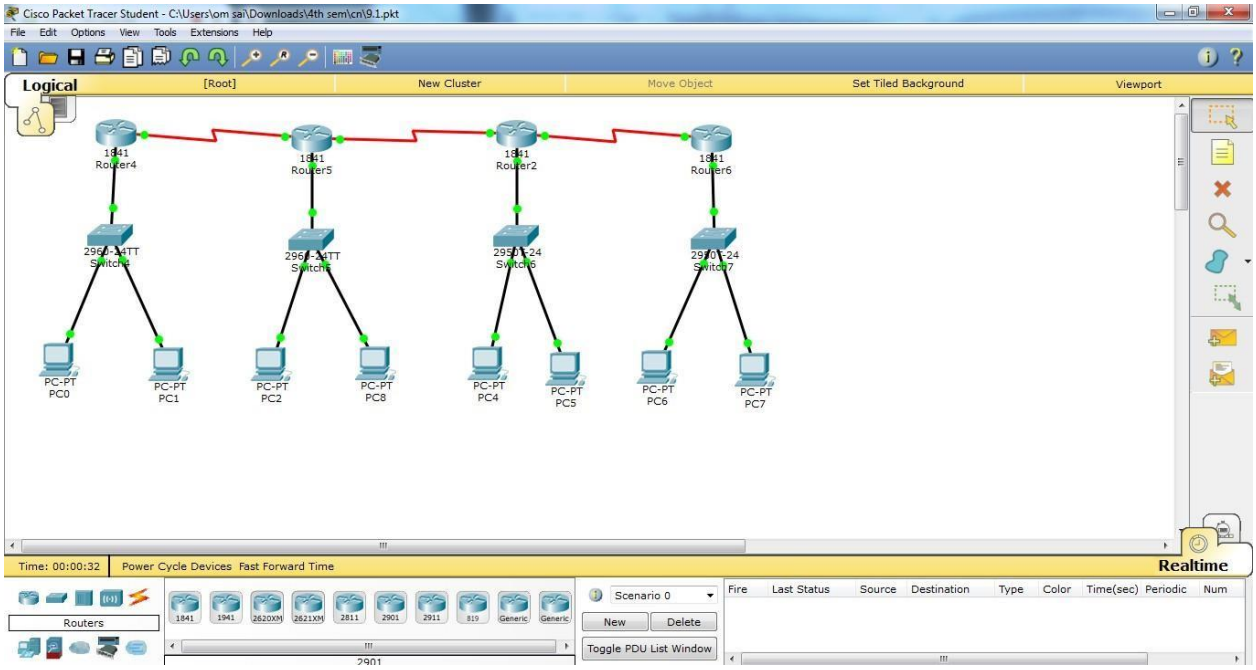
FLOWCHART



Static

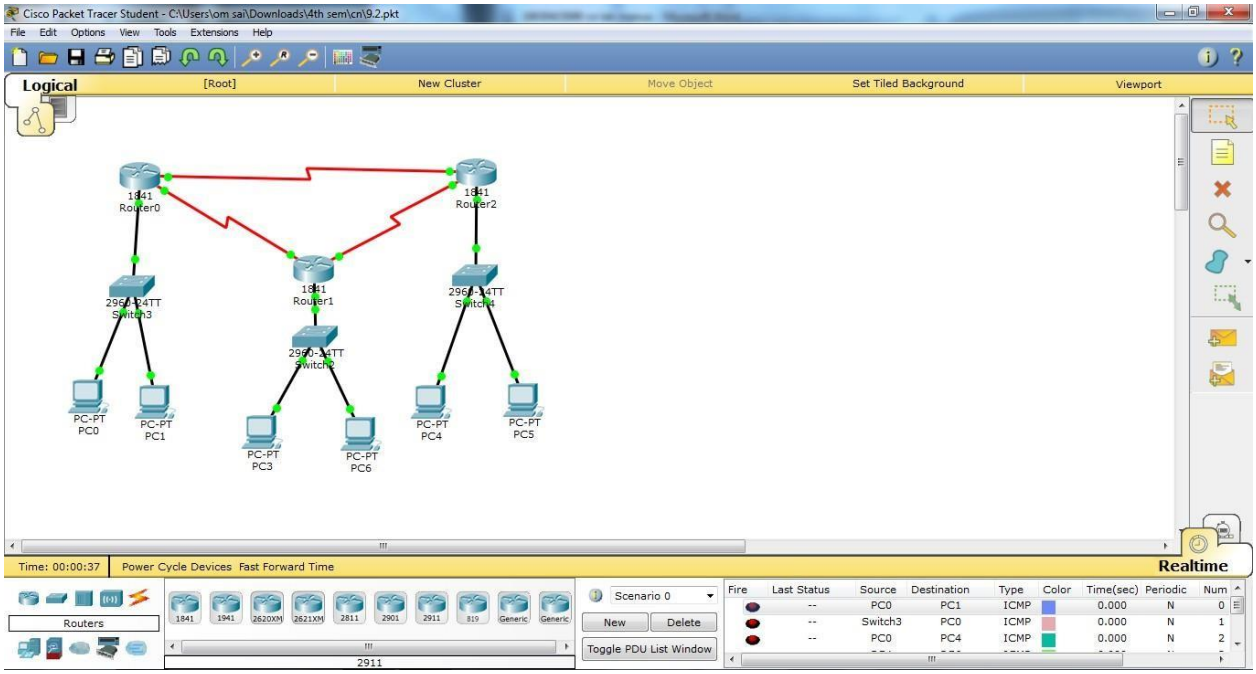
Static routing is a form of **routing** that occurs when a **router** uses a manually-configured **routing** entry, rather than information from dynamic **routing** traffic

Annexure No :



Dynamic

Dynamic **routing**, **static routes** are fixed and do not change if the network is changed or reconfigured.



Annexure No :

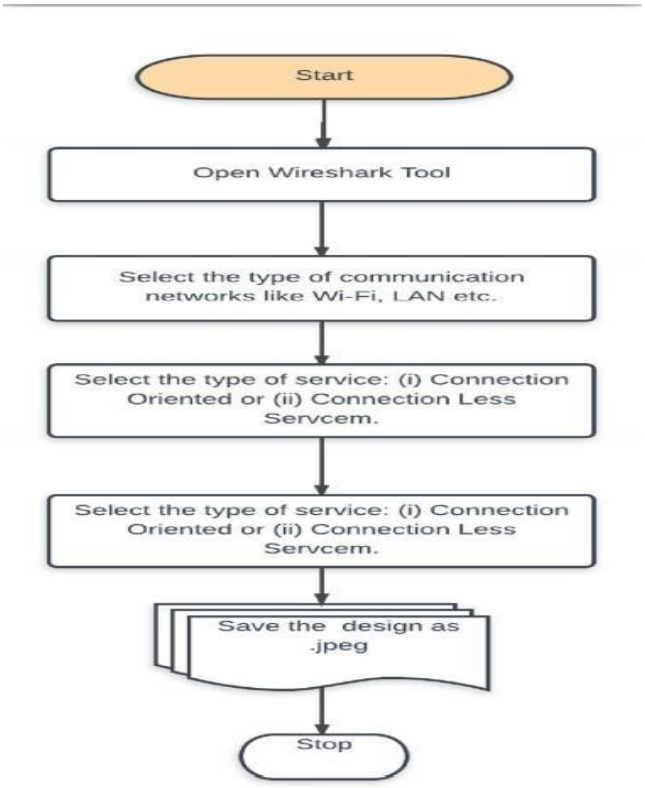
Practical-10

AIM: Experiment on Transport Layer: Implement echo client server using TCP/UDP sockets.

10.1 Purpose:

The main objective of the proposed experiment is to initiate communication between client and server nodes using echo client and echo server. Utilize both TCP and UDP sockets in the proposed experiment.

10.2 Logical Flow of Practical:

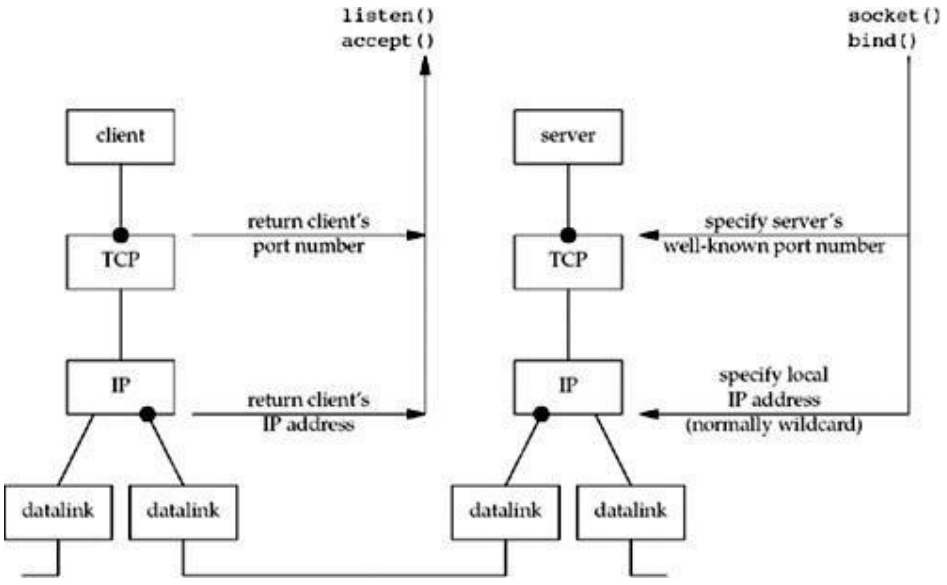


10.3 TCP Socket Program :

TCP Server Program :

```
#include<stdio.h>
#include<netinet/in.h>
#include<sys/socket.h>
int main()
{ int listenfd,connfd;
```

```
 int n;
 char msg[50];
socklen_t clen;

struct sockaddr_in servaddr,cliaddr;
listenfd=socket(AF_INET,SOCK_STREAM,0);

 bzero(&servaddr, sizeof(servaddr));

servaddr.sin_family = AF_INET;         servaddr.sin_port = htons(8888);
servaddr.sin_addr.s_addr = htonl(INADDR_ANY);

 bind(listenfd,(struct sockaddr *) &servaddr, sizeof(servaddr));

 listen(listenfd,5);

 clen=sizeof(cliaddr); printf("\nThe Server is in listening mode...\n");
connfd=accept(listenfd,(struct sockaddr * ) &cliaddr, &clen);          n=read(connfd,msg,50);
msg[n]='\0';        printf("\nThe received string from the client is '%s'\n\n",msg);
write(connfd,msg,n);         exit(0);
 return 0;
}
```

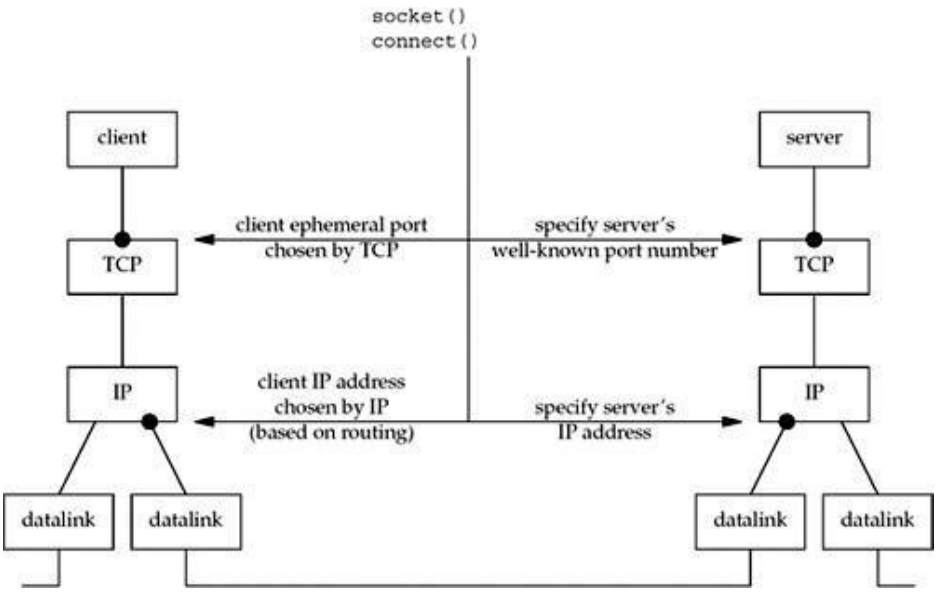


TCP Client Program:

```
#include<stdio.h>
```

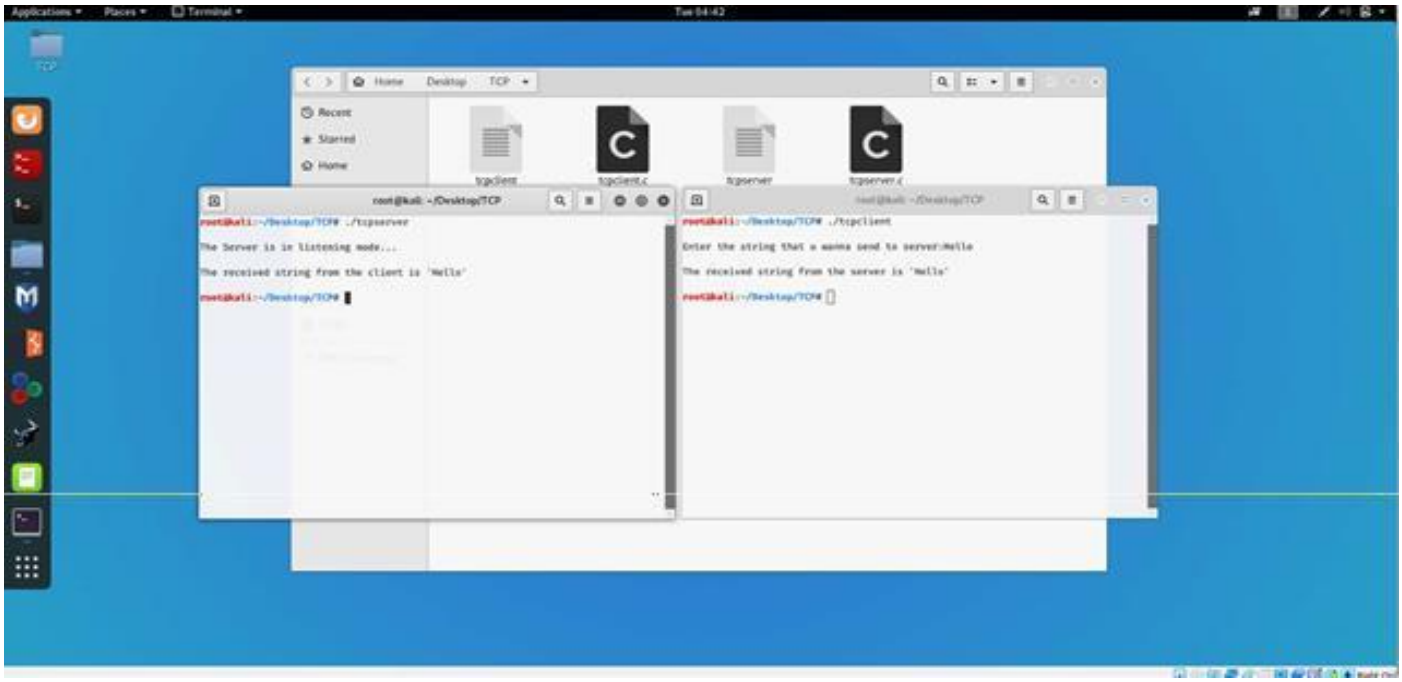
Annexure No :

```
#include<netinet/in.h>
#include<sys/socket.h>
int main() { int sockfd,n;
char msg[50],msg1[50];
socklen_t slen,len;
struct sockaddr_in servaddr;

bzero(&servaddr,sizeof(servaddr));
servaddr.sin_family = AF_INET;
servaddr.sin_port = htons(8888);
inet_pton(AF_INET,"127.0.0.1",  &servaddr.sin_addr);

sockfd=socket(AF_INET,SOCK_STREAM,0);
 slen = sizeof(servaddr);
connect(sockfd,(struct sockaddr *) &servaddr, slen);
 printf("\nEnter the string that u wanna send to server:");
 scanf("%s",&msg);

 write(sockfd,msg,50); n=read(sockfd,msg1,50);  msg1[n]='\0';
printf("\nThe received string from the server is '%s'\n\n",msg1);  exit(0);
   }
```



OUTPUT:-

Annexure No :



10.4 UDP Socket Program :

UDP Server Program :

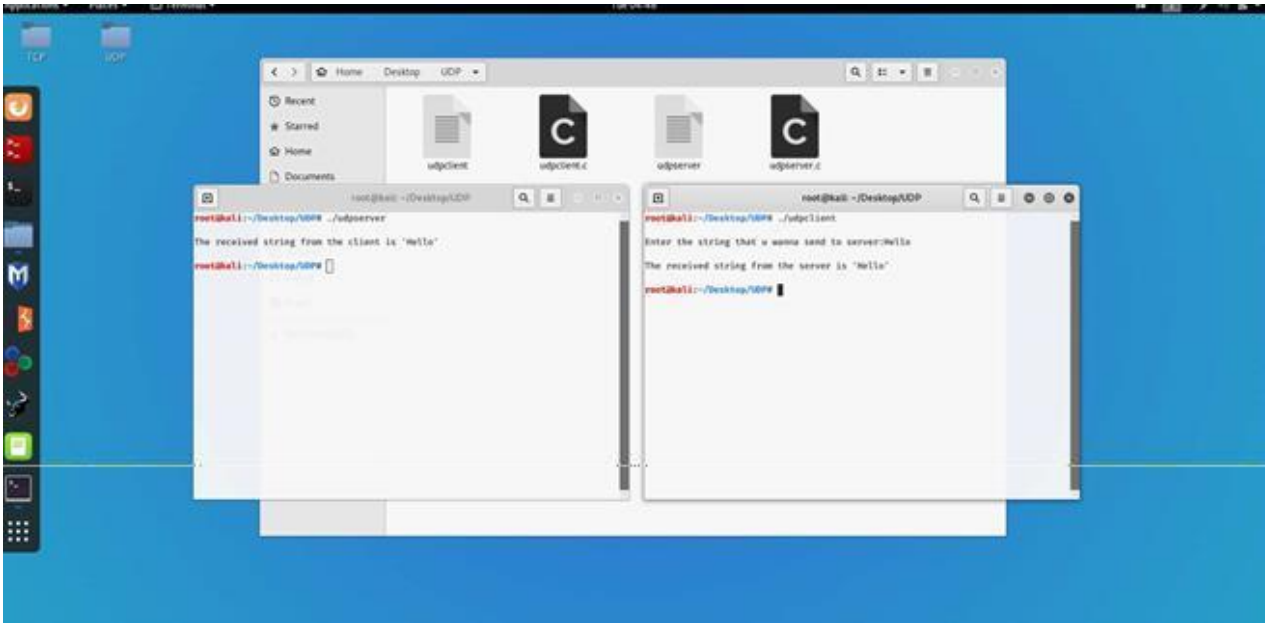
```
#include<stdio.h>
#include<netinet/in.h>
#include<sys/socket.h>

int main()
{
  int sockfd,n; char msg[50]; socklen_t len; struct sockaddr_in
servaddr,cliaddr;

  sockfd=socket(AF_INET,SOCK_DGRAM,0);

  bzero(&servaddr, sizeof(servaddr)); servaddr.sin_family = AF_INET;
servaddr.sin_port = htons(9600); servaddr.sin_addr.s_addr =
htonl(INADDR_ANY);

  bind(sockfd,(struct sockaddr *) &servaddr, sizeof(servaddr)); len= sizeof(cliaddr);

  n=recvfrom(sockfd,msg,50,0,(struct sockaddr *) &cliaddr, &len); msg[n]='\0';
  printf("\nThe received string from the client is '%s'\n",msg); sendto(sockfd,msg,n,0,(struct
```

```
sockaddr *) &cliaddr,len);
  exit(0); return 0;
}
```

UDP Client Program :

```
#include<stdio.h>
#include<netinet/in.h>
#include<sys/socket.h>

int main() { int sockfd,n; char msg[50],msg1[51];
socklen_t len; struct sockaddr_in servaddr;
bzero(&servaddr,sizeof(servaddr));
servaddr.sin_family = AF_INET; servaddr.sin_port
= htons(9600); inet_pton(AF_INET,"127.0.0.1",
&servaddr.sin_addr);

 sockfd=socket(AF_INET,SOCK_DGRAM,0);
 len = sizeof(servaddr);
 printf("\nEnter the string that u wanna send to server:"); scanf("%s",msg);

 sendto(sockfd,msg,strlen(msg),0,(struct sockaddr *) &servaddr, len);
n=recvfrom(sockfd,msg1,51,0,NULL,NULL);

 msg1[n]='\0'; printf("\nThe received string from the server is '%s'\n\n",msg1); exit(0);
return 0;
}
```

Annexure No :


TCP
UDP
Home
Desktop
UDP
Recent
Starred
Home
Documents
udpclient
udpclient.c
udpserver
udpserver.c
root@kali: ~/Desktop/UDP
root@kali:~/Desktop/UDP# ./udpserver
The received string from the client is 'Hello'
root@kali:~/Desktop/UDP#
root@kali: ~/Desktop/UDP
root@kali:~/Desktop/UDP# ./udpclient
Enter the string that u wanna send to server:Hello
The received string from the server is 'Hello'
root@kali:~/Desktop/UDP#