# COMPUTER NETWORKS

# LAB RECORD

## 1.Frabrication of Cables

### Objective:

To practise the colour code for different cables.

Observe the Lan Tester and make the decision accordingly.

### Theory:

A twisted pair consists of two insulated conductor twisted together in the shape of a spiral. It can be shielded or unshielded. The unshielded twisted pair cables are very cheap and easy to install. But they are very badly affected by the electromagnetic noise interference.
Twisting of wires will reduce the effect of noise or external interference. The induced emf into the two wires due to interference tends to cancel each other due to twisting. Number of twists per unit length will determine the quality of cable. More twists means better quality.

There are 3 types of UTP cables:-

1) Straight-through cable
2) Crossover cable
3) Roll-over cable

### A. Straight-through cable

Straight-Through refers to cables that have the pin assignments on each end of the cable. In other words Pin 1 connector A goes to Pin 1 on connector B, Pin 2 to Pin 2 ect. Straight-Through wired cables are most commonly used to connect a host to client. When we talk about cat5e patch cables, the Straight-Through wired cat5e patch cable is used to connect computers, printers and other network client devices to the router switch or hub (the host device in this instance).

### B. Crossover cable

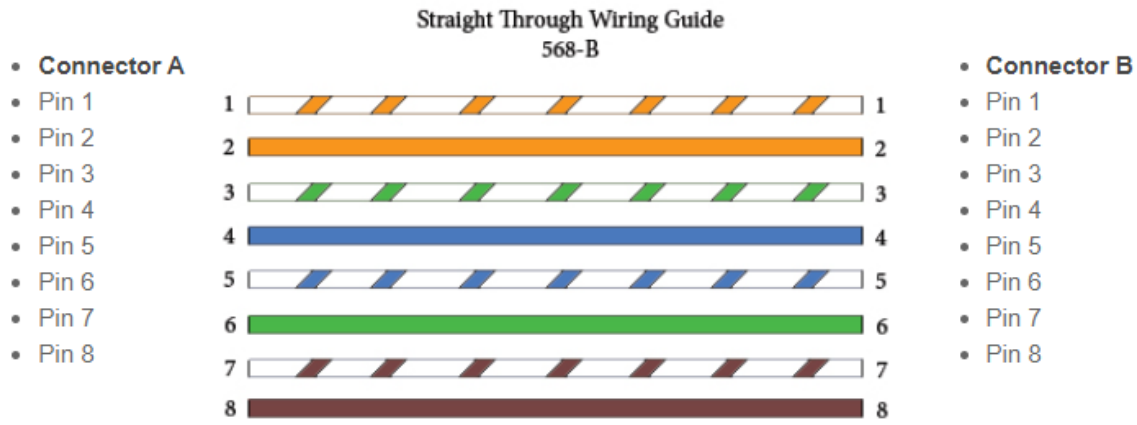
Crossover wired cables (commonly called crossover cables) are very much like Straight-Through cables with the exception that TX and RX lines are crossed (they are at oposite positions on either end of the cable. Using the 568-B standard as an example below you will see that Pin 1 on connector A goes to Pin 3 on connector B. Pin 2 on connector A goes to Pin 6 on connector B ect. Crossover cables are most commonly used to connect two hosts directly. Examples would be connecting a computer directly to another computer, connecting a switch directly to another switch, or connecting a router to a router.Note: While in the past when connecting two host devices directly a crossover cable was required. Now days most devices have auto sensing technology that detects the cable and device and crosses pairs when needed.

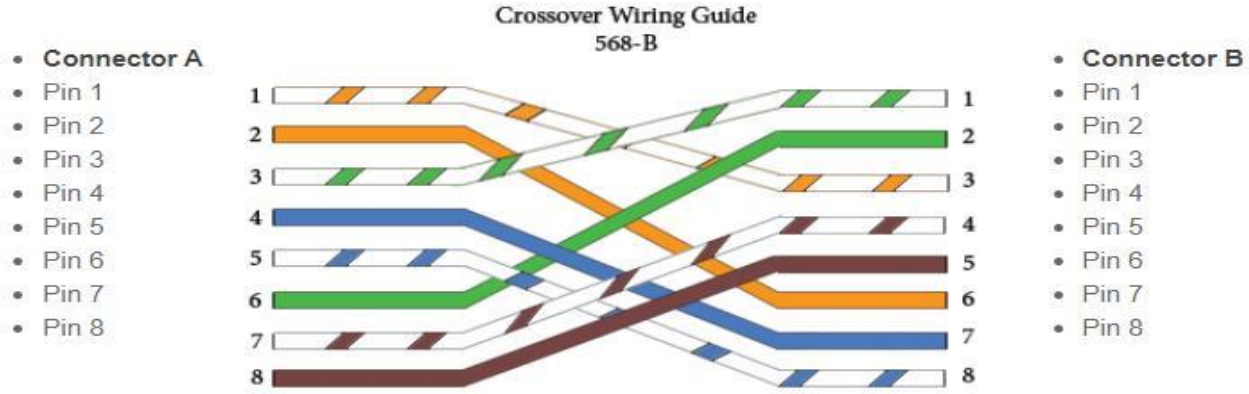
### C. Roll-over cable

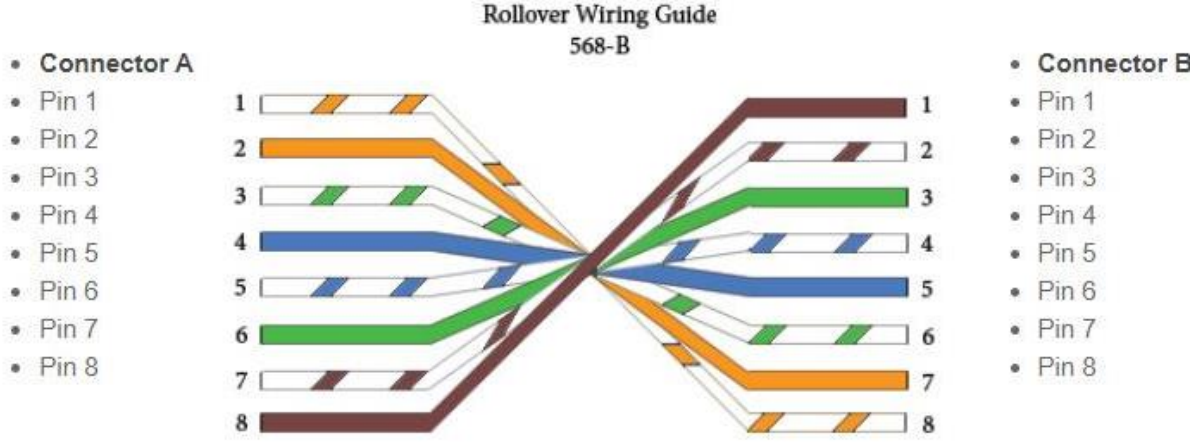
Rollover wired cables most commonly called rollover cables, have opposite Pin assignments on each end of the cable or in other words it is "rolled over". Pin 1 of connector A would be

connected to Pin 8 of connector B. Pin 2 of connector A would be connected to Pin 7 of connector B and so on. Rollover cables, sometimes referred to as Yost cables are most commonly used to connect to a devices console port to make programming changes to the device. Unlike crossover and straight-wired cables, rollover cables are not intended to carry data but instead create an interface with the device.

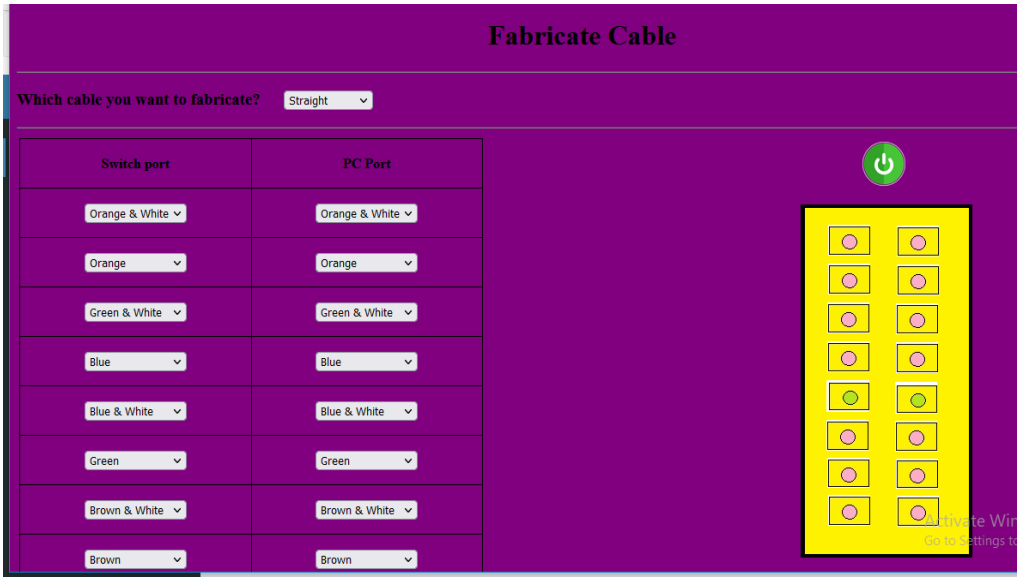
## Diagram:

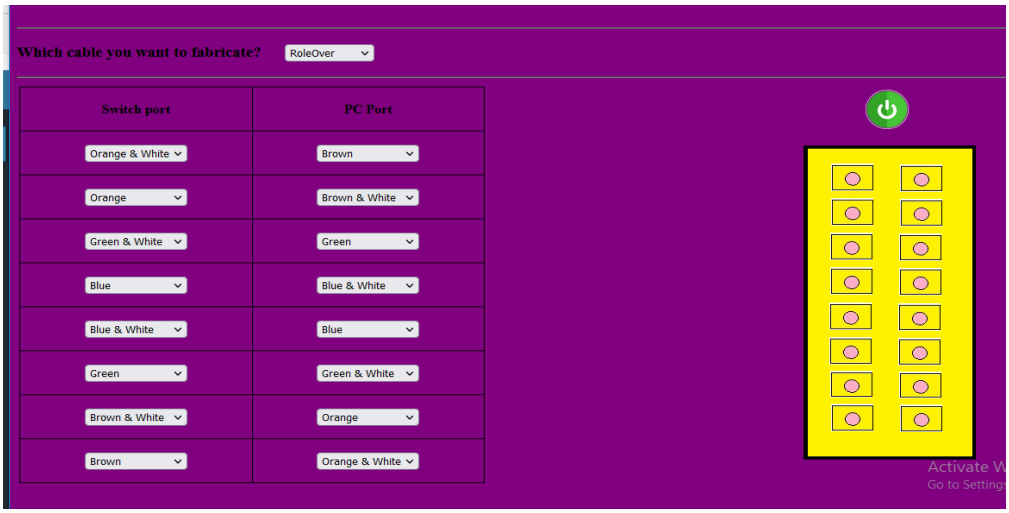


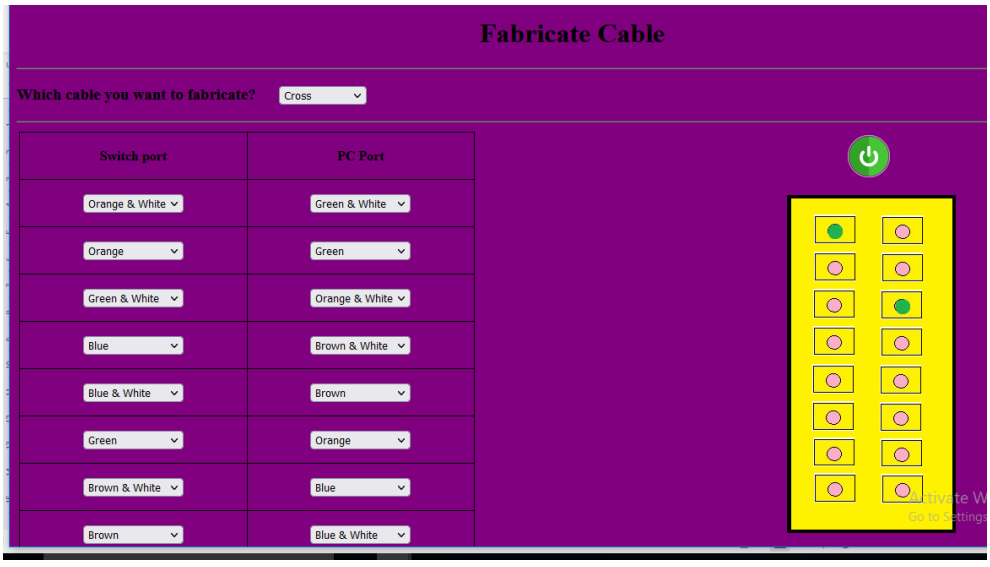



## Results:


Fabricate Cable
Which cable you want to fabricate?
Straight
Switch port
PC Port
Orange & White
Orange
Green & White
Blue
Blue & White
Green
Brown & White
Brown


Which cable you want to fabricate?
RoleOver
Switch port
PC Port
Orange & White
Brown
Orange
Brown & White
Green & White
Green
Blue
Blue & White
Blue & White
Blue
Green
Green & White
Brown & White
Orange
Brown
Orange & White


Fabricate Cable
Which cable you want to fabricate?
Cross
Switch port
PC Port
Orange & White
Green & White
Orange
Green
Green & White
Orange & White
Blue
Brown & White
Blue & White
Brown
Green
Orange
Brown & White
Blue
Brown
Blue & White

# 2.Simulation of Peer to Peer Network (With Two PC's) :

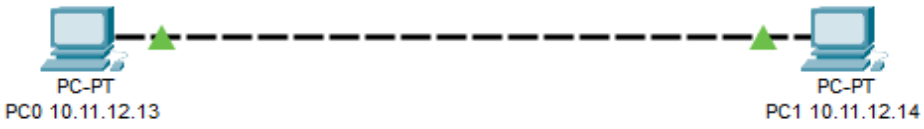
## Objective:

To construct peer to peer topology with two pc's.

## Theory:

- Peer to peer is the relationship where the devices share the link equally. The examples are ring and mesh topologies.
- In peer to peer architecture every node is connected to other node directly.
- Every computer node is referred as peer.
- Every peer provides services to other peers as well as uses services of them.
- There is no central server present

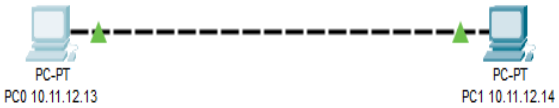
## Topology diagram:




## Commands used during the simulation:

ping 10.11.12.14

## Results/Tests done to check network:




```
Packet Tracer PC Command Line 1.0
C:\>ping 10.11.12.14

Pinging 10.11.12.14 with 32 bytes of data:

Reply from 10.11.12.14: bytes=32 time=4ms TTL=128
Reply from 10.11.12.14: bytes=32 time<1ms TTL=128
Reply from 10.11.12.14: bytes=32 time<1ms TTL=128
Reply from 10.11.12.14: bytes=32 time<1ms TTL=128

Ping statistics for 10.11.12.14:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss)
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 4ms, Average = 1ms
```

# 3.Simulation of STAR TOPOLOGY USING HUB :

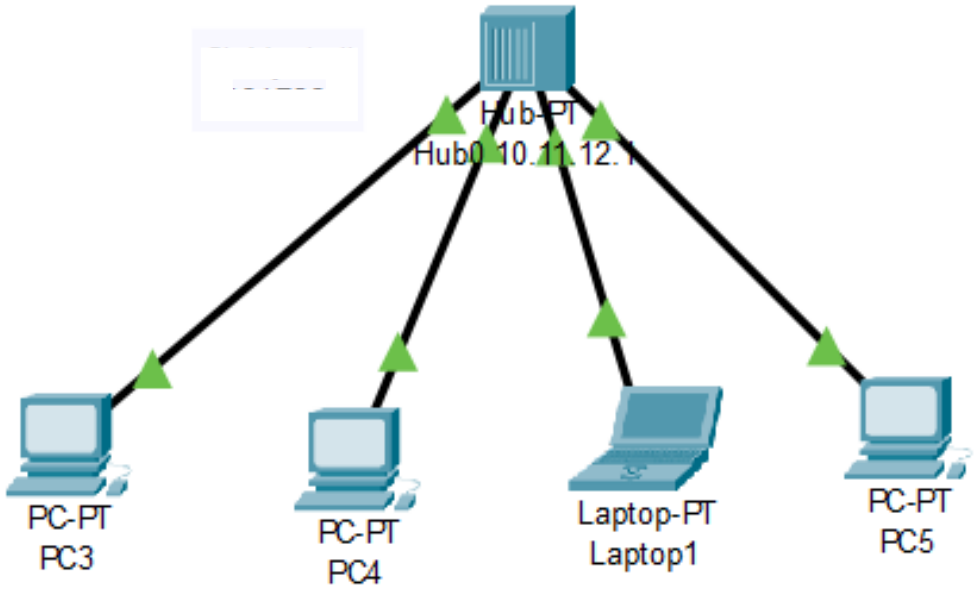
**Objective:**

To construct star topology using hub.

**Theory:**

- **Star topology** is a network topology in which each network component is physically connected to a central node such as a router, hub or switch. ... When the central node receives a packet from a connecting node, it can pass the packet on to other nodes in the network. A star topology is also known as a star network.
- A network **hub** is a node that broadcasts data to every computer or Ethernet-based device connected to it.
- A device at the center of a star topology network. Hubs can be active (where they repeat signals set to them) or passive (where they do not repeat but merely split signals sent through them).

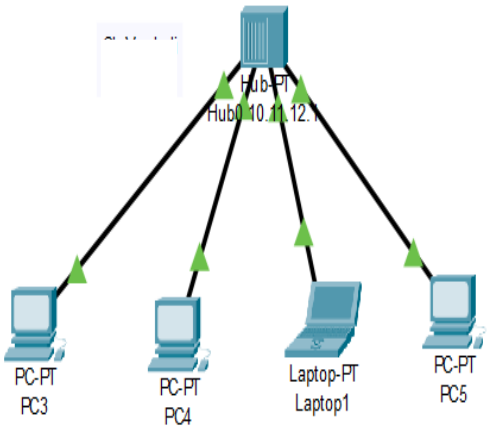
**Topology diagram:**




**Commands used during the simulation:**

ping 10.11.12.4

## Results/Tests done to check network:

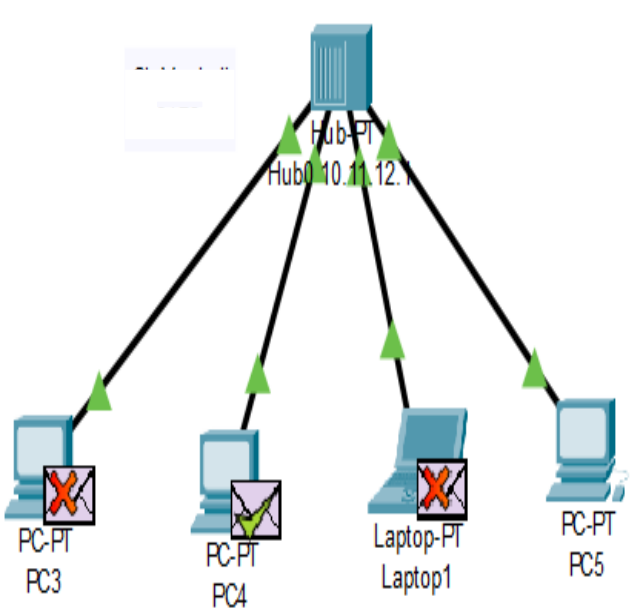



```
Packet Tracer PC Command Line 1.0
C:\>ping 10.11.12.4

Pinging 10.11.12.4 with 32 bytes of data:

Reply from 10.11.12.4: bytes=32 time<1ms TTL=128
Reply from 10.11.12.4: bytes=32 time<1ms TTL=128
Reply from 10.11.12.4: bytes=32 time<1ms TTL=128
Reply from 10.11.12.4: bytes=32 time<1ms TTL=128

Ping statistics for 10.11.12.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```




Simulation Panel

Event List

| Vis. | Time(sec) | Last Device | At Device | Type |
|---|---|---|---|---|
| | 0.000 | -- | PC4 | ICMP |
| | 0.004 | -- | PC4 | ICMP |
| | 0.005 | PC4 | Hub0 10.11.... | ICMP |
| | 0.006 | Hub0 10.11.12.1 | PC3 | ICMP |
| | 0.006 | Hub0 10.11.12.1 | Laptop1 | ICMP |
| | 0.006 | Hub0 10.11.12.1 | PC5 | ICMP |
| | 0.007 | PC5 | Hub0 10.11.... | ICMP |
| | 0.008 | Hub0 10.11.12.1 | PC3 | ICMP |
| | 0.008 | Hub0 10.11.12.1 | PC4 | ICMP |
| | 0.008 | Hub0 10.11.12.1 | Laptop1 | ICMP |

## 4.Simulation of STAR TOPOLOGY USING SWITCH :

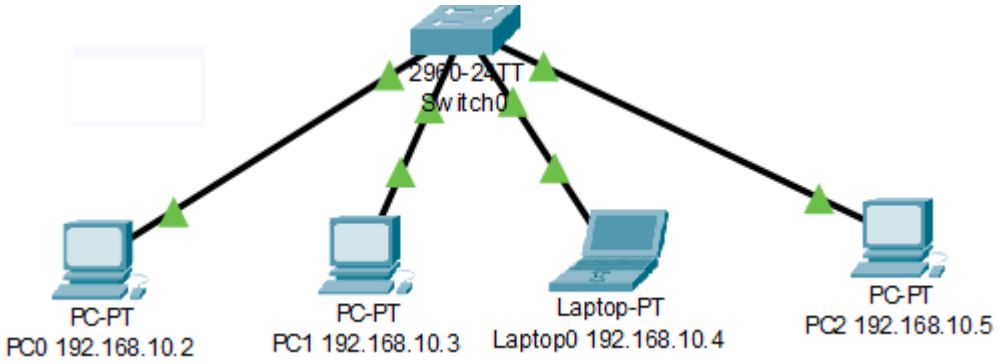
### Objective:

To construct star topology using switch.

### Theory:

- In a star topology all nodes indirectly connect to each other through one or more switches . The switch acts as a central point through which all communications are passed. Large networks using a star topology are usually controlled by one or more servers . Hence, the client-server model usually uses a star topology.
- Does unicasting, multicasting and broadcasting.

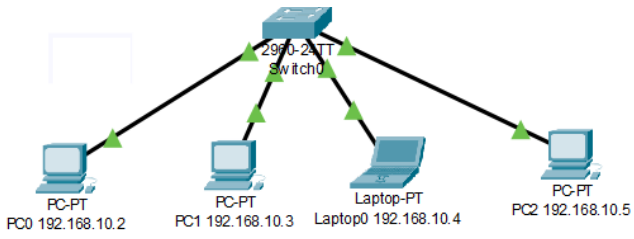
### Topology diagram:




### Commands used during the simulation:

ping 192.168.10.3

### Results/Tests done to check network:

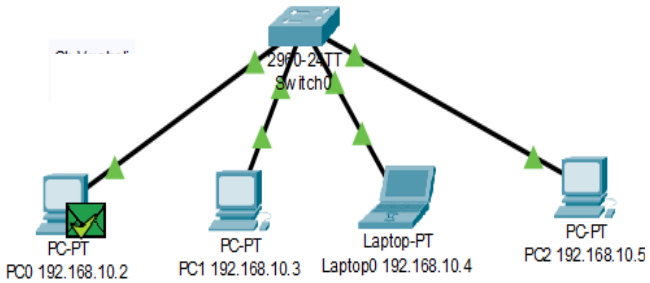



```
C:\>ping 192.168.10.3

Pinging 192.168.10.3 with 32 bytes of data:

Reply from 192.168.10.3: bytes=32 time=55ms TTL=128
Reply from 192.168.10.3: bytes=32 time<1ms TTL=128
Reply from 192.168.10.3: bytes=32 time<1ms TTL=128
Reply from 192.168.10.3: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.10.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 55ms, Average = 13ms
```




Event List

| Vis. | Time(sec) | Last Device | At Device | Type |
|---|---|---|---|---|
| | 0.000 | -- | PC0 192.168... | ICMP |
| | 0.001 | PC0 192.168.1... | Switch0 | ICMP |
| | 0.002 | Switch0 | Laptop0 192... | ICMP |
| | 0.003 | Laptop0 192.1... | Switch0 | ICMP |
| | 0.004 | Switch0 | PC0 192.168... | ICMP |

# 5.Simulation of BUS TOPOLOGY USING SWITCH:

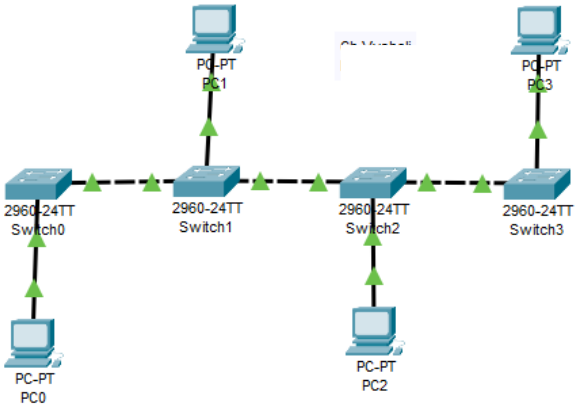
## Objective:

To construct bus topology using switch.

## Theory:

- A bus network is a network topology in which nodes are directly connected to a common half-duplex link called a bus. A host on a bus network is called a station. In a bus network, every station will receive all network traffic, and the traffic generated by each station has equal transmission priority.
- All nodes are connected to a Single Cable.
- If backbone cable is broken, Entire N/W fails.
- Easy to Install. Less Cabling is Required.

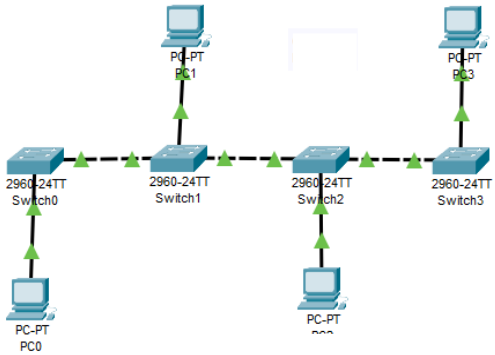
## Topology diagram:




## Commands used during the simulation:

ping 192.168.10.3

## Results/Tests done to check network:

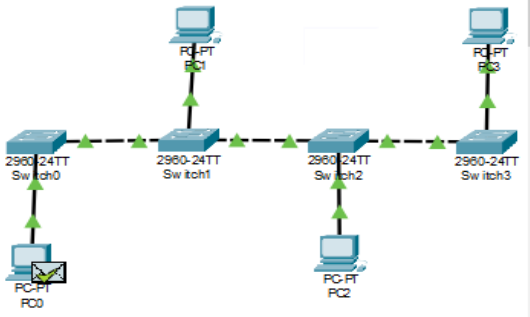


```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.10.3

Pinging 192.168.10.3 with 32 bytes of data:

Reply from 192.168.10.3: bytes=32 time<1ms TTL=128
Reply from 192.168.10.3: bytes=32 time<1ms TTL=128
Reply from 192.168.10.3: bytes=32 time<1ms TTL=128
Reply from 192.168.10.3: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.10.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```



Simulation Panel

Event List

| Vis. | Time(sec) | Last Device | At Device | Type |
|---|---|---|---|---|
| | 0.001 | PC0 | Switch0 | ICMP |
| | 0.002 | Switch0 | Switch1 | ICMP |
| | 0.003 | Switch1 | Switch2 | ICMP |
| | 0.004 | Switch2 | Switch3 | ICMP |
| | 0.005 | Switch3 | PC3 | ICMP |
| | 0.006 | PC3 | Switch3 | ICMP |
| | 0.007 | Switch3 | Switch2 | ICMP |
| | 0.008 | Switch2 | Switch1 | ICMP |
| | 0.009 | Switch1 | Switch0 | ICMP |
| | 0.010 | Switch0 | PC0 | ICMP |

# 6.Simulation of Mesh(Peer-to-Peer) TOPOLOGY USING SWITCH:

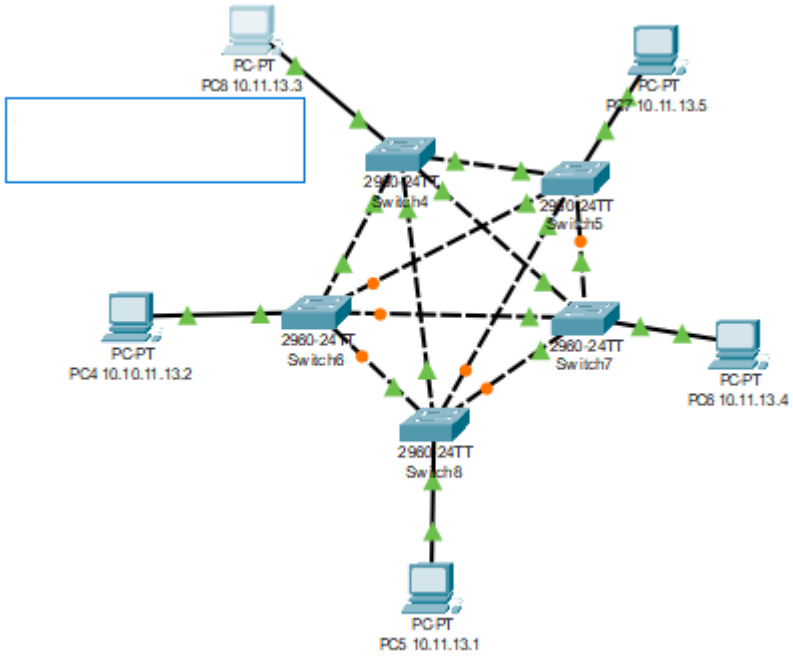
## Objective:

To construct mesh topology using switch.

## Theory:

- Computers are Interconnected.
- Dedicated Link between each Node.
- More Cabling is Required.
- Highly Reliable Network.

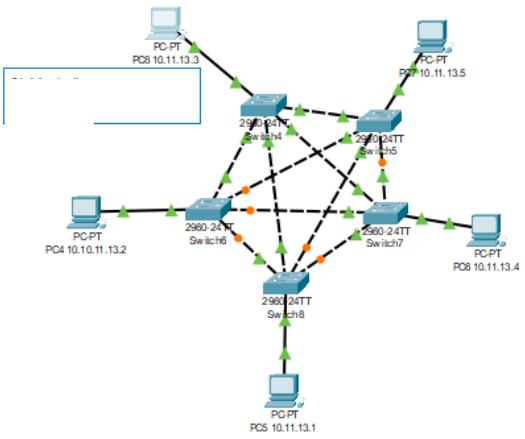
## Topology diagram:




## Commands used during the simulation:

ping 10.11.13.1

## Results/Tests done to check network:



```
Packet Tracer PC Command Line 1.0
C:\>ping 10.11.13.1

Pinging 10.11.13.1 with 32 bytes of data:

Reply from 10.11.13.1: bytes=32 time=13ms TTL=128
Reply from 10.11.13.1: bytes=32 time=6ms TTL=128
Reply from 10.11.13.1: bytes=32 time=6ms TTL=128
Reply from 10.11.13.1: bytes=32 time=6ms TTL=128

Ping statistics for 10.11.13.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 6ms, Maximum = 13ms, Average = 7ms
```

# 7.Simulation of Hybrid TOPOLOGY(Tree) USING SWITCH:

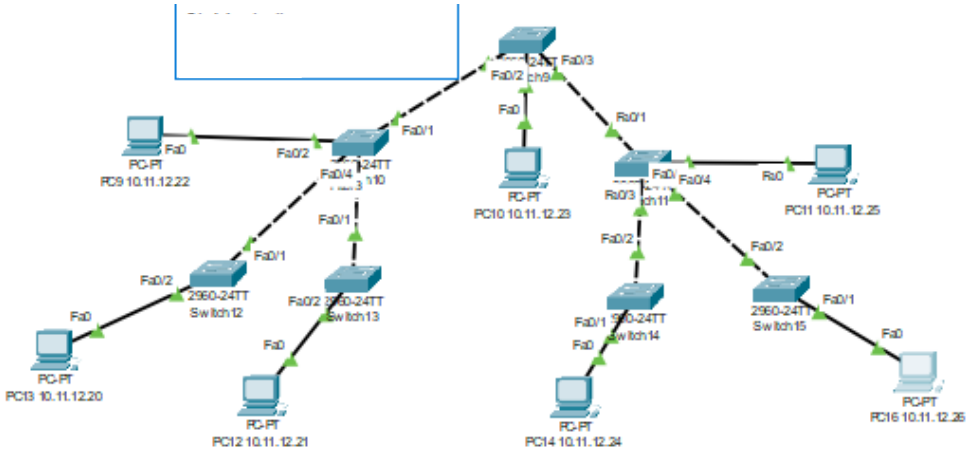
## Objective:

To construct hybrid topology using switch.

## Theory:

- Bus + Star Topologies (Also called as Tree).
- Top node is called as Root and other are Descendants.
- One path exists between any two nodes.
- Easily Scalable.

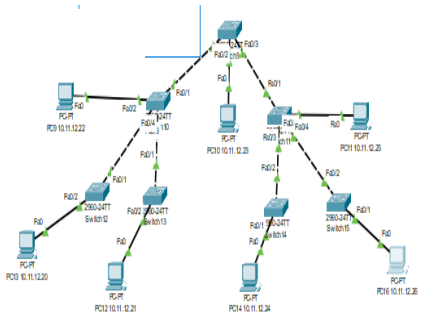
## Topology diagram:




## Commands used during the simulation:

```
ping 10.11.12.22
```

## Results/Tests done to check network:

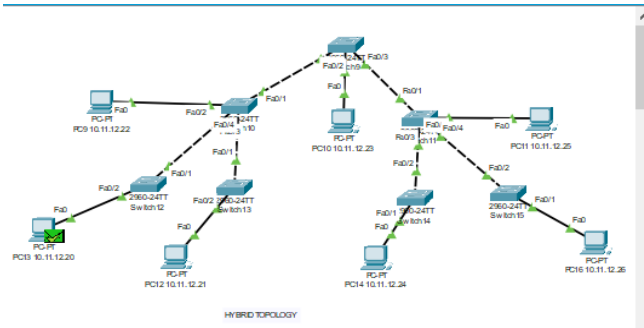


```
Packet Tracer PC Command Line 1.0
C:\>ping 10.11.12.22

Pinging 10.11.12.22 with 32 bytes of data:

Reply from 10.11.12.22: bytes=32 time=26ms TTL=128
Reply from 10.11.12.22: bytes=32 time=10ms TTL=128
Reply from 10.11.12.22: bytes=32 time=11ms TTL=128
Reply from 10.11.12.22: bytes=32 time=10ms TTL=128

Ping statistics for 10.11.12.22:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 10ms, Maximum = 26ms, Average = 14ms
```



Simulation Panel

Event List

| Vis. | Time(sec) | Last Device | At Device | Type |
|---|---|---|---|---|
| | 0.005 | Switch10 | Switch9 | ICMP |
| | 0.007 | Switch9 | Switch11 | ICMP |
| | 0.009 | Switch11 | Switch15 | ICMP |
| | 0.011 | Switch15 | PC16 10.11.... | ICMP |
| | 0.014 | PC16 10.11.12.26 | Switch15 | ICMP |
| | 0.016 | Switch15 | Switch11 | ICMP |
| | 0.018 | Switch11 | Switch9 | ICMP |
| | 0.020 | Switch9 | Switch10 | ICMP |
| | 0.022 | Switch10 | Switch12 | ICMP |
| | 0.024 | Switch12 | PC13 10.11.... | ICMP |

## 8.Remotely Accessing SWITCH using TELNET :

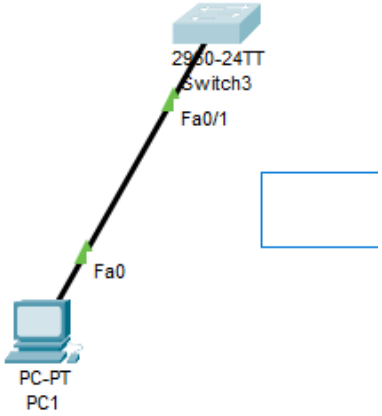
### Objective:

To remotely access switch using telnet.

### Theory:

- Telnet enables a user to manage a device remotely.
- Telnet is a protocol used to connect to switches and other devices in your network.
- Telnet provides a connection from a computer to a remote switch.
- The connection allows access to make changes to the device without actually having to be on site.

### Topology diagram:




### Commands used during the simulation:

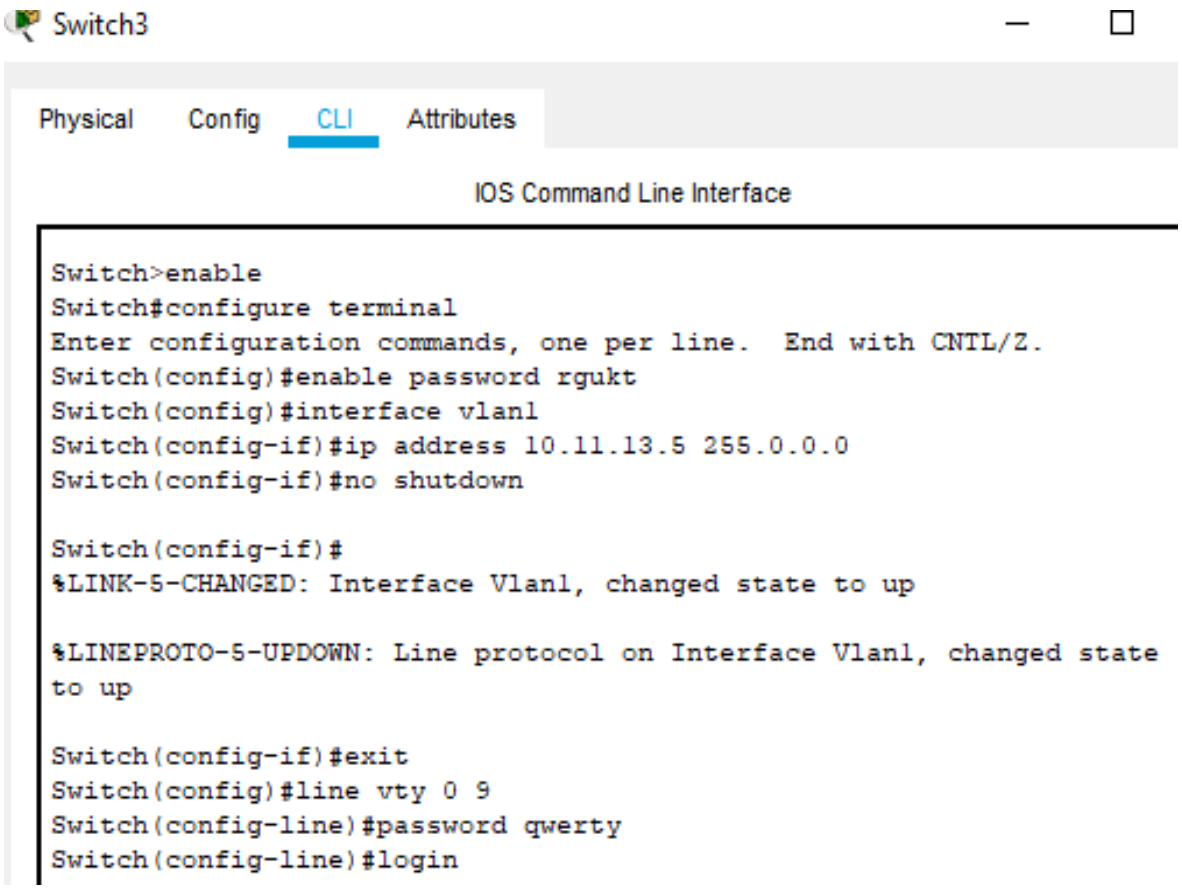
- **Commands at switch:**

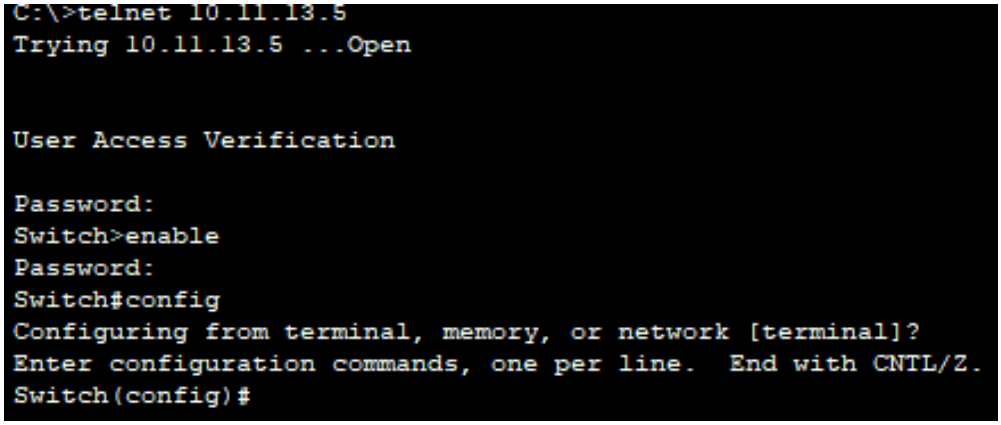
```
Switch>enable
Switch#configure terminal
Switch(config)#enable password rgukt
Switch(config)#interface vlan1
Switch(config-if)#IP address 10.11.13.5 255.0.0.0
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#line vty 0 2
Switch(config-line)#password qwerty
Switch(config-line)#login
Switch(config-line)#exit
Switch(config)#exit
Switch#write memory
```

- **Commands at Remote PC to access switch:**

```
C:\>telnet 10.11.13.5
User Access Verification
Password:
Switch>enable
Password:
Switch#config
Switch#exit
```

**Results/Tests done to check network:**



## 9.Remotely Accessing ROUTER using TELNET :

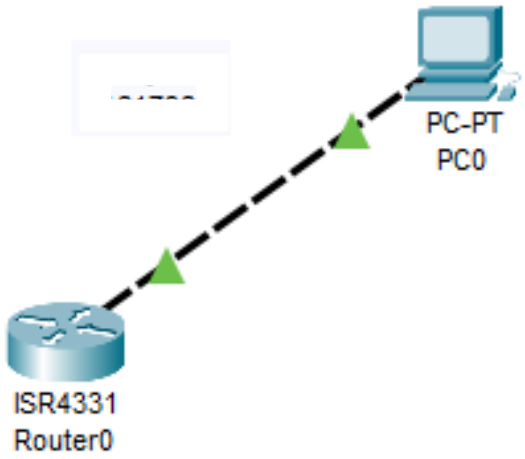
### Objective:

To remotely access switch using telnet.

### Theory:

- Telnet enables a user to manage a device remotely.
- A router is a networking device that forwards data packets between computer networks. Routers perform the traffic directing functions on the Internet.

### Topology diagram:




### Commands used during the simulation:

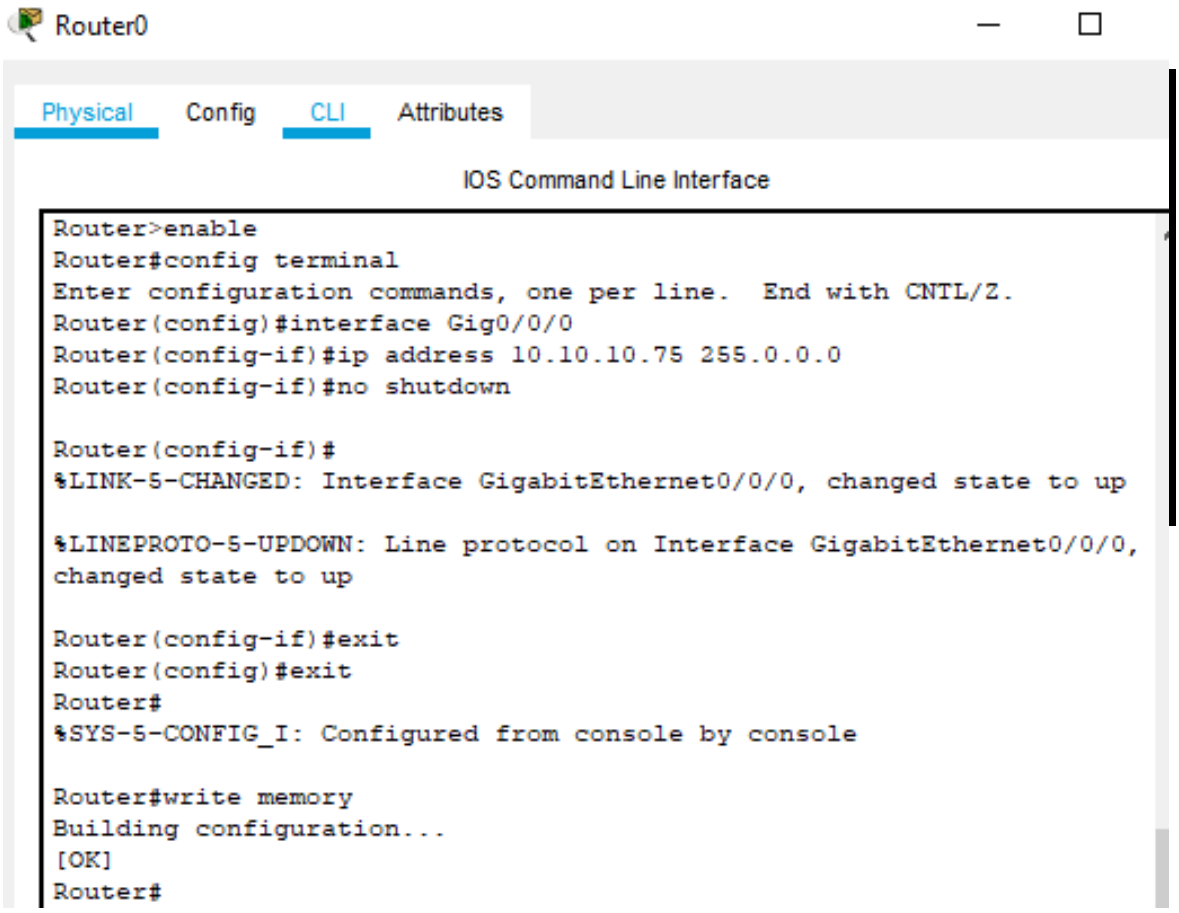
*At router:*

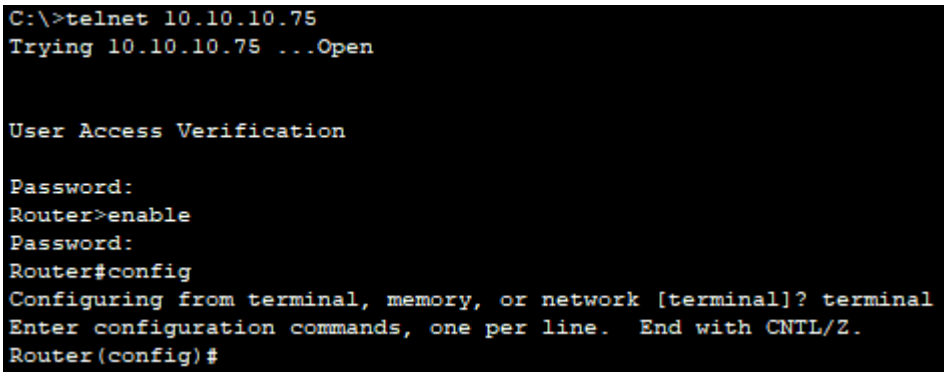
Router>enable
Router#config terminal
Router(config)#enable password rgukt
Router(config)#interface Gig0/0/0
Router(config-if)#IP address 10.10.10.75 255.0.0.0
Router(config-if)#no shutdown
Router( config-if)#
Router(config-if)#line vty 0 9
Router(config-line)#password rgukt
Router(config-line)#login
Router(config-line)#exit
Router(config)#exit
Router#
Router#write memory

**At PC:**

telnet 10.10.10.75

## Results/Tests done to check network:



# 10.Simulation of Connecting two different Networks Using ROUTER:

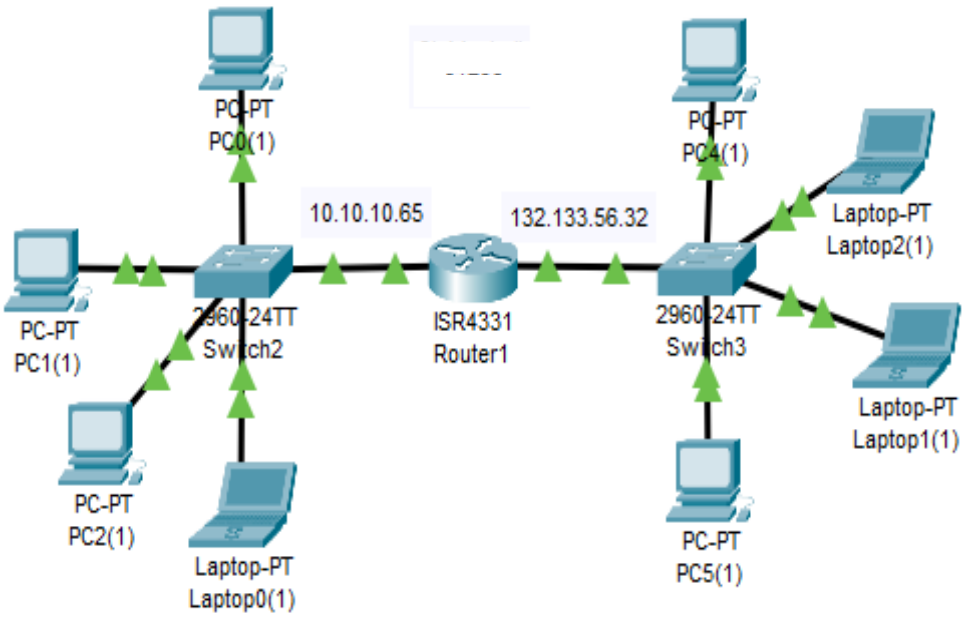
## Objective:

To simulate connection of two different networks using router.

## Theory:

- Network Layer Device that forward the packets between networks.
- Used to connect two Different Networks.
- Works on IP addresses.
- Maintains Routing Table.

## Topology diagram:

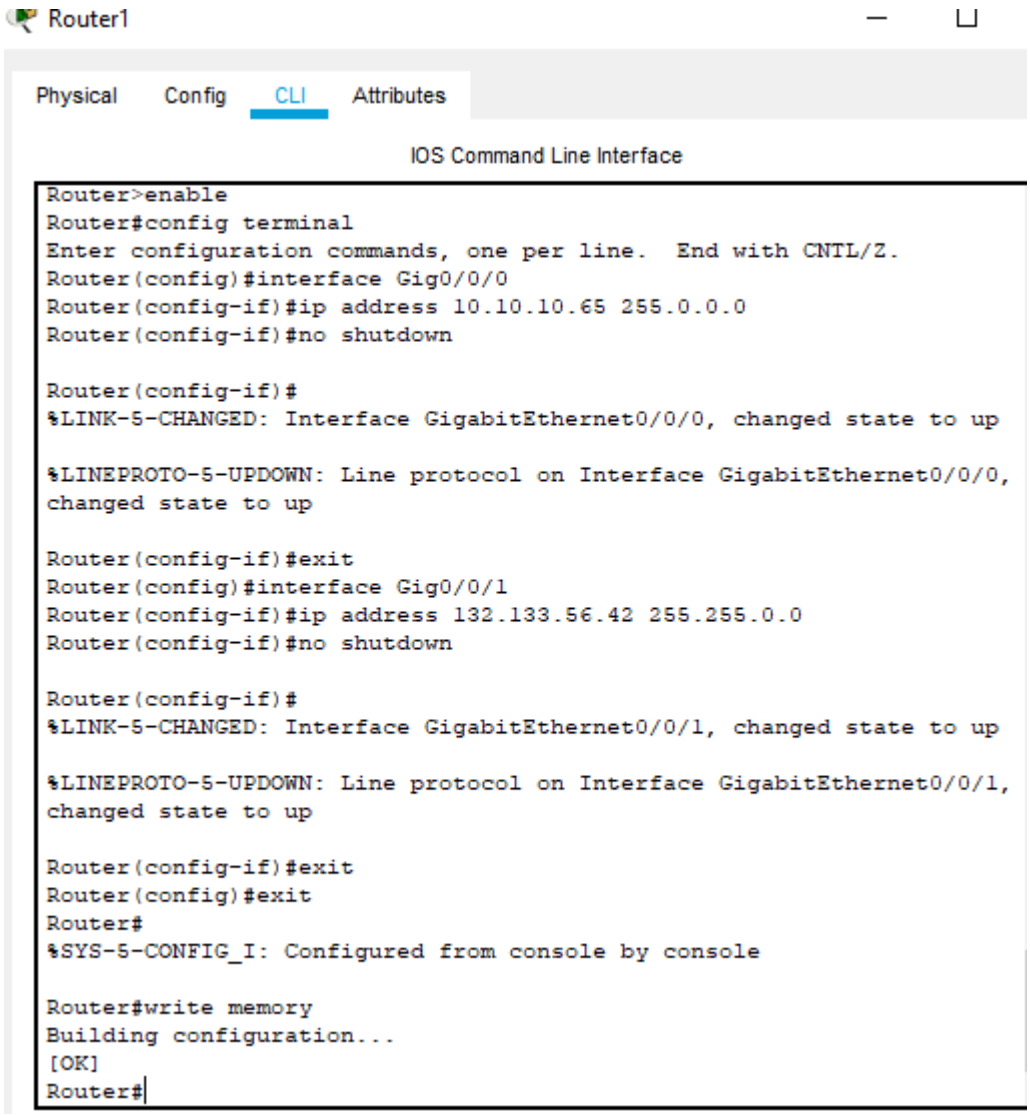


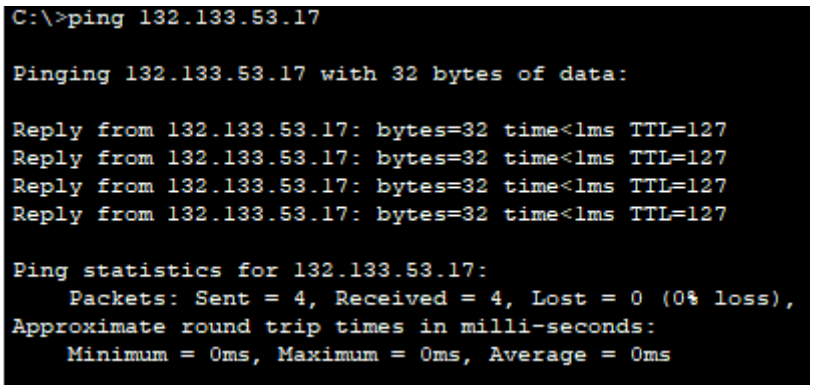

## Commands used during the simulation:

***CLI Commands:***

```
Router>enable
Router#config terminal
Router(config)#interface Gig0/0/0
Router(config-if)#IP address 10.11.12.10 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#exit
Router#
Router#write memory
Router#
```

## Results/Tests done to check network:



## 11.Configuration of DHCP Service on Router :

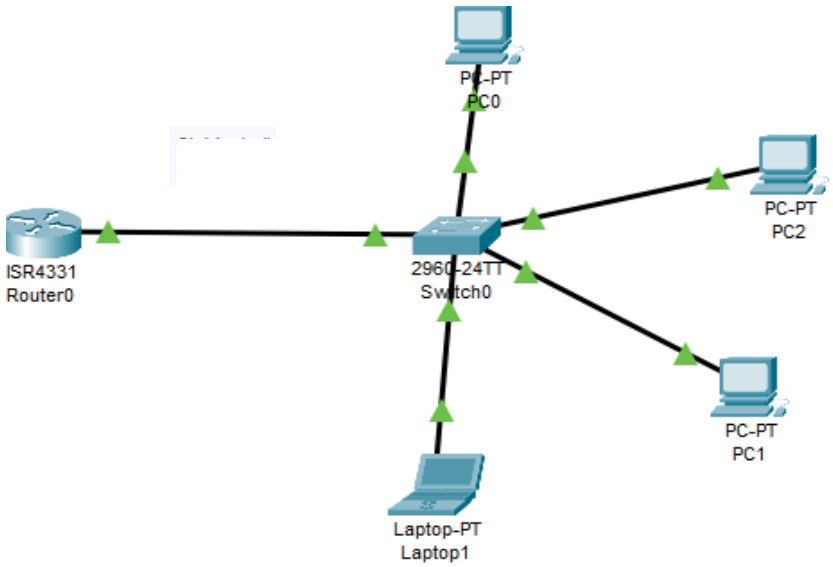
### Objective:

To configure DHCP service on Router.

### Theory:

- Dynamic Host Configuration Protocol (DHCP)
- Network management protocol used on Internet Protocol (IP) networks for automatically assigning IP addresses and other communication parameters to devices connected to the network.

### Topology diagram:




### Commands used during the simulation:

**CLI Commands**:

*Configure Router:*

```
Router>enable
Router#config terminal
Router(config)#interface gig0/0/0
Router(config-if)#IP address 10.10.10.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
```

*Configure DHCP Server and DNS on the router and Default Gateway:*

```
Router(config)#ip DHCP pool MyNetwork
Router(dhcp-config)#network 10.0.0.0 255.0.0.0
Router(dhcp-config)#default-router 10.10.10.1
Router(dhcp-config)#dns-server 10.10.10.20
Router(dhcp-config)#exit
Router(config)#exit
Router#
Router#write memory
Router#
```

## Results/Tests done to check network:

```
Router>enable
Router#config
Configuring from terminal, memory, or network [terminal]? terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface Gig0/0/0
Router(config-if)#ip address 10.10.10.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#ip dhcp pool seminarhall
Router(dhcp-config)#network 10.0.0.2 255.0.0.0
Router(dhcp-config)#default-router 10.10.10.1
Router(dhcp-config)#dns-server 10.10.10.20
Router(dhcp-config)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#write memory
Building configuration...
[OK]
Router#
```