



# COMPUTER SCIENCE

Submitted To :

**Mr. MILIND PARADKAR SIR**

Submitted By :

Name: .....  
Aditya Subhash Nikam

Class/Sec: B.Sc.CS

Roll No.:.....  
222716

**SUBJECT: COMPUTER NETWORK'S**

**Vikas College of Arts, Science &  
Commerce**

# CERTIFICATE

This is to certify that .....Aditya Subhash Nikam.....

of class/sec B.Sc.CS has successfully completed the project

entitled COMPUTER NETWORK'S PRACTICALS

to my satisfaction and submitted the same during the  
academic year 2022-2023

The project is the result of his/her efforts & endeavors.

.....

**Date :** .....

**(Signature of the teacher)**

Mr. MILIND M PARADKAR SIR

**(Name of the teacher)**

# Practical No 1

**Aim:** Using, linux-terminal or Windows-cmd, execute following networking commands and note the output: ping, traceroute, netstat, arp, ipconfig, Getmac, hostname, NSLookUp, pathping, SystemInfo

## **Theory:**

- 1) **ping:** ping is a computer network administration software utility used to test the reachability of a host on an Internet Protocol network. It is available for virtually all operating systems that have networking capability, including most embedded network administration software
- 2) **traceroute:** The traceroute command (tracert) is a utility designed for displaying the time it takes for a packet of information to travel between a host system and the final destination system. This command returns a list of the hops that the data packets take along their path along their way to the destination
- 3) **netstat:** The netstat provides statistics about all active connections so you that we can find out which computers or networks a PC is connected to  
Some of the netstat commands commonly used are
  - i) **netstat -in** command  
This netstat function shows the state of all configured interfaces.
  - ii) **netstat -a** command  
The netstat -a command shows the state of all sockets.
  - iii) **netstat -s**  
The netstat -s command shows statistics for each protocol (while the netstat -p command shows the statistics for the specified protocol).
  - iv) **netstat -r**  
Another option relevant to performance is the display of the discovered Path Maximum Transmission Unit (PMTU).
- 4) **arp:** The ARP (Address Resolution Protocol) commands are used to view, display, or modify the details/information in an ARP table/cache.  
Some of the common arp commands are as follows
  - i) **arp -a:** This command is used to display the ARP table for a particular IP address. It also shows all the entries of the ARP cache or table.
  - ii) **arp -g:** Same as the arp -a command.

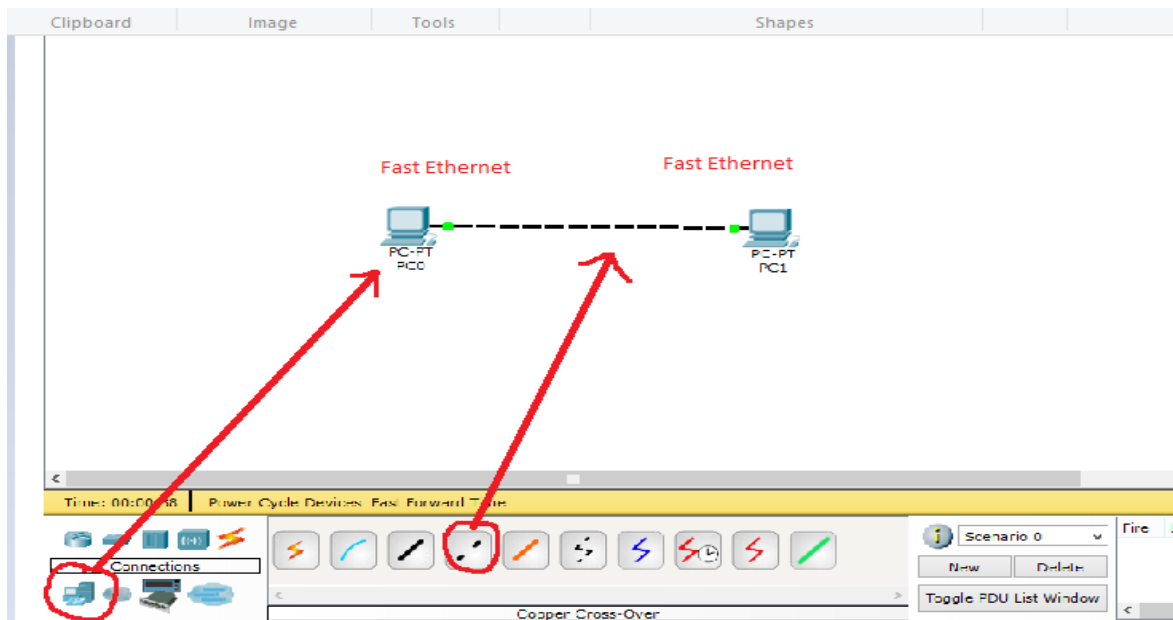
- iii) `arp -d`: This command is used to delete an entry from the ARP table for a particular interface. To delete an entry, write `arp -d` command along with the IP address in a command prompt to be deleted.
  - iv) `arp -s`: This command is used to add the static entry in the ARP table, which resolves the InetAddr (IP address) to the EtherAddr (physical address). To add a static entry in an ARP table, we write `arp -s` command along with the IP address and MAC address of the device in a command prompt.
- 5) `ipconfig`: `ipconfig` (Internet Protocol CONFIGuration) is used to display and manage the IP address assigned to the machine. In Windows, typing `ipconfig` without any parameters displays the computer's currently assigned IP, subnet mask and default gateway addresses.
- 6) `getmac`: `Getmac` is a Windows command used to display the Media Access Control (MAC) addresses for each network adapter in the computer.
- 7) `hostname`: A hostname is a label that is assigned to a device connected to a computer network and it is used to identify the device.
- 8) `NSlookup`: Using this command we can find the corresponding IP address or domain name system record. The user can also enter a command for it to do a reverse DNS lookup and find the host name for an IP address that is specified.
- 9) `Pathping`: This command sends multiple echo Request messages to each router between a source and destination, over a period of time, and then computes results based on the packets returned from each router. It can be used to find the routers or links having network problems.
- 10) `SystemInfo`: This command is use ot display detailed configuration information about a computer and its operating system, including operating system configuration, security information, product ID, and hardware properties

## Practical No 2

**Aim:** Using Packet Tracer, create a basic network of two computers using appropriate network wire through Static IP address allocation and verify connectivity

**Theory:**

We use the following network to verify the connectivity using Cisco packet tracer



Now we set the ip address of the devices as follows

Host name	ip Address	Default Gateway
PC0	192.168.1.2	192.168.1.1
PC1	192.168.1.3	192.168.1.1

PC0

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 192.168.1.2

Subnet Mask 255.255.255.0

Default Gateway 192.168.1.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::202:16FF:FEA6:BA6D

Default Gateway

DNS Server

PC1

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 192.168.1.3

Subnet Mask 255.255.255.0

Default Gateway 192.168.1.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

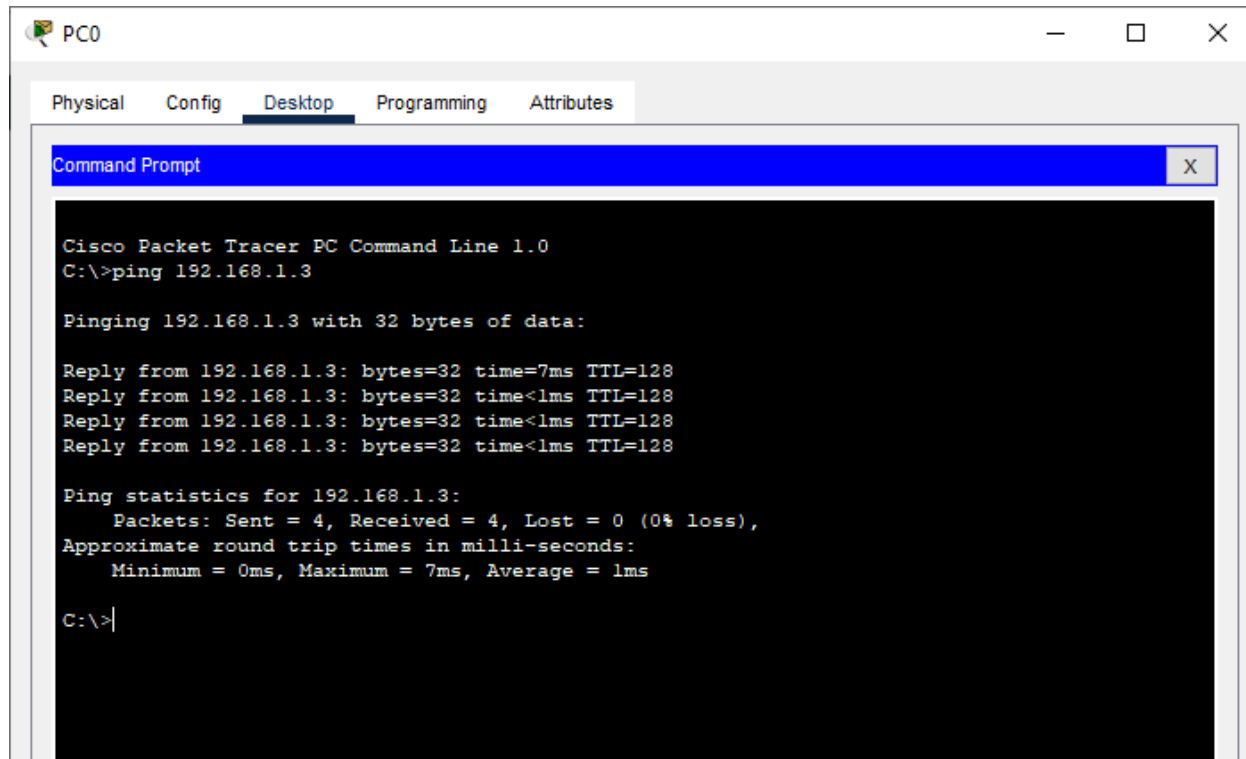
Link Local Address FE80::206:2AFF:FE01:EEDE

Default Gateway

DNS Server

802.1X

In order to check the connectivity we send a ping command from PC0 to PC1 as follows



```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Reply from 192.168.1.3: bytes=32 time=7ms TTL=128
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 7ms, Average = 1ms

C:\>|
```

### **Result:**

Hence the Connectivity between the PCs has been verified.

## Practical No 3

**Aim:** Using Packet Tracer, create a basic network of one server and two computers using appropriate network wire. Use Dynamic IP address allocation and show connectivity

### **Theory:**

For assigning ip addresses dynamically we use the DHCP protocol

Dynamic Host Configuration Protocol (DHCP) is a client/server protocol that automatically provides an Internet Protocol (IP) host with its IP address and other related configuration information such as the subnet mask and default gateway.

The DHCP server maintains a pool of IP addresses and leases an address to any DHCP-enabled client when it starts up on the network. Because the IP addresses are dynamic (leased) rather than static (permanently assigned), addresses no longer in use are automatically returned to the pool for reallocation.

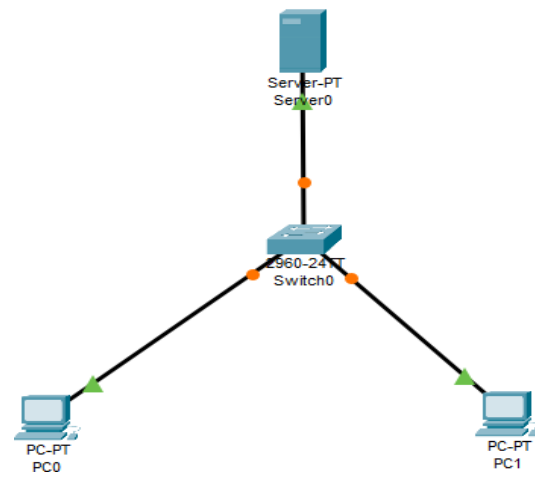
DHCP provides the following benefits.

- 1) **Reliable IP address configuration.** DHCP minimizes configuration errors caused by manual IP address configuration, such as typographical errors, or address conflicts caused by the assignment of an IP address to more than one computer at the same time.
- 2) **Reduced network administration.** DHCP includes the following features to reduce network administration

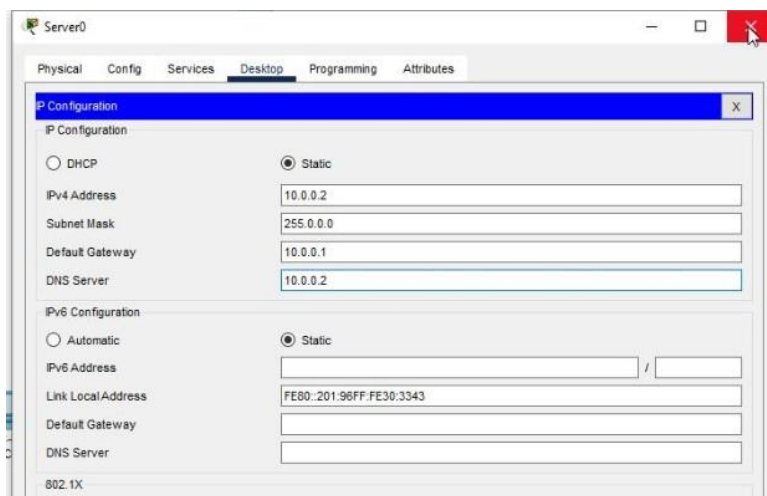
DHCP runs at the application layer of the Transmission Control Protocol/IP (TCP/IP) stack to dynamically assign IP addresses to DHCP clients and to allocate TCP/IP configuration information to DHCP clients. This includes subnet mask information, default gateway IP addresses and domain names system (DNS) addresses.



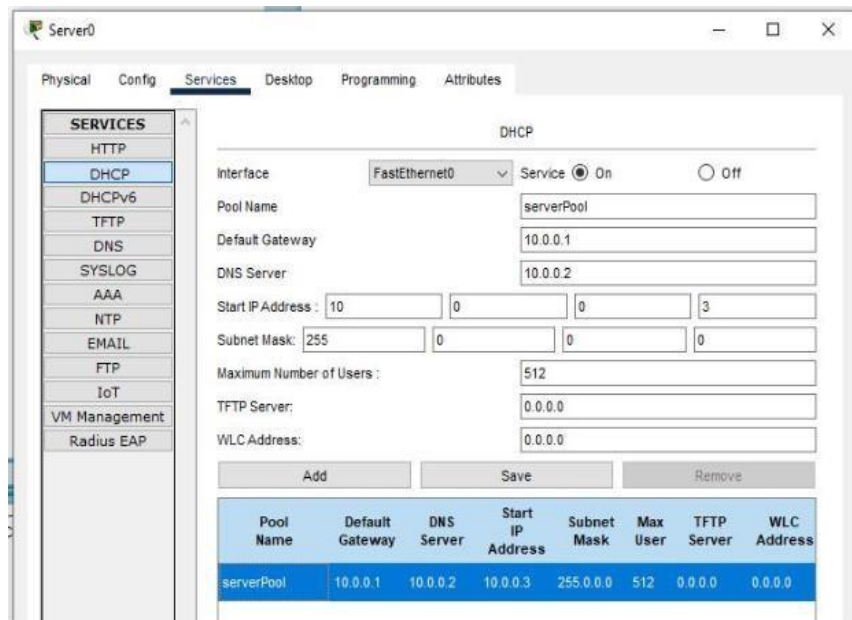
We use the following topology for the present case



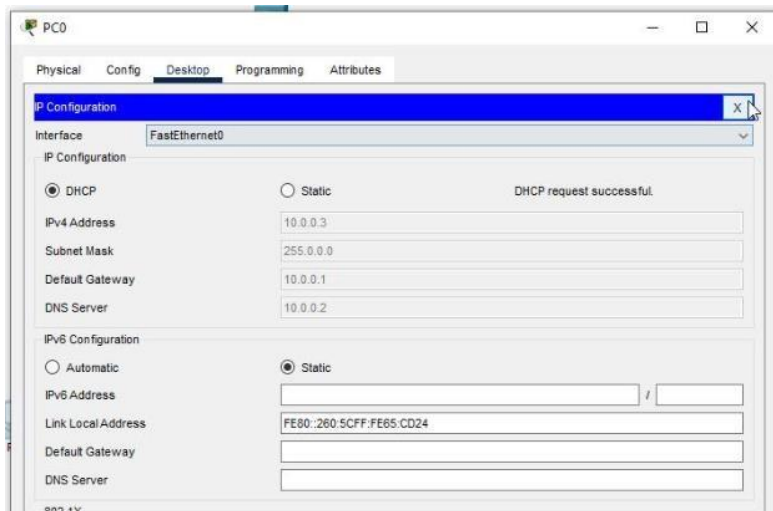
### Configuring the Server:

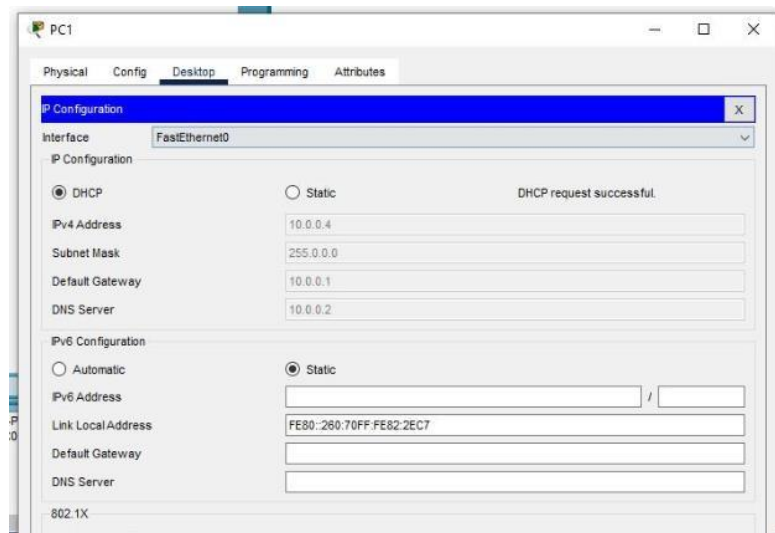


## Enabling and setting the DHCP Service on the Server:

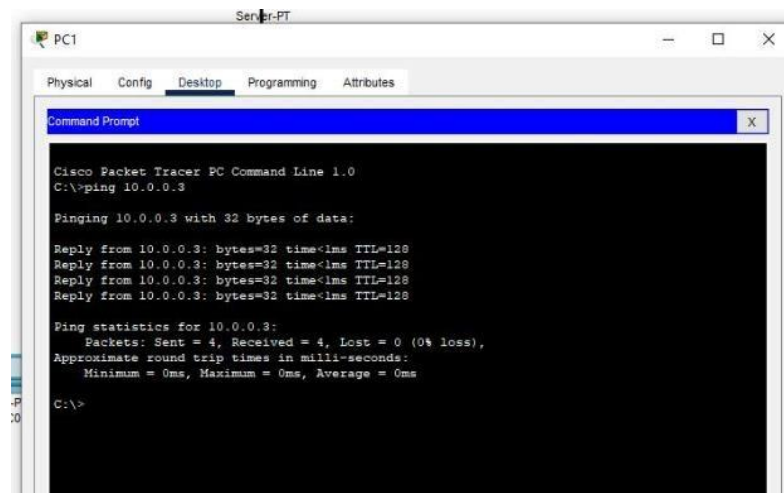


## Verifying the Dynamic Addressing on both the PCs:





### Checking the connectivity:



### Result:

Hence the Connectivity between the PCs has been verified.

## Practical No 4

**Aim:** Using Packet Tracer, create a basic network of one server and two computers and two mobile / movable devices using appropriate network wire. And verify the connectivity

### **Theory:**

A Wireless Access Point (WAP) is a networking device that allows wireless- capable devices to connect to a wired network. Instead of using wires and cables to connect every computer or device in the network, installing WAPs is a more convenient, more secure, and cost-efficient alternative.

Setting up a wireless network provides a lot of advantages and benefits for you and your small business.

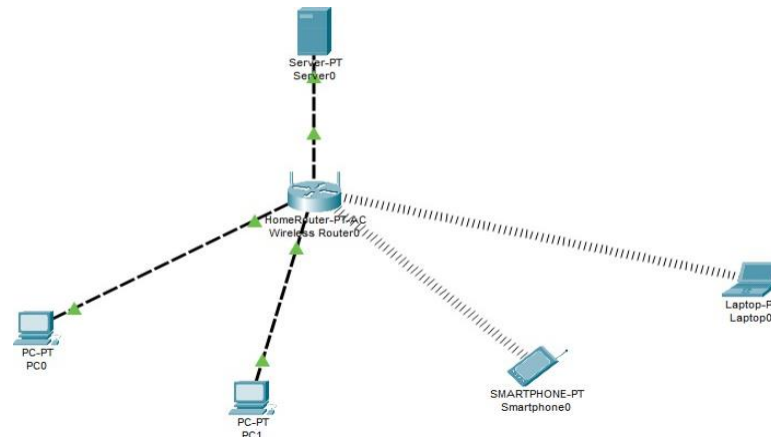
- 1) It is easier to set up compared to setting up a wired network.
- 2) It is more convenient to access.
- 3) It is less complicated to add new users in the network.
- 4) It gives users more flexibility to stay online even when moving from one area in the office to another.
- 5) Guest users can have Internet access by just using a password.
- 6) Wireless network protection can be set up even if the network is visible to the public by configuring maximum wireless security.
- 7) Segmentation of users, such as guests and employees, is possible by creating Virtual Local Area Networks (VLANs) to protect your network resources and assets.

There are different purposes of setting up a wireless network using a WAP.

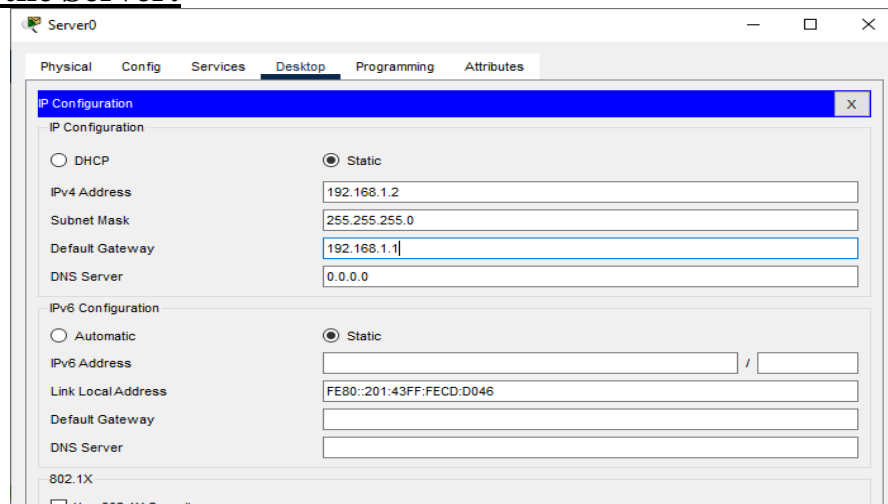
With a WAP, the following can be done:

- 1) Create a wireless network within your existing wired network.
- 2) Extend the signal range and strength of your wireless network to provide complete wireless coverage and get rid of dead spots especially in larger office spaces or buildings.
- 3) Accommodate wireless devices within a wired network.
- 4) Configure the settings of your wireless access points in one device.

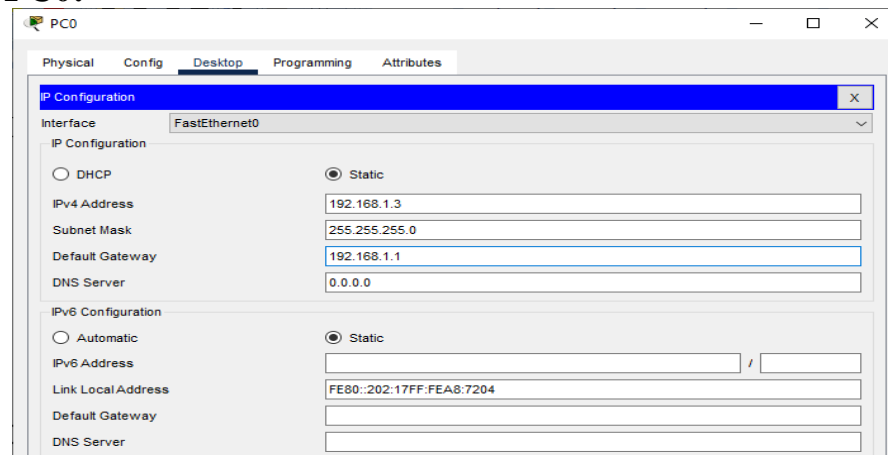
For the present case we use the following topology



## Configure the Server:



## Configure PC0:



## Configure PC1:

The screenshot shows the configuration window for PC1. The 'Desktop' tab is selected. The 'IP Configuration' window is open, showing the configuration for the 'FastEthernet0' interface. The 'Static' radio button is selected under 'IP Configuration'. The fields are filled with the following values:

Field	Value
IPv4 Address	192.168.1.4
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1
DNS Server	0.0.0.0
IPv6 Configuration	Static
IPv6 Address	
Link Local Address	FE80::200:CFF:FE03:E39
Default Gateway	
DNS Server	

## Configure Smartphone0:

The screenshot shows the configuration window for Smartphone0. The 'Desktop' tab is selected. The 'IP Configuration' window is open, showing the configuration for the 'Wireless0' interface. The 'Static' radio button is selected under 'IP Configuration'. The fields are filled with the following values:

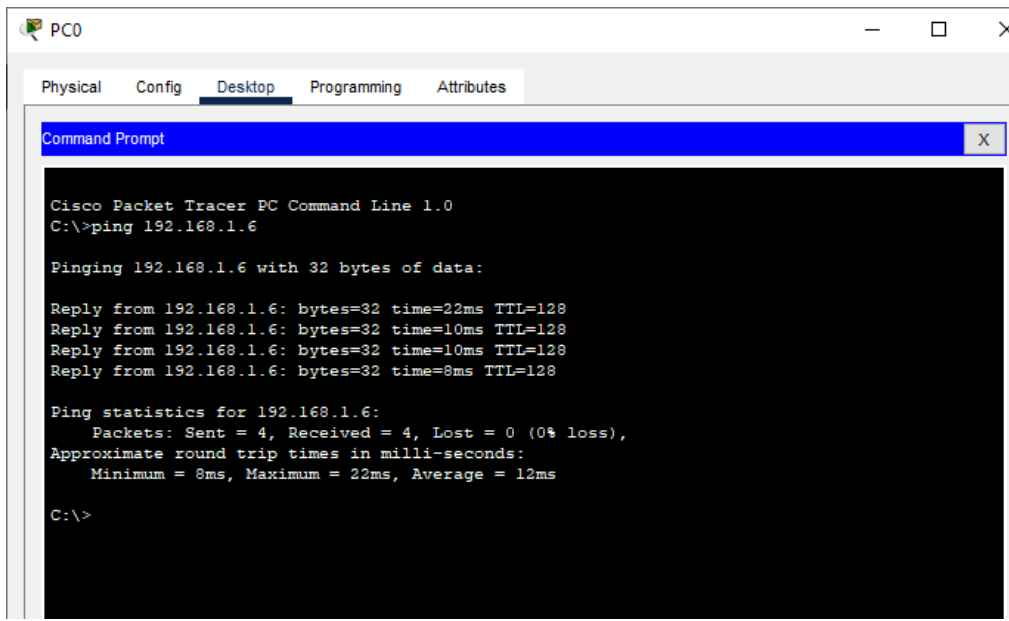
Field	Value
IPv4 Address	192.168.1.5
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1
DNS Server	0.0.0.0
IPv6 Configuration	Static
IPv6 Address	
Link Local Address	FE80::2E0:F9FF:FE12:4387
Default Gateway	
DNS Server	

## Configure Laptop0:

The screenshot shows the configuration window for Laptop0. The 'Desktop' tab is selected. The 'IP Configuration' window is open, showing the configuration for the 'Wireless0' interface. The 'Static' radio button is selected under 'IP Configuration'. The fields are filled with the following values:

Field	Value
IPv4 Address	192.168.1.6
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1
DNS Server	0.0.0.0
IPv6 Configuration	Static
IPv6 Address	
Link Local Address	FE80::20A:F3FF:FE79:78EB
Default Gateway	
DNS Server	

### **Checking the connectivity (pinging laptop0 from PC0):**



The screenshot shows a Cisco Packet Tracer interface for PC0. The 'Desktop' tab is selected, displaying a 'Command Prompt' window. The window title is 'Command Prompt' with a close button. The text inside the window is as follows:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.6

Pinging 192.168.1.6 with 32 bytes of data:

Reply from 192.168.1.6: bytes=32 time=22ms TTL=128
Reply from 192.168.1.6: bytes=32 time=10ms TTL=128
Reply from 192.168.1.6: bytes=32 time=10ms TTL=128
Reply from 192.168.1.6: bytes=32 time=8ms TTL=128

Ping statistics for 192.168.1.6:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 8ms, Maximum = 22ms, Average = 12ms

C:\>
```

Similarly the ping message can be checked for all the devices

### **Result:**

Hence the Connectivity of the network has been verified.

## Practical No 5

**Aim:** Using Packet Tracer to create a network with three routers with RIPv1 and each router associated network will have minimum three PC and show the connectivity

### **Theory:**

RIP is one of the dynamic routing protocols and the first distance-vector routing protocol that uses the hop count as a routing metric. A lower hop count is preferred.

Each router between the source and destination network is counted as one hop. RIP prevents routing loops by imposing a maximum number of hops on the path between source and destination.

In RIP, Every 30 seconds, each router broadcasts its entire routing table to its nearest neighbors.

### **Pros and Cons of RIP Protocol**

#### **Pros:**

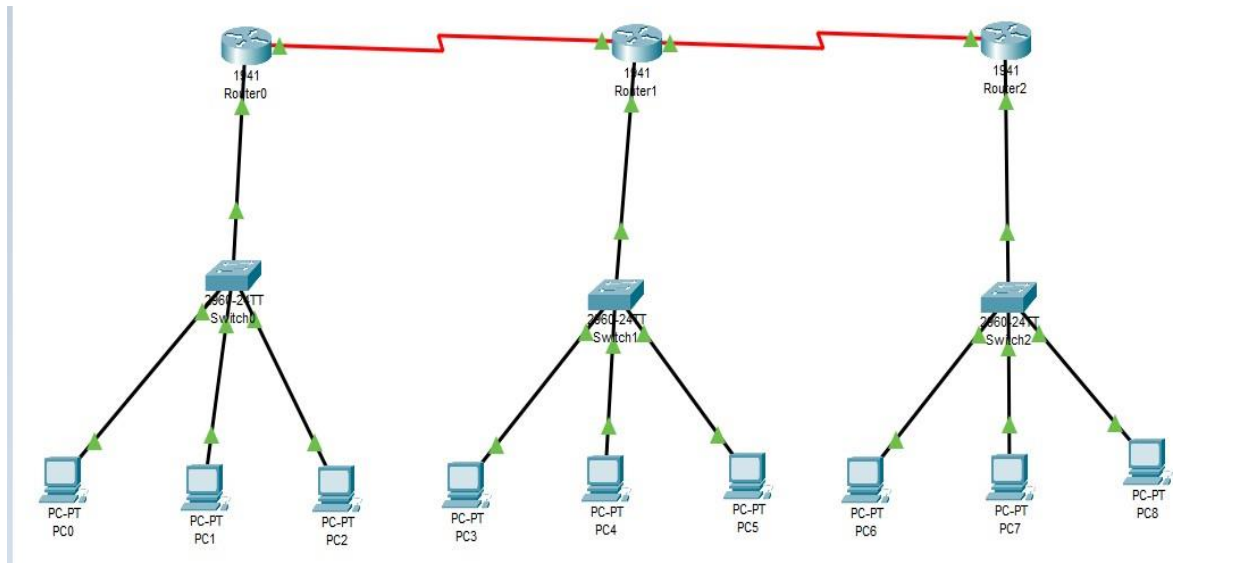
1. The RIP protocol is ideal for small networks since it is simple to learn and configure.
2. RIP routing is guaranteed to work with nearly all routers.
3. When the network topology changes, RIP does not require an update.

#### **Cons:**

1. RIP does not support variable length subnet masks
2. RIP transmits updates every 30 seconds, which cause traffic and consumes bandwidth.
3. RIP hop counts are restricted to 15, hence any router beyond that distance is deemed infinity and becomes unreachable.
4. The rate of convergence is slow in RIP compared to other routing protocols. When a link fails, finding alternate network paths takes a long time.
5. RIP does not support multiple paths on the same route, which may result in extra routing loops.



We use the following topology for the present case

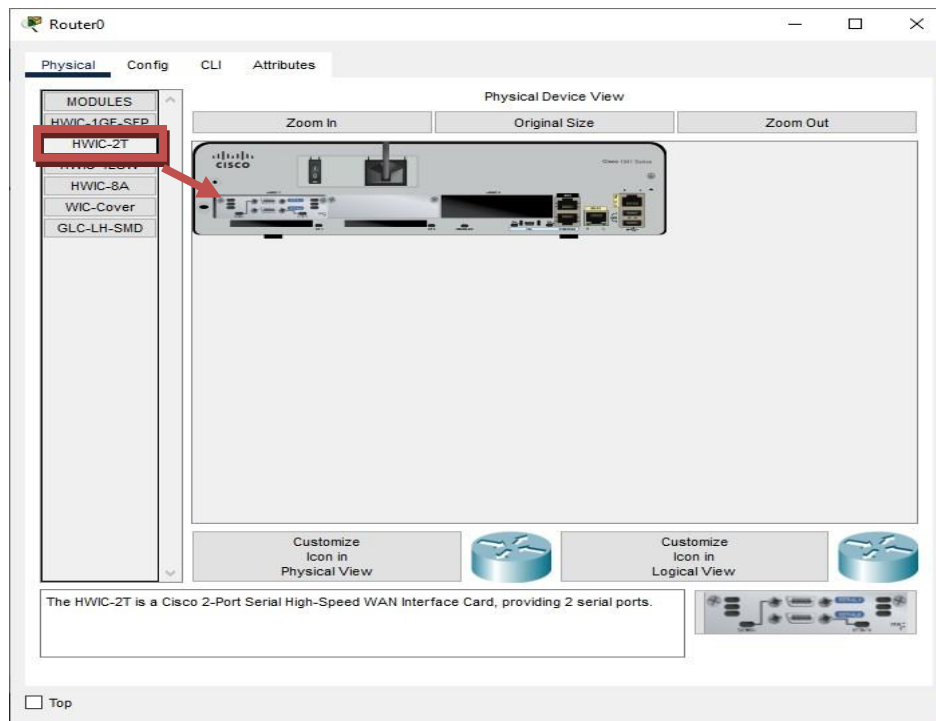


We configure the above network using the following IP addresses

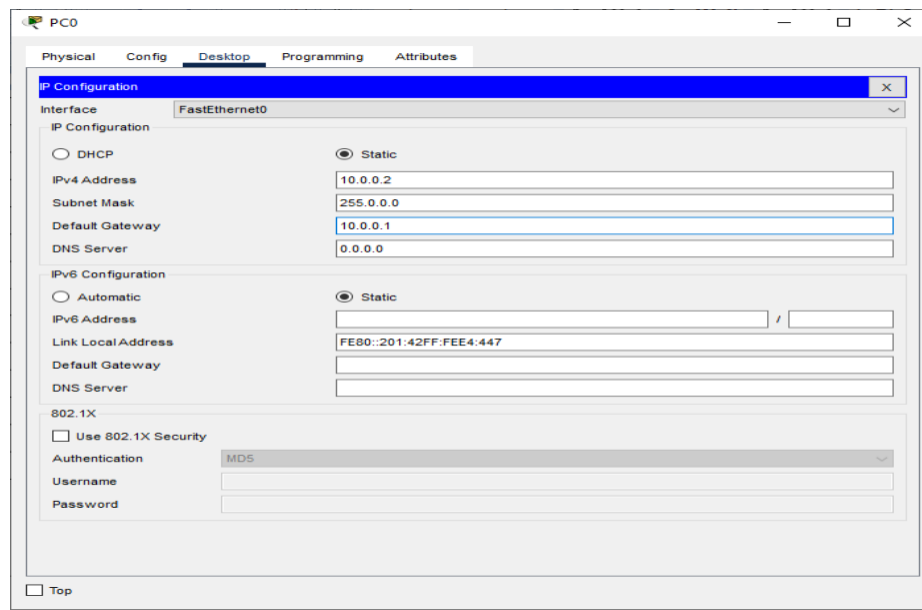
Host	Interface	IP address	Network Address	Default Gateway
Router 0	G0/0	10.0.0.1	10.0.0.0	
	S0/1/0	192.168.0.1	192.168.0.0	
Router 1	G0/0	20.0.0.1	20.0.0.0	
	S0/1/0	192.168.0.2	192.168.0.0	
	S0/1/1	192.168.1.1	192.168.1.0	
Router 2	G0/0	30.0.0.1	30.0.0.0	
	S0/1/1	192.168.1.2	192.168.1.0	
PC0	FastEthernet 0	10.0.0.2	10.0.0.0	10.0.0.1
PC1	FastEthernet 0	10.0.0.3	10.0.0.0	10.0.0.1
PC2	FastEthernet 0	10.0.0.4	10.0.0.0	10.0.0.1
PC3	FastEthernet 0	20.0.0.2	20.0.0.0	20.0.0.1
PC4	FastEthernet 0	20.0.0.3	20.0.0.0	20.0.0.1
PC5	FastEthernet 0	20.0.0.4	20.0.0.0	20.0.0.1

PC6	FastEthernet 0	30.0.0.2	30.0.0.0	30.0.0.1
PC7	FastEthernet 0	30.0.0.3	30.0.0.0	30.0.0.1
PC8	FastEthernet 0	30.0.0.4	30.0.0.0	30.0.0.1

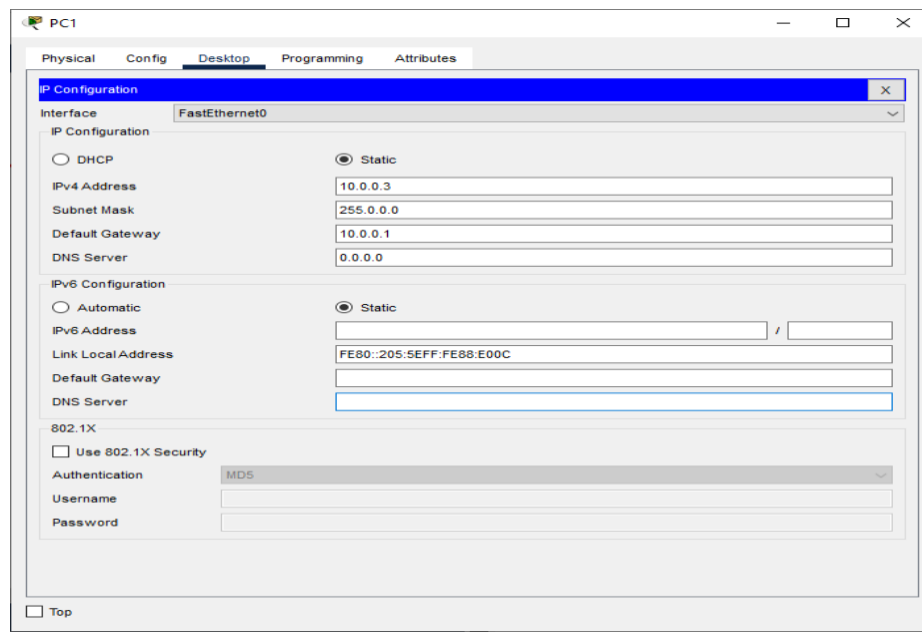
## Adding Serial Interface in each Router



## Configuring PC0:



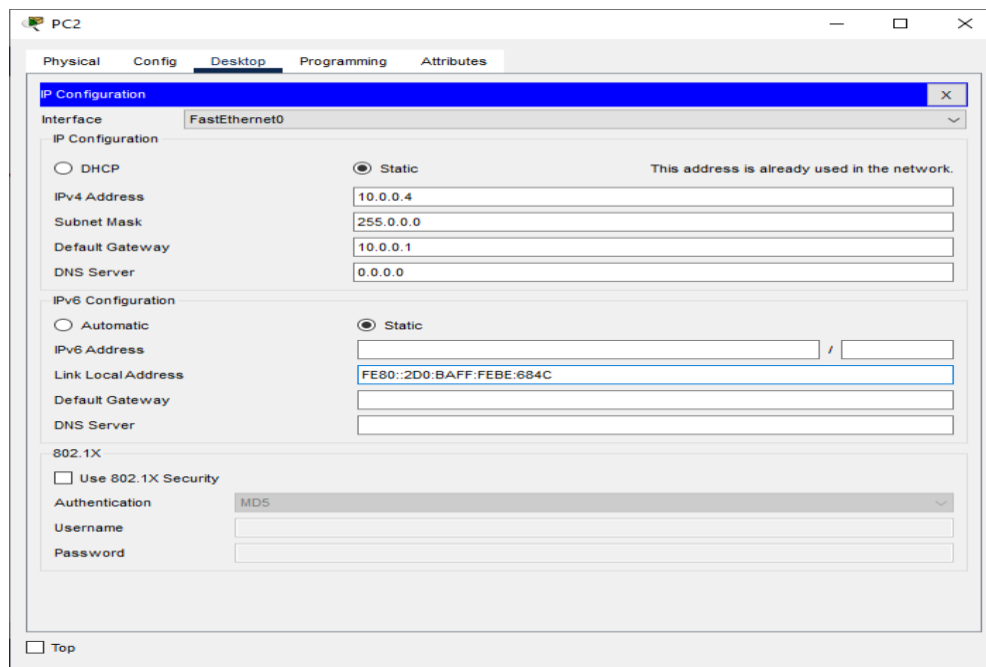
## Configuring PC1:



The screenshot shows the 'PC1' configuration window with the 'Desktop' tab selected. The 'IP Configuration' section is expanded, showing settings for the 'FastEthernet0' interface. The 'Static' radio button is selected for both IPv4 and IPv6 configurations. The IPv4 address is set to 10.0.0.3, subnet mask to 255.0.0.0, default gateway to 10.0.0.1, and DNS server to 0.0.0.0. The IPv6 address is set to FE80::205:5EFF:FE88:E00C, and the link local address is FE80::205:5EFF:FE88:E00C. The '802.1X' section is also visible, with 'Use 802.1X Security' unchecked and 'Authentication' set to 'MD5'.

Field	Value
Interface	FastEthernet0
IP Configuration	
<input type="radio"/> DHCP	
<input checked="" type="radio"/> Static	
IPv4 Address	10.0.0.3
Subnet Mask	255.0.0.0
Default Gateway	10.0.0.1
DNS Server	0.0.0.0
IPv6 Configuration	
<input type="radio"/> Automatic	
<input checked="" type="radio"/> Static	
IPv6 Address	
Link Local Address	FE80::205:5EFF:FE88:E00C
Default Gateway	
DNS Server	
802.1X	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MD5
Username	
Password	

## Configuring PC2:



The screenshot shows the 'PC2' configuration window with the 'Desktop' tab selected. The 'IP Configuration' section is expanded, showing settings for the 'FastEthernet0' interface. The 'Static' radio button is selected for both IPv4 and IPv6 configurations. The IPv4 address is set to 10.0.0.4, subnet mask to 255.0.0.0, default gateway to 10.0.0.1, and DNS server to 0.0.0.0. The IPv6 address is set to FE80::2D0:BAFF:FE8E:684C, and the link local address is FE80::2D0:BAFF:FE8E:684C. The '802.1X' section is also visible, with 'Use 802.1X Security' unchecked and 'Authentication' set to 'MD5'.

Field	Value
Interface	FastEthernet0
IP Configuration	
<input type="radio"/> DHCP	
<input checked="" type="radio"/> Static	This address is already used in the network.
IPv4 Address	10.0.0.4
Subnet Mask	255.0.0.0
Default Gateway	10.0.0.1
DNS Server	0.0.0.0
IPv6 Configuration	
<input type="radio"/> Automatic	
<input checked="" type="radio"/> Static	
IPv6 Address	
Link Local Address	FE80::2D0:BAFF:FE8E:684C
Default Gateway	
DNS Server	
802.1X	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MD5
Username	
Password	

The screenshot shows the configuration window for PC3. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing settings for the 'FastEthernet0' interface. The 'Static' radio button is selected for both IPv4 and IPv6 configurations. The IPv4 address is set to 20.0.0.2, the subnet mask to 255.0.0.0, the default gateway to 20.0.0.1, and the DNS server to 0.0.0.0. The IPv6 address is empty, the link local address is FE80::202:17FF:FE81:A06, and the default gateway and DNS server are empty. The '802.1X' section is collapsed, and the 'Top' button is at the bottom left.

Interface	FastEthernet0
<b>IP Configuration</b>	
<input type="radio"/> DHCP <input checked="" type="radio"/> Static	
IPv4 Address	20.0.0.2
Subnet Mask	255.0.0.0
Default Gateway	20.0.0.1
DNS Server	0.0.0.0
<b>IPv6 Configuration</b>	
<input type="radio"/> Automatic <input checked="" type="radio"/> Static	
IPv6 Address	
Link Local Address	FE80::202:17FF:FE81:A06
Default Gateway	
DNS Server	
<b>802.1X</b>	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MDS
Username	
Password	

☐ Top

## Configuring PC4:

The screenshot shows the configuration window for PC4. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing settings for the 'FastEthernet0' interface. The 'Static' radio button is selected for both IPv4 and IPv6 configurations. The IPv4 address is set to 20.0.0.3, the subnet mask to 255.0.0.0, the default gateway to 20.0.0.1, and the DNS server to 0.0.0.0. The IPv6 address is empty, the link local address is FE80::20A:41FF:FE13:AB7E, and the default gateway and DNS server are empty. The '802.1X' section is collapsed, and the 'Top' button is at the bottom left.

Interface	FastEthernet0
<b>IP Configuration</b>	
<input type="radio"/> DHCP <input checked="" type="radio"/> Static	
IPv4 Address	20.0.0.3
Subnet Mask	255.0.0.0
Default Gateway	20.0.0.1
DNS Server	0.0.0.0
<b>IPv6 Configuration</b>	
<input type="radio"/> Automatic <input checked="" type="radio"/> Static	
IPv6 Address	
Link Local Address	FE80::20A:41FF:FE13:AB7E
Default Gateway	
DNS Server	
<b>802.1X</b>	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MDS
Username	
Password	

☐ Top

The screenshot shows the configuration window for PC5. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing the 'FastEthernet0' interface. The 'Static' radio button is selected for both IPv4 and IPv6 configurations. The IPv4 configuration fields are filled with: IPv4 Address: 20.0.0.4, Subnet Mask: 255.0.0.0, Default Gateway: 20.0.0.1, and DNS Server: 0.0.0.0. The IPv6 configuration fields are: IPv6 Address: (empty), Link Local Address: FE80::2E0:F9FF:FE0D:3AA, Default Gateway: (empty), and DNS Server: (empty). The '802.1X' section is also visible, with 'Use 802.1X Security' unchecked, 'Authentication' set to 'MD5', and 'Username' and 'Password' fields empty.

PC5

Physical Config **Desktop** Programming Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address: 20.0.0.4

Subnet Mask: 255.0.0.0

Default Gateway: 20.0.0.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address: /

Link Local Address: FE80::2E0:F9FF:FE0D:3AA

Default Gateway:

DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

☐ Top

Configuring PC6:

The screenshot shows the configuration window for PC6. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing the 'FastEthernet0' interface. The 'Static' radio button is selected for both IPv4 and IPv6 configurations. The IPv4 configuration fields are filled with: IPv4 Address: 30.0.0.2, Subnet Mask: 255.0.0.0, Default Gateway: 30.0.0.1, and DNS Server: 0.0.0.0. The IPv6 configuration fields are: IPv6 Address: (empty), Link Local Address: FE80::2E0:F9FF:FE9A:D3AA, Default Gateway: (empty), and DNS Server: (empty). The '802.1X' section is also visible, with 'Use 802.1X Security' unchecked, 'Authentication' set to 'MD5', and 'Username' and 'Password' fields empty.

PC6

Physical Config **Desktop** Programming Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address: 30.0.0.2

Subnet Mask: 255.0.0.0

Default Gateway: 30.0.0.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address: /

Link Local Address: FE80::2E0:F9FF:FE9A:D3AA

Default Gateway:

DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

☐ Top

## Configuring PC7:

The screenshot shows the configuration window for PC7. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing settings for the 'FastEthernet0' interface. The 'Static' radio button is selected for both IPv4 and IPv6 configurations. The IPv4 address is set to 30.0.0.3, the subnet mask to 255.0.0.0, the default gateway to 30.0.0.1, and the DNS server to 0.0.0.0. The IPv6 address is set to FE80::201:C9FF:FEDC:D846, and the link local address is set to FE80::201:C9FF:FEDC:D846. The '802.1X' section is also visible, with 'Use 802.1X Security' unchecked, 'Authentication' set to 'MD5', and 'Username' and 'Password' fields empty.

PC7

Physical Config **Desktop** Programming Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address: 30.0.0.3

Subnet Mask: 255.0.0.0

Default Gateway: 30.0.0.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address: /

Link Local Address: FE80::201:C9FF:FEDC:D846

Default Gateway:

DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

☐ Top

## Configuring PC8:

The screenshot shows the configuration window for PC8. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing settings for the 'FastEthernet0' interface. The 'Static' radio button is selected for both IPv4 and IPv6 configurations. The IPv4 address is set to 30.0.0.4, the subnet mask to 255.0.0.0, the default gateway to 30.0.0.1, and the DNS server to 0.0.0.0. The IPv6 address is set to FE80::260:3EFF:FE25:E1BE, and the link local address is set to FE80::260:3EFF:FE25:E1BE. The '802.1X' section is also visible, with 'Use 802.1X Security' unchecked, 'Authentication' set to 'MD5', and 'Username' and 'Password' fields empty.

PC8

Physical Config **Desktop** Programming Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address: 30.0.0.4

Subnet Mask: 255.0.0.0

Default Gateway: 30.0.0.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address: /

Link Local Address: FE80::260:3EFF:FE25:E1BE

Default Gateway:

DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

☐ Top

### **Configuring Router 0 (using the CLI mode)**

```
Router>en
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface gigabitEthernet 0/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface serial 0/1/0
Router(config-if)#ip address 192.168.0.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router#
```

### **Configuring Router 1 (using the CLI mode)**

```
Router>enable
Router#configure terminal
Router(config)#interface gigabitEthernet 0/0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit

Router(config)#interface serial 0/1/0
Router(config-if)#ip address 192.168.0.2 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit

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



### **Configuring Router 2 (using the CLI mode)**

```
Router>enable
Router#configure terminal
Router(config)#interface gigabitEthernet 0/0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit

Router(config)#interface serial 0/1/1
Router(config-if)#ip address 192.168.1.2 255.255.255.0
Router(config-if)#no shutdown
```

### **Setting the RIPv1 on Router 0**

```
Router>enable
Router#configure terminal
Router(config)#router rip
Router(config-router)#network 10.0.0.0
Router(config-router)#network 192.168.0.0
Router(config-router)#exit
```

### **Setting the RIPv1 on Router 1**

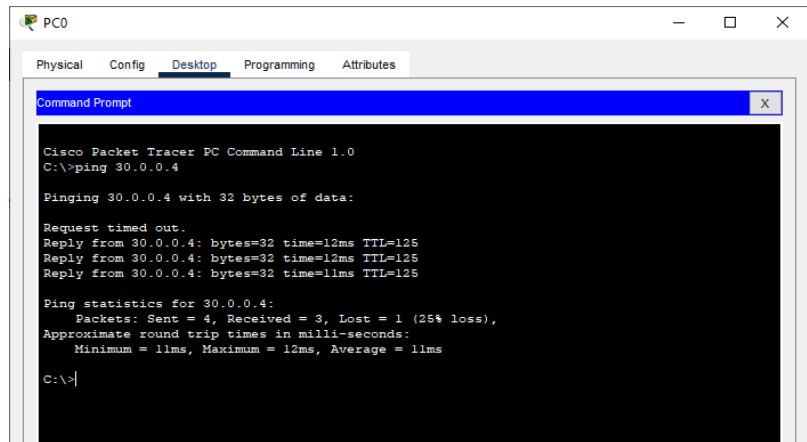
```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 192.168.0.0
Router(config-router)#network 20.0.0.0
Router(config-router)#network 192.168.1.0
Router(config-router)#exit
Router(config)#
Router#
```

### **Setting the RIPv1 on Router 2**

```
Router>enable
Router#configure terminal
Router(config)#router rip
Router(config-router)#network 192.168.1.0
Router(config-router)#network 30.0.0.0
Router(config-router)#exit
Router(config)#
```

## Checking the connectivity by using the ping command

Pinging PC8 (ip address 30.0.0.4) from PC0



```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 30.0.0.4

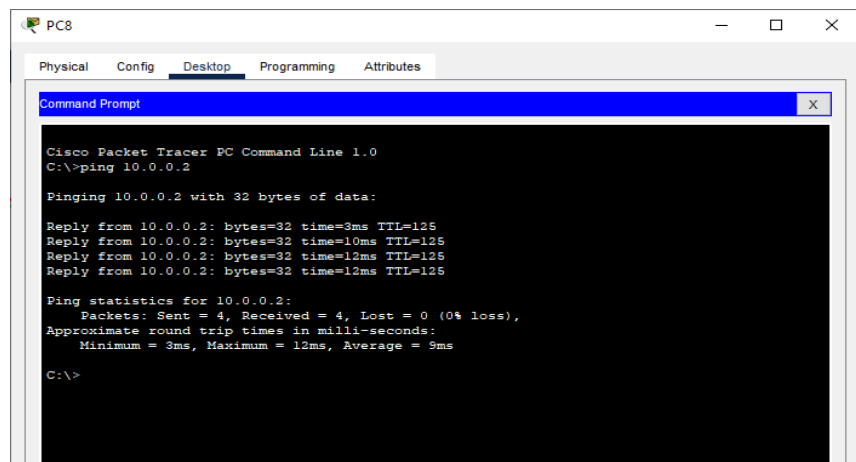
Pinging 30.0.0.4 with 32 bytes of data:

Request timed out.
Reply from 30.0.0.4: bytes=32 time=12ms TTL=125
Reply from 30.0.0.4: bytes=32 time=12ms TTL=125
Reply from 30.0.0.4: bytes=32 time=11ms TTL=125

Ping statistics for 30.0.0.4:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 11ms, Maximum = 12ms, Average = 11ms

C:\>
```

Pinging PC0 (ip address 10.0.0.2) from PC8



```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time=3ms TTL=125
Reply from 10.0.0.2: bytes=32 time=10ms TTL=125
Reply from 10.0.0.2: bytes=32 time=12ms TTL=125
Reply from 10.0.0.2: bytes=32 time=12ms TTL=125

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 3ms, Maximum = 12ms, Average = 9ms

C:\>
```

### Result:

Hence the RIPv1 has been studied and verified through the given network

## Practical No 6

**Aim:** Using Packet Tracer to create a network with three routers with RIPv2 and each router associated network will have minimum three PC and show the connectivity

### Theory:

RIPv2 is an enhancement to the original RIP protocol developed in 1994. RIPv2 is also a distance vector routing protocol but has a few enhancements to make it more efficient than RIPv1.

RIPv2 is more efficient than RIPv1, but is not suitable for larger, more complex networks. It simply provides more flexibility on smaller networks.

RIPv2 uses the same routing metric as RIPv1, the hop count. Updates with RIPv2 are sent via multicasts and not broadcasts. RIPv2 can also be configured to do classless routing. When configured for classless routing, RIPv2 will transmit subnet masks when it sends routing updates. This allows for the use of subnetting and discontinuous networks.

RIPv2 allows for authentication to be required for updates. When authentication is enabled, each router is configured with the RIP update password. The password sent with the RIP update must match the password configured on the destination router. If the passwords do not match, then the receiving router will not process the update.

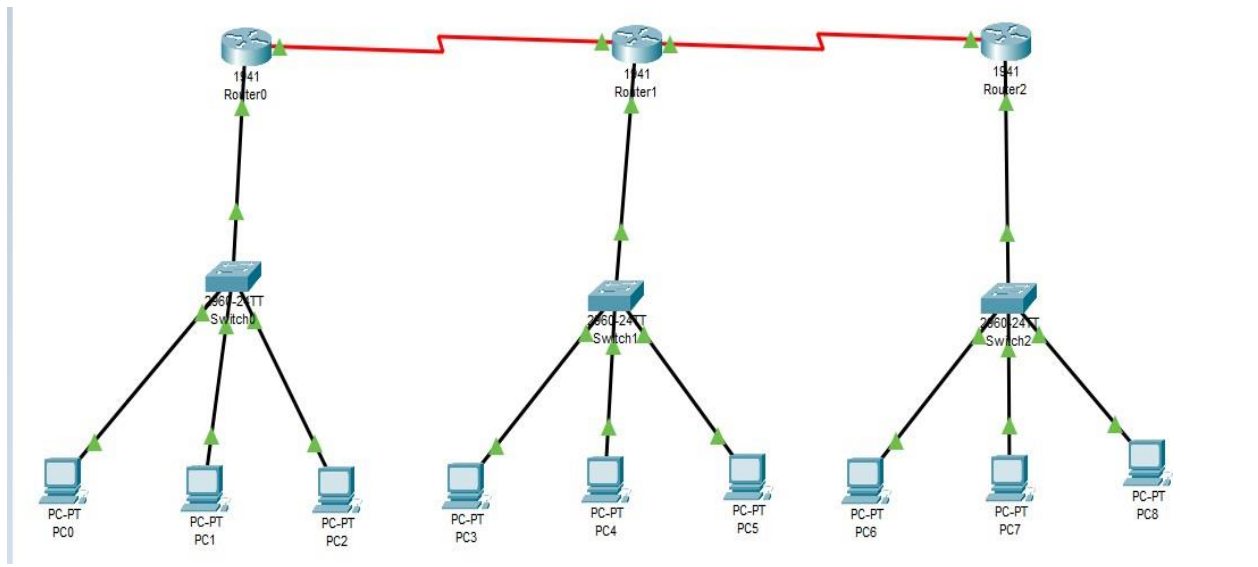
### Advantages of RIPv2

- 1) It's a standardized protocol.
- 2) It's VLSM compliant.
- 3) Provides fast convergence.
- 4) It sends triggered updates when the network changes.
- 5) Works with snapshot routing – making it ideal for dial networks.

### Disadvantage of RIPv2

- 1) Max hop count of 15, due to the 'count-to-infinity' vulnerability.
- 2) No concept of neighbors.
- 3) Exchanges entire table with all neighbors every 30 seconds (except in the case of a triggered update).

We use the following topology for the present case

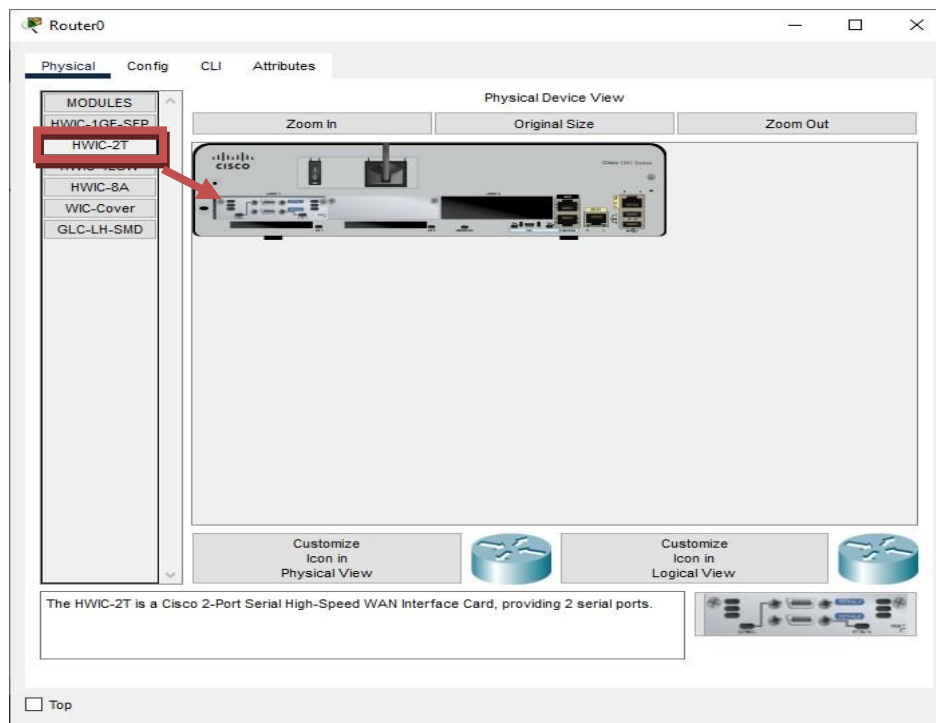


We configure the above network using the following IP addresses

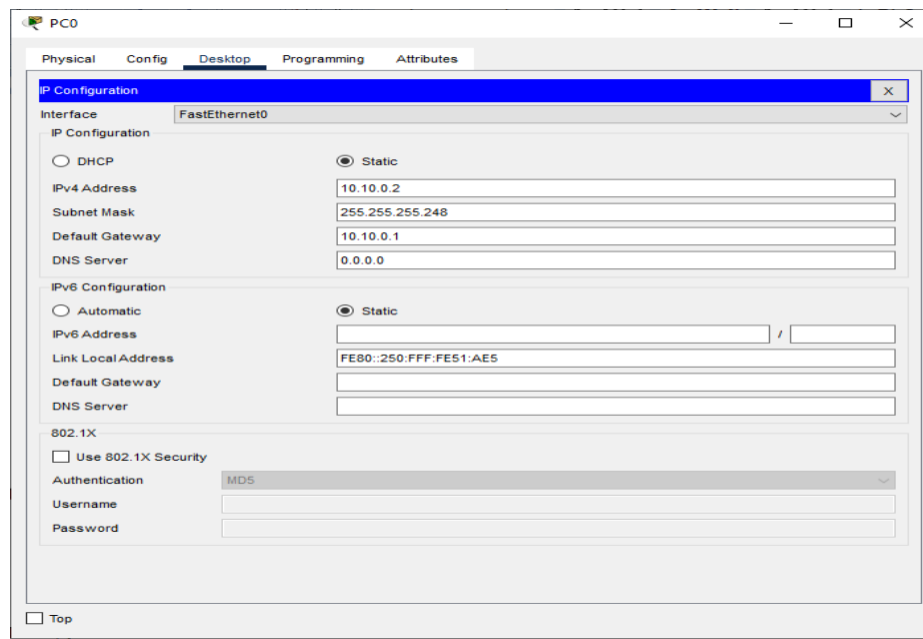
Host	Interface	IP address	Subnet Mask	Network Address	Default Gateway
Router 0	G0/0	10.10.0.1	255.255.255.248	10.10.0.0	
	S0/1/0	192.168.0.1	255.255.255.252	192.168.0.0	
Router 1	G0/0	10.20.0.1	255.255.255.248	10.20.0.0	
	S0/1/0	192.168.0.2	255.255.255.252	192.168.0.0	
	S0/1/1	192.168.1.1	255.255.255.252	192.168.1.0	
Router 2	G0/0	10.30.0.1	255.255.255.248	10.30.0.0	
	S0/1/1	192.168.1.2	255.255.255.252	192.168.1.0	
PC0	FastEthernet 0	10.10.0.2	255.255.255.248	10.10.0.0	10.10.0.1
PC1	FastEthernet 0	10.10.0.3	255.255.255.248	10.10.0.0	10.10.0.1
PC2	FastEthernet 0	10.10.0.4	255.255.255.248	10.10.0.0	10.10.0.1
PC3	FastEthernet 0	10.20.0.2	255.255.255.248	10.20.0.0	10.20.0.1
PC4	FastEthernet 0	10.20.0.3	255.255.255.248	10.20.0.0	10.20.0.1
PC5	FastEthernet	10.20.0.4	255.255.255.248	10.20.0.0	10.20.0.1

	0				
PC6	FastEthernet 0	10.30.0.2	255.255.255.248	10.30.0.0	10.30.0.1
PC7	FastEthernet 0	10.30.0.3	255.255.255.248	10.30.0.0	10.30.0.1
PC8	FastEthernet 0	10.30.0.4	255.255.255.248	10.30.0.0	10.30.0.1

## Adding Serial Interface in each Router



## Configuring PC0:



## Configuring PC1:

The screenshot shows the 'PC1' configuration window with the 'Desktop' tab selected. The 'IP Configuration' section is expanded, showing settings for the 'FastEthernet0' interface. The 'Static' radio button is selected for both IPv4 and IPv6 configurations. The IPv4 configuration includes an address of 10.10.0.3, a subnet mask of 255.255.255.248, a default gateway of 10.10.0.1, and a DNS server of 0.0.0.0. The IPv6 configuration includes a static address, a link local address of FE80::2D0:BAFF:FEA4:5B72, and empty fields for default gateway and DNS server. The 802.1X section is collapsed, showing a checkbox for 'Use 802.1X Security' which is unchecked, and a dropdown for 'Authentication' set to 'MD5'.

Interface	FastEthernet0
<b>IP Configuration</b>	
<input type="radio"/> DHCP	<input checked="" type="radio"/> Static
IPv4 Address	10.10.0.3
Subnet Mask	255.255.255.248
Default Gateway	10.10.0.1
DNS Server	0.0.0.0
<b>IPv6 Configuration</b>	
<input type="radio"/> Automatic	<input checked="" type="radio"/> Static
IPv6 Address	
Link Local Address	FE80::2D0:BAFF:FEA4:5B72
Default Gateway	
DNS Server	
<b>802.1X</b>	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MD5
Username	
Password	

☐ Top

## Configuring PC2:

The screenshot shows the 'PC2' configuration window with the 'Desktop' tab selected. The 'IP Configuration' section is expanded, showing settings for the 'FastEthernet0' interface. The 'Static' radio button is selected for both IPv4 and IPv6 configurations. The IPv4 configuration includes an address of 10.10.0.4, a subnet mask of 255.255.255.248, a default gateway of 10.10.0.1, and a DNS server of 0.0.0.0. The IPv6 configuration includes a static address, a link local address of FE80::2D0:BCFF:FE33:A758, and empty fields for default gateway and DNS server. The 802.1X section is collapsed, showing a checkbox for 'Use 802.1X Security' which is unchecked, and a dropdown for 'Authentication' set to 'MD5'.

Interface	FastEthernet0
<b>IP Configuration</b>	
<input type="radio"/> DHCP	<input checked="" type="radio"/> Static
IPv4 Address	10.10.0.4
Subnet Mask	255.255.255.248
Default Gateway	10.10.0.1
DNS Server	0.0.0.0
<b>IPv6 Configuration</b>	
<input type="radio"/> Automatic	<input checked="" type="radio"/> Static
IPv6 Address	
Link Local Address	FE80::2D0:BCFF:FE33:A758
Default Gateway	
DNS Server	
<b>802.1X</b>	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MD5
Username	
Password	

☐ Top

## Configuring PC3:

The screenshot shows the configuration window for PC3. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing the 'FastEthernet0' interface. The 'IP Configuration' section has two radio buttons: 'DHCP' (unselected) and 'Static' (selected). Below these are four text input fields: 'IPv4 Address' (10.20.0.2), 'Subnet Mask' (255.255.255.248), 'Default Gateway' (10.20.0.1), and 'DNS Server' (0.0.0.0). The 'IPv6 Configuration' section also has two radio buttons: 'Automatic' (unselected) and 'Static' (selected). Below these are four text input fields: 'IPv6 Address' (empty), 'Link Local Address' (FE80::2E0:8FFF:FE7E:6379), 'Default Gateway' (empty), and 'DNS Server' (empty). The '802.1X' section has a checkbox 'Use 802.1X Security' (unchecked), a dropdown menu 'Authentication' (MD5), and two text input fields 'Username' and 'Password' (both empty). A 'Top' button is at the bottom left.

## Configuring PC4:

The screenshot shows the configuration window for PC4. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing the 'FastEthernet0' interface. The 'IP Configuration' section has two radio buttons: 'DHCP' (unselected) and 'Static' (selected). Below these are four text input fields: 'IPv4 Address' (10.20.0.3), 'Subnet Mask' (255.255.255.248), 'Default Gateway' (10.20.0.1), and 'DNS Server' (0.0.0.0). The 'IPv6 Configuration' section also has two radio buttons: 'Automatic' (unselected) and 'Static' (selected). Below these are four text input fields: 'IPv6 Address' (empty), 'Link Local Address' (FE80::2D0:FFFF:FE8B:2C17), 'Default Gateway' (empty), and 'DNS Server' (empty). The '802.1X' section has a checkbox 'Use 802.1X Security' (unchecked), a dropdown menu 'Authentication' (MD5), and two text input fields 'Username' and 'Password' (both empty). A 'Top' button is at the bottom left.



The screenshot shows the configuration window for PC5. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing the configuration for the 'FastEthernet0' interface. The 'Static' radio button is selected for both IPv4 and IPv6 configurations.

Field	Value
Interface	FastEthernet0
IP Configuration	
<input type="radio"/> DHCP	<input checked="" type="radio"/> Static
IPv4 Address	10.20.0.4
Subnet Mask	255.0.0.0
Default Gateway	10.20.0.1
DNS Server	0.0.0.0
IPv6 Configuration	
<input type="radio"/> Automatic	<input checked="" type="radio"/> Static
IPv6 Address	
Link Local Address	FE80::230:F2FF:FE77:CBE7
Default Gateway	
DNS Server	
802.1X	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MD5
Username	
Password	

☐ Top

## Configuring PC6:

The screenshot shows the configuration window for PC6. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing the configuration for the 'FastEthernet0' interface. The 'Static' radio button is selected for both IPv4 and IPv6 configurations.

Field	Value
Interface	FastEthernet0
IP Configuration	
<input type="radio"/> DHCP	<input checked="" type="radio"/> Static
IPv4 Address	10.30.0.2
Subnet Mask	255.255.255.248
Default Gateway	10.30.0.1
DNS Server	0.0.0.0
IPv6 Configuration	
<input type="radio"/> Automatic	<input checked="" type="radio"/> Static
IPv6 Address	
Link Local Address	FE80::200:CFF:FE40:DCD0
Default Gateway	
DNS Server	
802.1X	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MD5
Username	
Password	

☐ Top

## Configuring PC7:

The screenshot shows the configuration window for PC7. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing the 'FastEthernet0' interface. The 'IP Configuration' section has two radio buttons: 'DHCP' (unselected) and 'Static' (selected). Below these are four text fields: 'IPv4 Address' (10.30.0.3), 'Subnet Mask' (255.0.0.0), 'Default Gateway' (10.30.0.1), and 'DNS Server' (0.0.0.0). The 'IPv6 Configuration' section also has two radio buttons: 'Automatic' (unselected) and 'Static' (selected). Below these are four text fields: 'IPv6 Address' (empty), 'Link Local Address' (FE80::202:4AFF:FE4A:9D36), 'Default Gateway' (empty), and 'DNS Server' (empty). The '802.1X' section has a checkbox 'Use 802.1X Security' (unchecked), a dropdown 'Authentication' (MD5), and two text fields 'Username' and 'Password' (both empty). A 'Top' button is at the bottom left.

PC7

Physical Config **Desktop** Programming Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address: 10.30.0.3

Subnet Mask: 255.0.0.0

Default Gateway: 10.30.0.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address: /

Link Local Address: FE80::202:4AFF:FE4A:9D36

Default Gateway:

DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

☐ Top

## Configuring PC8:

The screenshot shows the configuration window for PC8. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing the 'FastEthernet0' interface. The 'IP Configuration' section has two radio buttons: 'DHCP' (unselected) and 'Static' (selected). Below these are four text fields: 'IPv4 Address' (10.30.0.4), 'Subnet Mask' (255.0.0.0), 'Default Gateway' (10.30.0.1), and 'DNS Server' (0.0.0.0). The 'IPv6 Configuration' section also has two radio buttons: 'Automatic' (unselected) and 'Static' (selected). Below these are four text fields: 'IPv6 Address' (empty), 'Link Local Address' (FE80::240:BFF:FE65:D944), 'Default Gateway' (empty), and 'DNS Server' (empty). The '802.1X' section has a checkbox 'Use 802.1X Security' (unchecked), a dropdown 'Authentication' (MD5), and two text fields 'Username' and 'Password' (both empty). A 'Top' button is at the bottom left.

PC8

Physical Config **Desktop** Programming Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address: 10.30.0.4

Subnet Mask: 255.0.0.0

Default Gateway: 10.30.0.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address: /

Link Local Address: FE80::240:BFF:FE65:D944

Default Gateway:

DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

☐ Top

## Configuring IP addresses on Router 0

### i) Interface G0/0

The screenshot shows the configuration window for Router0, specifically for the GigabitEthernet0/0 interface. The left sidebar lists various configuration categories: GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, SWITCHING, VLAN Database, and INTERFACE. Under the INTERFACE category, GigabitEthernet0/0 is selected. The main configuration area for GigabitEthernet0/0 includes the following settings:

- Port Status: ☒ On
- Bandwidth: ☐ 1000 Mbps ☒ 100 Mbps ☐ 10 Mbps ☒ Auto
- Duplex: ☐ Half Duplex ☒ Full Duplex ☒ Auto
- MAC Address: 0090.0C15.A101
- IP Configuration:
  - IPv4 Address: 10.10.0.1
  - Subnet Mask: 255.255.255.248
- Tx Ring Limit: 10

### ii) Interface S0/1/0

The screenshot shows the configuration window for Router0, specifically for the Serial0/1/0 interface. The left sidebar lists various configuration categories: GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, SWITCHING, VLAN Database, and INTERFACE. Under the INTERFACE category, Serial0/1/0 is selected. The main configuration area for Serial0/1/0 includes the following settings:

- Port Status: ☒ On
- Duplex: ☒ Full Duplex
- Clock Rate: 1200
- IP Configuration:
  - IPv4 Address: 192.168.0.1
  - Subnet Mask: 255.255.255.252
- Tx Ring Limit: 10

## Configuring IP addresses on Router 1

### i) Interface G0/0

The screenshot shows the configuration window for Router1, specifically the 'Config' tab for the GigabitEthernet0/0 interface. The left sidebar lists various configuration categories: GLOBAL, Settings, Algorithm Settings, ROUTING (Static, RIP), SWITCHING (VLAN Database), and INTERFACE (GigabitEthernet0/0, GigabitEthernet0/1, Serial0/1/0, Serial0/1/1). The main area displays the configuration for GigabitEthernet0/0. The Port Status is checked 'On'. Bandwidth is set to 100 Mbps (selected) with Auto checked. Duplex is set to Full Duplex (selected) with Auto checked. The MAC Address is 0001.9670.9B01. The IP Configuration section shows the IPv4 Address as 10.20.0.1 and the Subnet Mask as 255.255.255.248. The Tx Ring Limit is set to 10.

Category	Value
Port Status	<input checked="" type="checkbox"/> On
Bandwidth	<input type="radio"/> 1000 Mbps <input checked="" type="radio"/> 100 Mbps <input type="radio"/> 10 Mbps <input checked="" type="checkbox"/> Auto
Duplex	<input type="radio"/> Half Duplex <input checked="" type="radio"/> Full Duplex <input checked="" type="checkbox"/> Auto
MAC Address	0001.9670.9B01
IPv4 Address	10.20.0.1
Subnet Mask	255.255.255.248
Tx Ring Limit	10

### ii) Interface S0/1/0

The screenshot shows the configuration window for Router1, specifically the 'Config' tab for the Serial0/1/0 interface. The left sidebar lists various configuration categories: GLOBAL, Settings, Algorithm Settings, ROUTING (Static, RIP), SWITCHING (VLAN Database), and INTERFACE (GigabitEthernet0/0, GigabitEthernet0/1, Serial0/1/0, Serial0/1/1). The main area displays the configuration for Serial0/1/0. The Port Status is checked 'On'. Duplex is set to Full Duplex (selected). The Clock Rate is set to 2000000. The IP Configuration section shows the IPv4 Address as 192.168.0.2 and the Subnet Mask as 255.255.255.252. The Tx Ring Limit is set to 10.

Category	Value
Port Status	<input checked="" type="checkbox"/> On
Duplex	<input checked="" type="radio"/> Full Duplex
Clock Rate	2000000
IPv4 Address	192.168.0.2
Subnet Mask	255.255.255.252
Tx Ring Limit	10

## iii) Interface S0/1/1

The screenshot shows the configuration window for Router1, specifically for the Serial0/1/1 interface. The left sidebar contains a tree view with categories: GLOBAL, ROUTING, SWITCHING, and INTERFACE. Under the INTERFACE category, the Serial0/1/1 interface is selected. The main configuration area for Serial0/1/1 includes the following settings:

- Port Status: ☒ On
- Duplex: ☒ Full Duplex
- Clock Rate: 1200
- IP Configuration:
  - IPv4 Address: 192.168.1.1
  - Subnet Mask: 255.255.255.252
- Tx Ring Limit: 10

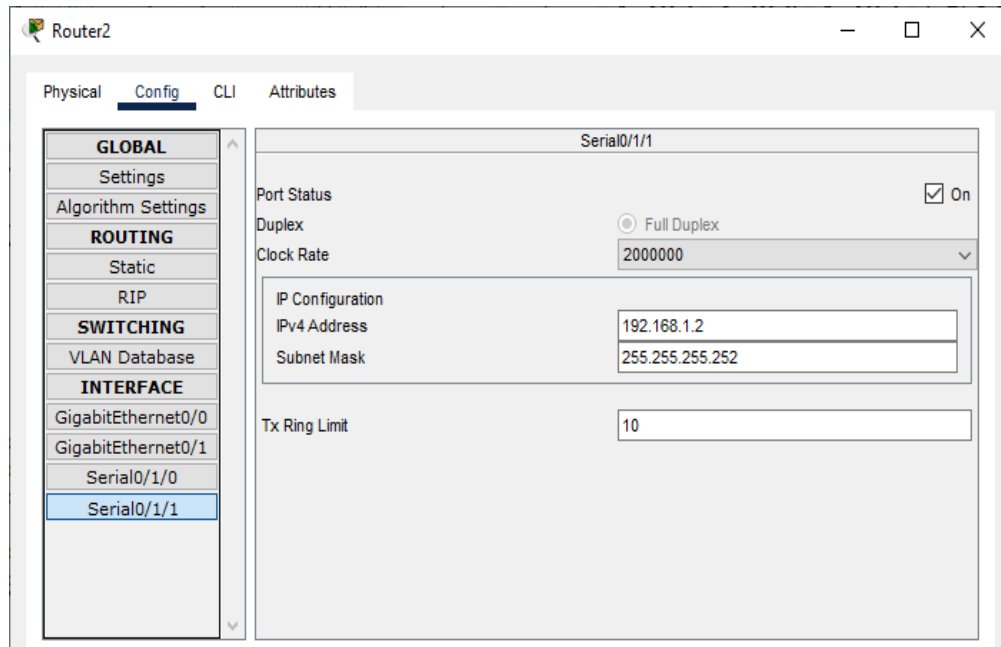
**Configuring IP addresses on Router 2**

## i) Interface G0/0

The screenshot shows the configuration window for Router2, specifically for the GigabitEthernet0/0 interface. The left sidebar contains a tree view with categories: GLOBAL, ROUTING, SWITCHING, and INTERFACE. Under the INTERFACE category, the GigabitEthernet0/0 interface is selected. The main configuration area for GigabitEthernet0/0 includes the following settings:

- Port Status: ☒ On
- Bandwidth: ☐ 1000 Mbps ☒ 100 Mbps ☐ 10 Mbps ☒ Auto
- Duplex: ☐ Half Duplex ☒ Full Duplex ☒ Auto
- MAC Address: 0030.A3B3.DA01
- IP Configuration:
  - IPv4 Address: 10.30.0.1
  - Subnet Mask: 255.255.255.248
- Tx Ring Limit: 10

## ii) Interface S0/1/1

**Configuring Router 0 for RIPv2 (using the CLI mode)**

```
Router>enable
Router#configure terminal
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#network 10.10.0.0
Router(config-router)#network 192.168.0.0
Router(config-router)#exit
Router(config)#
```

**Configuring Router 1 for RIPv2 (using the CLI mode)**

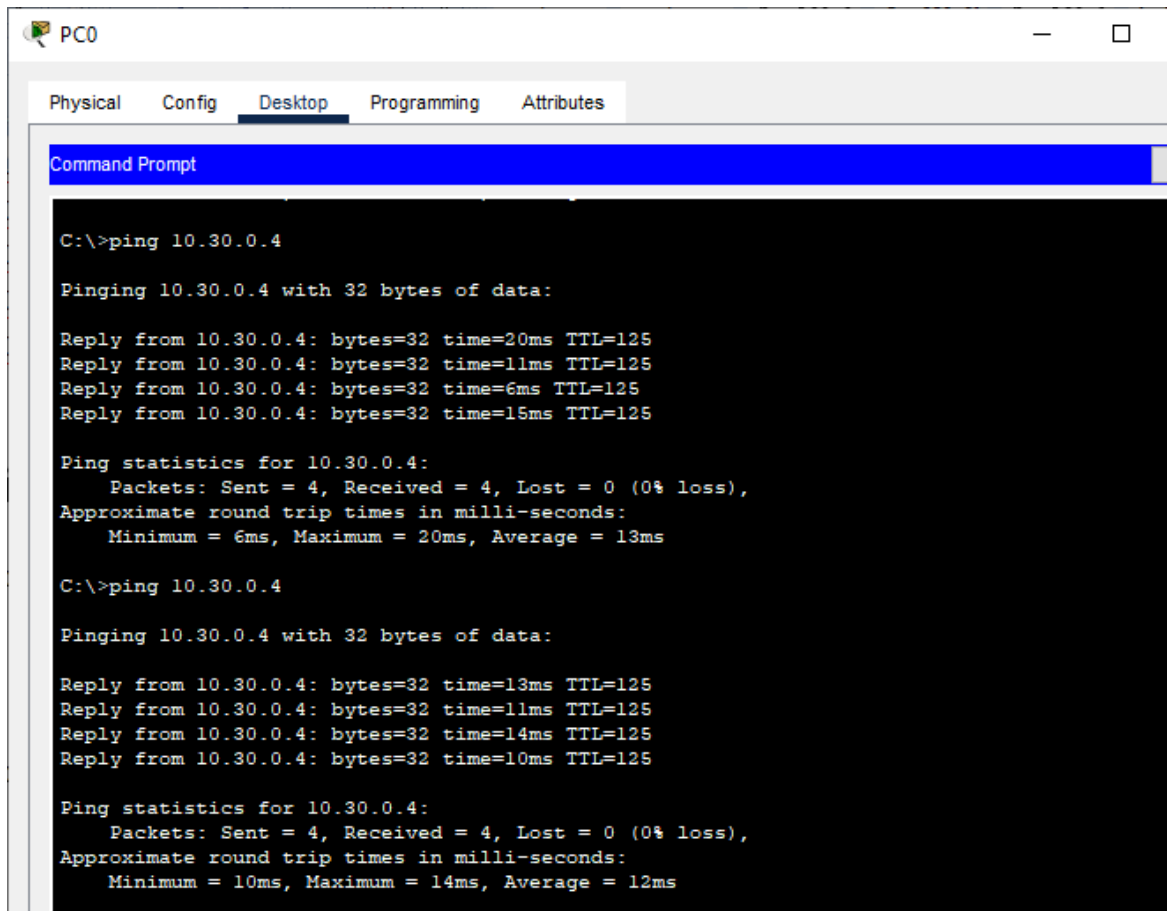
```
Router>enable
Router#configure terminal
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#network 10.20.0.0
Router(config-router)#network 192.168.0.0
Router(config-router)#network 192.168.1.0
Router(config-router)#exit
Router(config)#
```

## Configuring Router 2 for RIPv2 (using the CLI mode)

```
Router>enable
Router#configure terminal
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#network 10.30.0.0
Router(config-router)#network 192.168.1.0
Router(config-router)#exit
Router(config)#
```

## Checking the connectivity by using the ping command

- i) Pinging PC8 (ip address 10.30.0.4) from PC0



The screenshot shows a PC0 desktop environment with a taskbar at the top. The 'Desktop' tab is selected in the top navigation bar. A 'Command Prompt' window is open, displaying the results of two ping commands to the IP address 10.30.0.4. The first ping shows a successful connection with 4 packets sent and received, 0% loss, and round trip times ranging from 6ms to 20ms. The second ping also shows a successful connection with 4 packets sent and received, 0% loss, and round trip times ranging from 10ms to 14ms.

```
C:\>ping 10.30.0.4

Pinging 10.30.0.4 with 32 bytes of data:

Reply from 10.30.0.4: bytes=32 time=20ms TTL=125
Reply from 10.30.0.4: bytes=32 time=11ms TTL=125
Reply from 10.30.0.4: bytes=32 time=6ms TTL=125
Reply from 10.30.0.4: bytes=32 time=15ms TTL=125

Ping statistics for 10.30.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 6ms, Maximum = 20ms, Average = 13ms

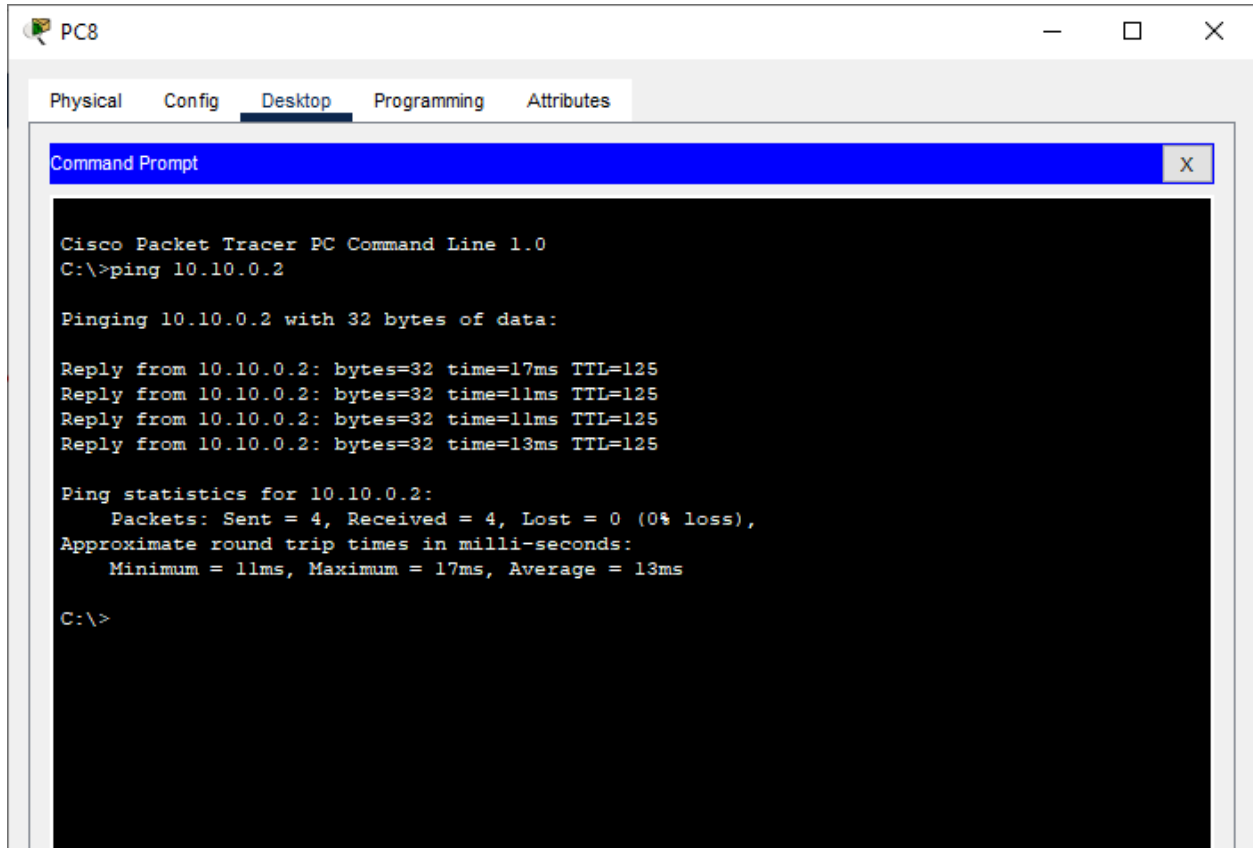
C:\>ping 10.30.0.4

Pinging 10.30.0.4 with 32 bytes of data:

Reply from 10.30.0.4: bytes=32 time=13ms TTL=125
Reply from 10.30.0.4: bytes=32 time=11ms TTL=125
Reply from 10.30.0.4: bytes=32 time=14ms TTL=125
Reply from 10.30.0.4: bytes=32 time=10ms TTL=125

Ping statistics for 10.30.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 10ms, Maximum = 14ms, Average = 12ms
```

ii) Pinging PC0 (ip address 10.10.0.2) from PC8



```
PC8
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.10.0.2

Pinging 10.10.0.2 with 32 bytes of data:

Reply from 10.10.0.2: bytes=32 time=17ms TTL=125
Reply from 10.10.0.2: bytes=32 time=11ms TTL=125
Reply from 10.10.0.2: bytes=32 time=11ms TTL=125
Reply from 10.10.0.2: bytes=32 time=13ms TTL=125

Ping statistics for 10.10.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 11ms, Maximum = 17ms, Average = 13ms

C:\>
```

Result:

Hence the RIPv2 has been studied and verified through the given network



## Practical No 7

**Aim:** Using Packet Tracer, create a network with three routers with OSPF and each router associated network will have minimum three PC and show Connectivity

### Theory:

Open shortest path first (OSPF) is a link-state routing protocol that is used to find the best path between the source and the destination router using its own shortest path first (SPF) algorithm. A link-state routing protocol is a protocol that uses the concept of triggered updates, i.e., if there is a change observed in the learned routing table then the updates are triggered only, not like the distance-vector routing protocol where the routing table is exchanged at a period of time.

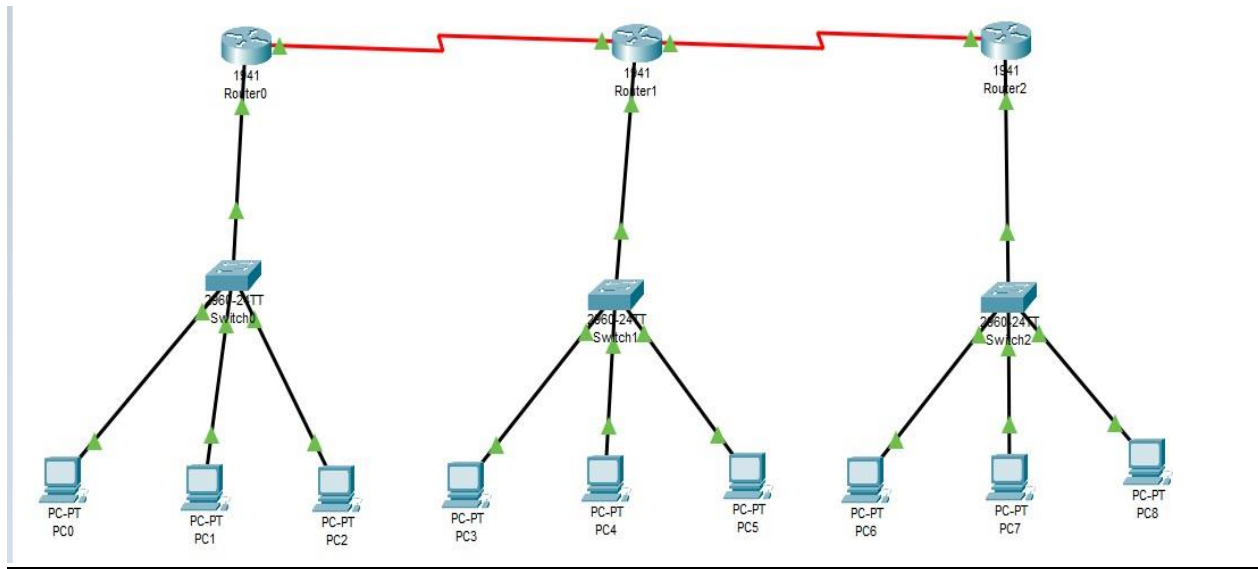
Open shortest path first (OSPF) is developed by Internet Engineering Task Force (IETF) as one of the Interior Gateway Protocol (IGP), i.e., the protocol which aims at moving the packet within a large autonomous system or routing domain.

OSPF advantages –

1. Both IPv4 and IPv6 routed protocols
2. Load balancing with equal-cost routes for the same destination
3. Unlimited hop counts
4. Trigger updates for fast convergence
5. A loop-free topology using SPF algorithm
6. Run on most routers
7. Classless protocol

There are some disadvantages of OSPF like, it requires an extra CPU process to run the SPF algorithm, requiring more RAM to store adjacency topology, and being more complex to set up and hard to troubleshoot.

We use the following topology for the present case

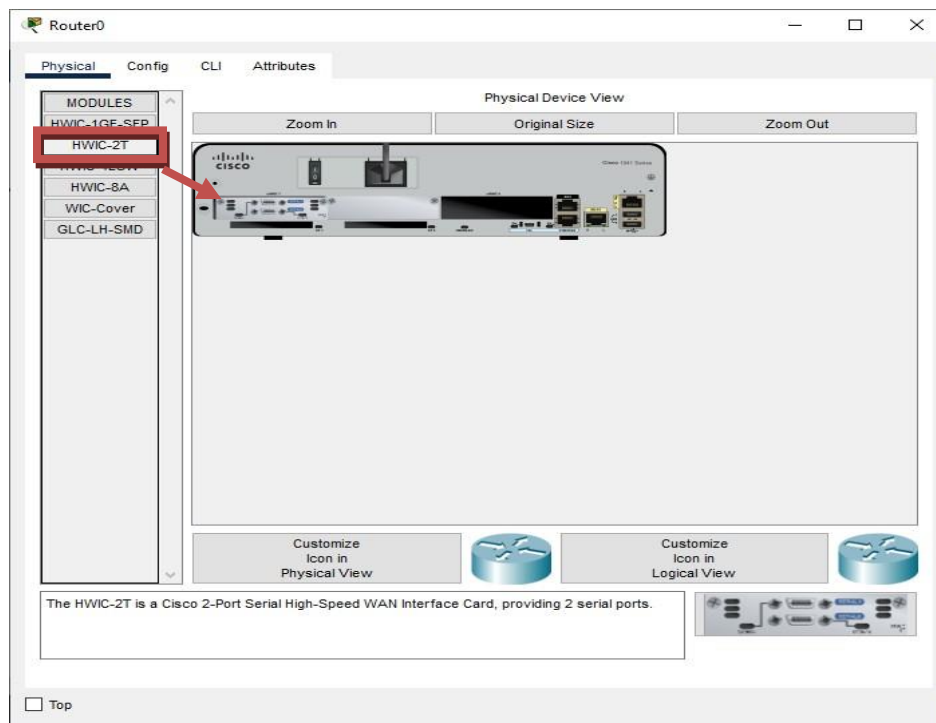


We configure the above network using the following IP addresses

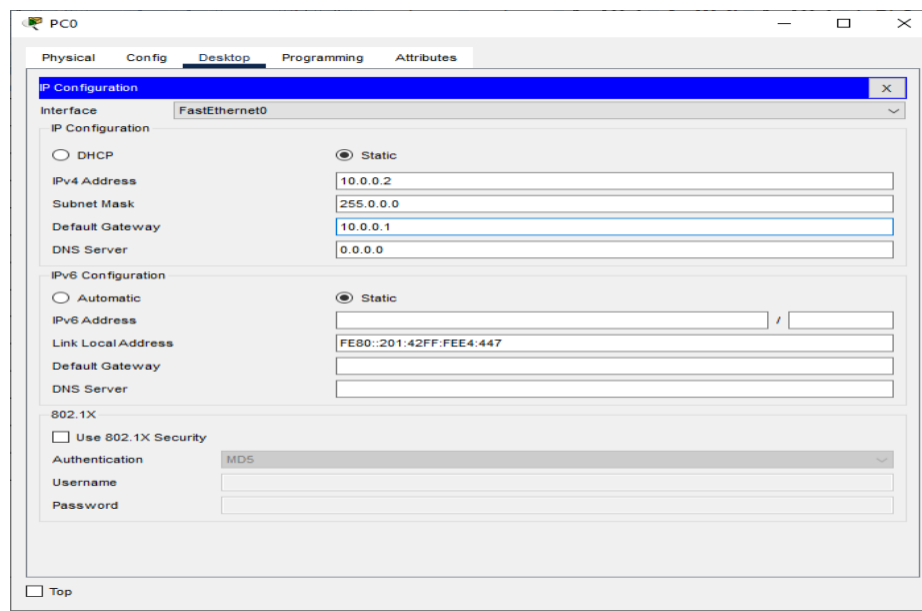
Host	Interface	IP address	Default Gateway	Subnet Mask	Wildcard Mask
Router 0	G0/0	10.0.0.1		255.0.0.0	0.255.255.255
	S0/1/0	40.0.0.1			
Router 1	G0/0	20.0.0.1			
	S0/1/0	40.0.0.2			
	S0/1/1	50.0.0.1			
Router 2	G0/0	30.0.0.1			
	S0/1/1	50.0.0.2			
PC0	FastEthernet 0	10.0.0.2	10.0.0.1		
PC1	FastEthernet 0	10.0.0.3			
PC2	FastEthernet 0	10.0.0.4			
PC3	FastEthernet 0	20.0.0.2	20.0.0.1		
PC4	FastEthernet 0	20.0.0.3			
PC5	FastEthernet 0	20.0.0.4			
PC6	FastEthernet	30.0.0.2			

	0		30.0.0.1		
PC7	FastEthernet 0	30.0.0.3			
PC8	FastEthernet 0	30.0.0.4			

## Adding Serial Interface in each Router



## Configuring PC0:



## Configuring PC1:

The screenshot shows the 'PC1' configuration window with the 'Desktop' tab selected. The 'IP Configuration' section is expanded, showing settings for the 'FastEthernet0' interface. The 'IP Configuration' section has two sub-sections: 'IP Configuration' and 'IPv6 Configuration'. In the 'IP Configuration' section, the 'Static' radio button is selected. The fields are: IPv4 Address (10.0.0.3), Subnet Mask (255.0.0.0), Default Gateway (10.0.0.1), and DNS Server (0.0.0.0). In the 'IPv6 Configuration' section, the 'Static' radio button is selected. The fields are: IPv6 Address (empty), Link Local Address (FE80::205:5EFF:FE88:E00C), Default Gateway (empty), and DNS Server (empty). Below these sections is the '802.1X' section, which is currently unchecked. The 'Authentication' dropdown is set to 'MD5', and the 'Username' and 'Password' fields are empty. A 'Top' button is located at the bottom left of the window.

Interface	FastEthernet0
<b>IP Configuration</b>	
<input type="radio"/> DHCP	<input checked="" type="radio"/> Static
IPv4 Address	10.0.0.3
Subnet Mask	255.0.0.0
Default Gateway	10.0.0.1
DNS Server	0.0.0.0
<b>IPv6 Configuration</b>	
<input type="radio"/> Automatic	<input checked="" type="radio"/> Static
IPv6 Address	
Link Local Address	FE80::205:5EFF:FE88:E00C
Default Gateway	
DNS Server	
<b>802.1X</b>	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MD5
Username	
Password	

## Configuring PC2:

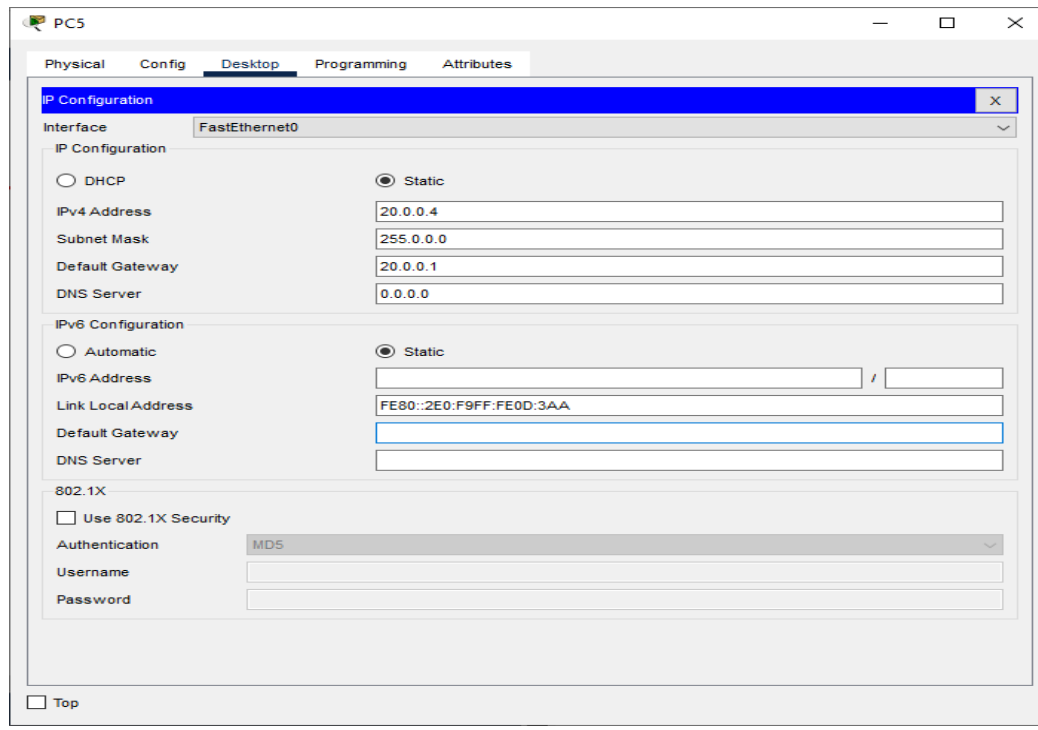
The screenshot shows the 'PC2' configuration window with the 'Desktop' tab selected. The 'IP Configuration' section is expanded, showing settings for the 'FastEthernet0' interface. The 'IP Configuration' section has two sub-sections: 'IP Configuration' and 'IPv6 Configuration'. In the 'IP Configuration' section, the 'Static' radio button is selected. The fields are: IPv4 Address (10.0.0.4), Subnet Mask (255.0.0.0), Default Gateway (10.0.0.1), and DNS Server (0.0.0.0). A warning message 'This address is already used in the network.' is displayed next to the IPv4 Address field. In the 'IPv6 Configuration' section, the 'Static' radio button is selected. The fields are: IPv6 Address (empty), Link Local Address (FE80::2D0:BAFF:FE8E:684C), Default Gateway (empty), and DNS Server (empty). Below these sections is the '802.1X' section, which is currently unchecked. The 'Authentication' dropdown is set to 'MD5', and the 'Username' and 'Password' fields are empty. A 'Top' button is located at the bottom left of the window.

Interface	FastEthernet0
<b>IP Configuration</b>	
<input type="radio"/> DHCP	<input checked="" type="radio"/> Static
IPv4 Address	10.0.0.4
Subnet Mask	255.0.0.0
Default Gateway	10.0.0.1
DNS Server	0.0.0.0
<b>IPv6 Configuration</b>	
<input type="radio"/> Automatic	<input checked="" type="radio"/> Static
IPv6 Address	
Link Local Address	FE80::2D0:BAFF:FE8E:684C
Default Gateway	
DNS Server	
<b>802.1X</b>	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MD5
Username	
Password	

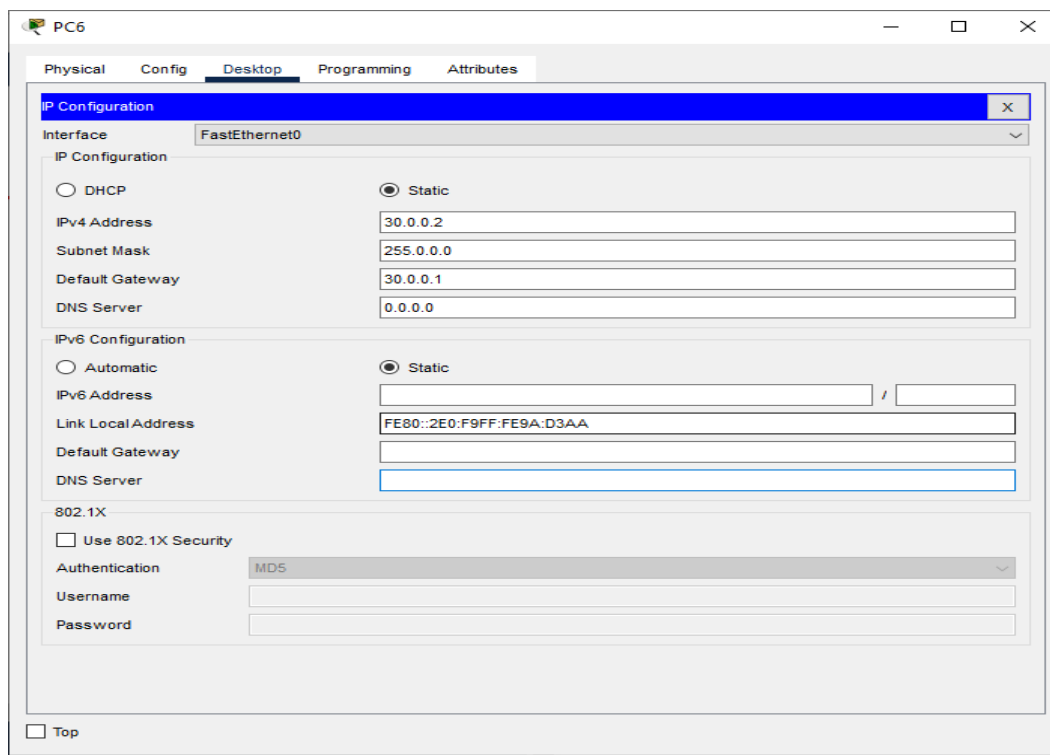
The screenshot shows the configuration window for PC3. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing the 'FastEthernet0' interface. The 'IP Configuration' section has two radio buttons: 'DHCP' (unselected) and 'Static' (selected). Below these are fields for 'IPv4 Address' (20.0.0.2), 'Subnet Mask' (255.0.0.0), 'Default Gateway' (20.0.0.1), and 'DNS Server' (0.0.0.0). The 'IPv6 Configuration' section also has two radio buttons: 'Automatic' (unselected) and 'Static' (selected). Below these are fields for 'IPv6 Address' (empty), 'Link Local Address' (FE80::202:17FF:FE81:A06), 'Default Gateway' (empty), and 'DNS Server' (empty). The '802.1X' section has a checkbox 'Use 802.1X Security' (unchecked), a dropdown 'Authentication' (MD5), and fields for 'Username' and 'Password' (both empty). A 'Top' button is at the bottom left.

Configuring PC4:

The screenshot shows the configuration window for PC4. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing the 'FastEthernet0' interface. The 'IP Configuration' section has two radio buttons: 'DHCP' (unselected) and 'Static' (selected). Below these are fields for 'IPv4 Address' (20.0.0.3), 'Subnet Mask' (255.0.0.0), 'Default Gateway' (20.0.0.1), and 'DNS Server' (0.0.0.0). The 'IPv6 Configuration' section also has two radio buttons: 'Automatic' (unselected) and 'Static' (selected). Below these are fields for 'IPv6 Address' (empty), 'Link Local Address' (FE80::20A:41FF:FE13:AB7E), 'Default Gateway' (empty), and 'DNS Server' (empty). The '802.1X' section has a checkbox 'Use 802.1X Security' (unchecked), a dropdown 'Authentication' (MD5), and fields for 'Username' and 'Password' (both empty). A 'Top' button is at the bottom left.



Configuring PC6:



## Configuring PC7:

The screenshot shows the configuration window for PC7. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing the 'FastEthernet0' interface. The 'Static' radio button is selected under 'IP Configuration'. The fields are filled with the following values:

Field	Value
IPv4 Address	30.0.0.3
Subnet Mask	255.0.0.0
Default Gateway	30.0.0.1
DNS Server	0.0.0.0

Under 'IPv6 Configuration', the 'Static' radio button is selected. The fields are filled with the following values:

Field	Value
IPv6 Address	
Link Local Address	FE80::201:C9FF:FEDC:D846
Default Gateway	
DNS Server	

Under '802.1X', the 'Use 802.1X Security' checkbox is unchecked. The 'Authentication' dropdown is set to 'MD5'. The 'Username' and 'Password' fields are empty.

## Configuring PC8:

The screenshot shows the configuration window for PC8. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing the 'FastEthernet0' interface. The 'Static' radio button is selected under 'IP Configuration'. The fields are filled with the following values:

Field	Value
IPv4 Address	30.0.0.4
Subnet Mask	255.0.0.0
Default Gateway	30.0.0.1
DNS Server	0.0.0.0

Under 'IPv6 Configuration', the 'Static' radio button is selected. The fields are filled with the following values:

Field	Value
IPv6 Address	
Link Local Address	FE80::260:3EFF:FE25:E1BE
Default Gateway	
DNS Server	

Under '802.1X', the 'Use 802.1X Security' checkbox is unchecked. The 'Authentication' dropdown is set to 'MD5'. The 'Username' and 'Password' fields are empty.



## Configuring IP addresses on Router 0

### i) Interface G0/0

The screenshot shows the configuration window for Router0, specifically for the GigabitEthernet0/0 interface. The window has tabs for Physical, Config, CLI, and Attributes. The Config tab is active. On the left, there is a sidebar with categories: GLOBAL, ROUTING, SWITCHING, and INTERFACE. Under the INTERFACE category, GigabitEthernet0/0 is selected. The main area displays the configuration for GigabitEthernet0/0. The Port Status is checked (On). Bandwidth is set to 100 Mbps. Duplex is set to Full Duplex. MAC Address is 0030.A3E4.1201. IP Configuration shows IPv4 Address as 10.0.0.1 and Subnet Mask as 255.0.0.0. Tx Ring Limit is set to 10.

GigabitEthernet0/0	
Port Status	<input checked="" type="checkbox"/> On
Bandwidth	<input type="radio"/> 1000 Mbps <input checked="" type="radio"/> 100 Mbps <input type="radio"/> 10 Mbps <input checked="" type="checkbox"/> Auto
Duplex	<input type="radio"/> Half Duplex <input checked="" type="radio"/> Full Duplex <input checked="" type="checkbox"/> Auto
MAC Address	0030.A3E4.1201
IP Configuration	
IPv4 Address	10.0.0.1
Subnet Mask	255.0.0.0
Tx Ring Limit	10

### ii) Interface S0/1/0

The screenshot shows the configuration window for Router0, specifically for the Serial0/1/0 interface. The window has tabs for Physical, Config, CLI, and Attributes. The Config tab is active. On the left, there is a sidebar with categories: GLOBAL, ROUTING, SWITCHING, and INTERFACE. Under the INTERFACE category, Serial0/1/0 is selected. The main area displays the configuration for Serial0/1/0. The Port Status is checked (On). Duplex is set to Full Duplex. Clock Rate is set to 1200. IP Configuration shows IPv4 Address as 40.0.0.1 and Subnet Mask as 255.0.0.0. Tx Ring Limit is set to 10.

Serial0/1/0	
Port Status	<input checked="" type="checkbox"/> On
Duplex	<input checked="" type="radio"/> Full Duplex
Clock Rate	1200
IP Configuration	
IPv4 Address	40.0.0.1
Subnet Mask	255.0.0.0
Tx Ring Limit	10

## Configuring IP addresses on Router 1

### i) Interface G0/0

The screenshot shows the configuration window for Router1, specifically the 'Config' tab for the GigabitEthernet0/0 interface. The left sidebar shows a tree view with categories: GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, SWITCHING, VLAN Database, and INTERFACE. Under the INTERFACE category, GigabitEthernet0/0 is selected. The main area displays the configuration for GigabitEthernet0/0. The Port Status is set to On. Bandwidth is set to 100 Mbps. Duplex is set to Full Duplex. The MAC Address is 0001.C711.B701. The IP Configuration section shows the IPv4 Address as 20.0.0.1 and the Subnet Mask as 255.0.0.0. The Tx Ring Limit is set to 10.

GigabitEthernet0/0	
Port Status	<input checked="" type="checkbox"/> On
Bandwidth	<input type="radio"/> 1000 Mbps <input checked="" type="radio"/> 100 Mbps <input type="radio"/> 10 Mbps <input checked="" type="checkbox"/> Auto
Duplex	<input type="radio"/> Half Duplex <input checked="" type="radio"/> Full Duplex <input checked="" type="checkbox"/> Auto
MAC Address	0001.C711.B701
IP Configuration	
IPv4 Address	20.0.0.1
Subnet Mask	255.0.0.0
Tx Ring Limit	10

### ii) Interface S0/1/0

The screenshot shows the configuration window for Router1, specifically the 'Config' tab for the Serial0/1/0 interface. The left sidebar shows a tree view with categories: GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, SWITCHING, VLAN Database, and INTERFACE. Under the INTERFACE category, Serial0/1/0 is selected. The main area displays the configuration for Serial0/1/0. The Port Status is set to On. Duplex is set to Full Duplex. The Clock Rate is set to 2000000. The IP Configuration section shows the IPv4 Address as 40.0.0.2 and the Subnet Mask as 255.0.0.0. The Tx Ring Limit is set to 10.

Serial0/1/0	
Port Status	<input checked="" type="checkbox"/> On
Duplex	<input checked="" type="radio"/> Full Duplex
Clock Rate	2000000
IP Configuration	
IPv4 Address	40.0.0.2
Subnet Mask	255.0.0.0
Tx Ring Limit	10

### iii) Interface S0/1/1

The screenshot shows the configuration window for Router1, specifically for the Serial0/1/1 interface. The left sidebar contains a tree view with categories: GLOBAL, Settings, Algorithm Settings, ROUTING (Static, RIP), SWITCHING (VLAN Database), and INTERFACE (GigabitEthernet0/0, GigabitEthernet0/1, Serial0/1/0, and Serial0/1/1). The main panel is titled 'Serial0/1/1' and includes the following settings:

- Port Status: ☒ On
- Duplex: ☒ Full Duplex
- Clock Rate: 1200
- IP Configuration:
  - IPv4 Address: 50.0.0.1
  - Subnet Mask: 255.0.0.0
- Tx Ring Limit: 10

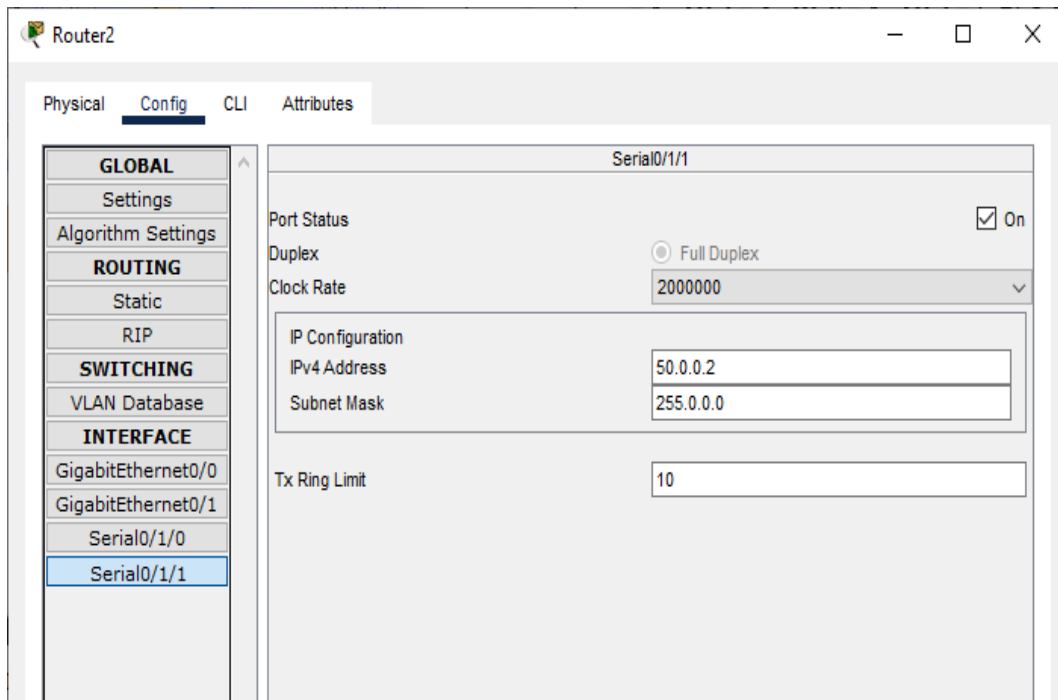
## Configuring IP addresses on Router 2

### i) Interface G0/0

The screenshot shows the configuration window for Router2, specifically for the GigabitEthernet0/0 interface. The left sidebar contains a tree view with categories: GLOBAL, Settings, Algorithm Settings, ROUTING (Static, RIP), SWITCHING (VLAN Database), and INTERFACE (GigabitEthernet0/0, GigabitEthernet0/1, Serial0/1/0, and Serial0/1/1). The main panel is titled 'GigabitEthernet0/0' and includes the following settings:

- Port Status: ☒ On
- Bandwidth: ☐ 1000 Mbps ☒ 100 Mbps ☐ 10 Mbps ☒ Auto
- Duplex: ☐ Half Duplex ☒ Full Duplex ☒ Auto
- MAC Address: 000A.F337.ED01
- IP Configuration:
  - IPv4 Address: 30.0.0.1
  - Subnet Mask: 255.0.0.0
- Tx Ring Limit: 10

## ii) Interface S0/1/1

**Configuring Router 0 for OSPF (using the CLI mode)**

```
Router(config)#  
Router(config)#router ospf 1  
Router(config-router)#network 10.0.0.0 0.0.0.255 area 1  
Router(config-router)#network 40.0.0.0 0.0.0.255 area 1  
Router(config-router)#exit  
Router(config)#
```

**Configuring Router 1 for OSPF (using the CLI mode)**

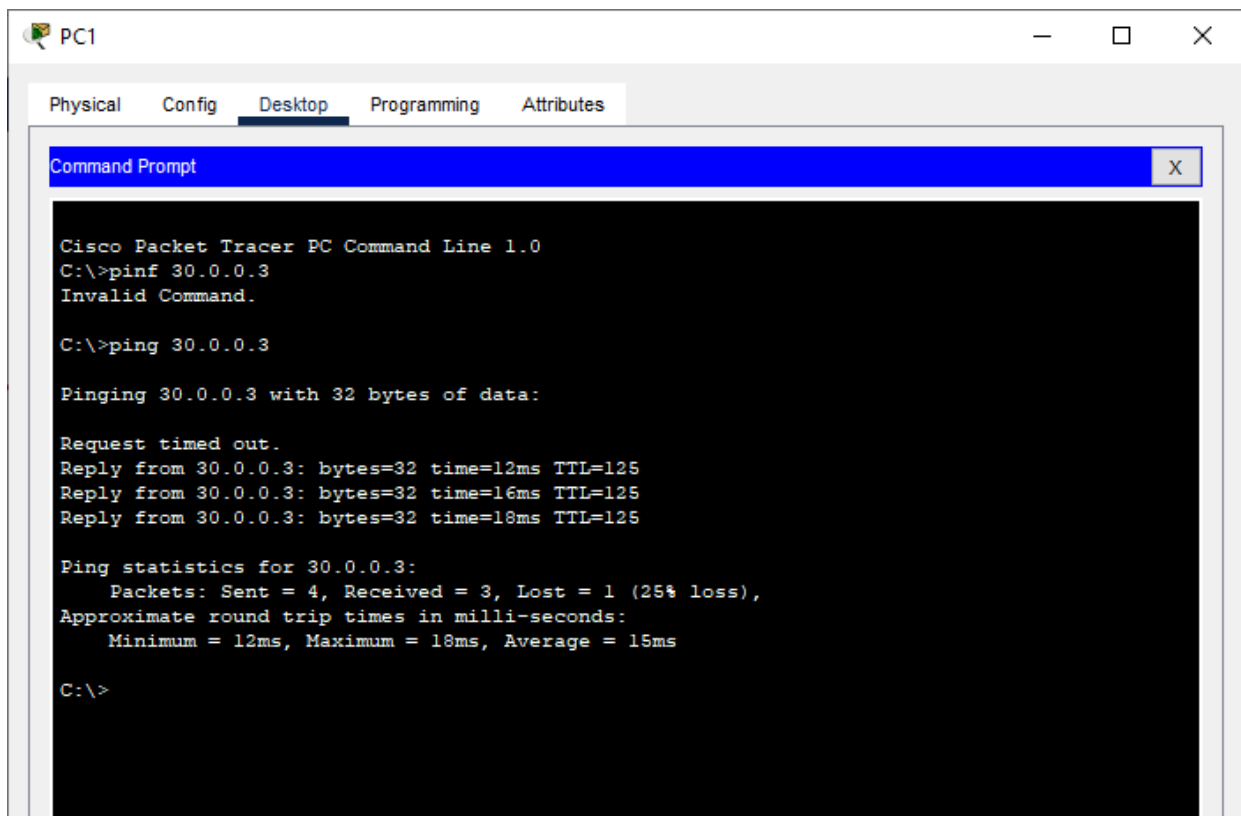
```
Router(config)#  
Router(config)#router ospf 1  
Router(config-router)#  
Router(config-router)#network 20.0.0.0 0.0.0.255 area 1  
Router(config-router)#network 40.0.0.0 0.0.0.255 area 1  
Router(config-router)#network 50.0.0.0 0.0.0.255 area 1  
Router(config-router)#exit  
Router(config)#
```

## Configuring Router 2 for OSPF (using the CLI mode)

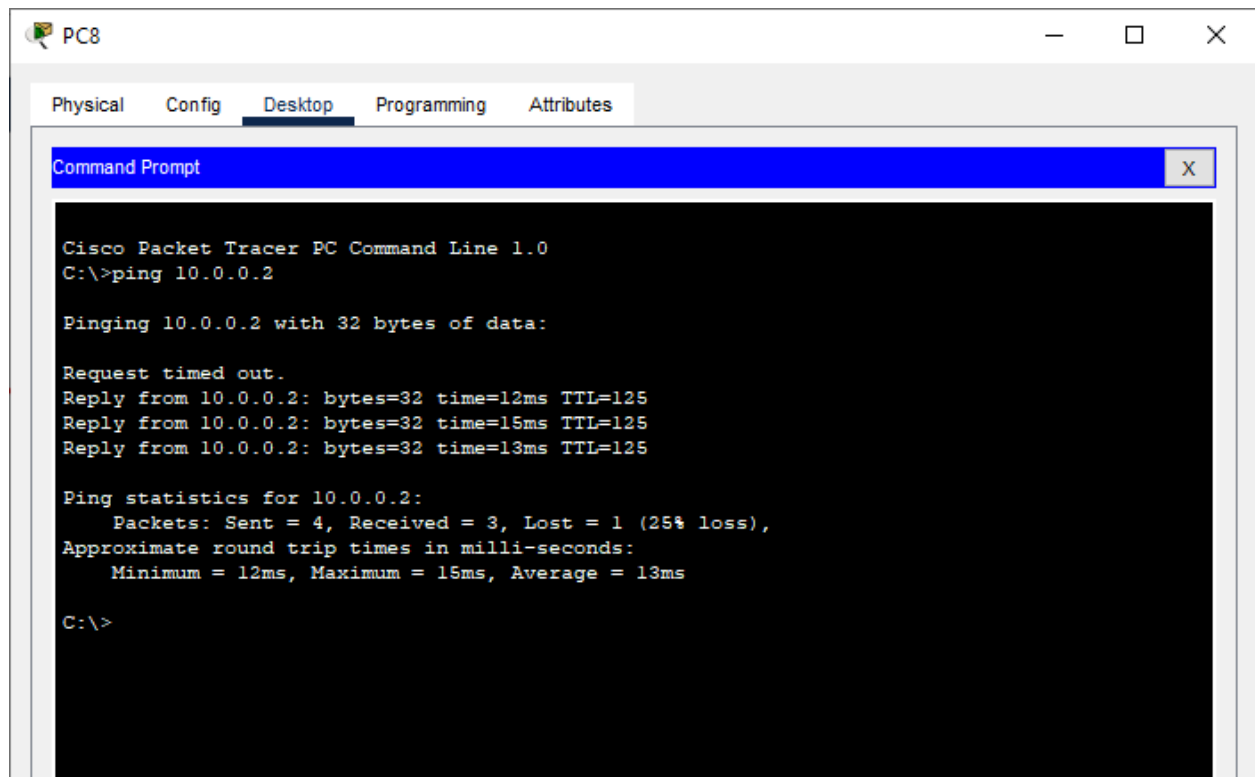
```
Router(config)#  
Router(config)#router ospf 1  
Router(config-router)#  
Router(config-router)#network 30.0.0.0 0.0.0.255 area 1  
Router(config-router)#network 50.0.0.0 0.0.0.255 area 1  
Router(config-router)# exit  
Router(config)#
```

## Checking the connectivity by using the ping command

- i) Pinging PC8 (ip address 10.30.0.4) from PC1



ii) Pinging PC0 (ip address 10.10.0.2) from PC8



```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Request timed out.
Reply from 10.0.0.2: bytes=32 time=12ms TTL=125
Reply from 10.0.0.2: bytes=32 time=15ms TTL=125
Reply from 10.0.0.2: bytes=32 time=13ms TTL=125

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 12ms, Maximum = 15ms, Average = 13ms

C:\>
```

Result:

Hence the OSPF has been studied and verified through the given network

## Practical No 8

**Aim:** Using Packet Tracer, create a network with three routers with BGP and each router associated network will have minimum three PC and show Connectivity

### Theory:

Border Gateway Protocol (BGP) is used to Exchange routing information for the internet and is the protocol used between ISP which are different Autonomous Systems (AS).

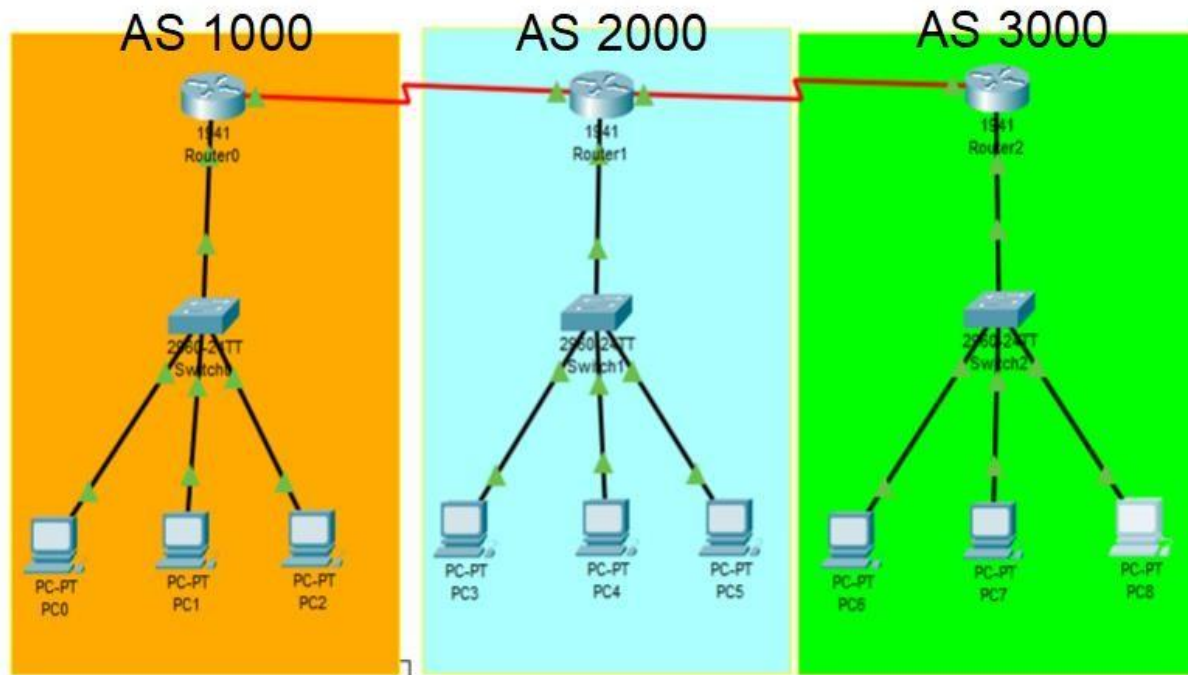
The protocol can connect together any internet network of autonomous system using an arbitrary topology. The only requirement is that each AS have at least one router that is able to run BGP and that is router connect to at least one other AS's BGP router.

BGP's main function is to exchange network reach-ability information with other BGP systems.

Characteristics of Border Gateway Protocol (BGP):

- a) The main role of BGP is to provide communication between two autonomous systems.
- b) BGP supports Next-Hop Paradigm.
- c) Coordination among multiple BGP speakers within the AS (Autonomous System).
- d) BGP advertisement also include path information, along with the reachable destination and next destination pair.
- e) BGP can implement policies that can be configured by the administrator.
- f) BGP runs Over TCP.
- g) BGP conserve network Bandwidth.
- h) BGP supports CIDR.
- i) BGP also supports Security

We use the following topology for the present case



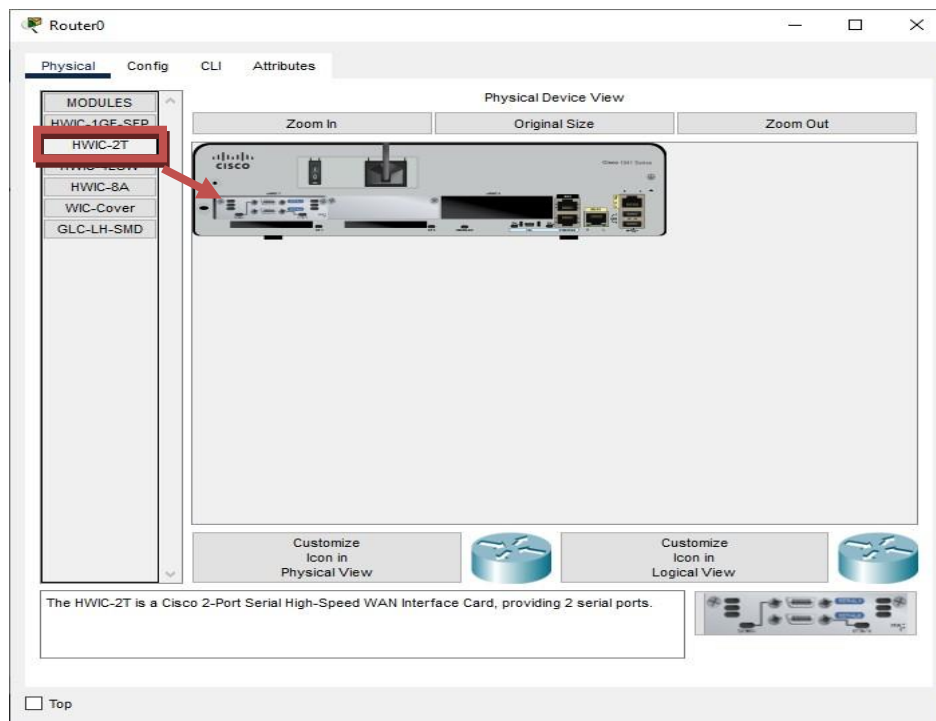
We configure the above network using the following IP addresses

Host	Interface	IP address	Network Address	Default Gateway
Router 0 AS 1000	G0/0	192.168.1.1	192.168.1.0	
	S0/1/0	10.0.0.1	10.0.0.0	
Router 1 AS 2000	G0/0	192.168.2.1	192.168.2.0	
	S0/1/0	10.0.0.2	10.0.0.0	
	S0/1/1	20.0.0.1	20.0.0.0	
Router 2 AS 3000	G0/0	192.168.3.1	192.168.3.0	
	S0/1/1	20.0.0.2	20.0.0.0	
PC0	FastEthernet 0	192.168.1.2	192.168.1.0	192.168.1.1
PC1	FastEthernet 0	192.168.1.3		
PC2	FastEthernet 0	192.168.1.4		
PC3	FastEthernet 0	192.168.2.2	192.168.2.0	192.168.2.1
PC4	FastEthernet 0	192.168.2.3		

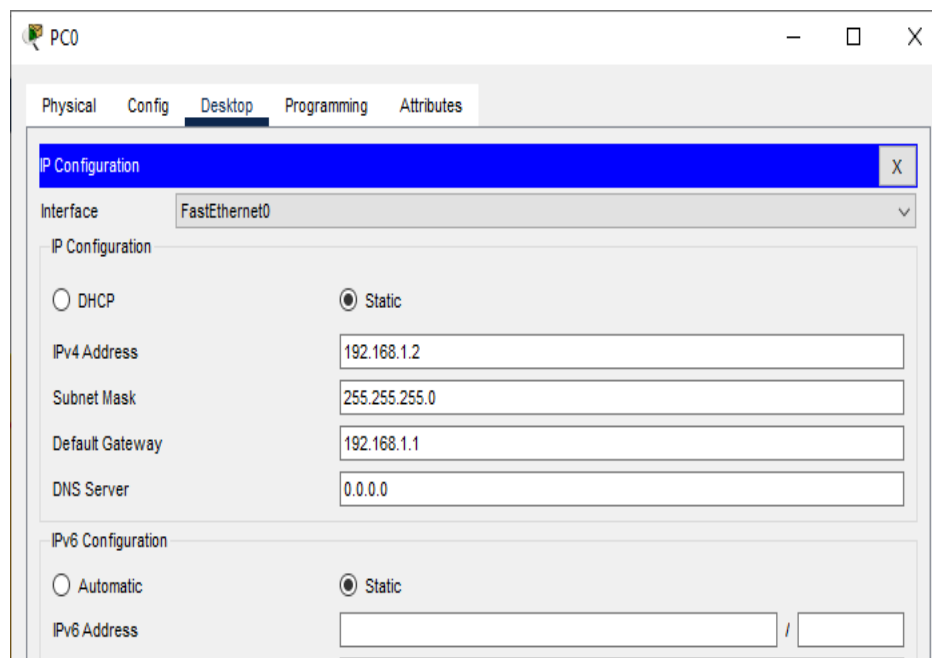


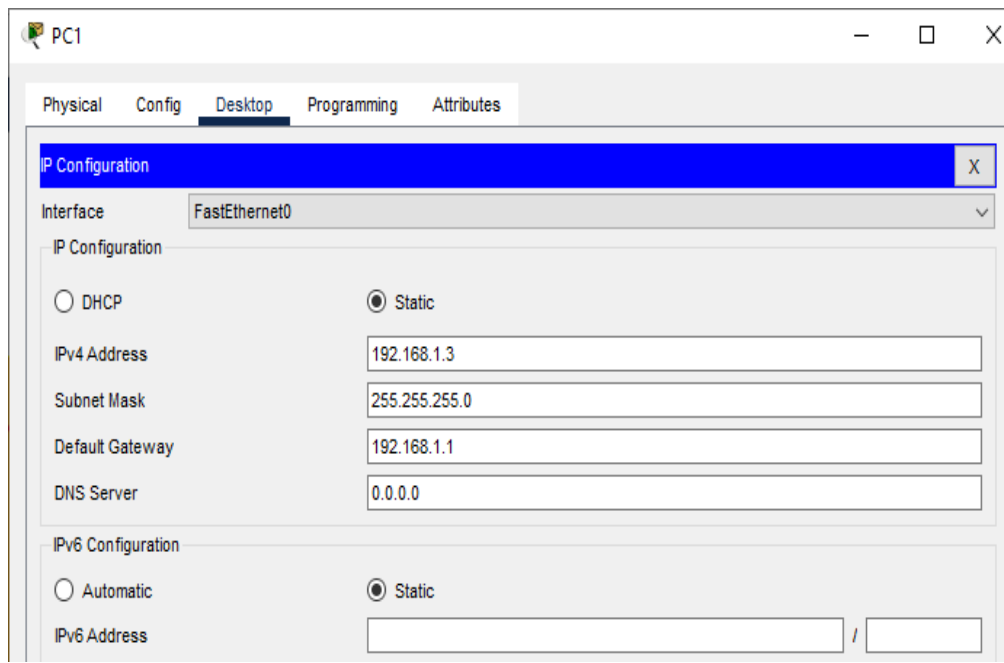
PC5	FastEthernet 0	192.168.2.4		
PC6	FastEthernet 0	192.168.3.2	192.168.3.0	192.168.3.1
PC7	FastEthernet 0	192.168.3.3		
PC8	FastEthernet 0	192.168.3.4		

## Adding Serial Interface in each Router

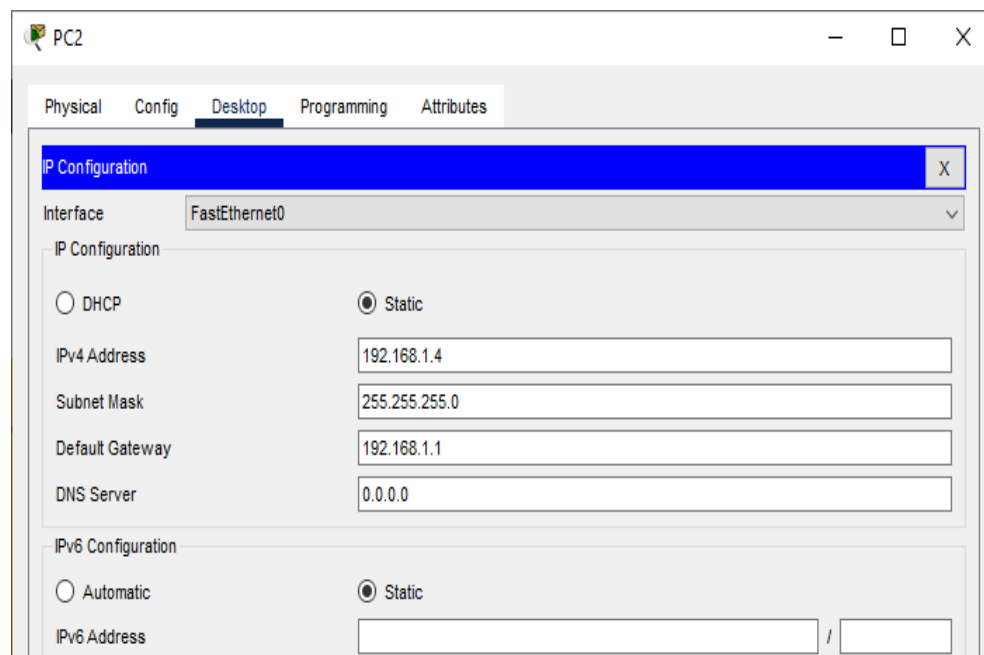


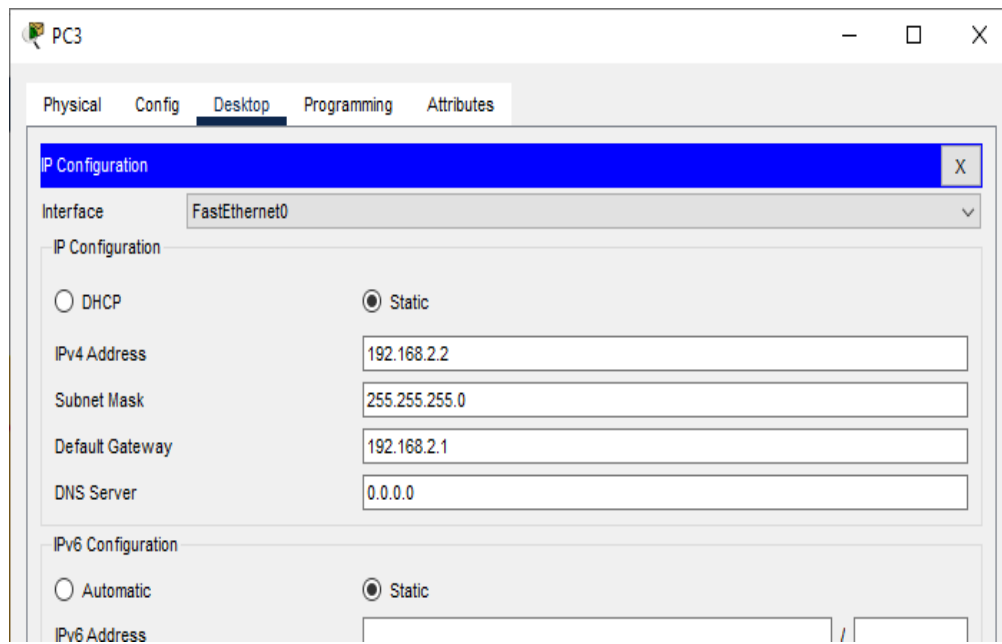
## Configuring PC0:



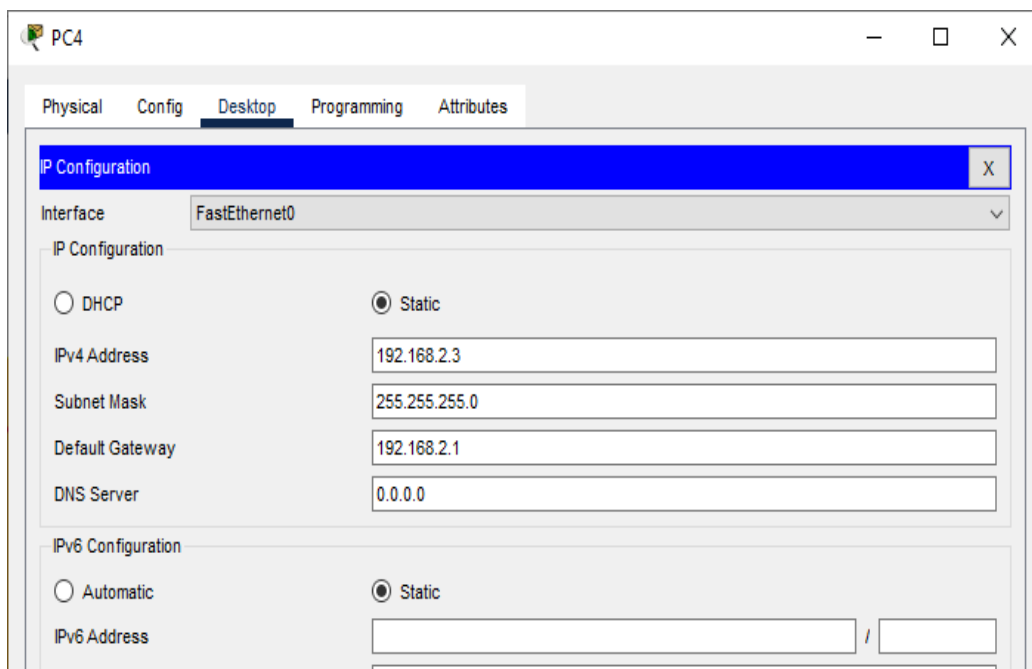


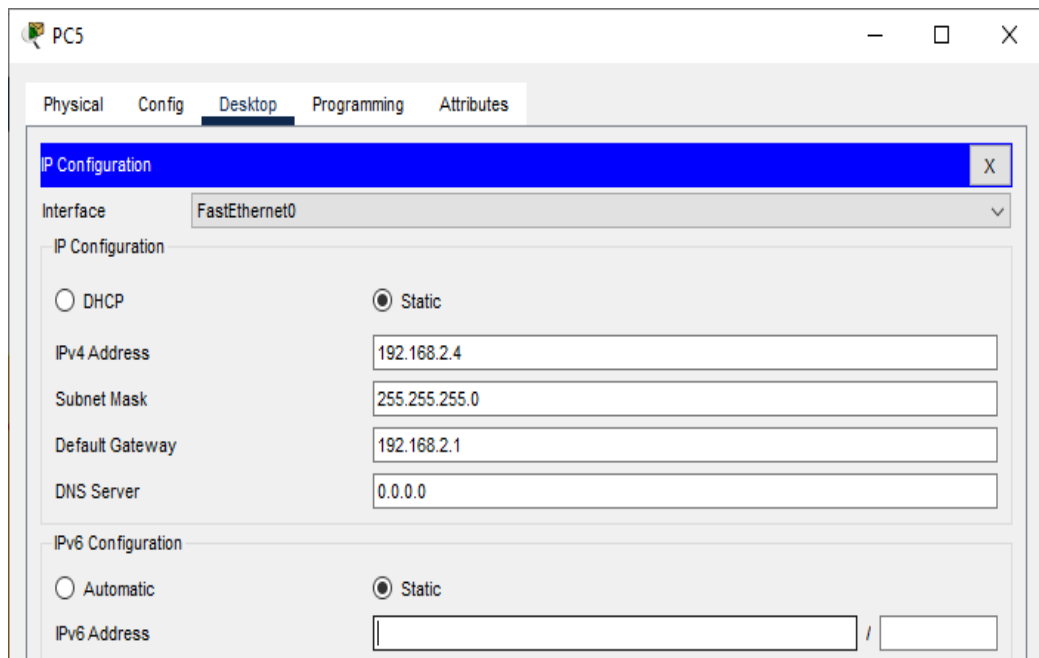
Configuring PC2:



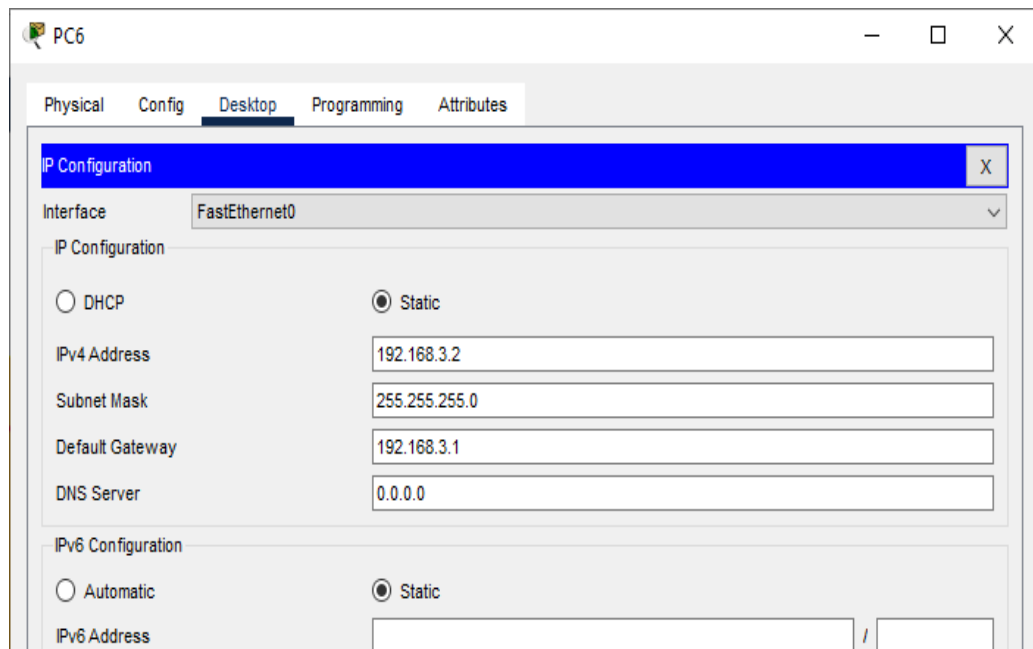


Configuring PC4:

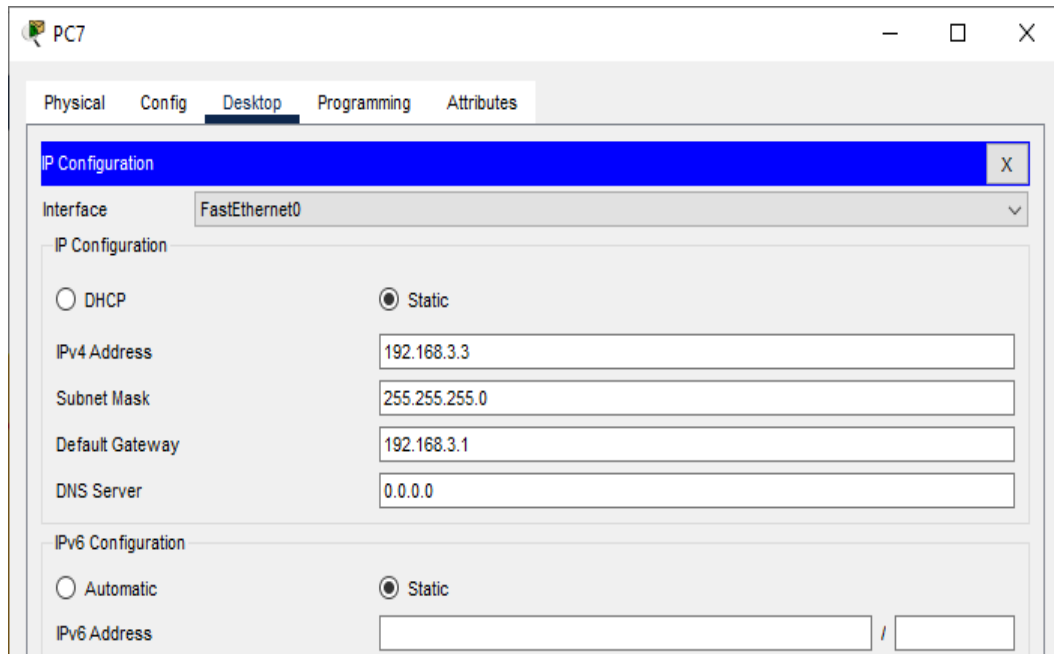




Configuring PC6:



### Configuring PC7:

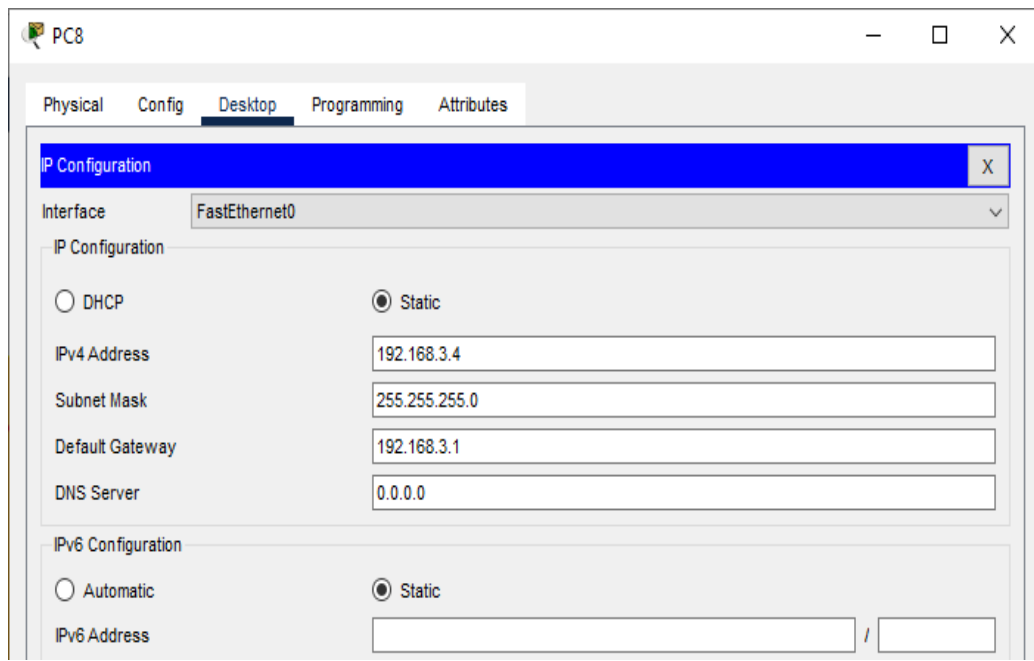


The screenshot shows the configuration window for PC7. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing the 'FastEthernet0' interface. The 'Static' radio button is selected for both IPv4 and IPv6 configurations. The IPv4 configuration fields are filled with the following values:

Field	Value
IPv4 Address	192.168.3.3
Subnet Mask	255.255.255.0
Default Gateway	192.168.3.1
DNS Server	0.0.0.0

The IPv6 configuration section shows the 'Static' radio button selected, but the IPv6 Address field is empty.

### Configuring PC8:



The screenshot shows the configuration window for PC8. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing the 'FastEthernet0' interface. The 'Static' radio button is selected for both IPv4 and IPv6 configurations. The IPv4 configuration fields are filled with the following values:

Field	Value
IPv4 Address	192.168.3.4
Subnet Mask	255.255.255.0
Default Gateway	192.168.3.1
DNS Server	0.0.0.0

The IPv6 configuration section shows the 'Static' radio button selected, but the IPv6 Address field is empty.

## Configuring IP addresses on Router 0

### i) Interface G0/0

The screenshot shows the configuration window for Router0, specifically the 'Config' tab for the GigabitEthernet0/0 interface. The left sidebar lists various configuration categories: GLOBAL, ROUTING, SWITCHING, and INTERFACE. Under the INTERFACE category, GigabitEthernet0/0 is selected. The main configuration area for GigabitEthernet0/0 includes the following settings:

- Port Status: ☒ On
- Bandwidth: ☒ 1000 Mbps, ☐ 100 Mbps, ☐ 10 Mbps, ☒ Auto
- Duplex: ☐ Half Duplex, ☒ Full Duplex, ☒ Auto
- MAC Address: 00D0.D398.4601
- IP Configuration:
  - IPv4 Address: 192.168.1.1
  - Subnet Mask: 255.255.255.0
- Tx Ring Limit: 10

### ii) Interface S0/1/0

The screenshot shows the configuration window for Router0, specifically the 'Config' tab for the Serial0/1/0 interface. The left sidebar lists various configuration categories: GLOBAL, ROUTING, SWITCHING, and INTERFACE. Under the INTERFACE category, Serial0/1/0 is selected. The main configuration area for Serial0/1/0 includes the following settings:

- Port Status: ☒ On
- Duplex: ☒ Full Duplex
- Clock Rate: 1200
- IP Configuration:
  - IPv4 Address: 10.0.0.1
  - Subnet Mask: 255.0.0.0
- Tx Ring Limit: 10

## Configuring IP addresses on Router 1

### i) Interface G0/0

The screenshot shows the configuration window for Router1, specifically the 'Config' tab for the GigabitEthernet0/0 interface. The left sidebar lists various configuration categories: GLOBAL, Settings, Algorithm Settings, ROUTING (Static, RIP), SWITCHING (VLAN Database), and INTERFACE (GigabitEthernet0/0, GigabitEthernet0/1, Serial0/1/0, Serial0/1/1). The main area displays the configuration for GigabitEthernet0/0. The Port Status is checked 'On'. Bandwidth is set to 'Auto' (1000 Mbps, 100 Mbps, 10 Mbps). Duplex is set to 'Auto' (Half Duplex, Full Duplex). The MAC Address is 0090.2B5B.9E01. The IP Configuration section shows the IPv4 Address as 192.168.2.1 and the Subnet Mask as 255.255.255.0. The Tx Ring Limit is set to 10.

Category	Value
Port Status	<input checked="" type="checkbox"/> On
Bandwidth	<input checked="" type="radio"/> 1000 Mbps <input type="radio"/> 100 Mbps <input type="radio"/> 10 Mbps <input checked="" type="checkbox"/> Auto
Duplex	<input type="radio"/> Half Duplex <input checked="" type="radio"/> Full Duplex <input checked="" type="checkbox"/> Auto
MAC Address	0090.2B5B.9E01
IP Configuration	
IPv4 Address	192.168.2.1
Subnet Mask	255.255.255.0
Tx Ring Limit	10

### ii) Interface S0/1/0

The screenshot shows the configuration window for Router1, specifically the 'Config' tab for the Serial0/1/0 interface. The left sidebar lists various configuration categories: GLOBAL, Settings, Algorithm Settings, ROUTING (Static, RIP), SWITCHING (VLAN Database), and INTERFACE (GigabitEthernet0/0, GigabitEthernet0/1, Serial0/1/0, Serial0/1/1). The main area displays the configuration for Serial0/1/0. The Port Status is checked 'On'. Duplex is set to 'Full Duplex'. The Clock Rate is set to 2000000. The IP Configuration section shows the IPv4 Address as 10.0.0.2 and the Subnet Mask as 255.0.0.0. The Tx Ring Limit is set to 10.

Category	Value
Port Status	<input checked="" type="checkbox"/> On
Duplex	<input checked="" type="radio"/> Full Duplex
Clock Rate	2000000
IP Configuration	
IPv4 Address	10.0.0.2
Subnet Mask	255.0.0.0
Tx Ring Limit	10



## iii) Interface S0/1/1

The screenshot shows the configuration window for Router1, specifically for the Serial0/1/1 interface. The left sidebar contains a tree view with categories: GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, SWITCHING, VLAN Database, and INTERFACE. Under the INTERFACE category, the following interfaces are listed: GigabitEthernet0/0, GigabitEthernet0/1, Serial0/1/0, and Serial0/1/1 (which is selected and highlighted in blue). The main configuration area for Serial0/1/1 includes the following settings:

- Port Status: ☒ On
- Duplex: ☒ Full Duplex
- Clock Rate: 2000000
- IP Configuration:
  - IPv4 Address: 20.0.0.1
  - Subnet Mask: 255.0.0.0
- Tx Ring Limit: 10

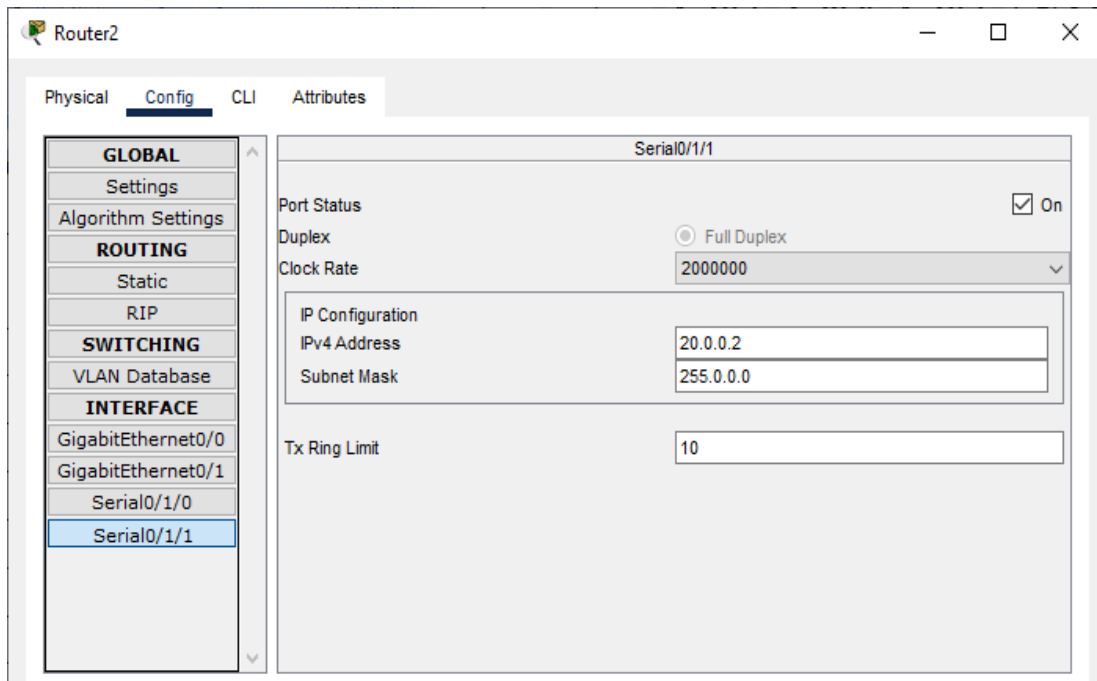
**Configuring IP addresses on Router 2**

## i) Interface G0/0

The screenshot shows the configuration window for Router2, specifically for the GigabitEthernet0/0 interface. The left sidebar contains a tree view with categories: GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, SWITCHING, VLAN Database, and INTERFACE. Under the INTERFACE category, the following interfaces are listed: GigabitEthernet0/0 (which is selected and highlighted in blue), GigabitEthernet0/1, Serial0/1/0, and Serial0/1/1. The main configuration area for GigabitEthernet0/0 includes the following settings:

- Port Status: ☒ On
- Bandwidth: ☒ 1000 Mbps ☐ 100 Mbps ☐ 10 Mbps ☒ Auto
- Duplex: ☒ Half Duplex ☐ Full Duplex ☒ Auto
- MAC Address: 00D0.FF59.B901
- IP Configuration:
  - IPv4 Address: 192.168.3.1
  - Subnet Mask: 255.255.255.0
- Tx Ring Limit: 10

## ii) Interface S0/1/1

**Configuring Router 0 for BGP (using the CLI mode)**

```
Router>enable
Router#configure terminal
Router(config)#
Router(config)#router bgp 1000
Router(config-router)#
Router(config-router)#network 10.0.0.0
Router(config-router)#network 192.168.1.0
Router(config-router)#neighbor 10.0.0.2 remote-as 2000
```

**Configuring Router 1 for BGP (using the CLI mode)**

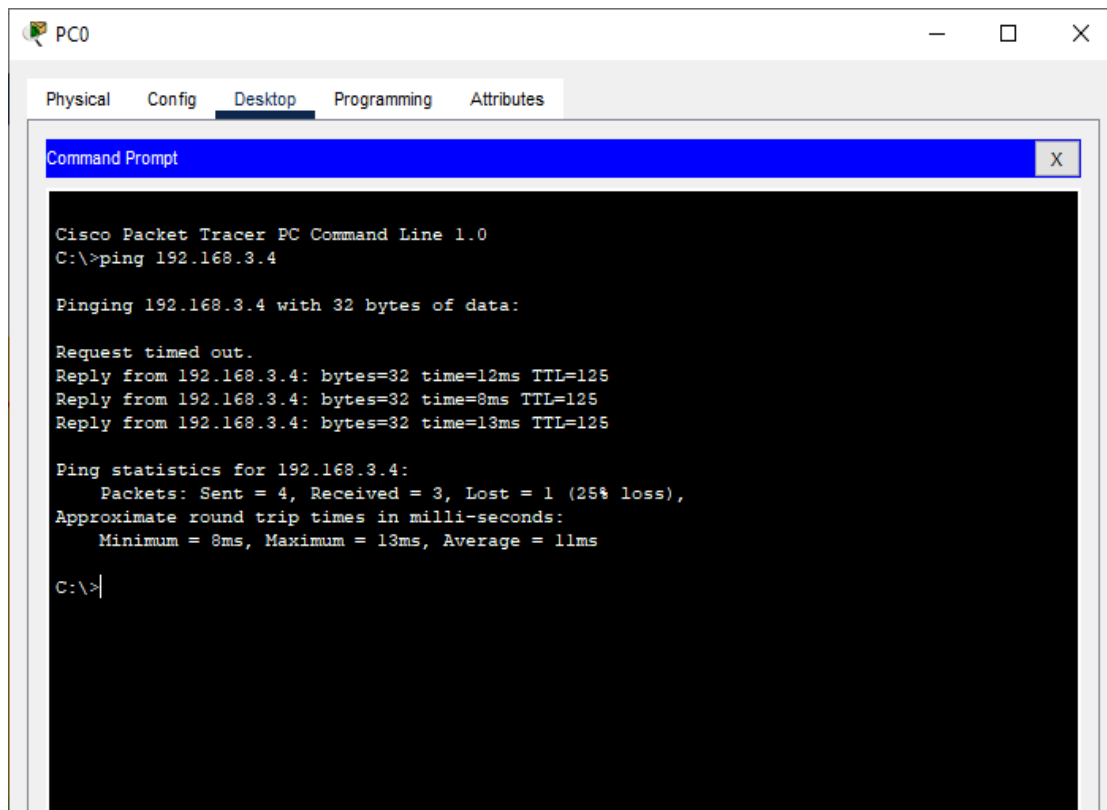
```
Router>enable
Router#configure terminal
Router(config)#
Router(config)#router bgp 2000
Router(config-router)#network 10.0.0.0
Router(config-router)#network 20.0.0.0
Router(config-router)#network 192.168.2.0
Router(config-router)#neighbor 10.0.0.1 remote-as 1000
Router(config-router)#neighbor 20.0.0.2 remote-as 3000
```

### **Configuring Router 2 for BGP (using the CLI mode)**

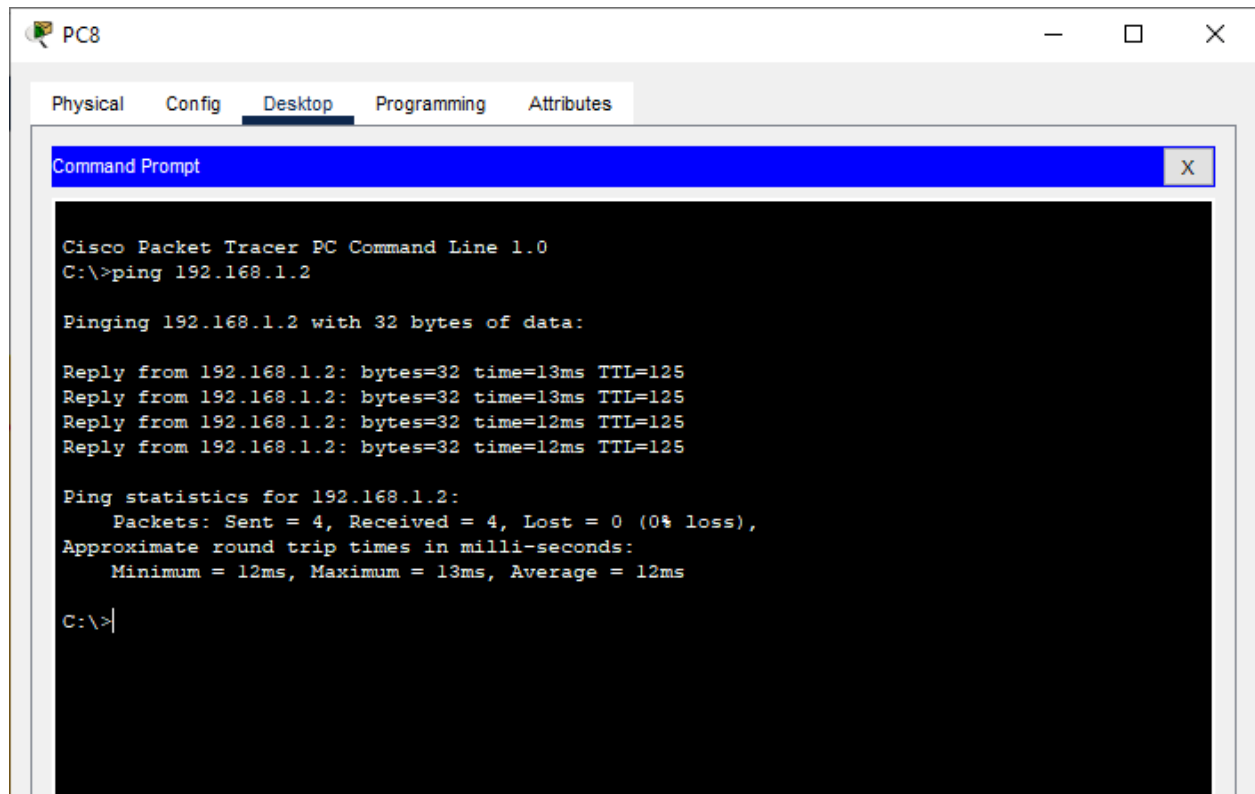
```
Router>enable
Router#configure terminal
Router(config)#
Router(config)#router bgp 3000
Router(config-router)#
Router(config-router)#network 20.0.0.0
Router(config-router)#network 192.168.3.0
Router(config-router)#neighbor 20.0.0.1 remote-as 2000
```

### **Checking the connectivity by using the ping command**

- i) Pinging PC8 (ip address 192.168.3.4) from PC1



ii) Pinging PC0 (ip address 192.168.1.2) from PC8



```
PC8
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=13ms TTL=125
Reply from 192.168.1.2: bytes=32 time=13ms TTL=125
Reply from 192.168.1.2: bytes=32 time=12ms TTL=125
Reply from 192.168.1.2: bytes=32 time=12ms TTL=125

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 12ms, Maximum = 13ms, Average = 12ms

C:\>
```

Result:

Hence the BGP has been studied and verified through the given network

## Practical No 9

**Aim:** Using Packet Tracer, create a wireless network of multiple PCs using appropriate access point

### **Theory:**

A Wireless Access Point (WAP) is a networking device that allows connecting the devices with the wired network. A Wireless Access Point (WAP) is used to create the WLAN (Wireless Local Area Network), it is commonly used in large offices and buildings which have expanded businesses.

A wireless AP connects the wired networks to the wireless client. It eases access to the network for mobile users which increases productivity and reduces the infrastructure cost.

Advantages of Wireless Access Point (WAP):

- 1) More User Access
- 2) Broader Transmission Range
- 3) Flexible Networking

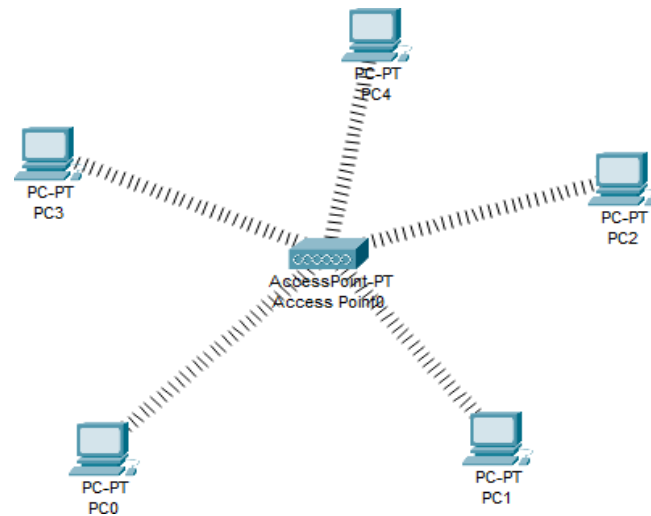
Disadvantages of Wireless Access Point (WAP):

- 1) High cost
- 2) Poor stability
- 3) Less Secure

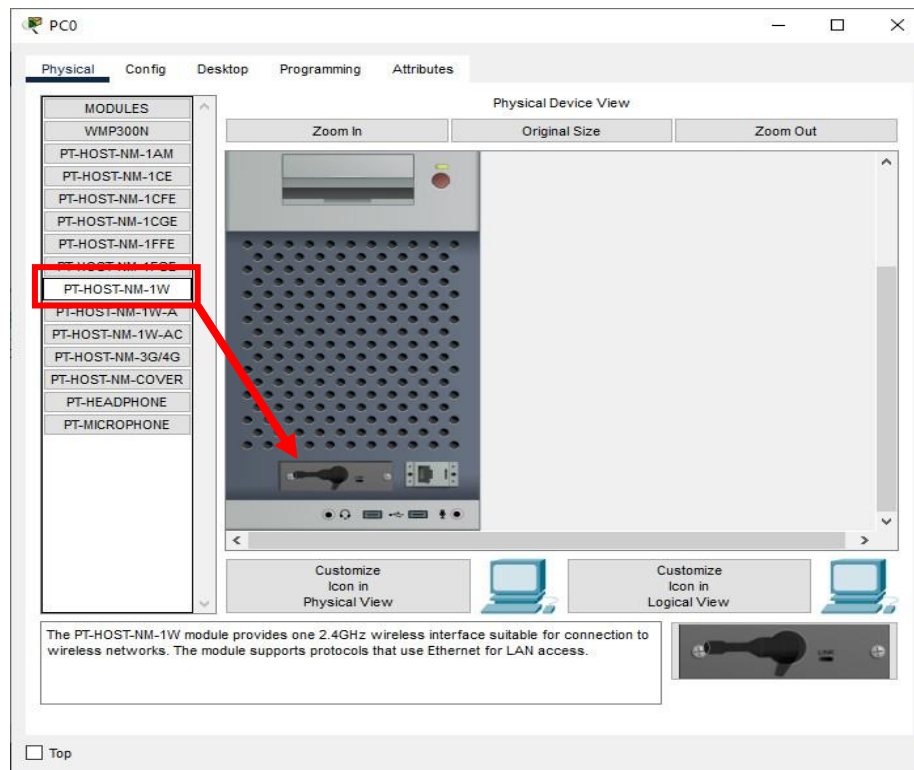
Application of Wireless Access Point:

- 1) It is a device that creates a WLAN (Wireless Local Area Network) in large enterprises.
- 2) It is used to extend the coverage area of the network so that it can't disconnect which allows more users to connect to the network easily.
- 3) An access point connects a switch, Ethernet cable, wired router, and Wi-fi to designate the particular area.
- 4) It is used to provide connectivity to the users in large offices or enterprises which allows users to roam easily anywhere in the office and be connected to a network.
- 5) LANs can also be provided in public places such as coffee shops, restaurants, airports, etc.

We use the following topology for the present case (5PCs and an Access Point)

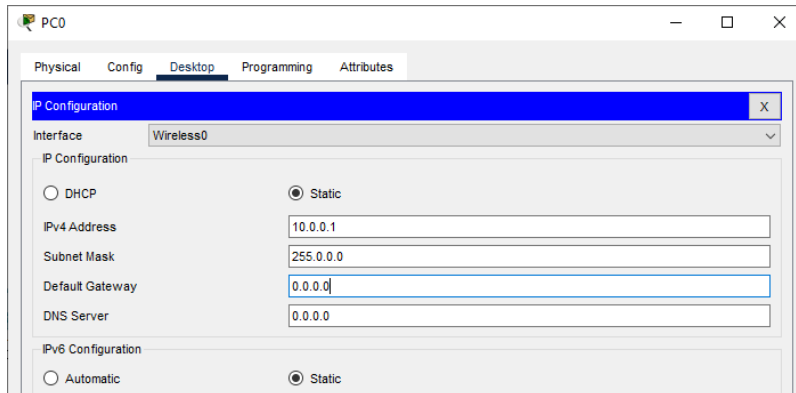


Add a Wireless interface to each PC as follows

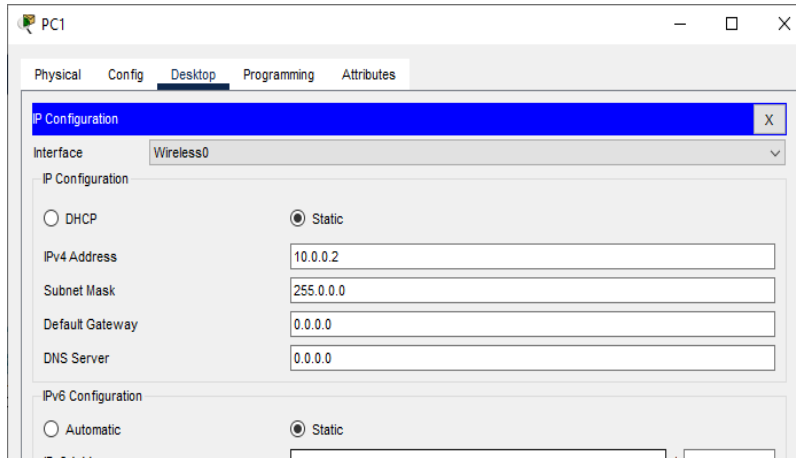


## Assigning IP Address to each PC (select Static)

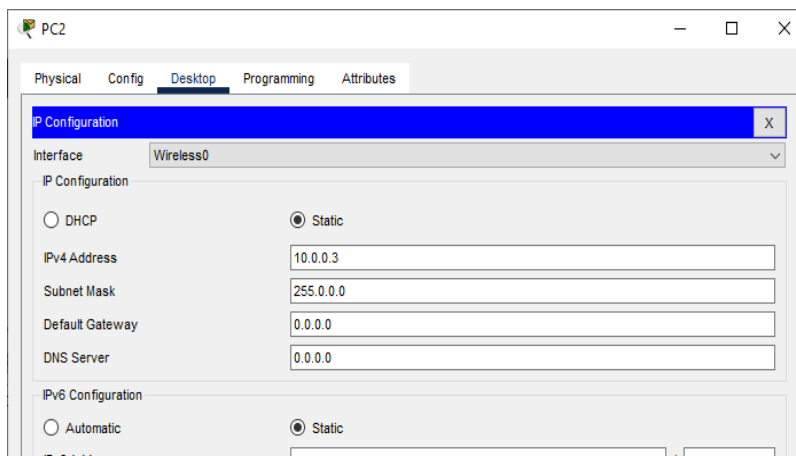
1) PC0 :



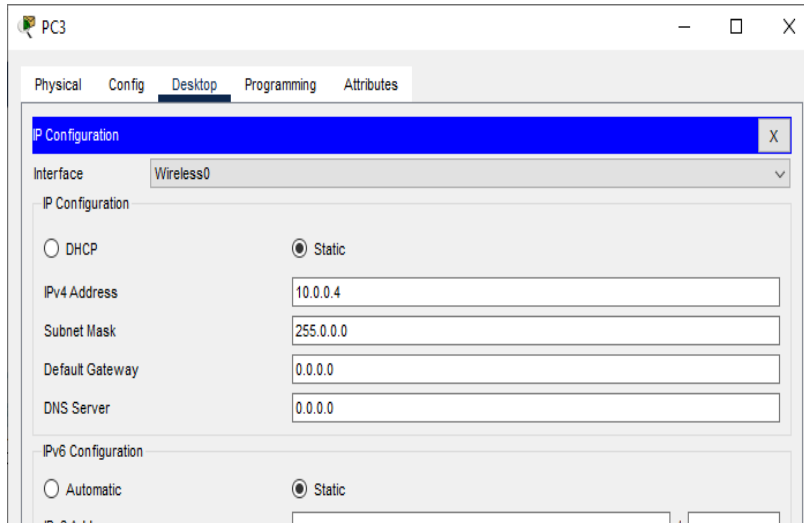
2) PC1 :



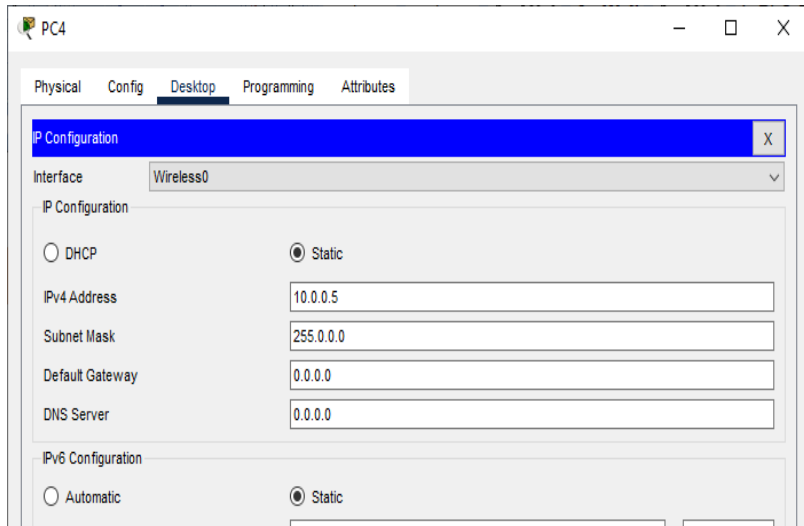
3) PC2 :



4) PC3 :



5) PC4 :



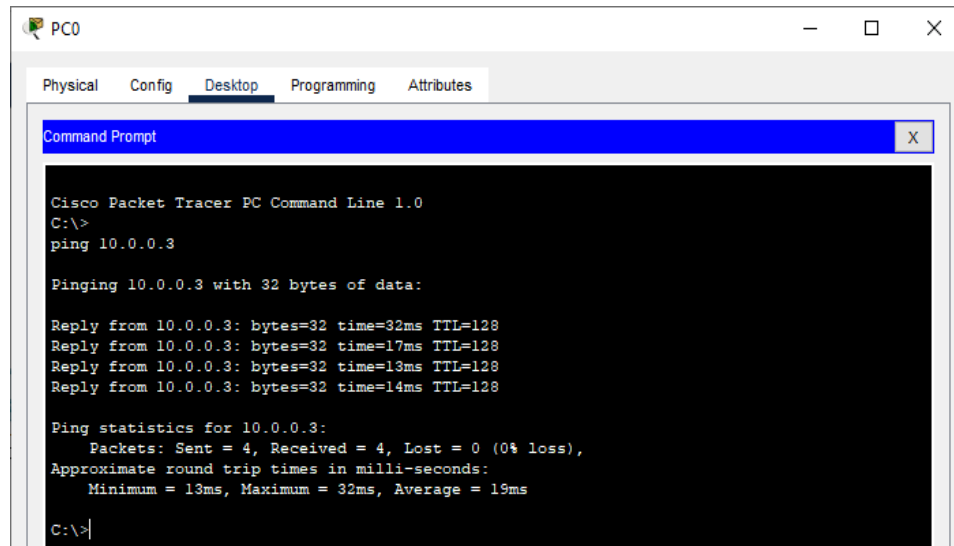
The IP addresses assigned are

Host	IP address
PC0	10.0.0.1
PC1	10.0.0.2
PC2	10.0.0.3
PC3	10.0.0.4
PC4	10.0.0.5



We verify the connectivity by sending ping message from any PC to any other PC

Pinging PC2 (10.0.0.3) from PC0 (10.0.0.1)



The screenshot shows a Cisco Packet Tracer PC Command Line window for PC0. The 'Desktop' tab is selected. The command prompt displays the output of a ping command to 10.0.0.3. The output shows four successful replies with varying times (32ms, 17ms, 13ms, 14ms) and a TTL of 128. The ping statistics indicate 4 packets sent, 4 received, and 0% loss, with an average round trip time of 19ms.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>
ping 10.0.0.3

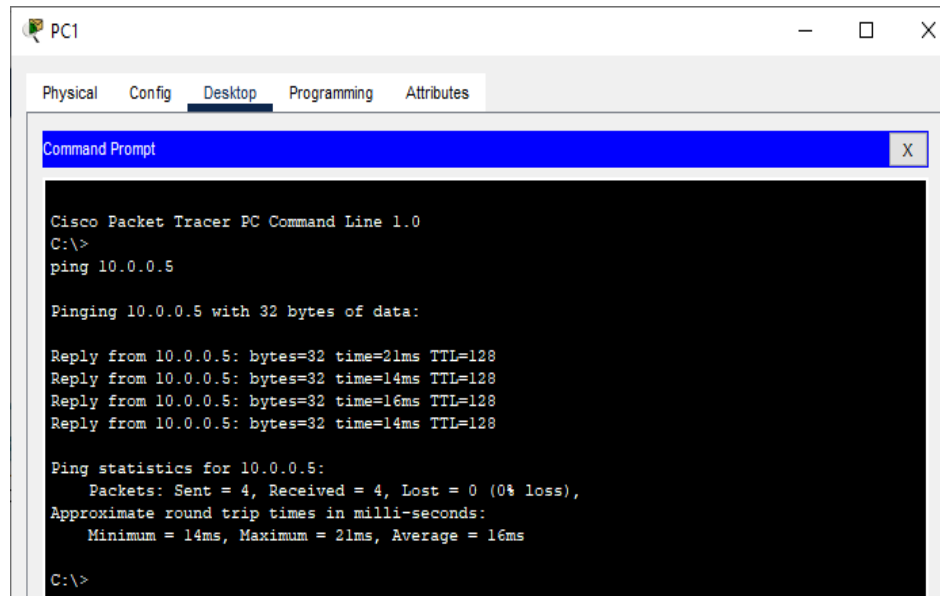
Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time=32ms TTL=128
Reply from 10.0.0.3: bytes=32 time=17ms TTL=128
Reply from 10.0.0.3: bytes=32 time=13ms TTL=128
Reply from 10.0.0.3: bytes=32 time=14ms TTL=128

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 13ms, Maximum = 32ms, Average = 19ms

C:\>
```

Pinging PC4 (10.0.0.5) from PC1 (10.0.0.2)



The screenshot shows a Cisco Packet Tracer PC Command Line window for PC1. The 'Desktop' tab is selected. The command prompt displays the output of a ping command to 10.0.0.5. The output shows four successful replies with varying times (21ms, 14ms, 16ms, 14ms) and a TTL of 128. The ping statistics indicate 4 packets sent, 4 received, and 0% loss, with an average round trip time of 16ms.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>
ping 10.0.0.5

Pinging 10.0.0.5 with 32 bytes of data:

Reply from 10.0.0.5: bytes=32 time=21ms TTL=128
Reply from 10.0.0.5: bytes=32 time=14ms TTL=128
Reply from 10.0.0.5: bytes=32 time=16ms TTL=128
Reply from 10.0.0.5: bytes=32 time=14ms TTL=128

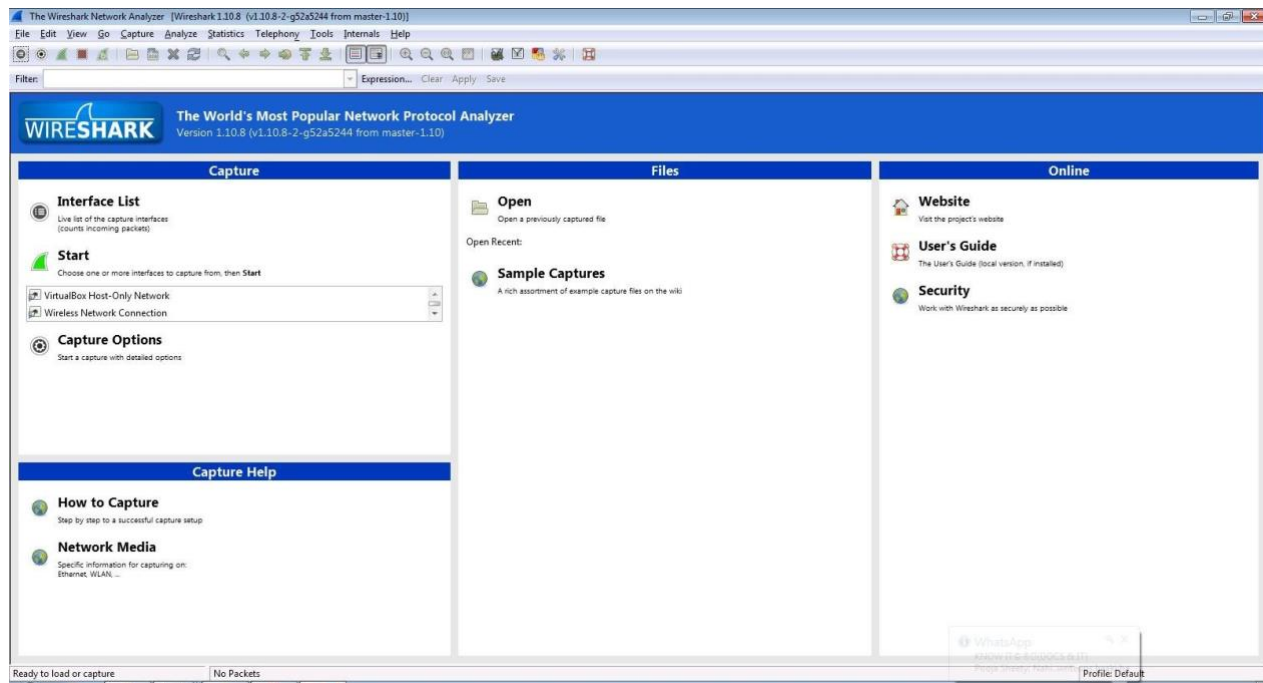
Ping statistics for 10.0.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 14ms, Maximum = 21ms, Average = 16ms

C:\>
```

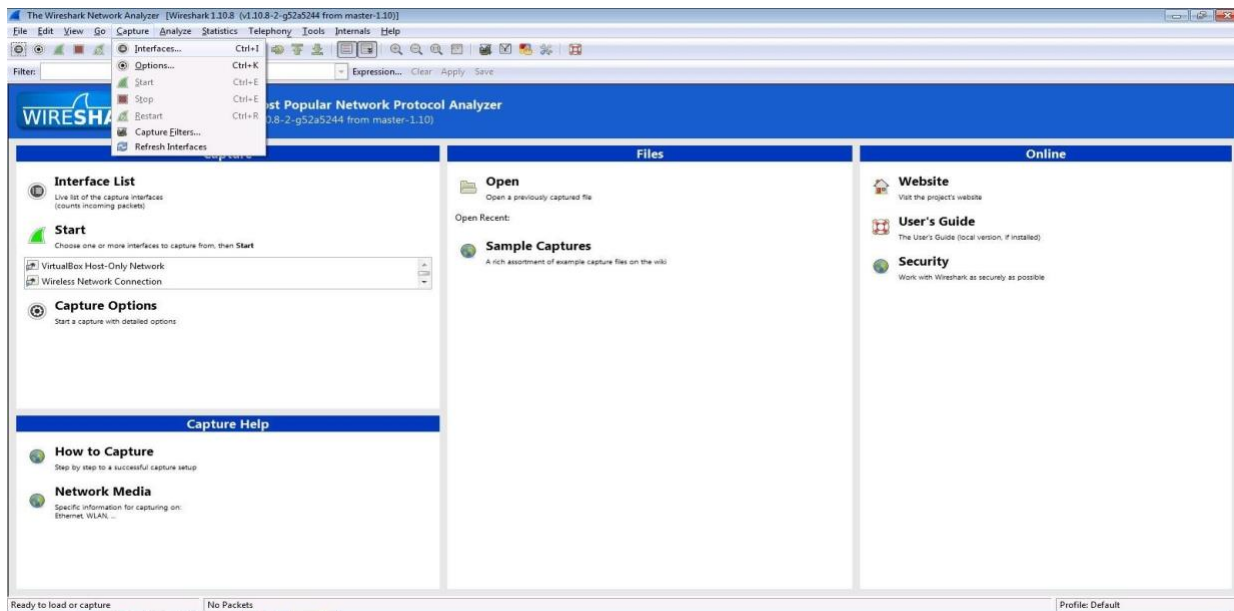
## PRACTICAL NO 10

**Using Wireshark, network analyzer, set the filter for ICMP, TCP, HTTP, UDP, FTP and perform respective protocol transactions to show/prove that the network analyzer is working**

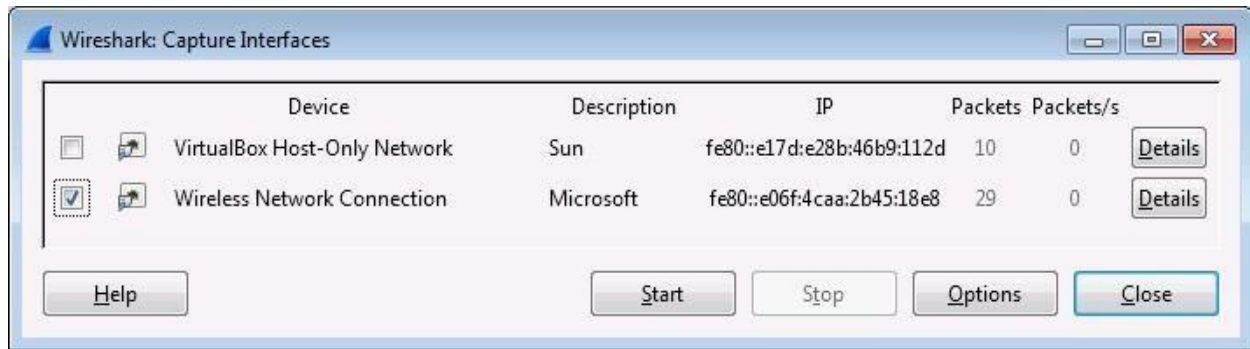
Step 1: Install and open WireShark .



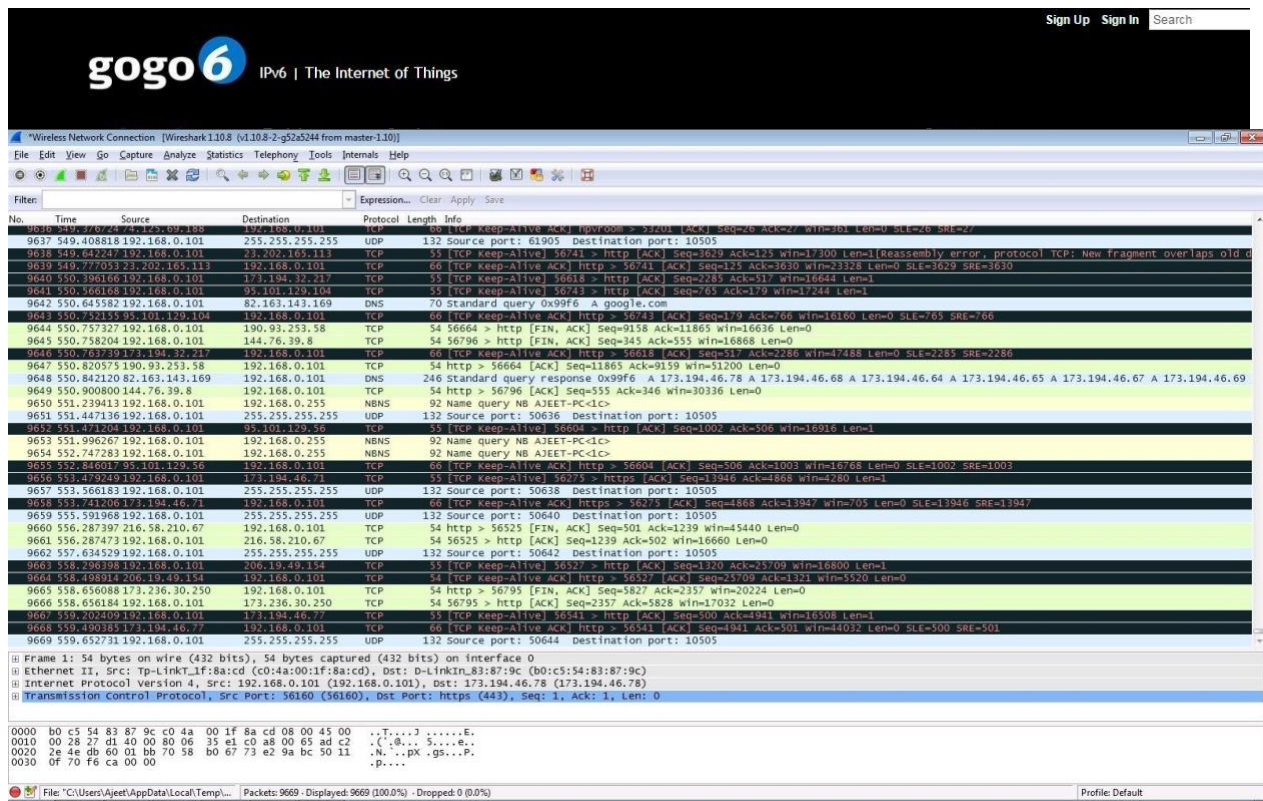
Step 2: Go to Capture tab and select Interface option.



Step 3: In Capture interface, Select Local Area Connection and click on start.



Step 4: The source, Destination and protocols of the packets in the LAN network are displayed.



Step 5: Open a website in a new window and enter the user id and password. Register if needed.

### Sign Up for gogoNET

Already a member? [Click here to sign in.](#)



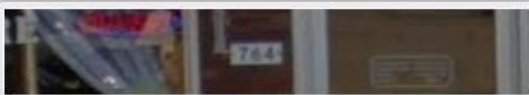
Create a new account...

Business Email Address

Password



Retype Password


What is the "I" in IoT? What is this word?

[Privacy & Terms](#)

[Sign Up](#)






Create a new account...

 Facebook 



---

#### About gogoNET

      
...and 120849 more

Community, training and services for IT professionals deploying IPv6 and the Internet of Things. Join to get free v6 connectivity.

Step 6: Enter the credentials and then sign in.

### Sign In to gogoNET

New? [Click here to join](#)



Business Email Address



Password


[Sign In](#)

[Forgot your password?](#)

...Or sign in with one of these:






 Facebook 



---

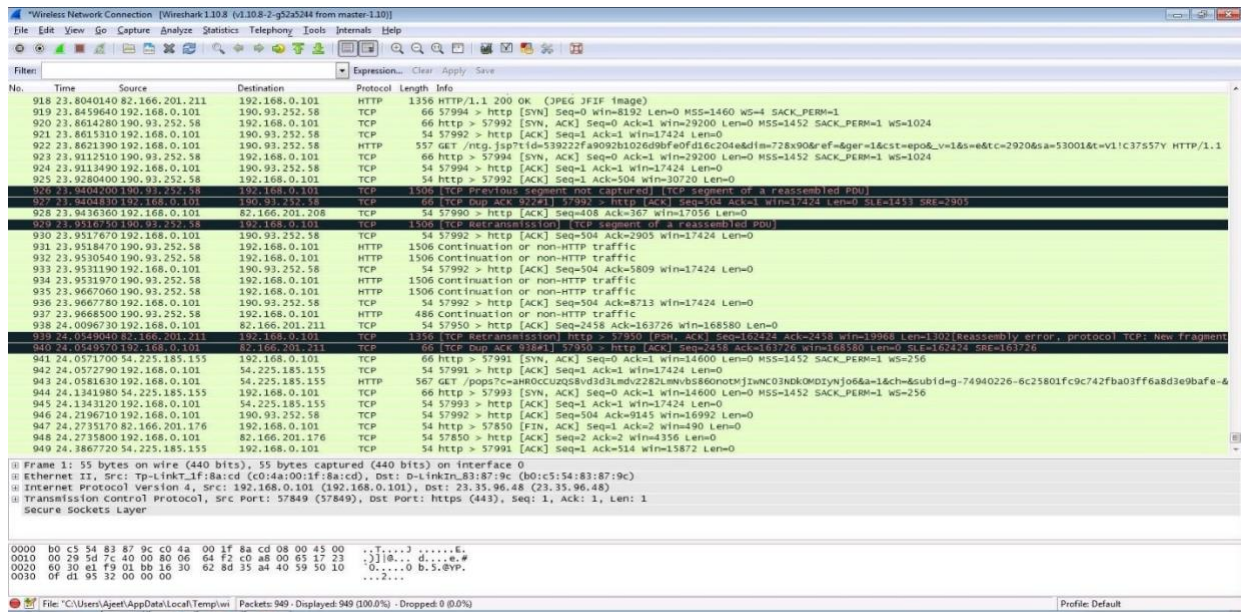
#### About gogoNET

      
...and 120851 more

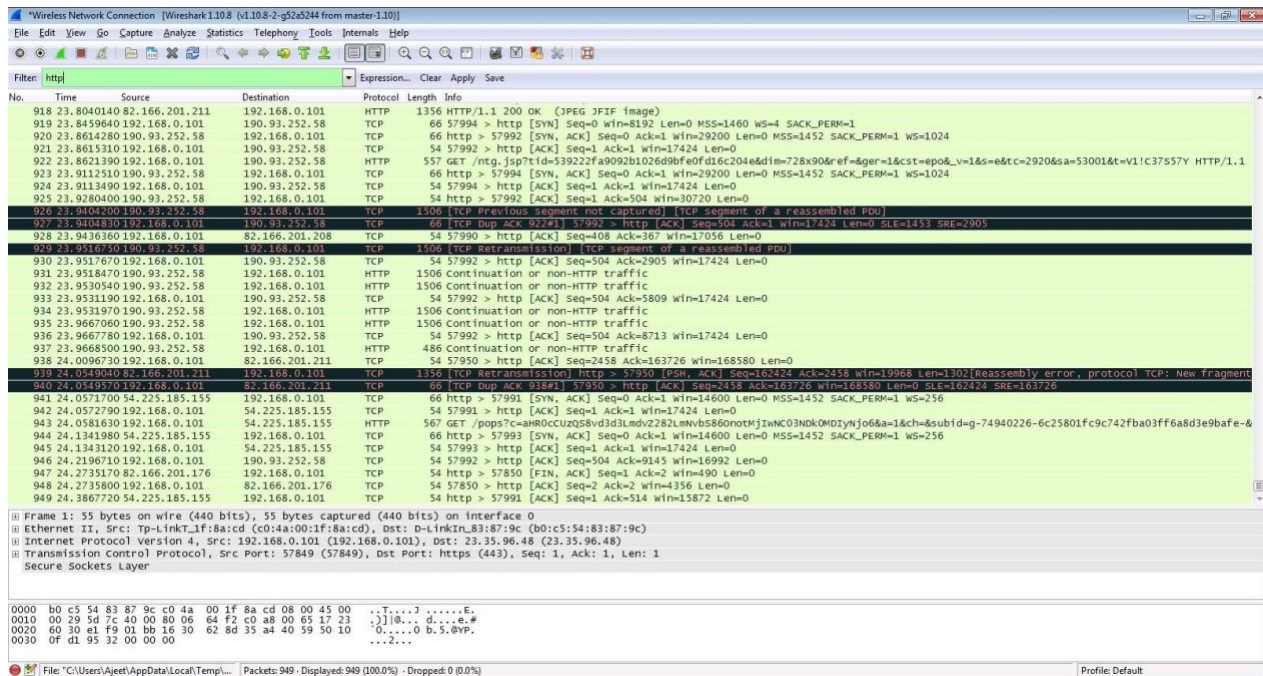
Community, training and services for IT professionals deploying IPv6 and the Internet of Things. Join to get free v6 connectivity.



## Step 7: The Wireshark tool will keep recording the packets



## Step 8: Select filter as http to make the search easier and click on apply.



## Step 9: Now stop the tool to stop recording.

Step 10: Find the post methods for username and passwords.

The figure displays a Wireshark network capture interface. At the top, the title bar reads "Wireshark Network Connection [Wireshark 1.10.8] (v108-2-g52a24 from master-1.10)". Below the title bar is a menu bar with options: File, Edit, View, Go, Capture, Analyze, Statistics, Telephony, Tools, Internals, Help. A toolbar contains various icons for file operations, zooming, and analysis. The main window is divided into three panes:

- Filter:** Set to "http".
- Expression... Clear Apply Save:** An empty field for custom filters.
- Packets List:** A table showing captured packets. The first column is "No.", followed by "Time", "Source", "Destination", "Protocol", "Length", and "Info". Packet 88 is highlighted, showing it's an HTTP POST request to "/main/authorization/dosignin?target=http%3A%2Fwww.google.com%2F" over "HTTP/1.1".

No.	Time	Source	Destination	Protocol	Length	Info
88	11.74898100	192.168.0.1	239.255.255.250	HTTP	132	POST /main/authorization/dosignin?target=http%3A%2Fwww.google.com%2F HTTP/1.1 (application/x-www-form-urlencoded)
90	11.7479490	192.168.0.1	239.255.255.250	SSDP	302	NOTIFY * HTTP/1.1
91	11.7481520	192.168.0.1	239.255.255.250	SSDP	311	NOTIFY * HTTP/1.1
92	11.7490970	192.168.0.1	239.255.255.250	SSDP	374	NOTIFY * HTTP/1.1
93	11.7492140	192.168.0.1	239.255.255.250	SSDP	370	NOTIFY * HTTP/1.1
94	11.7492970	192.168.0.1	239.255.255.250	SSDP	350	NOTIFY * HTTP/1.1
95	11.7503800	192.168.0.1	239.255.255.250	SSDP	382	NOTIFY * HTTP/1.1
96	11.7504410	192.168.0.1	239.255.255.250	SSDP	364	NOTIFY * HTTP/1.1
97	11.7505180	192.168.0.1	239.255.255.250	SSDP	302	NOTIFY * HTTP/1.1
98	11.7516130	192.168.0.1	239.255.255.250	SSDP	311	NOTIFY * HTTP/1.1
99	11.7517350	192.168.0.1	239.255.255.250	SSDP	374	NOTIFY * HTTP/1.1
100	11.7518140	192.168.0.1	239.255.255.250	SSDP	370	NOTIFY * HTTP/1.1
101	11.7528380	192.168.0.1	239.255.255.250	SSDP	350	NOTIFY * HTTP/1.1
102	11.7529390	192.168.0.1	239.255.255.250	SSDP	382	NOTIFY * HTTP/1.1
103	11.7530150	192.168.0.1	239.255.255.250	SSDP	364	NOTIFY * HTTP/1.1
104	11.9071740	208.82.16.68	192.168.0.101	HTTP	170	HTTP/1.1 302 Moved Temporarily
105	11.9140880	192.168.0.101	208.82.16.68	HTTP	339	GET / HTTP/1.1
149	13.9832110	208.82.16.68	192.168.0.101	HTTP	1490	HTTP/1.1 200 OK (text/html)
165	14.2075430	192.168.0.101	195.172.147.1	HTTP	584	GET /seg/r/a-p-874App3bbtkg;rand=22530144137711821045;http://www22.glam.com/cragsmgcmd.act?gtId=50000004404bgcmd-setc6gxpires
174	14.2451000	192.168.0.101	192.168.0.101	HTTP	591	GET /gad/gladamadact_srv.act?ga_adid=af1d-183770529;_g_cw=2;sz=lx1;ga_checkurl_info=yes;tt=i;kg_u_l=http33A/www.google.com/
177	14.2949640	192.168.0.101	192.168.0.101	HTTP	791	GET /gad/gladamadact_srv.act?ga_adid=183770529;zone=/ord=5725010759197176;sz=lx1;ga_slot=yes;gszd=/gsz=728x90/1-300x250/2-/slot.1
185	14.3354360	95.172.147.1	192.168.0.101	HTTP	396	HTTP/1.1 302 Found
206	14.5231410	192.168.0.101	192.168.0.101	HTTP	507	GET /files/D/jk8JZGXVU1Kqj1ob1k2aqRkdwcqdzor3j1xgwXkt1enub-KW8Jm27Scbf14062ABGpgQodefrdnMgz8yqsc/1124631029.jpg?width=73&
209	14.5266060	192.168.0.101	192.168.0.101	HTTP	583	GET /files/uefCQZ1xdn3w3o7dc6d6ghJ057oeqJuzB8cdj6t2mw397bh07Yr2CD8kMKIErBVuArJmrAU27SmPckAdAtwb/Cart/en.png?width=73&
214	14.5276780	192.168.0.101	192.168.0.101	HTTP	514	GET /files/uefCQZ1xdn3w3o7dc6d6ghJ057oeqJuzB8cdj6t2mw397bh07Yr2CD8kMKIErBVuArJmrAU27SmPckAdAtwb/Cart/en.png?width=73&
215	14.5284050	192.168.0.101	192.168.0.101	HTTP	560	GET /files/uefCQZ1xdn3w3o7dc6d6ghJ057oeqJuzB8cdj6t2mw397bh07Yr2CD8kMKIErBVuArJmrAU27SmPckAdAtwb/Cart/en.png?width=73&

Below the packet list, the details pane shows the structure of the selected packet (Frame 88):

- Frame 88: 122 bytes on wire (976 bits), 122 bytes captured (976 bits) on interface 0
- Ethernet II, Src: Tp-Link T-LINK\_TF\_8a:c:d(c0:4a:00:1f:8a:c:d), Dst: D-linkIn.83:87:9c(b0:c5:54:83:87:9c)
- Internet Protocol Version 4, Src: 192.168.0.101 (192.168.0.1), Dst: 208.82.16.68 (208.82.16.68)
- Transmission Control Protocol, Src Port: 57694 (57694), Dst Port: http (80), Seq: 1642, Ack: 1, Len: 68
- [3 Reassembled TCP segments (3709 bytes): #86(1452), #87(189), #88(68)]
- Hypertext Transfer Protocol
- Line-based text data: application/x-www-form-urlencoded
- xg\_token=&emailAddress=aieetsngh4804@gmail.com&password=knighthorse

At the bottom, the status bar indicates: Frame (122 bytes) | Reassembled TCP (3709 bytes) | File: C:\Users\Ajiet\AppData\Local\Temp\... | Packets: 949 - Displayed: 117 (12.3%) - Dropped 0 (0.0%) | Profile: Default

Step 11: U will see the email- id and password that you used to log in.

```
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
Frame 88: 122 bytes on wire (976 bits), 122 bytes captured (976 bits) on interface 0
Ethernet II, Src: Tp-LinkT_1f:8a:cd (c0:4a:00:1f:8a:cd), Dst: D-LinkIn_83:87:9c (b0:c5:54:83:87:9c)
Internet Protocol Version 4, Src: 192.168.0.101 (192.168.0.101), Dst: 208.82.16.68 (208.82.16.68)
Transmission Control Protocol, Src Port: 57694 (57694), Dst Port: http (80), Seq: 1642, Ack: 1, Len: 68
[3 Reassembled TCP Segments (1709 bytes): #86(1452), #87(189), #88(68)]
Hypertext Transfer Protocol
Line-based text data: application/x-www-form-urlencoded
xq_token=&emailAddress=ajeetsnqh480%40gmail.com&password=knighthorse
```

---