

Practicals: Advanced Computer Network using Cisco Packet Tracer

Packet Tracer is a cross-platform visual simulation tool designed by Cisco Systems that allows users to create network topologies and imitate modern computer networks. The software allows users to simulate the configuration of Cisco routers and switches using a simulated command line interface. Packet Tracer makes use of a drag and drop user interface, allowing users to add and remove simulated network devices as they see fit. The software is mainly focused towards Certified Cisco Network Associate Academy students as an educational tool for helping them learn fundamental CCNA concepts. Previously students enrolled in a CCNA Academy program could freely download and use the tool free of charge for educational use.

Practicals are based on following topics:

- Topologies
- HTTP(Hyper Text Transfer Protocol)
- DNS(Domain Name server)
- DHCP(Dynamic Host configuration Protocol)
- Gmail
- VOIP(Voice over IP)
- Subnet
- LanSegment component
- RIP(Routing Information Protocol)
- OSPF(Open Shortest Path)

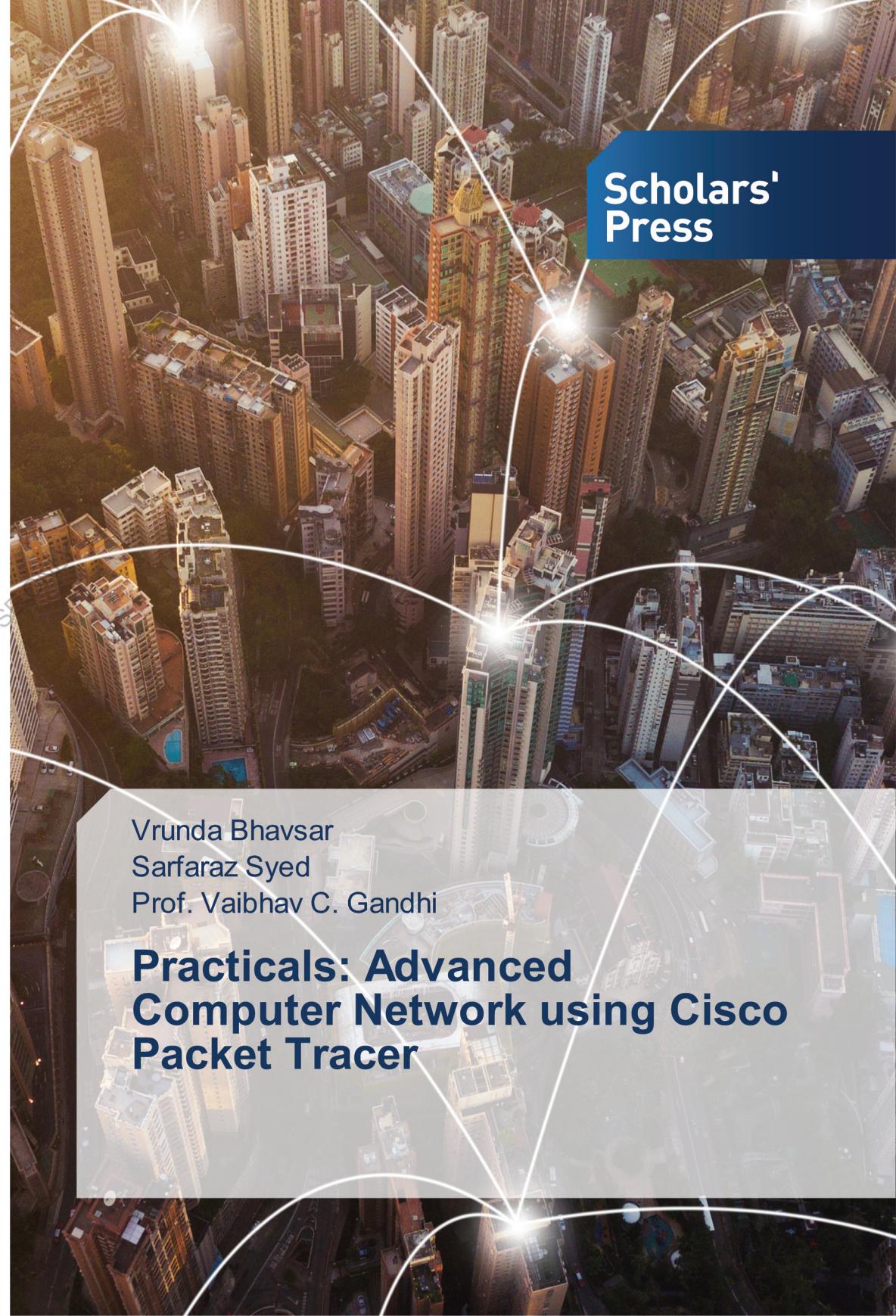
Vrunda C Bhavsar and **Sarfraz Syed** are currently pursuing in M.Tech (IOT) from Navrachana University.

Prof. Vaibhav C. Gandhi is working as Assistant Professor at Navrachana University - Vadodara. He has published more than 12 research papers.



Bhavsar, Syed, Gandhi
FOR AUTHOR USE ONLY

Scholars'
Press



Vrunda Bhavsar
Sarfraz Syed
Prof. Vaibhav C. Gandhi

**Practicals: Advanced
Computer Network using Cisco
Packet Tracer**

**Vrunda Bhavsar
Sarfraz Syed
Prof. Vaibhav C. Gandhi**

**Practicals: Advanced Computer Network using Cisco Packet
Tracer**

FOR AUTHOR USE ONLY

**Vrunda Bhavsar
Sarfraz Syed
Prof. Vaibhav C. Gandhi**

Practicals: Advanced Computer Network using Cisco Packet Tracer

FOR AUTHOR USE ONLY

Scholars' Press

Imprint

Any brand names and product names mentioned in this book are subject to trademark, brand or patent protection and are trademarks or registered trademarks of their respective holders. The use of brand names, product names, common names, trade names, product descriptions etc. even without a particular marking in this work is in no way to be construed to mean that such names may be regarded as unrestricted in respect of trademark and brand protection legislation and could thus be used by anyone.

Cover image: www.ingimage.com

Publisher:

Scholars' Press

is a trademark of

Dodo Books Indian Ocean Ltd., member of the OmniScriptum S.R.L Publishing group

str. A.Russo 15, of. 61, Chisinau-2068, Republic of Moldova Europe

Printed at: see last page

ISBN: 978-613-8-95442-2

Copyright © Vrunda Bhavsar, Sarfaraz Syed, Prof. Vaibhav C. Gandhi

Copyright © 2021 Dodo Books Indian Ocean Ltd., member of the OmniScriptum S.R.L Publishing group

FOR AUTHOR USE ONLY

FOR AUTHOR USE ONLY

Acknowledgement

The satisfaction that accompanies the successful completion of this book would be in complete without the mention of the people who made it possible, without whose constant guidance and encouragement would have made efforts go in vain. I consider myself privileged to express gratitude and respect towards all those who guided us through the completion of this book.

We express our gratitude to our guide Prof. Vaibhav Gandhi of Computer Science and Engineering Department for providing encouragement, constant support and guidance which was of a great help to complete this book successfully.

We also thank Mr.Yogesh Chaudhari (Head of Department) and all the faculty members of Computer Science and Engineering for their constant support, guidance and always encouraging us to move forward and achieve our ideas which till now were only dreams.

Last but not the least, we wish to thank our parents for financing our studies in this college as well as for constantly encouraging us to learn engineering. Their personal sacrifice in providing this opportunity to learn engineering is gratefully acknowledged.

FOR AUTHOR USE ONLY

Index

Sr no	Title	Page No
1.	Case Study of Network devices in Computer Network.	4-12
2.	Case Study of Cisco Packet tracer and types of topology.	13-20
3.	Configure and implement the types of Network Topology in Cisco Packet Tracer.	21-28
4.	To Build the simple Network with using Logical Topology like Mesh, Bus, Ring, Star etc.	29-35
5.	To create LAN segment using Cisco packet tracer	36-45
6.	To configure Subnet planning and its implementation.	46-60
7.	Configure the types of Commands and configure DHCP, HTTP and DNS Server with using Cisco Packet Tracer.	61-75
8.	To configure e - mail using Http, DNS and DHCP server using Cisco Packet Tracer.	76-102
9.	Implement the Program for Distance Vector Routing (Routing Information Protocol – RIP using Cisco Packet Tracer)	103-118
10.	To configure the Address Resolution Protocol – ARP and File Transfer Protocol – FTP.	119-137
11.	To configure the BGP protocol in Cisco Packet Trace.	138-150
12.	To Configure Open Shortest Path First – OSPF in packet trace.	151-157
13.	To configure single area and multipath area in OSPF using Cisco Packet Tracer.	158-175
14.	To configure Voice over IP – VOIP in cisco packet trace.	176-184
15.	Implementation of Wireless Network with using Cisco Packet tracer.	185-194
16.	To study of Network Simulator and Simulation of congestion Control Algorithm using Network Simulator.	195-196
17.	To configure the Network address translation (NAT) in statically and dynamically using cisco packet tracer.	197-222
18.	Configure default router and static route in cisco packet tracer	223-235
19.	Creating TCP/IP connection in Network Simulator – NS2 tool.	236-238
20.	References	239

Practical 1: Case Study of Network devices in Computer Network.

Network devices, or networking hardware, are physical devices that are required for communication and interaction between hardware on a computer network.

Types of network devices

Here is the common network device list:

- Hub
- Switch
- Router
- Bridge
- Gateway
- Modem
- Repeater
- Access Point

Hub

- Hubs connect multiple computer networking devices together.
- A hub also acts as a repeater in that it amplifies signals that deteriorate after traveling long distances over connecting cables.
- A hub is the simplest in the family of network connecting devices because it connects LAN components with identical protocols.
- A hub can be used with both digital and analog data, provided its settings have been configured to prepare for the formatting of the incoming data.
- For example, if the incoming data is in digital format, the hub must pass it on as packets; however, if the incoming data is analog, then the hub passes it on in signal form.
- Hubs do not perform packet filtering or addressing functions; they just send data packets to all connected devices.
- Hubs operate at the Physical layer of the Open Systems Interconnection (OSI) model. There are two types of hubs: simple and multiple port.



Switch

- The switch maintains limited routing information about nodes in the internal network, and it allows connections to systems like hubs or routers.
- Strands of LANs are usually connected using switches. Generally, switches can read the hardware addresses of incoming packets to transmit them to the appropriate destination.
- Using switches improves network efficiency over hubs or routers because of the virtual circuit capability.
- Switches also improve network security because the virtual circuits are more difficult to examine with network monitors.
- You can think of a switch as a device that has some of the best capabilities of routers and hubs combined.
- A switch can work at either the Data Link layer or the Network layer of the OSI model.



Router

- Routers help transmit packets to their destinations by charting a path through the sea of interconnected networking devices using different network topologies.
- Routers are intelligent devices, and they store information about the

networks they're connected to.

FOR AUTHOR USE ONLY

- Most routers can be configured to operate as packet-filtering firewalls and use access control lists (ACLs).
- Routers, in conjunction with a channel service unit/data service unit (CSU/DSU), are also used to translate from LAN framing to WAN framing. This is needed because LANs and WANs use different network protocols.
- Such routers are known as border routers. They serve as the outside connection of a LAN to a WAN, and they operate at the border of your network.



Bridge

- Bridges are used to connect two or more hosts or network segments together.
- The basic role of bridges in network architecture is storing and forwarding frames between the different segments that the bridge connects.
- They use hardware Media Access Control (MAC) addresses for transferring frames. By looking at the MAC address of the devices connected to each segment, bridges can forward the data or block it from crossing.
- Bridges can also be used to connect two physical LANs into a larger logical LAN.
- Bridges are like hubs in many respects, including the fact that they connect LAN components with identical protocols. However, bridges filter incoming data packets, known as frames, for addresses before they are forwarded.
- As it filters the data packets, the bridge makes no modifications to the format or content of the incoming data. The bridge filters and forwards

frames on the network with the help of a dynamic bridge table.

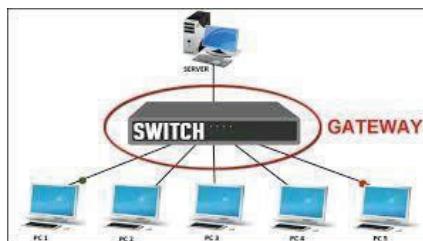
FOR AUTHOR USE ONLY

- Bridges have mostly fallen out of favor in recent years and have been replaced by switches, which offer more functionality. In fact, switches are sometimes referred to as “multiport bridges” because of how they operate.



Gateway

- Gateways normally work at the Transport and Session layers of the OSI model. At the Transport layer and above, there are numerous protocols and standards from different vendors; gateways are used to deal with them.
- Gateways provide translation between networking technologies such as Open System Interconnection (OSI) and Transmission Control Protocol/Internet Protocol (TCP/IP).
- Because of this, gateways connect two or more autonomous networks, each with its own routing algorithms, protocols, topology, domain name service, and network administration procedures and policies.
- Gateways perform all of the functions of routers and more. In fact, a router with added translation functionality is a gateway.
- The function that does the translation between different network technologies is called a protocol converter.



Modem

- Modems (modulators-demodulators) are used to transmit digital signals over analog telephone lines.
- Thus, digital signals are converted by the modem into analog signals of different frequencies and transmitted to a modem at the receiving location.
- The receiving modem performs the reverse transformation and provides a digital output to a device connected to a modem, usually a computer.
- The digital data is usually transferred to or from the modem over a serial line through an industry standard interface, RS-232.
- Modems work on both the Physical and Data Link layers.



Repeater

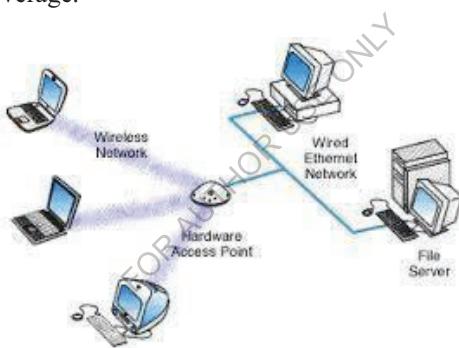
- A repeater is an electronic device that amplifies the signal it receives.
- You can think of repeater as a device which receives a signal and retransmits it at a higher level or higher power so that the signal can cover longer distances, more than 100 meters for standard LAN cables.
- Repeaters work on the Physical layer.



FOR AUTHOR USE ONLY

Access Point

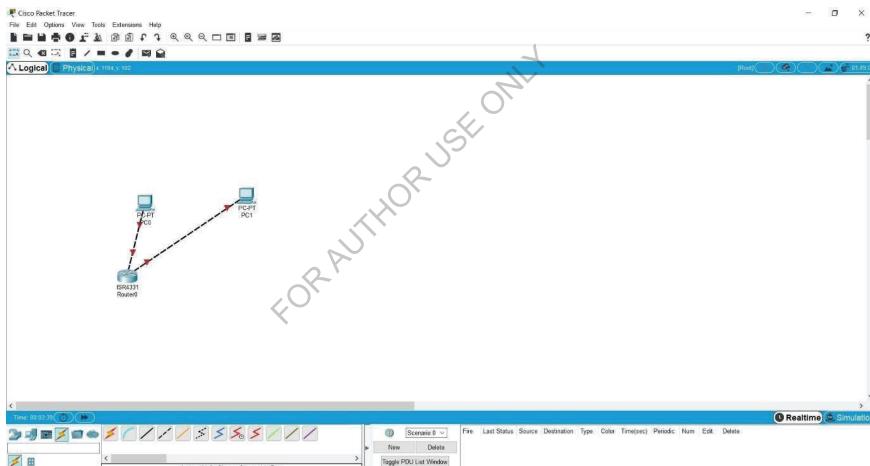
- Access point (AP) can technically involve either a wired or wireless connection, it commonly means a wireless device.
- An AP works at the second OSI layer, the Data Link layer, and it can operate either as a bridge connecting a standard wired network to wireless devices or as a router passing data transmissions from one access point to another.
- Access points typically are separate network devices with a built-in antenna, transmitter and adapter.
- APs use the wireless infrastructure network mode to provide a connection point between WLANs and a wired Ethernet LAN.
- They also have several ports, giving you a way to expand the network to support additional clients.
- Depending on the size of the network, one or more APs might be required to provide full coverage.



Practical 2:Case Study of Cisco Packet tracer and types of topology.

Cisco Packet Tracer

Packet Tracer is a cross-platform visual simulation tool designed by Cisco Systems that allows users to create network topologies and imitate modern computer networks. The software allows users to simulate the configuration of Cisco routers and switches using a simulated command line interface. Packet Tracer makes use of a drag and drop user interface, allowing users to add and remove simulated network devices as they see fit. The software is mainly focused towards Certified Cisco Network Associate Academy students as an educational tool for helping them learn fundamental CCNA concepts. Previously students enrolled in a CCNA Academy program could freely download and use the tool free of charge for educational use.



Students who spend more time in a hands-on mode of learning, with simulation and interactive capabilities, will be better equipped to apply concepts and configuration fundamentals when exposed to real equipment. As students gain practical experience with tasks such as configuration and troubleshooting, they become more confident in their abilities. Cisco Packet Tracer's multiuser functionality also provides an opportunity for social learning, allowing students to collaborate and compete with each other and play games that enhance the learning experience.

Key Features Packet Tracer : Cisco Packet Tracer has two workspaces— logical

and physical. The logical workspace allows users to build logical network topologies by placing, connecting, and clustering virtual network devices. The physical workspace provides a graphical physical dimension of the logical network, giving a sense of scale and placement in how network devices such as routers, switches, and hosts would look in a real environment. The physical view also provides geographic representations of networks, including multiple cities, buildings, and wiring closets.

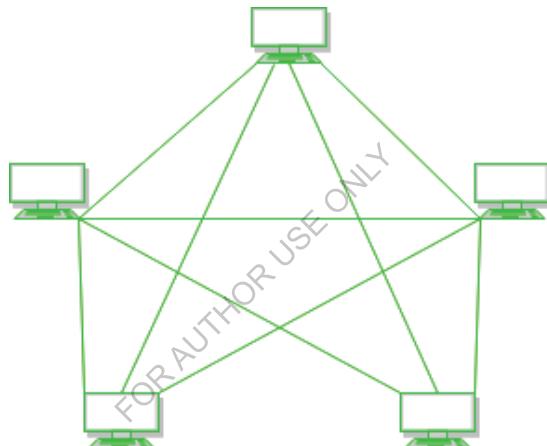
Packet Tracer Modes: Cisco Packet Tracer provides two operating modes to visualize the behavior of a network—real-time mode and simulation mode. In real-time mode the network behaves as real devices do, with immediate real-time response for all network activities. The real-time mode gives students a viable alternative to real equipment and allows them to gain configuration practice before working with real equipment. In simulation mode the user can see and control time intervals, the inner workings of data transfer, and the propagation of data across a network. This helps students understand the fundamental concepts behind network operations. A solid understanding of network fundamentals can help accelerate learning about related concepts.

Topologies

The study of geometrical properties and spatial relations unaffected by the continuous change of shape or size of figures.

1. Mesh Topology :

In mesh topology, every device is connected to another device via particular channel.



Every device is connected with another via dedicated channels. These channels are known as links.

If suppose, N number of devices are connected with each other in mesh topology, then total number of ports that is required by each device is $N-1$. In the Figure 1, there are 5 devices connected to each other, hence total number of ports required is 4.

If suppose, N number of devices are connected with each other in mesh topology, then total number of dedicated links required to connect them is $N(N-1)/2$. In the Figure 1, there are 5 devices connected to each other, hence total number of links required is $5*4/2 = 10$.

Advantages of this topology :

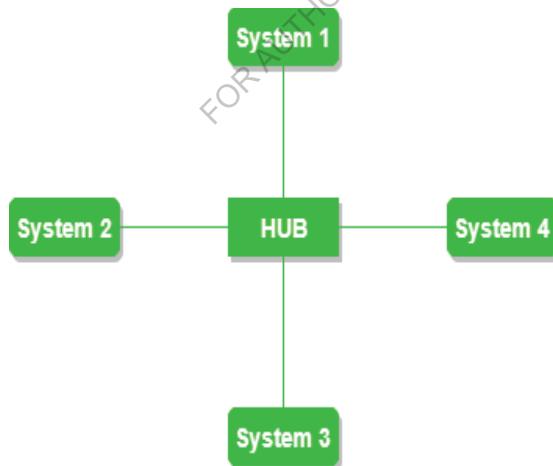
- It is robust.
- Fault is diagnosed easily. Data is reliable because data is transferred among the devices through dedicated channels or links.
- Provides security and privacy.

Problems with this topology :

- Installation and configuration is difficult.
- Cost of cables are high as bulk wiring is required, hence suitable for less number of devices.
- Cost of maintenance is high.

2. Star Topology :

In star topology, all the devices are connected to a single hub through a cable. This hub is the central node and all other nodes are connected to the central node. The hub can be passive in nature i.e. not intelligent hub such as broadcasting devices, at the same time the hub can be intelligent known as active hubs. Active hubs have repeaters in them.



A star topology having four systems connected to single point of connection i.e. hub.

Advantages of this topology :

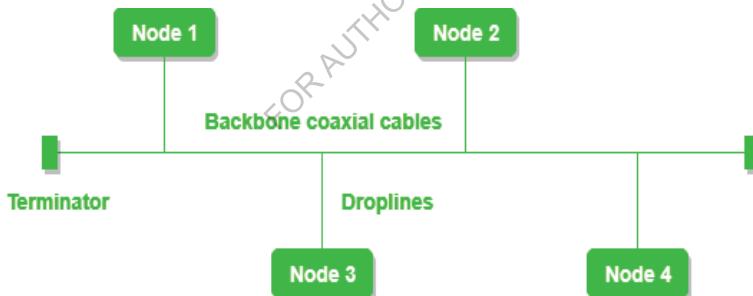
- If N devices are connected to each other in star topology, then the number of cables required to connect them is N. So, it is easy to set up.
- Each device require only 1 port i.e. to connect to the hub.

Problems with this topology :

- If the concentrator (hub) on which the whole topology relies fails, the whole system will crash down.
- Cost of installation is high.
- Performance is based on the single concentrator i.e. hub.

3. Bus Topology :

Bus topology is a network type in which every computer and network device is connected to single cable. It transmits the data from one end to another in single direction. No bi-directional feature is in bus topology.



A bus topology with shared backbone cable. The nodes are connected to the channel via drop lines.

Advantages of this topology :

- If N devices are connected to each other in bus topology, then the number of cables required to connect them is 1 which is known as backbone cable and N drop lines are required.
- Cost of the cable is less as compared to other topology, but it is used to built small networks.

Problems with this topology :

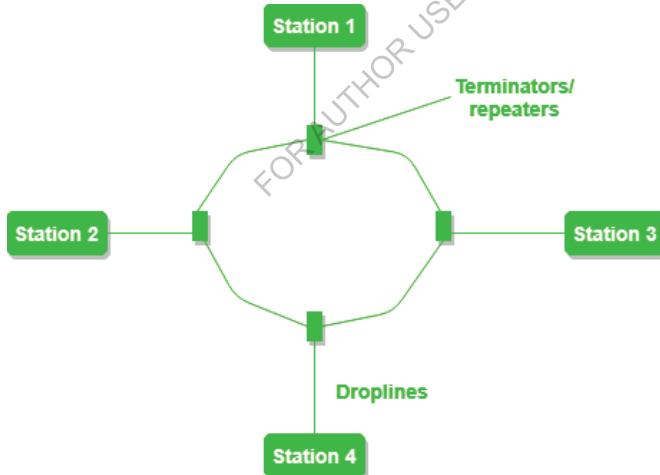
- If the common cable fails, then the whole system will crash down.
- If the network traffic is heavy, it increases collisions in the network. To avoid this, various protocols are used in MAC layer known as Pure Aloha, Slotted Aloha, CSMA/CD etc.

4. Ring Topology :

In this topology, it forms a ring connecting devices with its exactly two neighboring devices.

A number of repeaters are used for Ring topology with a large number of nodes, because if someone wants to send some data to the last node in the ring topology with 100 nodes, then the data will have to pass through 99 nodes to reach the 100th node. Hence to prevent data loss repeaters are used in the network.

The transmission is unidirectional, but it can be made bidirectional by having 2 connections between each Network Node, it is called Dual Ring Topology.



A ring topology comprises of 4 stations connected with each forming a ring.. The following operations takes place in ring topology are :

1. One station is known as **monitor** station which takes all the responsibility to perform the operations.
2. To transmit the data, station has to hold the token. After the

transmission is done, the token is to be released for other stations to use.

3. When no station is transmitting the data, then the token will circulate in the ring.
4. There are two types of token release techniques : **Early token release** releases the token just after the transmitting the data and **Delay token release** releases the token after the acknowledgement is received from the receiver.

Advantages of this topology :

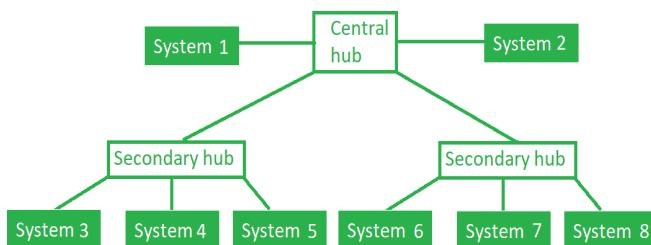
- The possibility of collision is minimum in this type of topology.
- Cheap to install and expand.

Problems with this topology :

- Troubleshooting is difficult in this topology.
- Addition of stations in between or removal of stations can disturb the whole topology.

5. Tree Topology :

This topology is the variation of Star topology. This topology have hierarchical flow of data.



In this the various secondary hubs are connected to the central hub which contains the repeater. In this data flow from top to bottom i.e from the central hub to secondary and then to the devices or from bottom to top i.e. devices to secondary hub and then to the central hub.

Advantages of this topology :

- It allows more devices to be attached to a single central hub thus it increases the distance that is travel by the signal to come to the devices.
- It allows the network to get isolate and also prioritize from different computers.

Problems with this topology :

- If the central hub gets fails the entire system fails.
- The cost is high because of cabling.

Practical 3: Configure and implement the types of Network Topology in Cisco Packet Tracer.

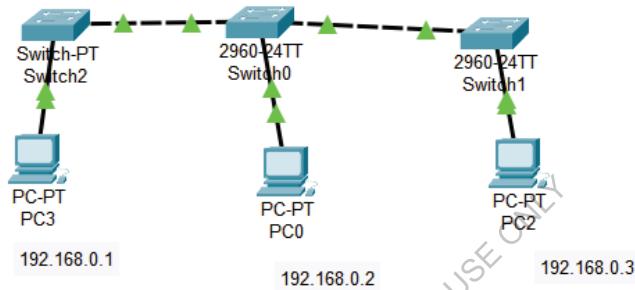
Topology

Steps of making Topology

Bus Topology

1. Take all required devices in cisco packet tracer.
 - 3 PC
 - 3 Switches
2. Using cable connect all devices
 - Connect three switches to each other as shown in fig
 - Connect every PC to according to switch.
3. Give IP address.
 - In Desktop->In static->IPv4
 - Give sequence vise ip address to pc
 - 192.168.0.1 for pc3
 - Follow same steps for another two pcs
 - Give ip as 192.168.0.2 pc0
 - Give ip as 192.168.0.3 pc2
4. wait until arrow become green

1.Bus topology



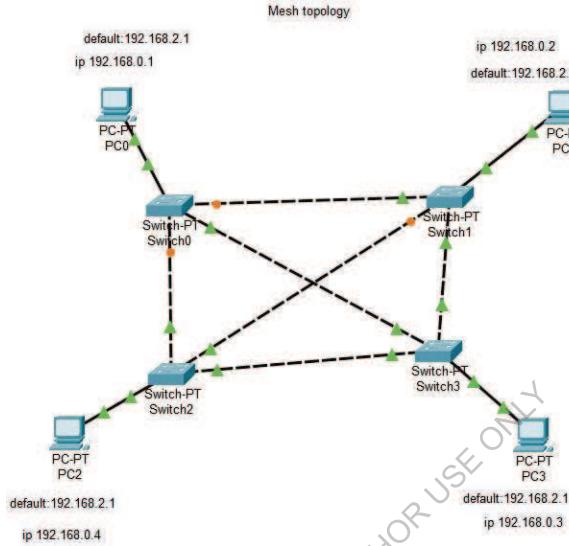
(a)

Bus topology

Mesh Topology

- 1.Take all required devices in cisco packet tracer.
 - 4 PC
 - 4 Switches
- 2.Using cable connect all devices
 - Connect four switches to each other as shown in fig
 - Make sure that no one switch is available that does not connect with each other.
 - Connect every PC to according to switch.
- 3.Give IP address.
 - In Desktop->In static->IPv4 and default gateway
 - Please make note default gateway is same for every pc
 - 192.168.2.1
 - Give sequence vise ip address to pc
 - 192.168.0.1 for pc0
 - Follow same steps for another two pcs
 - Give ip as 192.168.0.2 pc1
 - Give ip as 192.168.0.4 pc2
 - Give ip as 192.168.0.3 pc3
- 4.wait until arrow become green

2.Mesh Topology



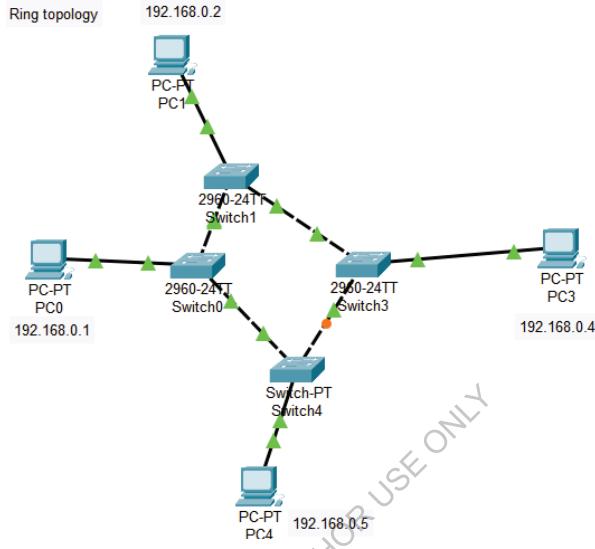
(b)

Mesh topology

Ring Topology

1. Take all required devices in cisco packet tracer.
 - 4 PC
 - 4 Switches
2. Using cable connect all devices
 - Connect four switches to each other as shown in fig
 - Connect every PC to according to switch.
3. Give IP address.
 - In Desktop->In static->IPv4
 - Give sequence vise ip address to pc
 - 192.168.0.1 for pc0
 - Follow same steps for another two pcs
 - Give ip as 192.168.0.2 pc1
 - Give ip as 192.168.0.4 pc3
 - Give ip as 192.168.0.5 pc4
4. wait until arrow become green

3. Ring Topology

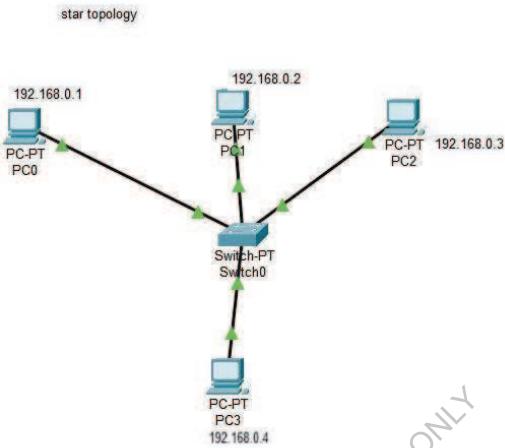


(c) Ring topology

Star Topology

1. Take all required devices in cisco packet tracer.
 - 4 PC
 - 1 Switches
2. Using cable connect all devices
 - Connect four pc to one switch as shown in fig
 - Connect every PC to according to switch.
3. Give IP address.
 - In Desktop->In static->IPv4
 - Give sequence vise ip address to pc
 - 192.168.0.1 for pc0
 - Follow same steps for another two pcs
 - Give ip as 192.168.0.2 pc1
 - Give ip as 192.168.0.3 pc2
 - Give ip as 192.168.0.4 pc3
4. wait until arrow become green

4. Star Topology



(a)Star topology

Practical 4: To Build the simple Network with using Logical Topology like Mesh, Bus, Ring, Star etc.

Steps of making all topology connected

1. Take all required devices in cisco packet tracer.

- 15 PC
- 3 Router
- 12 Switches

2. Using cable connect all devices

- Connect three PC to one switch same for another
- Connect two routers with each other

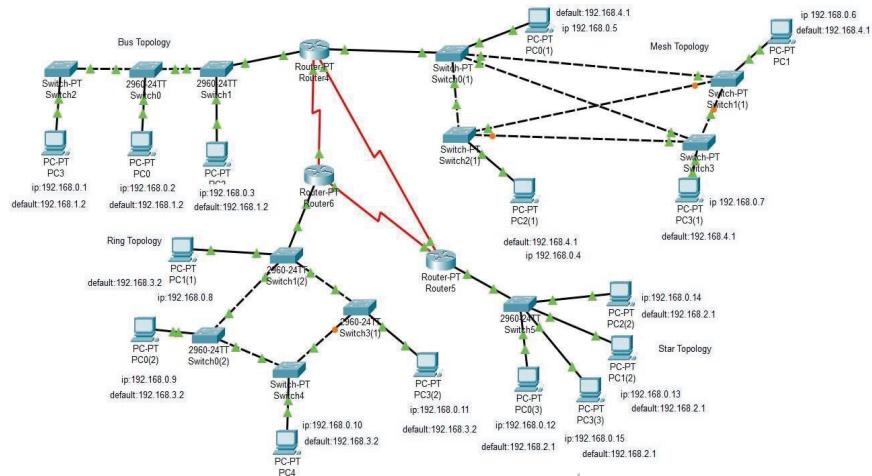
4. Give IP address and default gateway to PC

- In desktop IP config give IP address in static
- In Desktop->In static->IPv4
- Also set value of default gateway (different for every topology but same for each PC which connected in same topology)
- Labeling both the values

5. Enable the port of router according to connection

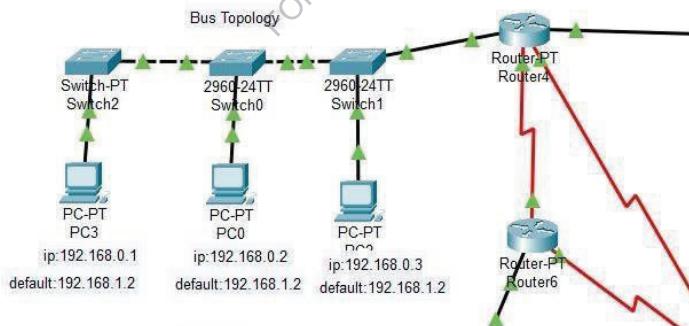
6. Take packet and transfer from one pc to another pc make attention that both the pc are belong to different topology

7. observe the result in simulation.



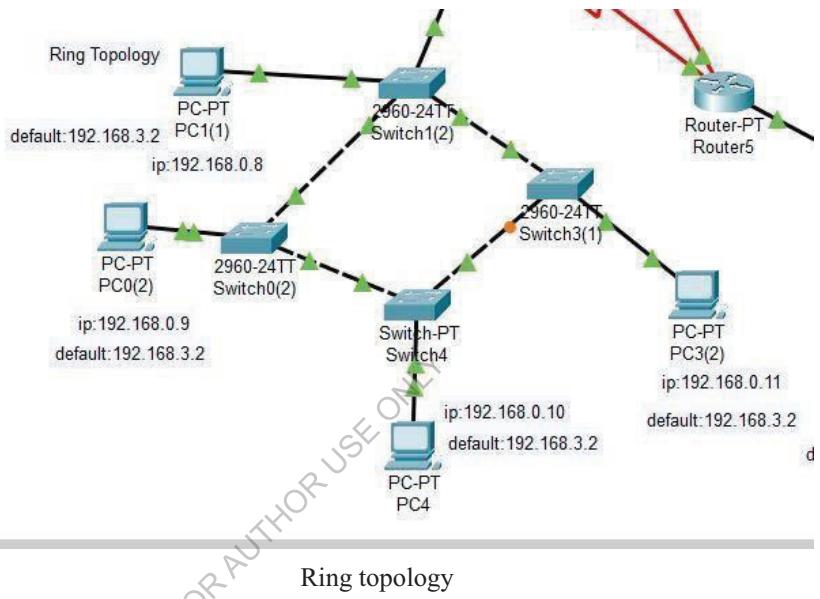
(a) All topology connected

Bus Topology

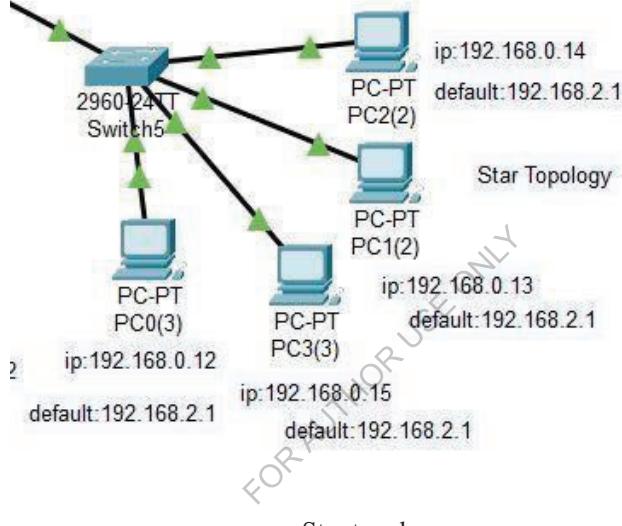


Bus topology

Ring Topology



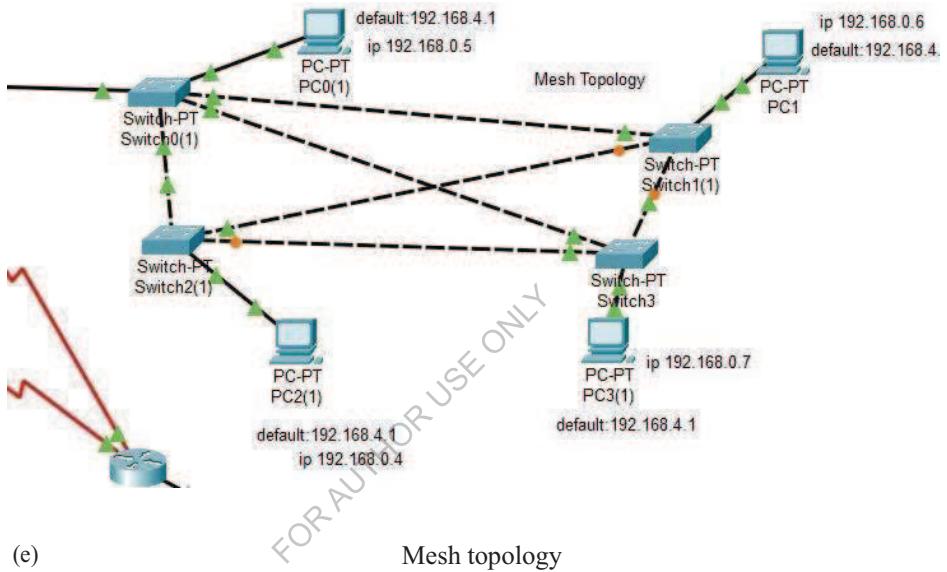
Star Topology



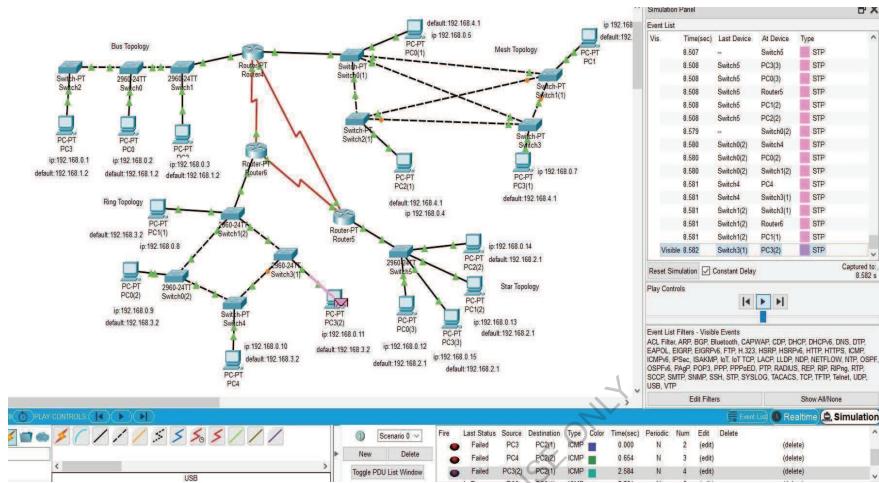
(d)

Star topology

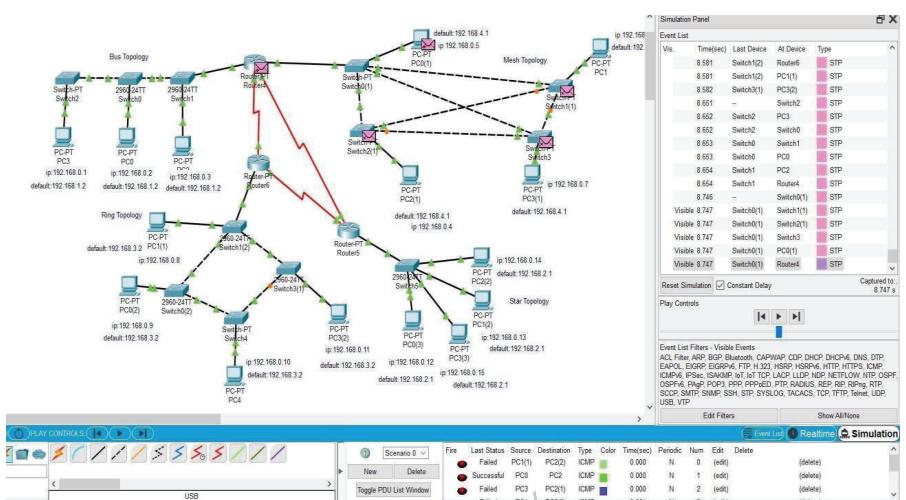
Mesh Topology



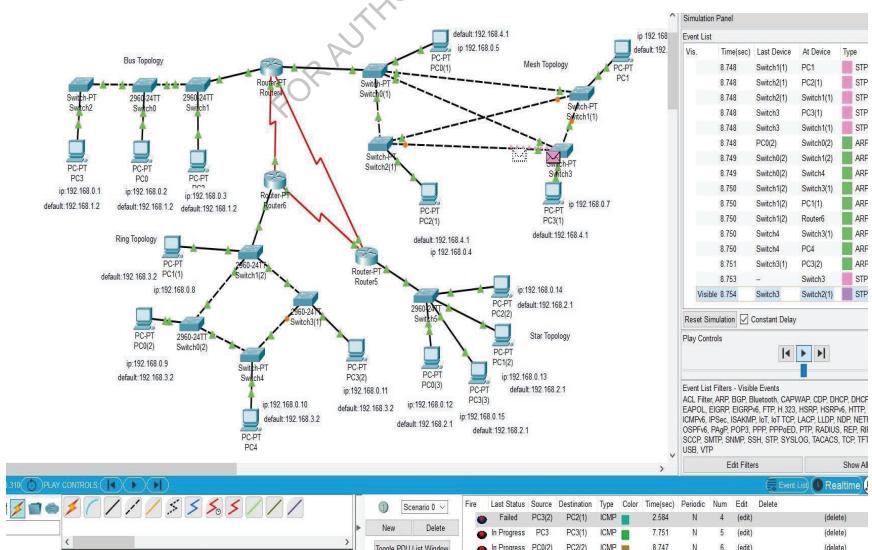
Packet transferring



(f) Packet are transfer from one pc to another we can see all the protocols in simulator



(c) Stp protocol and we can see success in simulation that packet is transferring successfully



(g) In this packet transferring is in progress

Practical 5: To creating a LAN Segment using Cisco Packet Tracer.

Steps of making LAN Segment

1. Take all required devices in cisco packet tracer.

- 3 PC
- 2 Laptop
- 1 Switches

2. Using cable connect all devices

- Connect three PC to one switch same for another
- Connect two Laptop to one switch

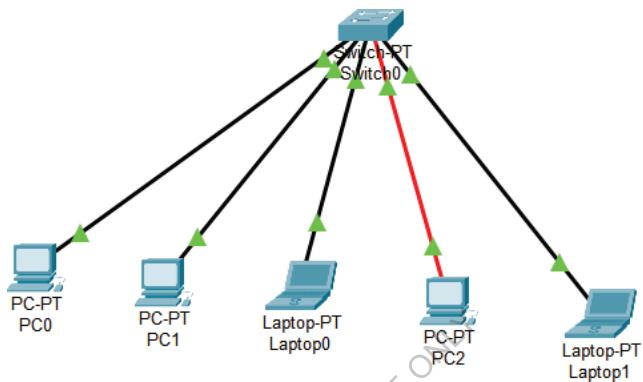
4. Give IP address and default gateway to PC

- In desktop IP config give IP address in static
- In Desktop->In static->IPv4
- Also set value of default gateway (different for every topology but same for each PC which connected in same topology)

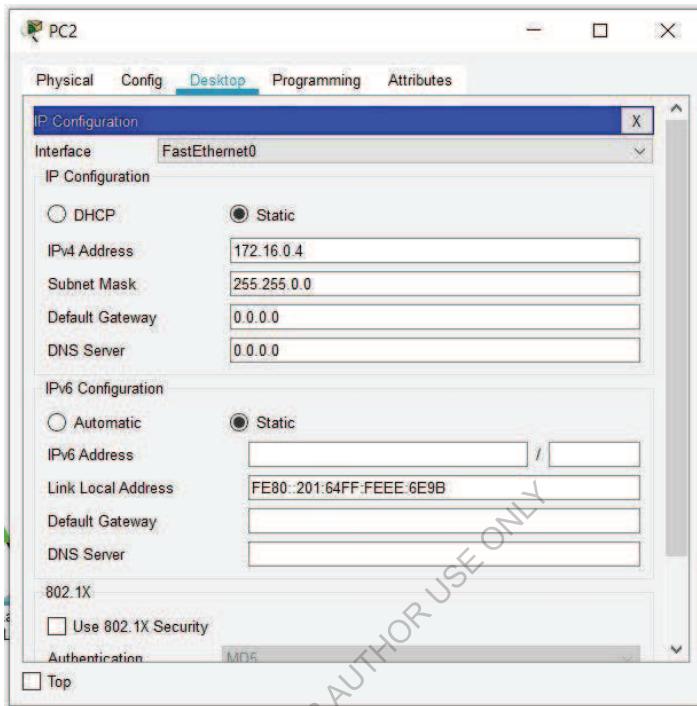
5. Enable the port of Switch according to connection

6. Give command in CLI of PC

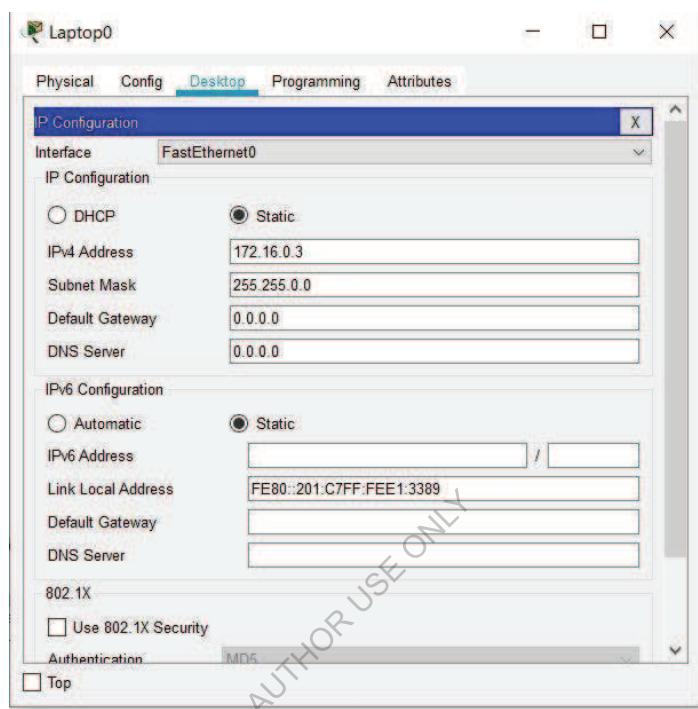
- Ping IP address



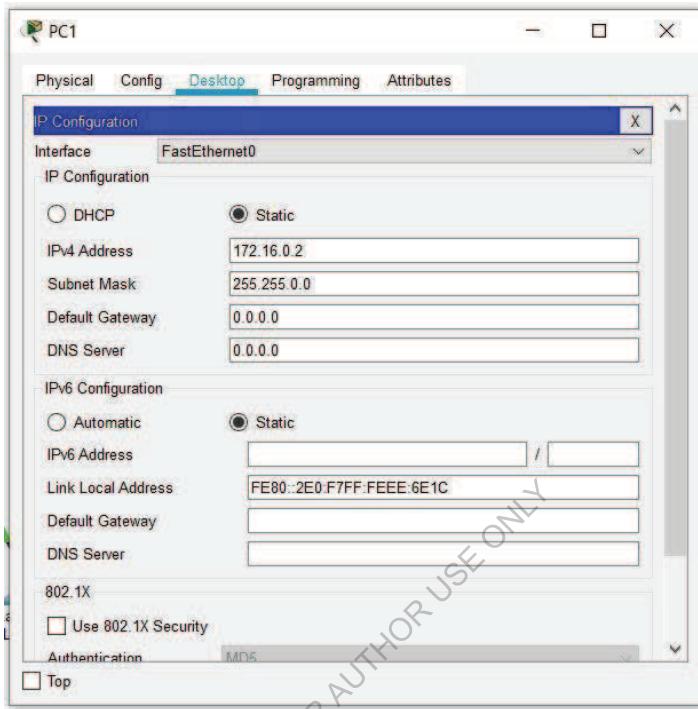
(a) Lansegment



(b) give static IP to PC

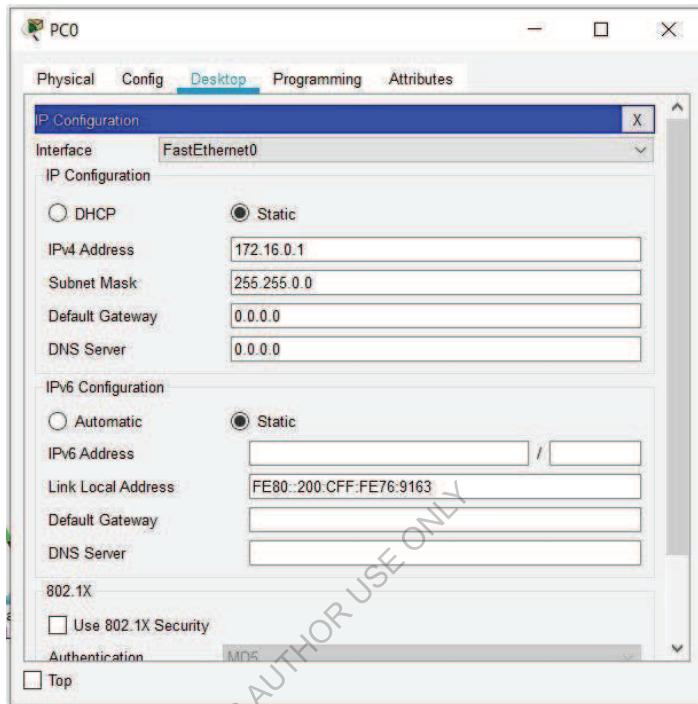


(b) give static IP to laptop

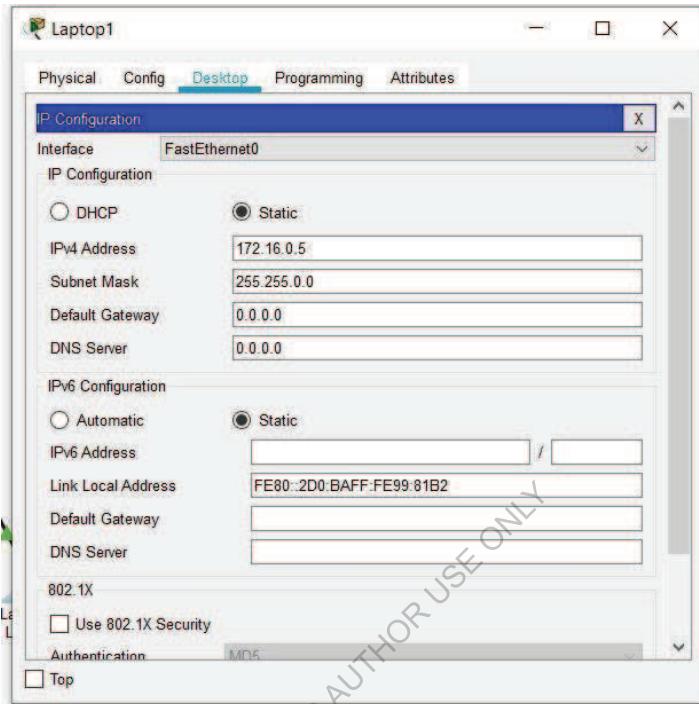


(c)

give static IP to PC1



(c) give static IP to PC0



(d) give static IP to laptop

```
Packet Tracer PC Command Line 1.0
C:\>ping 172.16.0.4

Pinging 172.16.0.4 with 32 bytes of data:

Reply from 172.16.0.4: bytes=32 time=1ms TTL=128
Reply from 172.16.0.4: bytes=32 time=3ms TTL=128
Reply from 172.16.0.4: bytes=32 time<1ms TTL=128
Reply from 172.16.0.4: bytes=32 time<1ms TTL=128

Ping statistics for 172.16.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 3ms, Average = 1ms

C:\>
```

(e) write ping command in CLI of laptop

PC1

Physical Config Desktop Programming Attributes

Command Prompt X

```
Packet Tracer PC Command Line 1.0
C:\>ping 172.16.0.3

Pinging 172.16.0.3 with 32 bytes of data:

Reply from 172.16.0.3: bytes=32 time=1ms TTL=128
Reply from 172.16.0.3: bytes=32 time<1ms TTL=128
Reply from 172.16.0.3: bytes=32 time=3ms TTL=128
Reply from 172.16.0.3: bytes=32 time<1ms TTL=128

Ping statistics for 172.16.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 3ms, Average = 1ms

C:\>
```

Top

(f) write ping command in CLI of PC1

PC2

Physical Config Desktop Programming Attributes

Command Prompt X

```
Packet Tracer PC Command Line 1.0
C:\>
ping 172.16.0.1

Pinging 172.16.0.1 with 32 bytes of data:

Reply from 172.16.0.1: bytes=32 time<1ms TTL=128

Ping statistics for 172.16.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

(g) write ping command in CLI of PC2

Practical 6: To configure Subnetting and Implementation.

Steps of making Subnet Planning

1. Take all required devices in cisco packet tracer.

- 8 PC
- 2 Router
- 4 Switches

2. Using cable connect all devices

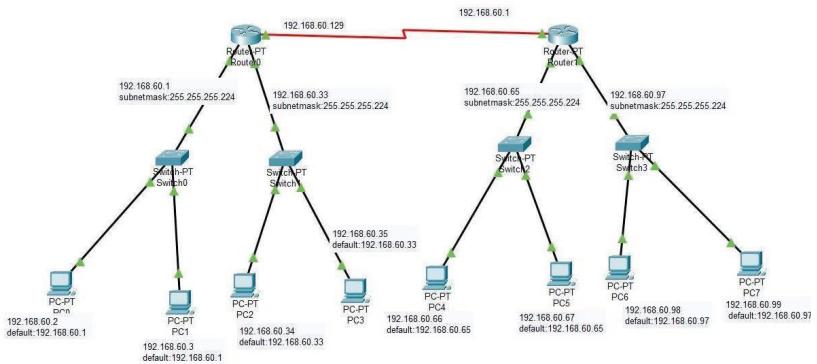
- Connect three PC to one switch same for another
- Connect two router with each other and two switches to router.

4. Give IP address and default gateway to PC

- In desktop IP config give IP address in static
- In Desktop->In static->IPv4
- Also set value of default gateway (same for every two pcs which are connected with one switch is as same)
- Give subnet mask according from router to switch.

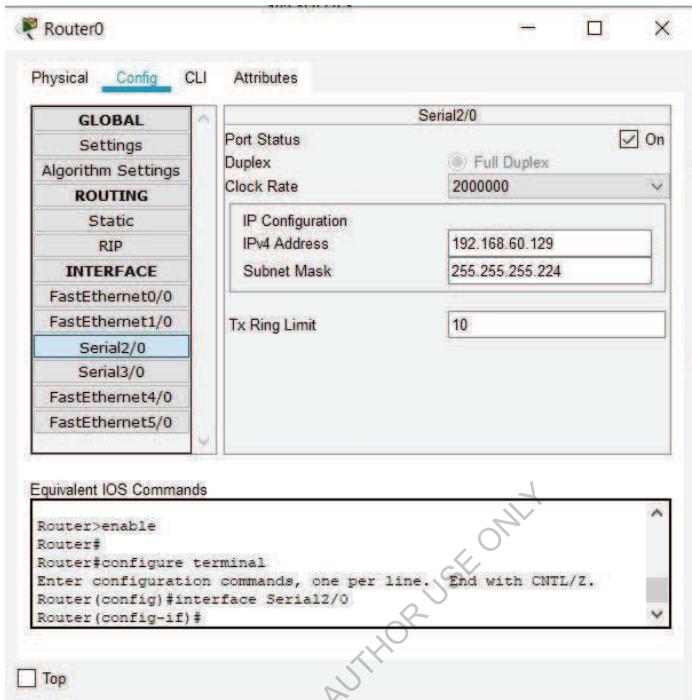
5. Enable the port of Switch according to connection

- Connect serial to serial connection between router give appropriate ip address as shown in fig.

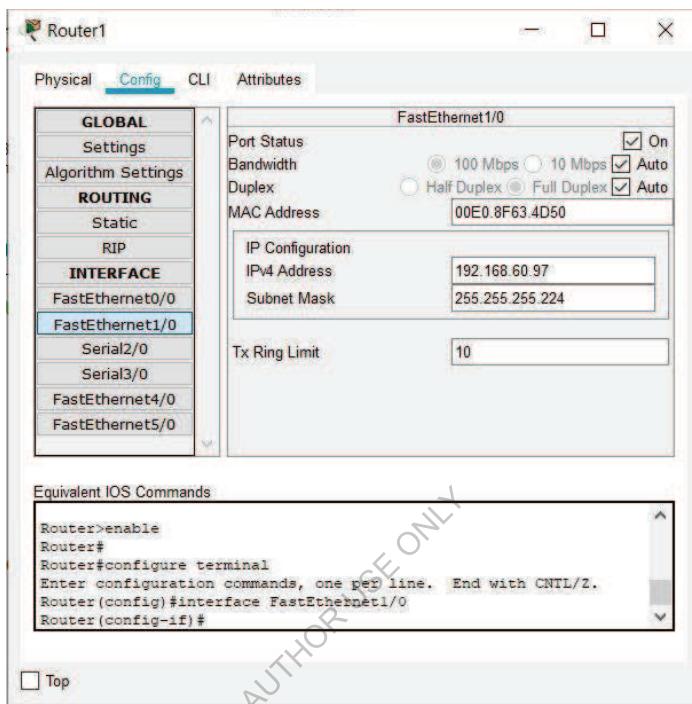


(a)

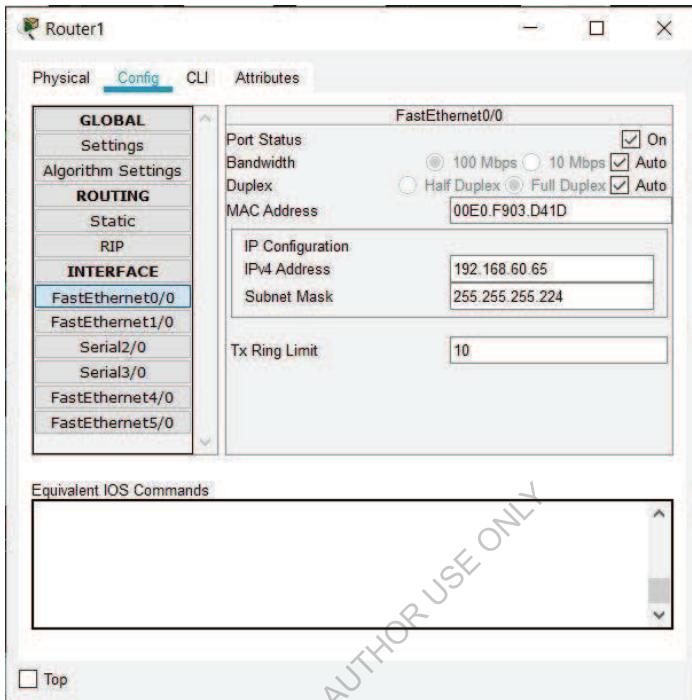
Subnetting



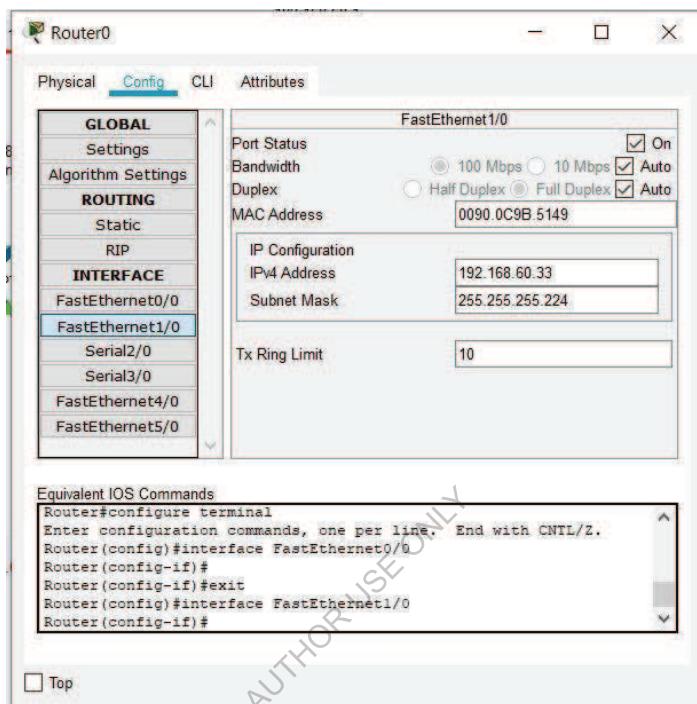
(b) Give address to serial port 2/0



(c) Give address to FastEthernet port 1/0

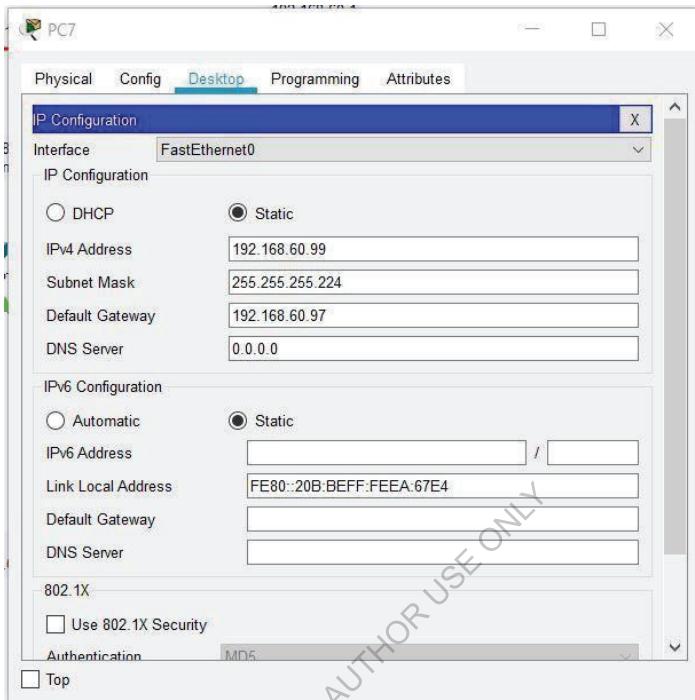


(d) Give address to FastEthernet port 0/0

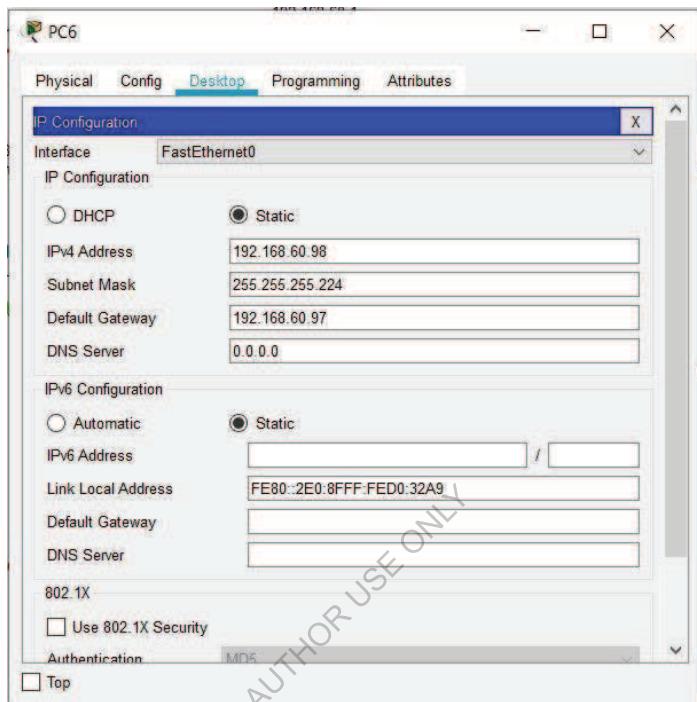


(e)

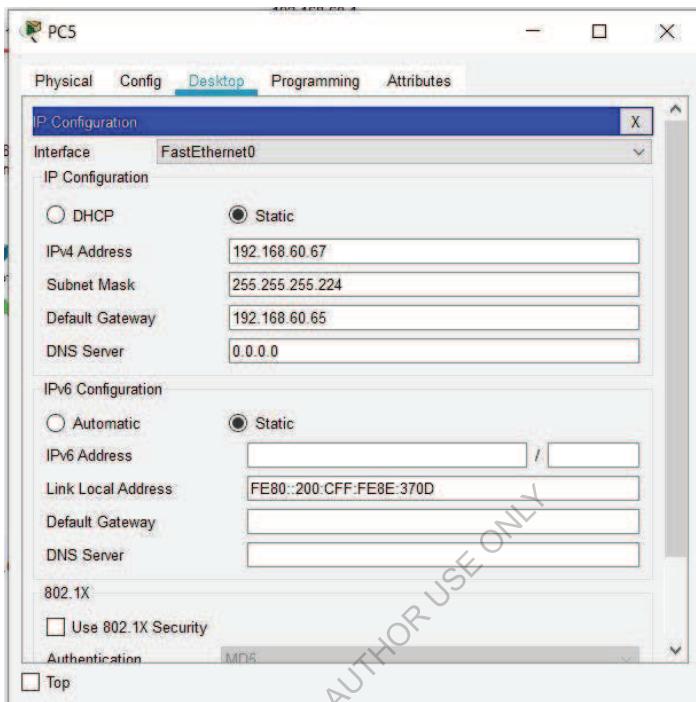
Give address to FastEthernet port 1/0



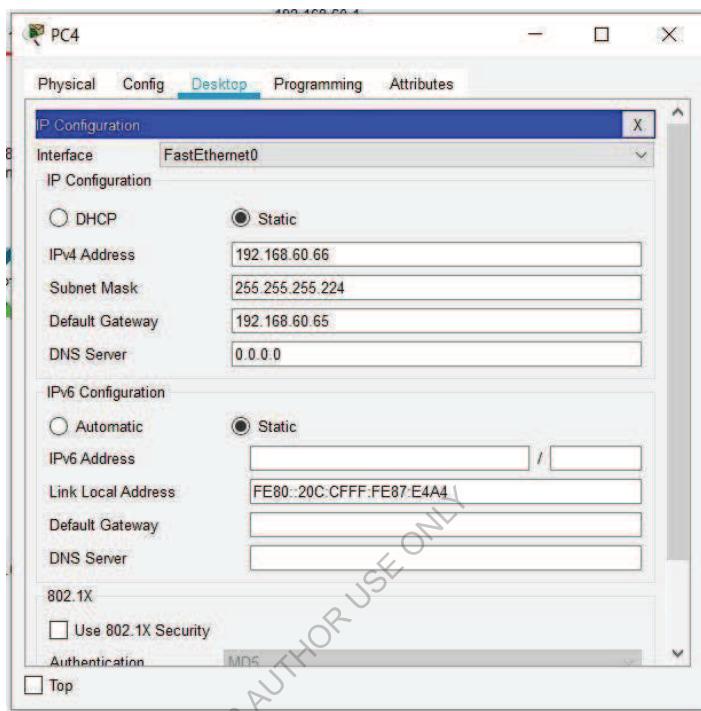
(f) give static IP to PC7



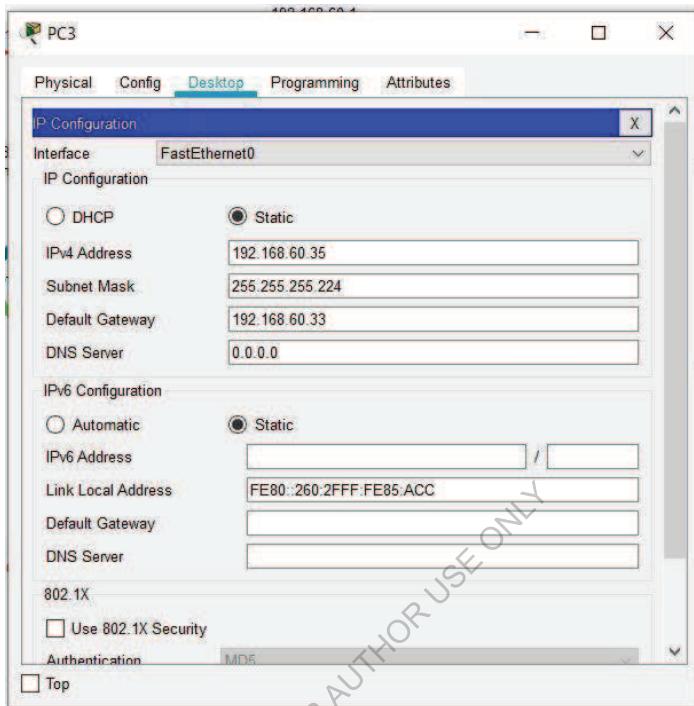
(g) give static IP to PC6



(h) give static IP to PC5

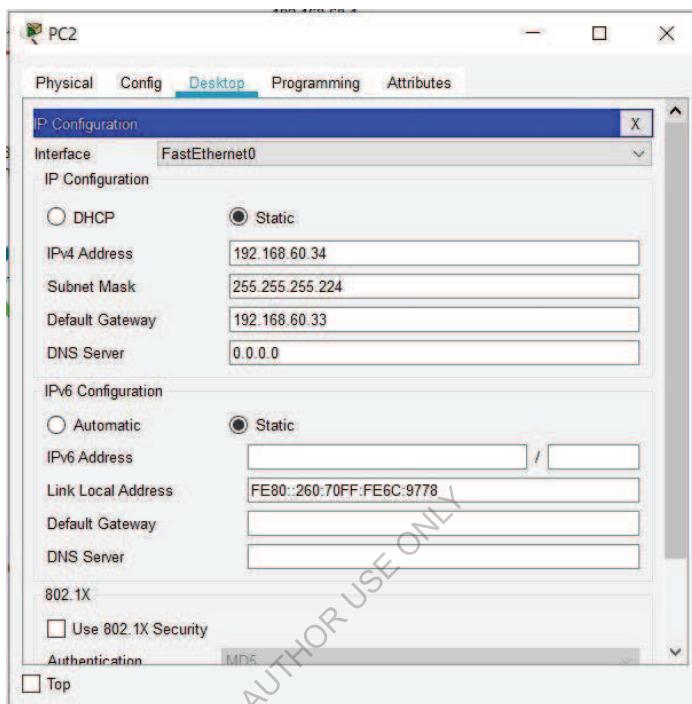


(i) give static IP to PC4

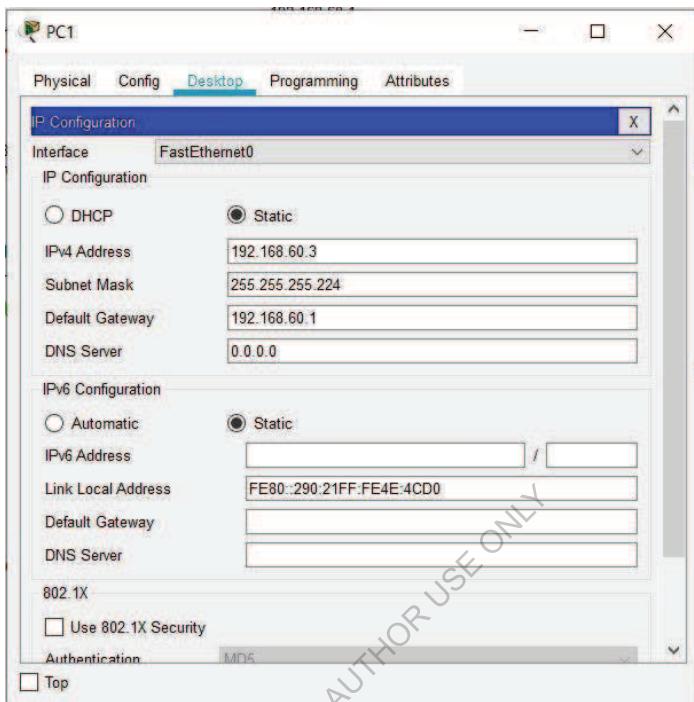


(j)

give static IP to PC3

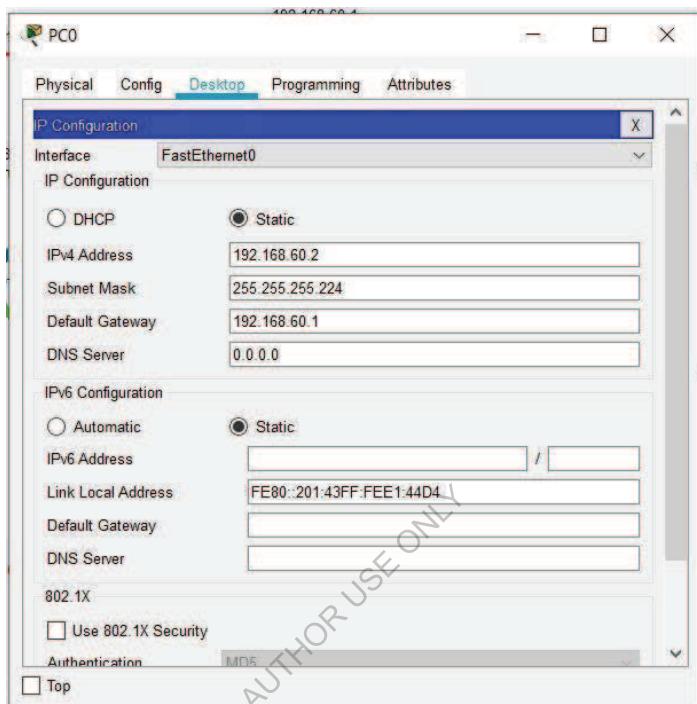


(k) give static IP to PC2

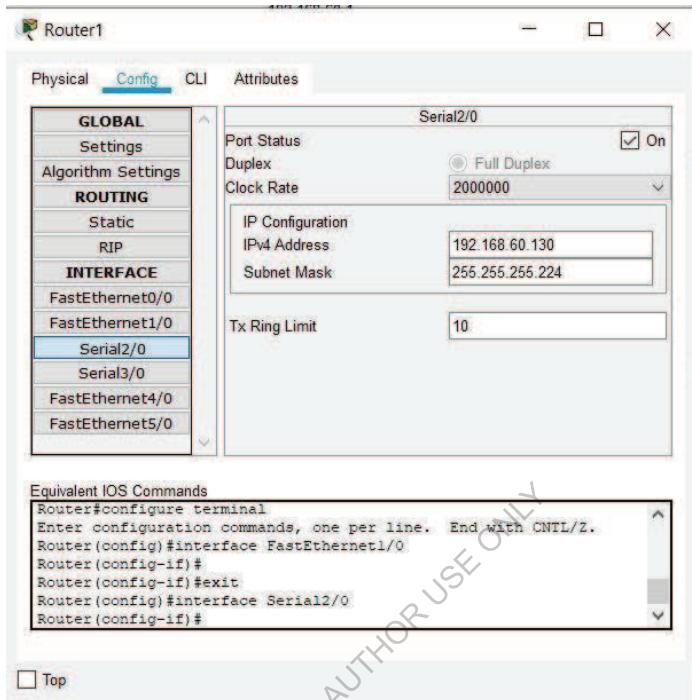


(I)

give static IP to PC1



(m) give static IP to PC0



(n) give address to serial port 2/0

Practical 7:Configure the types of Commands and configure DHCP, HTTP and DNS Server with using Cisco Packet Tracer.

Steps of making Http with DHCP and DNS with Web server

1.Take all required devices in cisco packet tracer.

- 6 PC
- 2 Router
- 2 Switches
- 4 Server

2.Make the name of each Server

- DHCP
- DNS
- DHCP2
- www.server

3.Using cable connect all devices

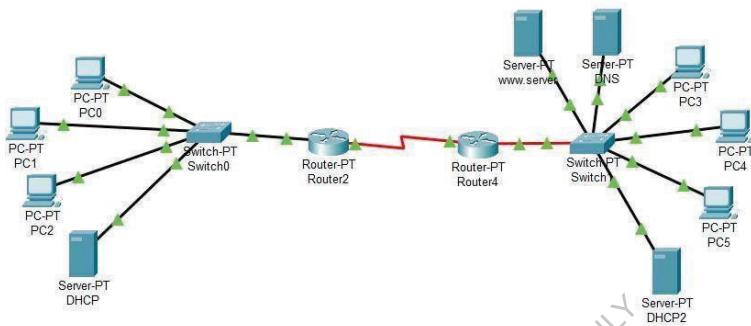
- Connect three PC to one switch same for another
- Connect two router with each other
- Connect one server with one switch and another three server to other one switch

4. Make server according to name

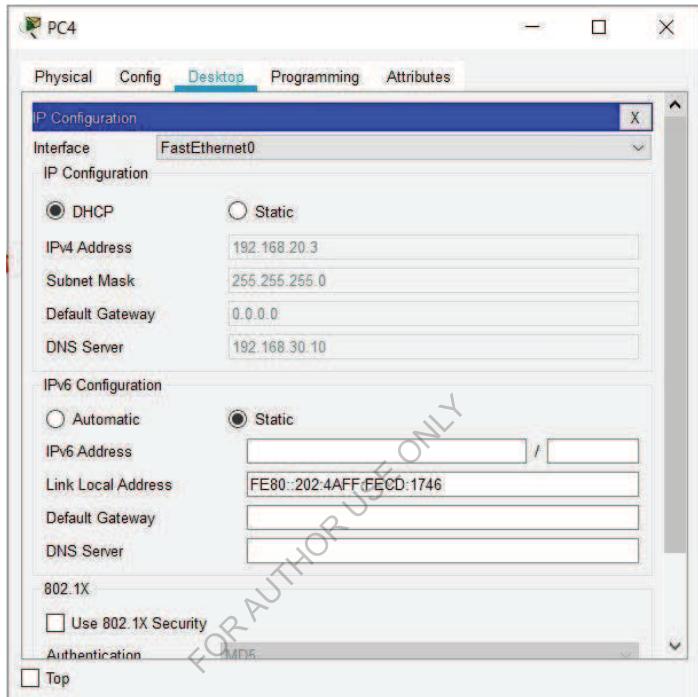
- To Make first DHCP server
 - 1. Give Ipv4 address as static
 - 2. Set Default and subnet mask
 - 3. In services Set DHCP server pool
- To make DNS server
 - 1. Give Ipv4 address as static
 - 2. Set Default and subnet mask
 - 3. In services give name of DNS domain as www.server and give IP address
- To make HTTP server
 - 1. Give Ipv4 address as static
 - 2. Set Default and subnet mask
 - 3. In services make on HTTP service

5.Request for IP to all PC as DHCP in IP address

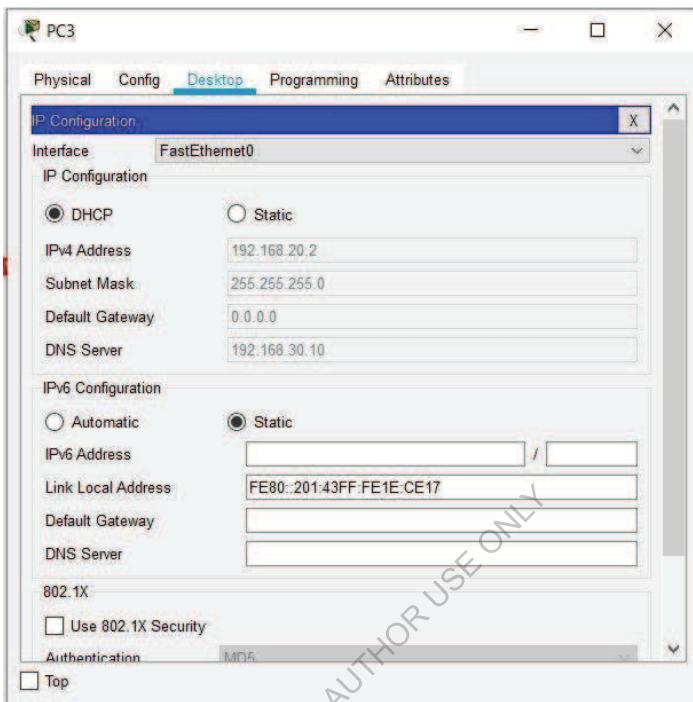
6. Enable the port of router according to connection



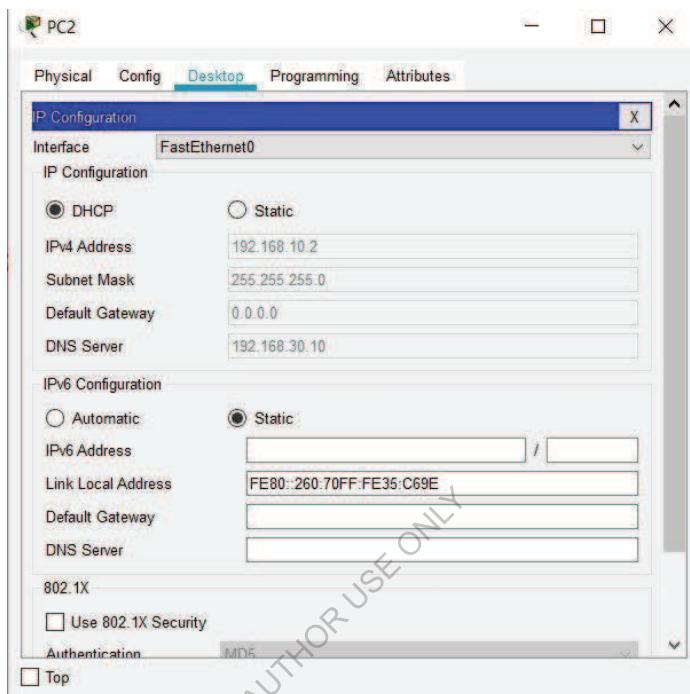
- (a) All the devices are connected using router also DHCP,DNS and Server in one figure



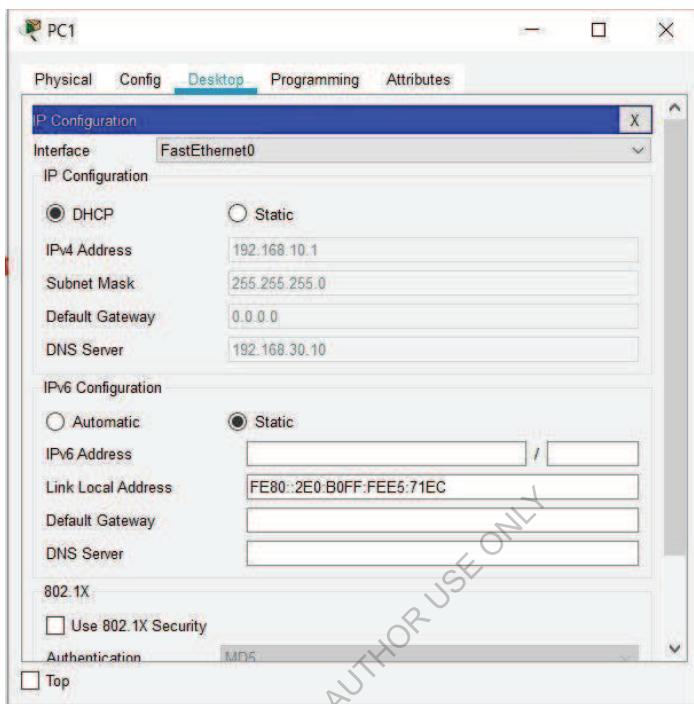
(b) Request DHCP for IP address in PC4



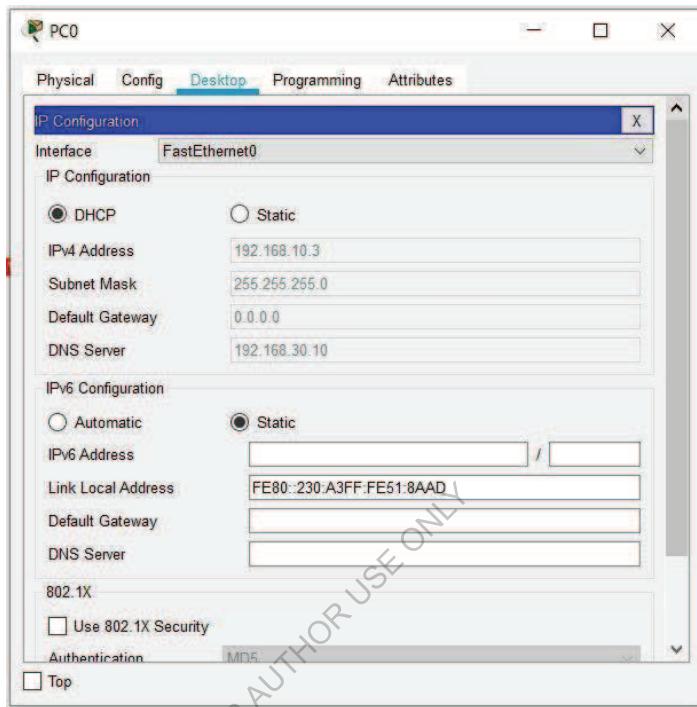
(c) Request DHCP for IP address in PC3



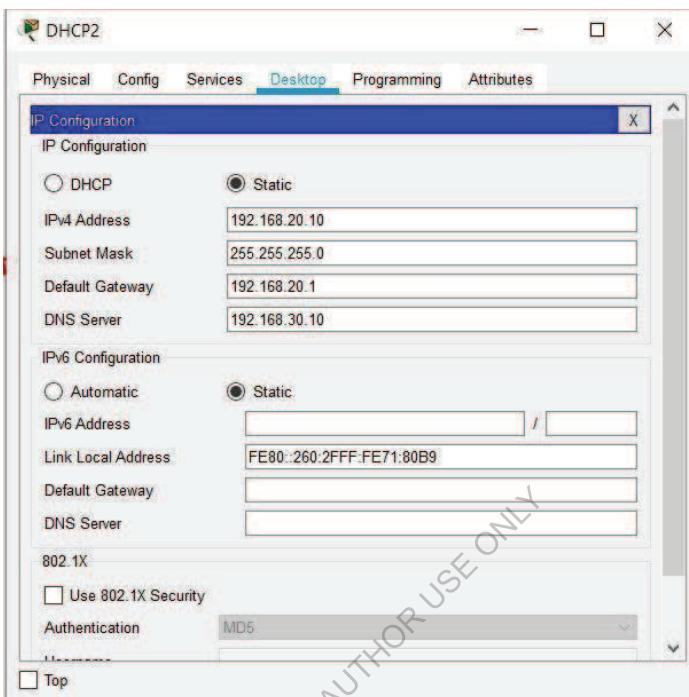
(d) Request DHCP for IP address in PC2



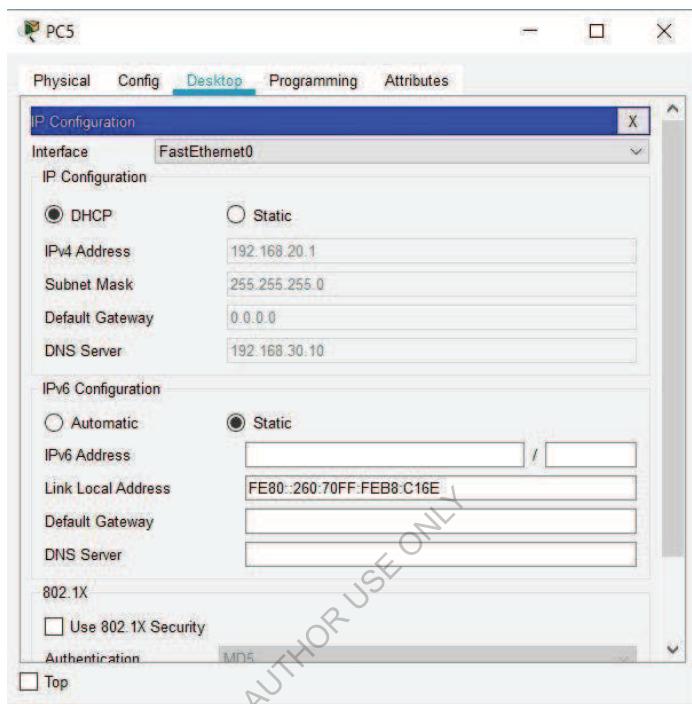
(e) Request DHCP for IP address in PC1



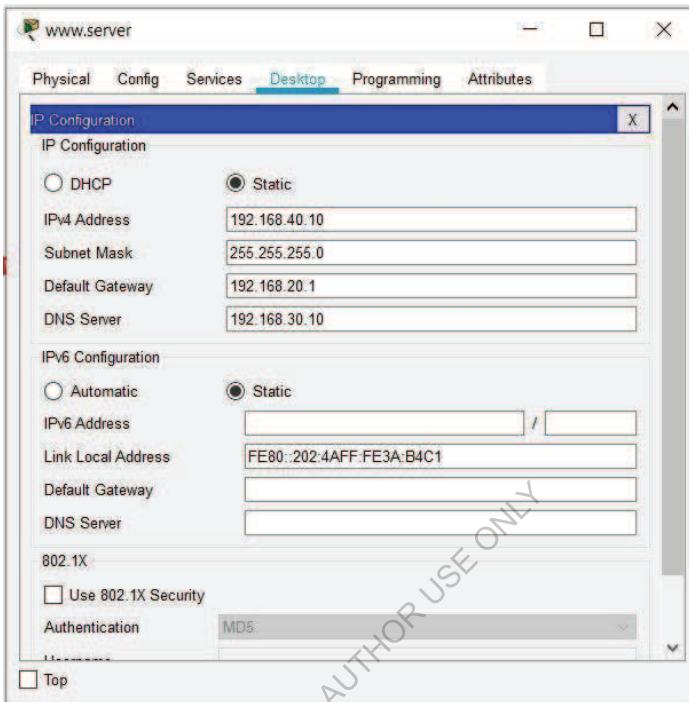
(f) Request DHCP for IP address in PC0



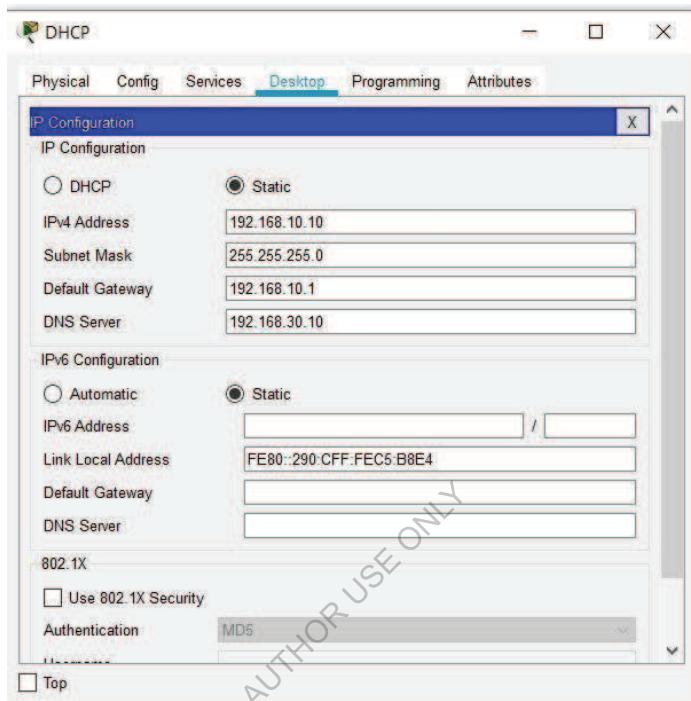
(g) Give Static IP address in DHCP2



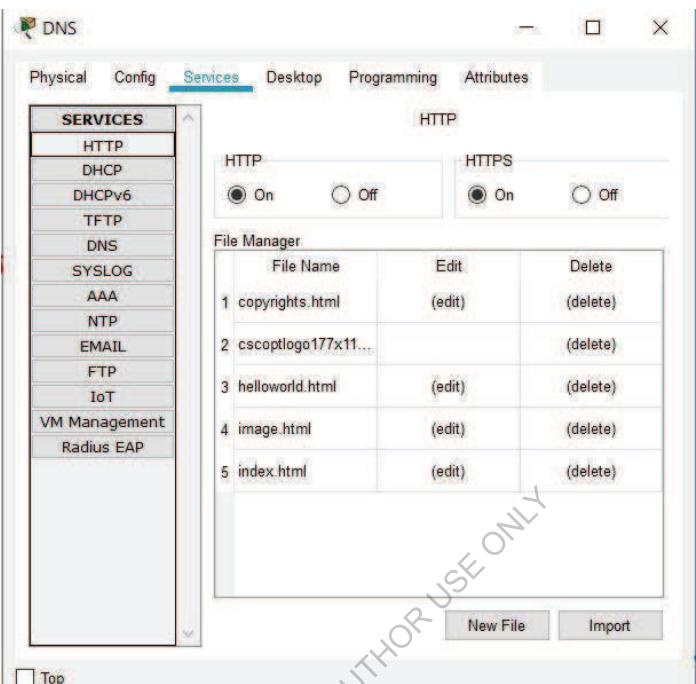
(h) Request DHCP for IP address in PC3



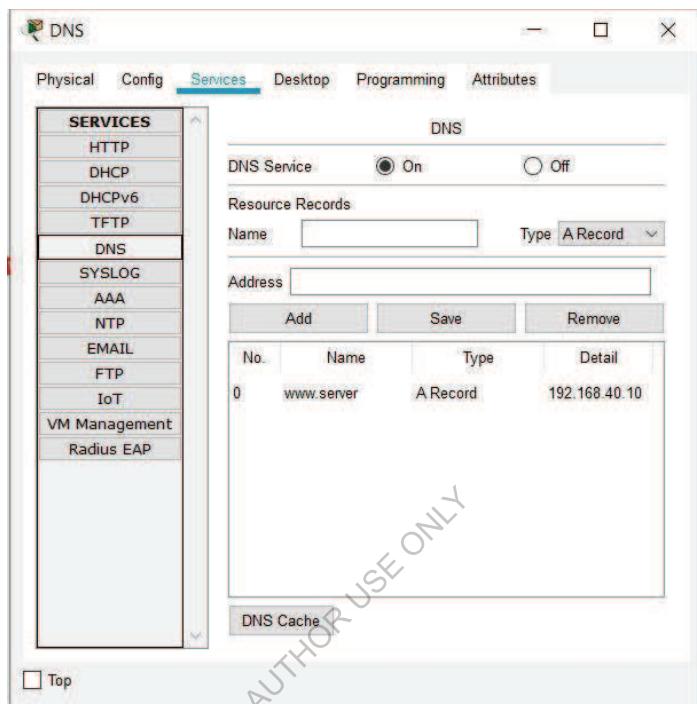
(i) Give Static IP address in www.server



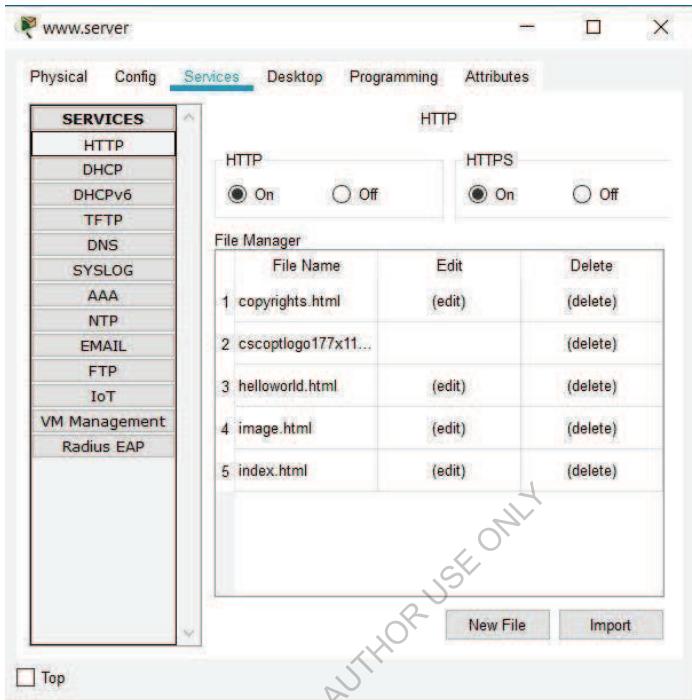
(j) Give Static IP address in DHCP2



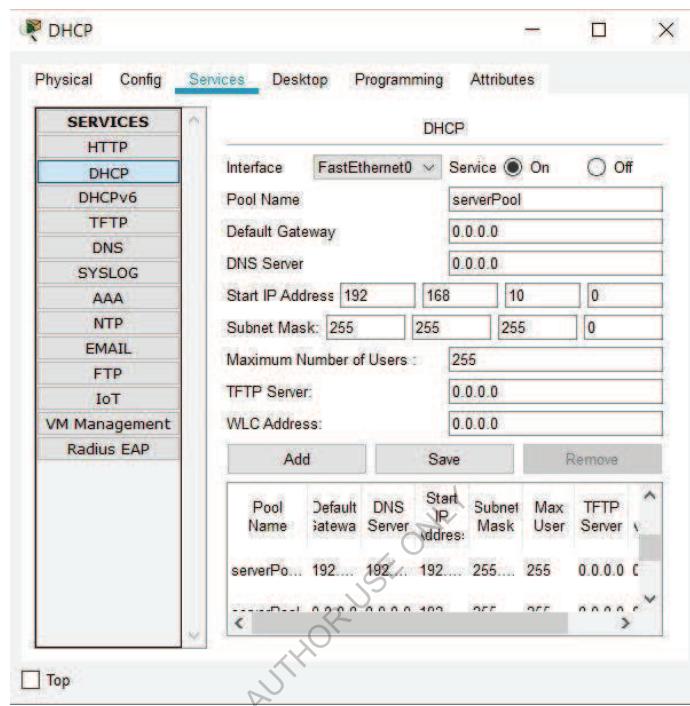
(k) on the HTTP services in DNS



- (l) on the services of DNS and add server as www.server



(m) on the HTTP services in DNS



(n)on the services of DHCP server and add server pool and IP address

Practical 8: To configure e - mail using Http, DNS and DHCP server using Cisco Packet Tracer.

Http server

Steps of making Http with Web server

1. Take all required devices in cisco packet tracer.

- 4 PC
- 3 Server

2. Make the name of each Server

- Server0
- Server1
- httpserver

3. Using cable connect all devices

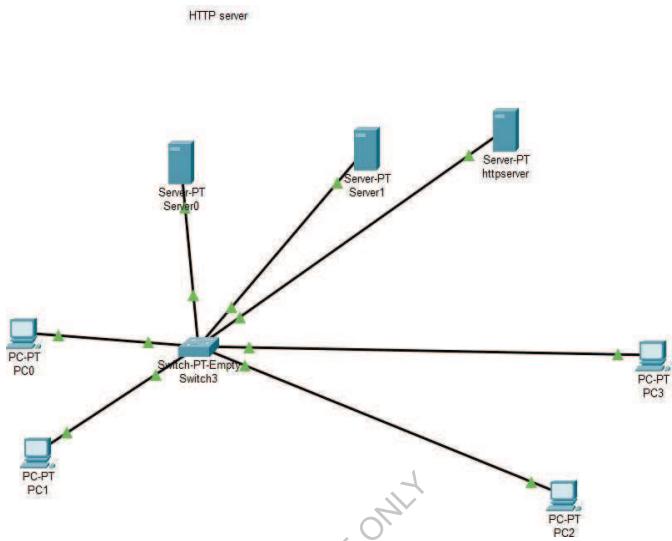
- Connect four PC to one switch
- Connect three server to one switch

4. Make server according to name

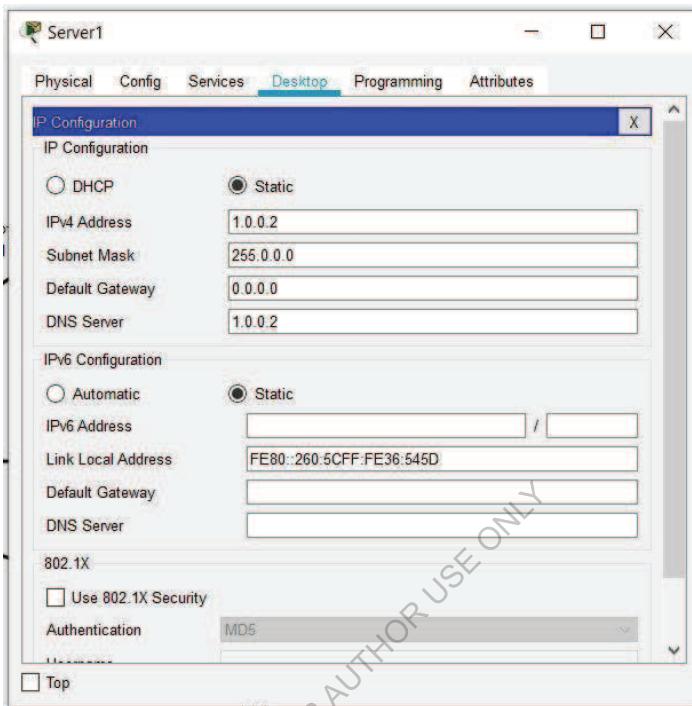
- To Make Server0 as DHCP server
 - 1. Give Ipv4 address as static
 - 2. Set Default and subnet mask
 - 3. In services Set DHCP server pool
- To make Server1 as DNS server
 - 1. Give Ipv4 address as static
 - 2. Set Default and subnet mask
 - 3. In services give name of DNS domain as www.server and give IP address
- To make httpserver as HTTP server
 - 1. Give Ipv4 address as static
 - 2. Set Default and subnet mask
 - 3. In services make on HTTP service

5. Request for IP to all PC as DHCP in IP address

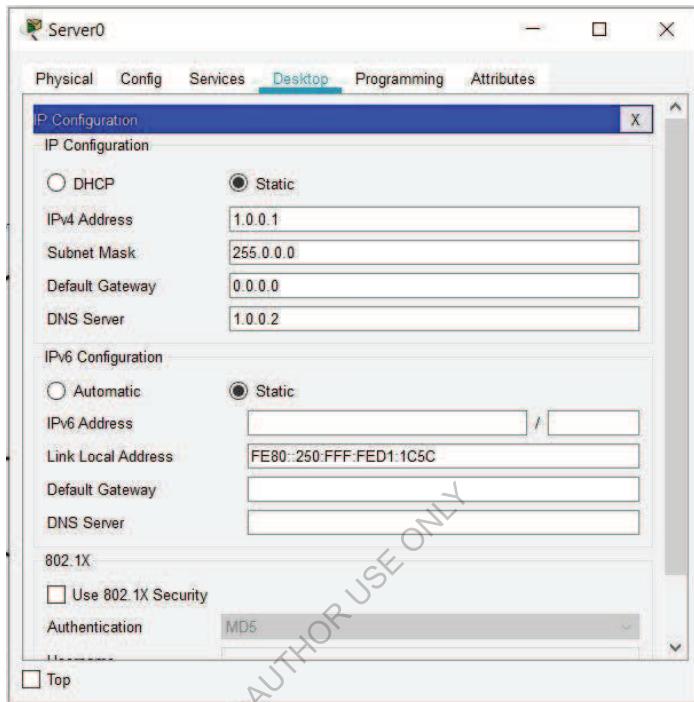
6. We can see the web page which are run on PCs as in desktop->web browser->url type “httpserver”



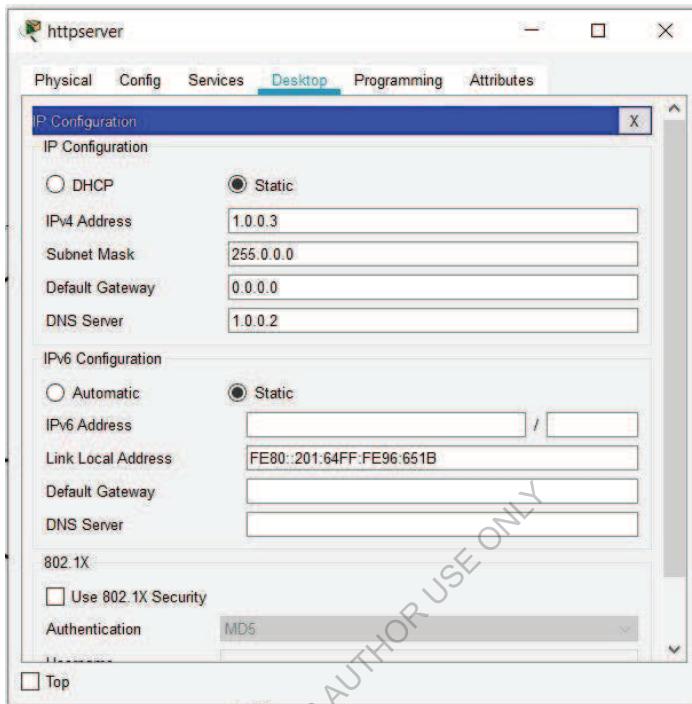
(a) all devices are connected using one switch in http



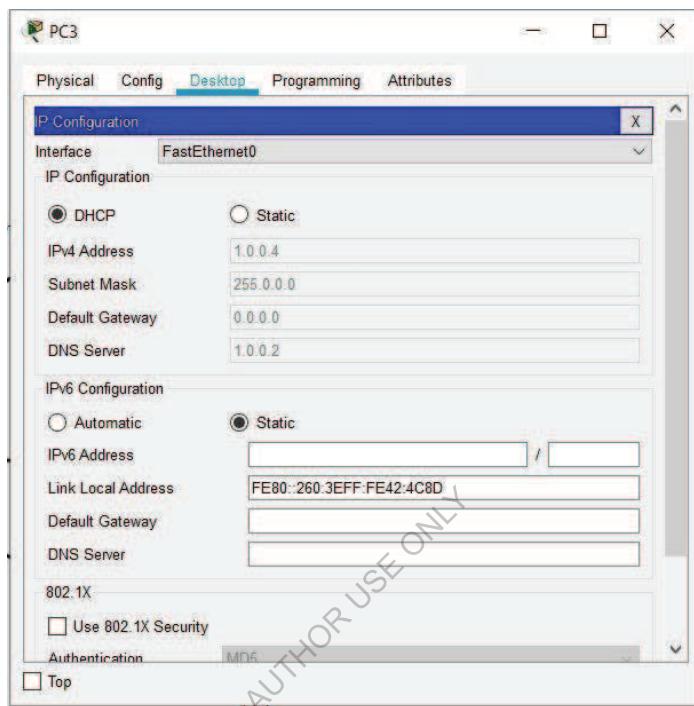
(b) set IP as static and give IP address in server1



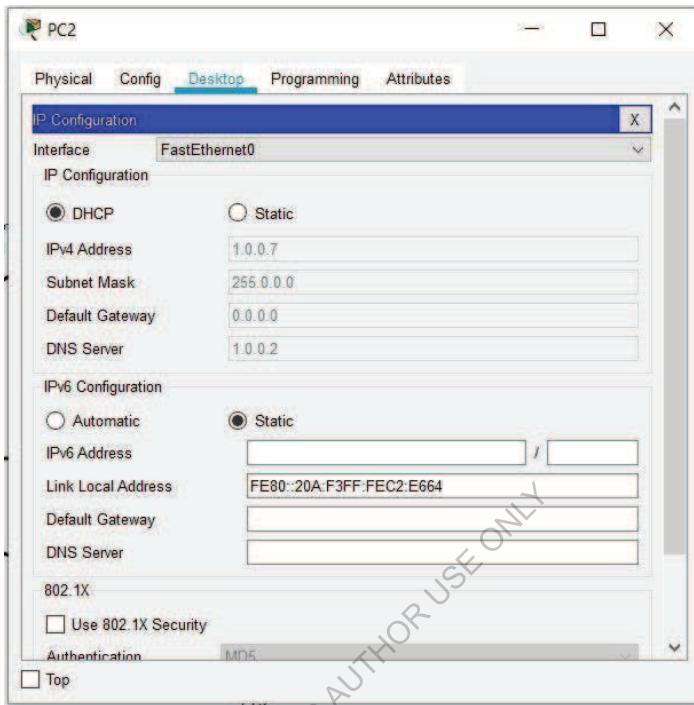
(c) set IP as static and give IP address in server0



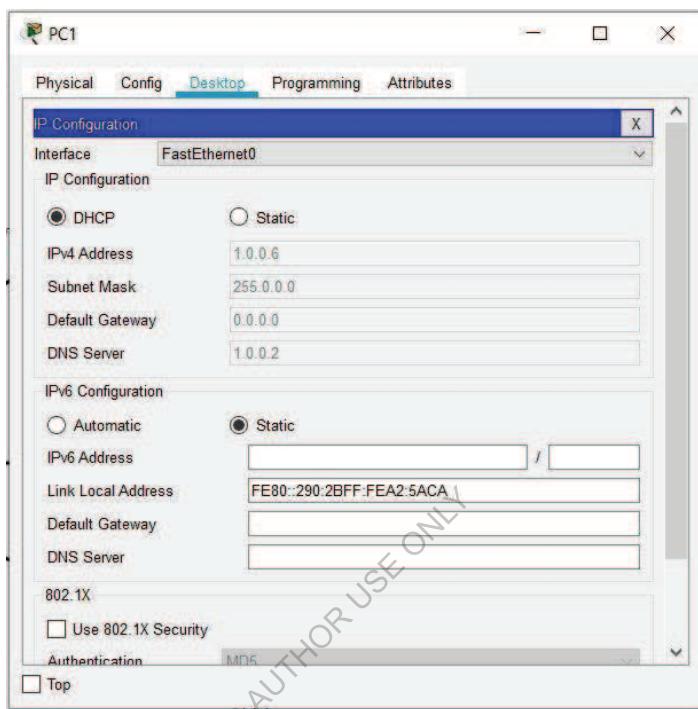
(d) set IP as static and give IP address in httpserver



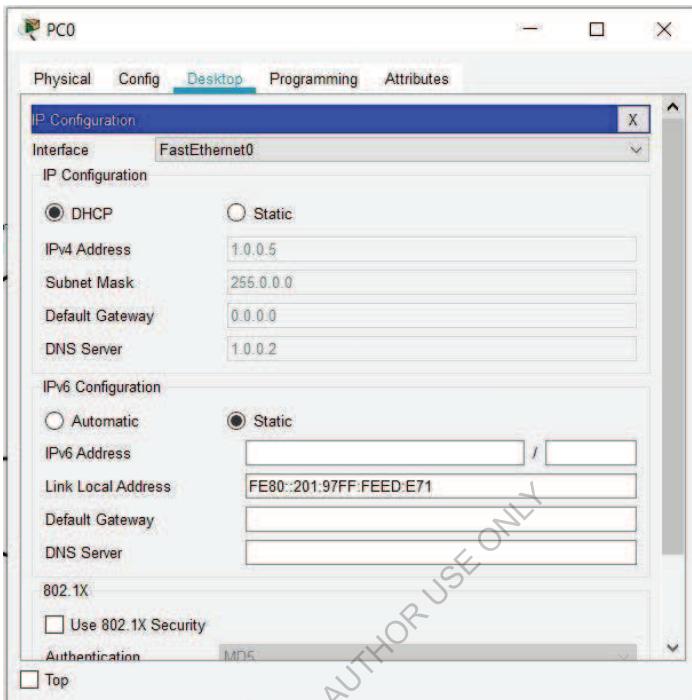
(e) set IP as static and give IP address in PC3



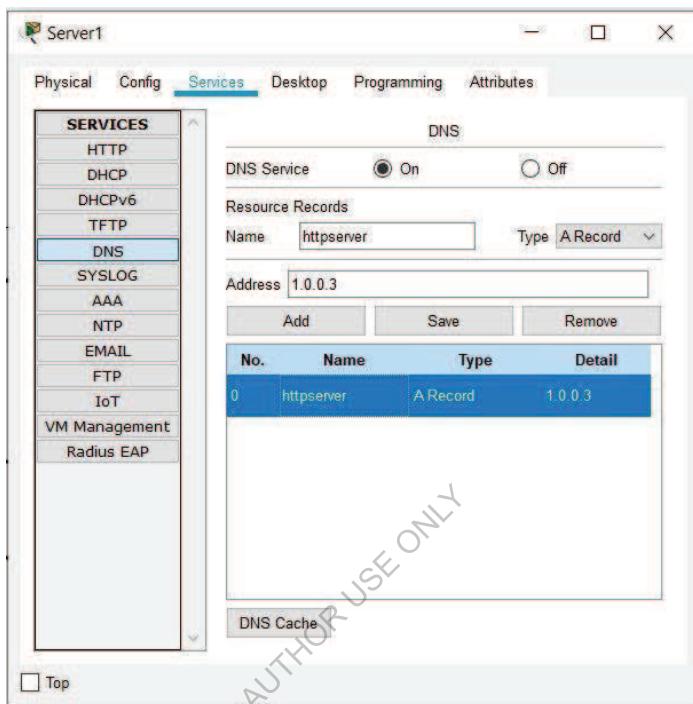
(f) set IP as static and give IP address in PC2



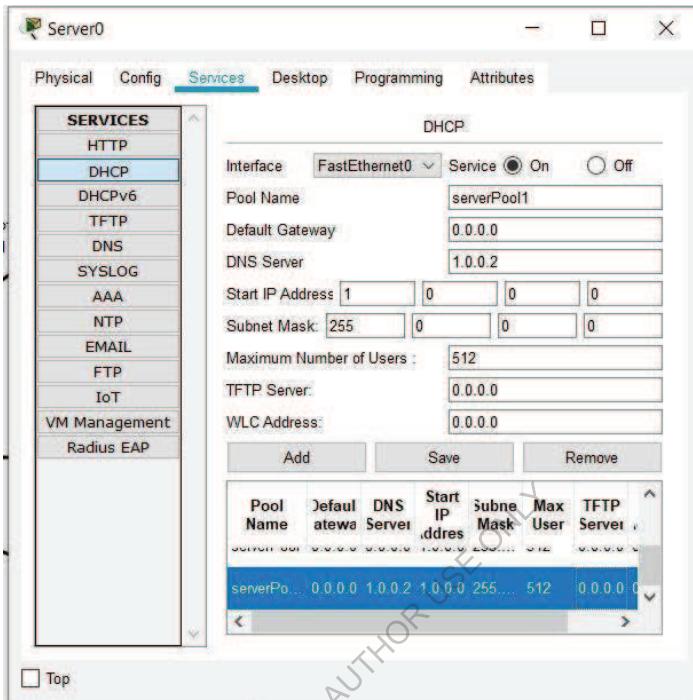
(g) Request DHCP for IP address in PC1



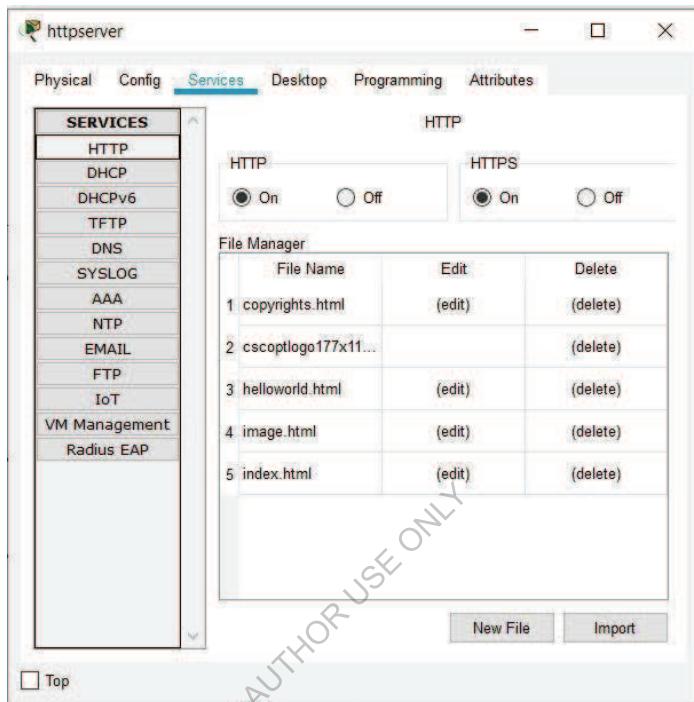
(h) Request DHCP for IP address in PC0



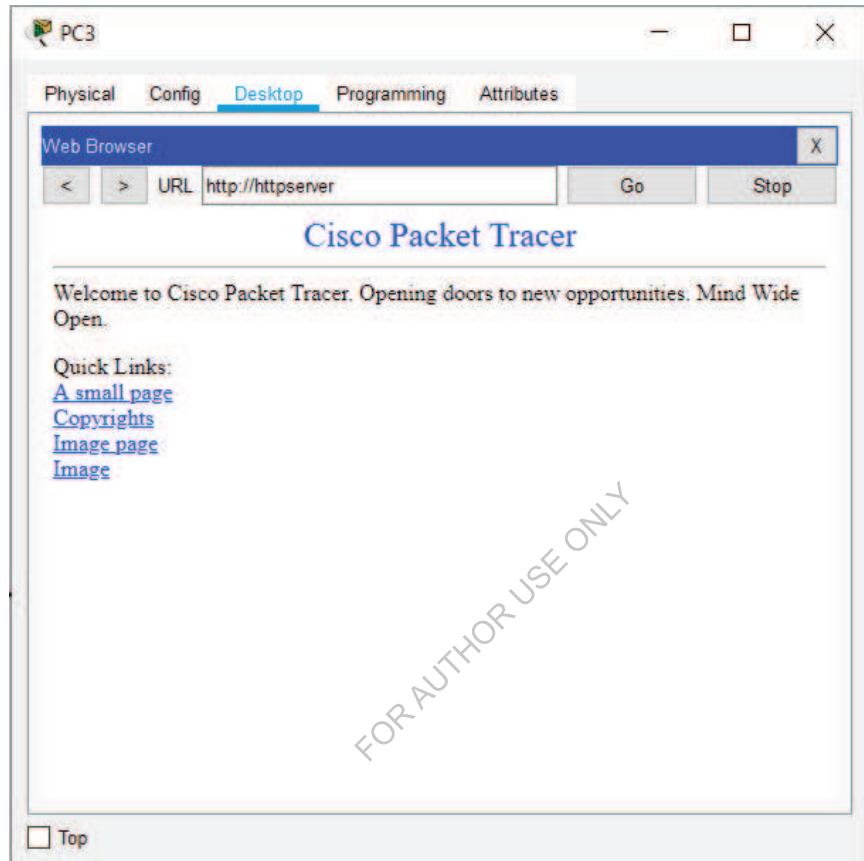
(i) on the service of DNS in Server1



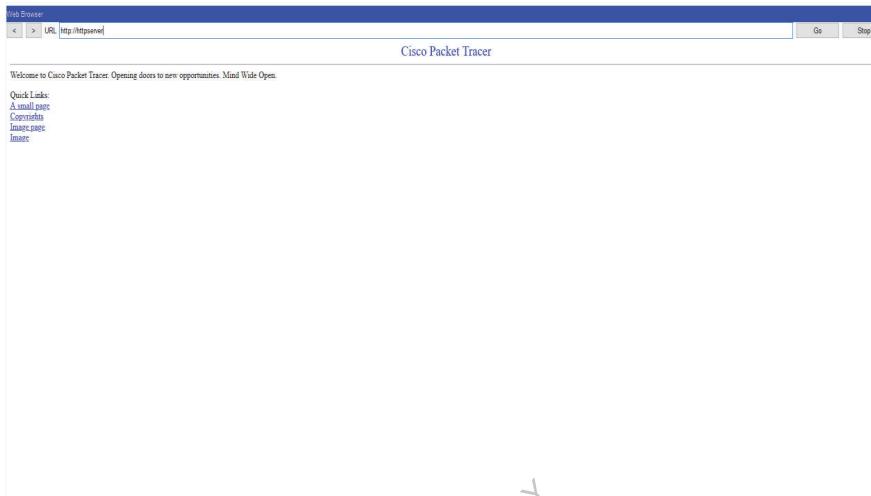
(j) on the service of DHCP in Server0



(k) on the service of http in httpserver



(l) In the web browser of URL httpserver



(m) Same as above figure

Email.com

Steps of making Email Web server

1. Take all required devices in cisco packet tracer.

- 3 PC
- 3 Server

2. Make the name of each Server

- Server0
- Server1
- httpserver

3. Using cable connect all devices

- Connect three PC to one switch
- Connect three server to one switch

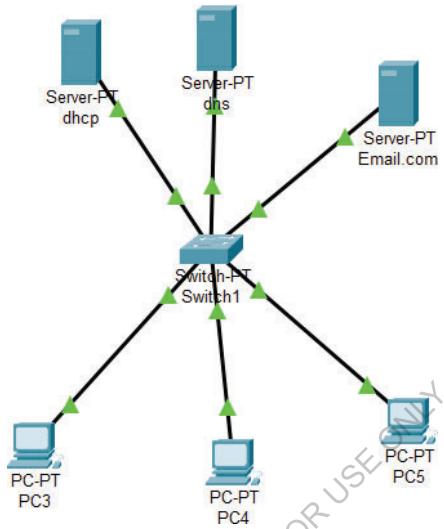
4. Make server according to name

- To Make DHCP server
 - 1. Give Ipv4 address as static
 - 2. Set Default and subnet mask
 - 3. In services Set DHCP server pool
- To make DNS server
 - 1. Give Ipv4 address as static
 - 2. Set Default and subnet mask
 - 3. In services give name of DNS domain email.com and give IP address
- To make Server as Email
 - 1. Give Ipv4 address as static
 - 2. Set Default and subnet mask
 - 3. In services make on HTTP service
 - 4. In Email.com server email ->give domain name and giveusername and password

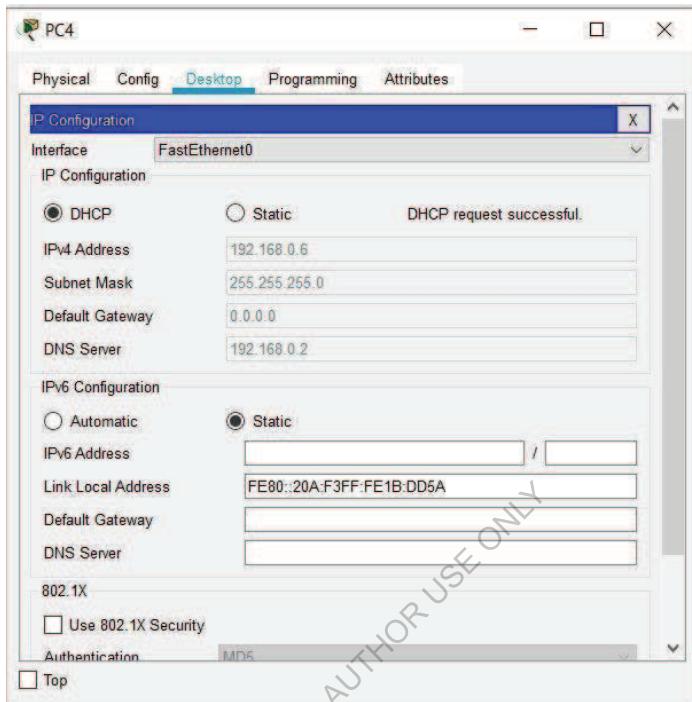
5. Request for IP to all PC as DHCP in IP address

6. send email from one pc to another pc to check whether it works or not

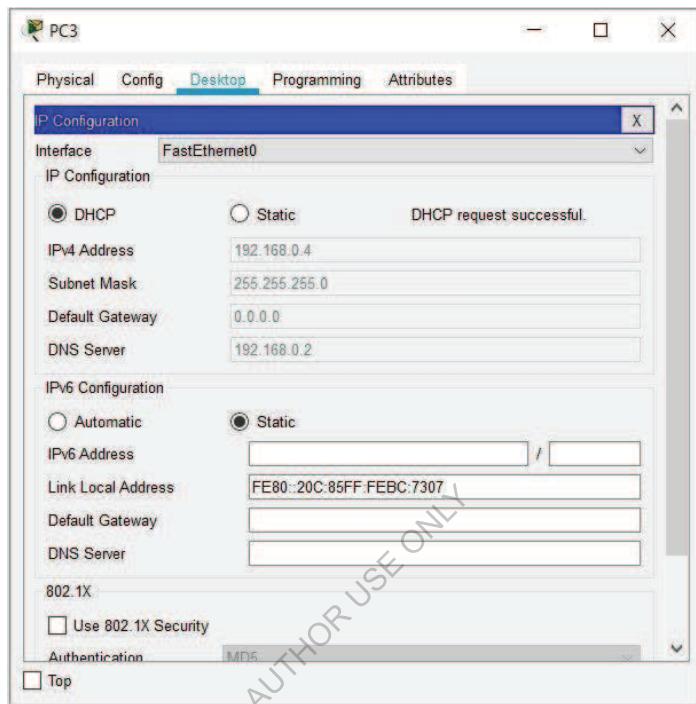
- In pc->desktop->email->set name and password
- Same for another pc
- Compose email and send to it



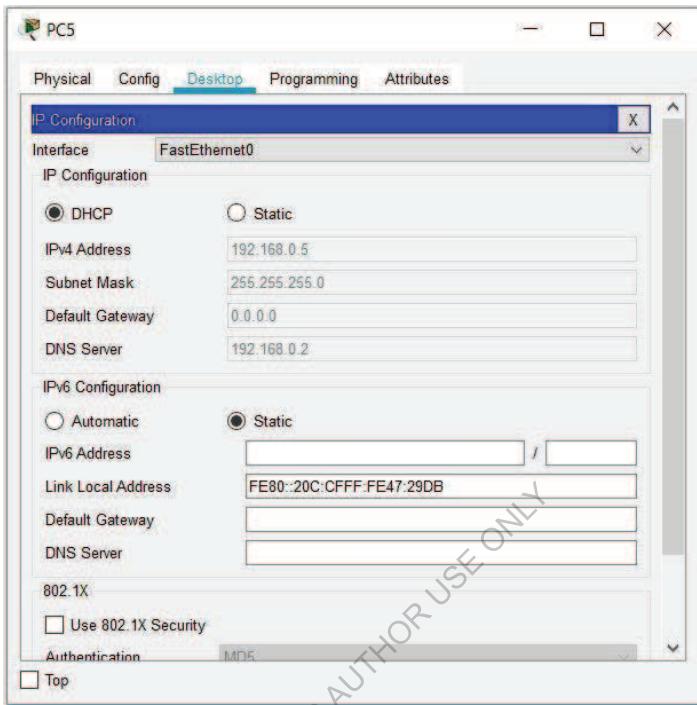
(a) all devices are connected using one switch



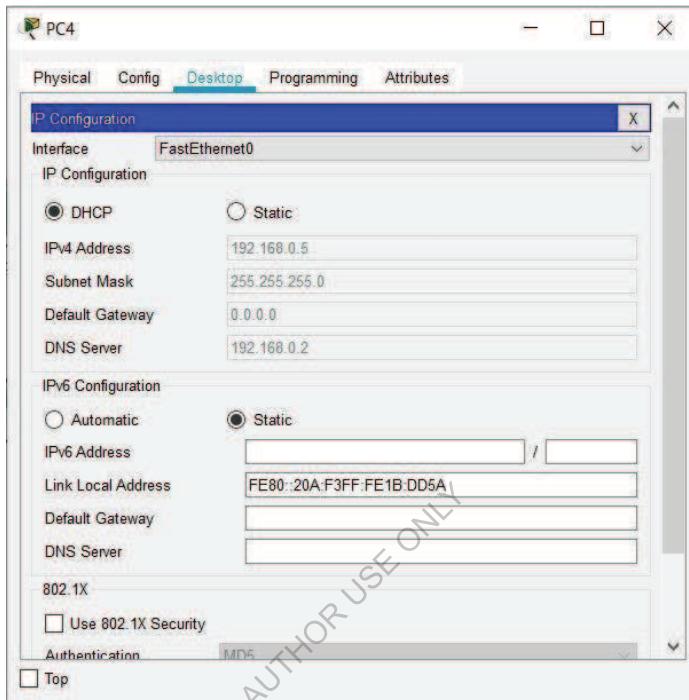
(b) Request DHCP for IP address in PC4



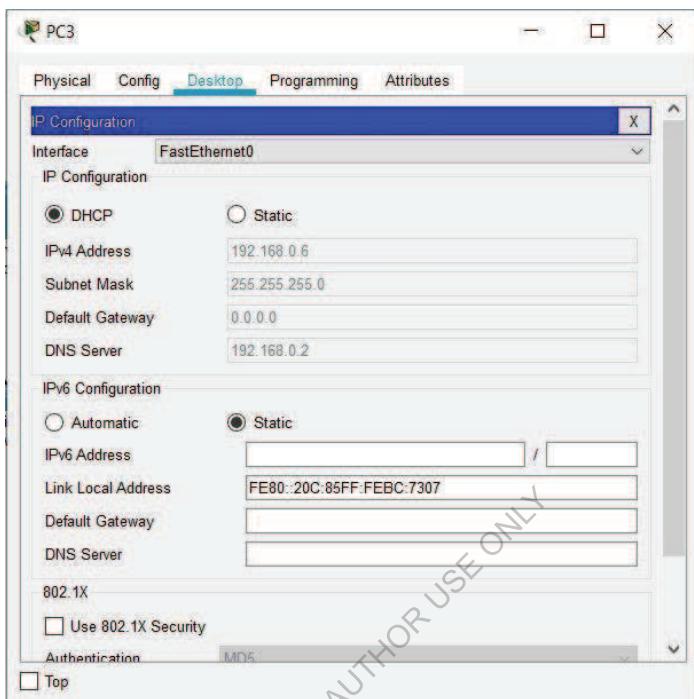
(c) Request DHCP for IP address in PC3



(d) Request DHCP for IP address in PC5

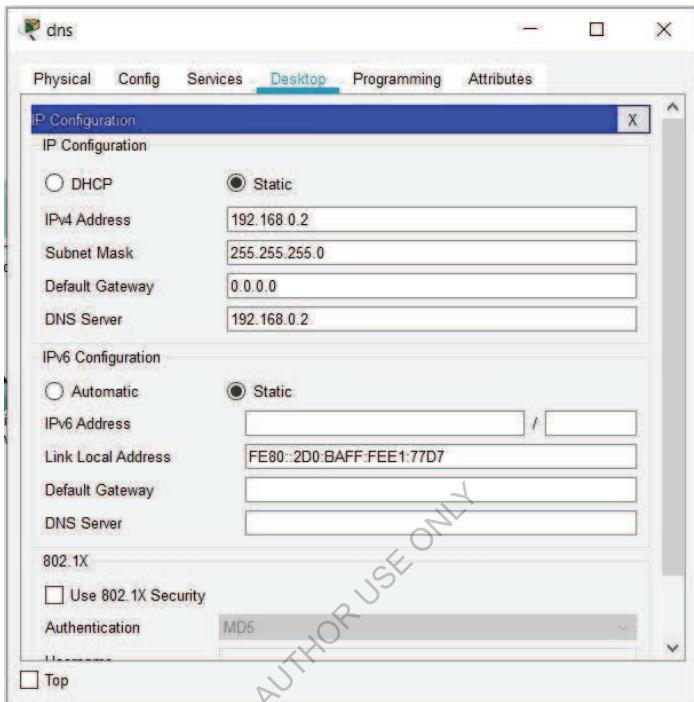


(e) Request DHCP for IP address in PC4

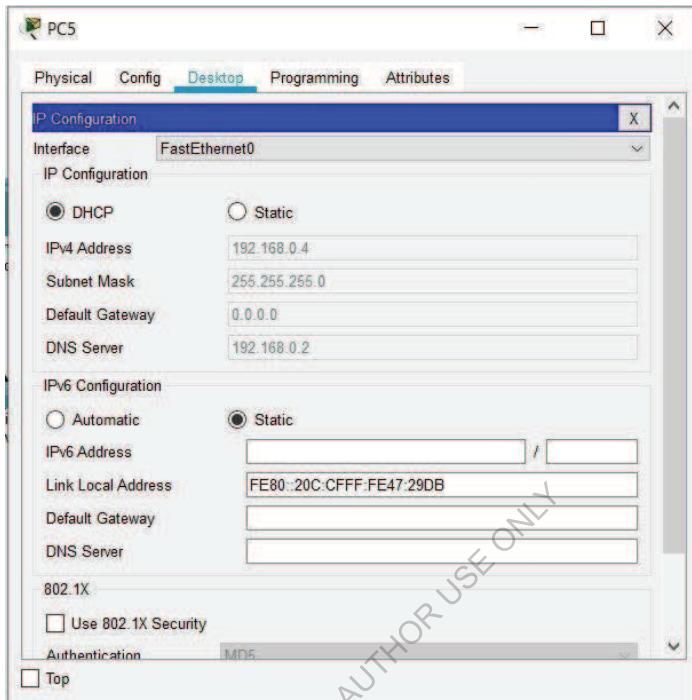


(f)

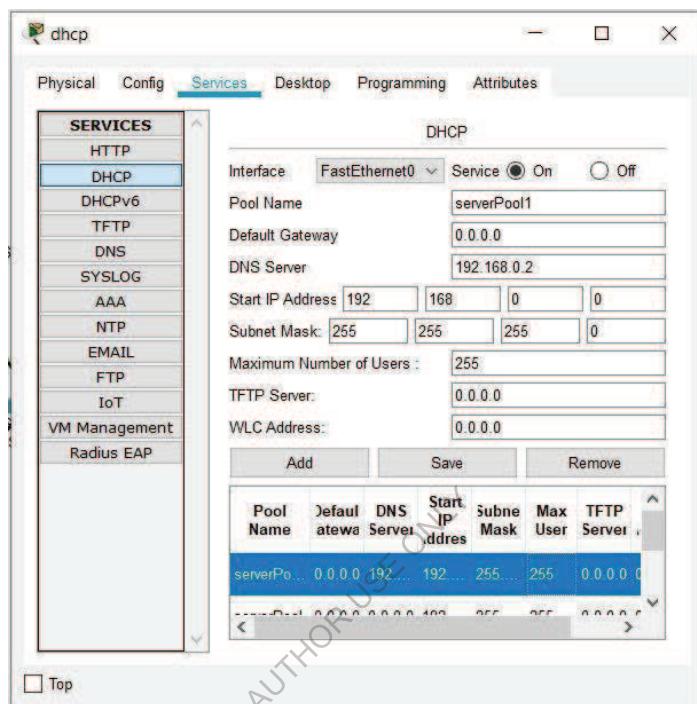
Request DHCP for IP address in PC3



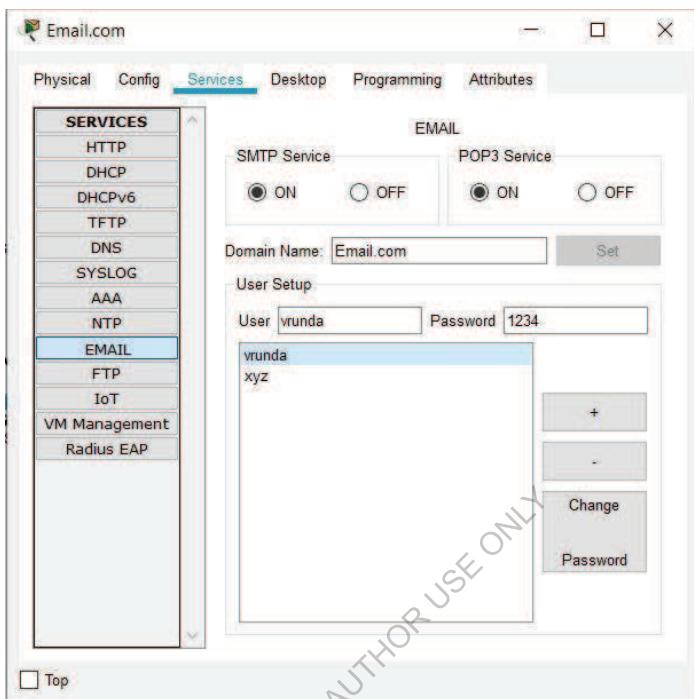
(g) set IP address in DNS as static



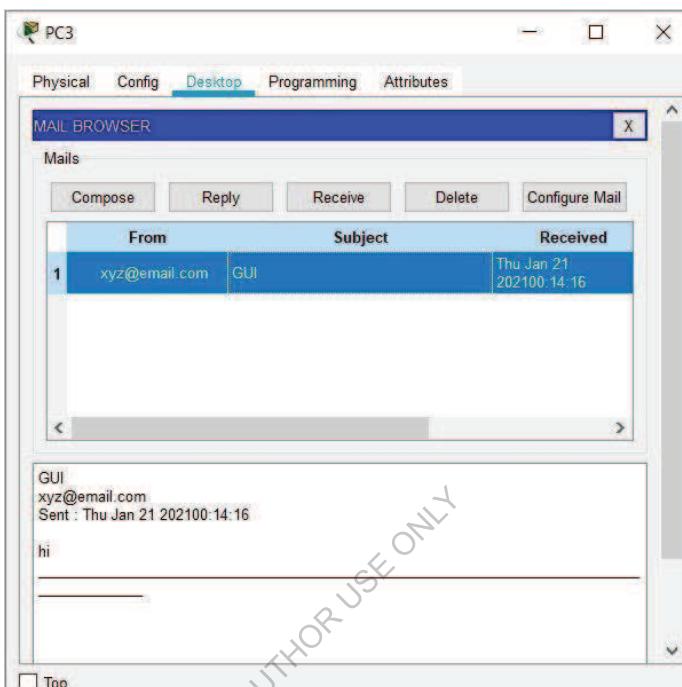
(h) Request DHCP for IP address in PC1



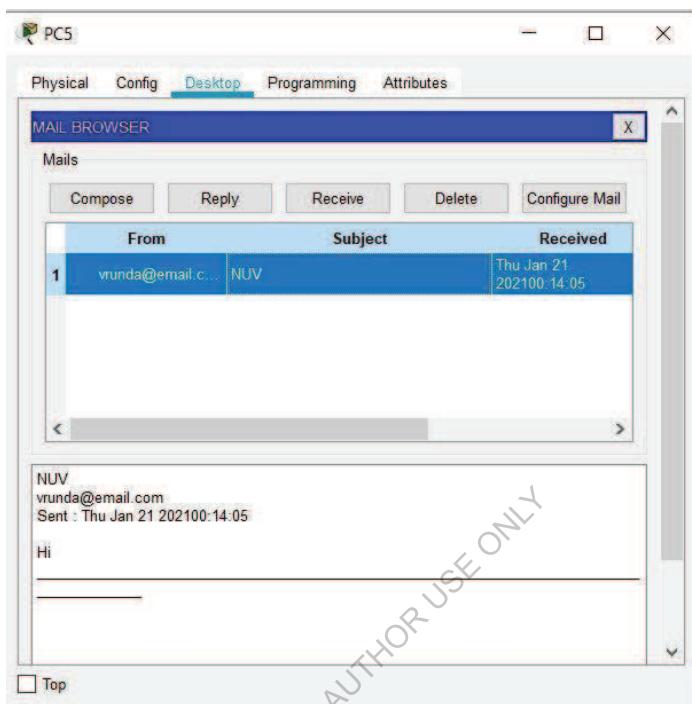
(i)on the services in DHCP for IP address in dhcp



(j) on the service of Email in Email.com



(k) compose the mail and type the message in pc3



(l) compose the mail and type the message in pc5

Practical 9: Implement the Program for Distance Vector Routing (Routing Information Protocol – RIP using Cisco Packet Tracer)

Steps of making RIP(Routing Information Protocol)

1.Take all required devices in cisco packet tracer.

- 3 PC
- 3 Router
- 3 Switches

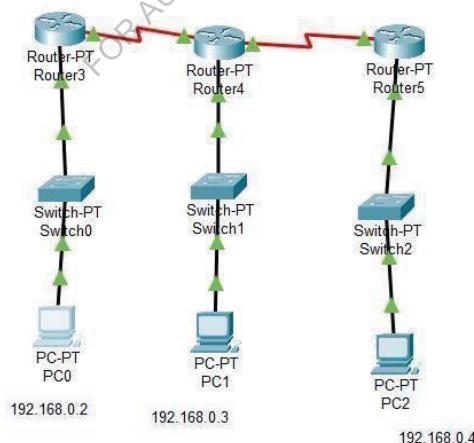
2.Using cable connect all devices

- Connect three PC to three switch according to diagram.
- Connect three router with each other as shown in fig and
- Connect router to switch as shown in fig

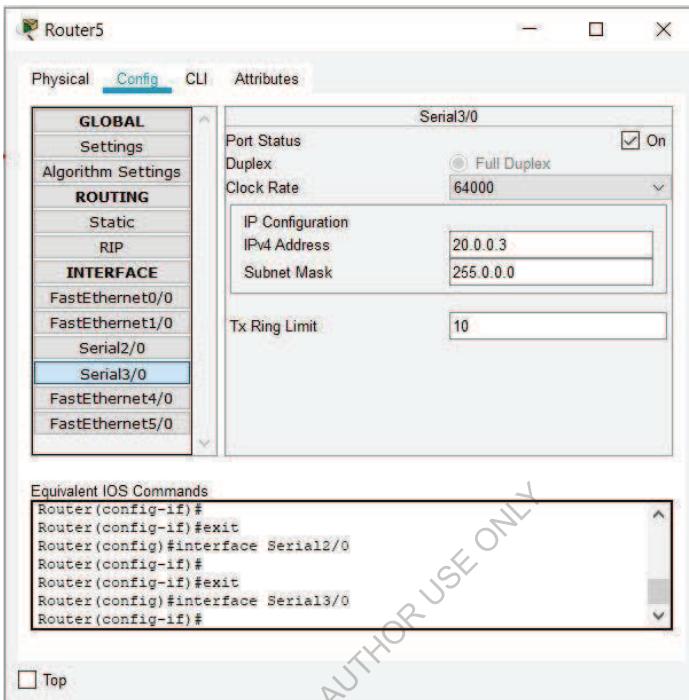
3.Give IP address using Desktop->Ip->static 4.In

router write command in CLI

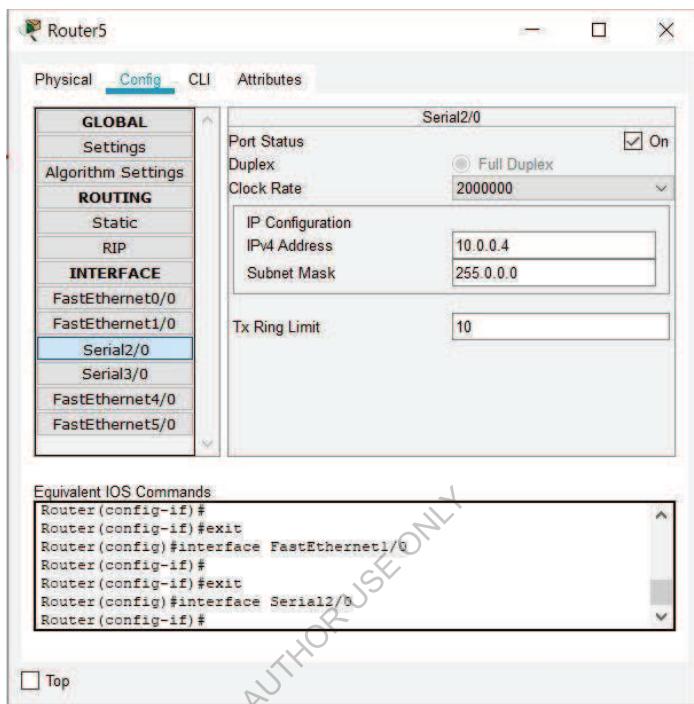
5.Eanble the port of router according to connection



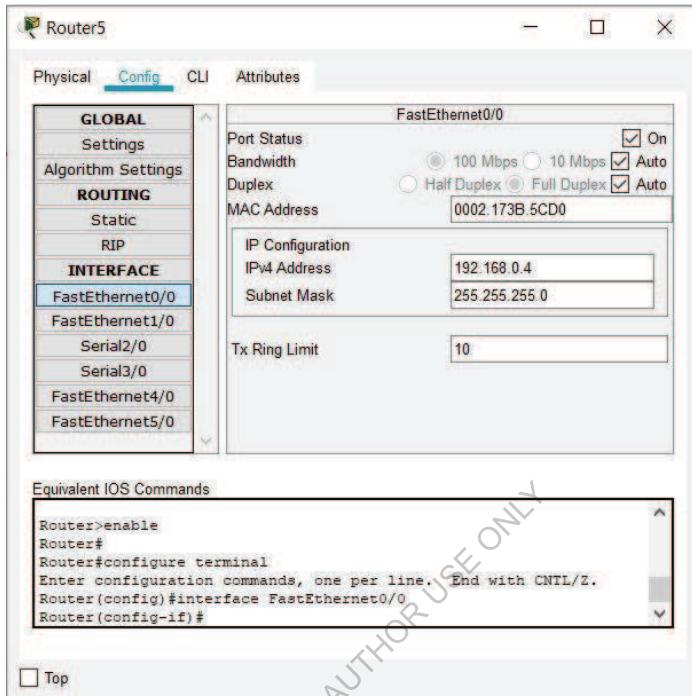
(a) Three Routers are connected with three switch and switch connected with pc



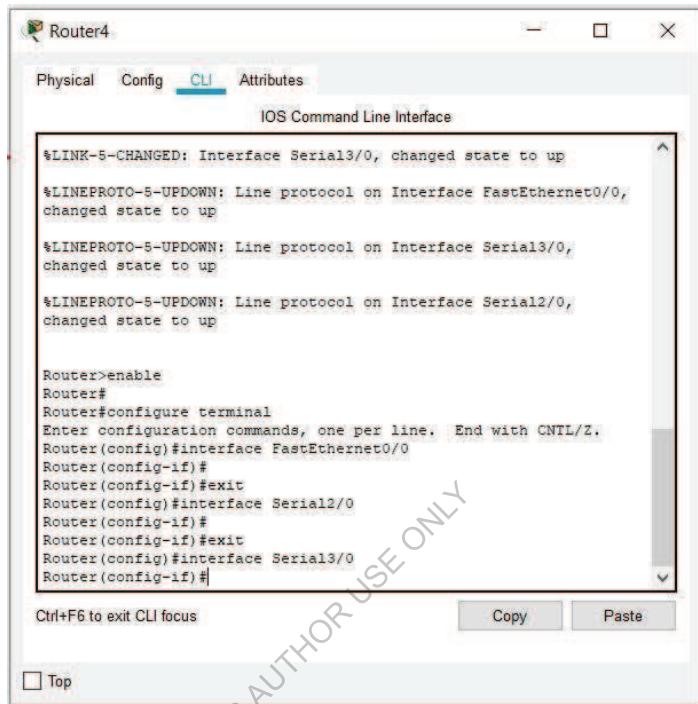
(b) Give the address to serial port 3/0



(c) Give the address to serial port 2/0



(d) Give the address to Fast Ethernet 0/0 in router 5

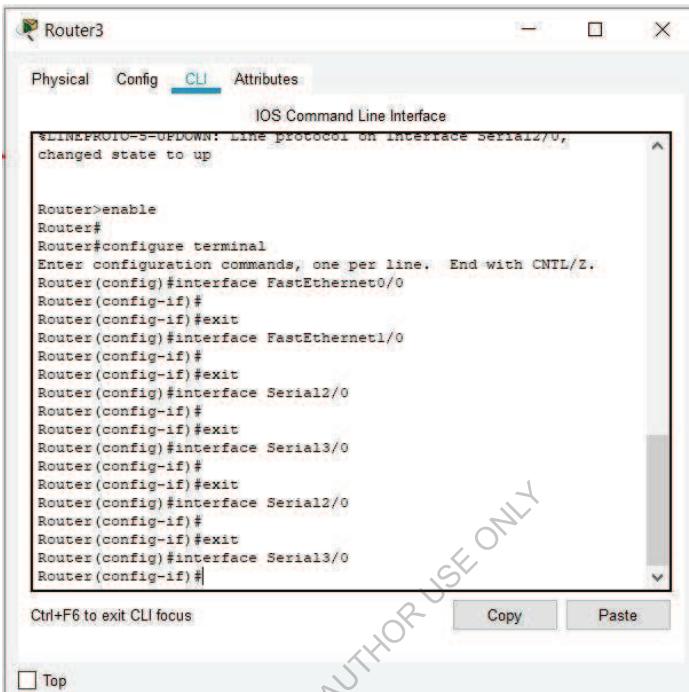


The image shows a computer screen displaying the Cisco IOS Command Line Interface (CLI) for a router named "Router4". The window has tabs at the top: "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area of the window is titled "IOS Command Line Interface". It displays the following text:

```
%LINK-5-CHANGED: Interface Serial3/0, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,  
changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0,  
changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0,  
changed state to up  
  
Router>enable  
Router#  
Router#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#interface FastEthernet0/0  
Router(config-if)#  
Router(config-if)#exit  
Router(config)#interface Serial2/0  
Router(config-if)#  
Router(config-if)#exit  
Router(config)#interface Serial3/0  
Router(config-if)#
```

At the bottom of the window, there are buttons for "Copy" and "Paste". Below the window, there is a small text box with a checkbox labeled "Top". A watermark reading "FOR AUTHOR USE ONLY" is diagonally across the center of the window.

(e) Give command to router for setting up the serial link router 4



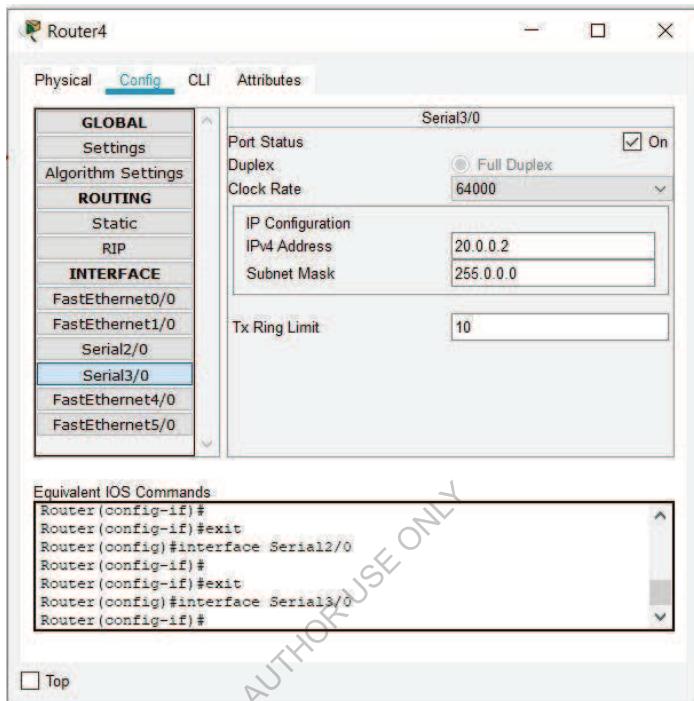
The image shows a Windows-style application window titled "Router3". The tab bar at the top has four tabs: "Physical", "Config", "CLI" (which is selected and highlighted in blue), and "Attributes". Below the tabs is a title bar "IOS Command Line Interface". The main area contains a command-line interface session. The session starts with "Router>enable", followed by "Router#configure terminal", and then a series of "Router(config-if)#interface" commands for FastEthernet0/0, FastEthernet1/0, Serial2/0, and Serial3/0. Each interface configuration block ends with "#exit". A message at the top of the session area says: "*LINEPROTO-0-5-UPDOWN: Line protocol on interface Serial2/0, changed state to up". At the bottom of the window, there are three buttons: "Ctrl+F6 to exit CLI focus" (disabled), "Copy", and "Paste". There is also a "Top" button with a checkbox.

```
*LINEPROTO-0-5-UPDOWN: Line protocol on interface Serial2/0, changed state to up

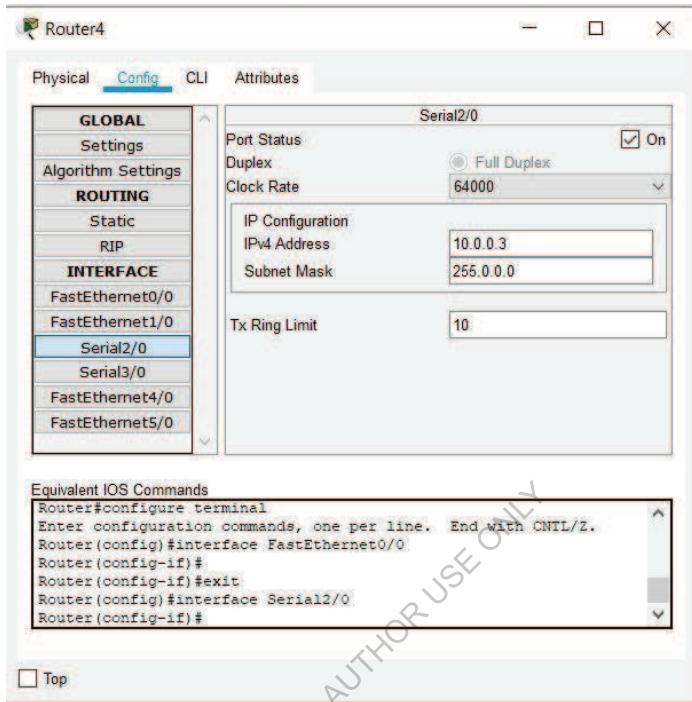
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#

Ctrl+F6 to exit CLI focus      Copy      Paste
```

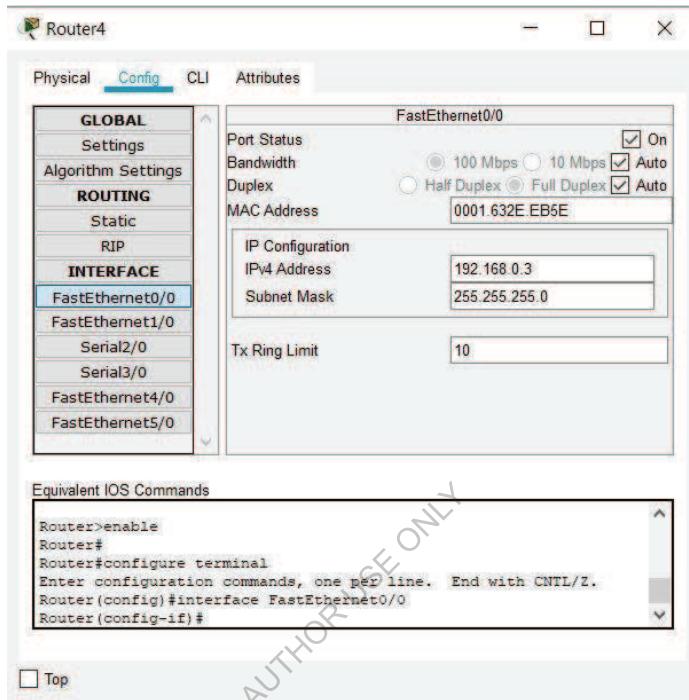
(f) Give command to router 3 for setting up the serial and fastethernet link



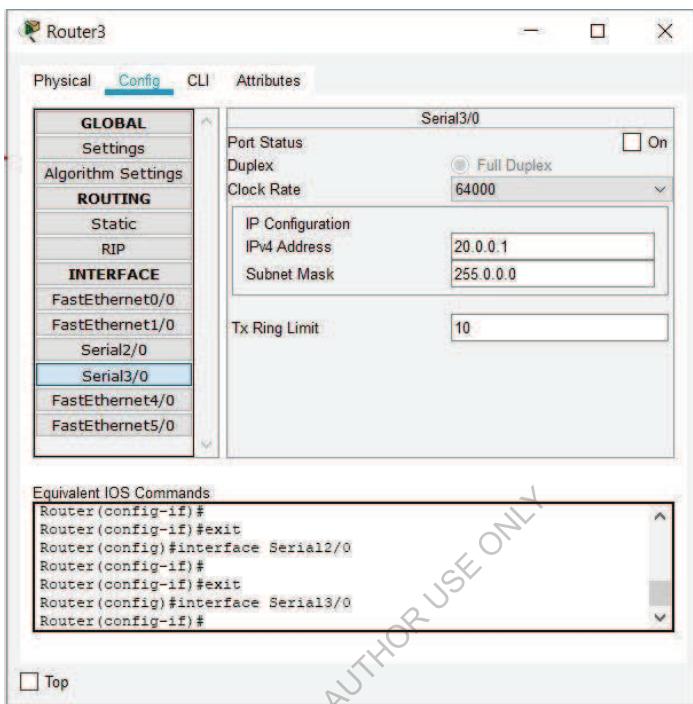
(g) Give the address to serial port 3/0 router 4



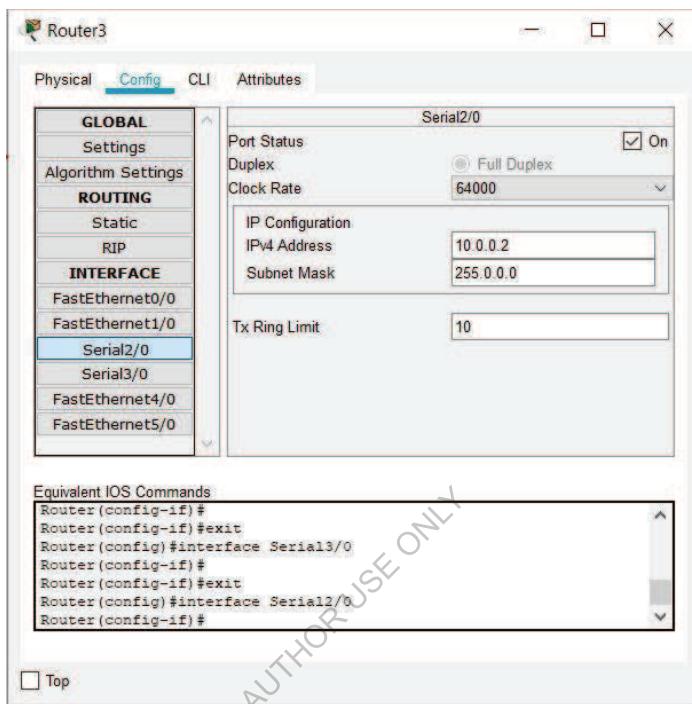
(h) Give the address to serial port 2/0 in router 4



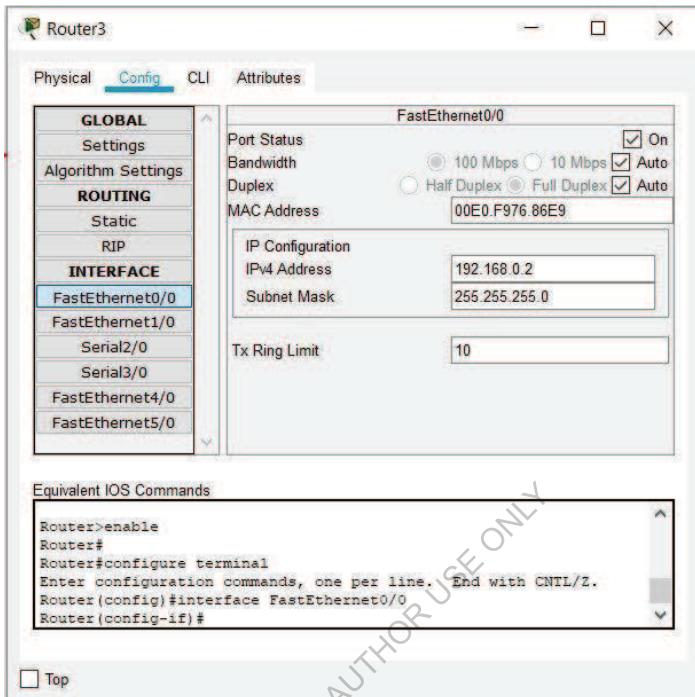
(i) Give the address to Fast Ethernet 3/0 in router 4



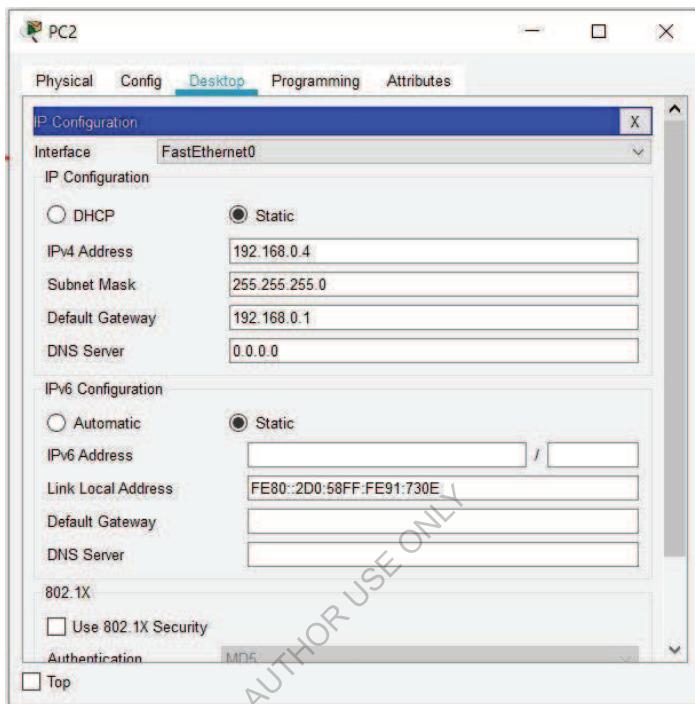
(j) Give the address to serial port 3/0 in router 4



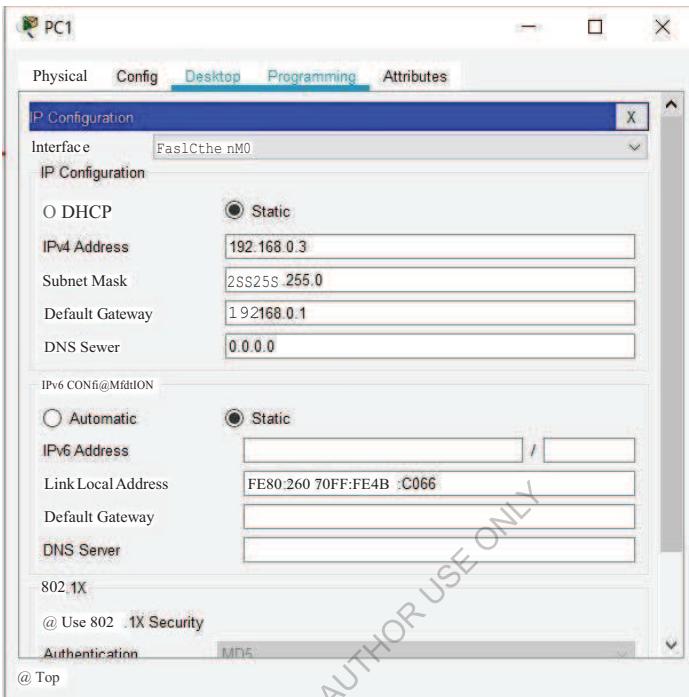
(k) Give the address to serial port 2/0 in router 3

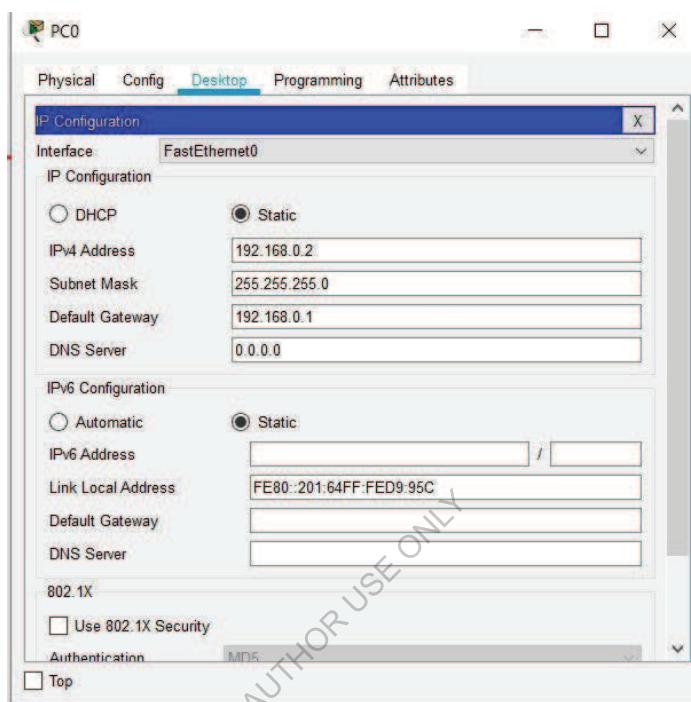


(l) Give the address to serial port 3/0 in router 3



(m) Give Static IP address to PC2





(n) Give Static IP address to PC0

The screenshot shows a Windows application window titled "Router5". The tab bar at the top has four tabs: "Physical", "Config", "CLI" (which is selected and highlighted in blue), and "Attributes". Below the tabs is a title bar "IOS Command Line Interface". The main area contains the following text:

```
%LINK-5-CHANGED: Interface Serial2/0, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,  
changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0,  
changed state to up  
  
Router>enable  
Router#  
Router#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#interface FastEthernet0/0  
Router(config-if)#  
Router(config-if)#exit  
Router(config)#interface FastEthernet1/0  
Router(config-if)#  
Router(config-if)#exit  
Router(config)#interface Serial2/0  
Router(config-if)#  
Router(config-if)#exit  
Router(config)#interface Serial3/0  
Router(config-if)#
```

At the bottom of the window, there are three buttons: "Copy", "Paste", and "Ctrl+F6 to exit CLI focus". A "Top" button is located in the bottom-left corner.

(n) Give command to router 5 for setting up the serial and fastethernet link

Practical 10: To configure the Address Resolution Protocol – ARP and File Transfer Protocol – FTP.

Steps of making ARP(Address Resolution Protocol)

1.Take all required devices in cisco packet tracer.

- 3 PC
- 1 Switches

2.Using cable connect all devices

- Connect three PC to one switch according to diagram.

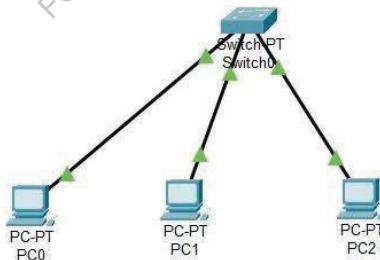
3.Give IP address using Desktop->Ip->static.

4. Take packet and transfer from any one pc to another see in figure.

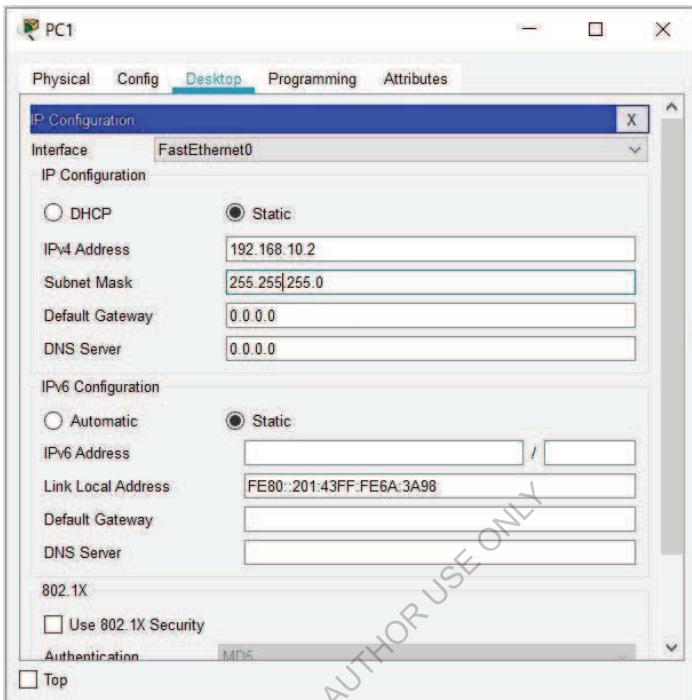
- See in Simulation ARP protocol

5.Eanble the port of router according to connection

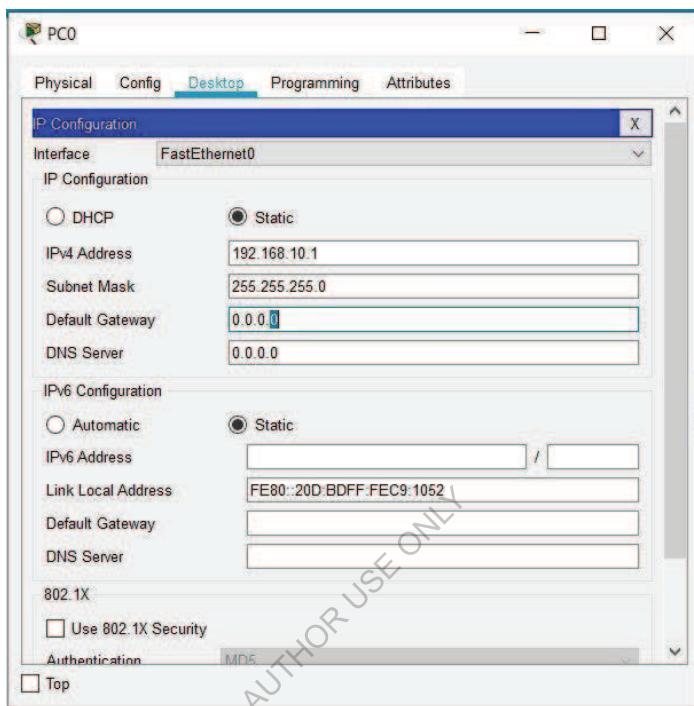
6.Using ping command and arp command in CLI we see the output



(a) Devices are connected in star topology for ARP evaluation

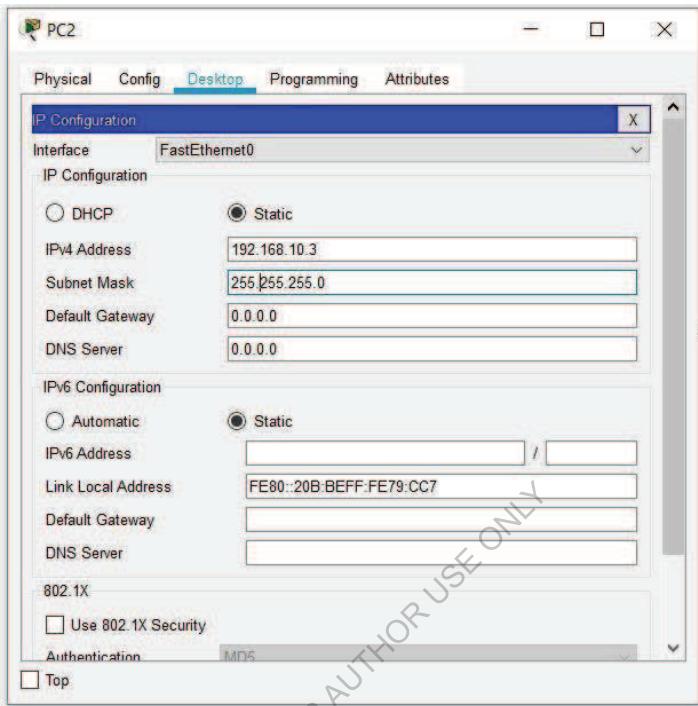


(b) Give IP address to PC1

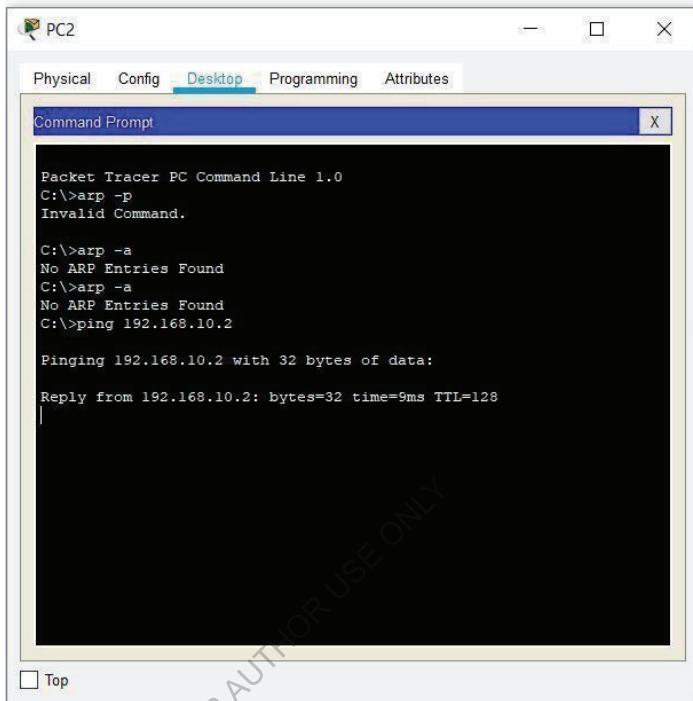


(c)

Give IP address to PC0



(d) Give IP address to PC2



The screenshot shows a software application window titled "PC2". At the top, there is a menu bar with tabs: "Physical", "Config", "Desktop" (which is highlighted in blue), "Programming", and "Attributes". Below the menu is a toolbar with icons. The main area is a "Command Prompt" window with a title bar "Command Prompt" and a close button "X". The command prompt window displays the following text:

```
Packet Tracer PC Command Line 1.0
C:>arp -p
Invalid Command.

C:>arp -a
No ARP Entries Found
C:>arp -a
No ARP Entries Found
C:>ping 192.168.10.2

Pinging 192.168.10.2 with 32 bytes of data:
Reply from 192.168.10.2: bytes=32 time=9ms TTL=128
```

(e)

Write Ping Command in CLI of PC2

Event List				
Vis.	Time(sec)	Last Device	At Device	Type
	0.000	--	PC2	ARP
	0.000	--	PC2	ICMP
	0.000	--	PC2	ARP
	0.001	PC2	Switch0	ARP
	0.001	--	PC2	ARP
	0.002	PC2	Switch0	ARP
	0.002	Switch0	PC0	ARP
	0.002	Switch0	PC1	ARP
Visible	0.003	Switch0	PC0	ARP
Visible	0.003	Switch0	PC1	ARP

FOR AUTHORIZED USE ONLY

(f)

Observe the result in simulation panel

The screenshot shows a network simulation environment with a window titled "PC2". The window has tabs at the top: Physical, Config, Desktop (which is selected), Programming, and Attributes. Below the tabs is a "Command Prompt" window containing the following text:

```
Packet Tracer PC Command Line 1.0
C:>arp -p
Invalid Command.

C:>arp -a
No ARP Entries Found
C:>arp -a
No ARP Entries Found
C:>ping 192.168.10.2

Pinging 192.168.10.2 with 32 bytes of data:
Reply from 192.168.10.2: bytes=32 time=9ms TTL=128
Reply from 192.168.10.2: bytes=32 time=4ms TTL=128
Reply from 192.168.10.2: bytes=32 time=4ms TTL=128
```

(g)

Write Ping Command in CLI of PC2

Steps of making FTP(File Transfer Protocol) 1.Take all required devices in cisco packet tracer.

- 3 PC
- 1 Router
- 2 Switches
- 1 Server

2.Using cable connect all devices

- Connect two PC to one switch according to diagram.
- Connect one router to another switch
- Connect server and pc to switch as shown in fig 3.Give

IP address to Pc and server using Desktop->Ip->static

4.In server Ftp service add Username and Password and add textfile.

- For adding text file in pc make text file and save it using name.

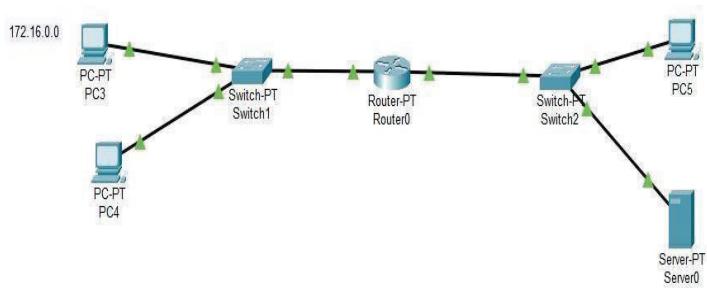
5.In router give serial address according to port and same forethernet

6.In router write command in CLI

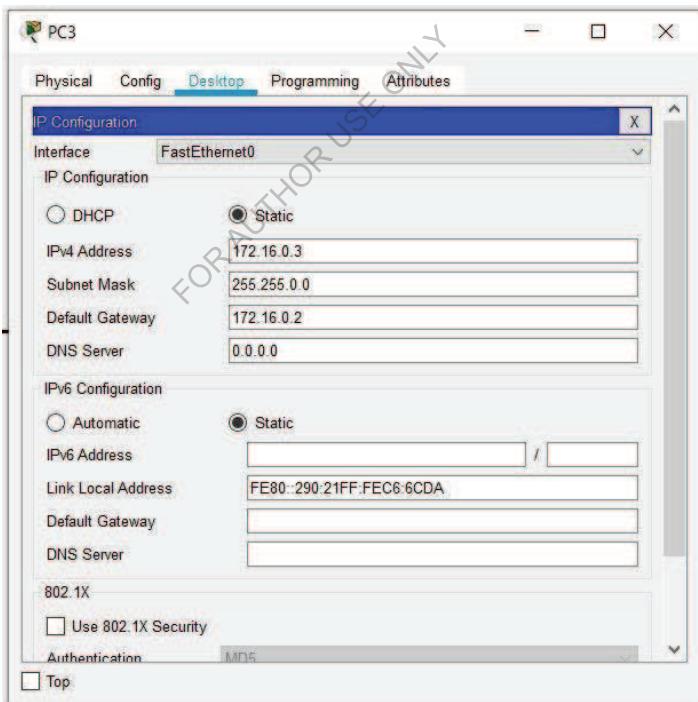
- ftp server address
- dir
- put filename
- after uploading file on server we can access the file from any other pc

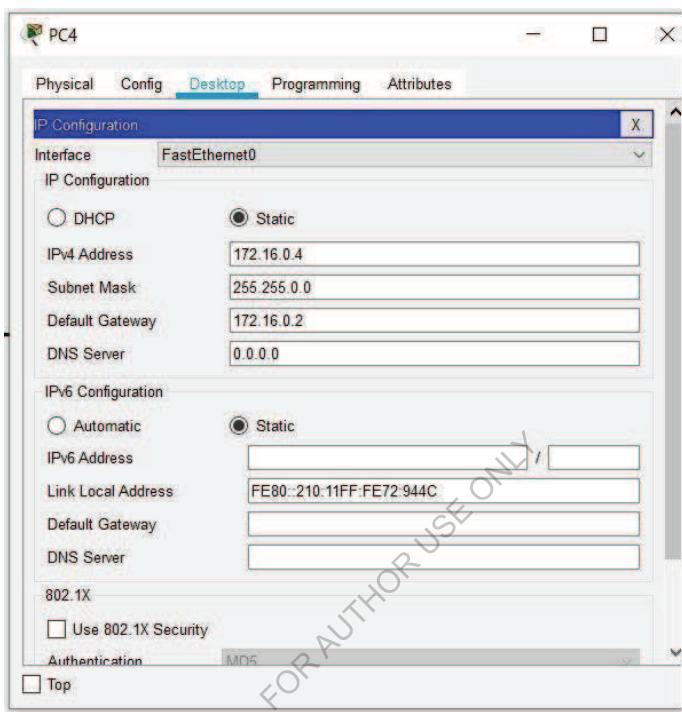
7.Eanble the port of router according to connection

8.We can access the file from any other pc using ftp command



(a) devices are connected for transferring file (FTP)



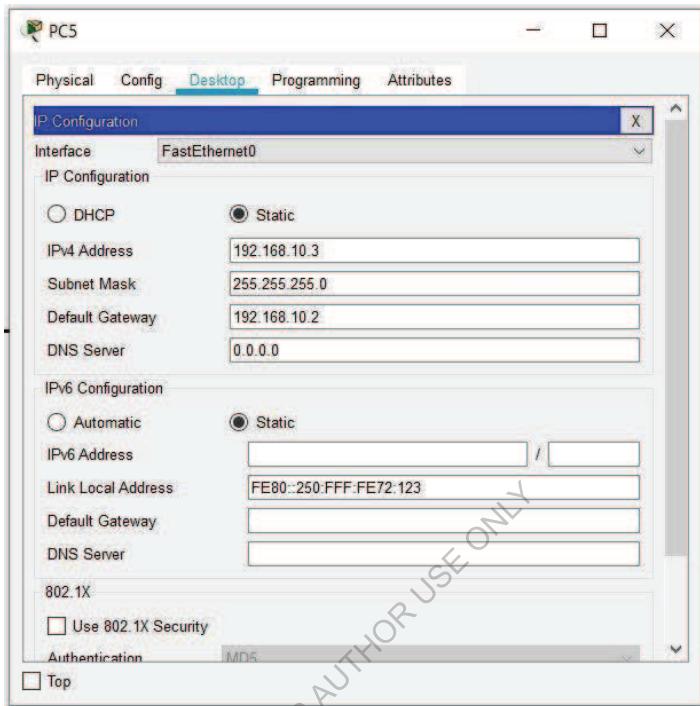


(b) Give Static IP address to PC4

Router0

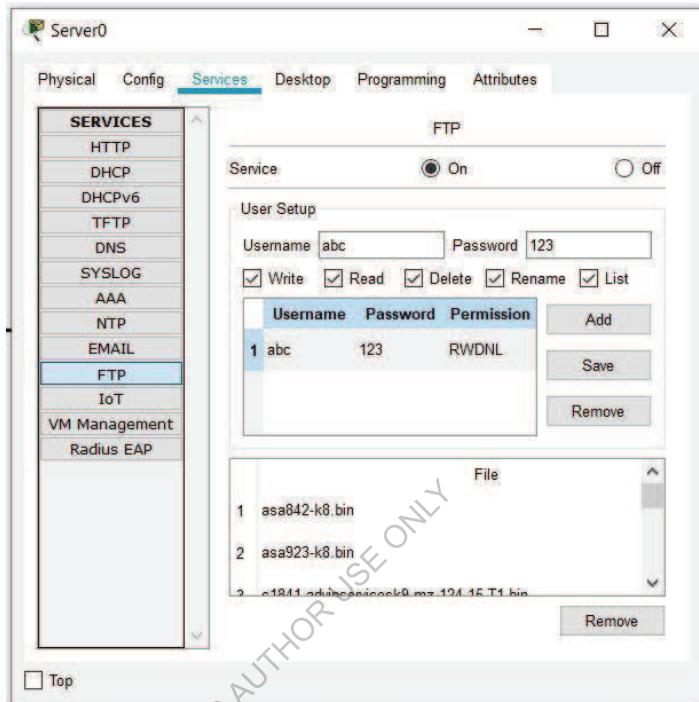
Physical Cnnda CLI Attributes

GLOBAL Settings Algorithm Settings ROUTING static RIP INTERFACE	FastEthernet0/0		
	POrt Status	On	
	Bandwidth	10'1Mbps	10Mbps @ Auto
	Duplex	HalfDuplex	Full Duplex @ Auto
	MACAddress	4 C 9	
	IP Configuration		
	IFv4 Address	192.168.10.2	
	Subnet Mask	255.255.255.0	
Tx Ring Limit		10	
Equivalent IOS Commands			
<pre>Router)enable Router* Router*configure terminal Enter configuration commands, one per line. End with CNTL/Z. Router(config)*interface FastEthernet0/0 Router(config-if)t</pre>			
Top			

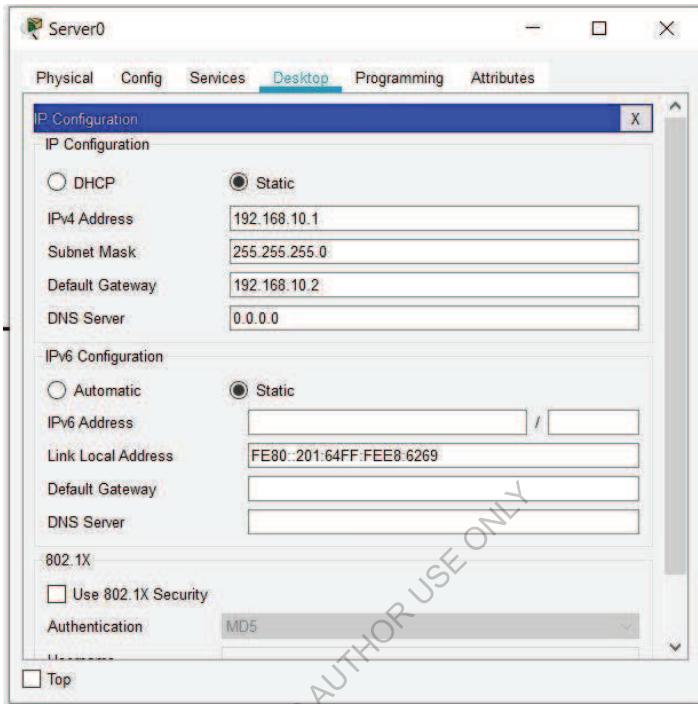


(c)

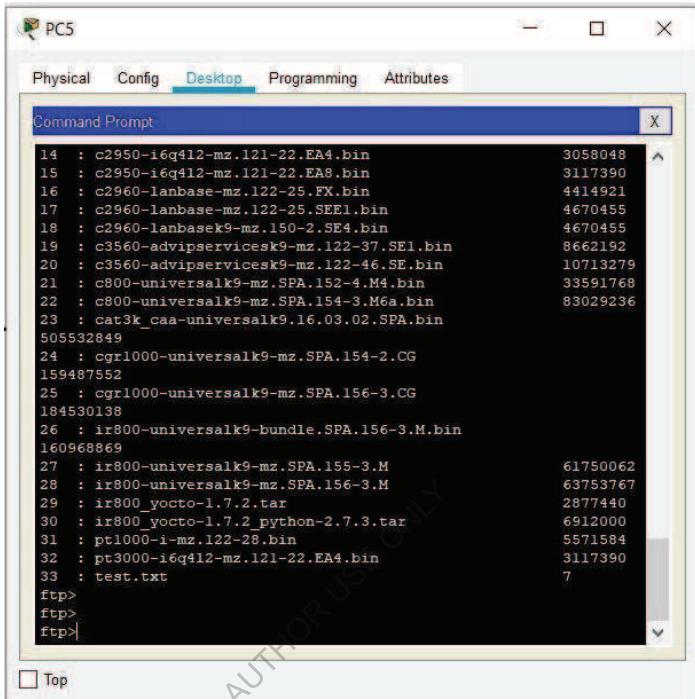
Give Static IP address to PC5



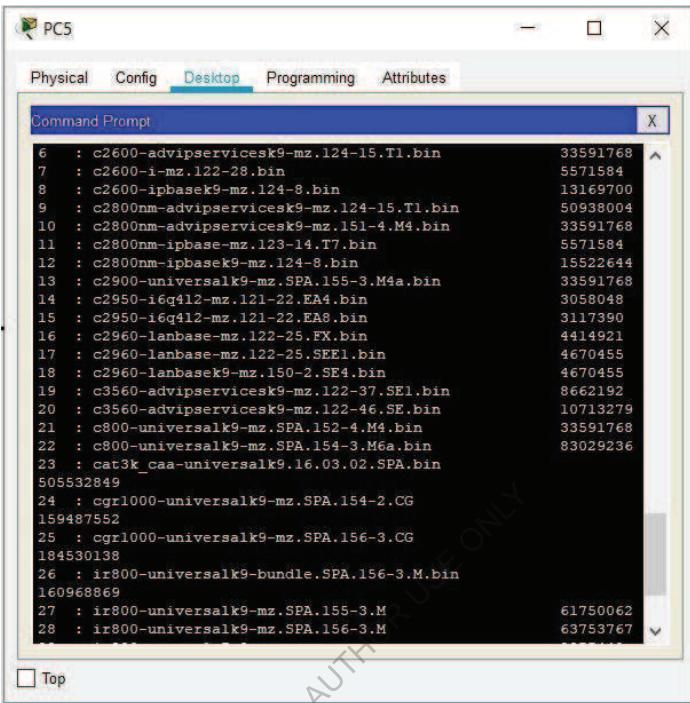
(d) Add Username and password in Server0



(e) Give Static IP address to Server0



(f) Give ftp command to PC5



(g) Give ftp command to PC5

The screenshot shows the PCS software interface with the 'Desktop' tab selected. A Command Prompt window is open, displaying the following session:

```
184530138
26 : ir800-universalk9-bundle.SPA.156-3.M.bin
160968869
27 : ir800-universalk9-mz.SPA.155-3.M          61750062
28 : ir800-universalk9-mz.SPA.156-3.M          63753767
29 : ir800_yocto-1.7.2.tar                      2877440
30 : ir800_yocto-1.7.2_python-2.7.3.tar        6912000
31 : ptl000-i-mz.122-28.bin                     5571584
32 : pt3000-i6q4i2-mz.121-22.EA4.bin           3117390
ftp>put test
%Error opening c:/test (No such file or directory)
ftp>put test.txt

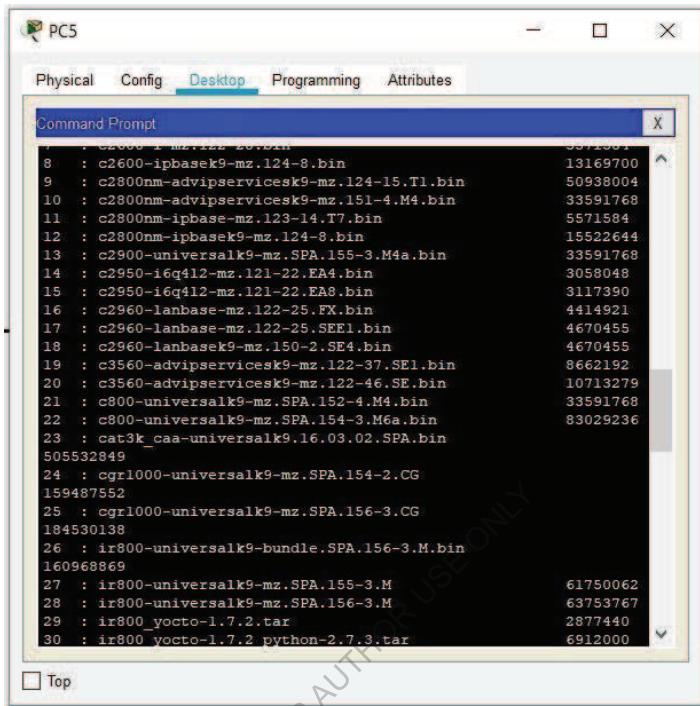
Writing file test.txt to 192.168.10.1;
File transfer in progress...

[Transfer complete - 7 bytes]

7 bytes copied in 0.031 secs (225 bytes/sec)
ftp>dir

Listing /ftp directory from 192.168.10.1:
0   : asa842-k8.bin                            5571584
1   : asa923-k8.bin                            30468096
2   : cl841-advipservicesk9-mz.124-15.T1.bin  33591768
3   : cl841-ipbase-mz.123-14.T7.bin           13832032
4   : cl841-ipbasek9-mz.124-12.bin            16599160
```

(h) Give ftp command to PCS



(i) Give ftp command to PC5

The screenshot shows a Windows Command Prompt window titled "Command Prompt". The window is part of a software interface with tabs for Physical, Config, Desktop, Programming, and Attributes. The Desktop tab is selected.

```
C:\>dir
Volume in drive C has no label.
Volume Serial Number is 5E12-4AF3
Directory of C:\

1/1/1970      5:30 PM           26      sampleFile.txt
1/1/1970      5:30 PM            7      test.txt
                  33 bytes          2 File(s)

C:\>ftp 192.168.10.1
Trying to connect...192.168.10.1
Connected to 192.168.10.1
220- Welcome to PT Ftp server
Username:abc
331- Username ok, need password
Password:
230- Logged in
(passive mode On)
ftp>dir

Listing /ftp directory from 192.168.10.1:
0   : asa842-k8.bin                   5571584
1   : asa923-k8.bin                   30468096
2   : cl841-advipservicesk9-mz.124-15.T1.bin 33591768
3   : cl841-ipbase-mz.123-14.T7.bin    13832032
4   : cl841-ipbasek9-mz.124-12.bin   16599160
5   : ipbasek9-mz.124-15.T1.bin     8861860
```

(j) dir command in CLI of pc5

Practical 11: To configure the BGP protocol in Cisco Packet Trace.

Steps of making BGP (Border Gateway Protocol)

1.Take all required devices in cisco packet tracer.

- 4 PC
- 3 Router
- 2 Switches

2.Using cable connect all devices

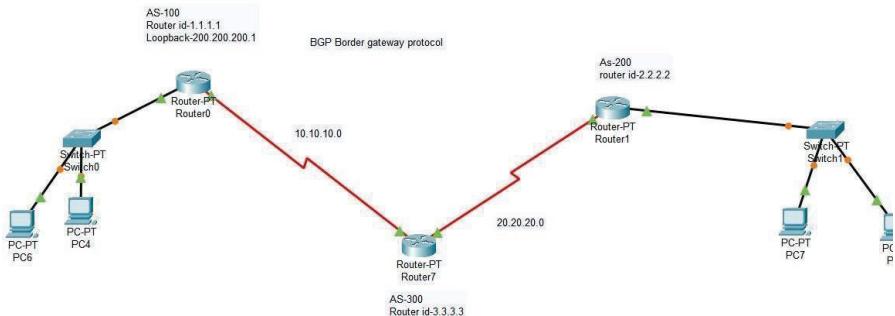
- Connect two PC to one switch according to diagram.
- Connect three routers with each other as shown in fig and
- Connect router to switch as shown in fig

3.Give IP address using Desktop->Ip->static

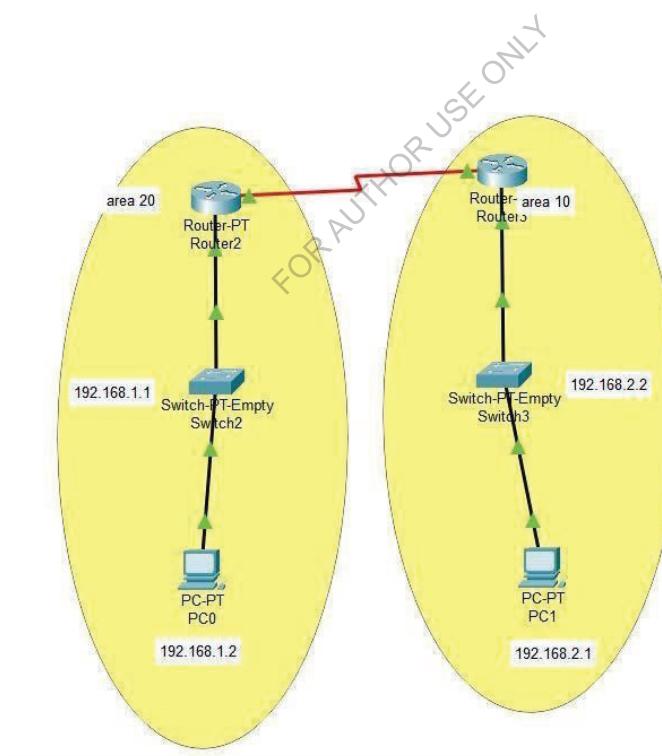
4.In router give serial address according to port and same for ethernet

5.In router write command in CLI

6.Eanble the port of router according to connection

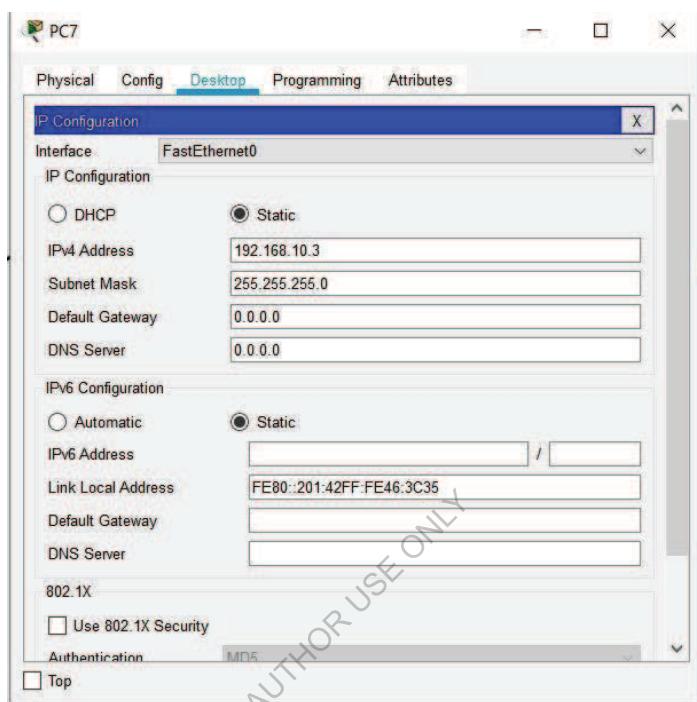


(a) connected router and switch as shown above

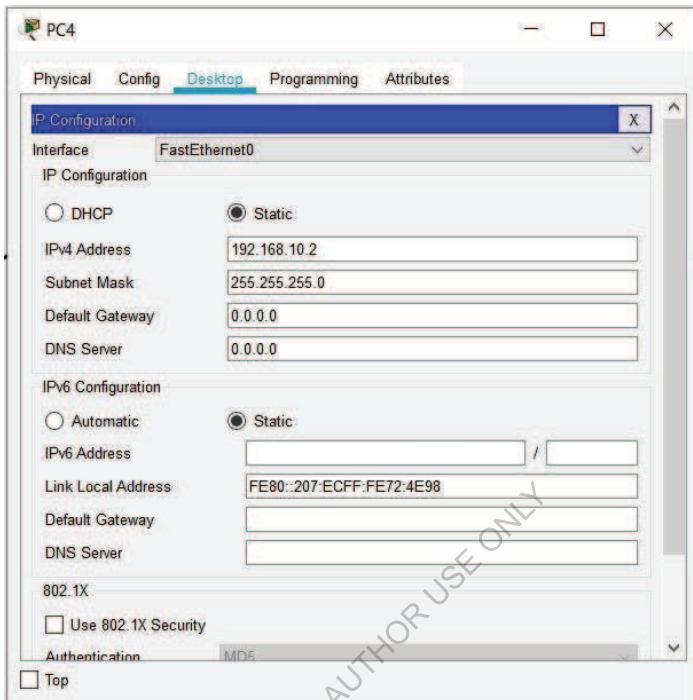


(b) connected router and switch as shown above for part 2

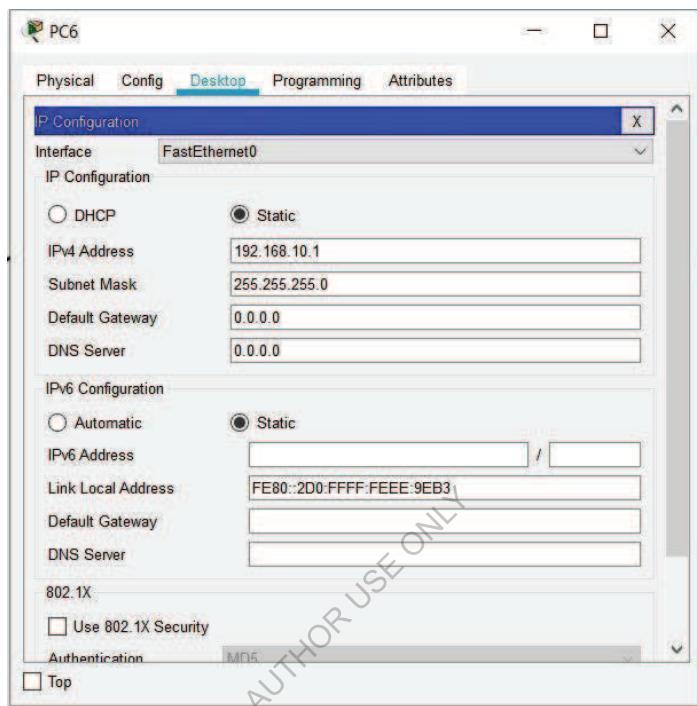
FOR AUTHOR USE ONLY



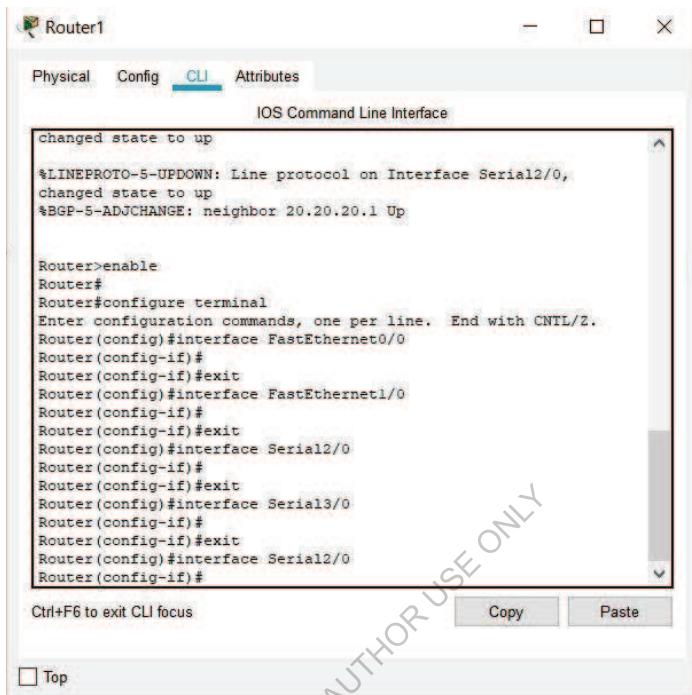
(c) Give static IP address to PC7



(d) Give static IP address to PC4



(e) Give static IP address to PC6



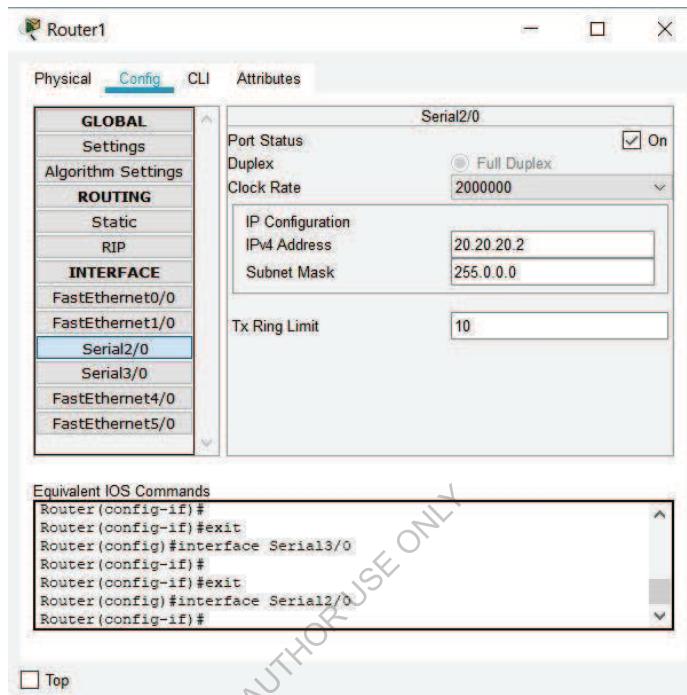
The image shows a Windows application window titled "Router1". The tab bar at the top has "Physical", "Config", "CLI" (which is selected and highlighted in blue), and "Attributes". Below the tab bar is a title bar "IOS Command Line Interface". The main area contains a scrollable text box displaying the following command-line session:

```
changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0,
changed state to up
%BGP-5-ADJCHANGE: neighbor 20.20.20.1 Up

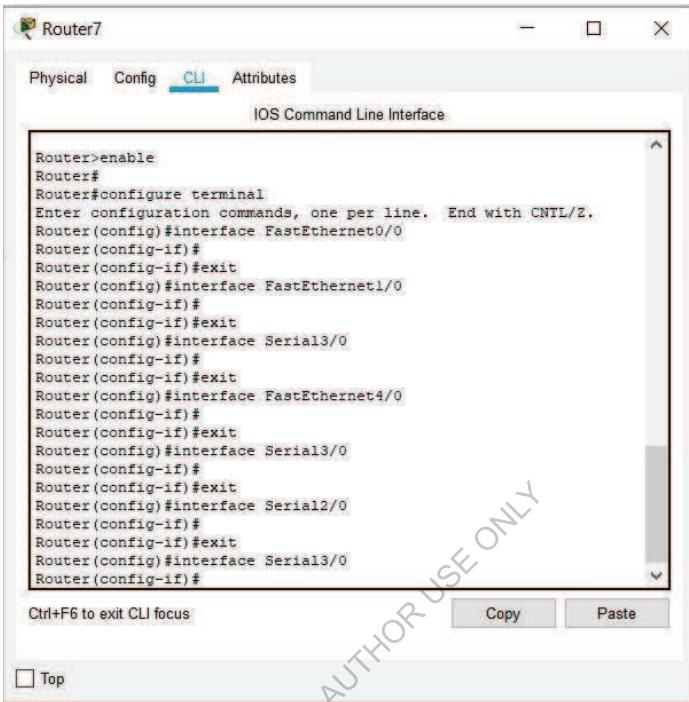
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Ctrl+F6 to exit CLI focus
```

At the bottom of the window are three buttons: "Copy", "Paste", and a "Top" button.

(f) Give command in router 1 for setting up the link



(g) Give the address to serial 2/0 to router 1

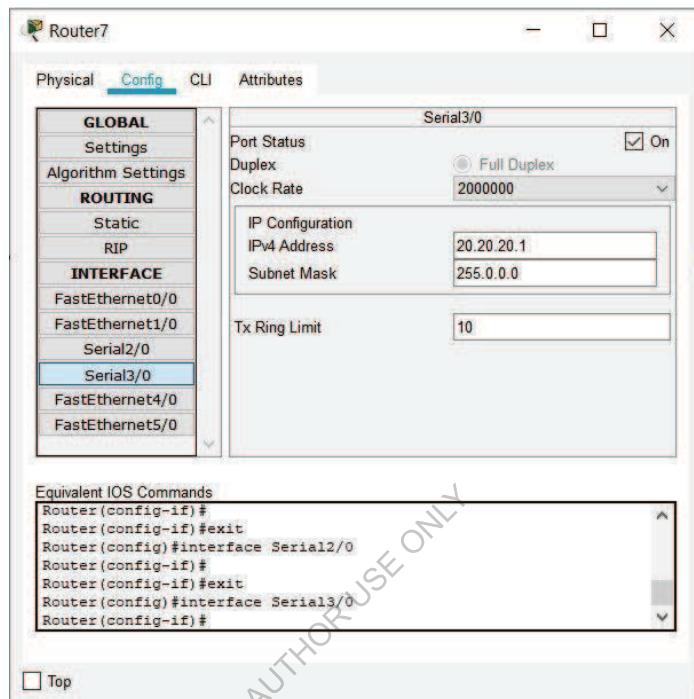


The image shows a computer screen displaying a terminal window titled "Router7". The window has tabs for "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area is labeled "IOS Command Line Interface". The terminal window contains the following text:

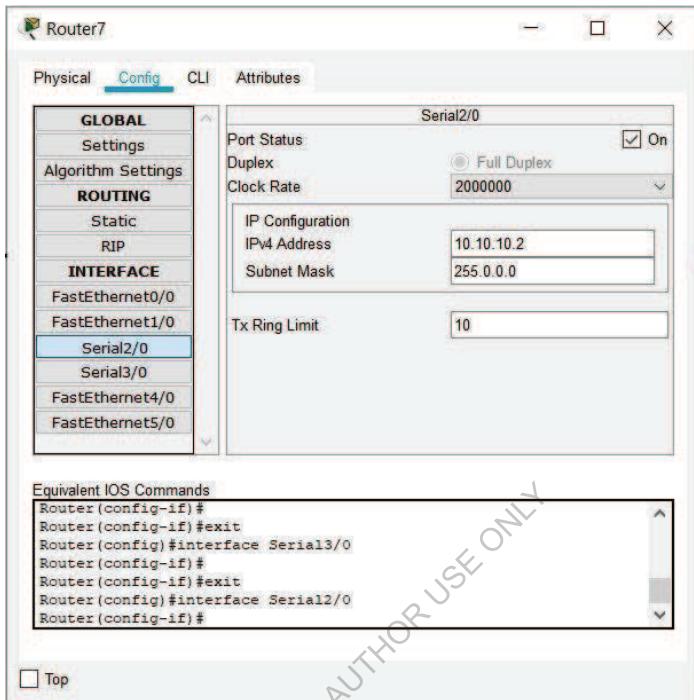
```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet4/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial12/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial13/0
Router(config-if)#
Ctrl+F6 to exit CLI focus
```

At the bottom of the window, there are "Copy" and "Paste" buttons, and a checkbox labeled "Top". A watermark "FOR AUTHOR USE ONLY" is diagonally across the window.

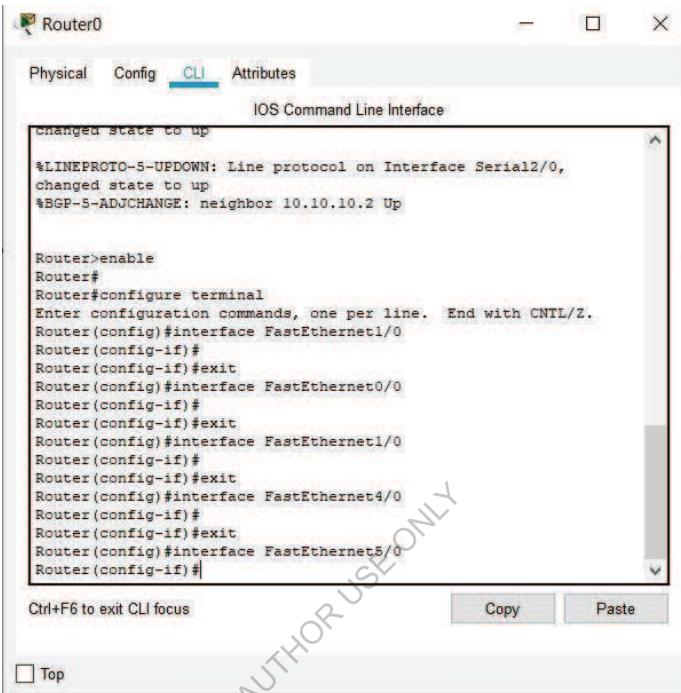
(h) Give command in router 1 for setting up the link



(i) Give the address to serial 3/0 to router 7



(j) Give the address to serial 2/0 to router 7



The image shows a computer screen displaying a terminal window titled "Router0". The window has tabs for "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area is labeled "IOS Command Line Interface". The text in the window is as follows:

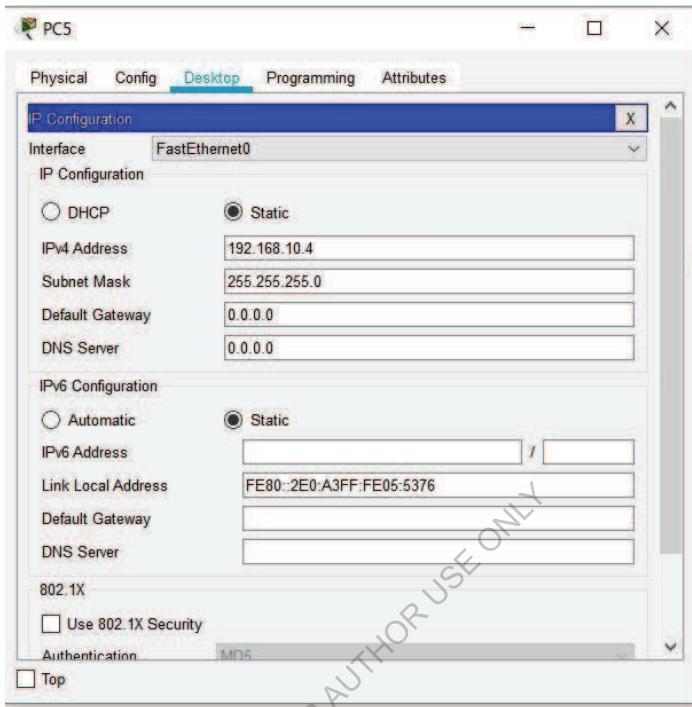
```
Changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0,
changed state to up
*BGP-5-ADJCHANGE: neighbor 10.10.10.2 Up

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet1/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet4/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet5/0
Router(config-if)#

Ctrl+F6 to exit CLI focus
```

At the bottom of the window, there are "Copy" and "Paste" buttons, and a checkbox labeled "Top". A watermark "PR AUTHOR USE ONLY" is diagonally across the text.

(k) Give command in router 0 for setting up the link



(l) Give static IP address to PC5

Practical 12: To Configure Open Shortest Path First – OSPF in packet trace.

Steps of making OSPF (Open Shortest Path First)

1.Take all required devices in cisco packet tracer.

- 3 PC
- 3 Router
- 3 Switches

2.Using cable connect all devices

- Connect three PC to three switch according to diagram.
- Connect three routers with each other as shown in fig and
- Connect router to switch as shown in fig

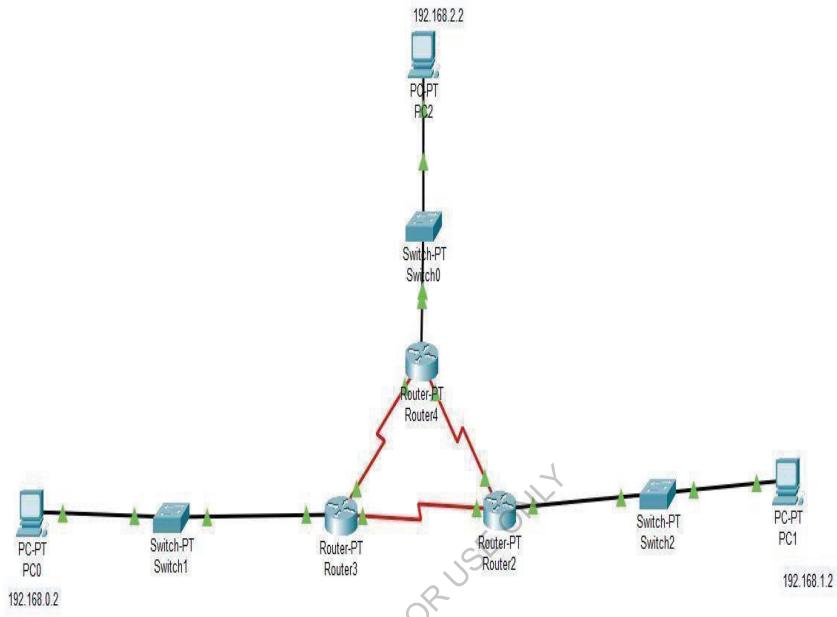
3.Give IP address using Desktop->Ip->static

4.In router give serial address according to port and ethernet address according to port.

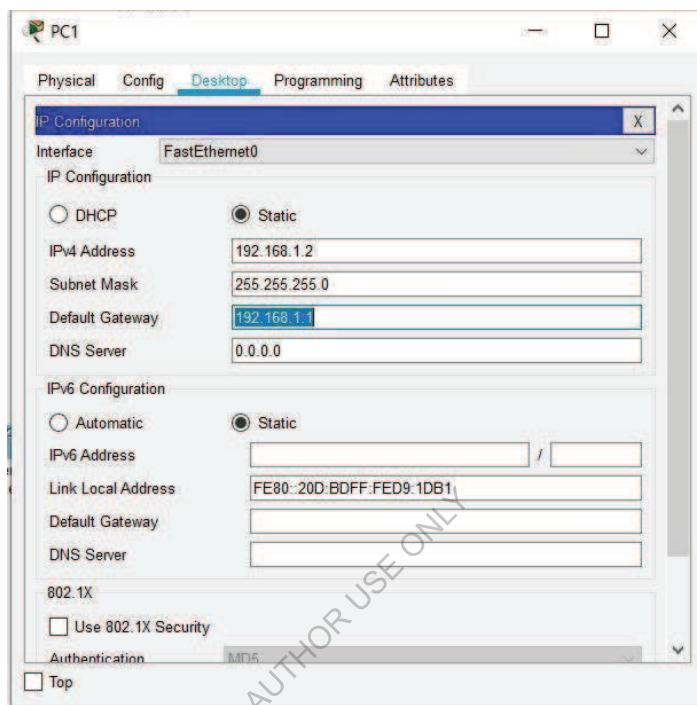
4.In router write command in CLI

5.Eanble the port of router according to connection

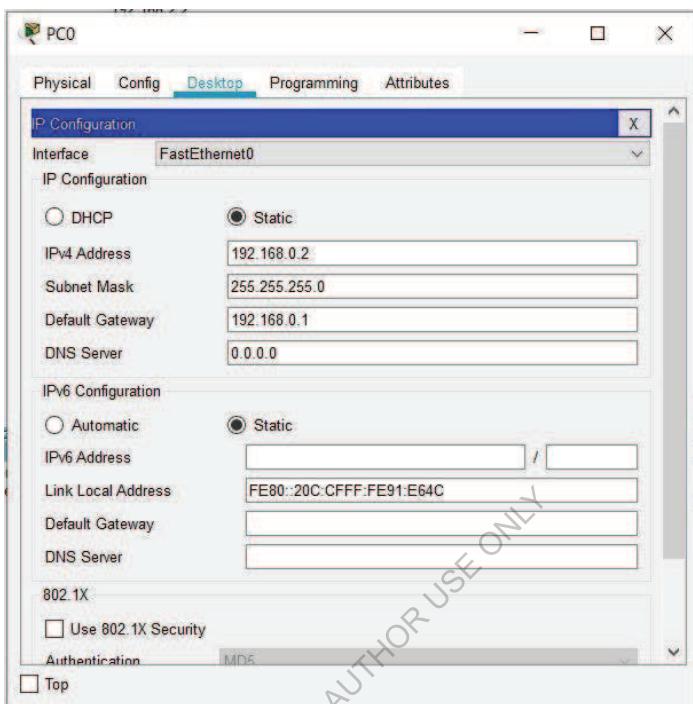
6.We can see OSPF protocol in simulator



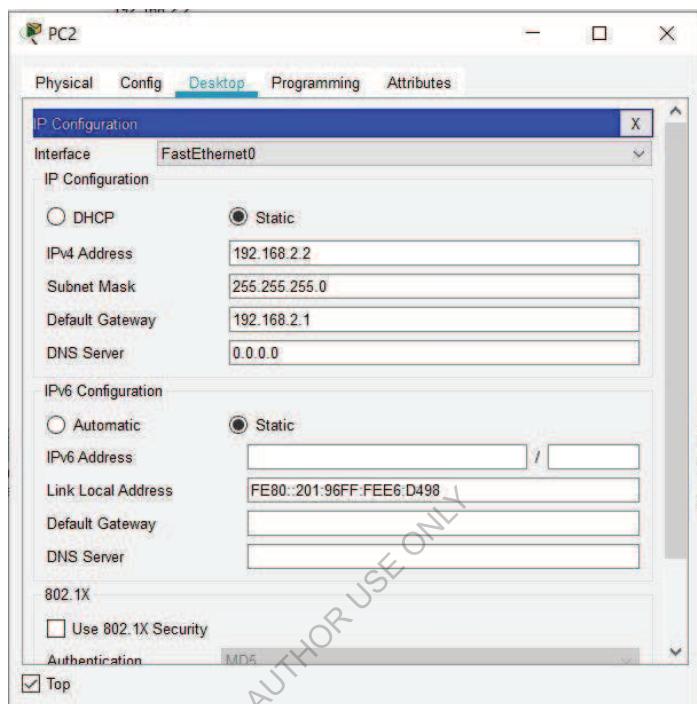
(a) set all the router in triangle and give Ip to PCS



(b) Give static IP to PC1



(c) Give static IP to PC0



(d) Give static IP to PC2

Router3

Physical Config **CLI** Attributes

IOS Command Line Interface

```
%LINK-5-CHANGED: Interface Serial3/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0,
changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0,
changed state to up
00:00:10: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.2.1 on
Serial2/0 from LOADING to FULL, Loading Done

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Ctrl+F6 to exit CLI focus
```

Top

Copy Paste

(e) write command in CLI of router for setting up the link

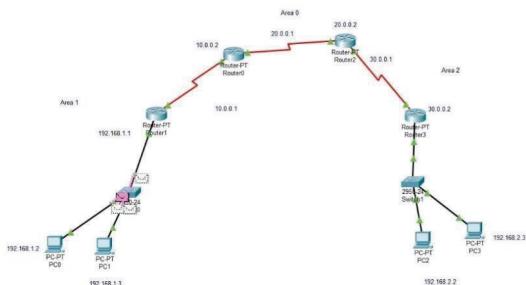
Simulation Panel				
Event List				
Vis.	Time(sec)	Last Device	At Device	Type
	0.003	Switch1	Router3	ICMP
	0.003	Router3	Switch1	ICMP
	0.004	Switch1	PC0	ICMP
	0.649	--	Switch2	STP
	0.650	Switch2	Router2	STP
	0.650	Switch2	PC1	STP
	0.684	--	Switch1	STP
	0.685	Switch1	Router3	STP
	0.685	Switch1	PC0	STP
	1.998	--	Switch0	STP
	1.999	Switch0	Router4	STP
	1.999	Switch0	PC2	STP
	2.124	--	Router4	OSPF
	2.125	Router4	Router3	OSPF
	2.128	--	Router3	OSPF
	2.129	Router3	Switch1	OSPF

(d)observe the result in simulation as OSPF protocol is present

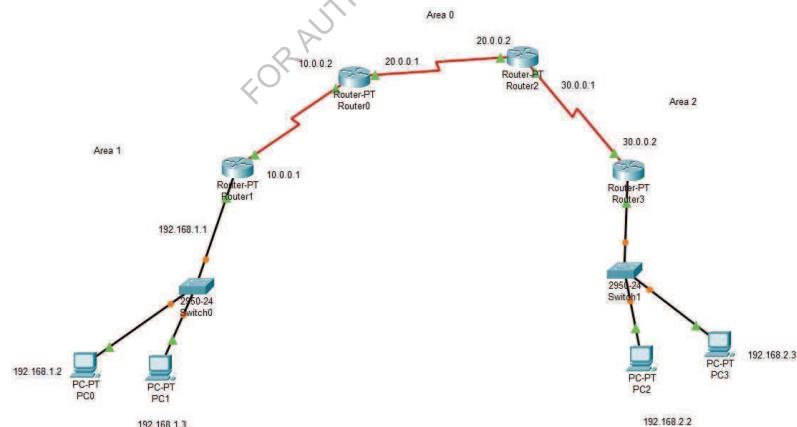
Practical 13: To configure single area and multipath area in OSPF using Cisco Packet Tracer.

Steps of Making MOSPF and OSPF

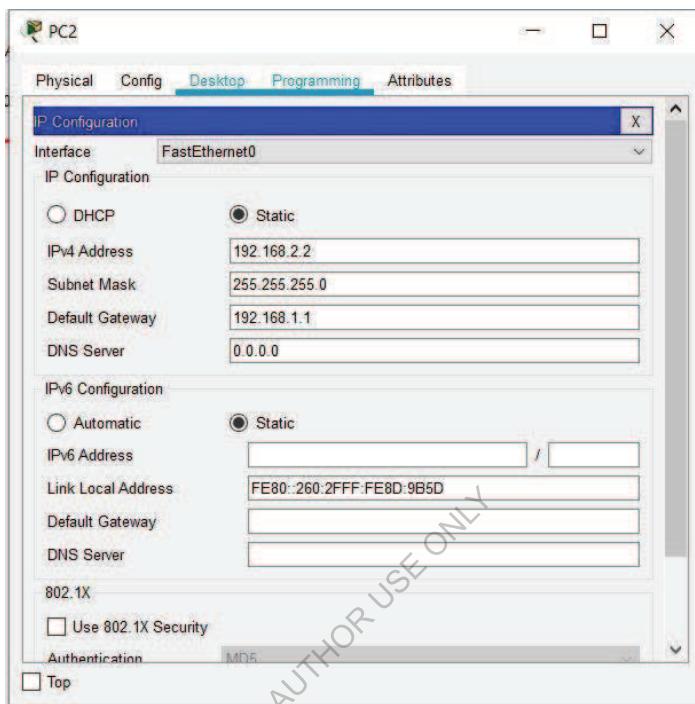
1. Take four PT-Router, two 2950-24 switch ,four PC.
2. Connect router with switch using copper straight through wire using fast ethernet and connect both pc to switches using same cable. Connect three router with single path as shown in diagram using serial DTE.
 1. Connect serial 2/0 to serial 2/0 for Router 1 to Router 0
 2. Connect serial 3/0 to serial 3/0 for Router 0 to Router 2
 3. Connect serial 2/0 to serial 2/0 for Router 2 to Router 3
3. Labelling to all devices and between the devices for our reference. Make label as shown in fig.
4. Give IP address to all PCS as static.
 - PC0-192.168.1.2
 - PC1-192.168.1.3
 - PC2-192.168.2.2
 - PC3-192.168.2.3
5. To configure MOSPF first make connection between all the devices using CLI of every devices.as shown in fig all the devices give command. first enable the router and then connect router with corresponding router and connect pc to corresponding router.



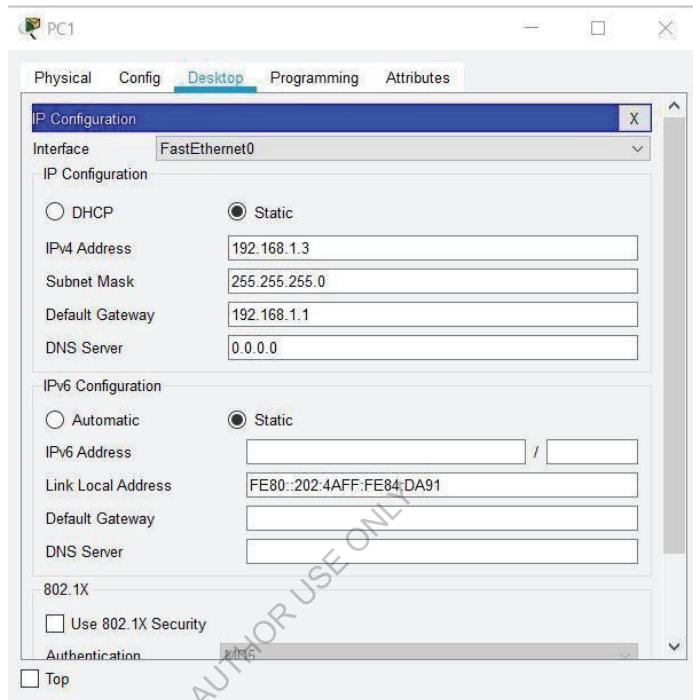
(a) Here we see the success status of packet transferring in MOSPF



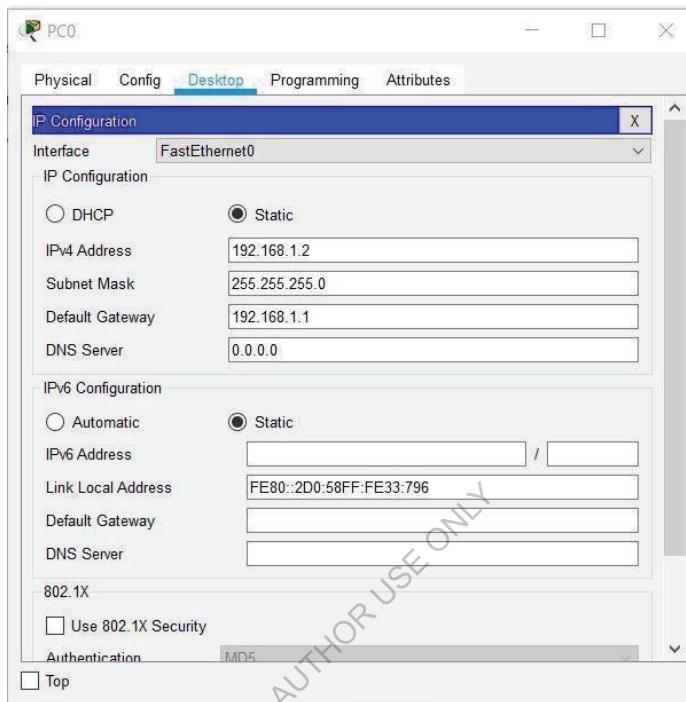
(b) three routers are connected with four PCS for MOSPF



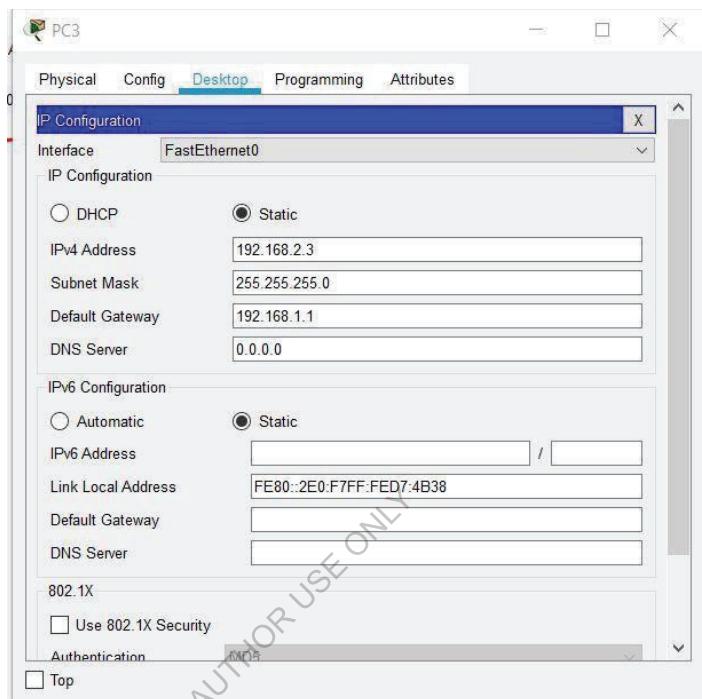
(c) Give IP address to PC2



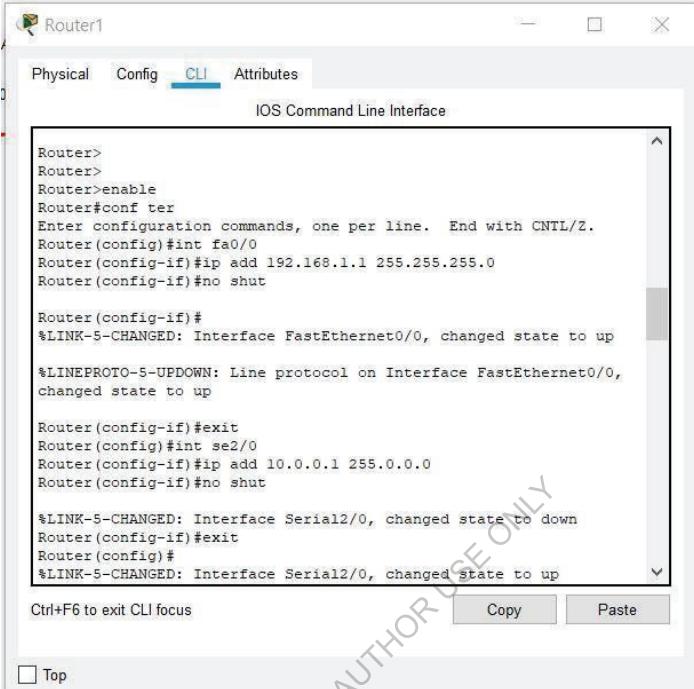
(d) Give IP address to PC1



(e) Give IP address to PC0



(f) Give IP address to PC3



The image shows a Windows application window titled "Router1". The window has tabs at the top: "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is a title bar "IOS Command Line Interface". The main area contains a command-line session:

```
Router>
Router>
Router>enable
Router#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip add 192.168.1.1 255.255.255.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up

Router(config-if)#exit
Router(config)#int se2/0
Router(config-if)#ip add 10.0.0.1 255.0.0.0
Router(config-if)#no shut

%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router(config-if)#exit
Router(config)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up
```

At the bottom of the terminal window, there are buttons for "Copy" and "Paste". Below the terminal window, there is a status bar with a "Top" button.

(g) add ip address and set up the link in router 1

The screenshot shows a Windows application window titled "Router0". The tab bar at the top has four tabs: "Physical", "Config", "CLI" (which is selected and highlighted in blue), and "Attributes". Below the tabs is a title bar "IOS Command Line Interface". The main area is a scrollable terminal window displaying the following CLI session:

```
Router>enable
Router#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 10.0.0.0 0.0.0.255 area 1
Router(config-router)#
00:37:03: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.1.1 on Serial2/0
from LOADING to FULL, Loading Done

Router(config-router)#network 20.0.0.0 0.0.0.255 area 0
Router(config-router)#exit
Router(config)#
00:40:36: %OSPF-5-ADJCHG: Process 1, Nbr 30.0.0.1 on Serial3/0
from LOADING to FULL, Loading Done
```

At the bottom left of the terminal window, there is a note: "Ctrl+F6 to exit CLI focus". At the bottom right, there are two buttons: "Copy" and "Paste". Below the terminal window, there is a toolbar with a "Top" button and a checkbox labeled "Top".

(h) Add network area in router 0

Router0

Physical Config **CLI** Attributes

IOS Command Line Interface

```
address

Router#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int se2/0
Router(config-if)#ip add 10.0.0.2 255.0.0.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

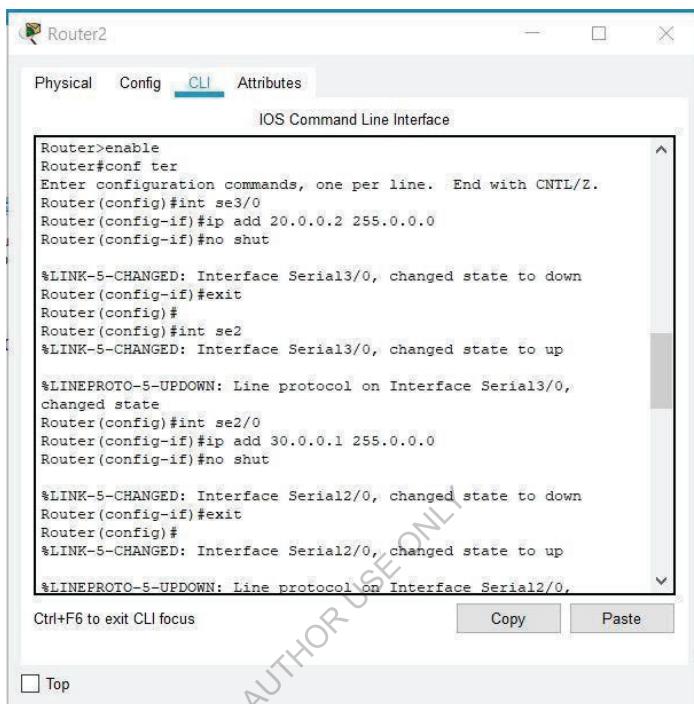
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0,
changed state to up

Router(config-if)#exit
Router(config)#int se3/0
Router(config-if)#ip add 20.0.0.1 255.0.0.0
Router(config-if)#no shut

%LINK-5-CHANGED: Interface Serial3/0, changed state to down
Router(config-if)#
Router(config-if)#exit
Router(config)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up
```

Ctrl+F6 to exit CLI focus Top

- (i) add ip address and set up the link in router 0



The image shows a screenshot of a Cisco Router configuration interface. The title bar says "Router2". Below it is a tab bar with "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area is titled "IOS Command Line Interface". It contains a command-line session history:

```
Router>enable
Router#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int se3/0
Router(config-if)#ip add 20.0.0.2 255.0.0.0
Router(config-if)#no shut

%LINK-5-CHANGED: Interface Serial3/0, changed state to down
Router(config-if)#exit
Router(config)#
Router(config)#int se2
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0,
changed state
Router(config)#int se2/0
Router(config-if)#ip add 30.0.0.1 255.0.0.0
Router(config-if)#no shut

%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router(config-if)#exit
Router(config)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0,
```

At the bottom left is the text "Ctrl+F6 to exit CLI focus". At the bottom right are "Copy" and "Paste" buttons. A "Top" button is at the bottom center.

(j) add ip address and set up the link in router 2



Physical Config **CLI** Attributes

```
Router>enable
Router#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#192.168.2.1 255.255.255.0
^
% Invalid input detected at '^' marker.

Router(config-if)#ip add 192.168.2.1 255.255.255.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

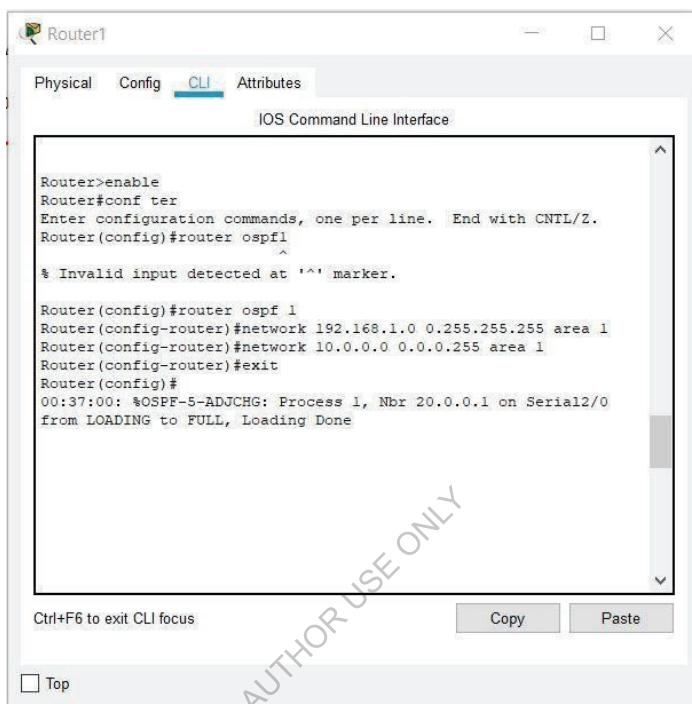
Router(config-if)#exit
Router(config)#int se2/0
Router(config-if)#ip 30.0.0.2 255.0.0.0
^
% Invalid input detected at '^' marker.

Router(config-if)#ip add 30.0.0.2 255.0.0.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router(config-if)#exit
Router(config)#
FOR AUTHOR USE ONLY
```

(k) add ip address and set up the link in router 3



The image shows a software interface for managing a router named 'Router1'. The window has tabs for 'Physical', 'Config', 'CLI' (which is selected), and 'Attributes'. Below the tabs is a title 'IOS Command Line Interface'. The main area contains the following command-line session:

```
Router>enable
Router#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf1
^
* Invalid input detected at '^' marker.

Router(config)#router ospf 1
Router(config-router)#network 192.168.1.0 0.255.255.255 area 1
Router(config-router)#network 10.0.0.0 0.0.0.255 area 1
Router(config-router)#exit
Router(config)#
00:37:00: %OSPF-5-ADJCHG: Process 1, Nbr 20.0.0.1 on Serial2/0
from LOADING to FULL, Loading Done
```

At the bottom left of the terminal window, there is a note: 'Ctrl+F6 to exit CLI focus'. At the bottom right are 'Copy' and 'Paste' buttons. A checkbox labeled 'Top' is located just below the 'Copy' button.

(l) Add network address in Router 1

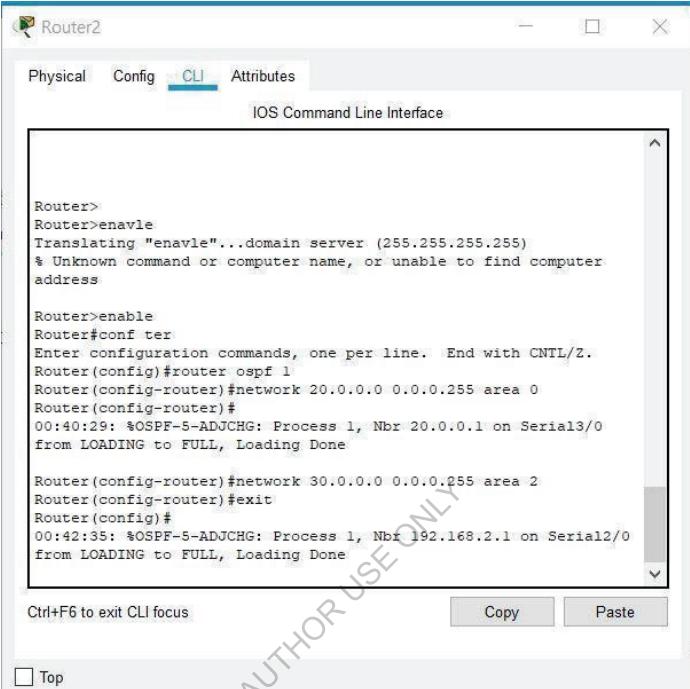
The screenshot shows a Windows-style application window titled "Router0". The tab bar at the top has four tabs: "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is a title bar "IOS Command Line Interface". The main area contains the following command-line session:

```
Router>enable
Router#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 10.0.0.0 0.0.0.255 area 1
Router(config-router)#
00:37:03: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.1.1 on Serial2/0
from LOADING to FULL, Loading Done

Router(config-router)#network 20.0.0.0 0.0.0.255 area 0
Router(config-router)#exit
Router(config)#
00:40:36: %OSPF-5-ADJCHG: Process 1, Nbr 30.0.0.1 on Serial3/0
from LOADING to FULL, Loading Done
```

At the bottom of the window, there are three buttons: "Ctrl+F6 to exit CLI focus" (disabled), "Copy", and "Paste". A checkbox labeled "Top" is located just below the buttons.

(m) Add network address in Router 0



The image shows a Windows application window titled "Router2". The window has tabs at the top: "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is a title bar "IOS Command Line Interface". The main area contains the following command-line session:

```
Router>
Router>enable
Translating "enable"...domain server (255.255.255.255)
% Unknown command or computer name, or unable to find computer
address

Router>enable
Router#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 20.0.0.0 0.0.0.255 area 0
Router(config-router)#
00:40:29: %OSPF-5-ADJCHG: Process 1, Nbr 20.0.0.1 on Serial3/0
from LOADING to FULL, Loading Done

Router(config-router)#network 30.0.0.0 0.0.0.255 area 2
Router(config-router)#exit
Router(config)#
00:42:35: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on Serial2/0
from LOADING to FULL, Loading Done
```

At the bottom left of the terminal window is the text "Ctrl+F6 to exit CLI focus". At the bottom right are "Copy" and "Paste" buttons. A checkbox labeled "Top" is located just below the "Copy" button.

(n) add network address in router 2

The screenshot shows a Windows-style application window titled "Router3". The window has tabs at the top: "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is a title bar "IOS Command Line Interface". The main area is a scrollable terminal window displaying the following configuration commands:

```
Router>enable
Router#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 30.0.0.0 0.0.0.255 area 2
Router(config-router)#
00:42:28: %OSPF-5-ADJCHG: Process 1, Nbr 30.0.0.1 on Serial2/0
from LOADING to FULL, Loading Done

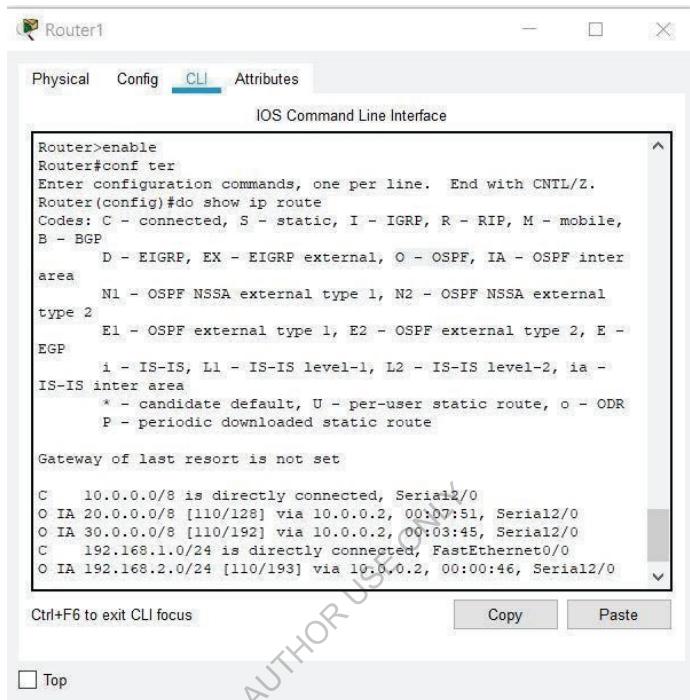
Router(config-router)#network 192.168.2 0.255.255.255 area 2
^
* Invalid input detected at '^' marker.

Router(config-router)#network 192.168.2.0 0.255.255.255 area 2
Router(config-router)#exit
Router(config)#

```

At the bottom of the terminal window, there are three buttons: "Ctrl+F6 to exit CLI focus", "Copy", and "Paste".

(o)add network address in router 3



The image shows a computer screen with a window titled "Router1". The window has tabs at the top: "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is a title "IOS Command Line Interface". The main area contains the output of an IOS command-line session. The session starts with "Router>enable" and "Router#conf ter". It then displays configuration commands for showing IP routes. A legend for route codes follows:

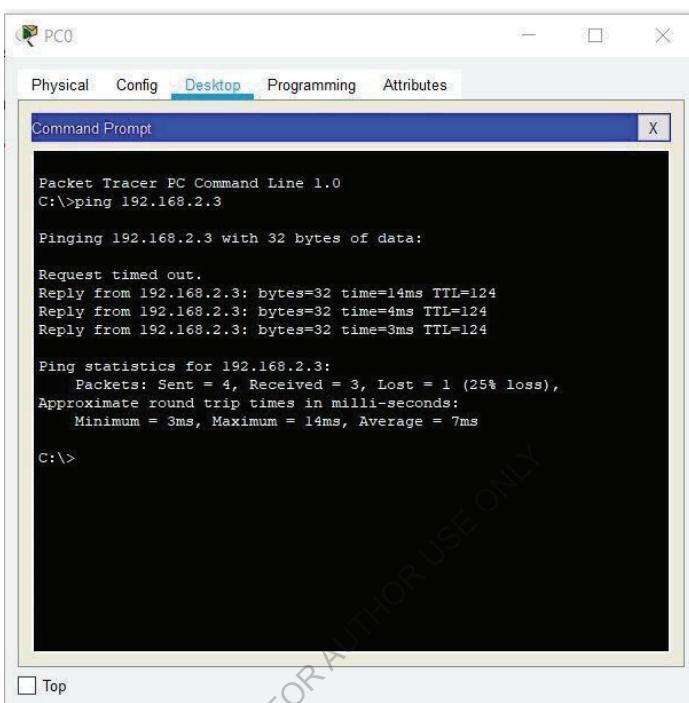
```
Router>enable
Router#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#do show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile,
      B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
      area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external
      type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E -
      EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia -
      IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

C    10.0.0.0/8 is directly connected, Serial1/0
O IA 20.0.0.0/8 [110/128] via 10.0.0.2, 00:07:51, Serial1/0
O IA 30.0.0.0/8 [110/192] via 10.0.0.2, 00:03:45, Serial1/0
C    192.168.1.0/24 is directly connected, FastEthernet0/0
O IA 192.168.2.0/24 [110/193] via 10.0.0.2, 00:00:46, Serial1/0
```

At the bottom of the window, there is a status bar with "Ctrl+F6 to exit CLI focus", a "Copy" button, and a "Paste" button. There is also a "Top" button.

(p)show the ip route in Router 1



The screenshot shows a software interface titled "PC0" with a tab bar at the top. The "Desktop" tab is selected. Below it is a "Command Prompt" window. The command line shows the user executing a ping command to an IP address. The output displays the ping statistics, including the number of packets sent, received, and lost, along with round-trip times.

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.2.3

Pinging 192.168.2.3 with 32 bytes of data:

Request timed out.
Reply from 192.168.2.3: bytes=32 time=14ms TTL=124
Reply from 192.168.2.3: bytes=32 time=4ms TTL=124
Reply from 192.168.2.3: bytes=32 time=3ms TTL=124

Ping statistics for 192.168.2.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 3ms, Maximum = 14ms, Average = 7ms

C:\>
```

(q)Check the ping Command in PC0

Simulation Panel

Event List

Vis.	Time(sec)	Last Device	At Device	Type
	135.449	Router3	Switch1	CDP
	135.449	Router3	Router2	CDP
	135.492	--	Router3	OSPF
	135.493	Router3	Switch1	OSPF
	135.494	Switch1	PC2	OSPF
	135.494	Switch1	PC3	OSPF
	136.000	--	Router0	OSPF
	136.001	Router0	Router2	OSPF
	136.297	--	Switch1	STP
	136.298	Switch1	PC3	STP
	136.298	Switch1	PC2	STP
	136.298	Switch1	Router3	STP
	137.306	--	Switch0	STP
①	137.307	Switch0	Router1	STP
①	137.307	Switch0	PC0	STP
①	137.307	Switch0	PC1	STP

(r)

Observing the simulation OSPF

Event List Realtime Simulation

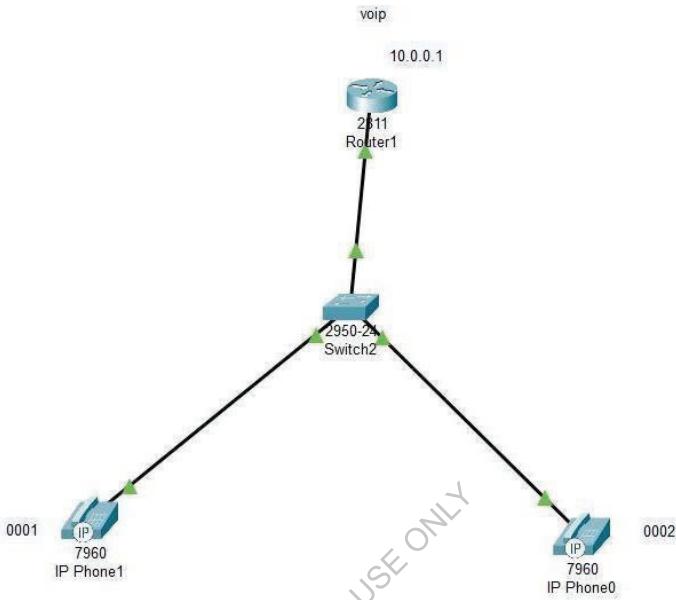
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
Successful	PC0	PC2	ICMP	█	0.000	N	0	(edit)	(delete)	

(S)Successfully packet transfer

Practical 14: To configure Voice over IP – VOIP in cisco packet trace.

Steps of making VOIP

1. Take one 2811 Router, one 2950-24 switch ,two 7960 ip phone.
2. Connect router with switch using copper straight through wireand connect both phones to switches using same cable.
3. Labelling to all devices for our reference.
 - Router-10.0.0.1
 - Phone1-0001
 - Phone2-0002
4. To configure go to the CLI of Router and type command as shown in below figure ,follow same for configure the switch.
5. We can connect both phone using VOIP and also see in fig as connected.



(a) Two telephones are connected with one router

The screenshot shows the Router1 CLI interface. The title bar says "Router1". Below it are tabs: Physical, Config, **CLI**, and Attributes. The main window title is "IOS Command Line Interface". The command-line area contains the following configuration session:

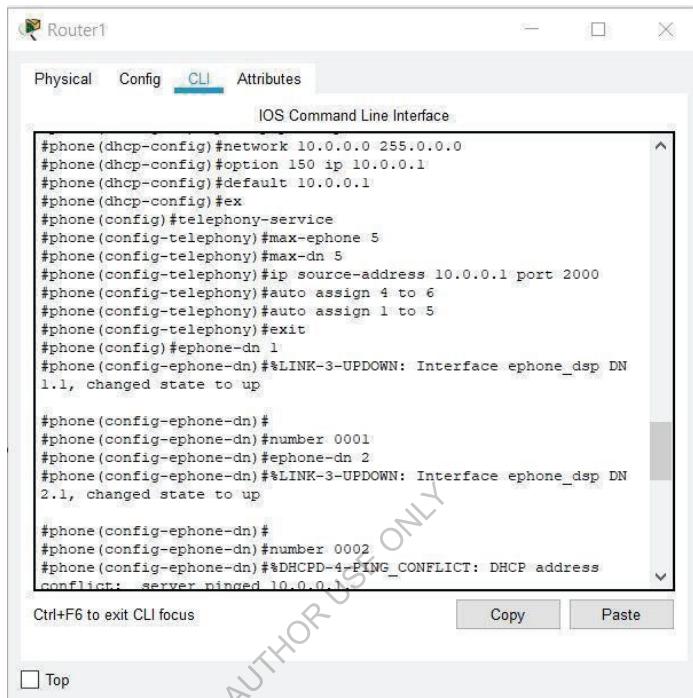
```
Router>
Router>en
Router#
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#host #phone
#phone(config)#interface fa 0/0
#phone(config-if)#ip address 10.0.0.1 255.0.0.0
#phone(config-if)#no shut

#phone(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up
#exit
^
% Invalid input detected at '^' marker.

#phone(config-if)#ip dhcp pool ephone
#phone(dhcp-config)#network 10.0.0.0 255.0.0.0
#phone(dhcp-config)#option 150 ip 10.0.0.1
#phone(dhcp-config)#default 10.0.0.1
```

At the bottom left is the text "Ctrl+F6 to exit CLI focus". At the bottom right are "Copy" and "Paste" buttons. A checkbox labeled "Top" is located at the bottom left of the main window.

(b) Add address and network in router 1



The image shows a software window titled "Router1" with a tab bar at the top. The "CLI" tab is selected, indicated by a blue underline. Below the tab bar is a title bar "IOS Command Line Interface". The main area contains a command-line interface with the following configuration commands:

```
#phone(dhcp-config) #network 10.0.0.0 255.0.0.0
#phone(dhcp-config) #option 150 ip 10.0.0.1
#phone(dhcp-config) #default 10.0.0.1
#phone(dhcp-config) #ex
#phone(config) #telephony-service
#phone(config-telephony) #max-ephone 5
#phone(config-telephony) #max-dn 5
#phone(config-telephony) #ip source-address 10.0.0.1 port 2000
#phone(config-telephony) #auto assign 4 to 6
#phone(config-telephony) #auto assign 1 to 5
#phone(config-telephony) #exit
#phone(config) #ephone-dn 1
#phone(config-ephone-dn) #LINK-3-UPDOWN: Interface ephone_dsp DN
1.1, changed state to up

#phone(config-ephone-dn) #
#phone(config-ephone-dn) #number 0001
#phone(config-ephone-dn) #ephone-dn 2
#phone(config-ephone-dn) #LINK-3-UPDOWN: Interface ephone_dsp DN
2.1, changed state to up

#phone(config-ephone-dn) #
#phone(config-ephone-dn) #number 0002
#phone(config-ephone-dn) #DHCPD-4-PING_CONFLICT: DHCP address
conflict: server pinged 10.0.0.1
```

At the bottom of the CLI window, there is a status message "Ctrl+F6 to exit CLI focus" and two buttons: "Copy" and "Paste".

(c) add telephone number in Router 1

Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
#phone(config)#ephone-dn 1
#phone(config-ephone-dn)#$LINK-3-UPDOWN: Interface ephone_dsp DN
1.1, changed state to up

#phone(config-ephone-dn)#
#phone(config-ephone-dn)#number 0001
#phone(config-ephone-dn)#ephone-dn 2
#phone(config-ephone-dn)#$LINK-3-UPDOWN: Interface ephone_dsp DN
2.1, changed state to up

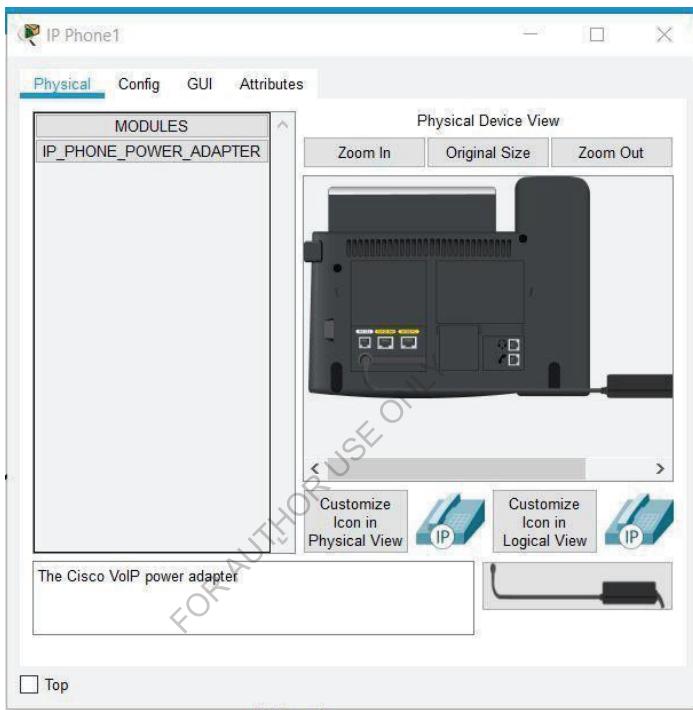
#phone(config-ephone-dn)#
#phone(config-ephone-dn)#number 0002
#phone(config-ephone-dn)#$DHCPD-4-PING_CONFLICT: DHCP address
conflict: server pinged 10.0.0.1.

%IPPHONE-6-REGISTER: ephone-1 IP:10.0.0.2 Socket:2
DeviceType:Phone has registered.

%IPPHONE-6-REGISTER: ephone-2 IP:10.0.0.3 Socket:2
DeviceType:Phone has registered.
```

Ctrl+F6 to exit CLI focus. Top

(d) add telephone number in Router 1



(e) change the physical device in IP phone1

The screenshot shows a Cisco Switch CLI window titled "Switch2". The tab bar at the top has "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs, it says "IOS Command Line Interface". The main pane displays the following text:

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up  
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up  
  
Switch>  
Switch>  
Switch>en  
Switch#conf t  
Enter configuration commands, one per line. End with CNTL/Z.  
Switch(config)#interface range fa 0/1-24  
Switch(config-if-range)#switchport mode access  
Switch(config-if-range)#switchport voice vlan 1  
Switch(config-if-range)#
```

At the bottom of the window, there are buttons for "Copy" and "Paste". A watermark "FOR AUTHOR USE ONLY" is diagonally across the text area. A checkbox labeled "Top" is located at the bottom left.

(f) Enable the port for VIOP



(g) after dailing the IP Phone0 is connected with each other



(h) after dailing the IP Phone1 is connected with each other

Practical 15: Implementation of Wireless Network with using Cisco Packet tracer.

Steps of making Wireless Network

1. Take all required devices in cisco packet tracer.

- 4 PC
- 1 Laptop
- 1 Router-1841
- 1 Switch
- 1 wireless Router

2. Using cable connect all devices

- Connect three PC to one switch according to diagram.
- Connect one router with one switch each other as shown in fig and
- Connect router to switch as shown in fig
- Connect wireless router to router and wireless router to switch
- For connection between wireless router to pc and laptop go to wireless router->config->wireless->wep->1234567890
- Set wireless connection in pc and desktop using following command

3. Give IP address using Desktop->Ip->static

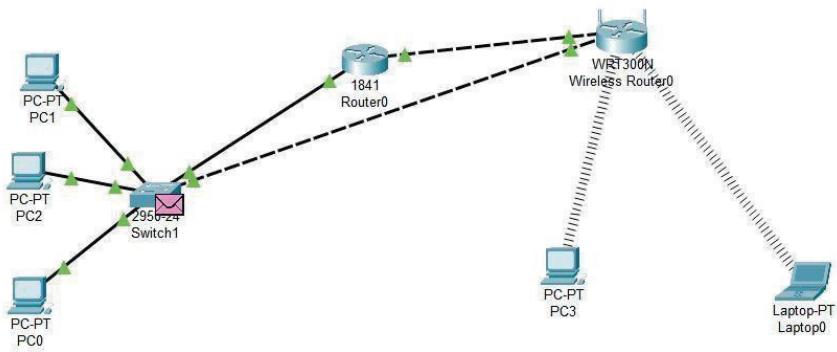
4. In router give serial address according to port and ethernet address according to port.

4. switch of the cpu of pc and remove existing device add Wmp300n in the pc and switch on it. for connecting wireless network follow the below steps.

Desktop->pc->wireless->connect->wep key provide

5. Enable the port of router according to connection

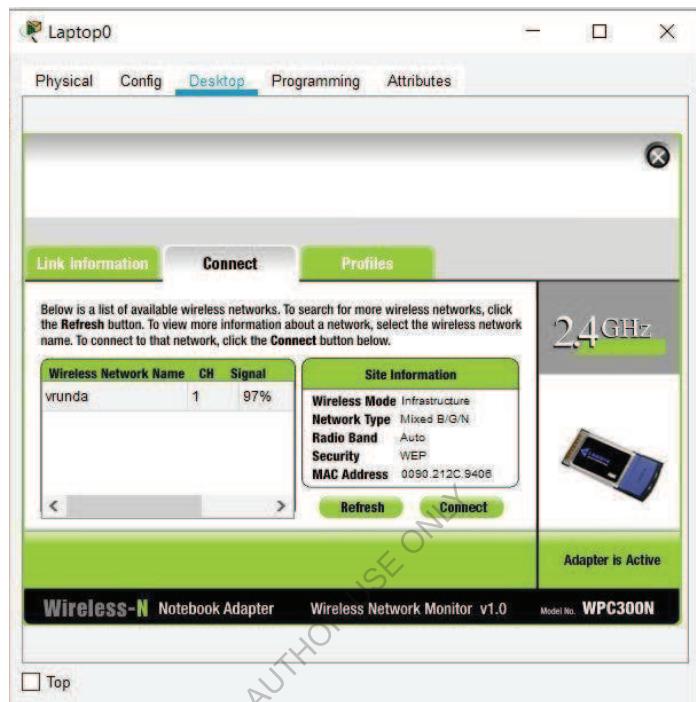
6. We can see wireless network in figure.



(a) using wireless network devices are connected with each other

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
Failed	PC0	Laptop0	Router0	ICMP	purple	0.000	N	0	(edit)	(delete)
Successful	PC1	Router0	ICMP	green	10.447	N	1	(edit)	(delete)	
Failed	PC0	PC3	ICMP	orange	0.000	N	2	(edit)	(delete)	

(b) successfully transfer the packet using wireless network



(c) after adding wireless connection connect laptop to it



(d) after adding wireless connection connect laptop to it

The screenshot shows a window titled "Router0" with tabs for "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is selected, displaying the "IOS Command Line Interface". The interface shows the following configuration commands:

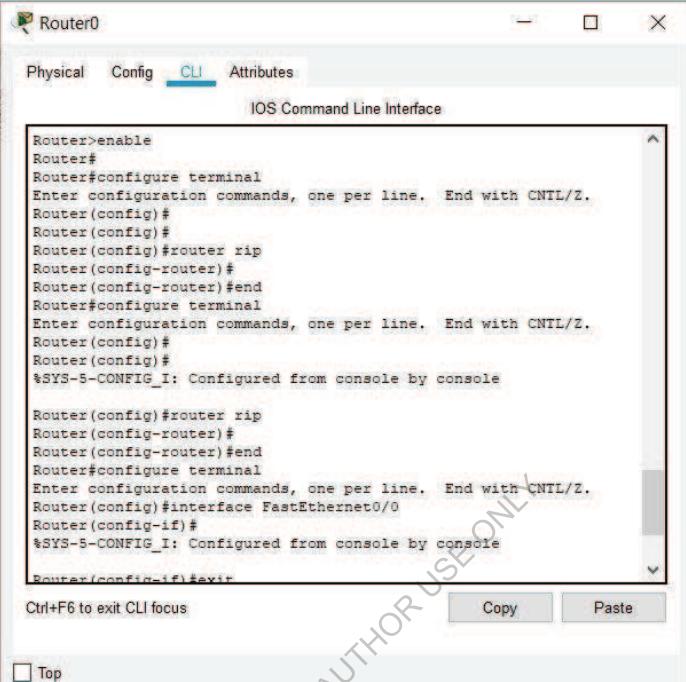
```
Router(config-router)#end
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#
%SYS-5-CONFIG_I: Configured from console by console

Router(config)#router rip
Router(config-router)#
Router(config-router)#end
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
%SYS-5-CONFIG_I: Configured from console by console

Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#
Router(config-if)#
Ctrl+F6 to exit CLI focus
```

At the bottom of the window, there are "Copy" and "Paste" buttons, and a checkbox labeled "Top". A watermark "FOR AUTHOR USE ONLY" is visible across the center of the window.

(e) set up the serial and fast ethernet link of router 0



The image shows a software interface for configuring a router. The title bar says "Router0". Below it is a menu bar with "Physical", "Config", "CLI" (which is underlined), and "Attributes". The main area is titled "IOS Command Line Interface". It contains a command-line history and a configuration log. The log shows the following commands being entered:

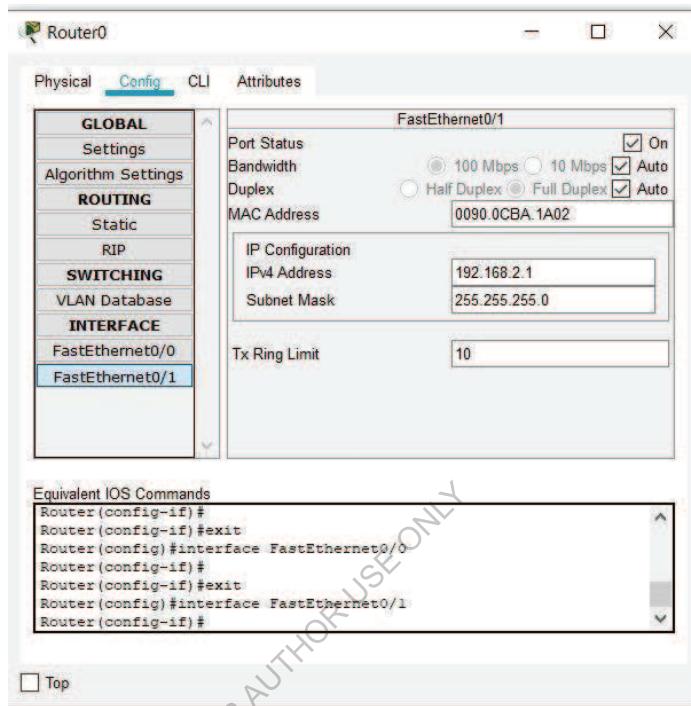
```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#
Router(config)#router rip
Router(config-router)#
Router(config-router)#end
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#
%SYS-5-CONFIG_I: Configured from console by console

Router(config)#router rip
Router(config-router)#
Router(config-router)#end
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
%SYS-5-CONFIG_I: Configured from console by console

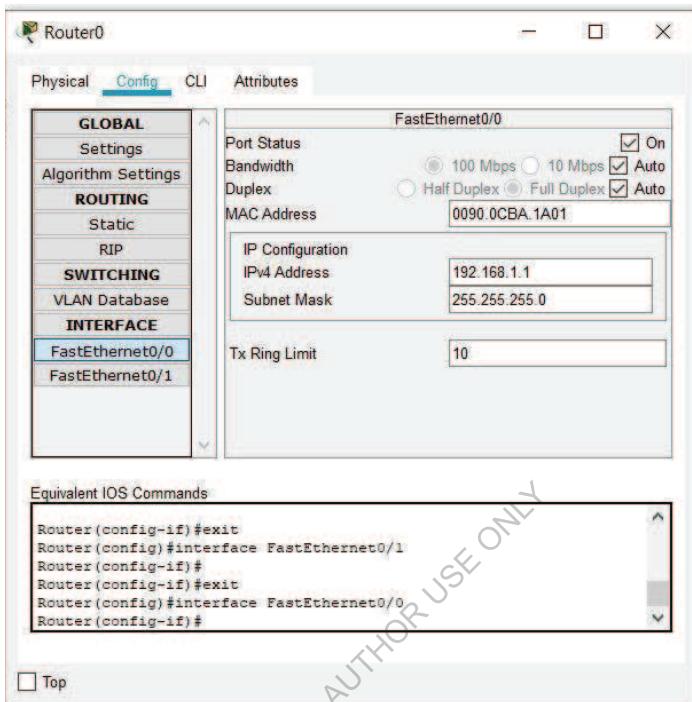
Router(config-if)#exit
```

At the bottom of the window, there are buttons for "Copy" and "Paste". A checkbox labeled "Top" is also present.

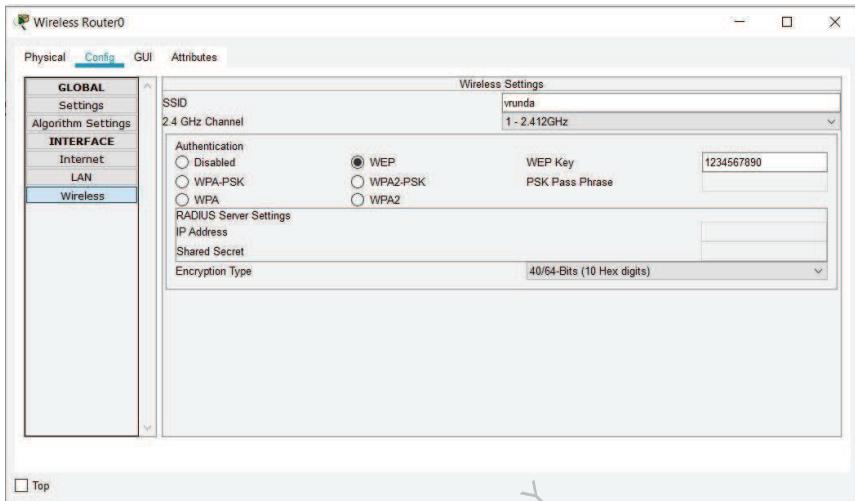
(f) set up the serial and fast ethernet link of router 0



(g) Give Ip address to fast ethernet 0/1 of router 0



(h) Give Ip address to fast ethernet 0/0 of router 0



(i)

Add WEP in Wireless routing for access network

Event List											Realtime	Simulation
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete		
	Failed	PC0	Laptop0	ICMP	■	0.000	N	0	(edit)	(delete)		
	Successful	PC1	Router0	ICMP	■	10.447	N	1	(edit)	(delete)		

(j)

successfully transfer the packet from PC0 to Laptop0

Simulation Panel

Event List

Vis.	Time(sec)	Last Device	At Device	Type
27.681		Switch1	PC2	STP
27.681		Switch1	PC0	STP
27.681		Switch1	Router0	STP
27.681		Switch1	Wireless ...	STP
29.680	--		Switch1	STP
29.681		Switch1	PC1	STP
29.681		Switch1	PC2	STP
29.681		Switch1	PC0	STP
29.681		Switch1	Router0	STP
29.681		Switch1	Wireless ...	STP
31.678	--		Switch1	STP
31.679		Switch1	PC1	STP
31.679		Switch1	PC2	STP
31.679		Switch1	PC0	STP
31.679		Switch1	Router0	STP
31.679		Switch1	Wireless ...	STP

Simulation Panel

Event List

Vis.	Time(sec)	Last Device	At Device	Type
0.000	--		PC0	ICMP
0.001		PC0	Switch1	ICMP
0.002		Switch1	Router0	ICMP
0.002	--		Router0	ARP
0.003		Router0	Wireless ...	ARP
0.448	--		Switch1	STP
0.449		Switch1	Router0	STP
0.449		Switch1	PC1	STP
0.449		Switch1	PC0	STP
0.449		Switch1	Wireless ...	STP
0.449		Switch1	PC2	STP
0.811	--		Switch1	DTP
0.812		Switch1	PC1	DTP
2.450	--		Switch1	STP
2.451		Switch1	Router0	STP
2.451		Switch1	PC1	STP

(k) Observe simulation panel and see different protocol

Practical 16: To study of Network Simulator and Simulation of congestion Control Algorithm using Network Simulator.

- Network simulation is a technique whereby a software program models the behaviour of a network by calculating the interaction between the different network entities (routers, switches, nodes, access points, links etc.).
- Most simulators use discrete event simulation - the modelling of systems in which state variables change at discrete points in time.
- The behaviour of the network and the various applications and services it supports can then be observed in a test lab
- various attributes of the environment can also be modified in a controlled manner to assess how the network / protocols would behave under different conditions.
- A network simulator is software that predicts the behaviour of a computer network.
- Since communication networks have become too complex for traditional analytical methods to provide an accurate understanding of system behaviour, network simulators are used.
- In simulators, the computer network is modelled with devices, links, applications etc. and the network performance is reported.
- Simulators come with support for the most popular technologies and networks in use today such as 5G, Internet of Things (IoT), Wireless LANs, mobile ad hoc networks, wireless sensor networks, vehicular ad hoc networks, cognitive radio networks, LTE etc

Algorithm

- Recent advances in wireless sensor networks (WSNs) have lead to applications with increased traffic demands.
- Research is evolving from applications where performance is not considered as a crucial factor, to applications where performance is a critical factor.
- There are many cases in the fields of automation, health monitoring, and disaster response that demand wireless sensor networks where performance assurances are vital, especially for parameters like power, delay, and reliability.

- Due to the nature of these networks the higher amount of traffic is observed when the monitored event takes place. Exactly at this instance, there is a higher probability of congestion appearance in the network.
- Congestion in WSNs is tackled by the employment of two methods: either by reducing the load (“traffic control”), or by increasing the resources (“resource control”).
- In this paper we present the Hierarchical Tree Alternative Path (HTAP) algorithm, a “resource control” algorithm that attempts, through simple steps and minor computations, to mitigate congestion in wireless sensor networks by creating dynamic alternative paths to the sink.
- HTAP is evaluated in several scenarios in comparison with another “resource control” algorithm (TARA), as well as with a “traffic control” algorithm (SenTCP), and also the case where no congestion control exists in the network (“no CC”).
- Results show that HTAP is a simple and efficient algorithm capable of dealing successfully with congestion in WSNs, while preserving the performance characteristics of the network.

Practical 17: To configure the Network address translation(NAT) in statically and dynamically using cisco packet tracer.

Steps of making NAT(Network Address Transmission -static)

1.Take all required devices in cisco packet tracer.

- 2 PC
- 2 2960-24T Switches
- 2 Servers
- 2 1841 Routers

2.Using cable connect all devices

- Connect one PC and one server to one switch according to diagram.
- Same for another one Pc and server
- Labeling the PC and other devices according to diagram

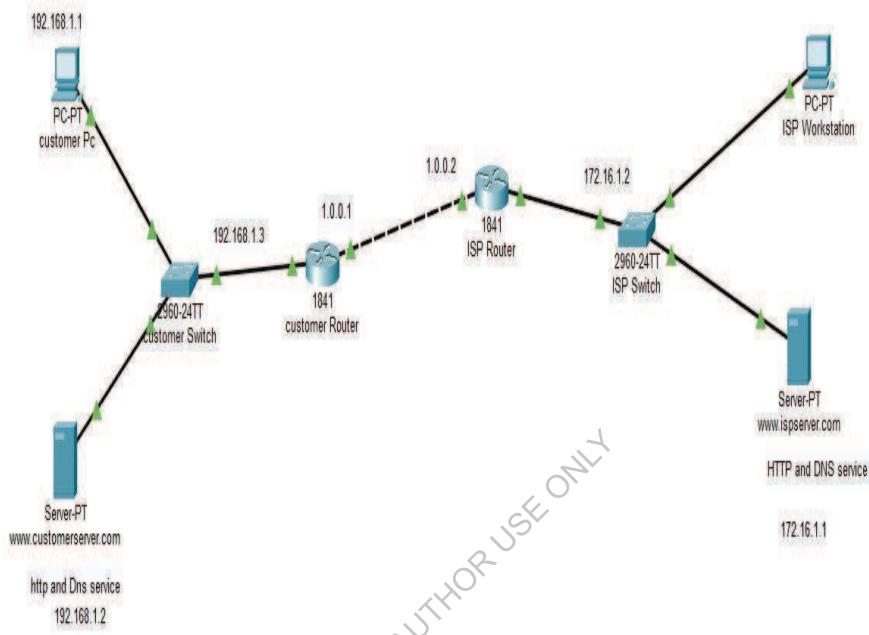
3.Give IP address

- Give IP address to PC and Server using Desktop->Ip->static
- Give IP to Serial and fast Ethernet according to router

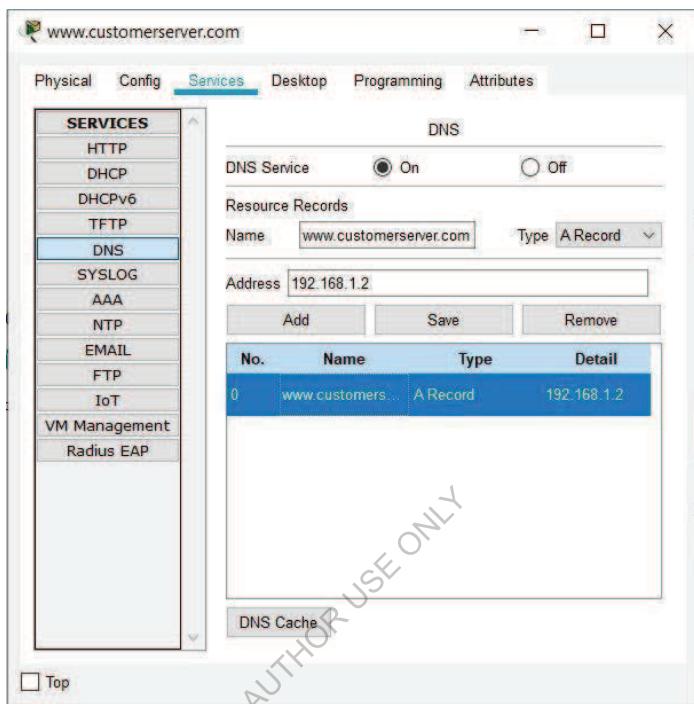
4.Make server according to name

- Make both server as DNS and on the services of HTTP
- Give name and address in DNS services

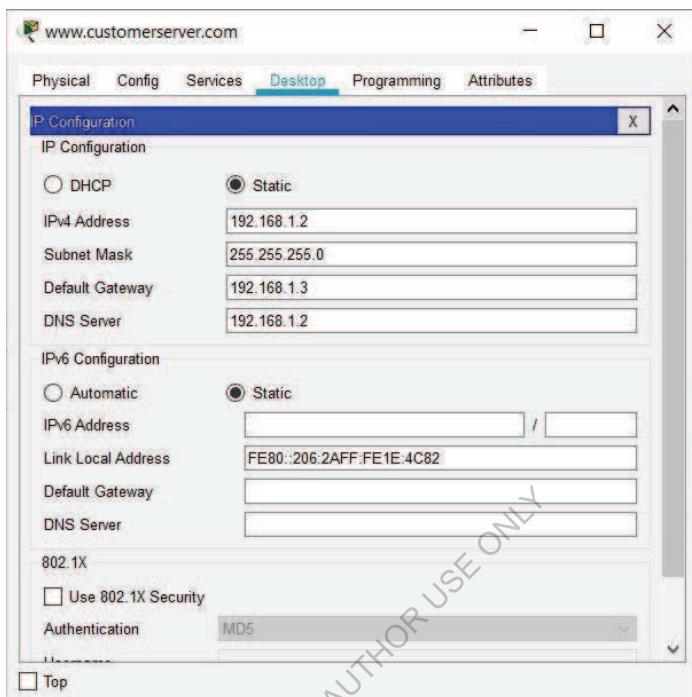
5.Enable the port of router according to connection



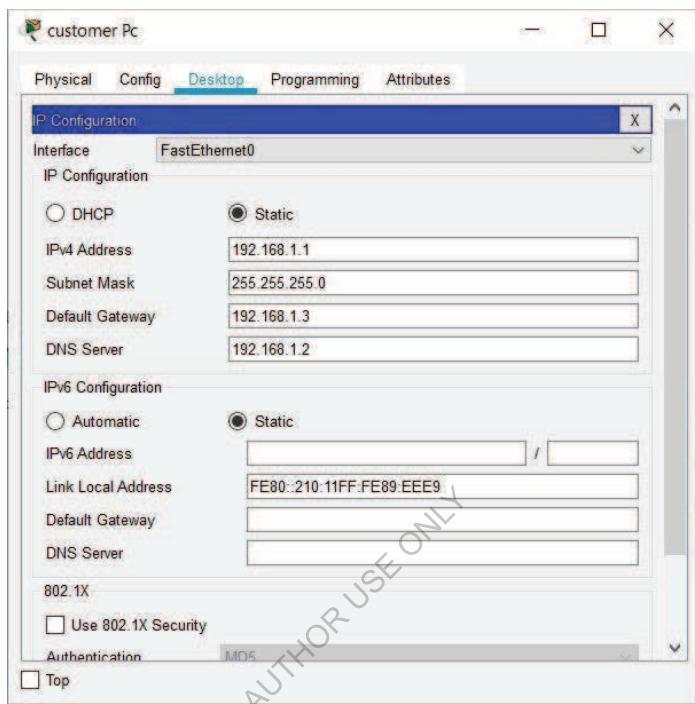
(a) Connected all devices to Servers ,PC and Routers



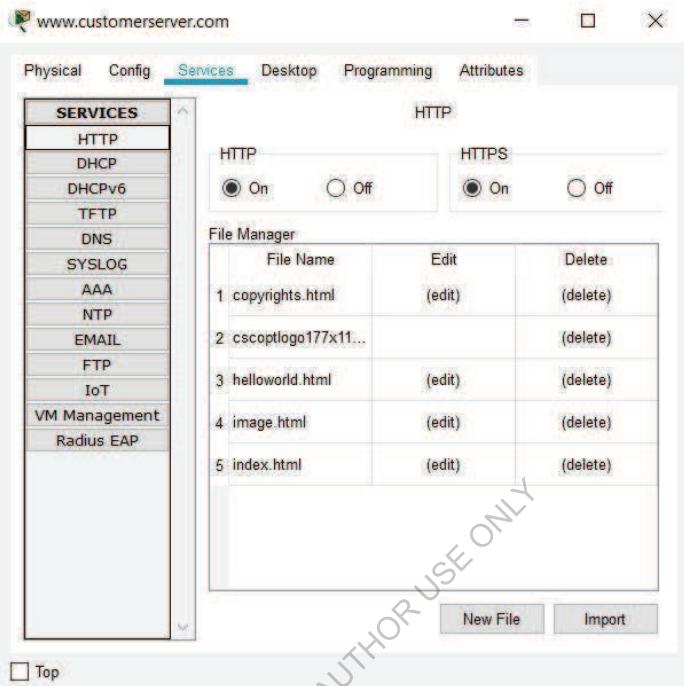
(b) on the services of DNS in costumerserver.com



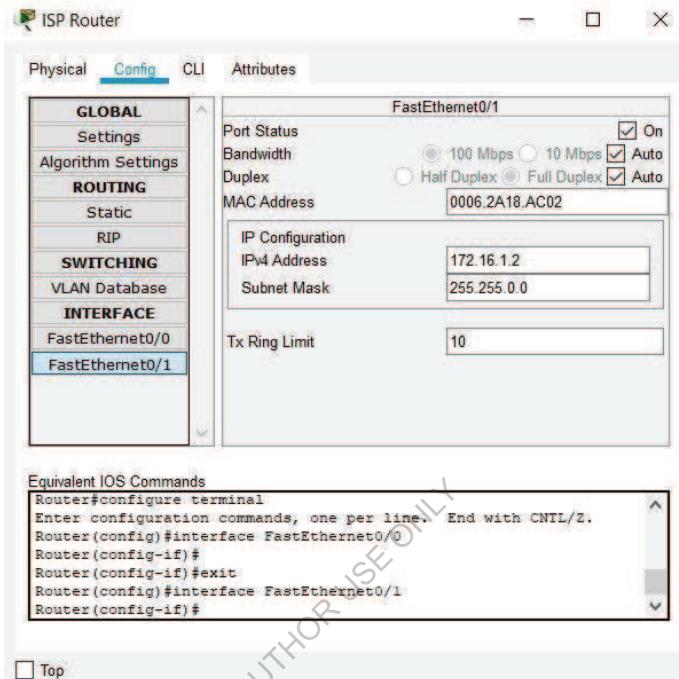
(c) Give Static IP to Customerserver.com



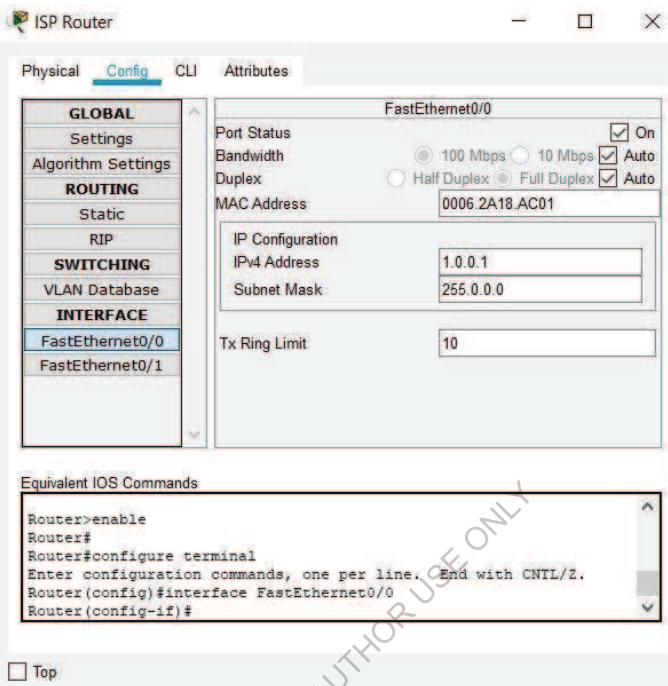
(d) Give Static IP to Customer PC



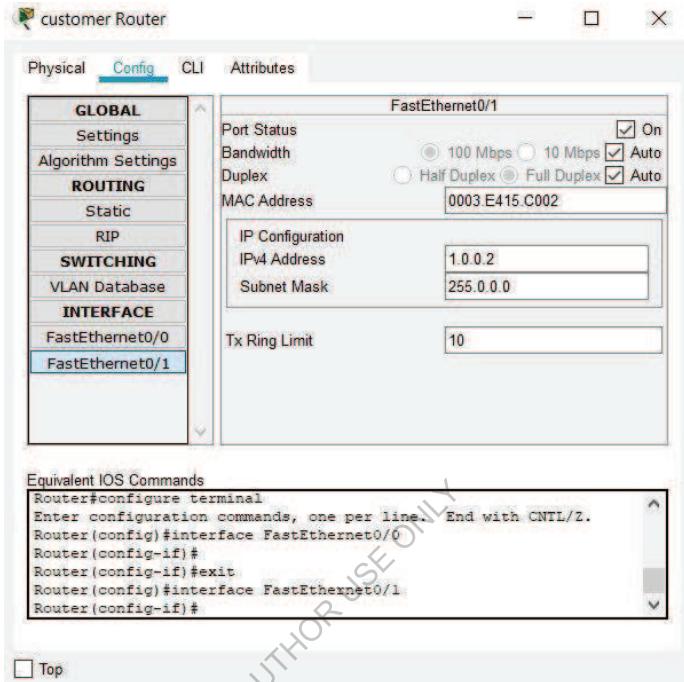
(e) on the services of HTTP in costomerver.com



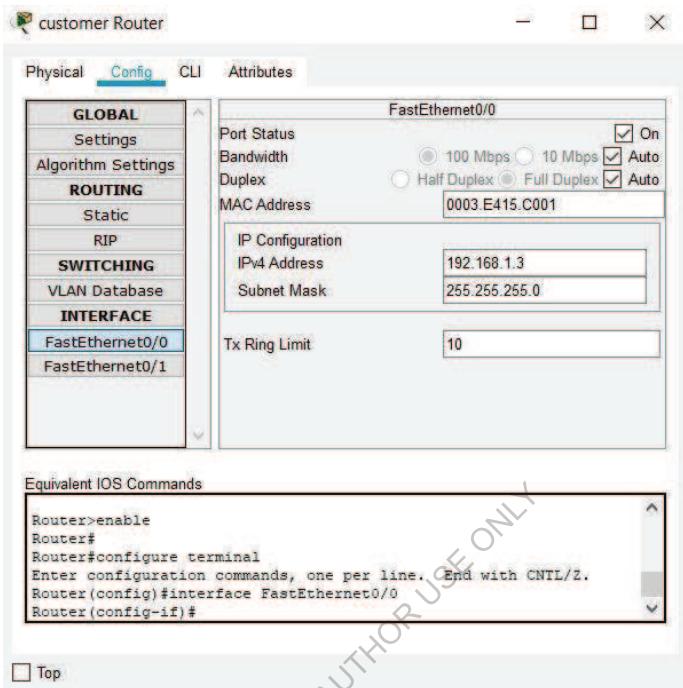
(f) Give address to fast ethernet port 0/1 in ISP router



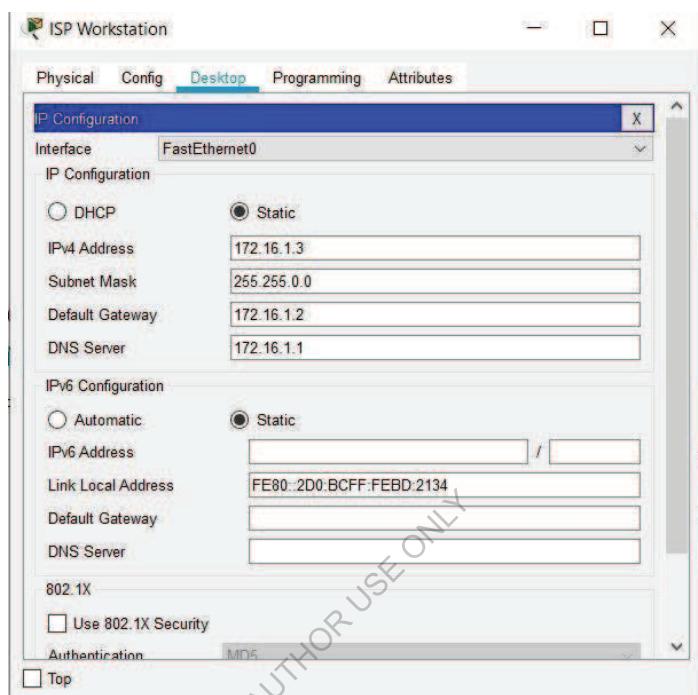
(g) Give address to fast ethernet port 0/0 in ISP router



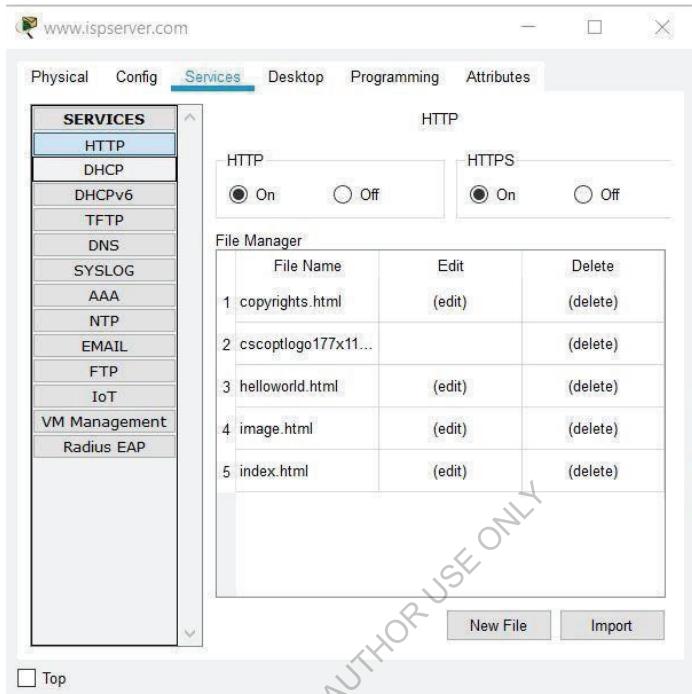
(h) Give address to fast ethernet port 0/1 in Customer router



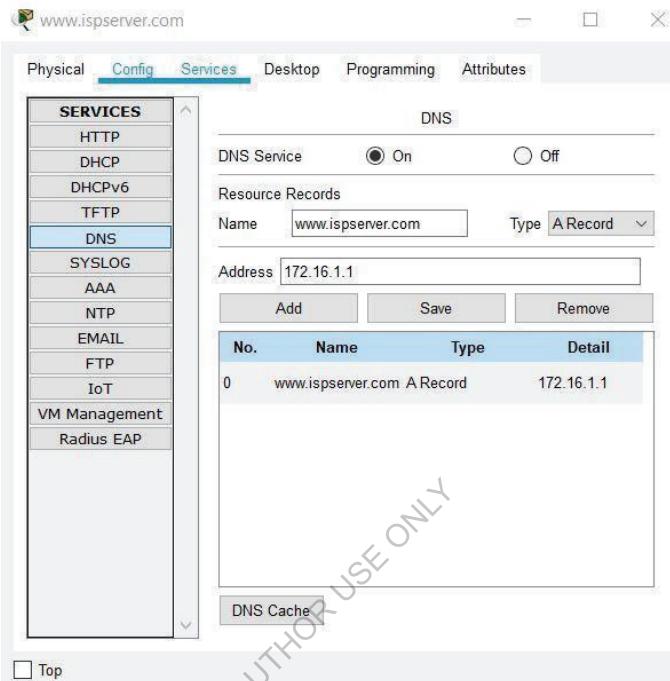
- (i) Give address to fast ethernet port 0/0 in Customer router



(j) Give static IP address to ISP workstation



(k) on the services of HTTP in ispserver.com



(l) on the services of DNS in ispserver.com

Steps of making NAT(Network Address Transmission -Dynamic)

1.Take all required devices in cisco packet tracer.

- 2 PC
- 2 Switches
- 1 Servers
- 2 Routers

2.Using cable connect all devices

- Connect two PC and one router through one switch according to diagram.
- Connect two routers with each other

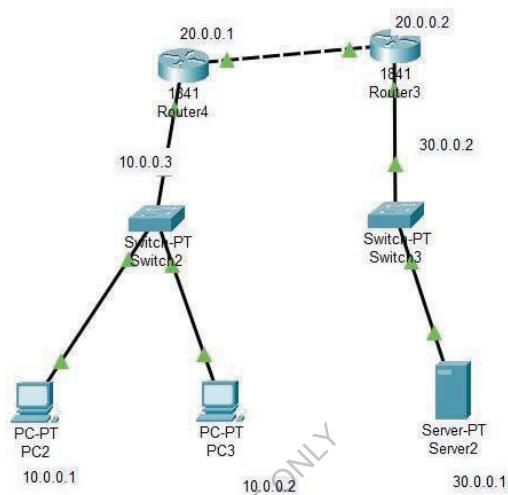
3.Give IP address

- Give IP address to PC and Server using Desktop->Ip->static
- Give IP to Serial and fast Ethernet according to router

4.Make server according to name

- on the services of HTTP

5.Enable the port of router according to connection



(a) Devices are connected in Dynamic NAT

The screenshot shows the Router4 CLI interface. The title bar says "Router4". Below it are tabs: Physical, Config, **CLI**, and Attributes. The main window is titled "IOS Command Line Interface" and contains the following text:

```
Press RETURN to get started!

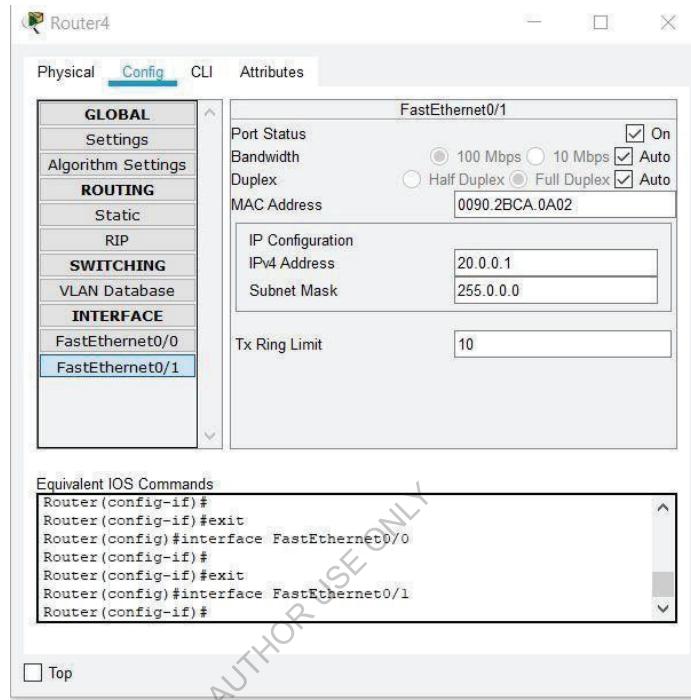
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to up

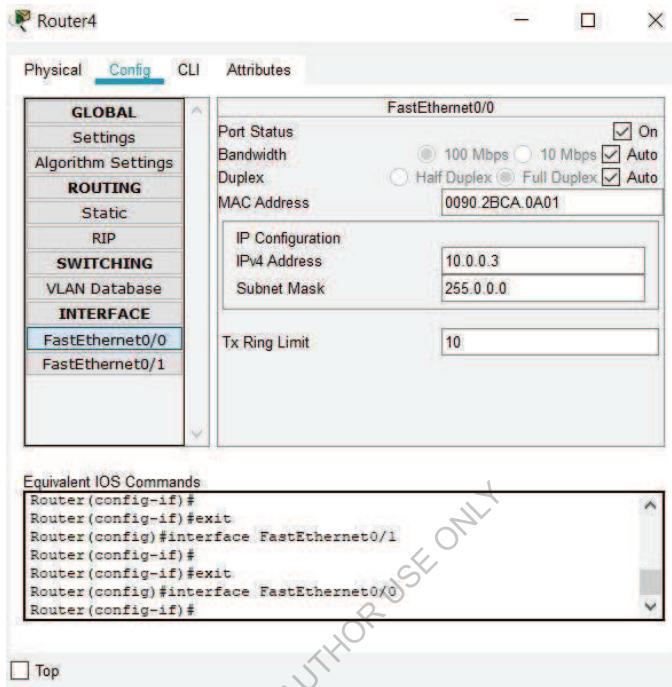
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#
Router(config-if)#
Ctrl+F6 to exit CLI focus
```

At the bottom right are "Copy" and "Paste" buttons. At the bottom left is a checkbox labeled "Top". A watermark "FOR AUTHOR USE ONLY" is diagonally across the center of the window.

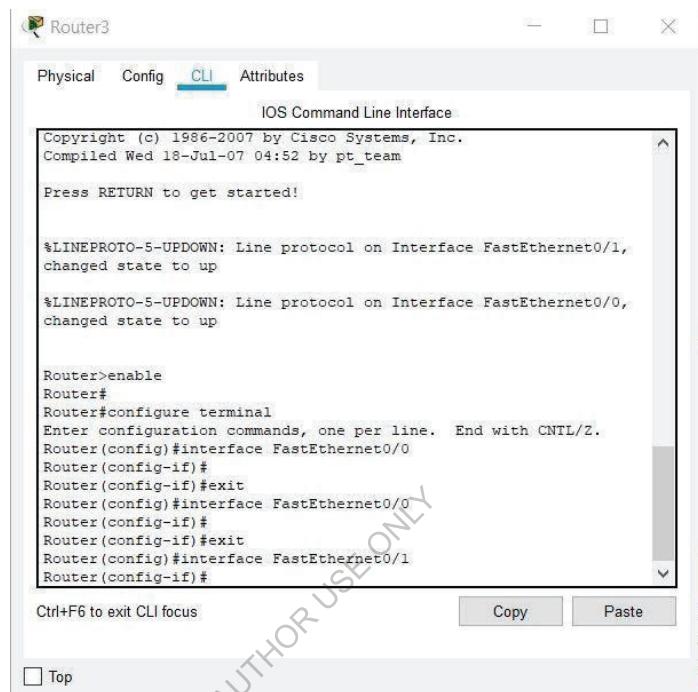
(b) interface command in CLI of Router 4



(c) Give IP address to Fast Ethernet 0/1 in router 4



(d) Give IP address to Fast Ethernet 0/0 in router 4



The image shows a Cisco IOS Command Line Interface (CLI) window titled "Router3". The window has tabs for "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area displays the following text:

```
IOS Command Line Interface
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 18-Jul-07 04:52 by pt_team

Press RETURN to get started!

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to up

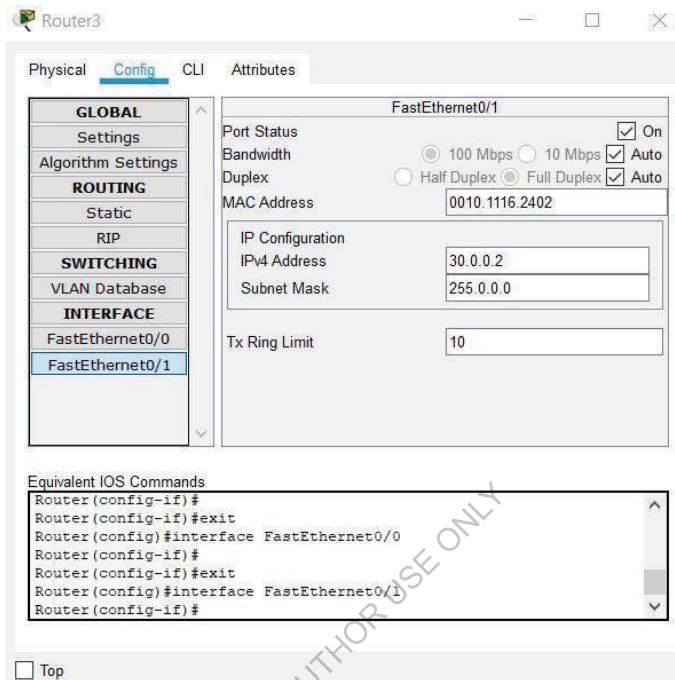
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#

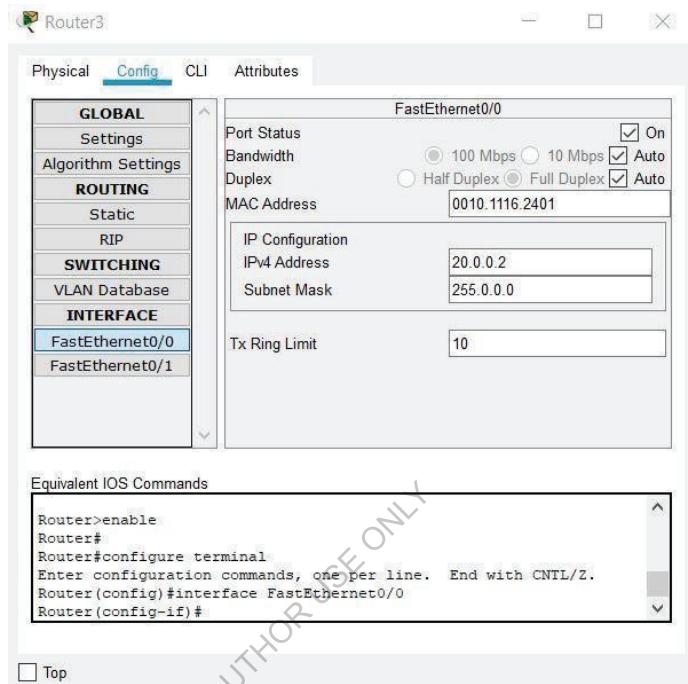
Ctrl+F6 to exit CLI focus
```

At the bottom right of the window are "Copy" and "Paste" buttons. At the bottom left is a checkbox labeled "Top". A watermark "FOR AUTHOR USE ONLY" is diagonally across the text area.

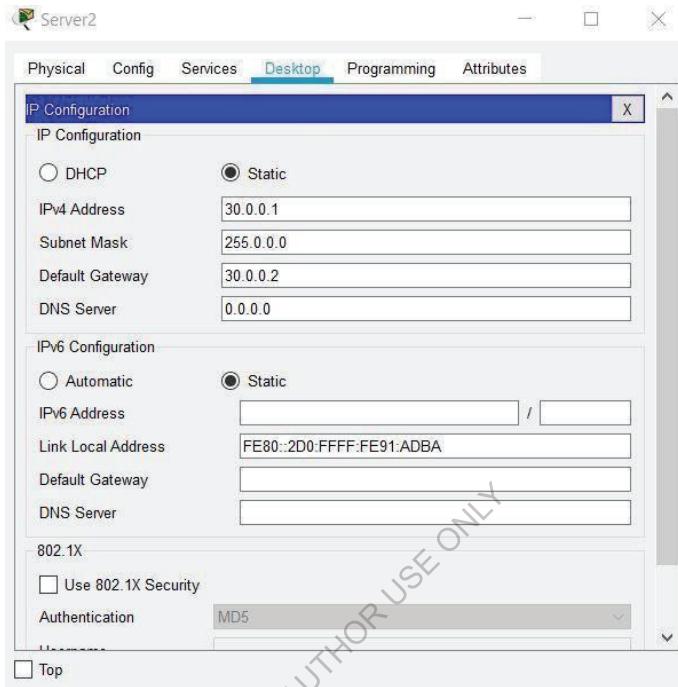
(e) interface command in CLI of Router 4



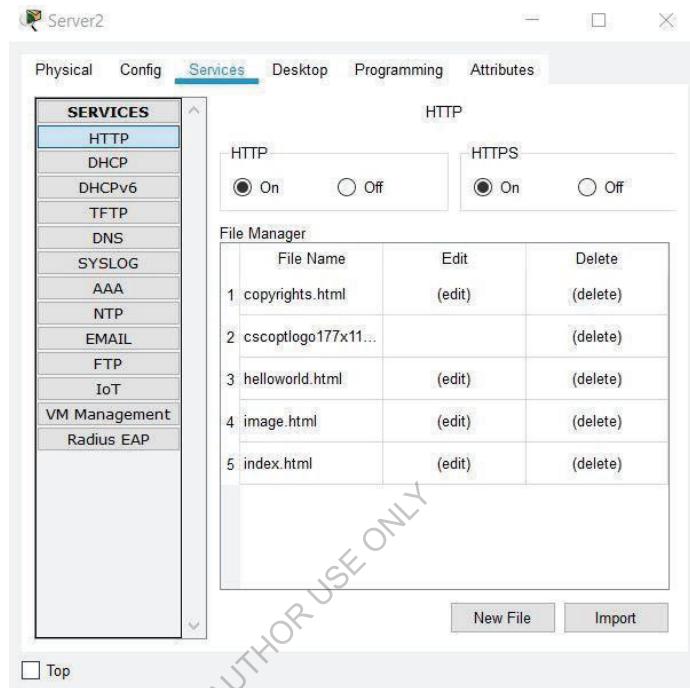
(f) Give IP address to Fast Ethernet 0/1 in router 3



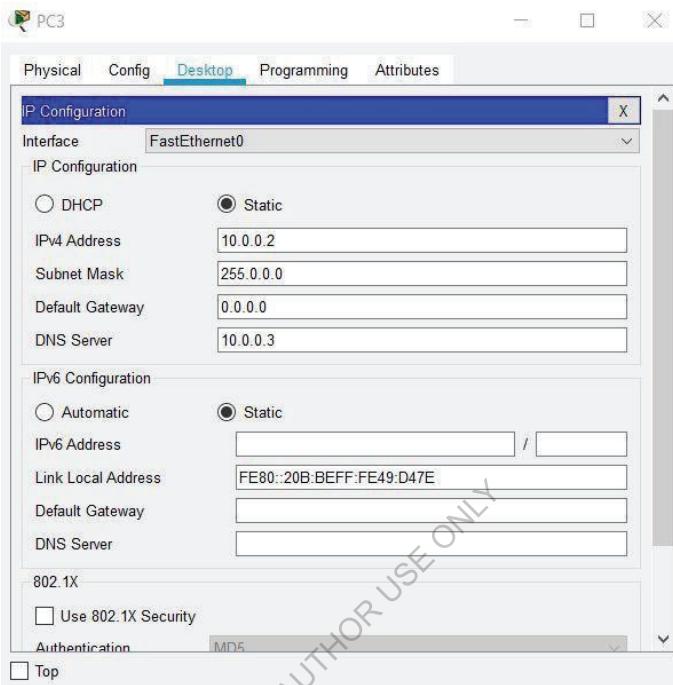
(g) Give IP address to Fast Ethernet 0/0 in router 3



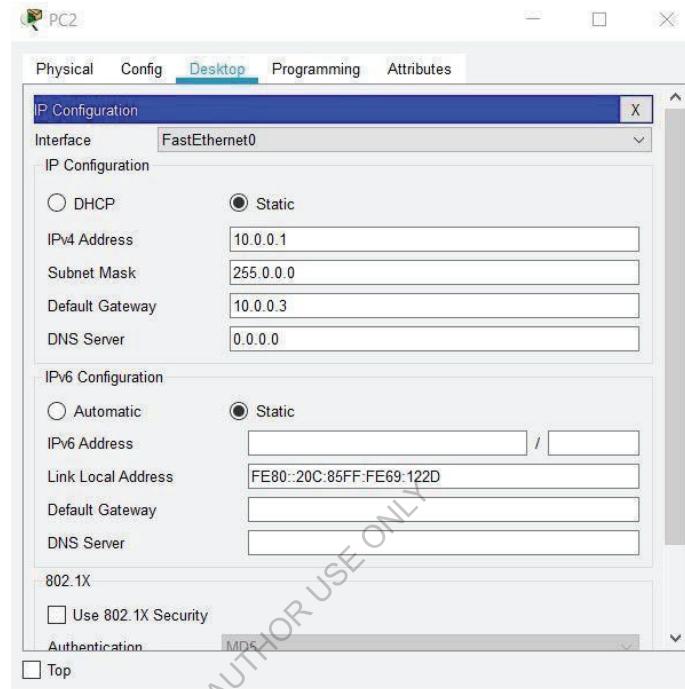
(h) Give static IP address to server2



(i) On the services of Http in Server2



(j) Give static IP address to PC3



(k) Give static IP address to PC2

The screenshot shows the Router3 CLI interface with the following configuration history:

```
Router>
Router>
Router>
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#

```

At the bottom left, there is a watermark reading "NOT FOR USE ONLY". At the bottom right, there are "Copy" and "Paste" buttons.

(l) interface command in CLI of Router 3

Practical 18: Configure default router and static route in cisco packet tracer

Steps of making default router and static route in cisco packet tracer

1. Take all required devices in cisco packet tracer.

- 6 PC
- 2 Router
- 2 Switches

2. Using cable connect all devices

- Connect three PC to one switch same for another
- Connect two router with each other

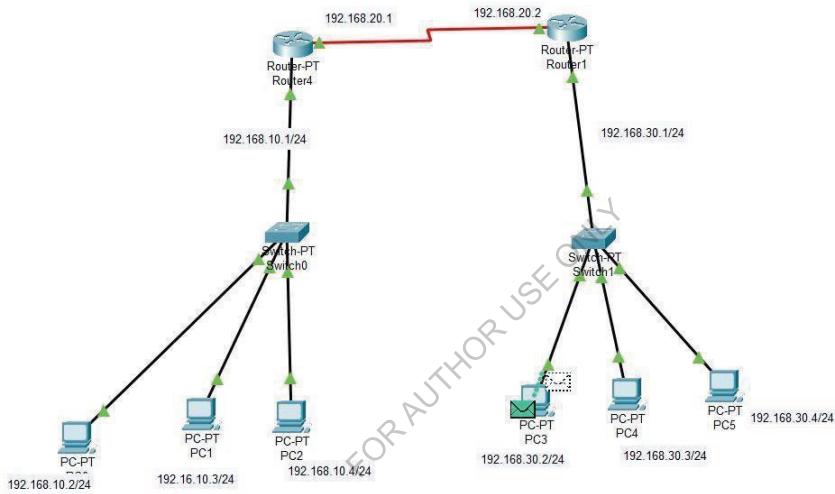
4. Give IP address and default gateway to PC

- In desktop IP config give IP address in static
- In Desktop->In static->IPv4
- Also set value of default gateway (different for every topology but same for each PC which connected in same topology)
- Write interface command and IP address for each router as shown in fig

5. Enable the port of Switch according to connection

6. Give command in CLI of PC

- Ping

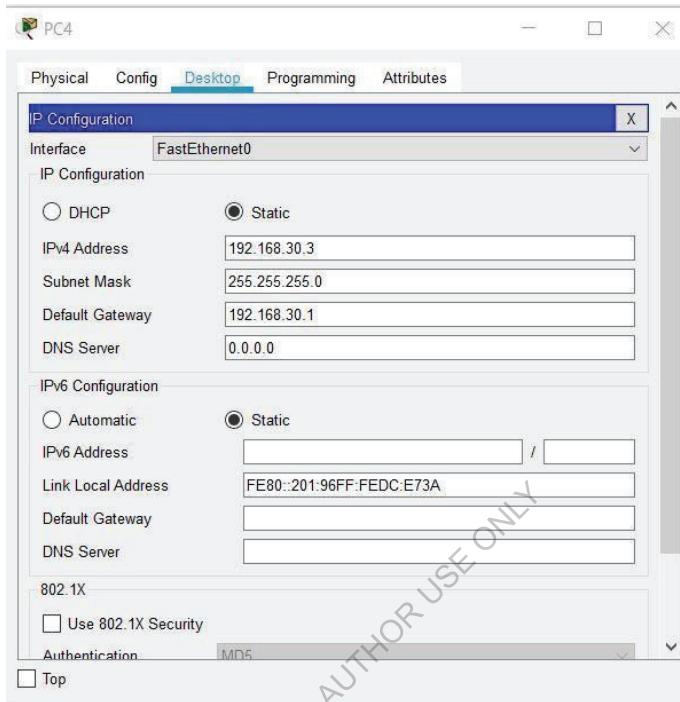


(a) devices are connected through two router and two star topology present here

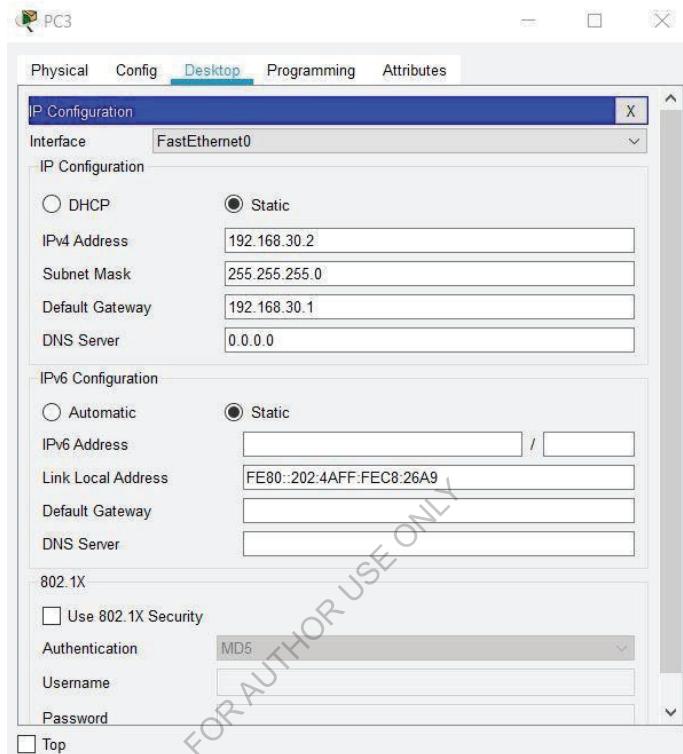
FOR AUTHORIZED USE ONLY

Event List				
Vis.	Time(sec)	Last Device	At Device	Type
	10.828	--	Switch1	DTP
	10.829	Switch1	PC5	DTP
	11.990	--	Switch0	STP
	11.990	--	PC1	ICMP
	11.990	--	PC1	ARP
	11.991	Switch0	Router4	STP
	11.991	Switch0	PC2	STP
	11.991	Switch0	PC0	STP
	11.991	Switch0	PC1	STP
	11.991	PC1	Switch0	ARP
	11.992	Switch0	Router4	ARP
	11.992	Switch0	PC0	ARP
	11.992	Switch0	PC2	ARP
	11.993	Router4	Switch0	ARP
Visible	11.994	Switch0	PC1	ARP
Visible	11.994	--	PC1	ICMP

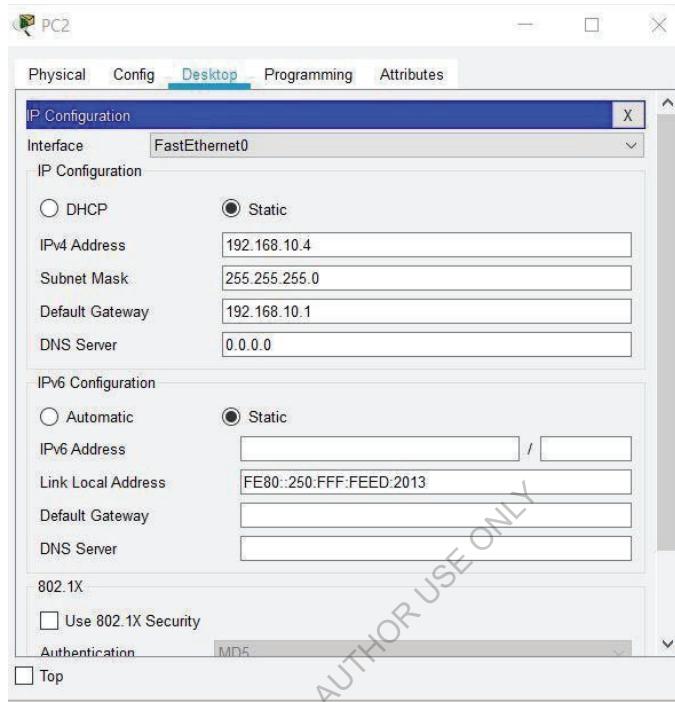
(b) we see simulation panel that shows different type of protocols



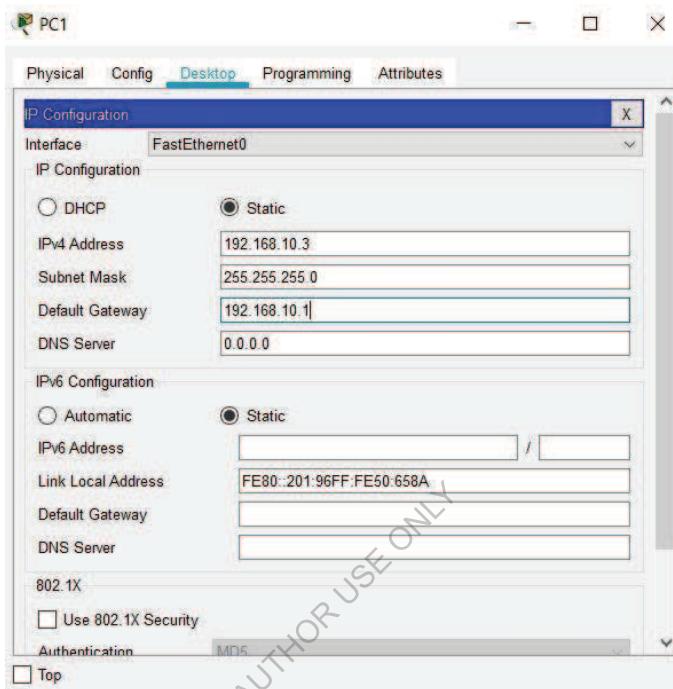
(c) Give static IP address to PC4



(d) Give static IP address to PC3

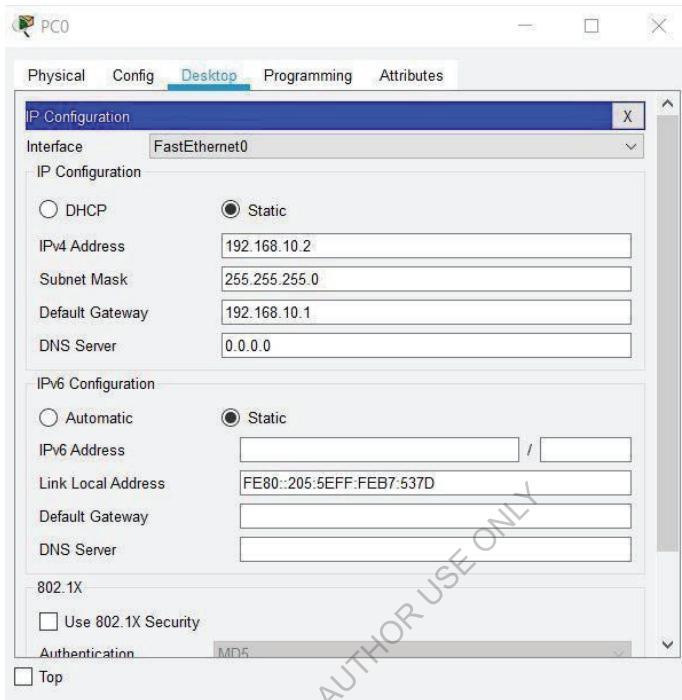


(e) Give static IP address to PC2



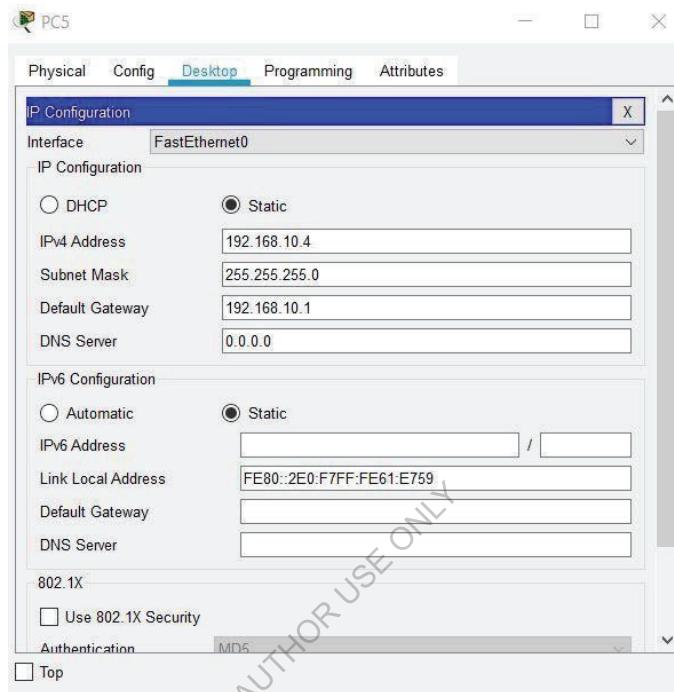
(f)

Give static IP address to PC1



(g)

Give static IP address to PC0



(h) Give static IP address to PC2

Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router>en
Router#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface serial 2/0
^
% Invalid input detected at '^' marker.

Router(config)#interface serial 2/0
Router(config-if)#ip add 192.168.20.2 255.255.255.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

Router(config-if)#interface serial 2/0
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0,
changed state to up

Router(config-if)#interface fastethernet 0/0
Router(config-if)#ip add 192.168.30.1 255.255.255.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
```

Ctrl+F6 to exit CLI focus

Top

(i) Give command to CLI about IP address of Router1

Router4

Physical Config **CLI** Attributes

IOS Command Line Interface

```
%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router#interface fastethernet 2/0
%Invalid interface type and number
Router#interface fastethernet 0/0
Router#ip add 192.168.10.1 255.255.255.0
Router#no shut

Router#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

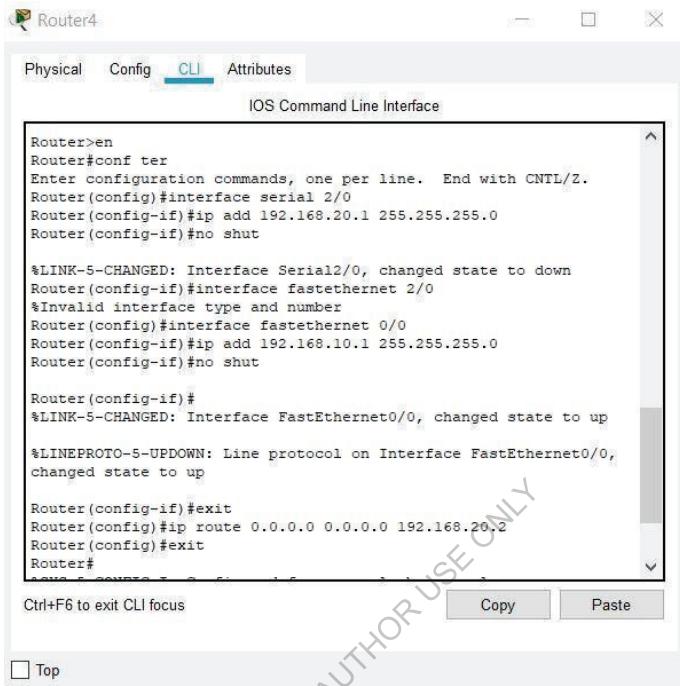
Router#exit
Router#ip route 0.0.0.0 0.0.0.0 192.168.20.2
Router#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router#
```

Ctrl+F6 to exit CLI focus

Top

(j) Give command to CLI about IP address of Router1



The image shows a computer screen displaying the Cisco IOS Command Line Interface (CLI) for a device named "Router4". The window has tabs at the top: "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is the title "IOS Command Line Interface". The main area contains the following command history:

```
Router>en
Router>conf ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface serial 2/0
Router(config-if)#ip add 192.168.20.1 255.255.255.0
Router(config-if)#no shut

%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router(config-if)#interface fastethernet 2/0
%Invalid interface type and number
Router(config)#interface fastethernet 0/0
Router(config-if)#ip add 192.168.10.1 255.255.255.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up

Router(config-if)#exit
Router(config)#ip route 0.0.0.0 0.0.0.0 192.168.20.2
Router(config)#exit
Router#
```

At the bottom of the CLI window, there are buttons for "Copy" and "Paste". Below the window, there is a checkbox labeled "Top" and a large watermark reading "FOR AUTHOR USE ONLY".

(k) Give command to CLI about IP address of Router4

Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router(config-if)#interface serial 2/0
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0,
changed state to up

Router(config-if)#interface fastethernet 0/0
Router(config-if)#ip add 192.168.30.1 255.255.255.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up

Router(config-if)#exit
Router(config)#ip route 0.0.0.0 0.0.0.0 192.166.20.1
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router#
```

Ctrl+F6 to exit CLI focus

Top

Copy Paste

(l) Give command to CLI about IP address of Router1

The screenshot shows a software interface titled "PC1" at the top. Below the title bar are tabs: Physical, Config, Desktop (which is selected), Programming, and Attributes. A sub-menu window titled "Command Prompt" is open, displaying the following text:

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.30.4

Pinging 192.168.30.4 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.30.4:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
```

A watermark "FOR AUTHOR USE ONLY" is diagonally across the command prompt window.

(m) Give ping command to CLI to PC1

Practical 19: Creating TCP/IP connection in Network Simulator – NS2 tool.

TCP/IP means of communication ideal of TCP methods to the replies and amends of the data communication rate. We build innovative research via submit to process new technological innovation. In which it is made as a result of research also for scholar's carriers to be relaxed. Implementing four layers of TCP IP in NS2 using a standard algorithm reno for routing applications.

What is TCP/IP

- TCP defines how to establish and also maintain a network conversation, and TCP works with IP.
- IP defines how to send data also to each other.
- TCP/IP is a basic communication language on the internet.
- Tcp/Ip uses the client/server model, also for communication.
- TCP/Ip has a two-layer program which includes,
- Higher layer And also in the Lower layer

Simulation

- Simulation is the process of *learning by doing*. Whenever there is something new in the world, we try to analyse it first by examining it and in the process get to learn a lot of things. This entire course is called as Simulation.
- Correlating to this process, in order to understand all the complexities one need to model the entire role-play in form of computer simulation, the need is to build artificial objects and assign them roles dynamically.
- Computer simulation is the designing of a theoretical physical system on a digital computer with emphasis on model designing, execution and analysis.
- After creation of the mathematical model the most important step is to create a computer program for updating the state and event variables through time (by time slicing or event scheduling).
- If this simulation is carried out successively in parallel computers, it is called *Parallel or Distributed simulation*.

- Network simulation (NS) is one of the types of simulation, which is used to simulate the networks such as in MANETs, VANETs etc.
- It provides simulation for routing and multicast protocols for both wired and wireless networks. NS is licensed for use under version 2 of the GNU (General Public License) and is popularly known as NS2.
- It is an object-oriented, discrete event-driven simulator written in C++ and Otcl/tcl.NS-2 can be used to implement network protocols such as TCP and UPD, traffic source behavior such as FTP, Telnet, Web, CBR and VBR, router queue management mechanism such as Drop Tail, RED and CBQ, routing algorithms and many more.
- In ns2, C++ is used for detailed protocol implementation and Otcl is used for the setup. The compiled C++ objects are made available to the Otcl interpreter and in this way, the ready-made C++ objects can be controlled from the OTcl level.

Install NS-2 using this command :

```
sudo apt-get install ns2
```

- Nam is also needed to install. Nam (Network Animator) is an animation tool to graphically represent the network and packet traces. Use this command :

```
sudo apt-get install nam  
set a 8  
set b [expr $a/8]
```
- In the first line, the variable a is assigned the value 8. In the second line, the result of the command [expr \$a/8], which equals 1, is then used as an argument to another command, which in turn assigns a value to the variable b.
- The “\$” sign is used to obtain a value contained in a variable and square brackets are an indication of a command substitution.

References:

Book:

1. Title Cisco Packet Tracer for Beginners
Author kalyan chinta
Publisher kalyan chinta, 2016
ISBN 1536531413, 9781536531411

2. Title Packet Tracer Network Simulator
Released January 2014
Publisher Packet Publishing
ISBN 9781782170426

3. Title CISCO PACKET TRACER LABS
By Best practice of configuring or troubleshooting Network
Publication Date Mulayam Singh
ISBN 10-17-2019
978-3-7487-1816-1

Web Article:

- https://www.cisco.com/c/en_in/index.html
<https://www.udemy.com/course/practical-cisco-networking-labs/>
<https://learningnetwork.cisco.com/s/article/ccie-practical-exam-format>
<https://www.practicalnetworking.net/classes/cisco-firewalls/>
<https://www.practicalnetworking.net/announcement/discounted-ccna-course-by-neil-anderson/>
https://www.cisco.com/c/en_in/solutions/small-business/resource-center/networking/networking-basics.html



yes I want morebooks!

Buy your books fast and straightforward online - at one of world's fastest growing online book stores! Environmentally sound due to Print-on-Demand technologies.

Buy your books online at
www.morebooks.shop

Kaufen Sie Ihre Bücher schnell und unkompliziert online – auf einer der am schnellsten wachsenden Buchhandelsplattformen weltweit! Dank Print-On-Demand umwelt- und ressourcenschonend produziert.

Bücher schneller online kaufen
www.morebooks.shop

KS OmniScriptum Publishing
Brivibas gatve 197
LV-1039 Riga, Latvia
Telefax: +371 686 20455

info@omnascriptum.com
www.omnascriptum.com

OMNI**S**criptum



