BUILD A WAN(WIDE AREA NETWORK) COMMUNICATION NETWORK USING MULTIPLE ROUTERS IN DHCP IP ADDRESS :

INTRODUCTION :

In this network we are build a WAN (Wide Area Network) communication network using multiple router. Hare we assign static IP address. Under each router has minimum one switch and also under each switch has more than one node (pc, laptop, server, printer etc.) .

- ### ***WAN :*** (WIDE AREA NETWORK)

  A wide area network (WAN) is a geographically distributed private telecommunications network that interconnects multiple local area networks (LANs) . A WAN may consist of connections to a company's headquarters, branch office, cloud service and other facilities. Typically, a router or other multifunction device is used to connect a LAN to a WAN.

  WAN are not restricted to the same geographical location.

- ### ***ROUTER :***

  A router is a networking device that forwards data packets between computer networks. Router perform the traffic directing functions on the internet. Data sent through the internet, such as a web page or email, is in the form of data packets. A packet is typically forwarded from one router to another router through the networks that constitute an internetwork until it destination node.

  A router is connected to two or more data lines from different IP networks. When a data packet comes in on one of the lines, the router reads the network address information in the packet header to determine the ultimate destination. Then, using information in its routing table or routing policy, it directs the packet to the next network on its journey.

- ### ***DHCP IP ADDRESS : (DYNAMIC HOST CONFIGARATION PROTOCOL)***

  A DHCP server dynamically assigns an IP address and other network configuration parameters to each device on a network so they can communicate with other IP networks. DHCP is an enhancement of an older protocol called BOOTP. DHCP is an important part of the DDI solution (DNS - DHCP – IPAM). It relies on the standard protocol known as Dynamic Host Configuration Protocol or DHCP to respond to broadcast queries by clients.

REQUIRMENTS :

I. THREE 2811 ROUTER.
II. THREE 2950 – 24 SWITCH.
III. NINE NODES.

1. FOUR LAPTOP.
2. THREE PC.
3. ONE SERVER.
4. ONE PRINTER.

- *2811 ROUTER :* The Cisco 2811 router is a multiple – chip standalone cryptographic module. The router has a processing speed of 350MHz. Depending on configuration, either the internal NetGX chip or the IOS software is used for cryptographic operations. The cryptographic boundary of the module is the device's case.

  It has –

  - One enhanced network module slot.
  - Two integrated 10/100 Fast Ethernet ports.

  -etc.

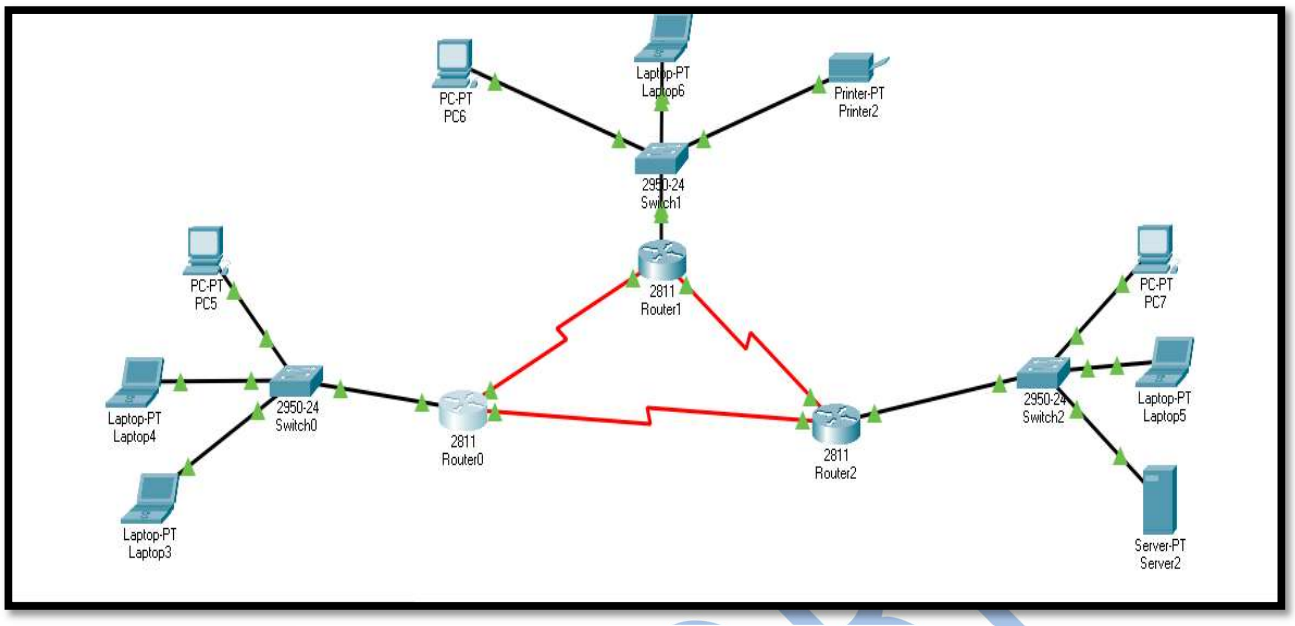
  Hare in this practical we add two serial port (WIC – 1T) in this router.

- *2950 – 24 SWITCH :* The Cisco Catalyist 2950 Series, are standalone, fixed-configuration, managed 10/100 Mbps switches providing basic workgroup connectivity for small to midsize networks.

  It has –

  - 24 10/100 Mbps fast Ethernet ports(first 4 are up link and remaining are down link).

NETWORK DIAGRAM :



WAN Network using DHCP IP address

Hare in this diagram three 2811 router are used, and each router connected with a switch(2950-24) via Copper Straight cable. Each switch connected three nodes via Copper Straight cable. Three routers are connected each other via serial DCE cable.

CONFIGARATION OF NETWORKS :

UNDER SWITCH – 0 :

NAME OF THE NODE	IP ADDRESS	*SUBNET MASK*	*DEFAULT GATEWAY*
PC – 5	192.168.1.2	255.255.255.0	192.168.1.1
LAPTOP – 3	192.168.1.4	255.255.255.0	192.168.1.1
LAPTOP - 4	192.168.1.3	255.255.255.0	192.168.1.1

UNDER SWITCH – 1 :

NAME OF THE NODE	IP ADDRESS	SUBNET MAST	DEFAULT GATEWAY
PC – 6	192.168.0.3	255.255.255.0	192.168.0.1
LAPTOP – 6	192.168.0.4	255.255.255.0	192.168.0.1
PRINTER - 2	192.168.0.2	255.255.255.0	192.168.0.1

UNDER SWITCH -2 :

NAME OF THE NODE	IP ADDRESS	SUBNET MASK	DEFAULT GATEWAY
PC – 7	192.168.2.2	255.255.255.0	192.168.2.1
LAPTOP – 5	192.168.2.3	255.255.255.0	192.168.2.1
SERVER - 1	192.168.2.4	255.255.255.0	192.168.2.1

ROUTER – 0 :

NAME OF THE PORT	IP ADDRESS	SUBNET MASK
SERIAL 0/0/0	192.168.4.2	255.255.255.0
SERIAL 0/0/1	192.168.5.1	255.255.255.0
FAST ETHERNET 0/0	192.168.1.1	255.255.255.0

ROUTER – 1 :

NAME OF THE PORT	*IP ADDRESS*	*SUBNET MASK*
SERIAL 0/0/0	192.168.4.1	255.255.255.0
SERIAL 0/0/1	192.168.3.1	255.255.255.0
FAST ETHERNET 0/0	192.168.0.1	255.255.255.0

ROUTER – 2 :

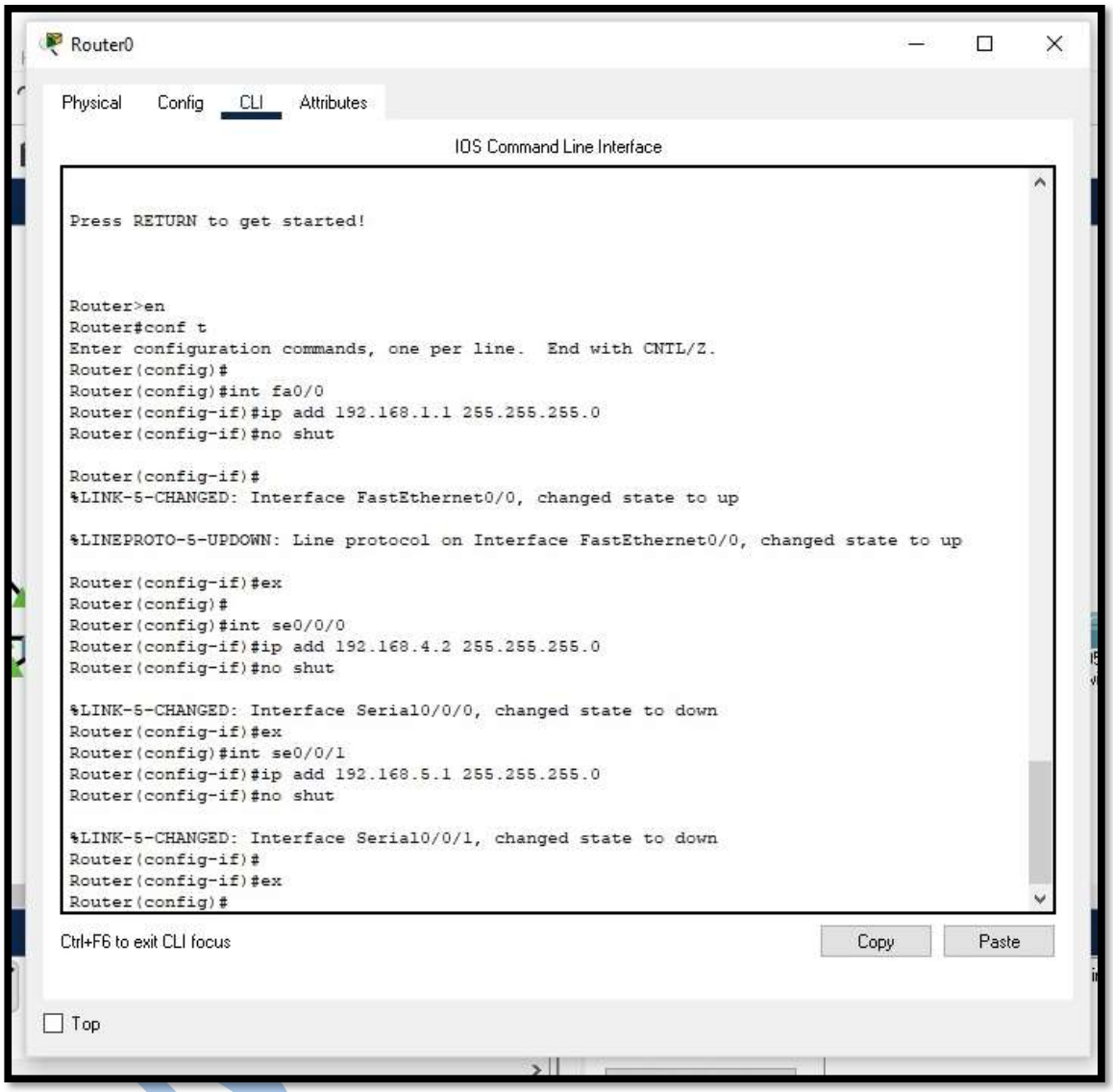
NAME OF THE PORT	*IP ADDRESS*	*SUBNET MASK*
SERIAL 0/0/0	192.168.3.2	255.255.255.0
SERIAL 0/0/1	192.168.5.2	255.255.255.0
FAST ETHERNET 0/0	192.168.2.1	255.255.255.0

After configure all IP address , the connection is done and to check the connection by pinging from one node to another node. If all IP address are configure correctly then the ping operation will perform rightly.

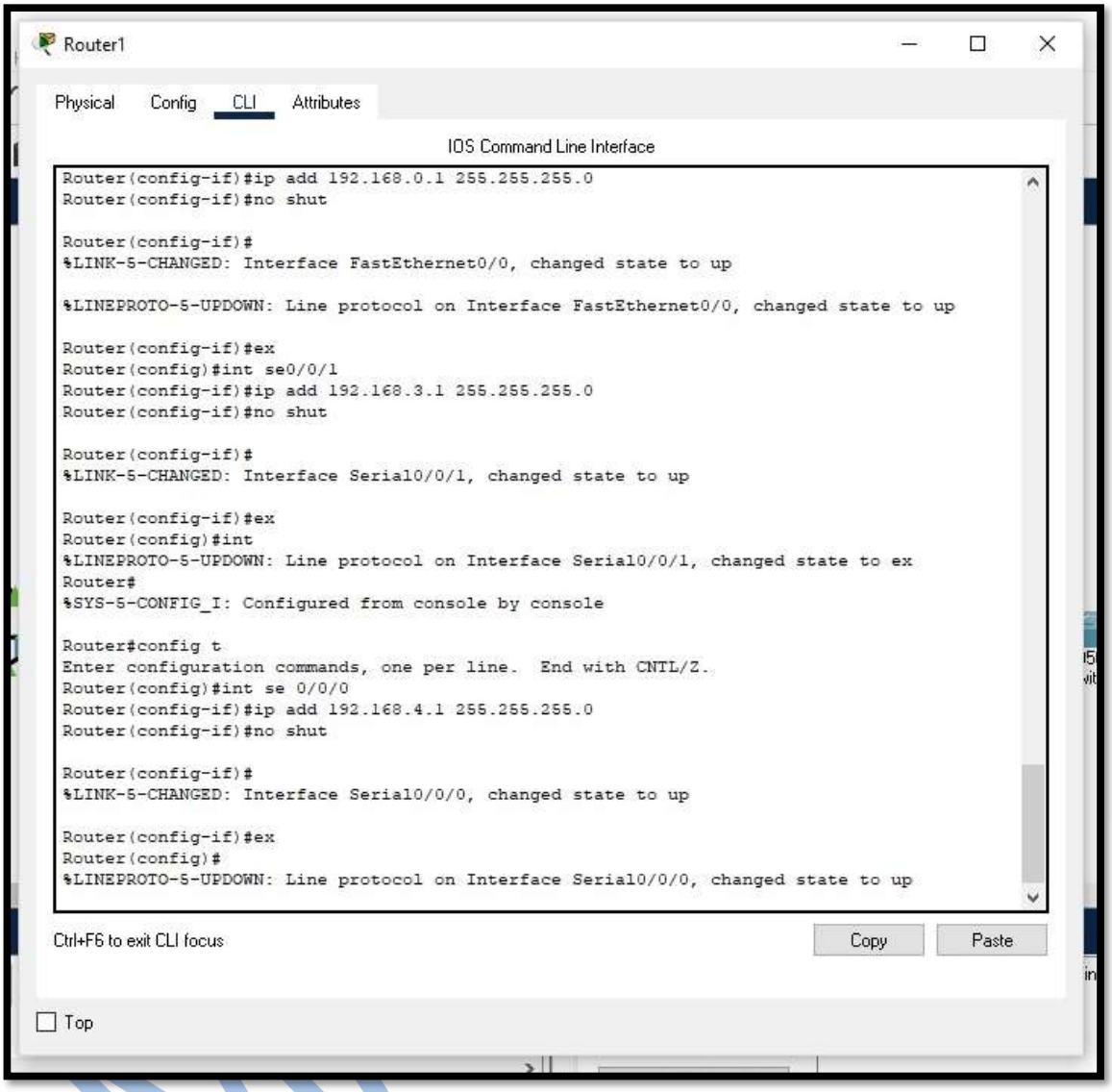
Here I use class C type of IP address and it is also IPv4 address. Class C network addresses range from **192.0.0.0 TO 223.255.255.0** . In this type of network first three bytes are Net ID and last byte is Host ID.

ROUTER CONFIGARATION :

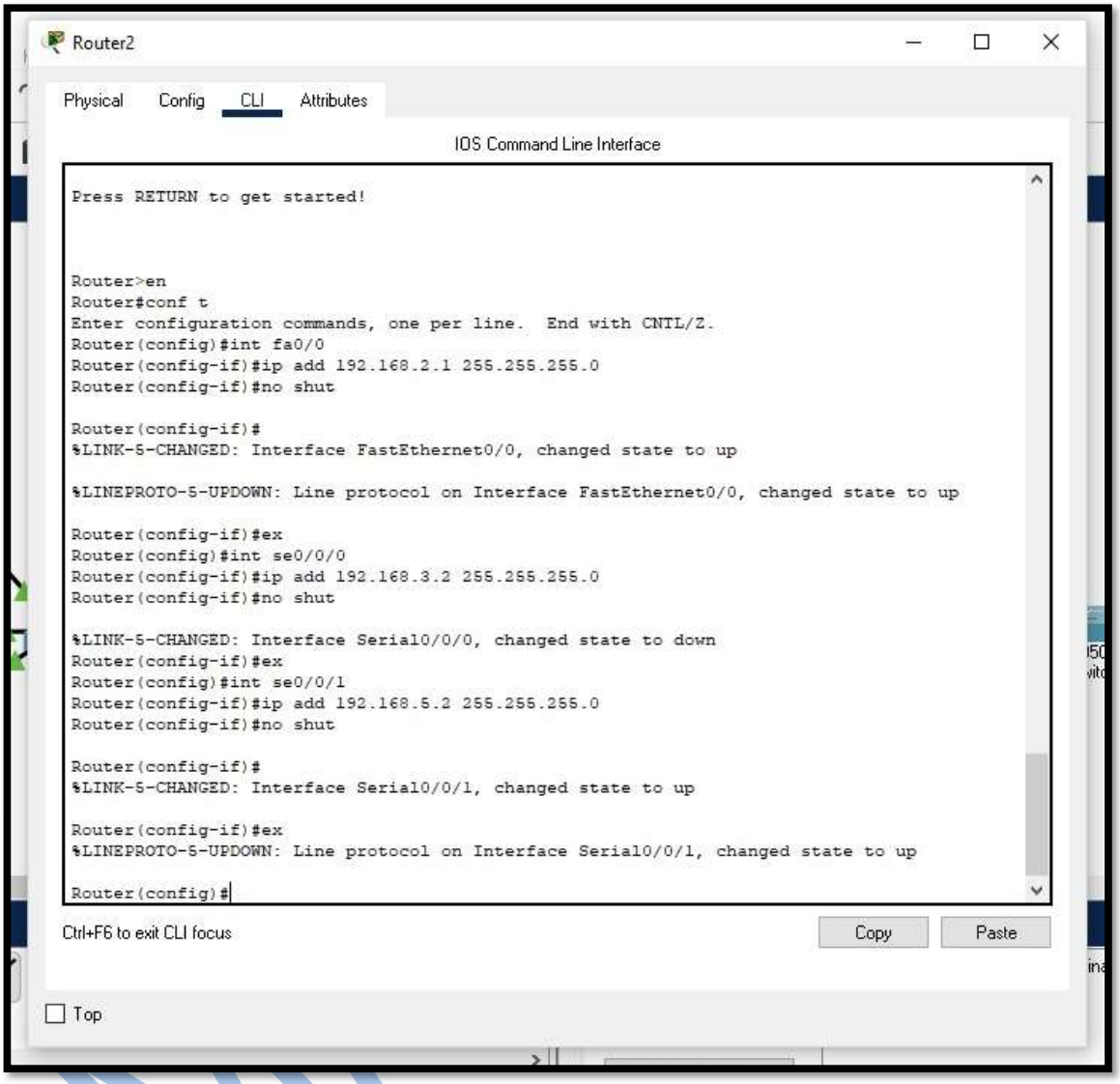
ROUTER – 0 :



ROUTER – 1:

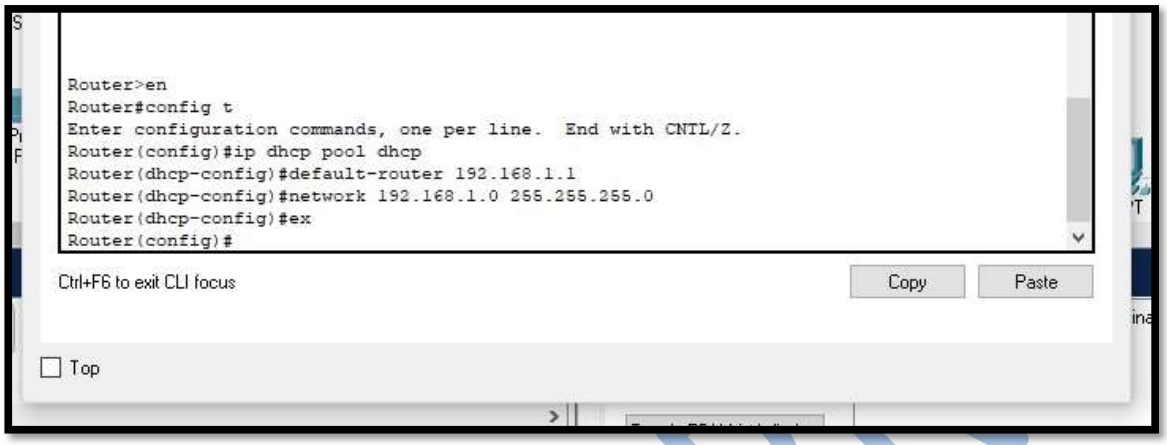

Router1
Physical
Config
CLI
Attributes
IOS Command Line Interface
Router(config-if)#ip add 192.168.0.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
Router(config-if)#ex
Router(config)#int se0/0/1
Router(config-if)#ip add 192.168.3.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up
Router(config-if)#ex
Router(config)#int
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to ex
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int se 0/0/0
Router(config-if)#ip add 192.168.4.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Router(config-if)#ex
Router(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
Ctrl+F6 to exit CLI focus
Copy
Paste
Top

ROUTER – 2 :

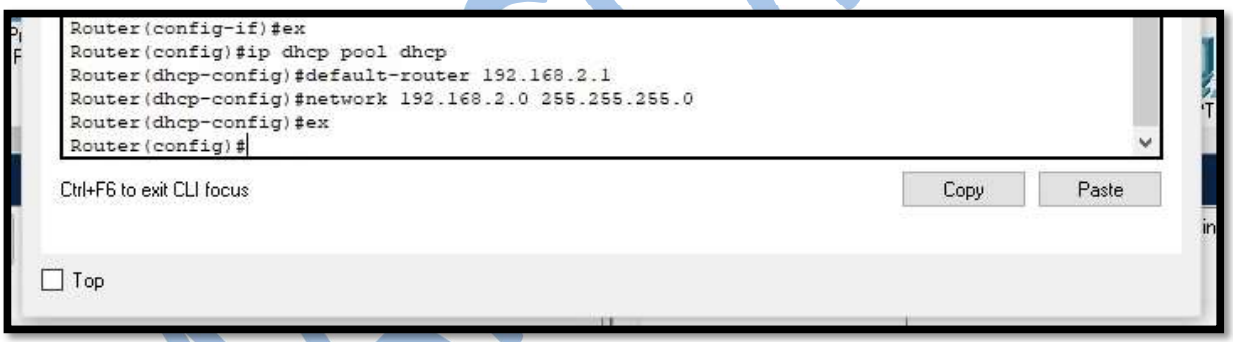

Router2
Physical
Config
CLI
Attributes
IOS Command Line Interface
Press RETURN to get started!
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip add 192.168.2.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#
%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)#ex
Router(config)#int se0/0/0
Router(config-if)#ip add 192.168.3.2 255.255.255.0
Router(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
Router(config-if)#ex
Router(config)#int se0/0/1
Router(config-if)#ip add 192.168.5.2 255.255.255.0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up
Router(config-if)#ex
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up
Router(config)#
Ctrl+F6 to exit CLI focus
Copy
Paste
Top

DHCP IP CONFIGARATION :

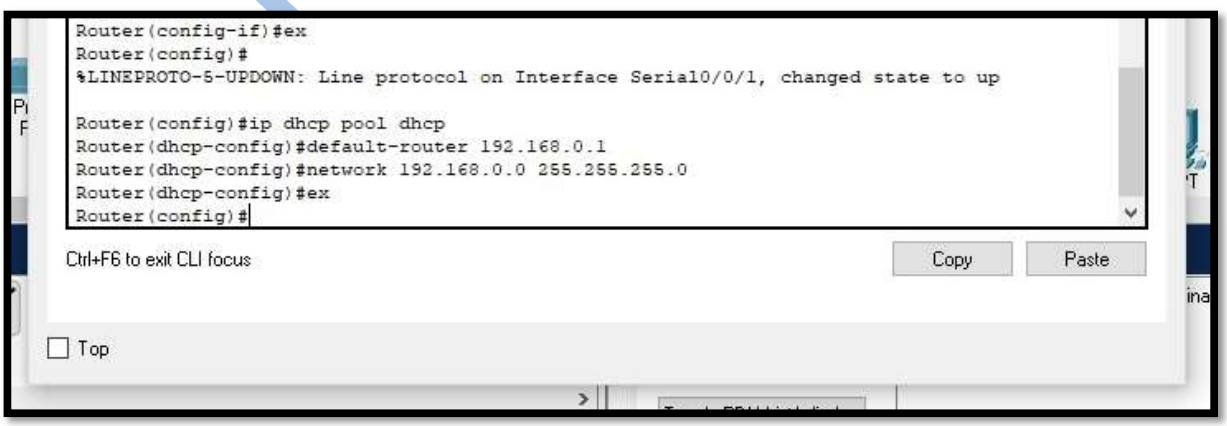
ROUTER – 0 :



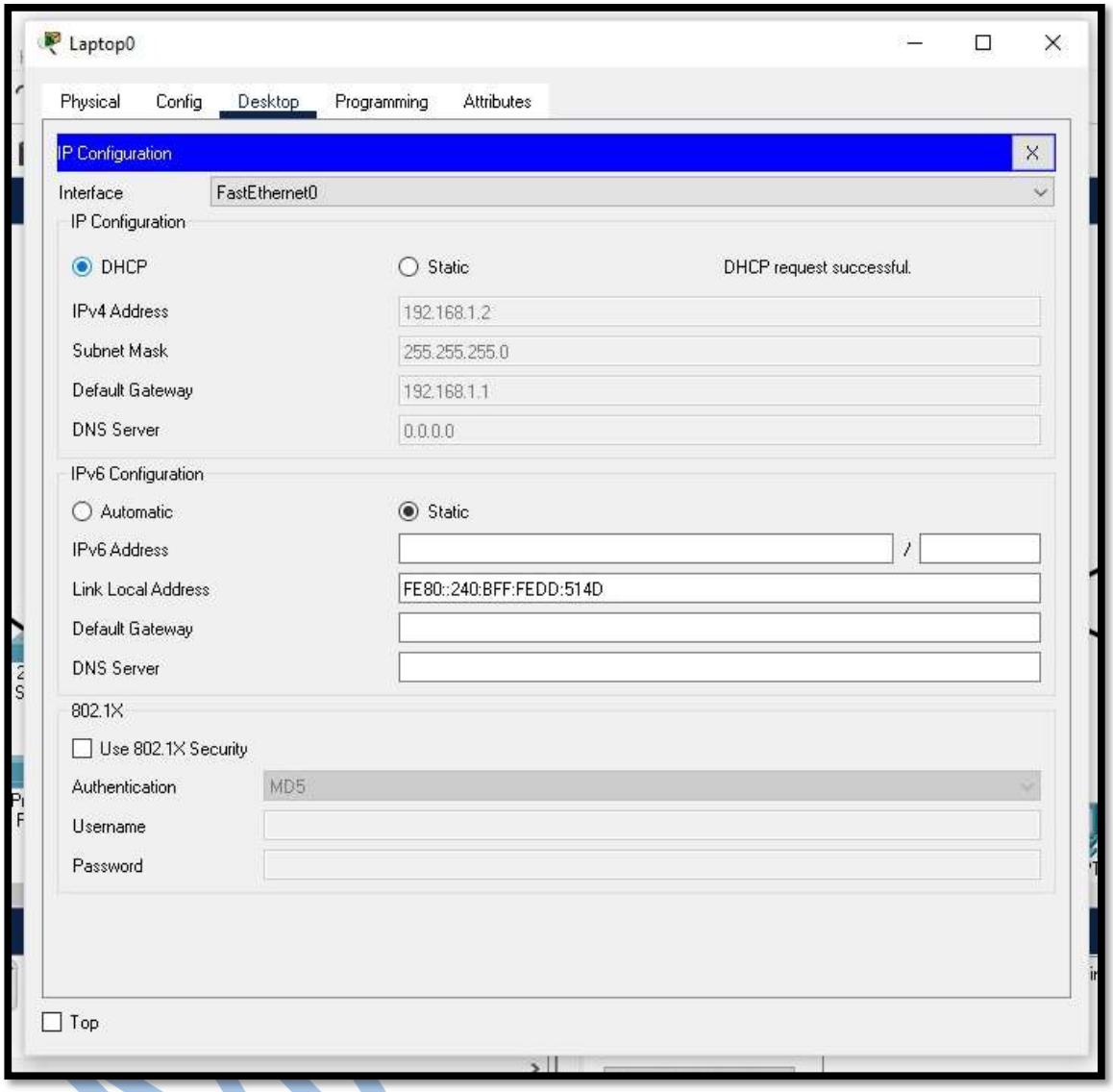
ROUTER – 1:



ROUTER – 2 :



DHCP IP CONFIGARATION IN A NODE :

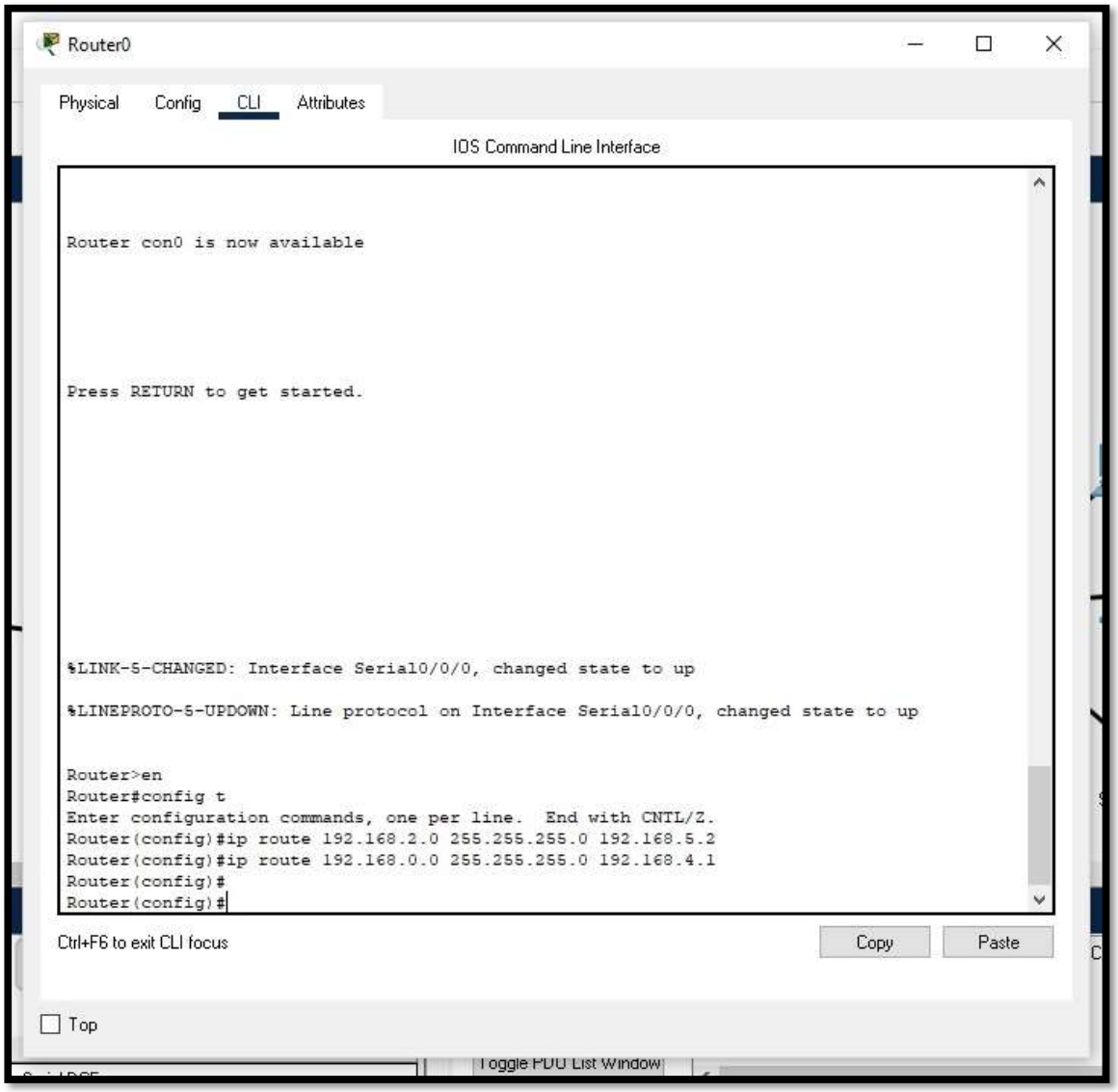


LAPTOP – 0 (NODE) IP CONFIGARATION USING DHCP

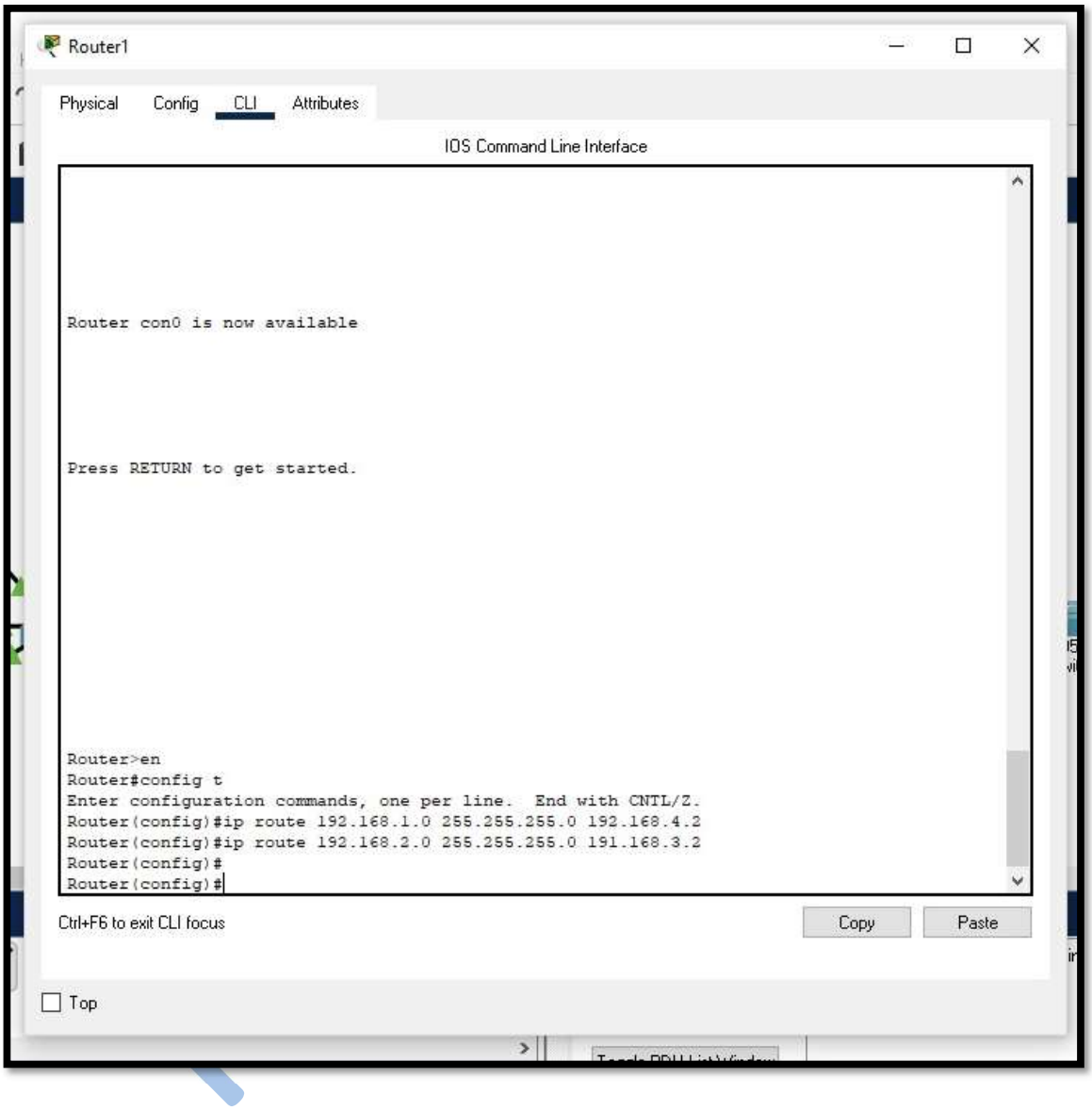
Here similarly, we assign all nodes IP address using DHCP configuration.

ROUTE CONFIGARATION :

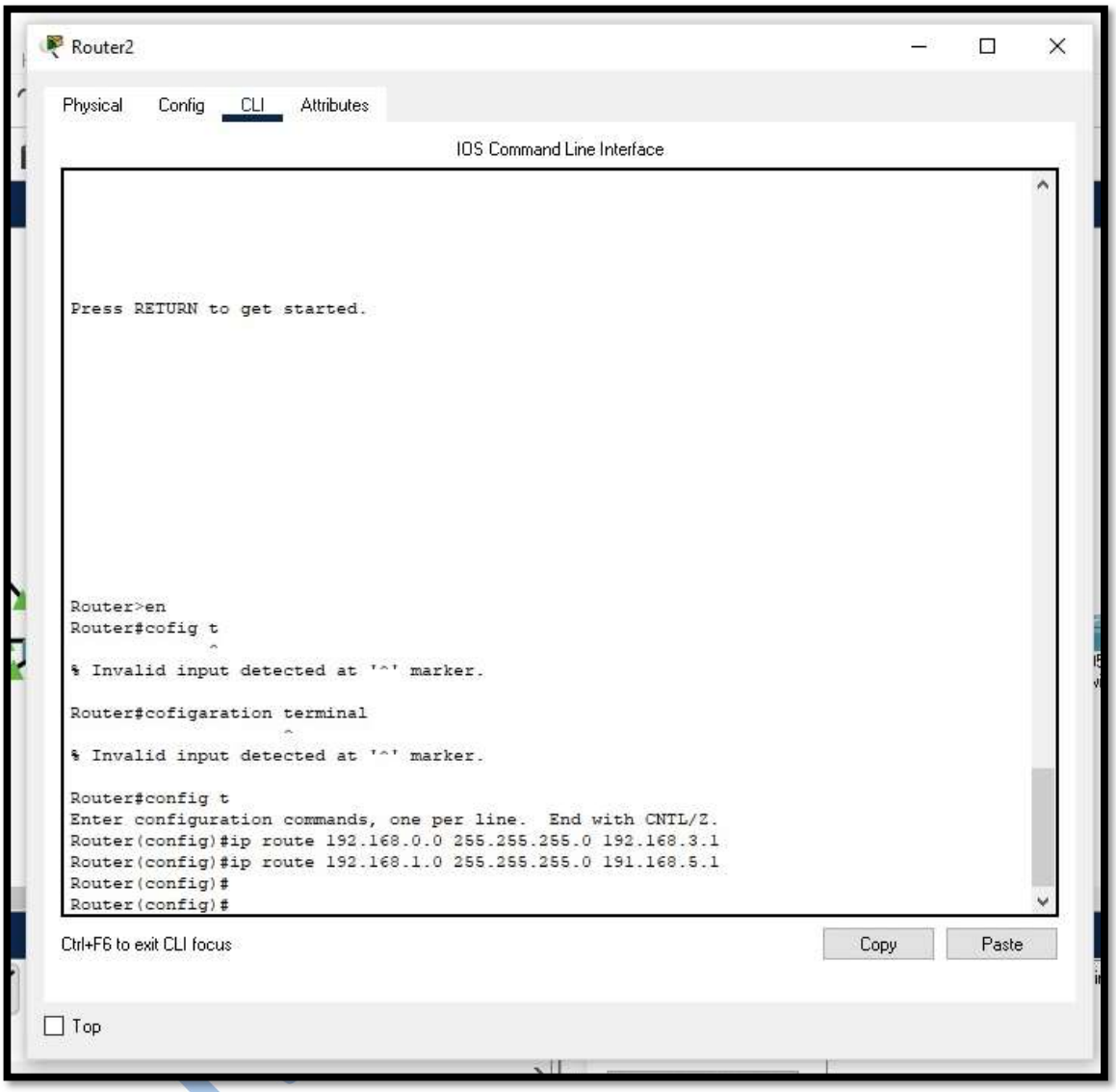
FROM ROUTER-0 TO ROUTER-1 AND ROUTER-2 :



FROM ROUTER-1 TO ROUTER-0 AND ROUTER-2 :



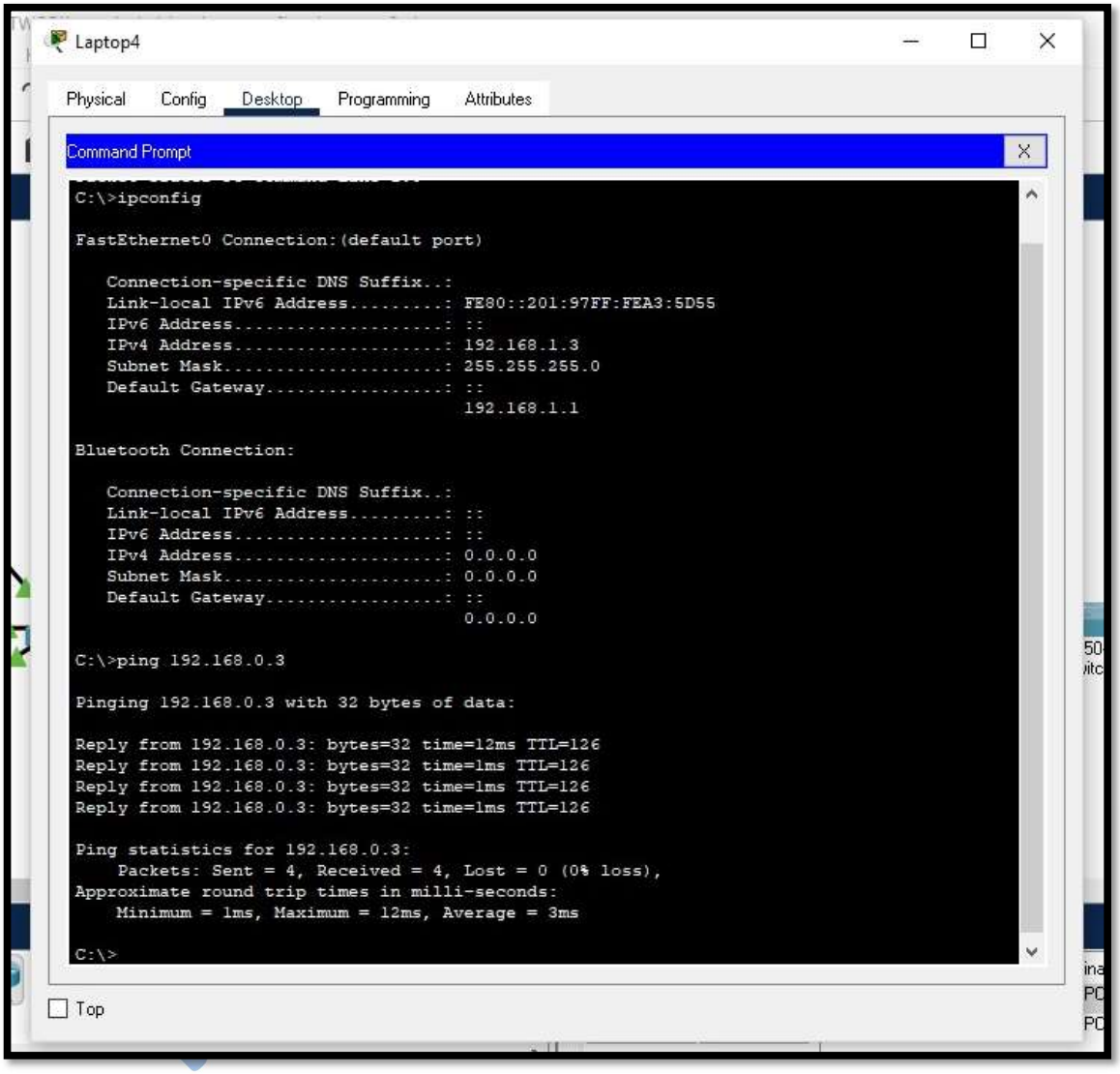
FROM ROUTER-2 TO ROUTER-0 AND ROUTER-1 :



OUTPUT :

- ***PINGING THE NETWORK :***

SENDER :- 192.168.1.3 RECIEVER :- 192.168.0.3



❖ ***SIMULATION RESULT :***

REFERENCES :

- YOUTUBE
- GOOGLE

CONCLUSION :

- Some examples of WAN technologies like leased lines, frame relay, DSL, cable, and Ethernet.
- The difference between circuit switching, packet switching, and cell switching.
- The terminology that used when talking about the WAN network.
- The difference between LAN and WAN.