

**Geeta Engineering College, Naultha,
Panipat, Haryana**

A

Project Report

On

“College Network”



For The Academic Year
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Chapter-1

1.1 WHAT IS COMPUTER NETWORK:-

Computer network is a group of computer, ip phones and other device Which can be communicate to each other through a network.

Aim of computer network:-

->Resources sharing among various devices.

Component for computer network:-

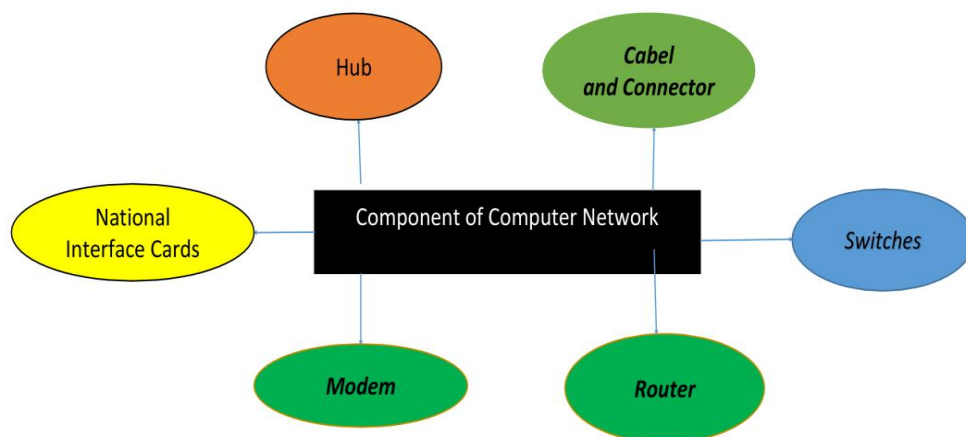


Fig-1,1

NIC(National Interface Cards):-

NIC is a device that helps the computer to communicate with another

Device.The network interface cards contains the hardware addresses

the data-link layer protocol use this address to identify the system on the network so that it transfers the data to the correct destination.

There are two types of NIC: wireless NIC and wired NIC.

Wireless NIC:- All the modern laptops use the wireless NIC. In Wireless NIC, a connection is made using the antenna that employs the **radio wave technology**.

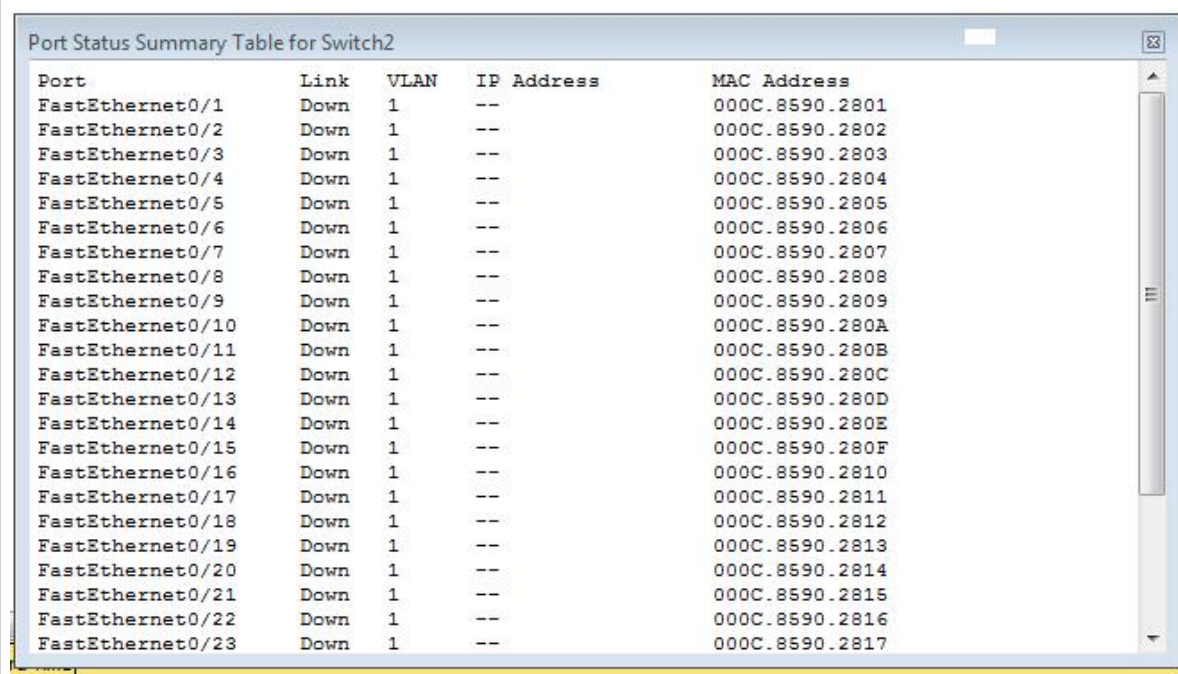
Wired NIC:- Cables use the **wired NIC** to transfer the data over the medium.

Hub:-

Hub is a central device that splits the network connection into multiple devices. When computer requests for information from a computer, it sends the request to the Hub. Hub distributes this request to all the interconnected computers.

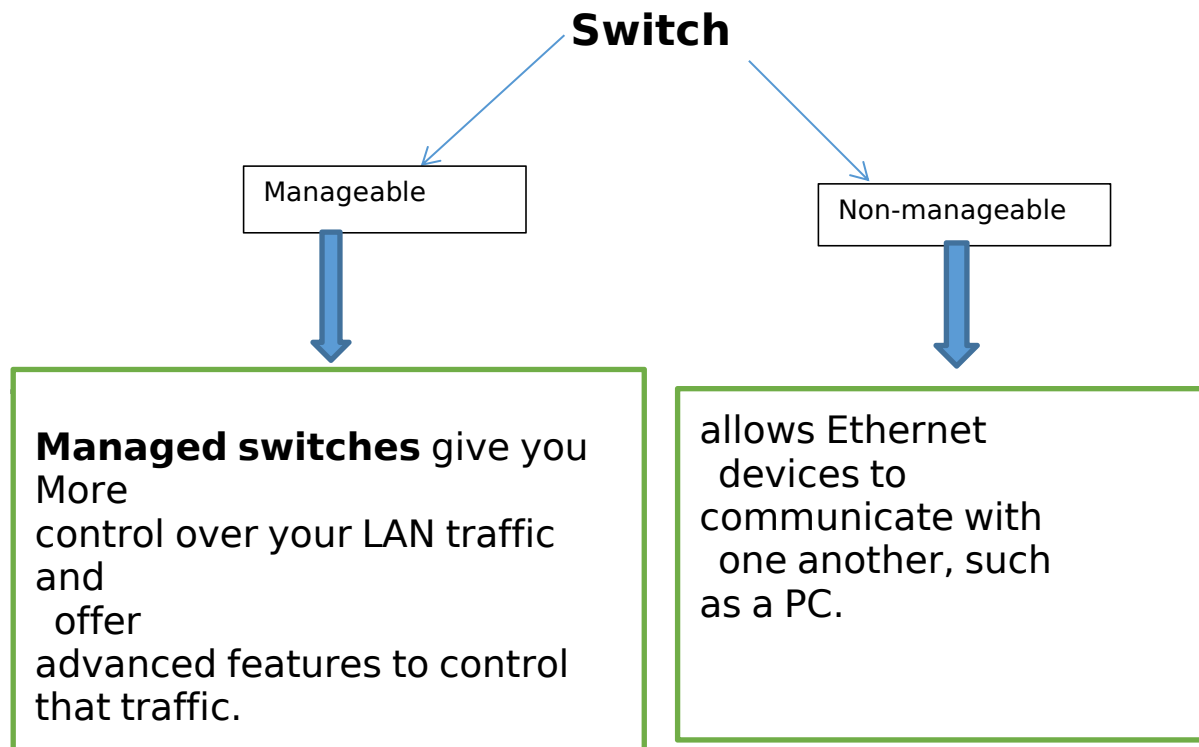
Switch:-

Switch is also used to connect multiple workstation. Switch is more intelligent than hub. It has special kind of memory Mac address/Filter/Lookup table.



Port	Link	VLAN	IP Address	MAC Address
FastEthernet0/1	Down	1	--	000C.8590.2801
FastEthernet0/2	Down	1	--	000C.8590.2802
FastEthernet0/3	Down	1	--	000C.8590.2803
FastEthernet0/4	Down	1	--	000C.8590.2804
FastEthernet0/5	Down	1	--	000C.8590.2805
FastEthernet0/6	Down	1	--	000C.8590.2806
FastEthernet0/7	Down	1	--	000C.8590.2807
FastEthernet0/8	Down	1	--	000C.8590.2808
FastEthernet0/9	Down	1	--	000C.8590.2809
FastEthernet0/10	Down	1	--	000C.8590.280A
FastEthernet0/11	Down	1	--	000C.8590.280B
FastEthernet0/12	Down	1	--	000C.8590.280C
FastEthernet0/13	Down	1	--	000C.8590.280D
FastEthernet0/14	Down	1	--	000C.8590.280E
FastEthernet0/15	Down	1	--	000C.8590.280F
FastEthernet0/16	Down	1	--	000C.8590.2810
FastEthernet0/17	Down	1	--	000C.8590.2811
FastEthernet0/18	Down	1	--	000C.8590.2812
FastEthernet0/19	Down	1	--	000C.8590.2813
FastEthernet0/20	Down	1	--	000C.8590.2814
FastEthernet0/21	Down	1	--	000C.8590.2815
FastEthernet0/22	Down	1	--	000C.8590.2816
FastEthernet0/23	Down	1	--	000C.8590.2817

->Switch reads Mac address & it store in filter table.switch sends the message directly from source to the destination.



->Manageable switch use also console cabel for extension properties of switch.

Cabel & Connectors:-

Cable is a transmission media that transmits the communication signals.

There are three types of cables:-

- 1).**Twisted pair cable
- 2).**Coaxial cable
- 3).**Fiber optic cable

1).Twisted pair cable:-

It is a high-speed cable that transmits the data over **1Gbps** or more.

2).Coaxial cable:-

Coaxial cable resembles like a TV installation cable. Coaxial cable is more expensive than twisted pair cable, but it provides the high data transmission speed.

3).Fiber optic cable:-

Fibre optic cable is a high-speed cable that transmits the data using light beams. It provides high data transmission speed as compared to other cables. It is more expensive as compared to other cables, so it is installed at the government level.

Router:-

Router is a device that connects the LAN to the internet. The router is mainly used to connect the distinct networks or connect the internet to multiple computers.

Modem:-

Modem connects the computer to the internet over the existing telephone line. A modem is not integrated with the computer motherboard. A modem is a separate part on the PC slot found on the motherboard.

NETWORK MODEL

A communication subsystem is a complex piece of Hardware and software. Early attempts for implementing the software for such subsystems were based on a single, complex, unstructured program with many interacting component.

-> In a layered approach, networking concept is divided into several layers, and each layer is assigned a particular task.

The basic elements of layered architecture are services, protocols, and interfaces.

Service: It is a set of actions that a layer provides to the higher layer.

Protocol: It defines a set of rules that a layer uses to exchange the information with peer entity. These rules mainly concern about both the contents and order of the messages used.

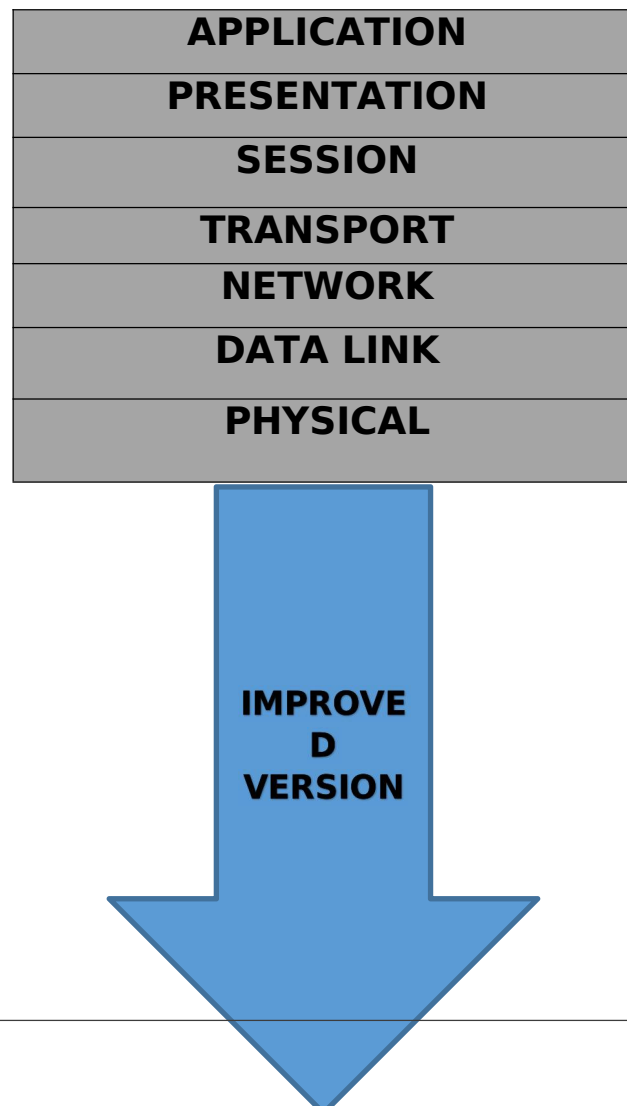
Interface: It is a way through which the message is transferred from one layer to another layer.

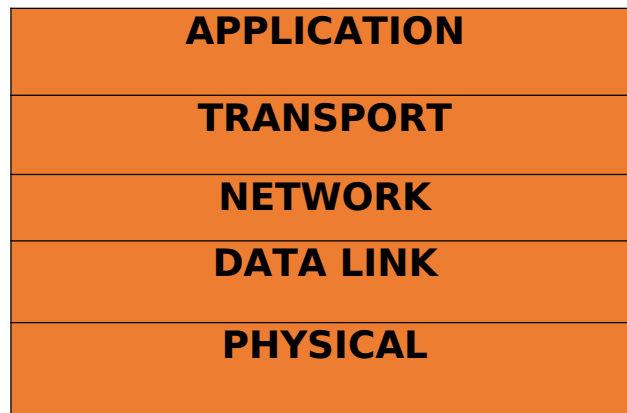
OSI MODEL

OSI stands for **Open System Interconnection** is a reference model that describes how information from a software application in one computer moves through a physical medium to the software application in another computer.

-> *OSI consists of seven layers, and each layer performs a particular network function.*

-> OSI model was developed by the International Organization for Standardization (ISO) in 1984, and it is now considered as an architectural model for the inter-computer communications





TCP/IP MODEL

1) .PHYSICAL LAYER:-

It provides a physical medium through which bits are transferred.

Example:- router,nic cards,hub,switch,cable & connector etc.

2) .DATA LINK LAYER:-

The **data link layer** is the protocol **layer** in a program that handles the moving of **data** into and out of a physical **link** in a **network**.

->It use for error free transfer of data frames.

->It provides a reliable and efficient communication between two or more devices.

Example:-protocols are Ethernet for local area networks (multi-node), the Point-to-Point Protocol (PPP), HDLC and ADCCP for point-to-point (dual-node) connections.

3) .NETWORK LAYER:-

It is responsible for moving packet from source to destination.

Four important function of network layer.

Internetworking: An internetworking is the main responsibility of the network layer. It provides a logical connection between different devices.

Addressing: A Network layer adds the source and destination address to the header of the frame. Addressing is used to identify the device on the internet.

Routing: Routing is the major component of the network layer, and it determines the best optimal path out of the multiple paths from source to the destination.

Packetizing: A Network Layer receives the packets from the upper layer and converts them into packets. This process is known as Packetizing. It is achieved by internet protocol (IP).

Examples:- Internet Protocol, Internet Control Message Protocol (ICMP or "ping"), Internet Gateway Management Protocol (IGMP), IPX/SPX.

4) **.TRANSPORT LAYER:-**(TCP/UDP)

It provides reliable message delivery from process to processes.

The two protocols used in this layer are:

a).Transmission Control Protocol

->It is a standard protocol that allows the systems to communicate over the internet.

->It establishes and maintains a connection between hosts.

->When data is sent over the TCP connection, then the TCP protocol divides the data into smaller units known as segments. Each segment travels over the internet using multiple routes, and they arrive in different orders at the destination. The transmission control protocol reorders the packets in the correct order at the receiving end.

b).User Datagram Protocol

->User Datagram Protocol is a transport layer protocol.

->It is an unreliable transport protocol as in this case receiver does not send any acknowledgment when the packet is received, the sender does not wait for any acknowledgment. Therefore, this makes a protocol unreliable.

5) **.SESSION LAYER:-**

It is used to establish, manage and terminate the session.

Functions of Session layer:-

Dialog control: Session layer acts as a dialog controller that creates a dialog between two processes or we can say that it allows the communication between two processes which can be either half-duplex or full-duplex.

Synchronization: Session layer adds some checkpoints when transmitting the data in a sequence. If some error occurs in the middle of the transmission of data, then the transmission will take place again from the checkpoint. This process is known as Synchronization and recovery.

6) **.PRESENTATION LAYER:-**

It is responsible for translation, compression and encryption.

Functions of Presentation layer:

Translation: The processes in two systems exchange the information in the form of character strings, numbers and so on. Different computers use different encoding methods, the presentation layer handles the interoperability between the different encoding methods. It converts the data from sender-dependent format into a common format and changes the common format into receiver-dependent format at the receiving end.

Encryption: Encryption is needed to maintain privacy. Encryption is a process of converting the sender-transmitted information into another form and sends the resulting message over the network.

Compression: Data compression is a process of compressing the data, i.e., it reduces the number of bits to be transmitted. Data compression is very important in multimedia such as text, audio, video.

Example:-presentation layer protocols are SSL, HTTP/ HTML (agent), FTP (server), AppleTalk Filing Protocol, Telnet, and so on.

7) **.APPLICATION LAYER:-**

This layer provides service to the user.

Functions of Application layer:-

File transfer, access, and management (FTAM): An application layer allows a user to access the files in a remote

computer, to retrieve the files from a computer and to manage the files in a remote computer.

Mail services: An application layer provides the facility for email forwarding and storage.

Directory services: An application provides the distributed database sources and is used to provide that global information about various objects.

TCP/IP MODEL

Tcp/ip model is improved model of osi model. Tcp/Ip is connection full model.

-> In this model three layer as session, presentation and application are merge and get one layer known as Application layer.

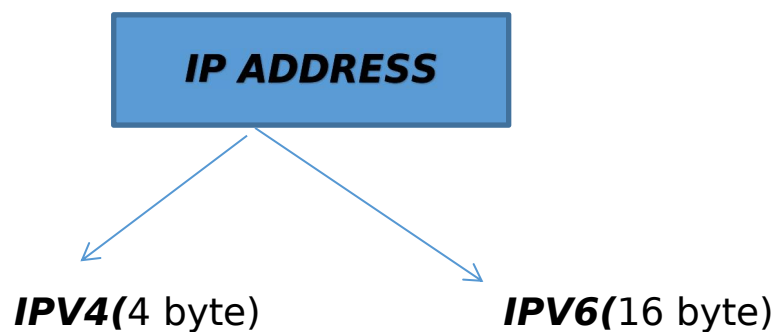
Application	SMTP,FTP,Telnet,
presentation	
Session	
Transport	TCP,UDP
Network	IP,ICMP,IGMP,ARP,RARP
Data link	
Physical layer	

Chapter-3

IP Addressing:-It supports unique addressing for computer on a network.

IP(Internet protocol):-

IP(Internet protocol) is the primary network protocol used on the internet, developed in the 1970s. On the internet and many other networks, together with TCP.



->This is a layer 3 of the OSI model.

IPV4(IP Version 4)

0	3	7	15	24	31
Version	Header length	Service type	Total length		
Identification			Flags	Fragment Offset	
Total time leave		Protocol	Header check sum		
32 BITS SOURCES ADDRESS					
32 BITS DESTINATION ADDRESS					
OPTIONS AND PADDING					

IP ADDRESS CLASSES :-

*FIVE different **IP** address classes.*

Class Name	range
A	1-127
B	128-191
C	192-223
D	224-239
E	240-254

127.0.0.0



***Lookup back address or
Local computer***

IP ADDRESSING

STATIC IP

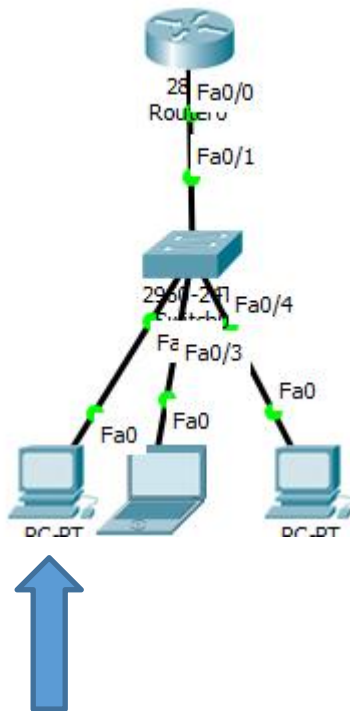
DHCP

Static IP:-

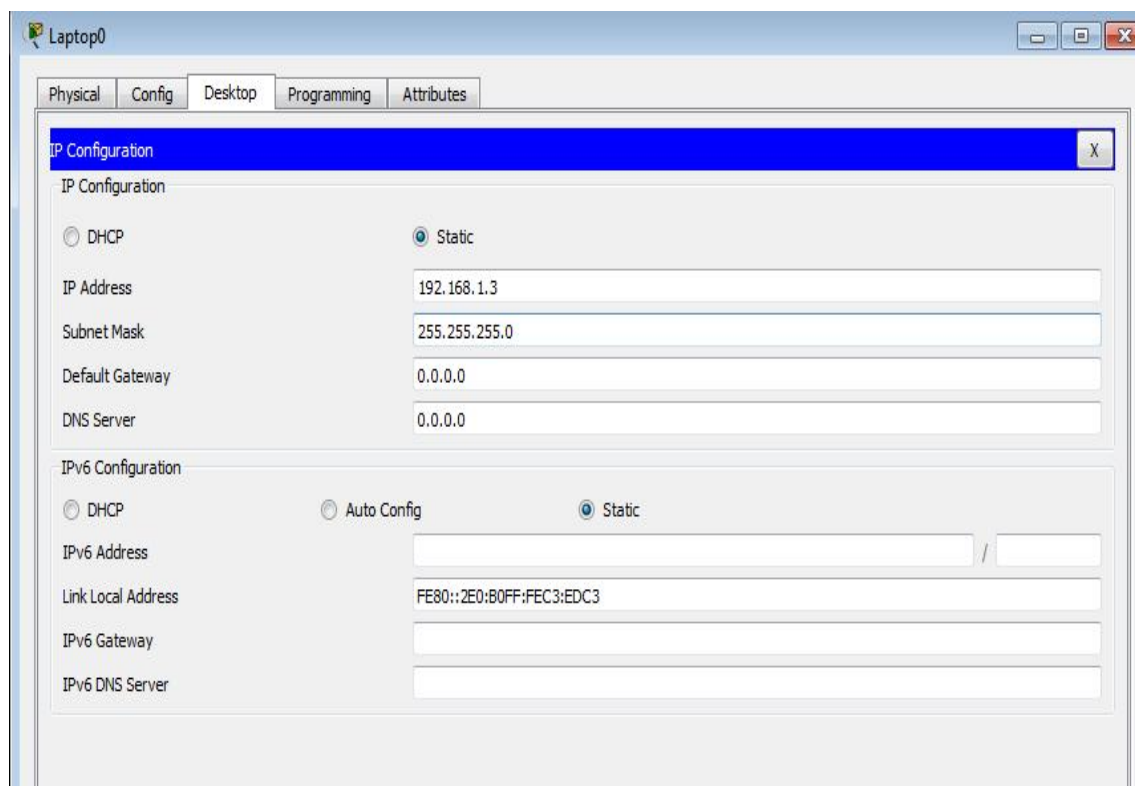
Ip addressing is a scheme by which ip address is assign statically all the device which are communicate to each other.

Ip assign method:-

First a network is create by the help of router ,switch,cabel and Pc or laptop or any other device which are communicate to each other



Click on Pc0 and after then ip configure then

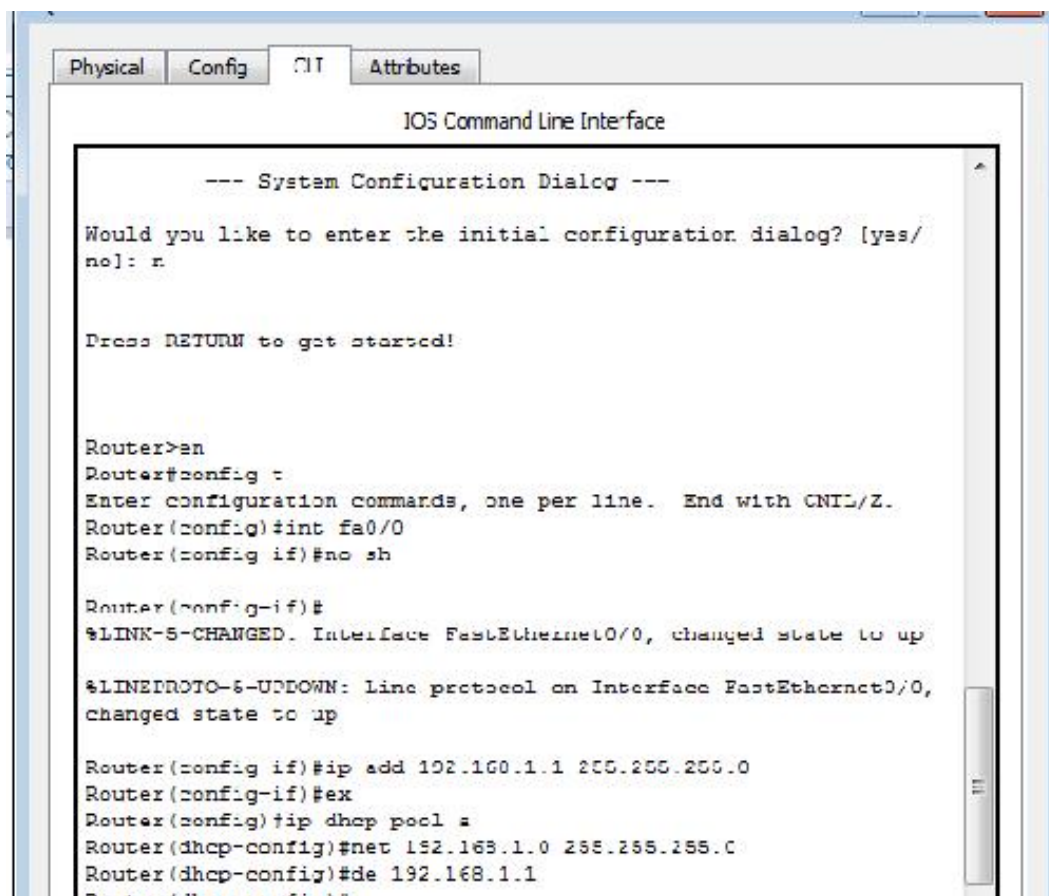


DHCP(Dynamic host configure protocol):-

Ip address is assign dynamically when click on dhcp for any device which are communicate to each other.

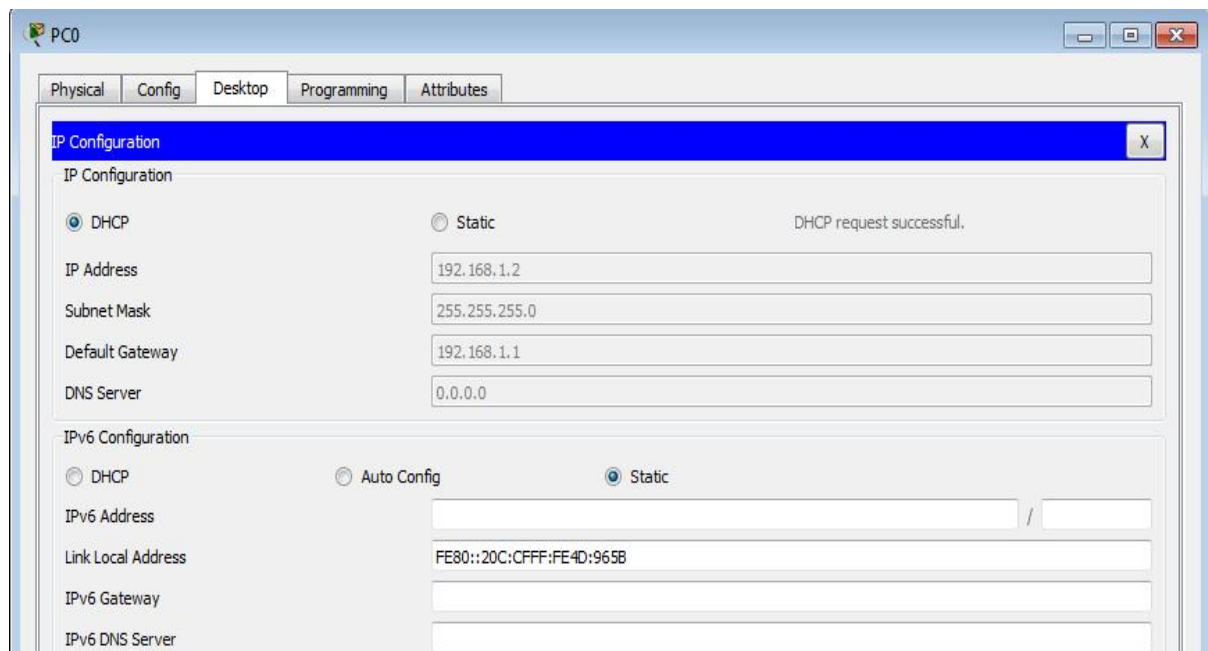
Command on Router:-(for dhcp ip)

```
Router>en
Router#config t
Router(config)#int fa0/0
Router(config-if)#no sh
Router(config-if)#ip add 192.168.1.1 255.255.255.0
Router(config-if)#ex
Router(config)#ip dhcp pool a
Router(config-dhcp)#net 192.168.1.0 255.255.255.0
Router(config-dhcp)#de 192.168.1.1
Router(config-dhcp)#ex
```



Method of dhcp ip after command given:-

Click on any device which are connected network host after then click on ip configure and then click on dhcp.



Testing of connection on network:-

Choose one sender and other is receiver.

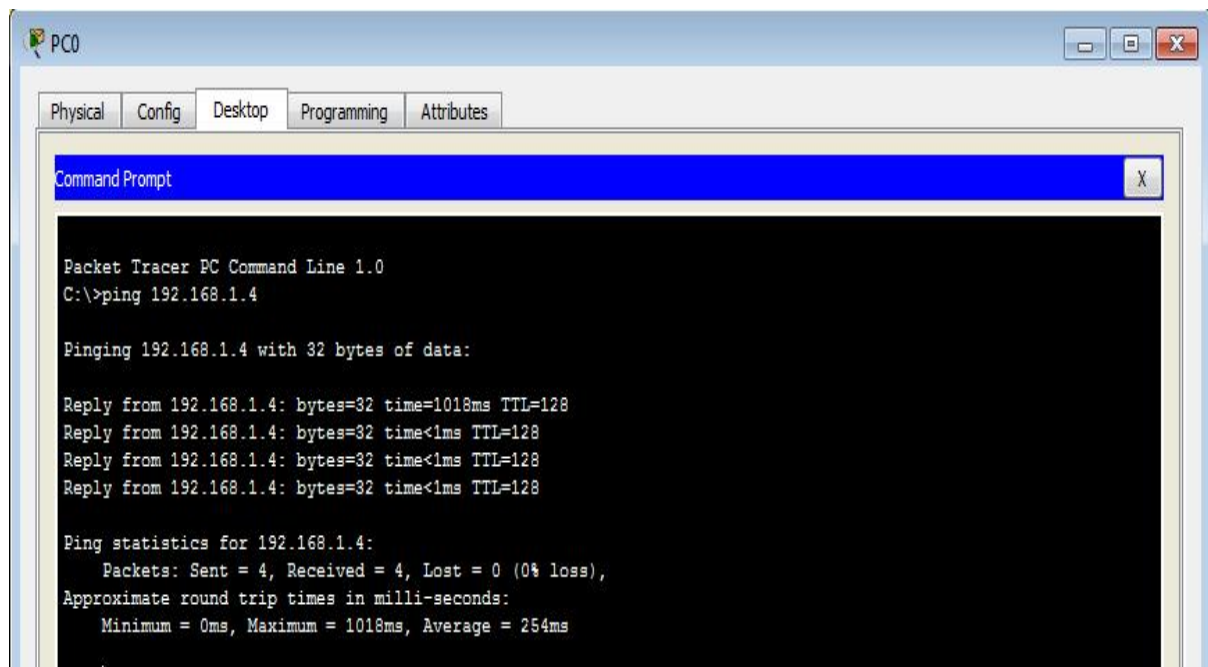
Click on sender pc and go on Desktop and then click and go

On command prompt write command:-

C:\>ping receiver_ip_address

Example:-

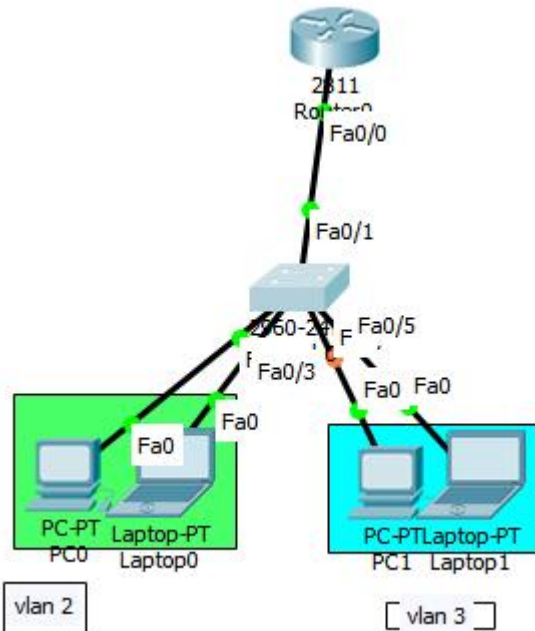
C:\>ping 192.168.1.4



Virtual area network(vlan):-

Vlan is a method by which create multiple network on one switch.

->One vlan create only one network.



Command for create Vlan:-

```
Switch>en
Switch#config t
Switch(config)#vl 2
Switch(config-vlan)#vl 3
Switch(config-vlan)#ex
Switch(config)#int r fa0/2-3
Switch(config-if)#sw m a
Switch(config-if-range)#sw a vl 2
Switch(config-if-range)#ex
Switch(config)#int r fa0/4-5
Switch(config-if range)#sw m a
Switch(config-if-range)#sw a vl 3
```

Vlan was created on switch:-

Vlan 2

Vlan 3

And command use:- Switch#sh vl

fa0/2,fa0/3	→	Vlan 2
Fa0/4,fa0/5	→	Vlan 3

```

IOS Command Line Interface

Switch>en
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#int r fa0/2-3
Switch(config-if-range)#vl 2
Switch(config-vlan)#sw m a
Switch(config-vlan)#ex
Switch(config)#int r fa0/2-3
Switch(config-if-range)#sw m a
Switch(config-if-range)#sw vl 2
Switch(config-if-range)#sw a vl 2
Switch(config-if-range)#ex
Switch(config)#vl 3
Switch(config-vlan)#ex
Switch(config)#int r fa0/4-5
Switch(config-if-range)#sw m a
Switch(config-if-range)#sw a vl 3
Switch(config-if-range)#

```

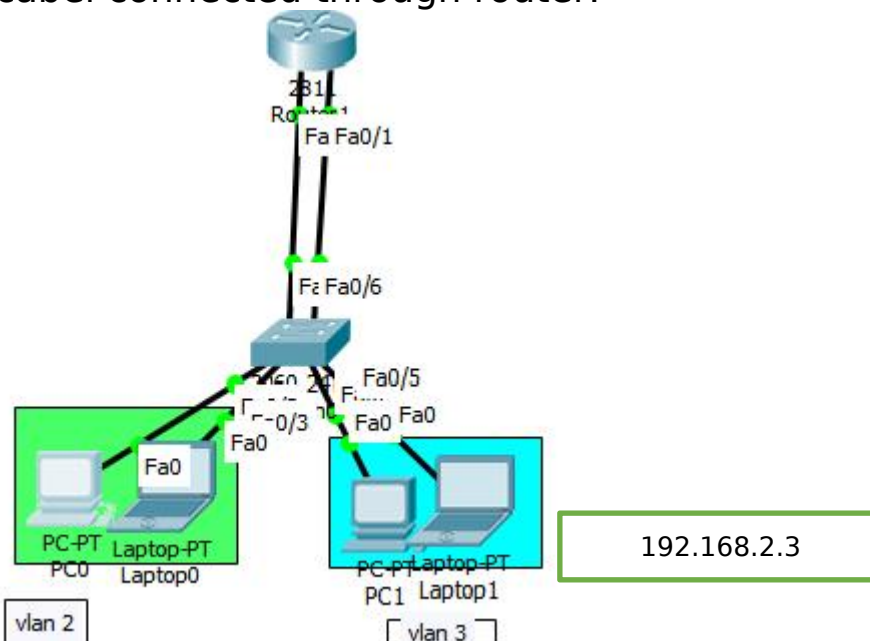
Here two network was created:-

Network 192.168.1.0

Network 192.168.2.0

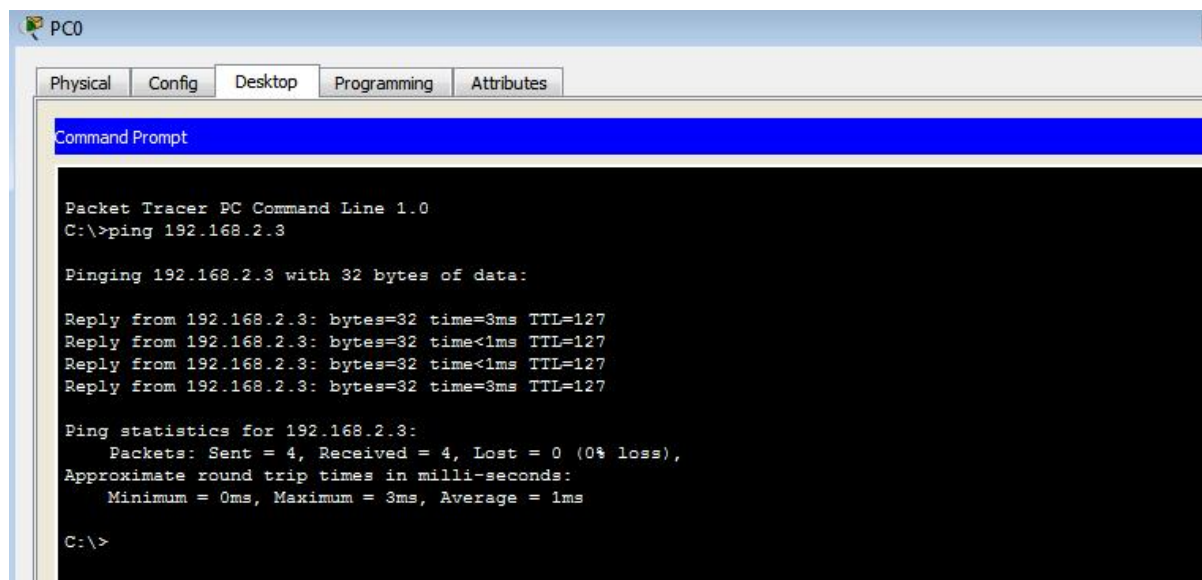
Intervlan

Intervlan is a method by which different network is created on Switch and communication is takes place by the help of number of cabel connected through router.



First dhcp ip is give all the device through dhcp ip command.
After then on switch this command is give.

```
Switch>en
Switch#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#int fa0/5
Switch(config-if)#sw m a
Switch(config-if)#sw a vl 2
Switch(config-if)#int fa0/6
Switch(config-if)#sw m a
Switch(config-if)#sw a vl 3
Switch(config-if)#vl 2
Switch(config-vlan)#vl 3
Switch(config-vlan)#ex
Switch(config)#int r fa0/2-3
Switch(config-if-range)#sw m a
Switch(config-if-range)#sw a vl 2
Switch(config-if-range)#int r fa0/4-5
Switch(config-if-range)#sw m a
Switch(config-if-range)#sw a vl 3
Switch(config-if-range)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to <
```

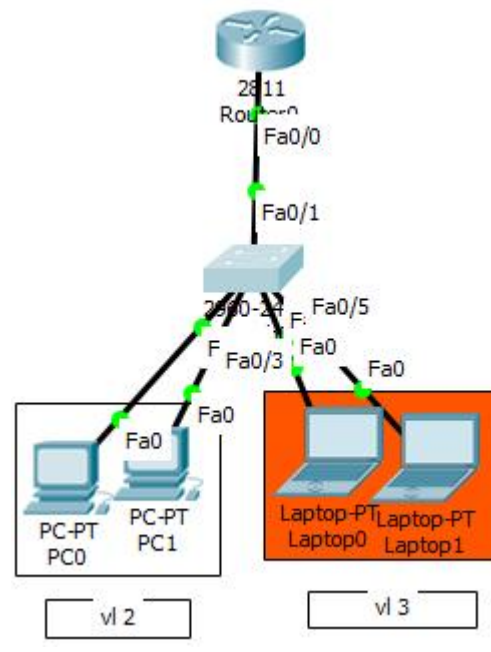


Disadvantage:-

Here multiple cabel is use for multiple vlan or network.

Router on stick

Router on stick is an improved version of inter-vlan. In this network, DHCP IP is given by one trunk cable on switch.



```

Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0.1
Router(config-subif)#no sh
Router(config-subif)#en dot1q 2
Router(config-subif)#ip add 192.168.1.1 255.255.255.0
Router(config-subif)#ip dhcp pool a
Router(dhcp-config)#net 192.168.1.0 255.255.255.0
Router(dhcp-config)#de 192.168.1.1
Router(dhcp-config)#int fa0/0.2
Router(config-subif)#no sh
Router(config-subif)#ip add 192.168.2.1 255.255.255.0

% Configuring IP routing on a LAN subinterface is only allowed if that
subinterface is already configured as part of an IEEE 802.1Q, IEEE 802.1Q,
or ISL VLAN.

Router(config-subif)#en dot1q 3
Router(config-subif)#ip add 192.168.2.1 255.255.255.0
Router(config-subif)#ip dhcp pool b
Router(dhcp-config)#net 192.168.2.0 255.255.255.0
Router(dhcp-config)#de 192.168.2.1
Router(dhcp-config)#int fa0/0
Router(config-if)#no sh

Router(config-if)#

```

VLAN

~~LINK-5-CHANGED: Interface FastEthernet0/0 changed state to up~~

```

Switch0
Physical Config CLI Attributes
IOS Command Line Interface
*LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to up

Switch>en
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vl 2
Switch(config-vlan)#vl 3
Switch(config-vlan)#int r fa0/2-3
Switch(config-if-range)#sw m a
Switch(config-if-range)#sw a vl 2
Switch(config-if-range)#int r fa0/4-5
Switch(config-if-range)#sw m a
Switch(config-if-range)#sw a vl 3
Switch(config-if-range)#int fa0/1
Switch(config-if)#sw m trunk

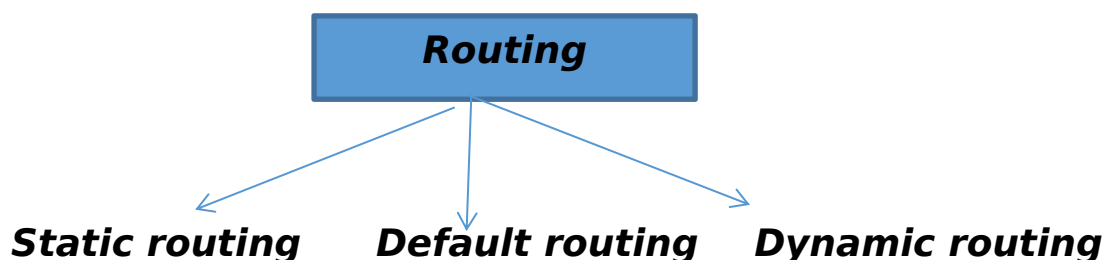
Switch(config-if)#
*LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1

```

Routing

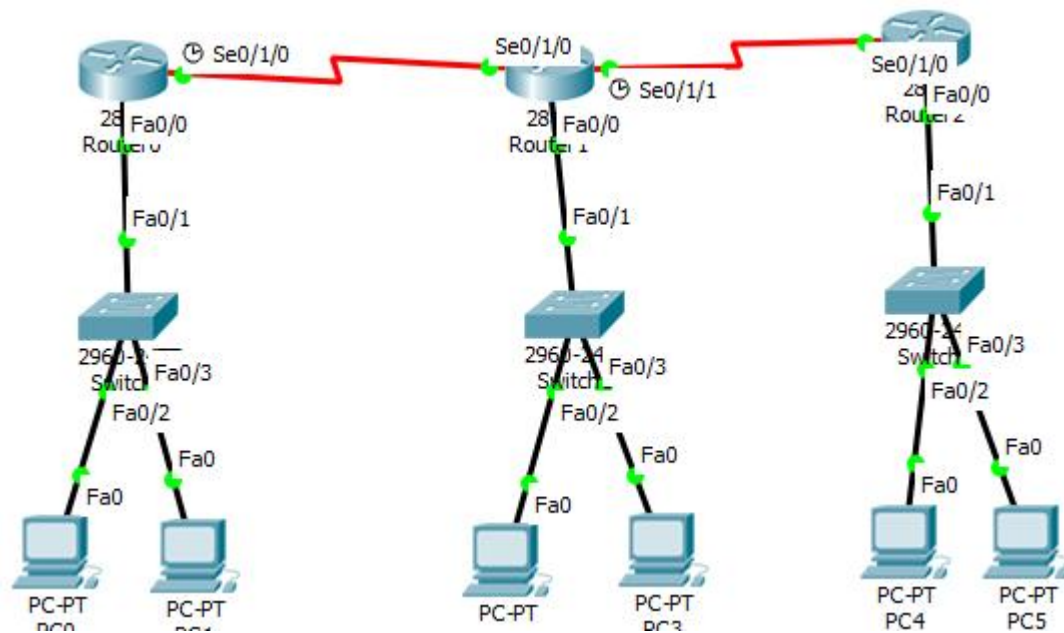
Routing is a method by which communicate one router to another router through routing.

Types of routing:-



STATIC ROUTING

In Static routing all indirect network give by statically.



Static routing command:-

Router(config)#ip route destination_network netmask next_hop_address

->First dhcp ip is given all the device .

#Command on Router1

```

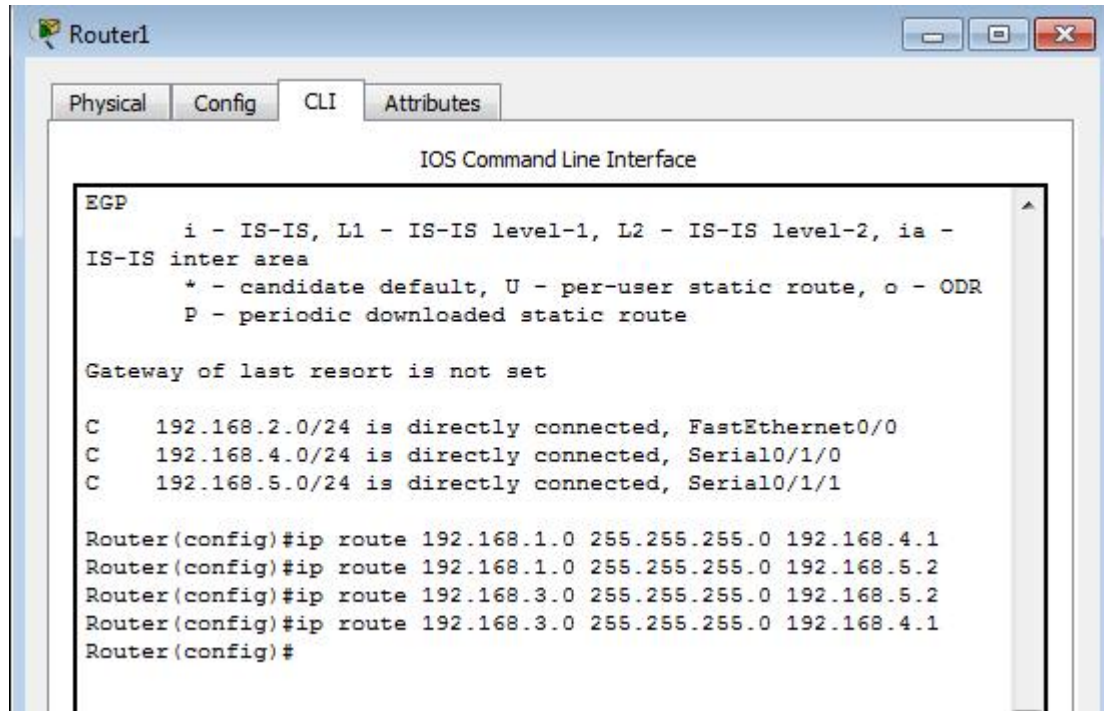
Router0
  Physical Config CLI Attributes
  IOS Command Line Interface
  IS-IS inter area
    * - candidate default, U - per-user static route, o - ODR
    P - periodic downloaded static route

  Gateway of last resort is not set

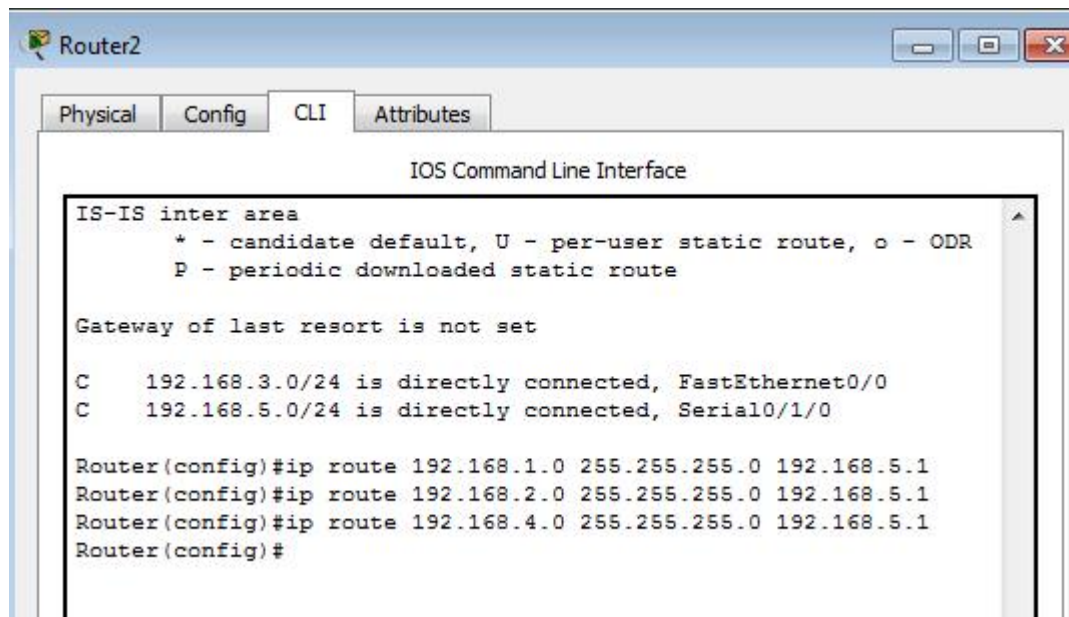
  C   192.168.1.0/24 is directly connected, FastEthernet0/0
  C   192.168.4.0/24 is directly connected, Serial0/1/0

  Router(config)#ip route 192.168.2.0 255.255.255.0 192.168.4.2
  Router(config)#ip route 192.168.3.0 255.255.255.0 192.168.4.2
  Router(config)#ip route 192.168.5.0 255.255.255.0 192.168.4.2
  Router(config)#
  
```

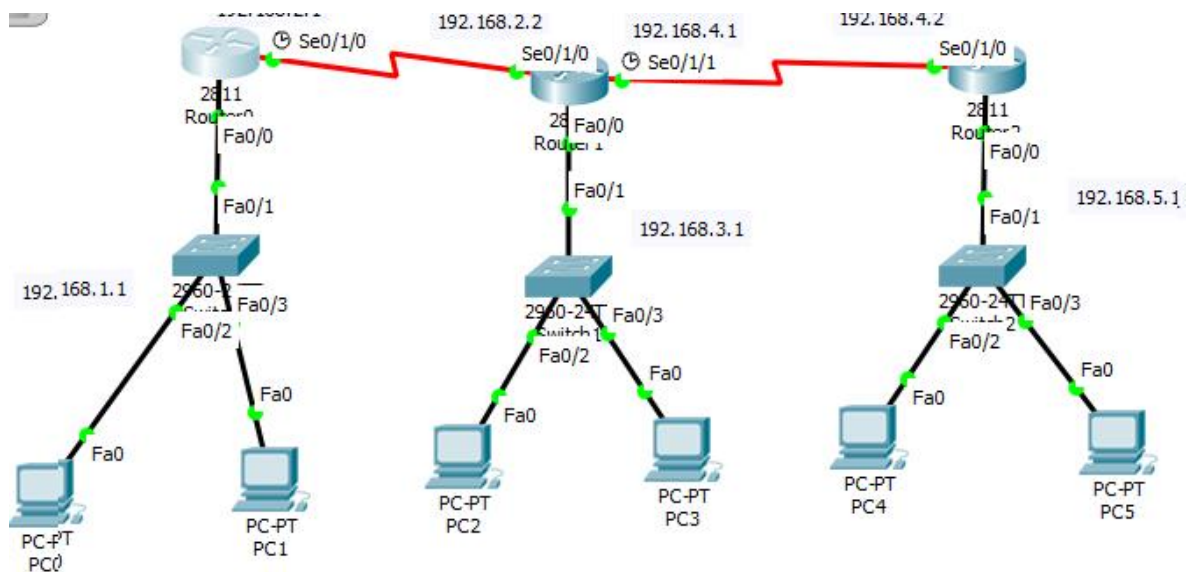
Command on Router2:-



Command on Router3:-



Default routing



Router0

Physical Config CLI Attributes

IOS Command Line Interface

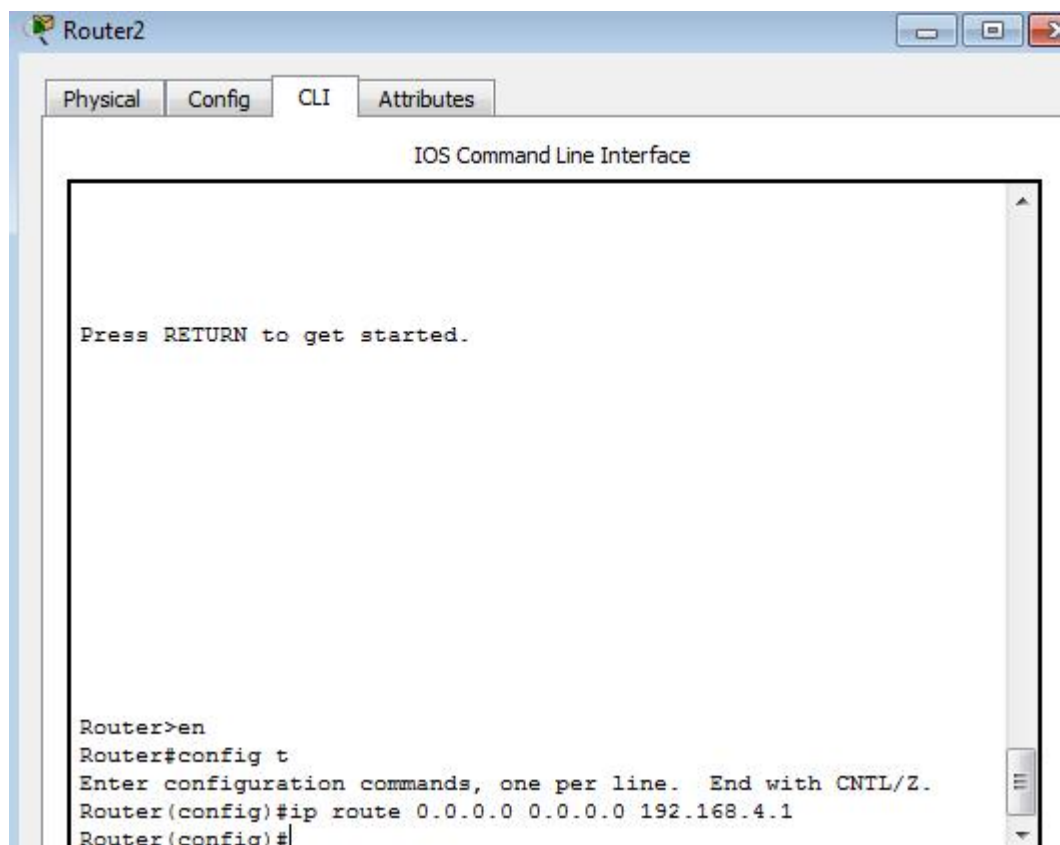
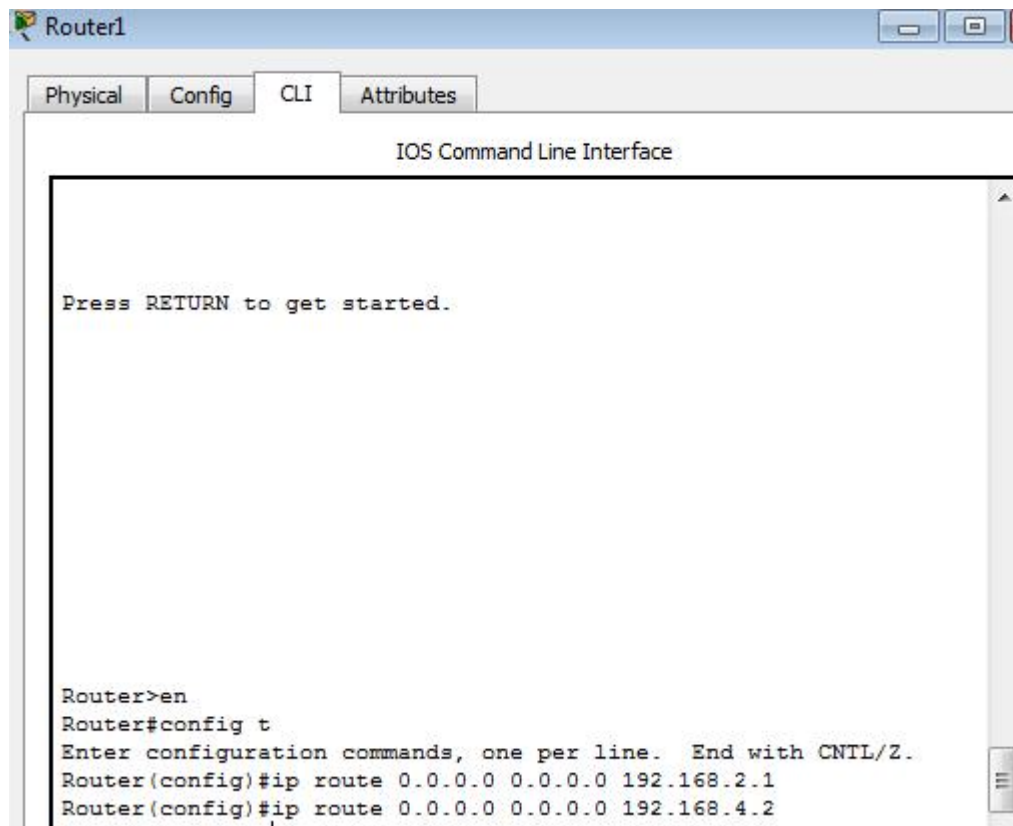
```

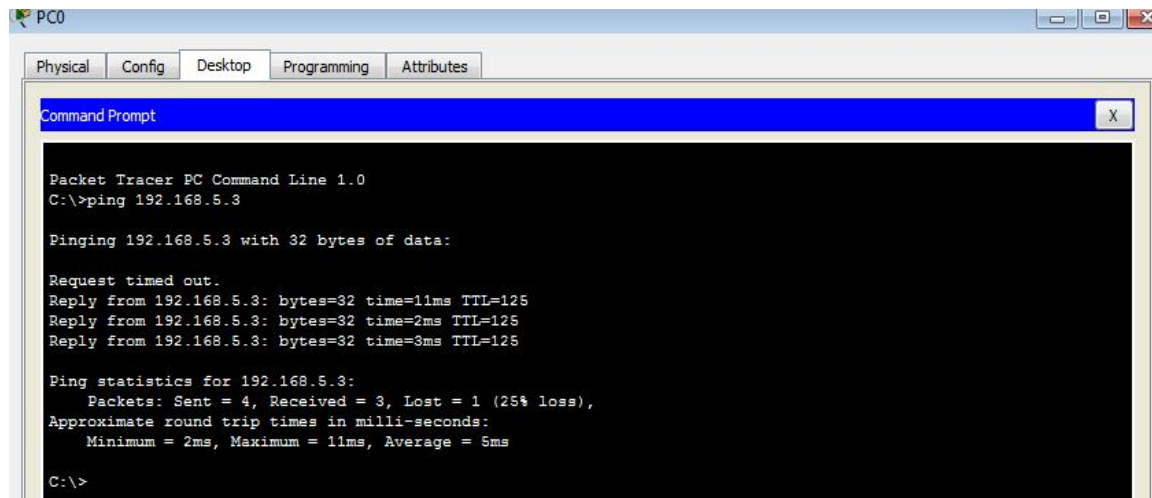
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#do sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile,
B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
area
       N1 - OSPF NSSA external type 1, N2 - 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    192.168.1.0/24 is directly connected, FastEthernet0/0
C    192.168.2.0/24 is directly connected, Serial0/1/0

Router(config)#ip route 0.0.0.0 0.0.0.0 192.168.2.2
  
```



```

PC0
Physical Config Desktop Programming Attributes
Command Prompt

Packet Tracer PC Command Line 1.0
C:\>ping 192.168.5.3

Pinging 192.168.5.3 with 32 bytes of data:

Request timed out.
Reply from 192.168.5.3: bytes=32 time=11ms TTL=125
Reply from 192.168.5.3: bytes=32 time=2ms TTL=125
Reply from 192.168.5.3: bytes=32 time=3ms TTL=125

Ping statistics for 192.168.5.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 11ms, Average = 5ms

C:\>

```

DYNAMIC ROUTING

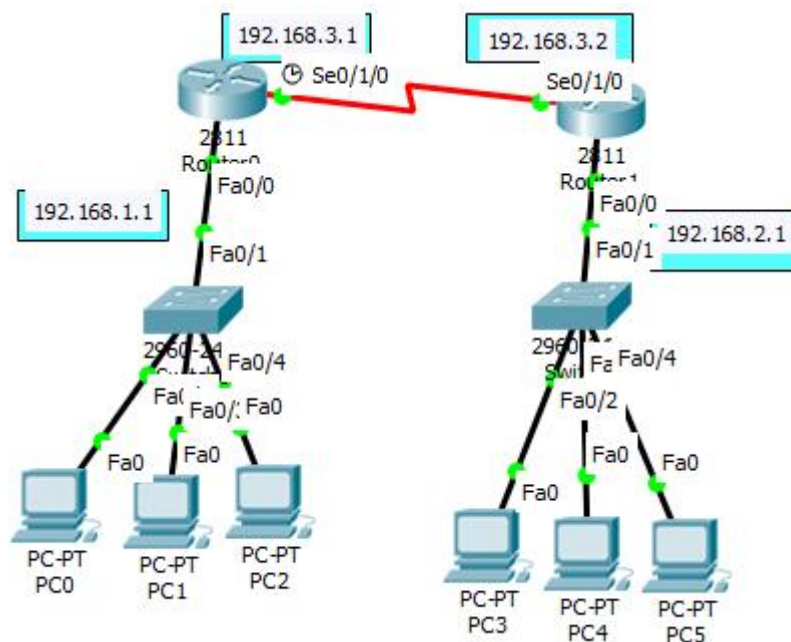
1).RIP

2). EIGRP

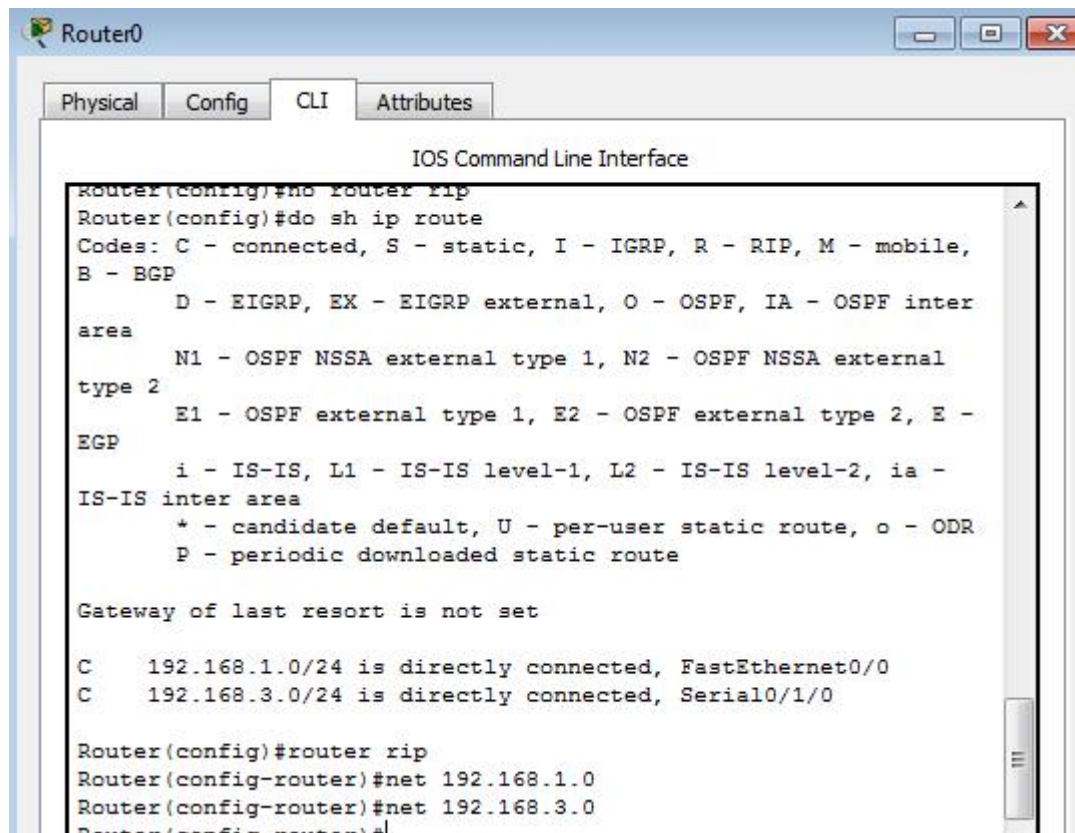
3).OSPF

a).SINGLE AREA

b).MULTIPLE AREA



1).RIP ROUTING



The screenshot shows the CLI of Router0. The user has entered the command `no router rip` to disable RIP. Then, they used `do sh ip route` to display the current routing table. The output shows two connected routes: `192.168.1.0/24` on `FastEthernet0/0` and `192.168.3.0/24` on `Serial0/1/0`. Finally, the user entered `router rip` to enable RIP, followed by `net 192.168.1.0` and `net 192.168.3.0` to advertise these networks.

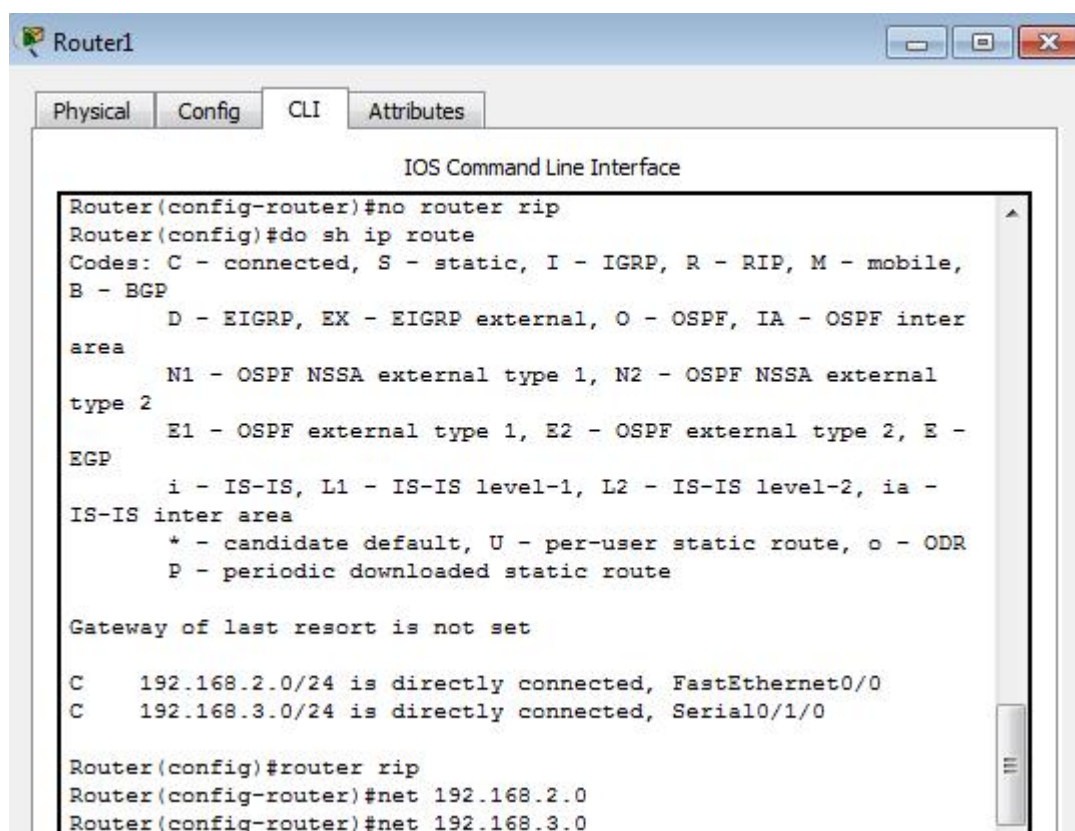
```

Router0
Physical Config CLI Attributes
IOS Command Line Interface
Router(config)#no router rip
Router(config)#do sh 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    192.168.1.0/24 is directly connected, FastEthernet0/0
C    192.168.3.0/24 is directly connected, Serial0/1/0

Router(config)#router rip
Router(config-router)#net 192.168.1.0
Router(config-router)#net 192.168.3.0
Router(config-router)#
  
```



The screenshot shows the CLI of Router1. The user has entered the command `no router rip` to disable RIP. Then, they used `do sh ip route` to display the current routing table. The output shows two connected routes: `192.168.2.0/24` on `FastEthernet0/0` and `192.168.3.0/24` on `Serial0/1/0`. Finally, the user entered `router rip` to enable RIP, followed by `net 192.168.2.0` and `net 192.168.3.0` to advertise these networks.

```

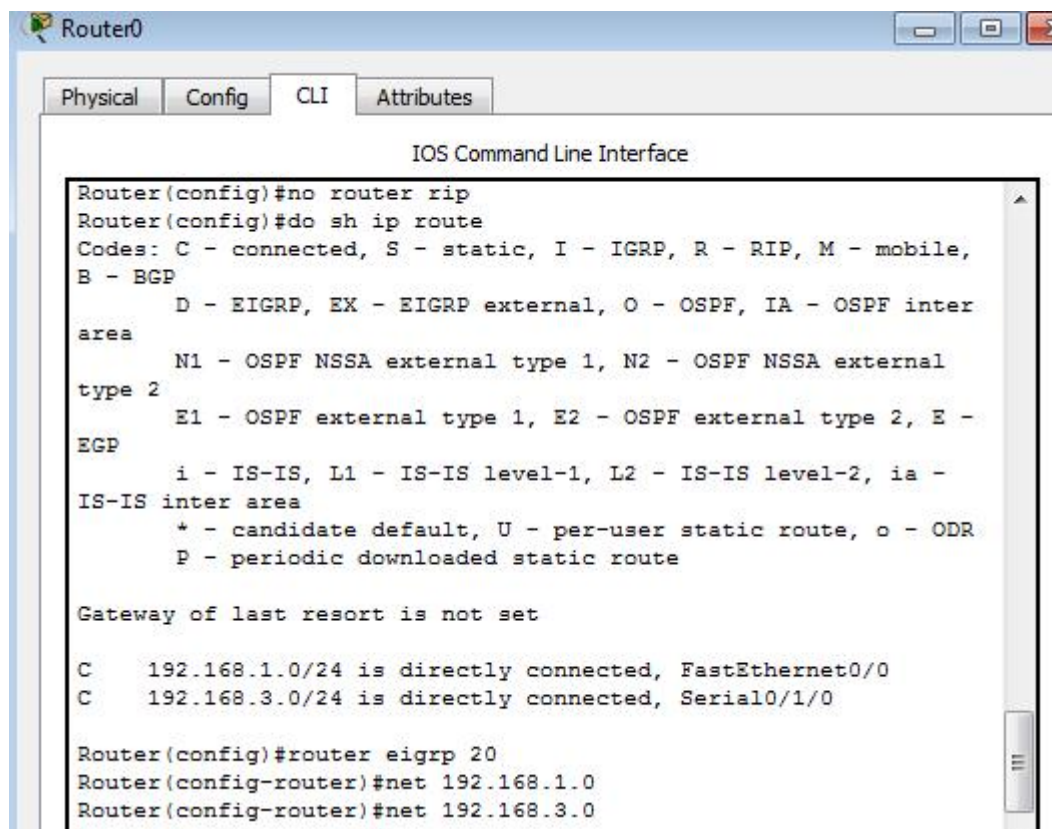
Router1
Physical Config CLI Attributes
IOS Command Line Interface
Router(config-router)#no router rip
Router(config)#do sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile,
B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
area
       N1 - OSPF NSSA external 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    192.168.2.0/24 is directly connected, FastEthernet0/0
C    192.168.3.0/24 is directly connected, Serial0/1/0

Router(config)#router rip
Router(config-router)#net 192.168.2.0
Router(config-router)#net 192.168.3.0
  
```

2).EIGRP ROUTING



Router0

Physical Config CLI Attributes

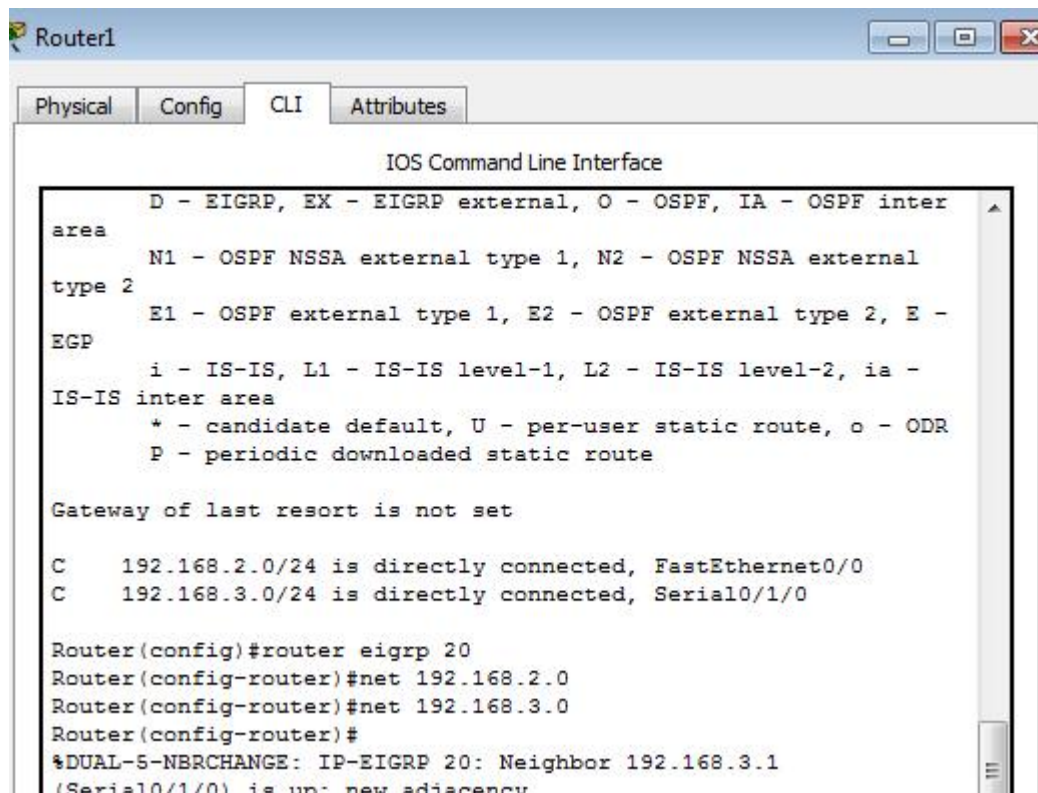
IOS Command Line Interface

```
Router(config)#no router rip
Router(config)#do sh 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    192.168.1.0/24 is directly connected, FastEthernet0/0
C    192.168.3.0/24 is directly connected, Serial0/1/0

Router(config)#router eigrp 20
Router(config-router)#net 192.168.1.0
Router(config-router)#net 192.168.3.0
```



Router1

Physical Config CLI Attributes

IOS Command Line Interface

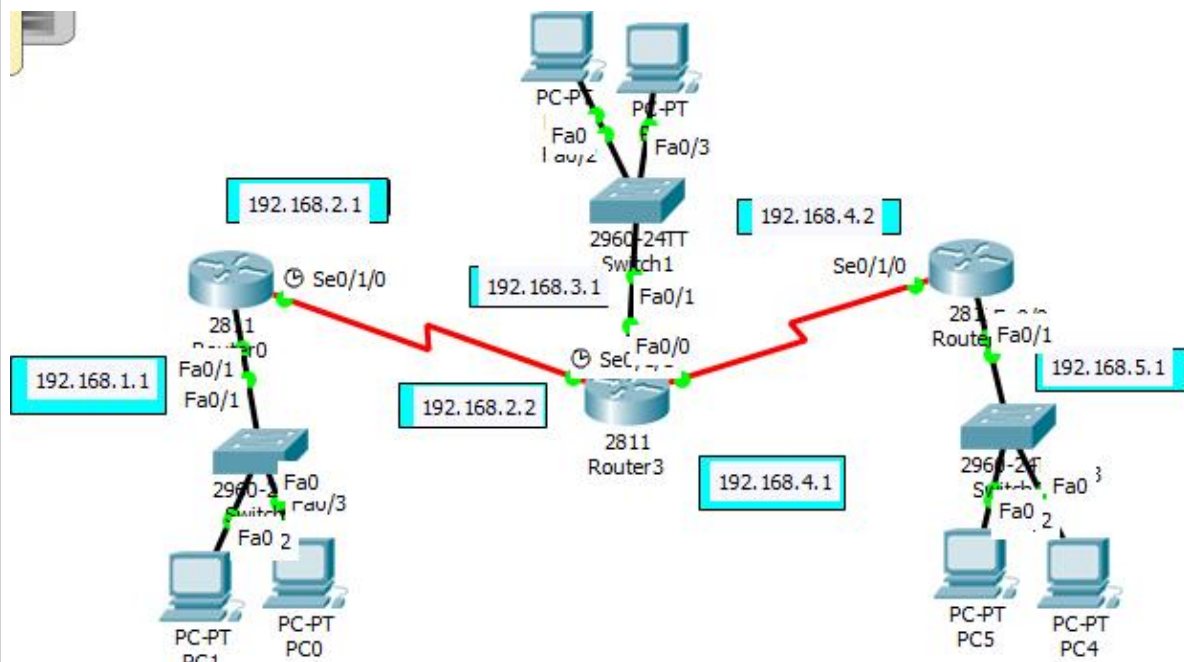
```
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external
type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E -
EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia -
IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

C    192.168.2.0/24 is directly connected, FastEthernet0/0
C    192.168.3.0/24 is directly connected, Serial0/1/0

Router(config)#router eigrp 20
Router(config-router)#net 192.168.2.0
Router(config-router)#net 192.168.3.0
Router(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 20: Neighbor 192.168.3.1
(Serial0/1/0) is up: new adjacency
```


3).OSPF ROUTING



a).SINGLE AREA ROUTING

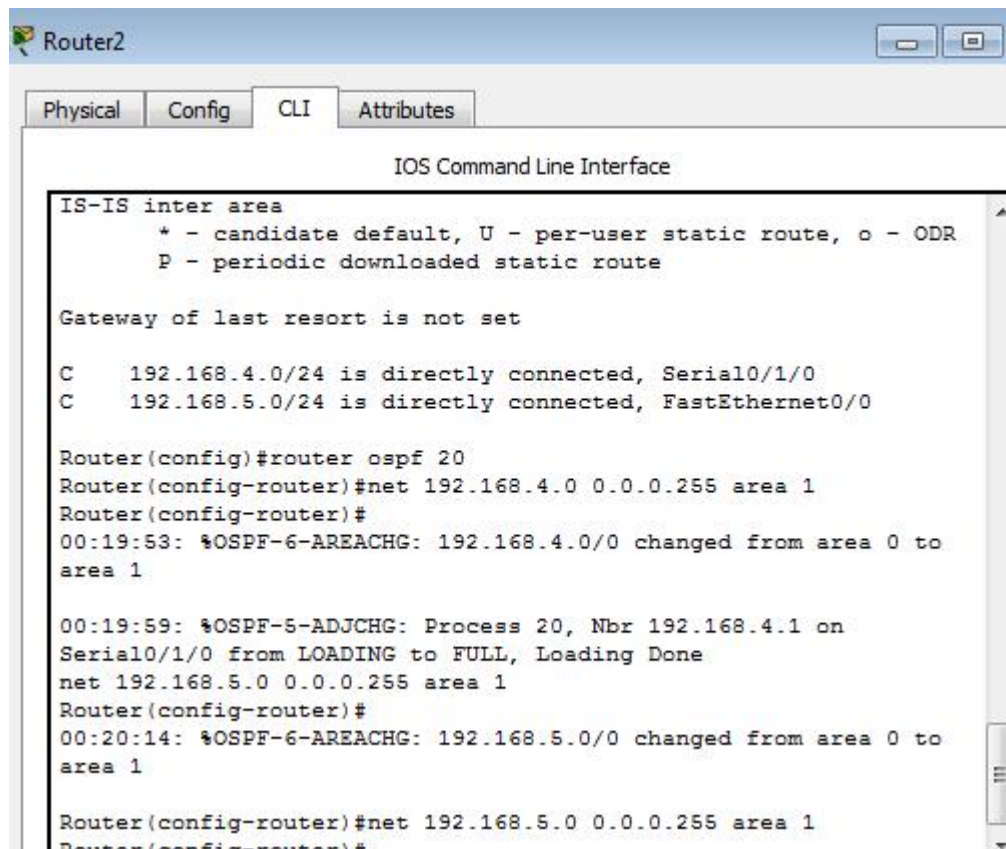
```

Router0
Physical Config CLI Attributes
IOS Command Line Interface
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#do sh 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    192.168.1.0/24 is directly connected, FastEthernet0/1
C    192.168.2.0/24 is directly connected, Serial0/1/0

Router(config)#router ospf 20
Router(config-router)#net 192.168.1.0 0.0.0.255 area 1
Router(config-router)#net 192.168.2.0 0.0.0.255 area 1
Router(config-router)#
  
```



Router2

Physical Config CLI Attributes

IOS Command Line Interface

```
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

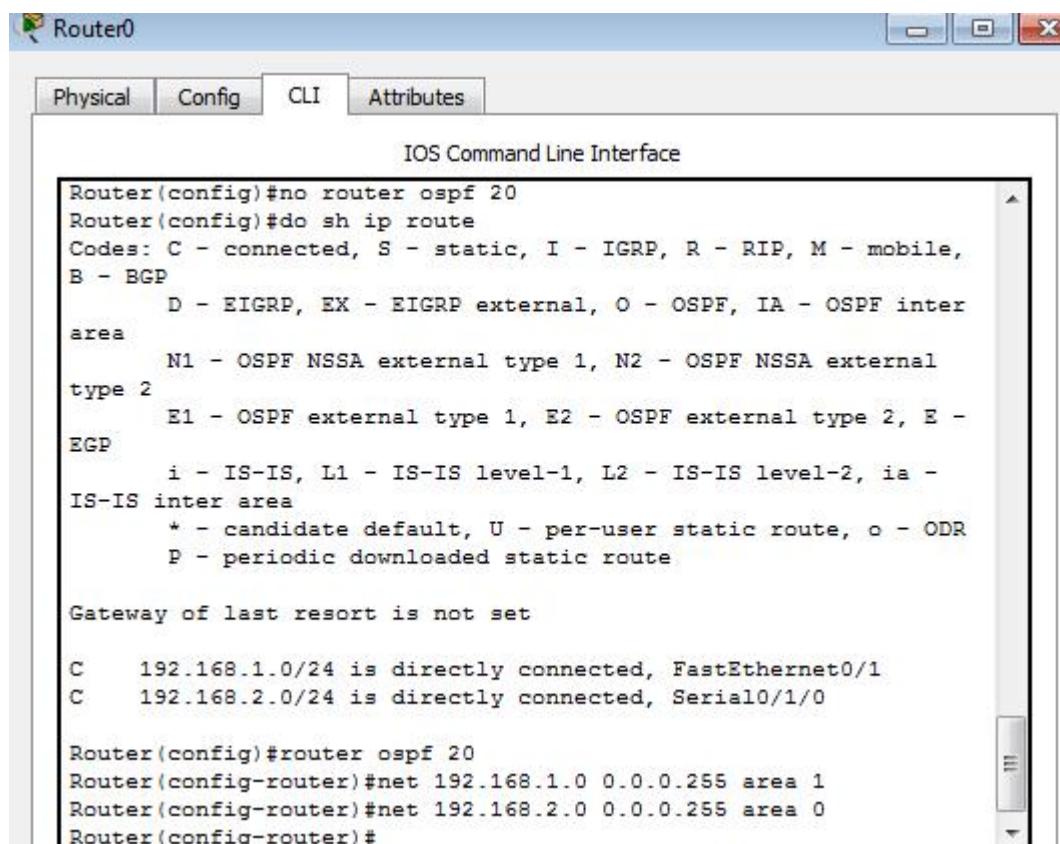
C    192.168.4.0/24 is directly connected, Serial0/1/0
C    192.168.5.0/24 is directly connected, FastEthernet0/0

Router(config)#router ospf 20
Router(config-router)#net 192.168.4.0 0.0.0.255 area 1
Router(config-router)#
00:19:53: %OSPF-6-AREACHG: 192.168.4.0/0 changed from area 0 to
area 1

00:19:59: %OSPF-5-ADJCHG: Process 20, Nbr 192.168.4.1 on
Serial0/1/0 from LOADING to FULL, Loading Done
net 192.168.5.0 0.0.0.255 area 1
Router(config-router)#
00:20:14: %OSPF-6-AREACHG: 192.168.5.0/0 changed from area 0 to
area 1

Router(config-router)#net 192.168.5.0 0.0.0.255 area 1
Router(config-router)#
```

MULTIPLE AREA ROUTING



Router0

Physical Config CLI Attributes

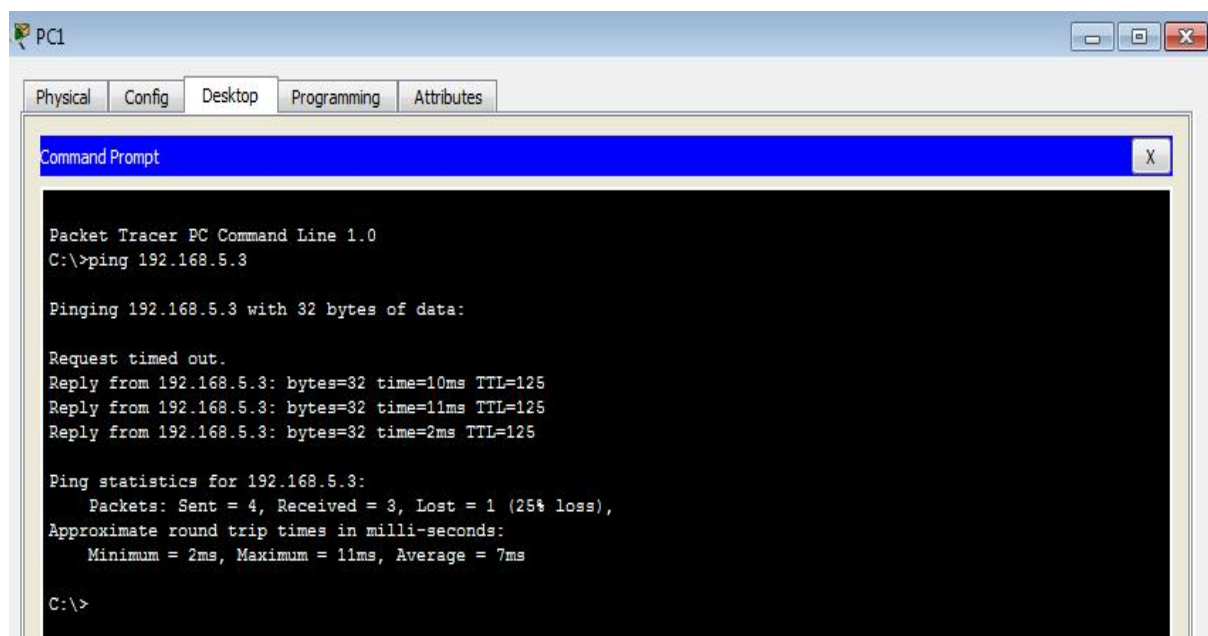
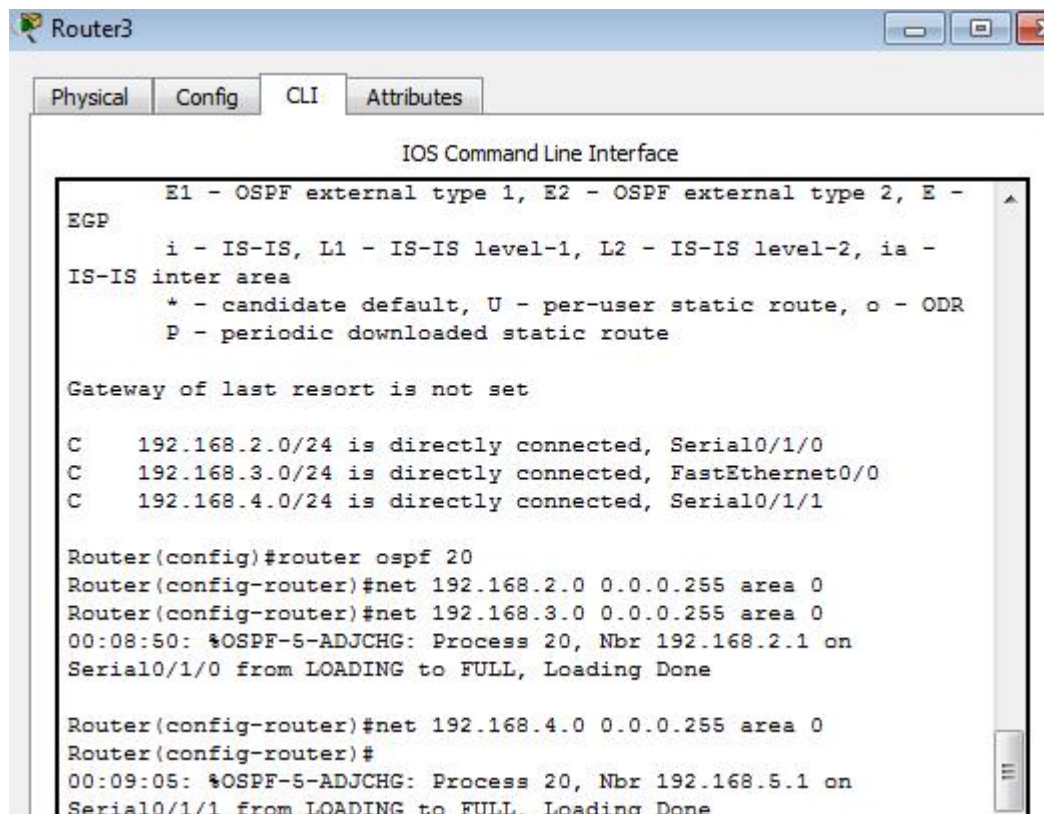
IOS Command Line Interface

```
Router(config)#no router ospf 20
Router(config)#do sh 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

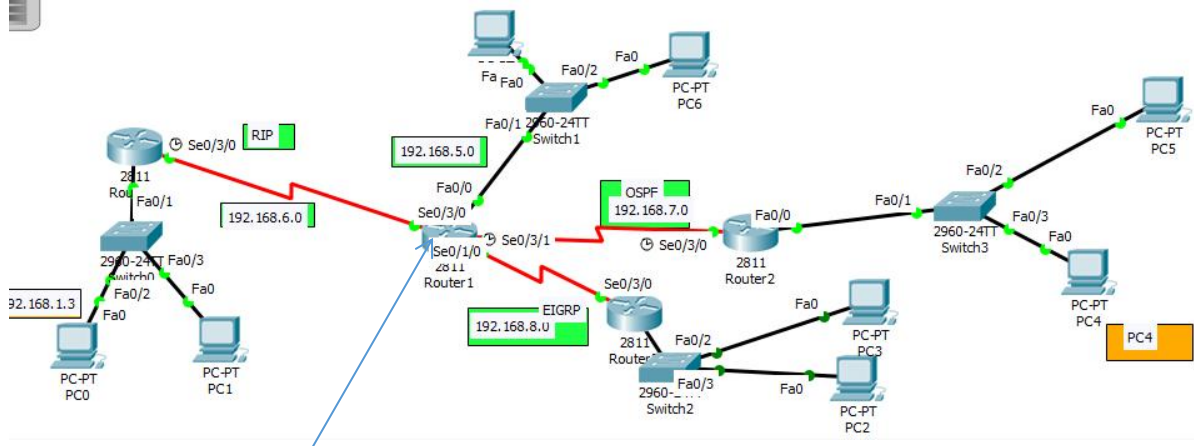
Gateway of last resort is not set

C    192.168.1.0/24 is directly connected, FastEthernet0/1
C    192.168.2.0/24 is directly connected, Serial0/1/0

Router(config)#router ospf 20
Router(config-router)#net 192.168.1.0 0.0.0.255 area 1
Router(config-router)#net 192.168.2.0 0.0.0.255 area 0
Router(config-router)#
```



REDISTRIBUTION OF ROUTING



Redistribution on this router

```

Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#re
Router(config-router)#redistribute eigrp 10 metric 2
Router(config-router)#redistribute ospf 10 metric 3
Router(config-router)#router eigrp 10
Router(config-router)#re
Router(config-router)#redistribute rip metric ?
  <1-4294967295> Bandwidth metric in Kbits per second
Router(config-router)#redistribute rip metric 150000 ?
  <0-4294967295> EIGRP delay metric, in 10 microsecond units
Router(config-router)#redistribute rip metric 150000 20000?
  <0-4294967295>
Router(config-router)#redistribute rip metric 150000 20000 ?
  <0-255> EIGRP reliability metric where 255 is 100% reliable
Router(config-router)#redistribute rip metric 150000 20000 150 ?
  <1-255> EIGRP Effective bandwidth metric (Loading) where 255 is 100% loaded
Router(config-router)#redistribute rip metric 150000 20000 150 100 ?
  <1-65535> EIGRP MTU of the path
Router(config-router)#redistribute rip metric 150000 20000 150 100 15000
Router(config-router)#redistribute ospf 10 metric 150000 20000 150 100 15000
Router(config-router)#router ospf 10
Router(config-router)#router rip subnets
  ^
% Invalid input detected at '^' marker.

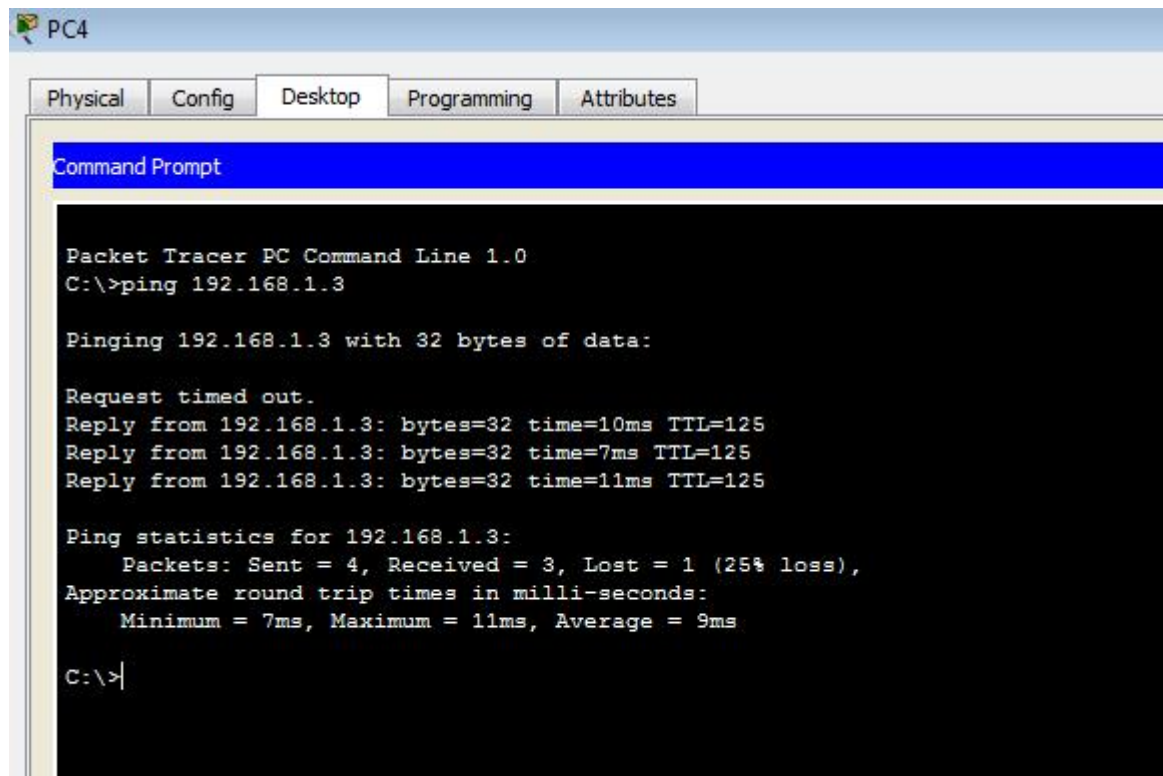
Router(config-router)#red rip subnets
Router(config-router)#red eigrp 10 subnets
  
```

RIP
REDISTRIBUTION

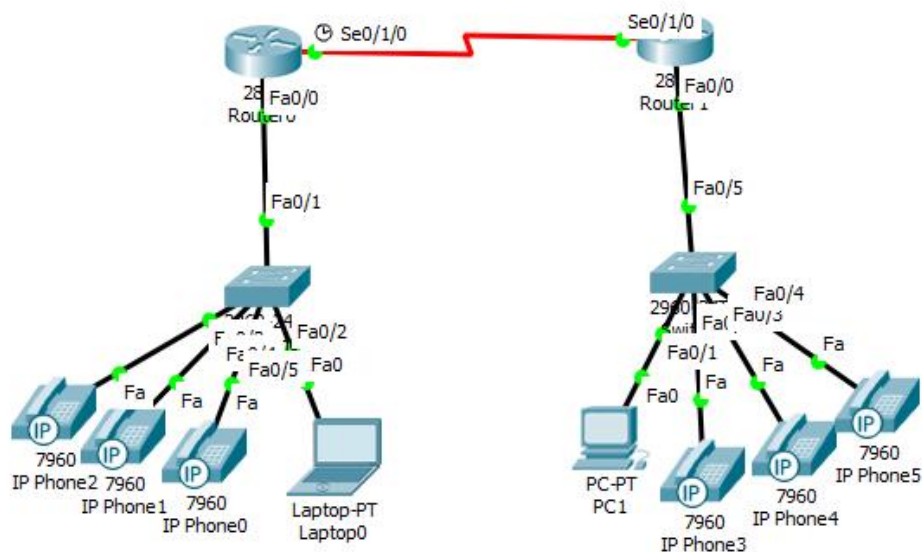
EIGRP
REDISTRIBUTION

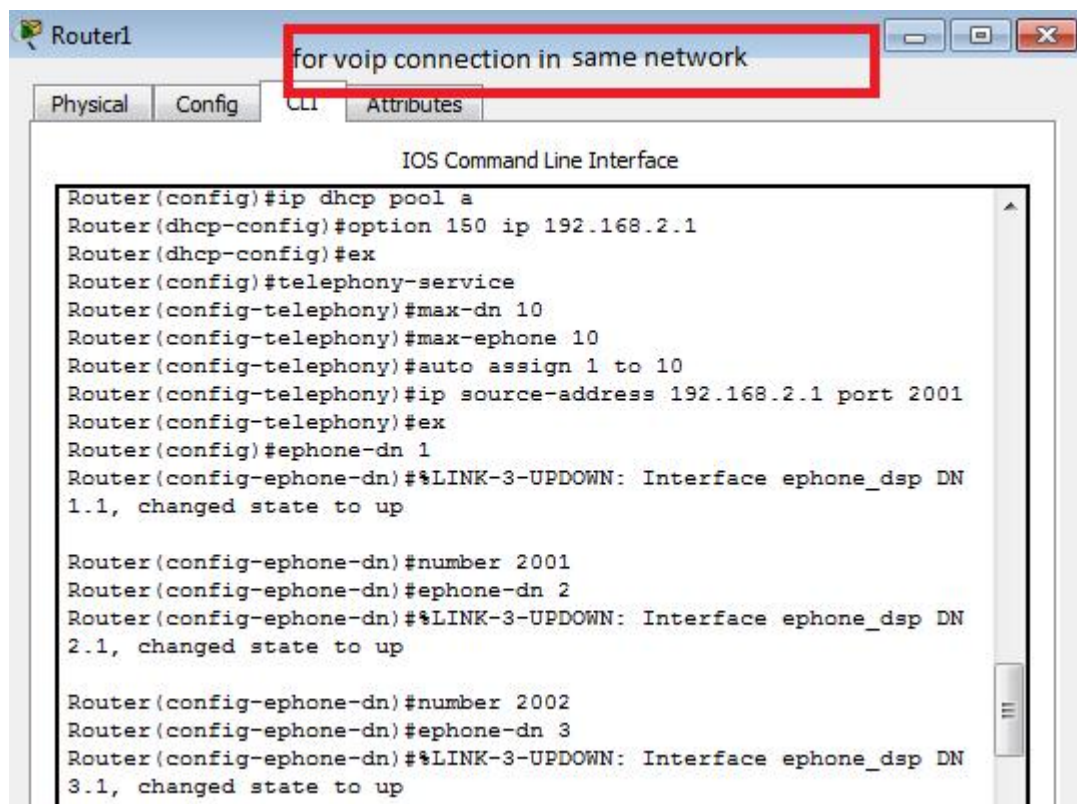
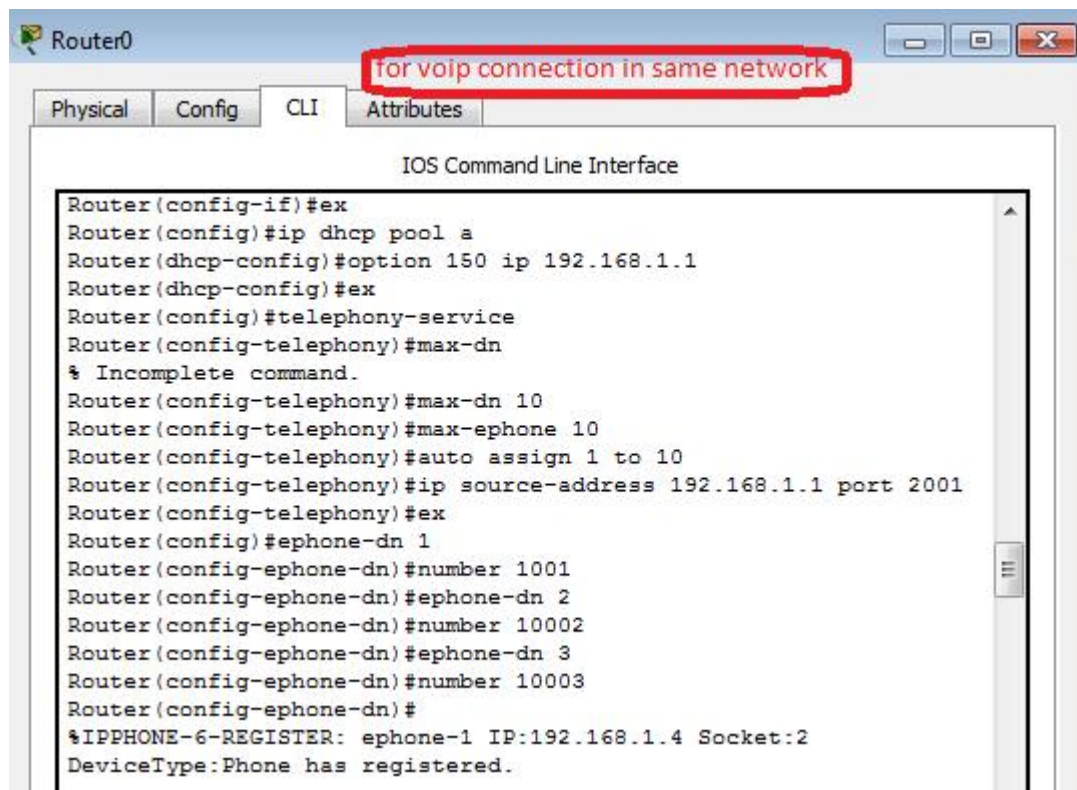
OSPF
REDISTRIBUTION

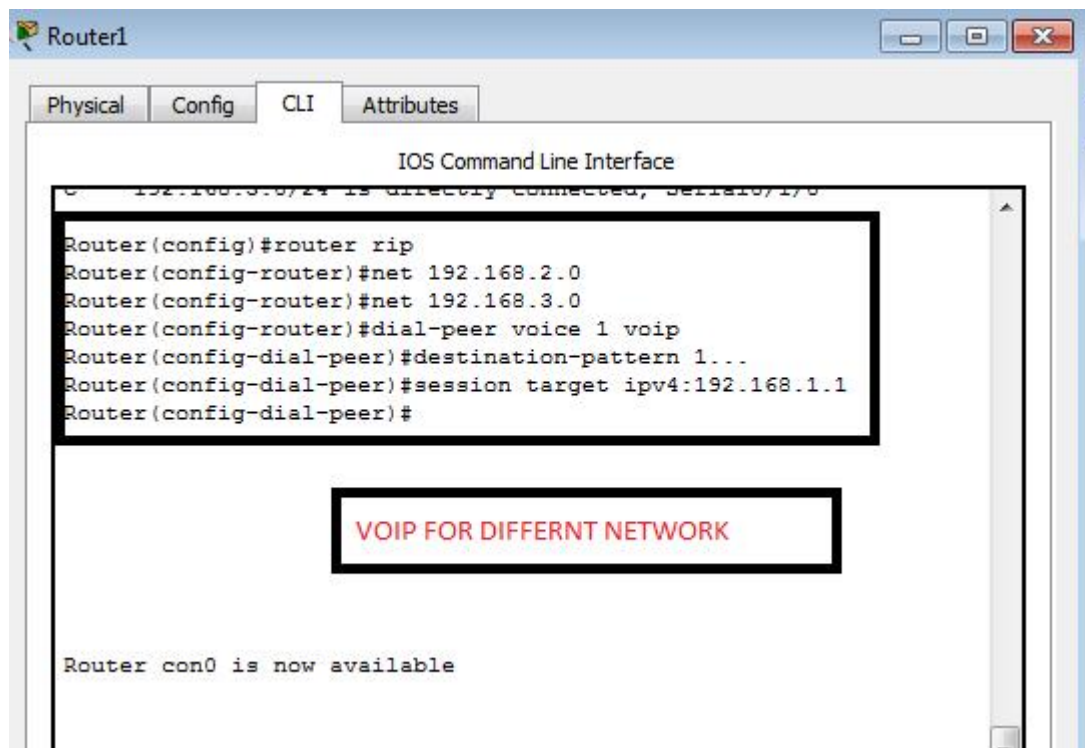
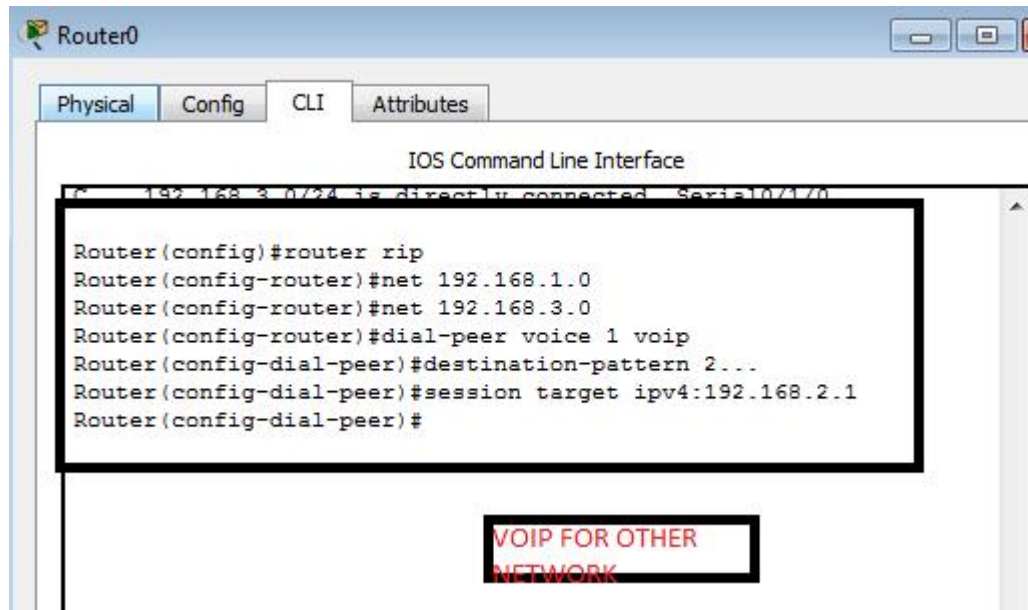
Testing of connection



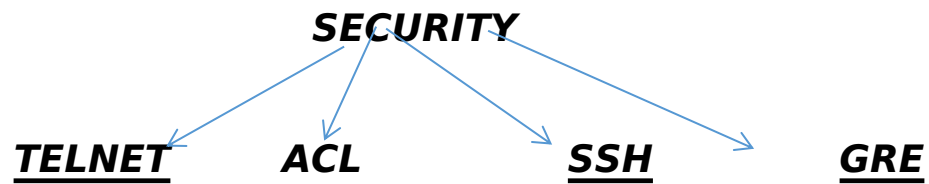
VOIP(VOICE OVER IP FORMAT)



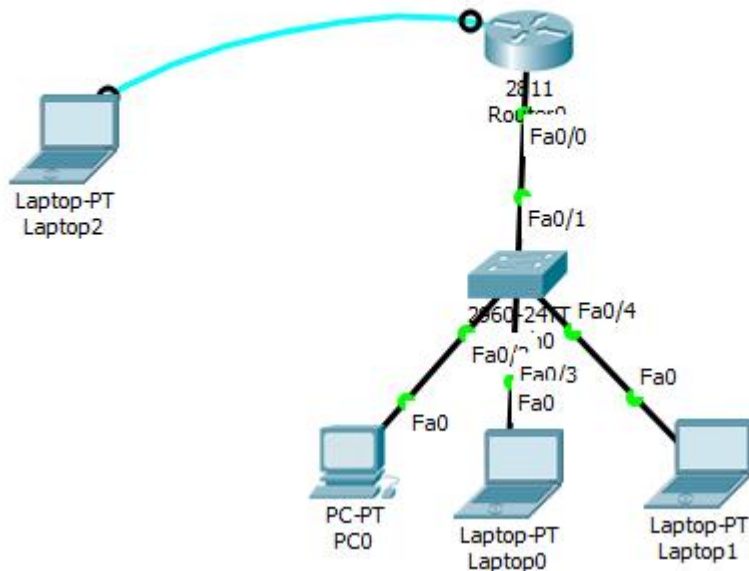








TELNET



Router0

Physical Config CLI Attributes

IOS Command Line Interface

```

Press RETURN to get started!

Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#line con 0
Router(config-line)#pass 123
Router(config-line)#login
Router(config-line)#line vty ?
% Unrecognized command
Router(config-line)#line vty 0 4
Router(config-line)#username rohit
Router(config)#username rohit pass 1234
Router(config)#login local
Router(config)#^
% Invalid input detected at '^' marker.

Router(config)#line vty 0 4
Router(config-line)#login local
Router(config-line)#enable sec 12345
  
```


PC0

Physical Config Desktop Programming Attributes

Command Prompt

```
Packet Tracer PC Command Line 1.0
C:\>telnet 192.168.1.1
Trying 192.168.1.1 ...Open

User Access Verification

Username: rohit

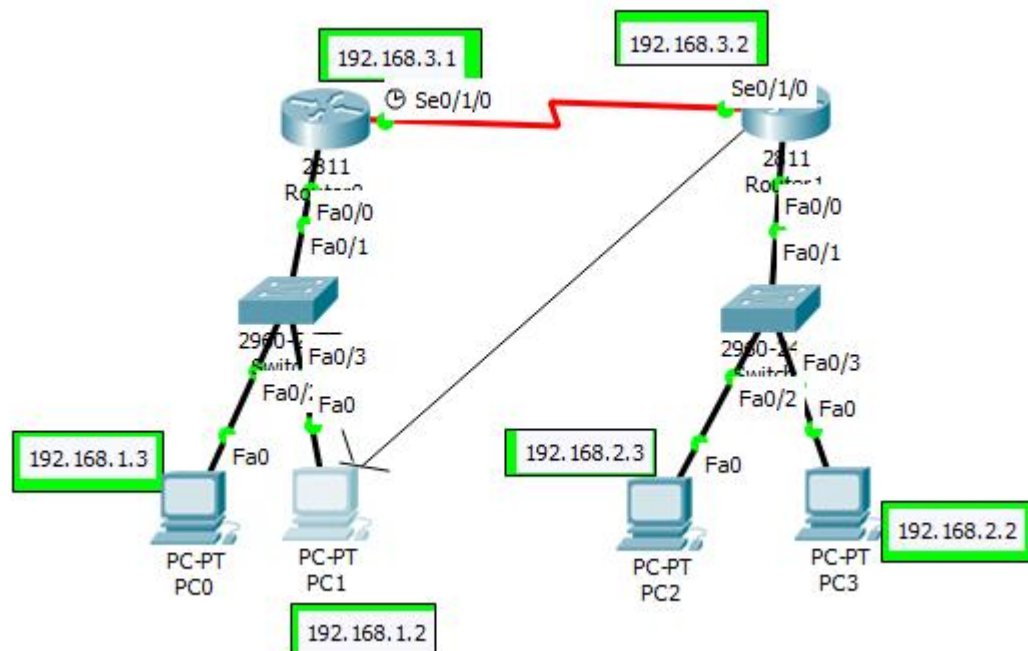
Password:
Router>en
Password:
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#do sh run
Building configuration...

Current configuration : 751 bytes
!
```

ACL(ACCESS CONTROL LIST)

STANDARD

EXTENDED



```

Router(config)#do sh access-list 1
Router(config)#acc
Router(config)#access-list 1 deny h 192.168.1.2
^
% Invalid input detected at '^' marker.

Router(config)#access-list 1 deny h 192.168.1.2
Router(config)#access-list 1 permit any
Router(config)#int fa0/0
Router(config-if)#ip acce
Router(config-if)#ip access-group 1 out

```

PC1

Physical Config Desktop Programming Attributes

Command Prompt

Packet Tracer PC Command Line 1.0

C:\>ping 192.168.2.2 **no acl apply**

Pinging 192.168.2.2 with 32 bytes of data:

Request timed out.

Reply from 192.168.2.2: bytes=32 time=12ms TTL=126

Reply from 192.168.2.2: bytes=32 time=1ms TTL=126

Reply from 192.168.2.2: bytes=32 time=10ms TTL=126

Ping statistics for 192.168.2.2:

Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),

Approximate round trip times in milli-seconds:

Minimum = 1ms, Maximum = 12ms, Average = 7ms

C:\>ping 192.168.2.2 **when acl apply**

Pinging 192.168.2.2 with 32 bytes of data:

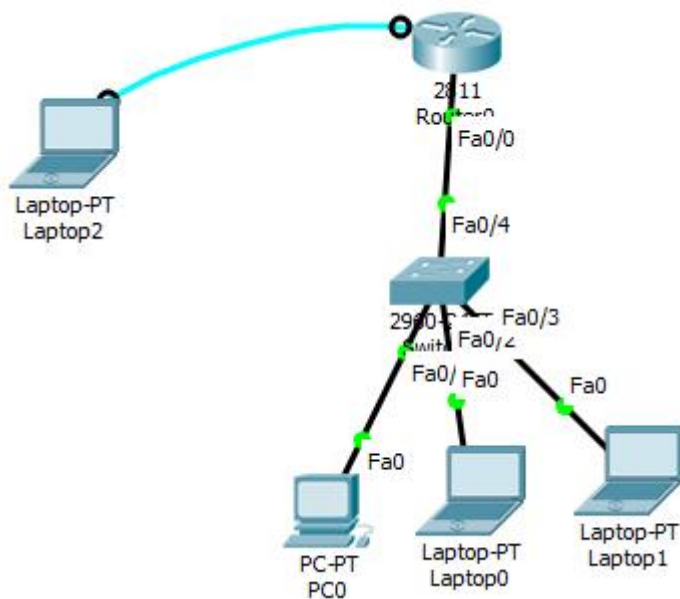
Reply from 192.168.3.2: Destination host unreachable.

Reply from 192.168.3.2: Destination host unreachable.

Reply from 192.168.3.2: Destination host unreachable.

Reply from 192.168.3.2: Destination host unreachable.

SECURE SHELL(ssh)



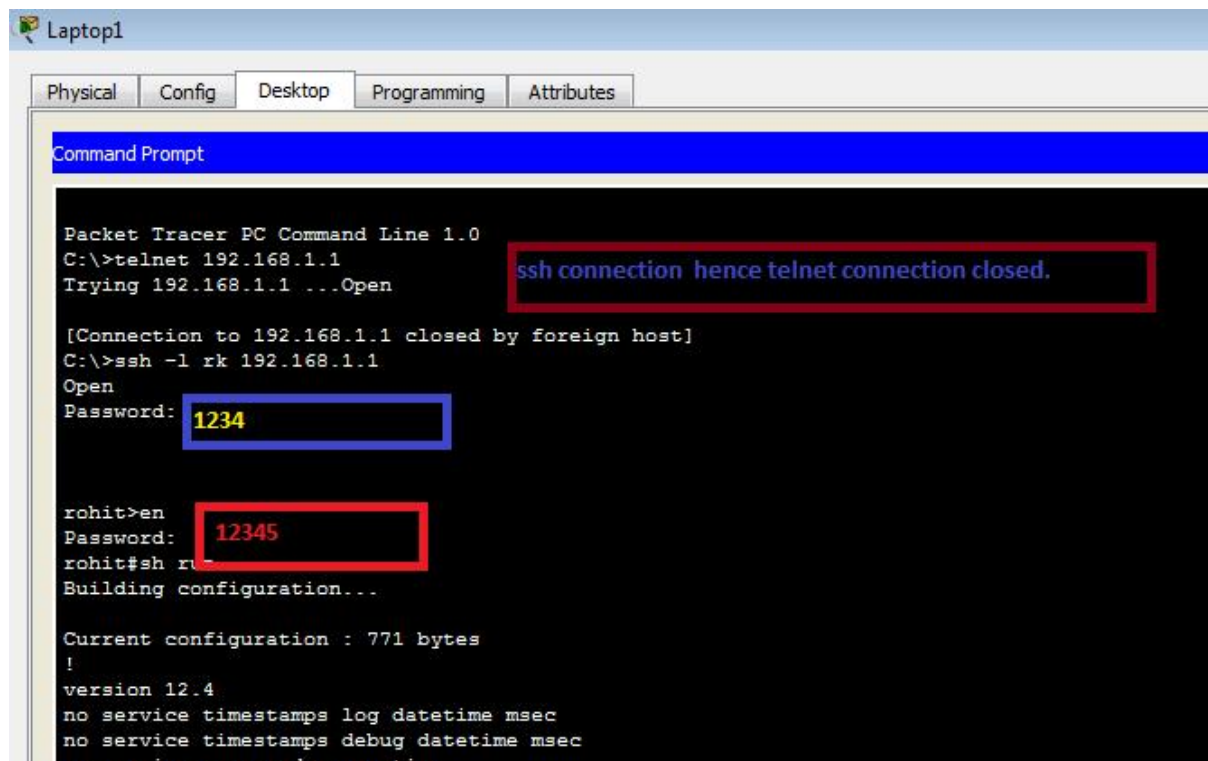
```

Router0
Physical Config CLI Attributes

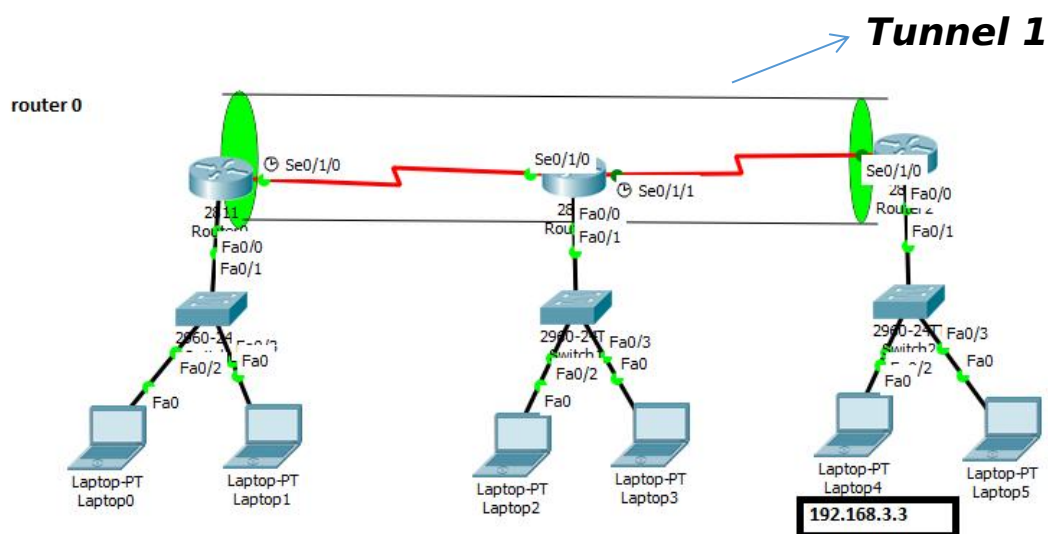
Router(config)#hostname rohit
rohit(config)#ip domain name codehack
rohit(config)#crypto key generate rsa
The name for the keys will be: rohit.codehack
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

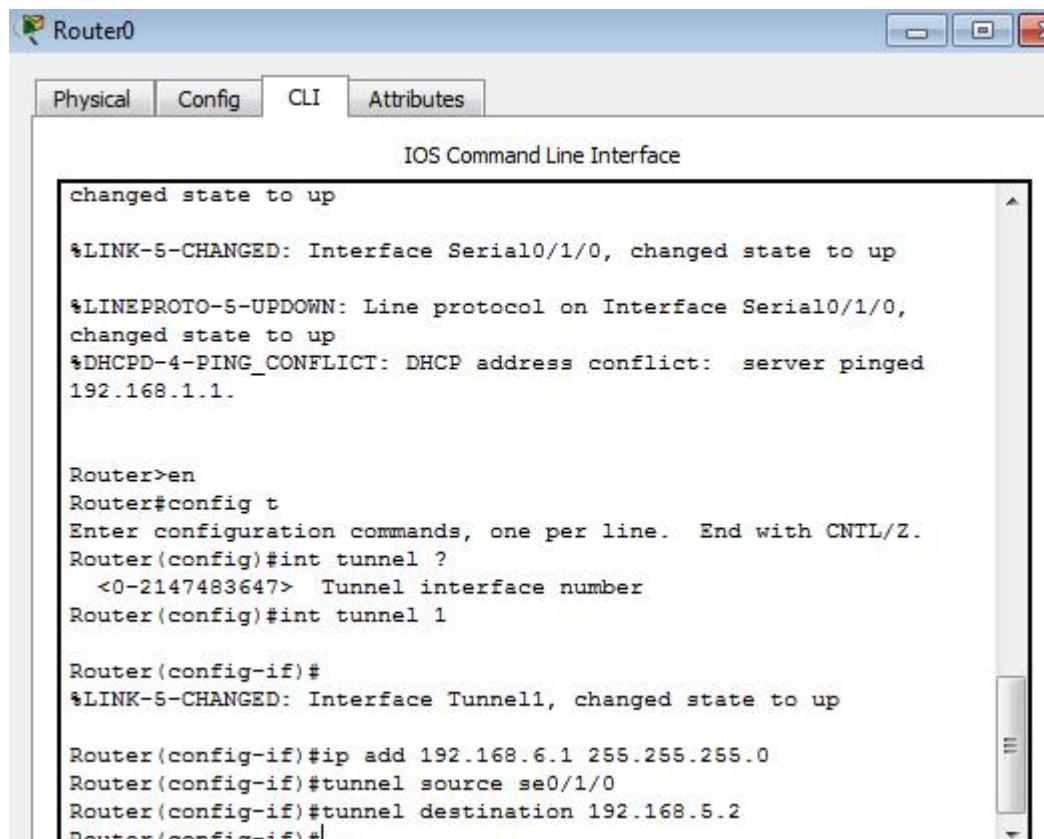
How many bits in the modulus [512]: ?
% A decimal number between 360 and 2048
How many bits in the modulus [512]: % A decimal number between 360 and 2048
How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

rohit(config)#line vty 0 4
*Mar 1 0:10:15.215: %SSH-5-ENABLED: SSH 1.99 has been enabled
rohit(config-line)#transport input ssh
rohit(config-line)#line vty 0 4
rohit(config-line)#username rk
rohit(config)#username rk pass 1234
rohit(config)#secret enable 12345
^
% Invalid input detected at '^' marker.
  
```

Generic routing encapsulation(gre)





The screenshot shows the CLI window for Router0. The window has tabs for Physical, Config, CLI, and Attributes. The CLI tab is active, displaying the IOS Command Line Interface. The output shows several status messages: '%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up', '%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up', and '%DHCPD-4-PING_CONFLICT: DHCP address conflict: server pinged 192.168.1.1.'. The user enters 'Router>en' to enter enable mode, then 'Router#config t' to enter configuration mode. The prompt changes to 'Router(config)#'. The user enters 'int tunnel ?' which shows the prompt '<0-2147483647> Tunnel interface number'. The user enters '1' and the prompt changes to 'Router(config)#int tunnel 1'. The user enters '#' and the prompt changes to 'Router(config-if)#'. The output shows '%LINK-5-CHANGED: Interface Tunnell1, changed state to up'. The user enters 'ip add 192.168.6.1 255.255.255.0', then 'tunnel source se0/1/0', and finally 'tunnel destination 192.168.5.2'. The prompt changes to 'Router(config-if)#'.

```

changed state to up

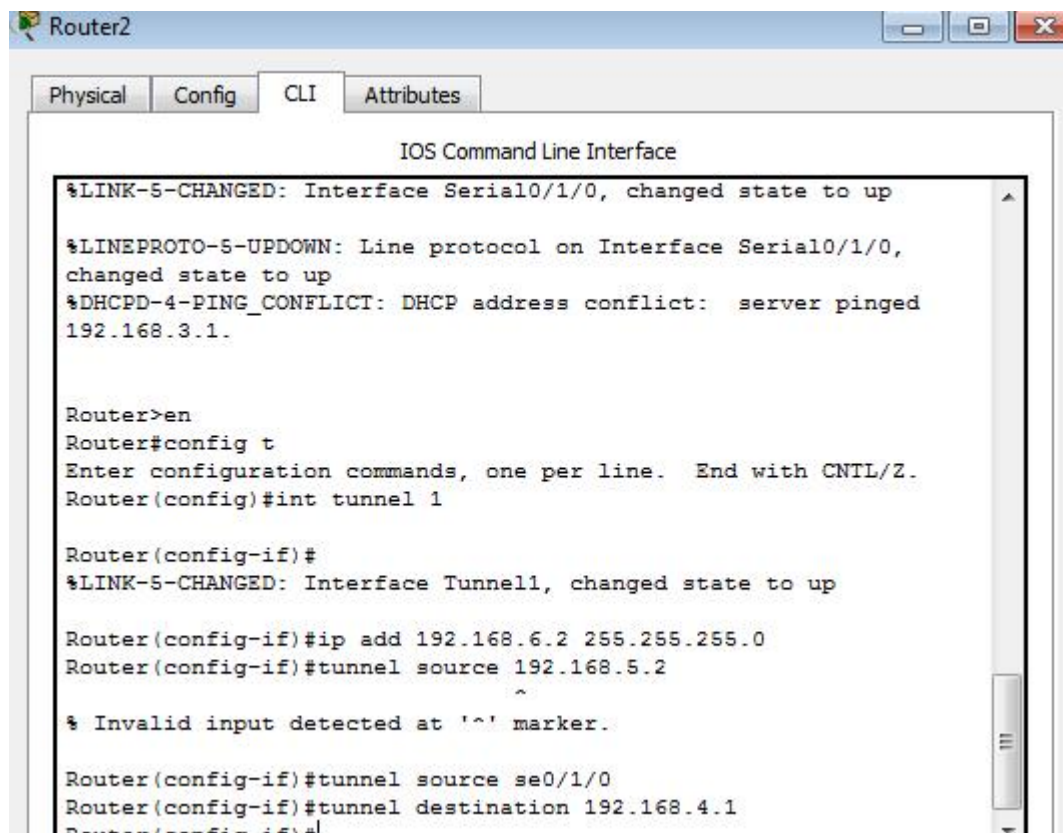
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0,
changed state to up
%DHCPD-4-PING_CONFLICT: DHCP address conflict:  server pinged
192.168.1.1.

Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int tunnel ?
    <0-2147483647> Tunnel interface number
Router(config)#int tunnel 1

Router(config-if)#
%LINK-5-CHANGED: Interface Tunnell1, changed state to up

Router(config-if)#ip add 192.168.6.1 255.255.255.0
Router(config-if)#tunnel source se0/1/0
Router(config-if)#tunnel destination 192.168.5.2
Router(config-if)#
  
```



The screenshot shows the CLI window for Router2. The window has tabs for Physical, Config, CLI, and Attributes. The CLI tab is active, displaying the IOS Command Line Interface. The output shows several status messages: '%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up', '%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up', and '%DHCPD-4-PING_CONFLICT: DHCP address conflict: server pinged 192.168.3.1.'. The user enters 'Router>en' to enter enable mode, then 'Router#config t' to enter configuration mode. The prompt changes to 'Router(config)#'. The user enters 'int tunnel 1' and the prompt changes to 'Router(config-if)#'. The output shows '%LINK-5-CHANGED: Interface Tunnell1, changed state to up'. The user enters 'ip add 192.168.6.2 255.255.255.0', then 'tunnel source 192.168.5.2', and finally '^' (caret). The output shows '% Invalid input detected at '^' marker.'. The user enters 'tunnel source se0/1/0' and finally 'tunnel destination 192.168.4.1'. The prompt changes to 'Router(config-if)#'.

```

%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0,
changed state to up
%DHCPD-4-PING_CONFLICT: DHCP address conflict:  server pinged
192.168.3.1.

Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int tunnel 1

Router(config-if)#
%LINK-5-CHANGED: Interface Tunnell1, changed state to up

Router(config-if)#ip add 192.168.6.2 255.255.255.0
Router(config-if)#tunnel source 192.168.5.2
Router(config-if)#^
% Invalid input detected at '^' marker.

Router(config-if)#tunnel source se0/1/0
Router(config-if)#tunnel destination 192.168.4.1
Router(config-if)#
  
```

```
Router0
Physical Config CLI Attributes
IOS Command Line Interface

C 192.168.1.0/24 is directly connected, FastEthernet0/0
C 192.168.4.0/24 is directly connected, Serial0/1/0

Router(config)#router rip
Router(config-router)#net 192.168.1.0
Router(config-router)#net 192.168.4.0
Router(config-router)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Tunnel1, changed
state to up

Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#traceroute 192.168.3.3
Type escape sequence to abort.
Tracing the route to 192.168.3.3

 1  192.168.4.2      0 msec    1 msec    0 msec
 2  192.168.5.2     12 msec    2 msec    2 msec
 3  192.168.3.3      0 msec    1 msec    2 msec

Router#
```

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A SOFTWARE SOLUTION

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CH
Member of
Cooperation
of Indian Industry

ISO
9001
CERTIFIED

9 YEAR
OF
EXCELLENCE

ISO Certification


No. NFOWIZ/6W2019/1930

This is to certify that Mr. / Ms. Rohit Kumar S/D/o. Sh. Vijay Yadav
of G.E.C, Panipat has successfully done more than One Hundred and Twenty Hours (120 hrs.)
on Networking from June 2019 to July 2019
During the tenure of the above course, we found him/her a hardworking & innovative individual.
We wish him/her a very bright and prosperous future.

Simrat Kaur
Authorised Signatory




[Signature]
Managing Director

Chandigarh : 0172 4567888, 98885 00888, 98886 00888 Bathinda : 0164 5007088, 90235 00888, 90236 00888



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H.O.: SCO 118 - 120, Sector 34 - A, **CHANDIGARH**
B.O.: First Floor, Crown Tower, 100 Ft. Road, **BATHINDA**
Web.: www.infowiz.co.in E-mail : info@infowiz.co.in

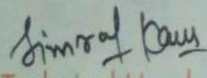




Certificate


No. INFOWIZ/6W2019/1930

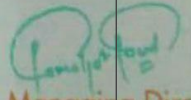
This is certified that Mr./Ms. Rohit Kumar S/D/o. Sh. Vijay Yadav
of G.E.C, Pamipat has successfully undergone Training Course Networking
From June 2019 to July 2019. During the tenure of the above course, we found him/her
a hardworking & innovative individual.

We wish him/her a very bright and prosperous future.



Technical Head






Managing Director

Chandigarh : 0172 4567888, 98885 00888, 98886 00888

Bathinda : 0164 5007088, 90235 00888, 90236 00888

Certificate of Training



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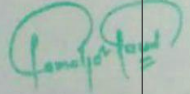
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Experience Certificate

Reference no :- 1930

This is to certify that Mr/Ms. Rohit Kumar
S/D/o. Sh. Vijay Yadav
was working as a Networking with our organization
INFOWIZ - A Software Solution, Chandigarh from June 2019 to July 2019.

During the tenure, we found him/her hardworking and an innovative individual.
His/her performance was excellent.



Managing Director

Chandigarh : 0172 4567888, 98885 00888, 98886 00888 Bathinda : 0164 5007088, 90235 00888, 90236 00888

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Web: www.infowiz.co.in
E-mail : info@infowiz.co.in



PERSONALITY Development Course CERTIFICATE

No. INFOWIZ/6W2019/1930

This is to certify that Mr. / Ms. Rohit Kumar

S/D/o. Sh. Vijay Yadav of G-E-C, Panipat

has successfully undergone our PERSONALITY DEVELOPMENT COURSE conducted in **INFOWIZ®** premises. We have found an immense development in his/her overall personality ✓ing the Personality Development Course.

✓ him/her a very bright and prosperous future.

Simrat Kaur
Authorised Signatory



Simrat Kaur
Managing Director