

## CO513 - Lab 02

### Static Routing

#### Basic Configuration

1. Draw the network topology in cisco packet tracer using appropriate devices; routers, switches and end devices as indicated in Figure 01.

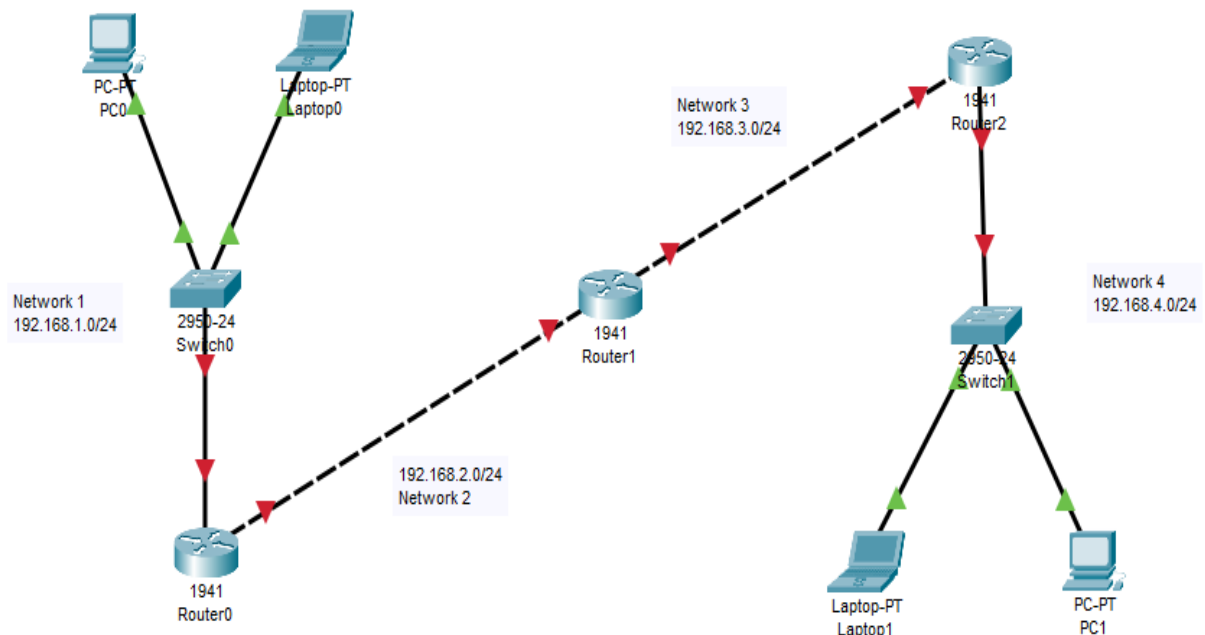


Figure 1.1

## 2. Assign the end devices and router ports with appropriate IP addresses.

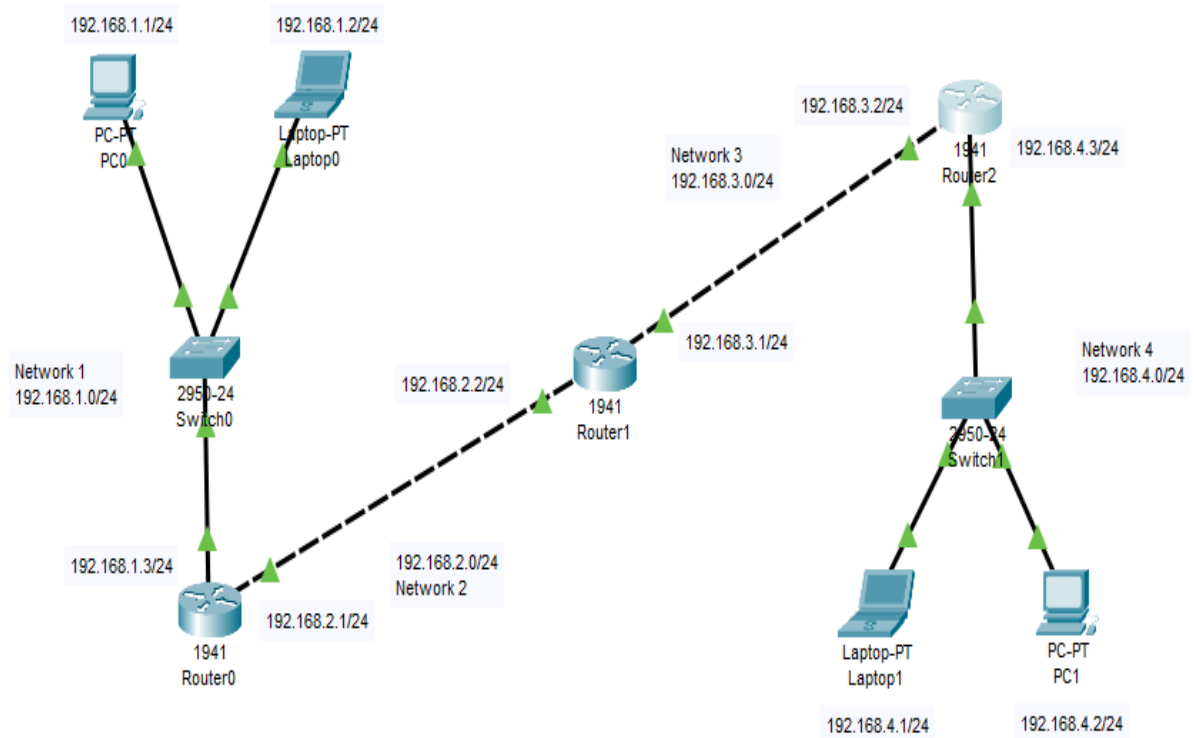


Figure 1.2.1

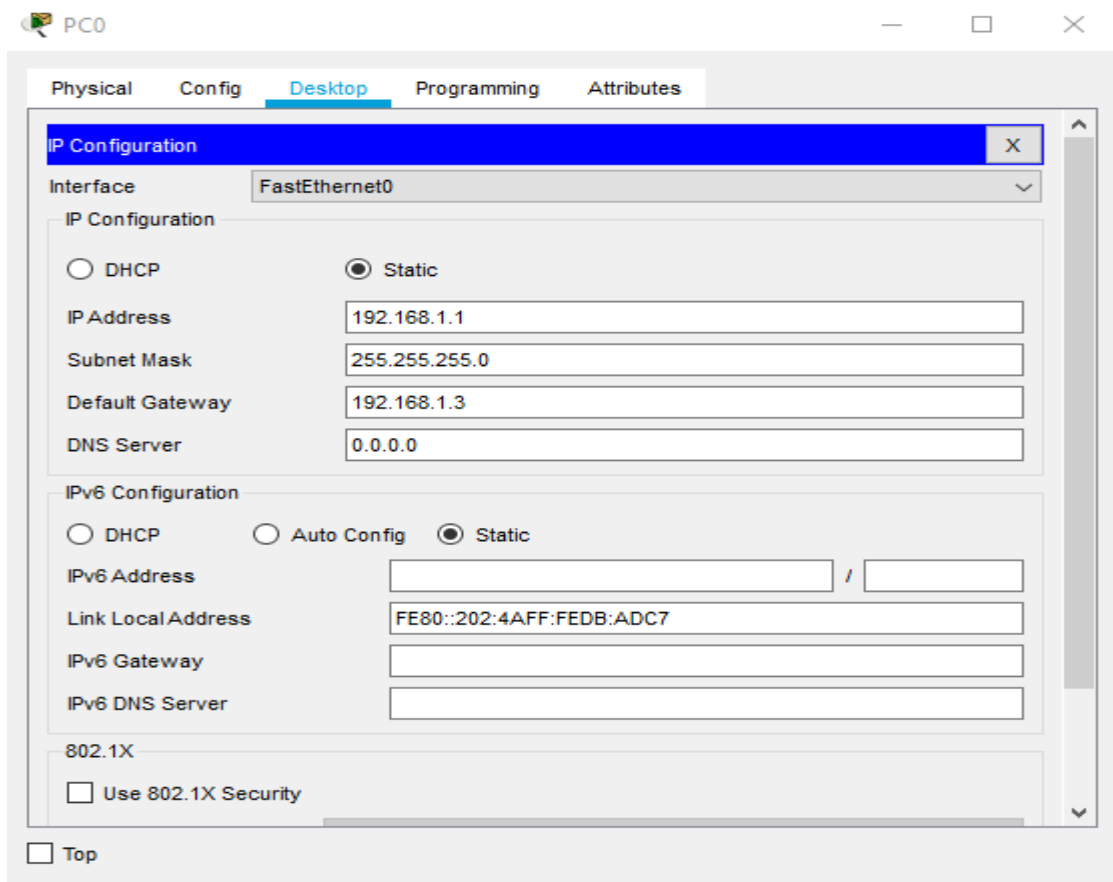


Figure 1.2.2

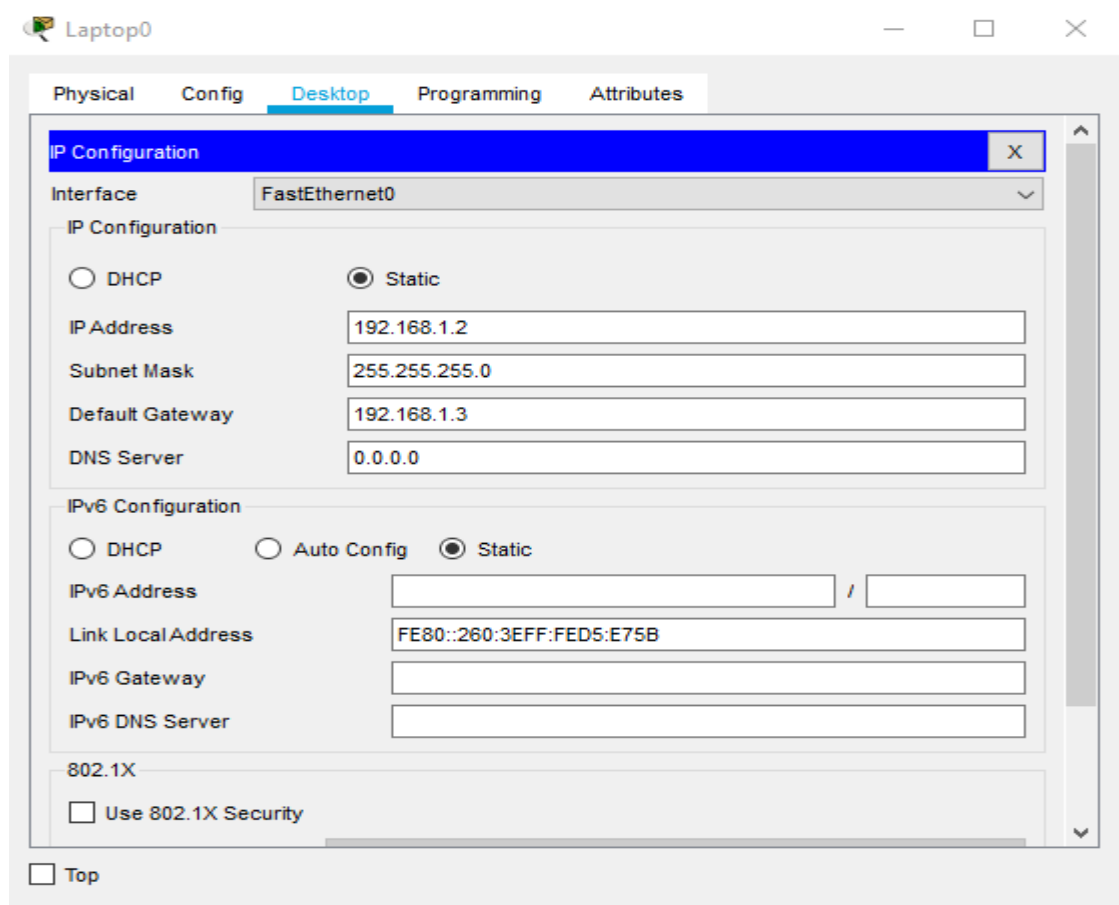


Figure 1.2.3

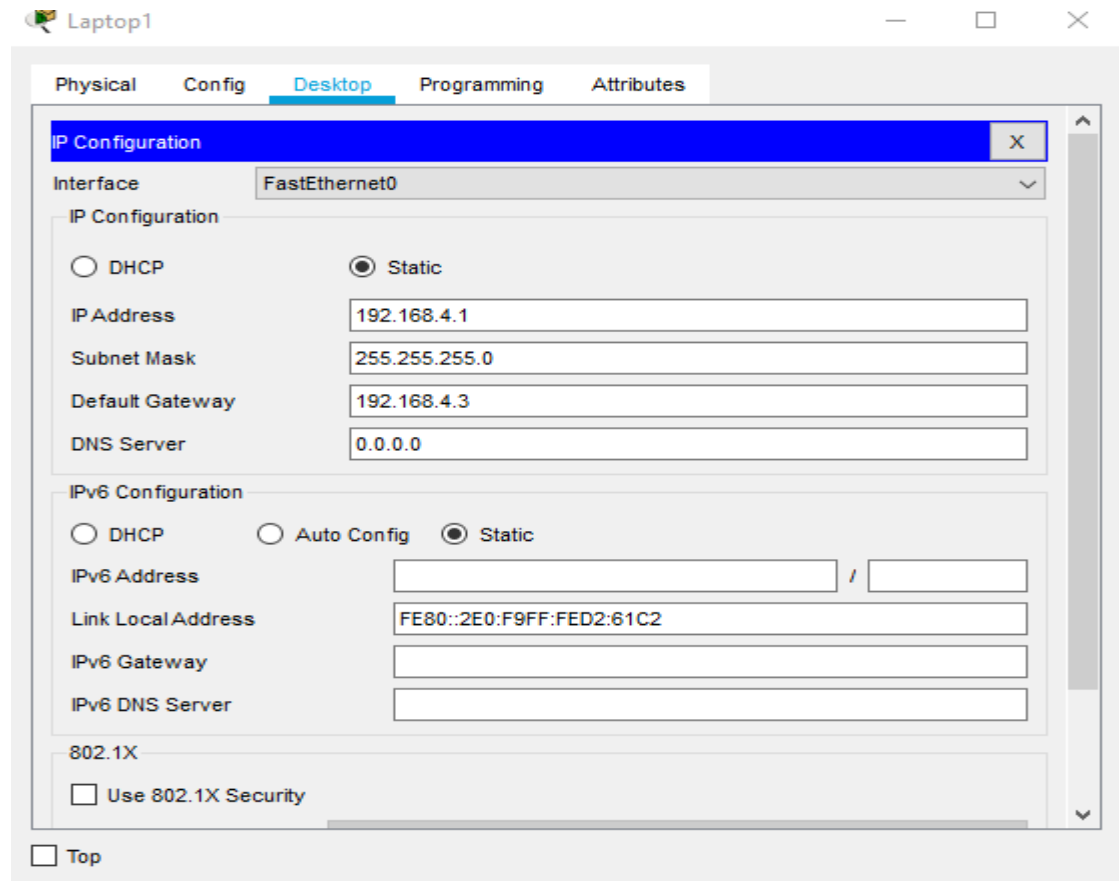


Figure 1.2.4

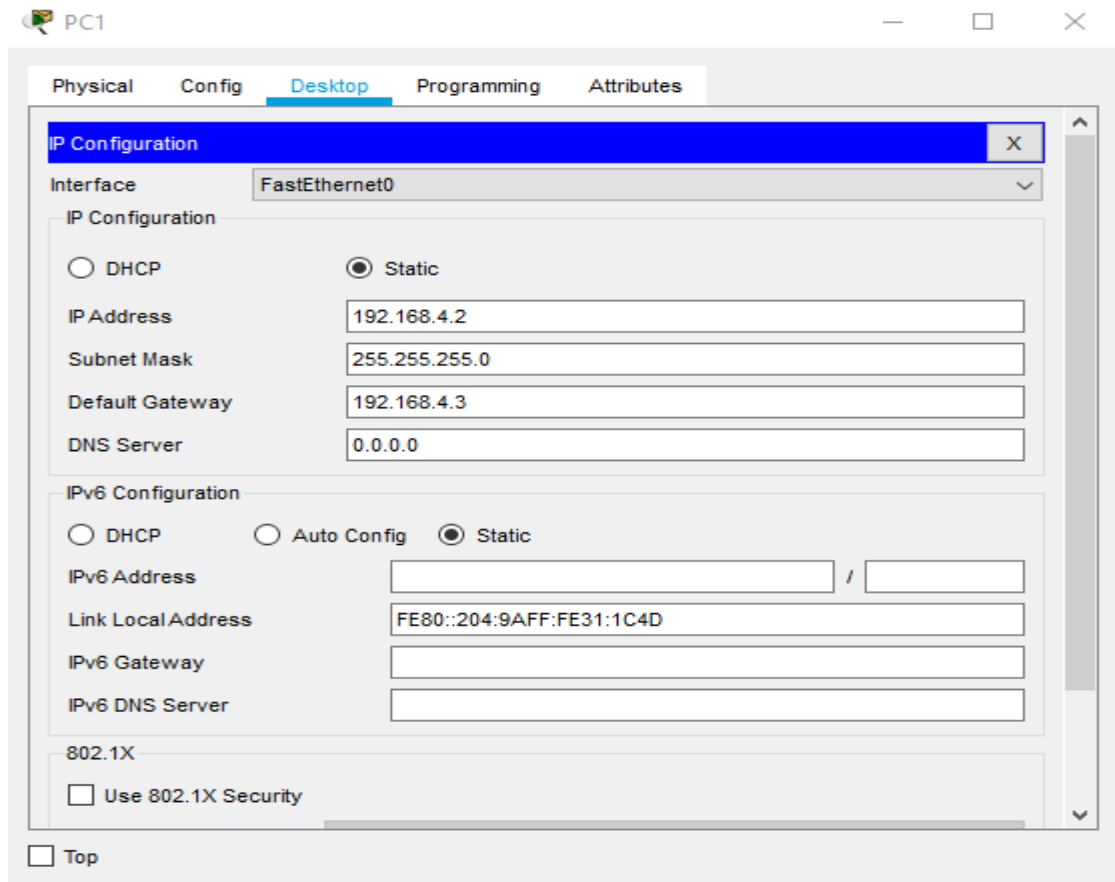


Figure 1.2.5

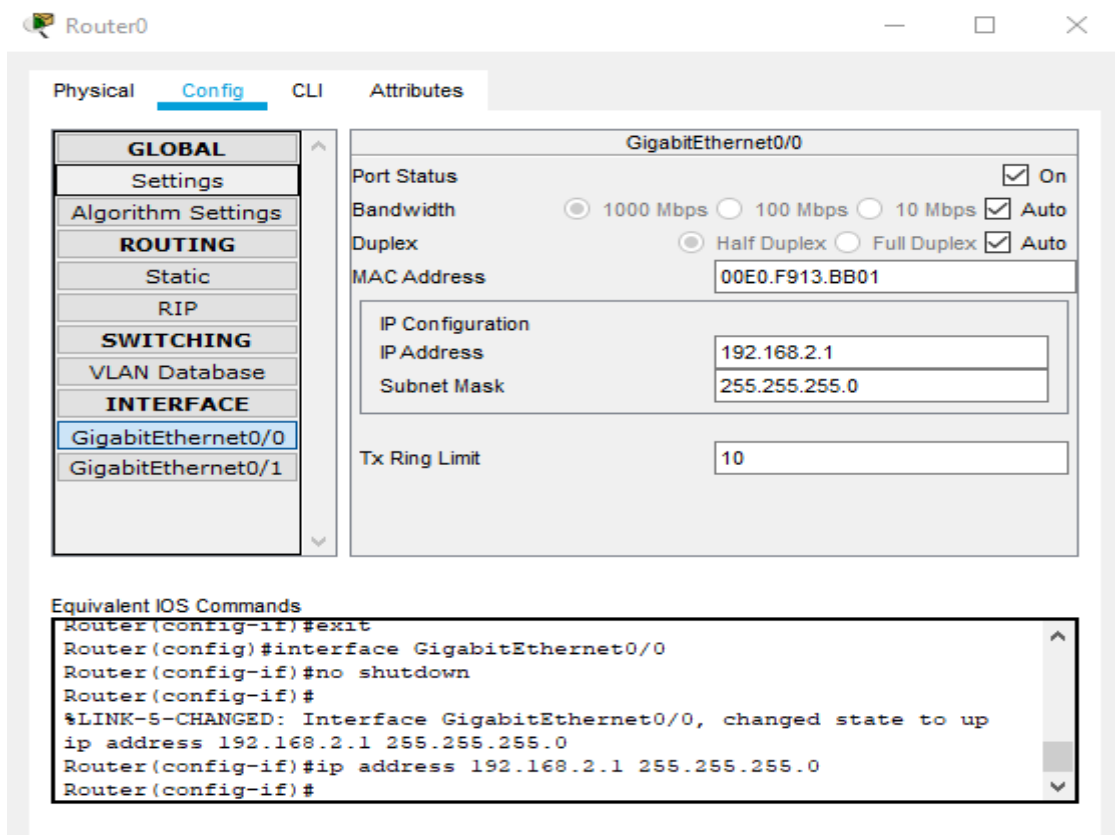


Figure 1.2.6

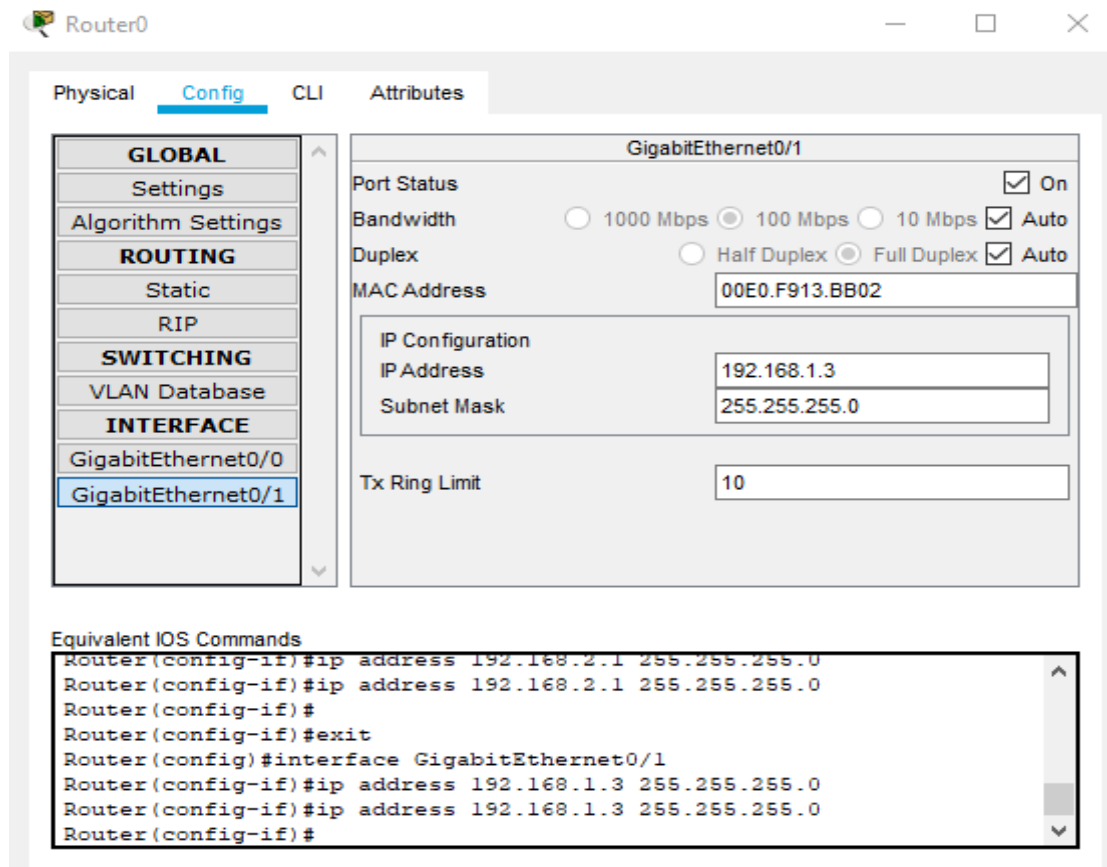


Figure 1.2.6

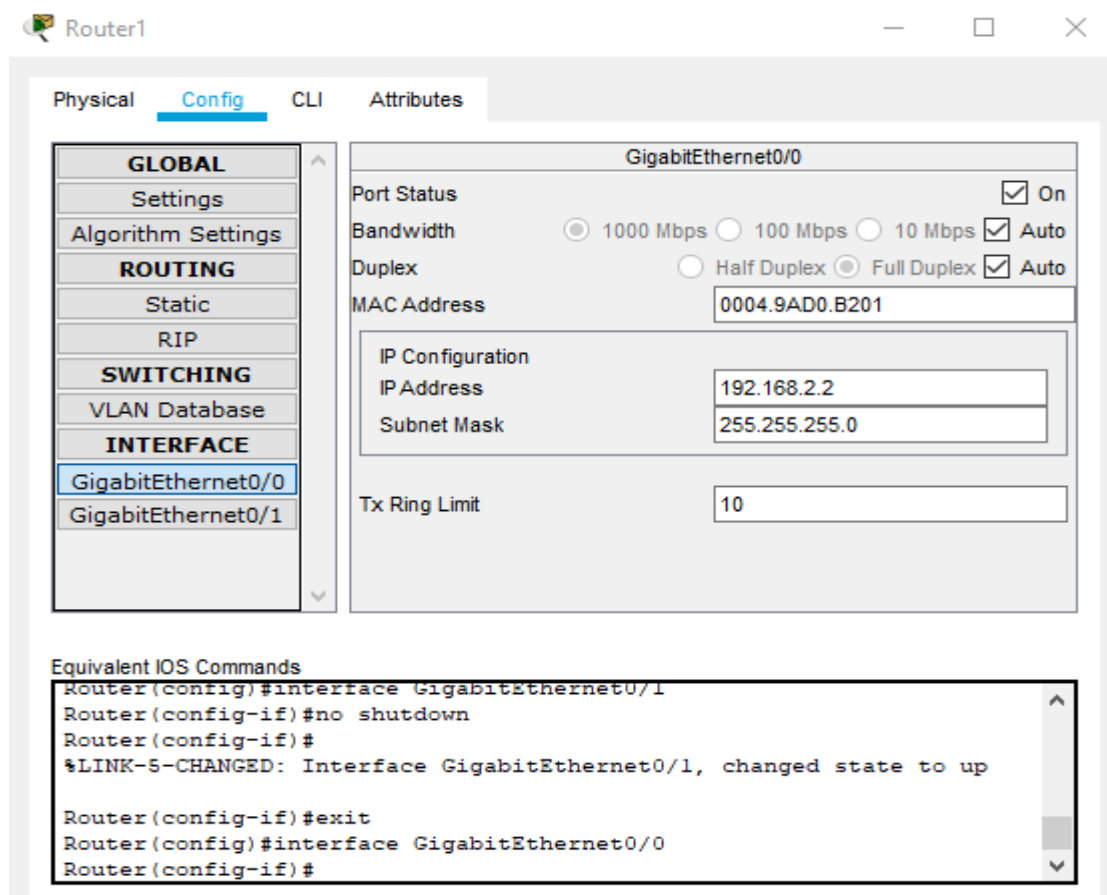


Figure 1.2.7

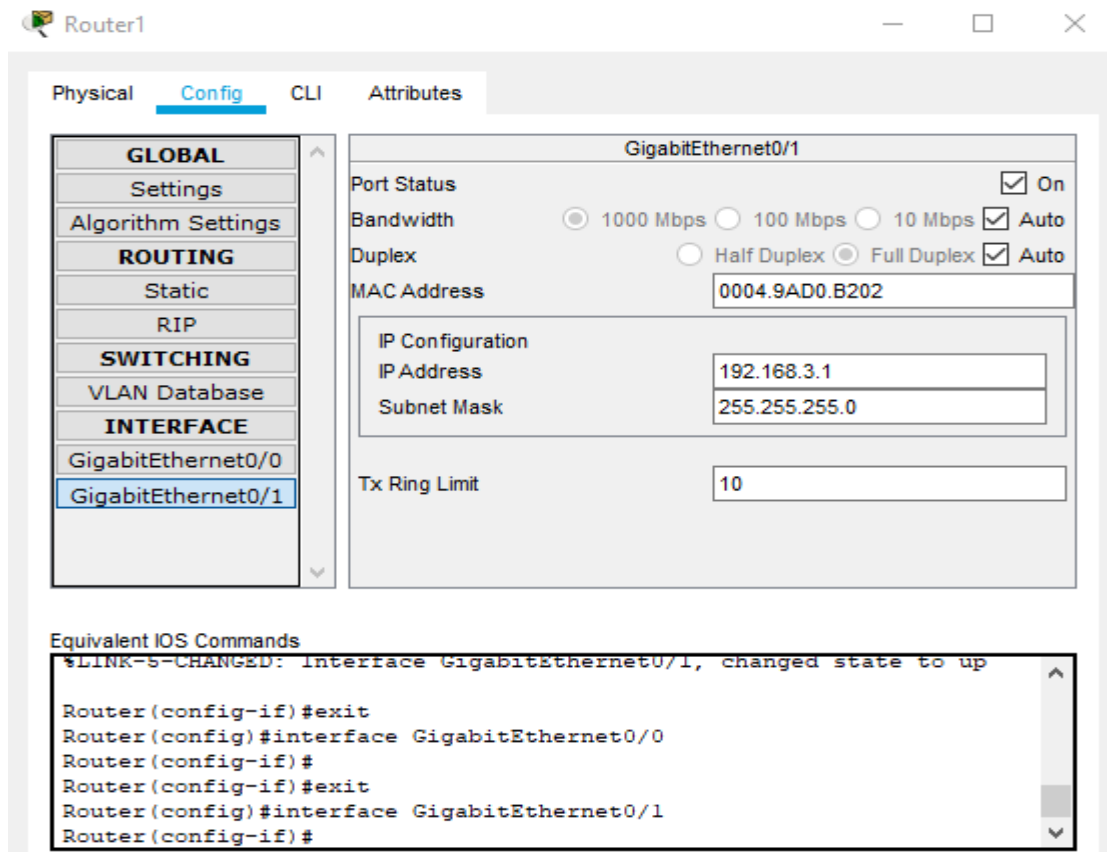


Figure 1.2.8

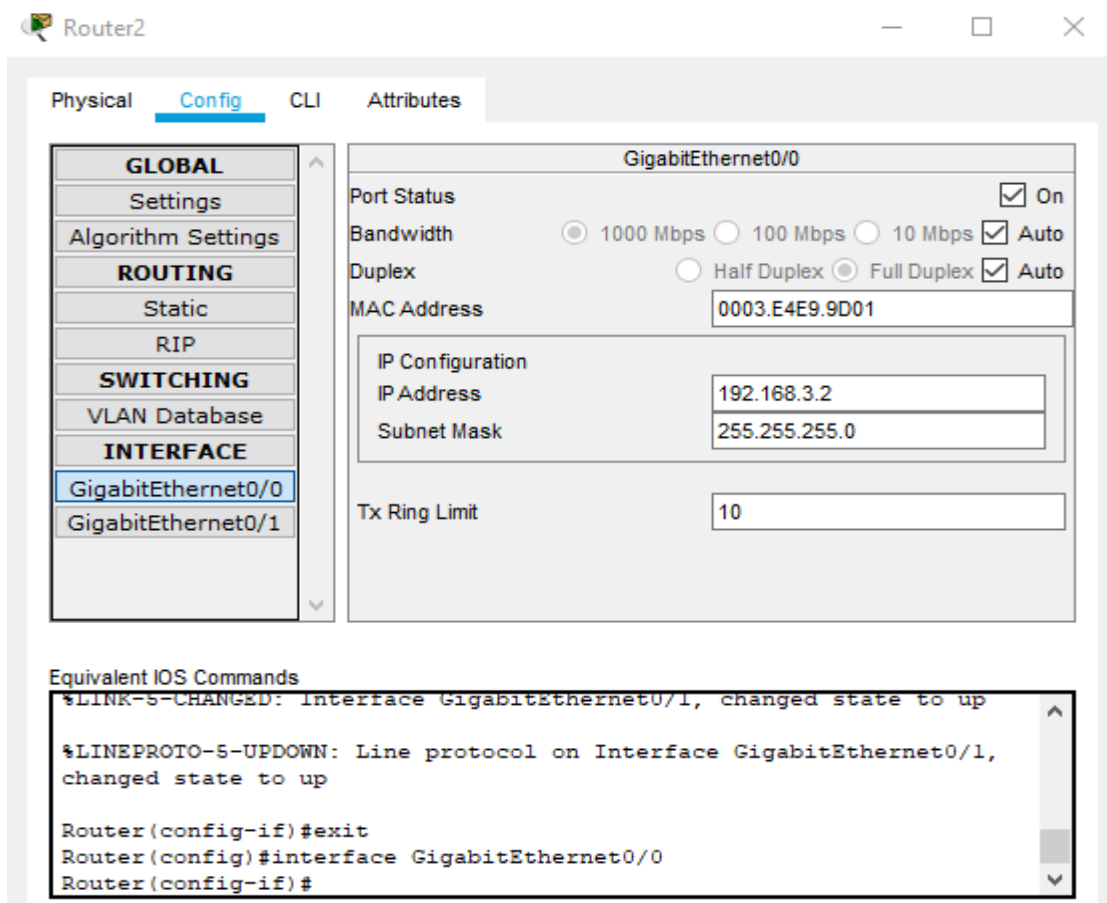


Figure 1.2.9

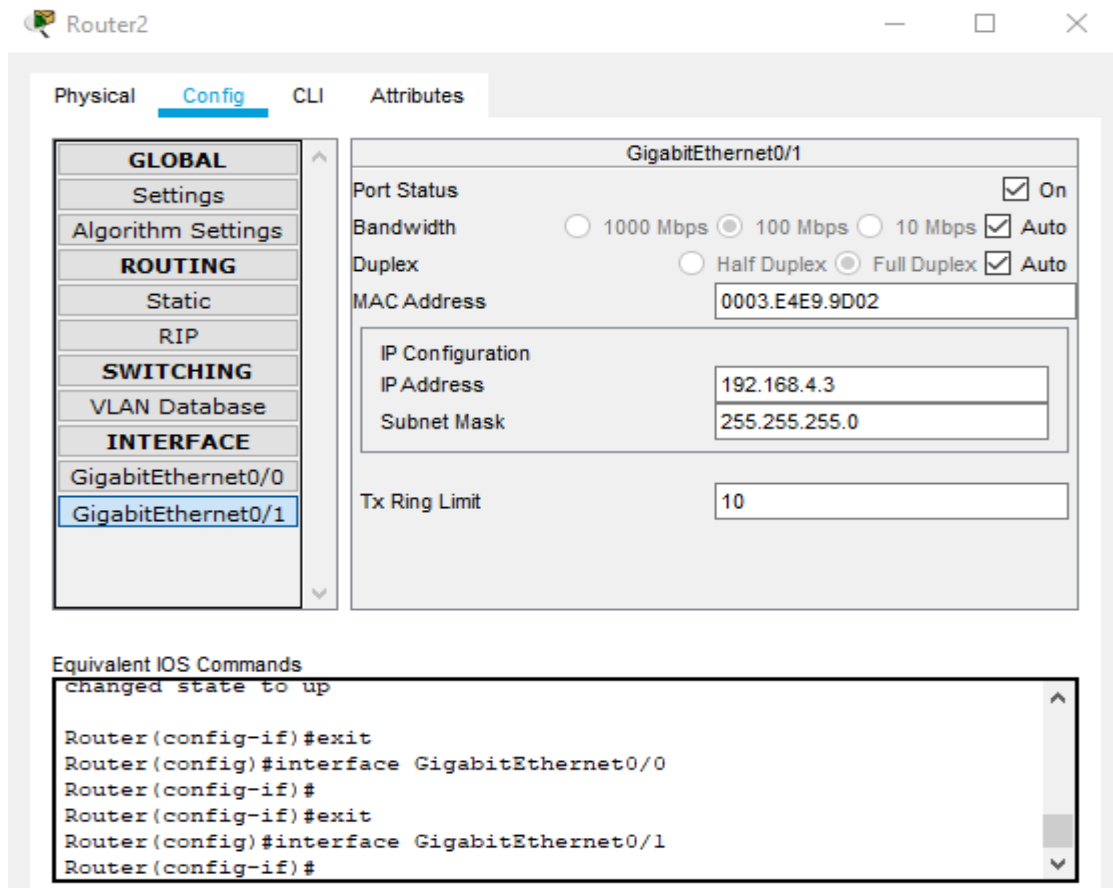
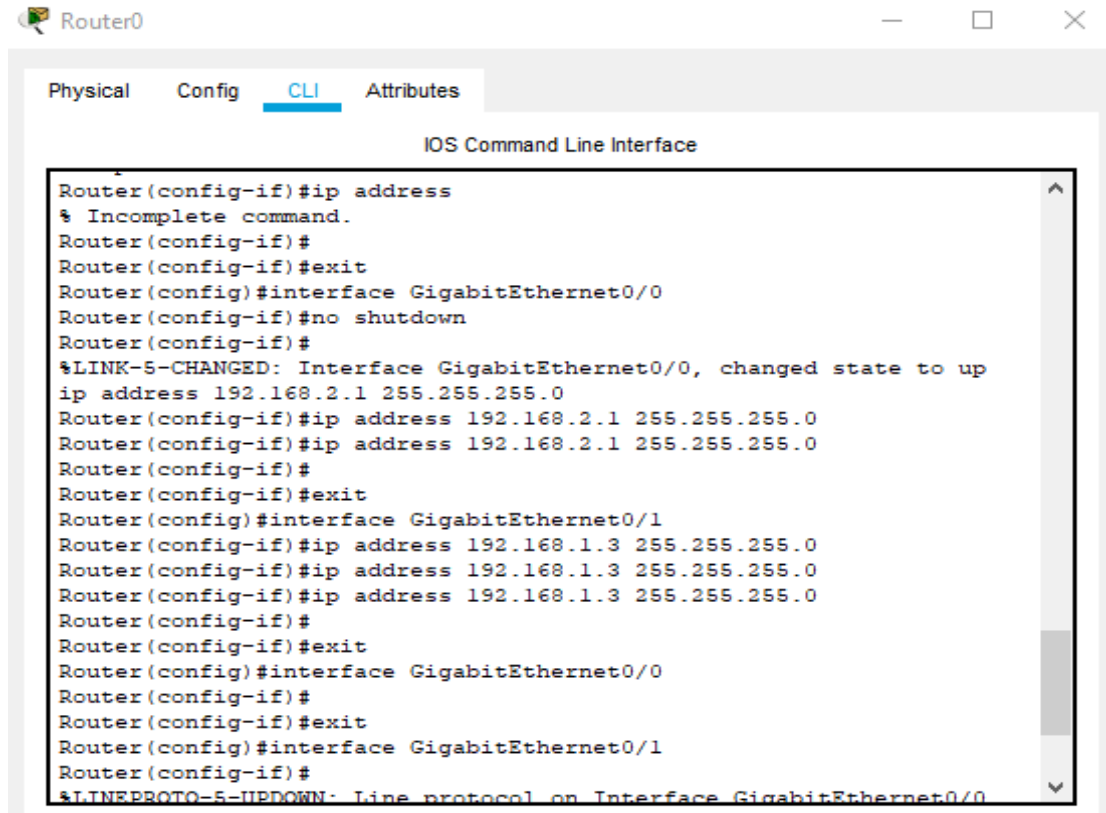


Figure 1.2.10

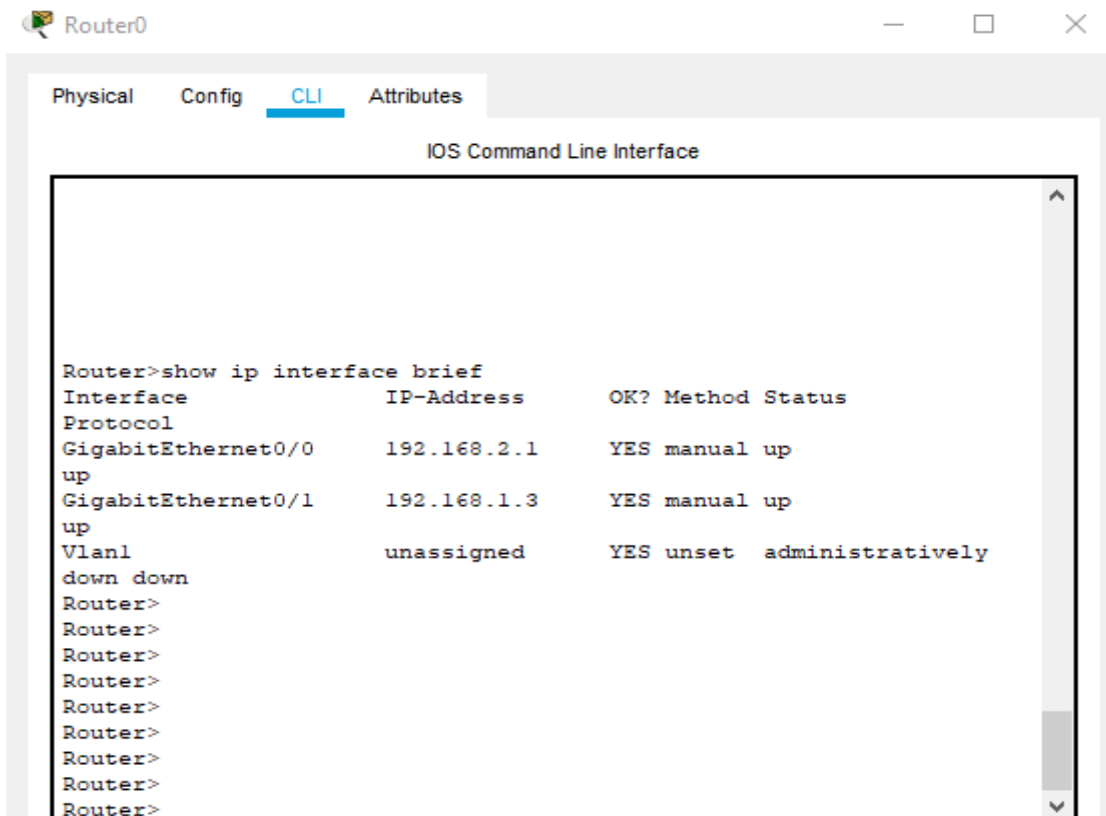
3. Use built in show commands in Cisco IOS to visualize IP configurations in each of the routers.



The screenshot shows the Cisco IOS Command Line Interface for Router0. The CLI window has tabs for Physical, Config, CLI (selected), and Attributes. The command history shows the following sequence of commands and outputs:

```
Router(config-if)#ip address
% Incomplete command.
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
ip address 192.168.2.1 255.255.255.0
Router(config-if)#ip address 192.168.2.1 255.255.255.0
Router(config-if)#ip address 192.168.2.1 255.255.255.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/1
Router(config-if)#ip address 192.168.1.3 255.255.255.0
Router(config-if)#ip address 192.168.1.3 255.255.255.0
Router(config-if)#ip address 192.168.1.3 255.255.255.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/1
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0
```

Figure 1.3.1



The screenshot shows the Cisco IOS Command Line Interface for Router0. The CLI window has tabs for Physical, Config, CLI (selected), and Attributes. The command history shows the following sequence of commands and outputs:

```
Router>show ip interface brief
Interface                IP-Address      OK? Method Status
Protocol
GigabitEthernet0/0       192.168.2.1     YES manual up
up
GigabitEthernet0/1       192.168.1.3     YES manual up
up
Vlan1                    unassigned      YES unset  administratively
down down
Router>
Router>
Router>
Router>
Router>
Router>
Router>
Router>
```

Figure 1.3.2



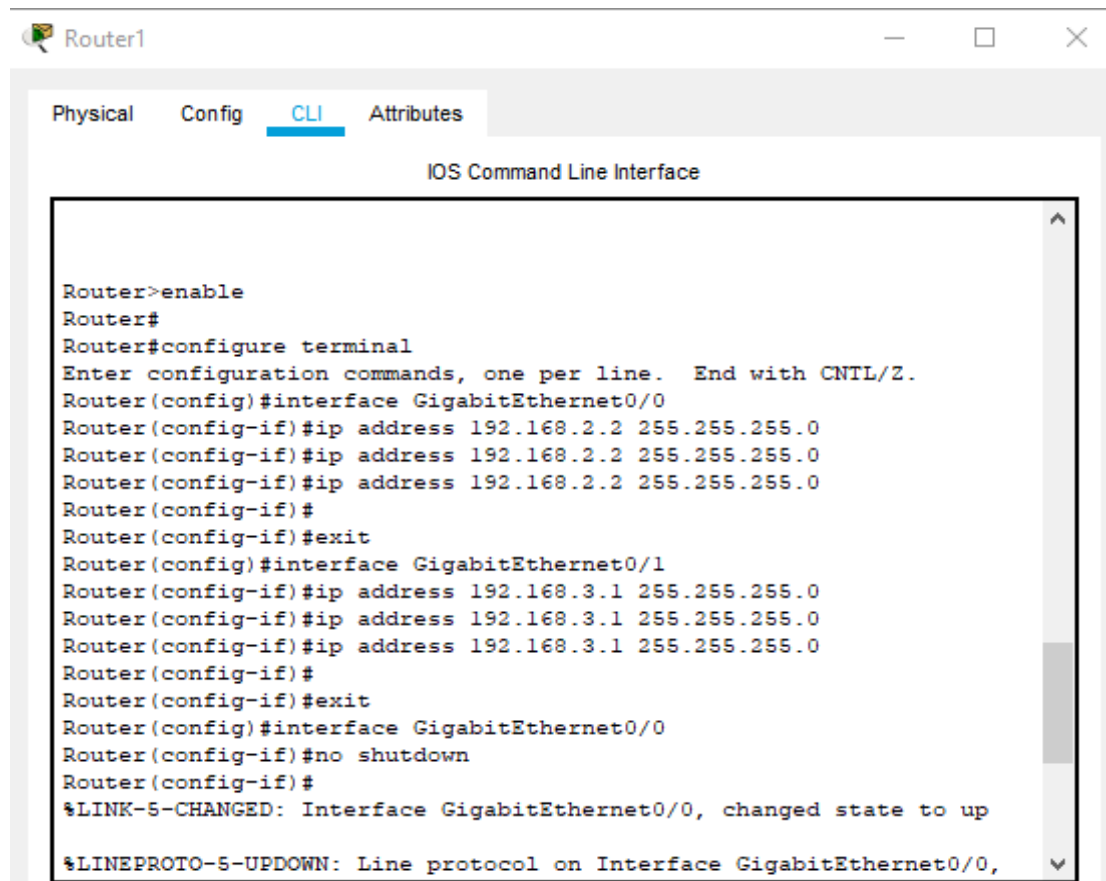


Figure 1.3.3

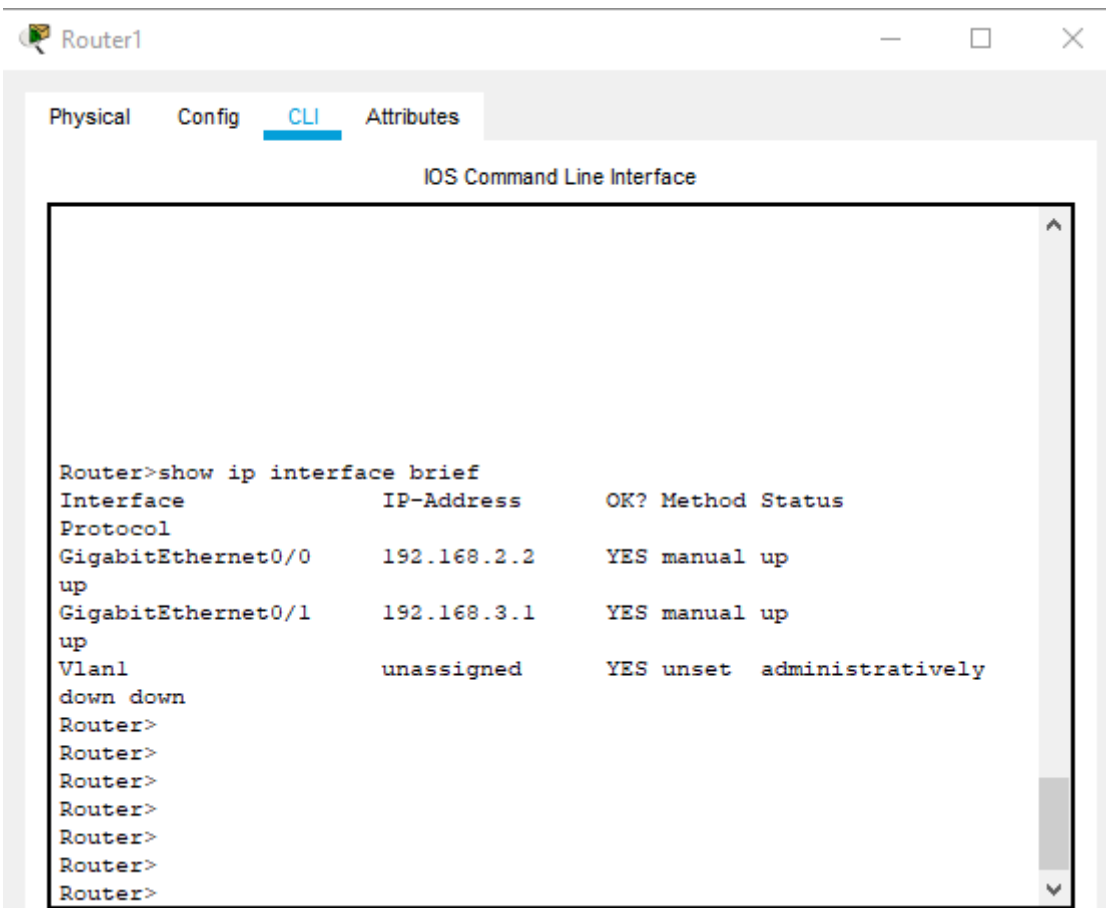


Figure 1.3.4

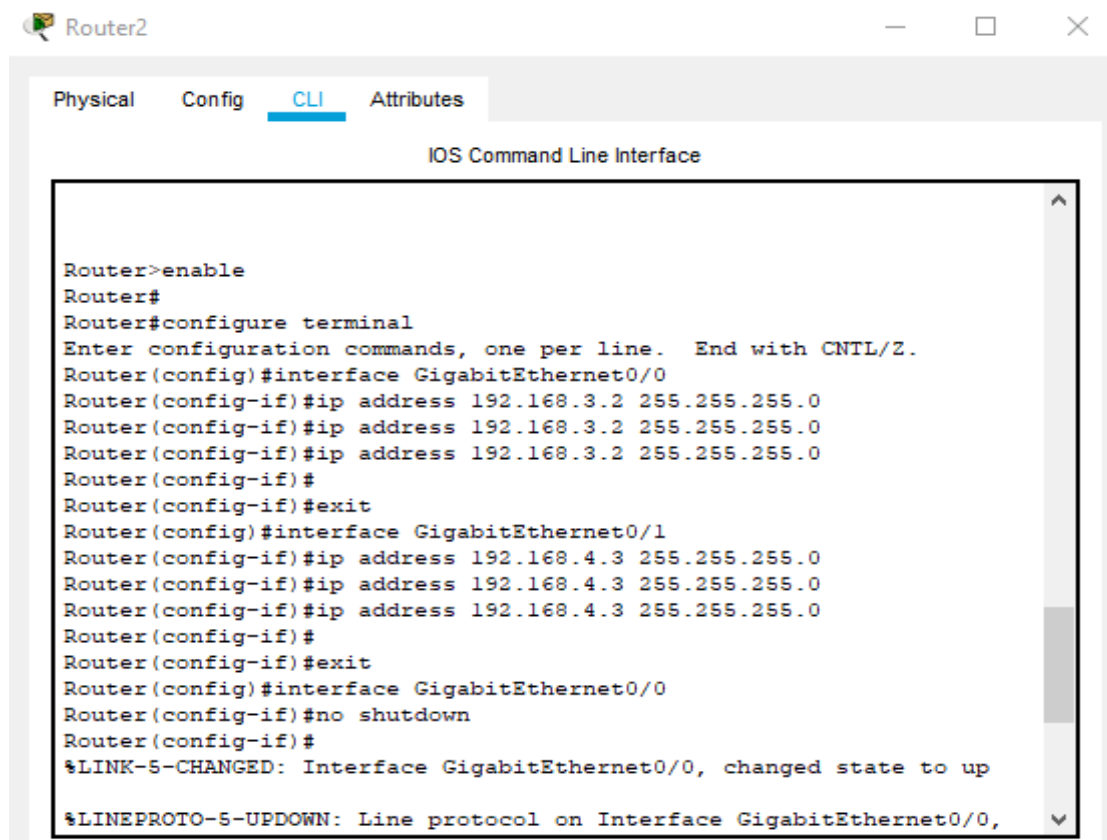


Figure 1.3.5

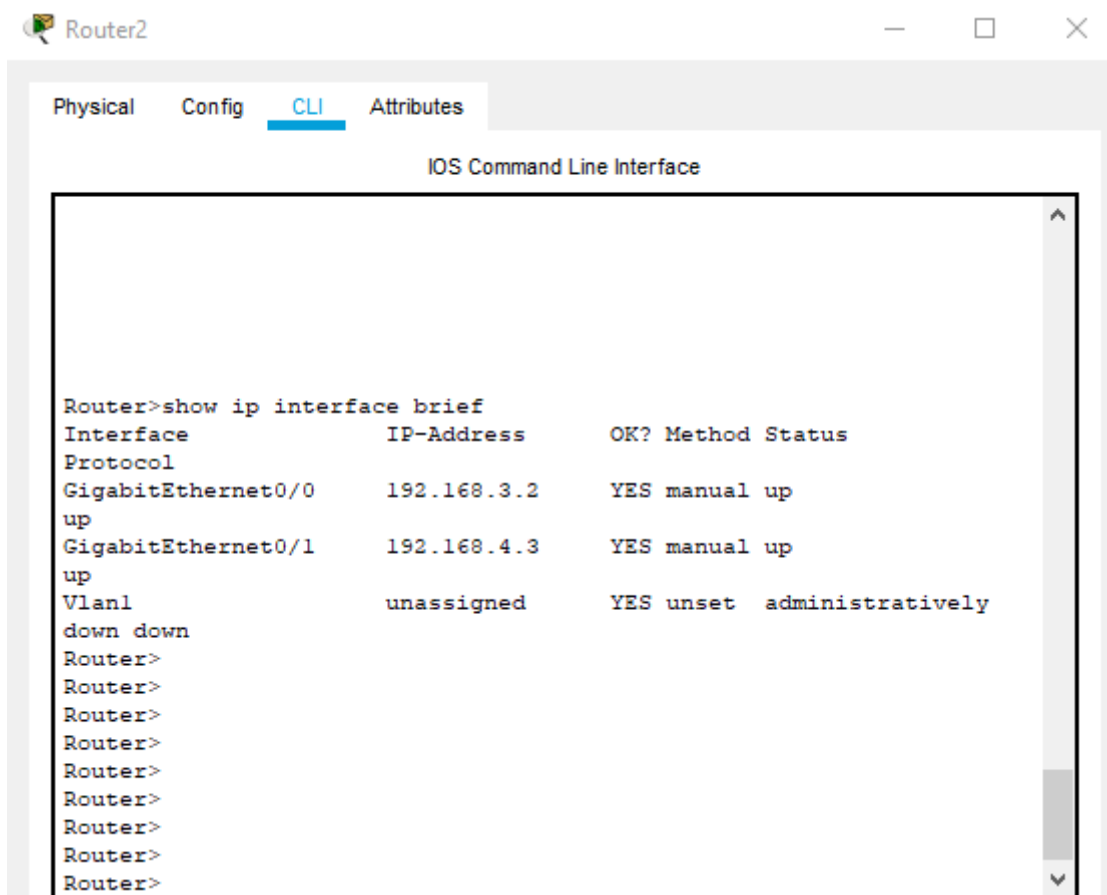


Figure 1.3.6

4. Try to ping from one of the devices in network 1 to another device in network 4. Perform the ping operation under both Realtime and simulation modes. Identify and explain the issues met under this step.

First I tried to ping two devices from network 1 together and it was successful. (Figure 1.4.1)

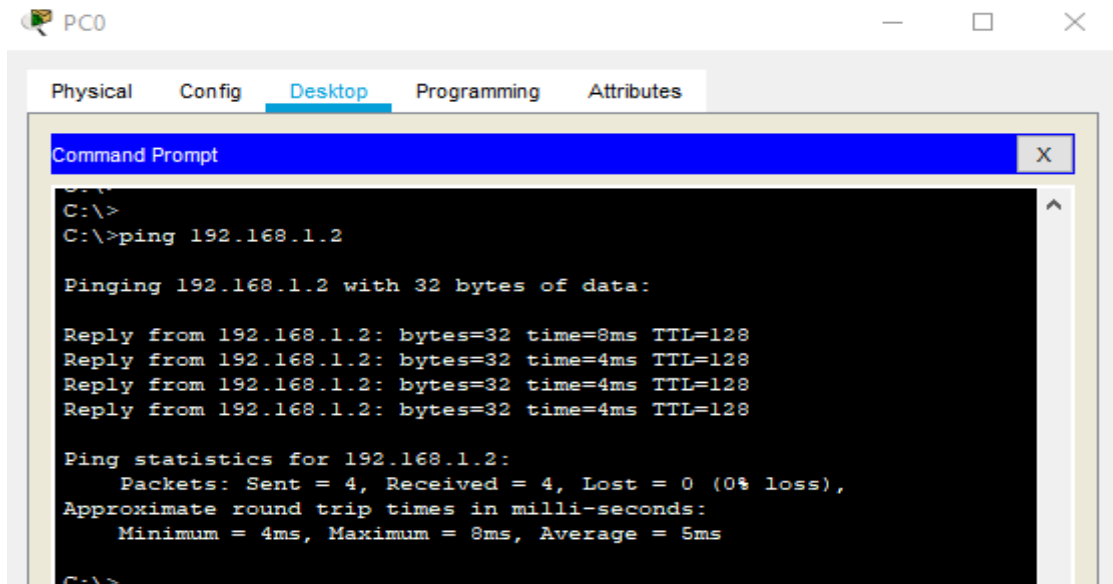


Figure 1.4.1

Next the same thing was repeated to network 4 as well. Then it was also successful. (Figure 1.4.2) That means inside those networks, the connection was successful.

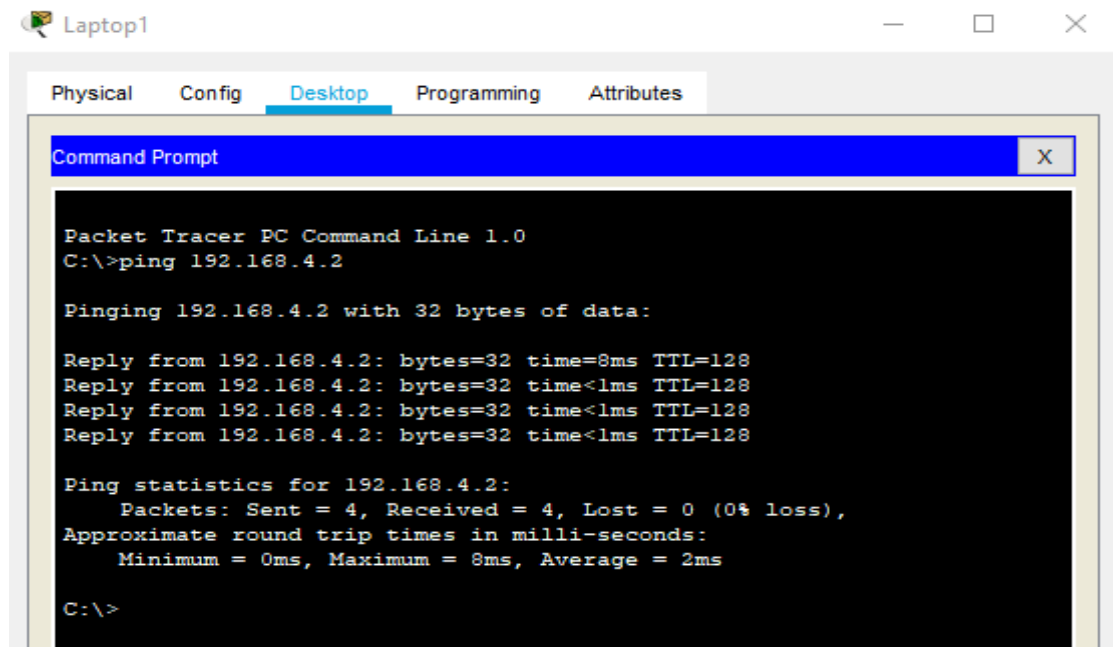
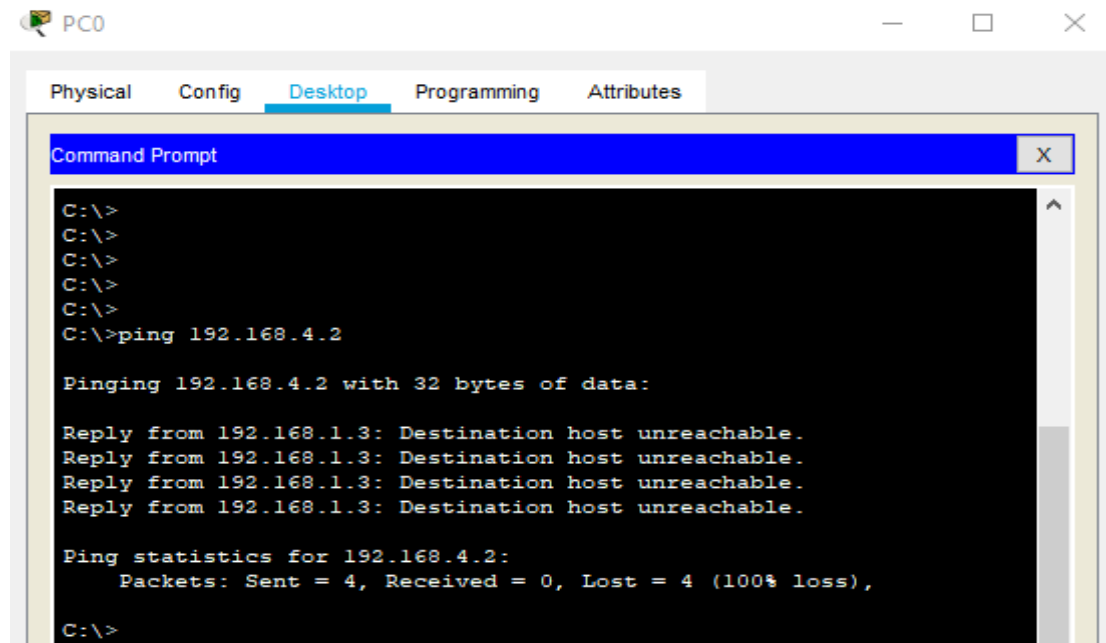


Figure 1.4.2

But when I tried to ping from one of the devices in network 1 to another device in network 4 in Realtime and simulation modes, the below results were obtained.



```
PC0
Physical Config Desktop Programming Attributes
Command Prompt
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>ping 192.168.4.2

Pinging 192.168.4.2 with 32 bytes of data:

Reply from 192.168.1.3: Destination host unreachable.
Reply from 192.168.1.3: Destination host unreachable.
Reply from 192.168.1.3: Destination host unreachable.
Reply from 192.168.1.3: Destination host unreachable.

Ping statistics for 192.168.4.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

Figure 1.4.3

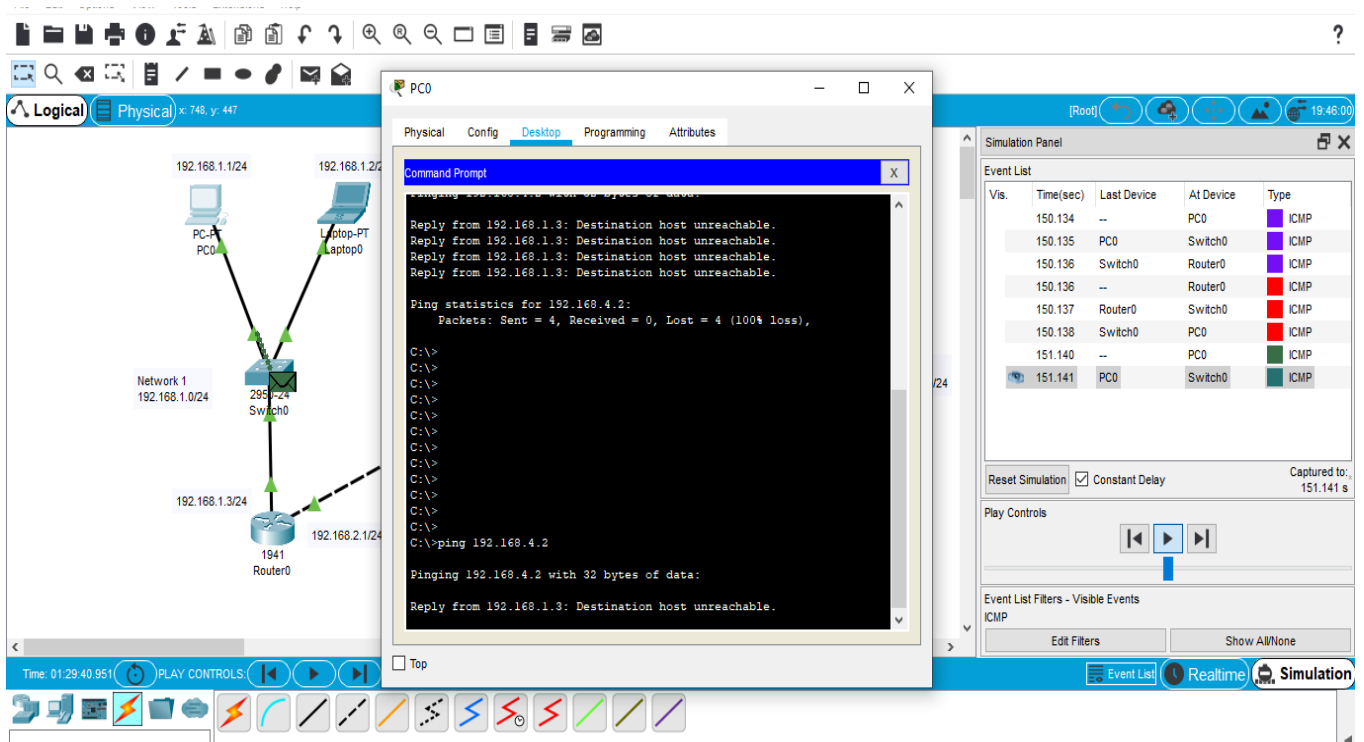


Figure 1.4.4

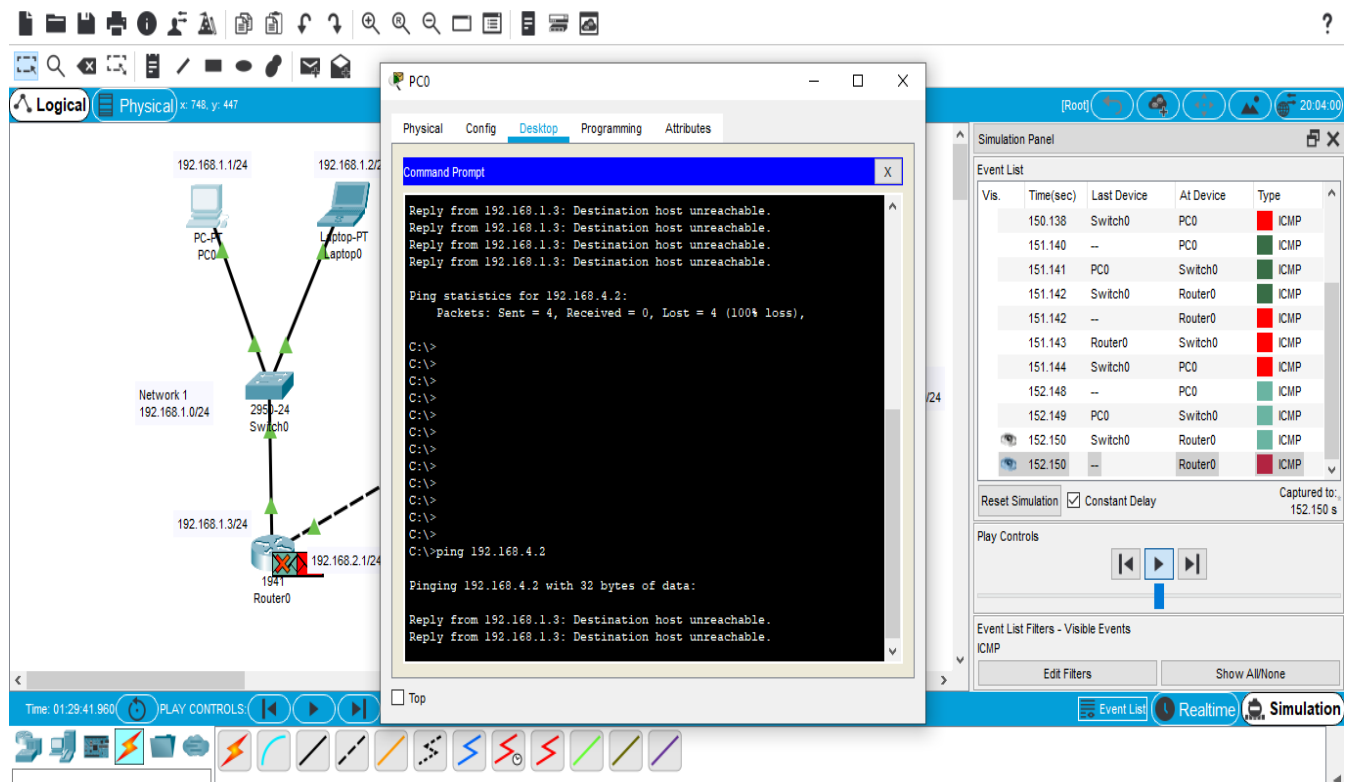


Figure 1.4.5

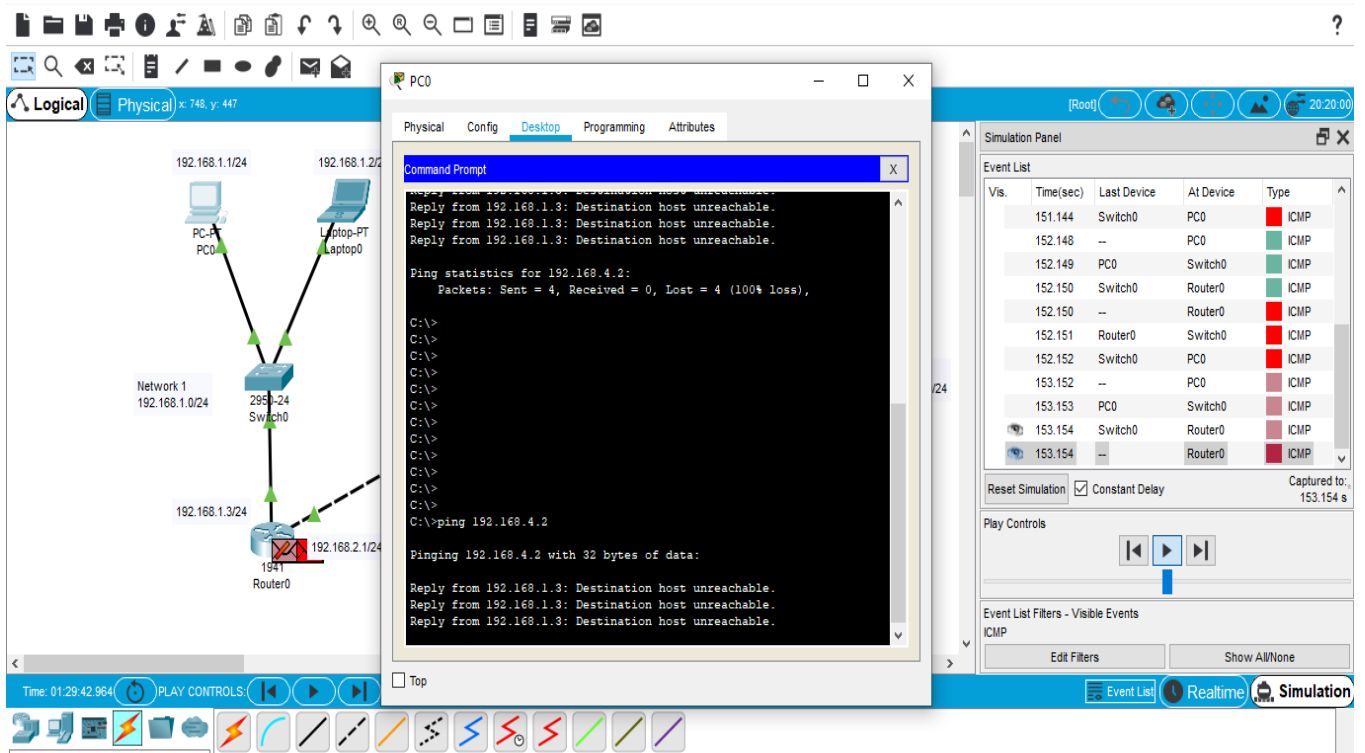


Figure 1.4.6

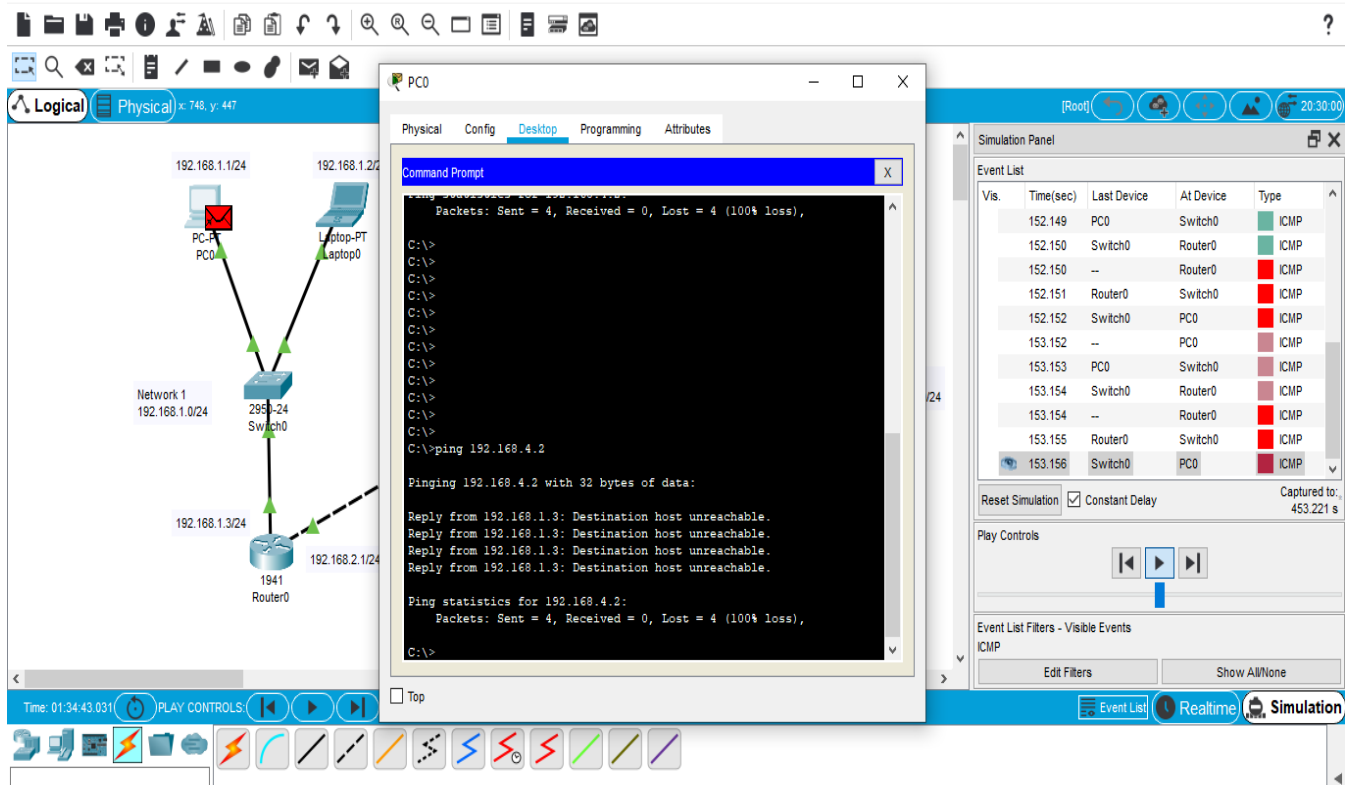


Figure 1.4.7

The command prompt shows that, *“Reply from 192.168.1.3 : Destination host unreachable”* and we use simulation modes we can see that packet doesn’t go to the router 0 either.

When we take routers in to our consideration, to work in this scenario, routing table of every router should contain the addresses of other routers. But here we haven’t set that yet. So we have to manually reconfigure static routes when network changes occur.

When a data packet comes to a router port, the router reads address information in packet to determine out which port the packet will be sent. When a packet arrives at a Router, it examines destination IP address of a received packet and make routing decisions accordingly. Routers use Routing Tables to determine out which interface the packet will be sent. A routing table contains the information necessary to forward a packet along the best path toward its destination. Each packet contains information about its origin

and destination. Routing Table provides the device with instructions for sending the packet to the next hop on its route across the network.

Since in our case our routing tables are not fully completed with all the information we can't send packets between the networks.

## Static Route Configurations

5. Configure Router 0 and Router 1 with appropriate static routes only to the network 4. Perform the ping operation again from a device in network 1 to network 4.

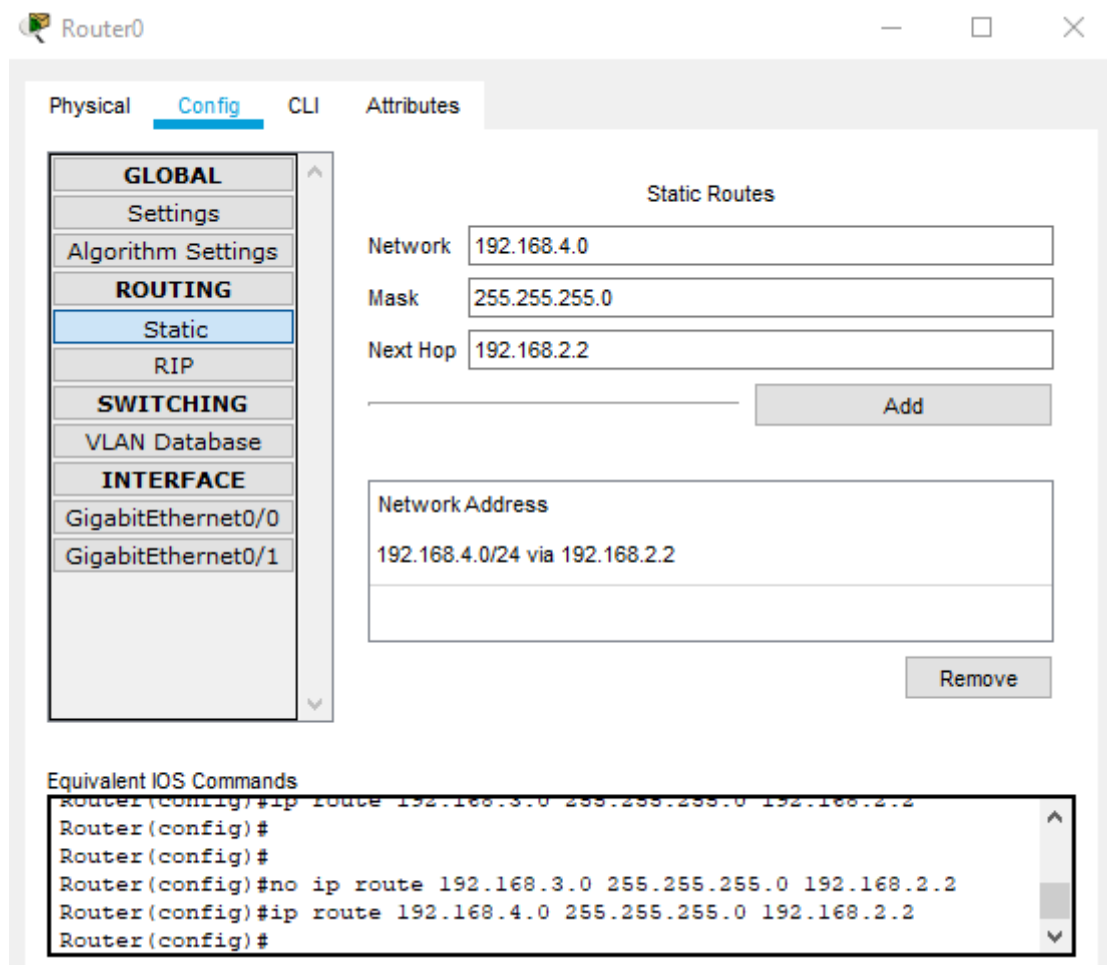


Figure 1.5.1

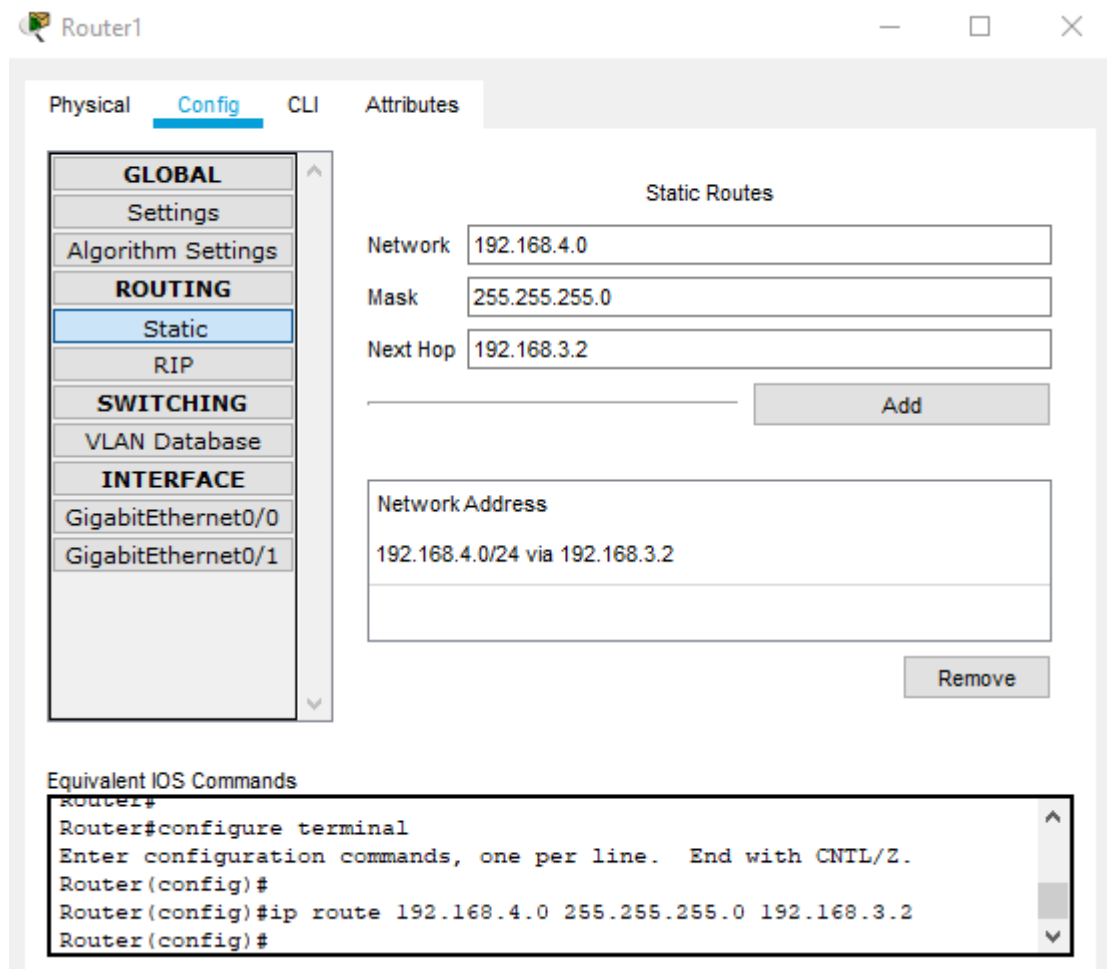


Figure 1.5.2

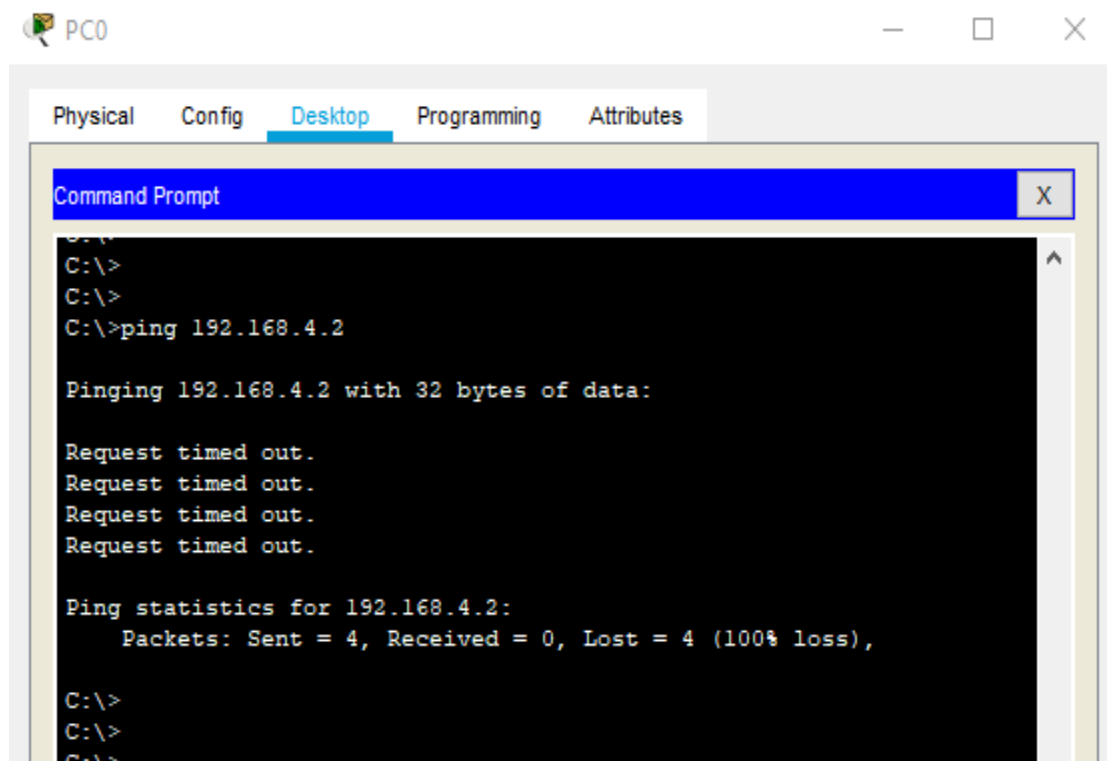


Figure 1.5.2



6. Identify the issues related with the above ping operation and compare it with the previous error you got under the prior ping operation in the above section.

When a data packet comes to a router port, the router reads address information in packet to determine out which port the packet will be sent. In the part 4, packet does not even go through router 0, since that router does not aware of other routing paths. But now it has gone to the relevant end device since we have configured router 0 and router 1 with appropriate static routes only to go to the network 4. But to ping successfully sending device should receive the packets again. Since we haven't set coming back paths, sending device does not receive the packets and it display the message *"Request time out"*

7. Observe the routing tables of each of the routers.

Routing Table for Router0						Routing Table for Router1					
Type	Network	Port	Next Hop IP	Metric		Type	Network	Port	Next Hop IP	Metric	
C	192.168.1.0/24	GigabitEthernet0/1	---	0/0		C	192.168.2.0/24	GigabitEthernet0/0	---	0/0	
L	192.168.1.3/32	GigabitEthernet0/1	---	0/0		L	192.168.2.2/32	GigabitEthernet0/0	---	0/0	
C	192.168.2.0/24	GigabitEthernet0/0	---	0/0		C	192.168.3.0/24	GigabitEthernet0/1	---	0/0	
L	192.168.2.1/32	GigabitEthernet0/0	---	0/0		L	192.168.3.1/32	GigabitEthernet0/1	---	0/0	
S	192.168.4.0/24	---	192.168.2.2	1/0		S	192.168.4.0/24	---	192.168.3.2	1/0	

Routing Table for Router2					
Type	Network	Port	Next Hop IP	Metric	
C	192.168.3.0/24	GigabitEthernet0/0	---	0/0	
L	192.168.3.2/32	GigabitEthernet0/0	---	0/0	
C	192.168.4.0/24	GigabitEthernet0/1	---	0/0	
L	192.168.4.3/32	GigabitEthernet0/1	---	0/0	

Figure 1.7.1

8. Configure the Router 1 and Router 2 with static route information to network 1.

The screenshot shows the configuration window for Router2. The 'Config' tab is active, and the 'Static' option under the 'ROUTING' section is selected. The 'Static Routes' section contains the following fields: Network (192.168.1.0), Mask (255.255.255.0), and Next Hop (192.168.3.1). Below these fields is an 'Add' button. A 'Network Address' box displays the configured route: '192.168.1.0/24 via 192.168.3.1'. A 'Remove' button is located below the network address box. At the bottom, the 'Equivalent IOS Commands' section shows the following commands:

```
Router#  
Router#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#  
Router(config)#ip route 192.168.1.0 255.255.255.0 192.168.3.1  
Router(config)#
```

Figure 1.8.1

The screenshot shows the configuration window for Router1. The 'Config' tab is active, and the 'Static' option under the 'ROUTING' section is selected. The 'Static Routes' section contains the following fields: Network (192.168.1.0), Mask (255.255.255.0), and Next Hop (192.168.2.1). Below these fields is an 'Add' button. A 'Network Address' box displays two configured routes: '192.168.4.0/24 via 192.168.3.2' and '192.168.1.0/24 via 192.168.2.1'. A 'Remove' button is located below the network address box. At the bottom, the 'Equivalent IOS Commands' section shows the following commands:

```
Router#  
Router#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#  
Router(config)#ip route 192.168.1.0 255.255.255.0 192.168.2.1  
Router(config)#
```

Figure 1.8.2

9. Perform the ping operation again and observe the command prompt output and final routing tables of each of the routers.

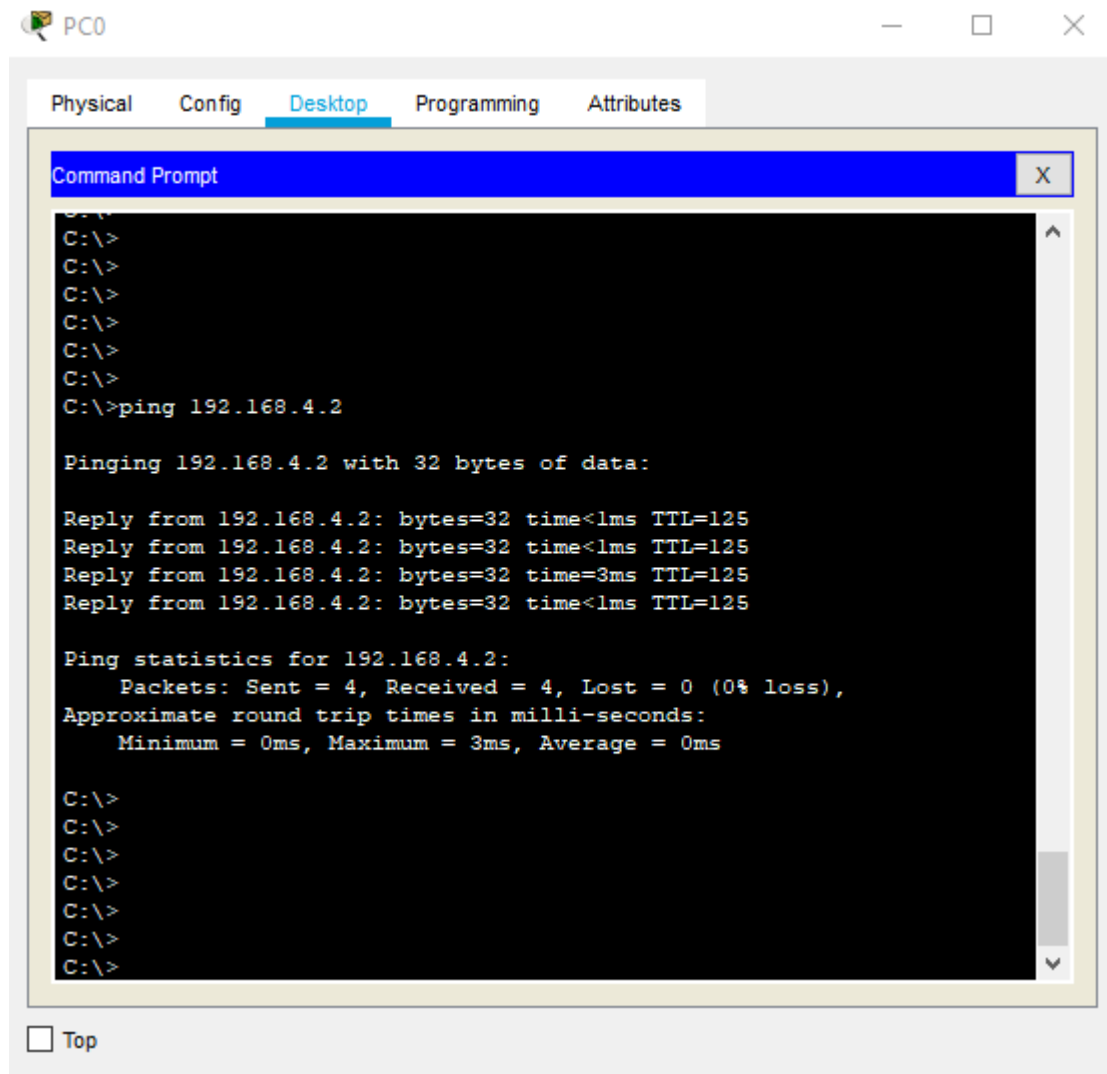


Figure 1.9.1

Routing Table for Router0

Type	Network	Port	Next Hop IP	Metric
C	192.168.1.0/24	GigabitEthernet0/1	---	0/0
L	192.168.1.3/32	GigabitEthernet0/1	---	0/0
C	192.168.2.0/24	GigabitEthernet0/0	---	0/0
L	192.168.2.1/32	GigabitEthernet0/0	---	0/0
S	192.168.4.0/24	---	192.168.2.2	1/0

Routing Table for Router1

Type	Network	Port	Next Hop IP	Metric
S	192.168.1.0/24	---	192.168.2.1	1/0
C	192.168.2.0/24	GigabitEthernet0/0	---	0/0
L	192.168.2.2/32	GigabitEthernet0/0	---	0/0
C	192.168.3.0/24	GigabitEthernet0/1	---	0/0
L	192.168.3.1/32	GigabitEthernet0/1	---	0/0
S	192.168.4.0/24	---	192.168.3.2	1/0

Routing Table for Router2

Type	Network	Port	Next Hop IP	Metric
S	192.168.1.0/24	---	192.168.3.1	1/0
C	192.168.3.0/24	GigabitEthernet0/0	---	0/0
L	192.168.3.2/32	GigabitEthernet0/0	---	0/0
C	192.168.4.0/24	GigabitEthernet0/1	---	0/0
L	192.168.4.3/32	GigabitEthernet0/1	---	0/0

Figure 1.9.2