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LAB REPORT

on

Computer Networks

Submitted by

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in partial fulfillment for the award of the degree of
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**B. M. S. College of Engineering,
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CERTIFICATE

This is to certify that the Lab work entitled “Computer Networks” carried out by **SHRUTI DASAMANDAM (1BM20CS216)**, who is bona fide student of **B. M. S. College of Engineering**. It is in partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum during the year 2022. The Lab report has been approved as it satisfies the academic requirements in respect of a **Computer Networks - (20CS5PCCON)** work prescribed for the said degree.

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Index

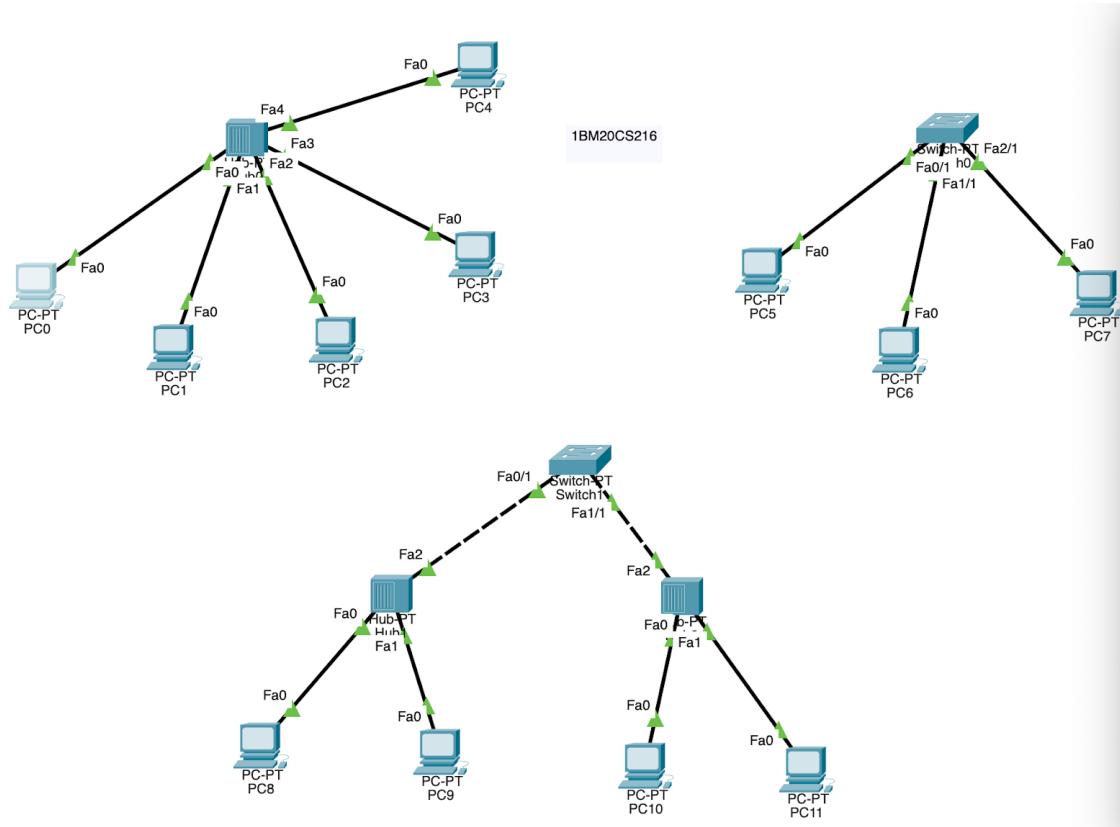
Sl. No.	Date	Experiment Title	Page No.
CYCLE 1			
1	7/11/22	Creating a topology and simulate sending a simple PDU from source to destination using hub and switch as connecting devices.	4
2	14/11/22	Configuring IP address to Routers in Packet Tracer. Explore the following messages: Ping Responses, Destination unreachable, Request timed out, Reply	8
3	19/11/12	Configuring default route to the Router	17
4	28/11/22	Configuring DHCP within a LAN in a packet Tracer	33
5	5/12/22	Configuring RIP Routing Protocol in Routers	41
6	12/12/22	Demonstration of WEB server and DNS using Packet Tracer	46
CYCLE 2			
1	19/12/22	Write a program for error detecting code using CRC-CCITT (16-bits).	49
2	26/12/22	Write a program for distance vector algorithm to find suitable path for transmission	53
3	2/1/23	Implement Dijkstra's algorithm to compute the shortest path for a given topology.	58
4	9/1/23	Write a program for congestion control using Leaky bucket algorithm.	62
5	16/1/23	Using TCP/IP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.	64
6	16/1/23	Using UDP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.	66

CYCLE 1

Experiment No 1

Aim of the program: Creating a topology and simulate sending a simple PDU from source to destination using hub and switch as connecting devices

Topology:



Procedure:

1. First create the topology by placing the amount of end devices and the amount of switches or hubs
2. Create connections between the end devices and hubs/switches by Connections -> Automatically choose connection type [lighting symbol]

3. In the end devices, create IP addresses for the devices by Desktop -> IP configuration -> Make the IPV4 address 10.0.0.1 and make the Subnet mask 255.0.0.0. Do this for all the end devices.
4. Click on one of the end devices, Desktop -> Command Prompt -> Ping 10.0.0.4 [pinging another end device]

Snapshot of Output:

The image shows a screenshot of the Cisco Packet Tracer software interface. At the top, there is a menu bar with five tabs: Physical, Config, Desktop (which is currently selected), Programming, and Attributes. Below the menu bar, a blue header bar displays the text "Command Prompt". The main area is a black terminal window showing command-line output. The output starts with "Cisco Packet Tracer PC Command Line 1.0" followed by a ping command: "C:\>ping 10.0.0.4". The terminal then displays the results of the ping, including four replies from the target IP address, each with bytes=32, time<1ms, and TTL=128. It then shows ping statistics: 4 packets sent, 4 received, 0% loss, and round trip times ranging from 0ms to 2ms with an average of 0ms. Finally, it ends with the prompt "C:\>".

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.4

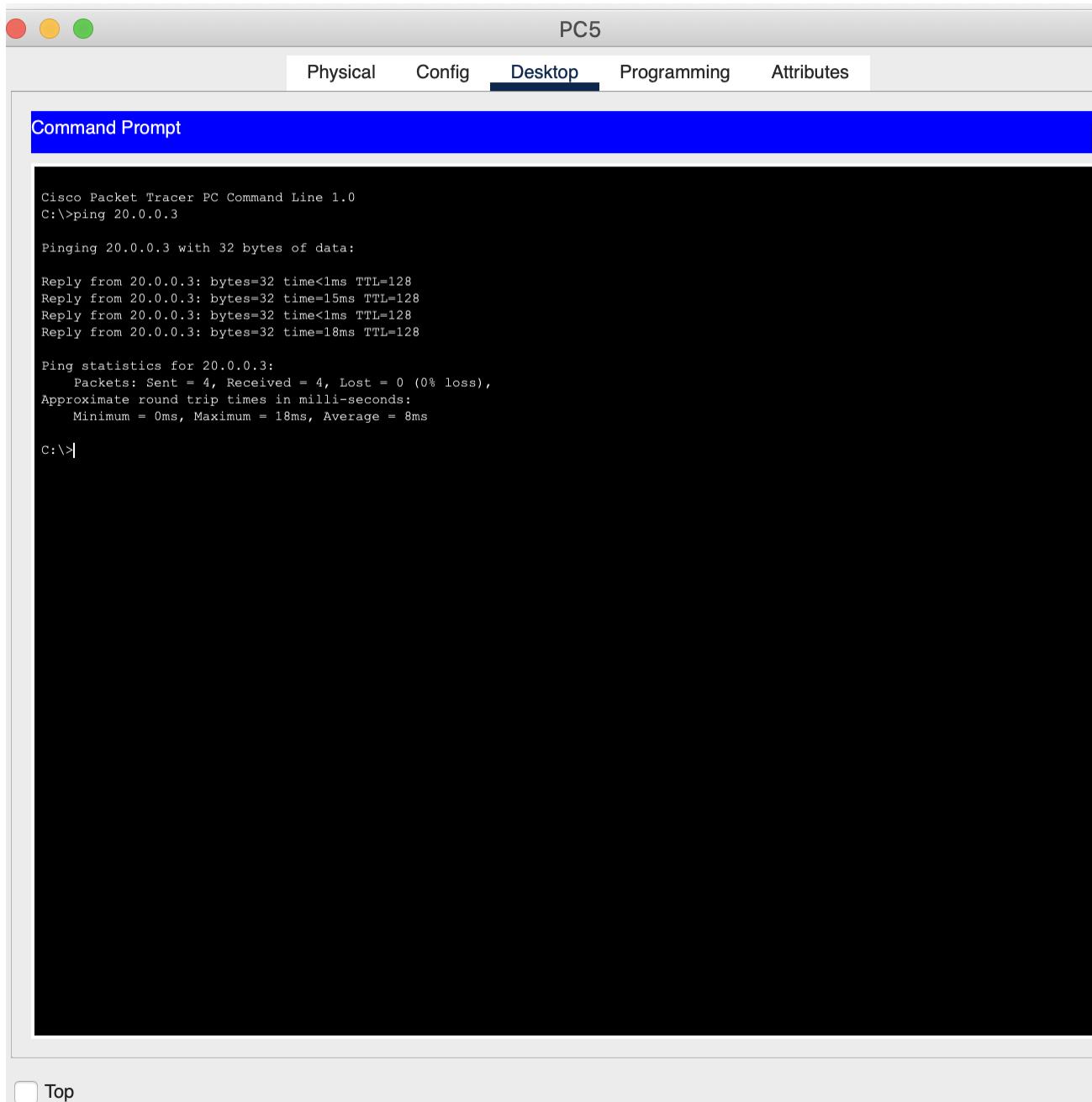
Pinging 10.0.0.4 with 32 bytes of data:

Reply from 10.0.0.4: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 0ms

C:\>
```

Top



The image shows a screenshot of the Cisco Packet Tracer software interface. At the top, there is a menu bar with three colored circles (red, yellow, green) on the left and the text "PC5" on the right. Below the menu bar is a navigation bar with five tabs: "Physical", "Config", "Desktop" (which is highlighted in dark blue), "Programming", and "Attributes". A blue header bar contains the text "Command Prompt". The main area is a black terminal window displaying the output of a ping command. The text in the terminal is as follows:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 20.0.0.3

Pinging 20.0.0.3 with 32 bytes of data:

Reply from 20.0.0.3: bytes=32 time<1ms TTL=128
Reply from 20.0.0.3: bytes=32 time=15ms TTL=128
Reply from 20.0.0.3: bytes=32 time<1ms TTL=128
Reply from 20.0.0.3: bytes=32 time=18ms TTL=128

Ping statistics for 20.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 18ms, Average = 8ms

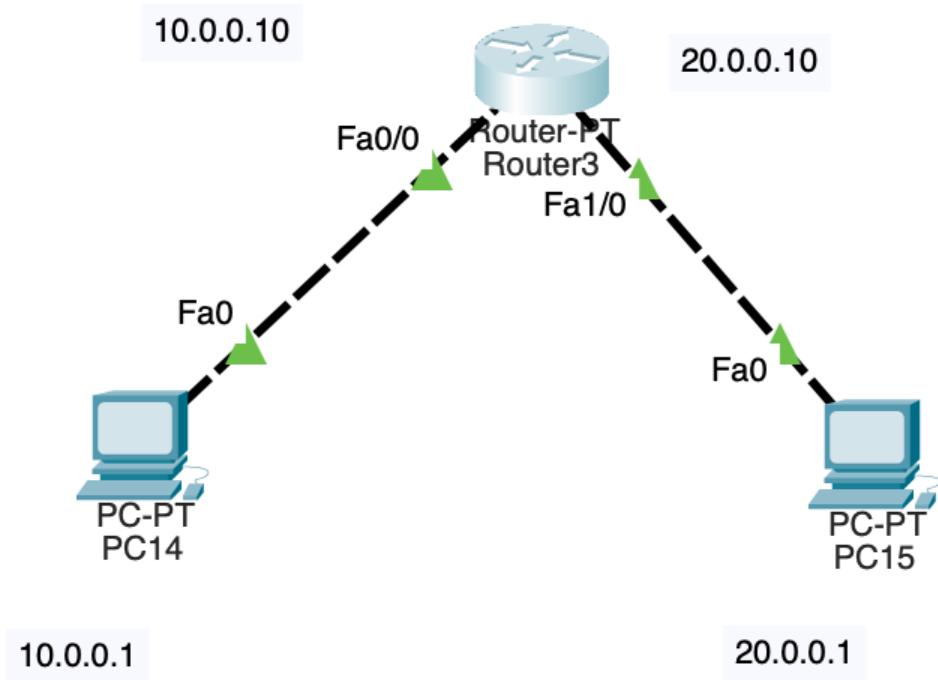
C:\>
```

Top

Experiment No 2

Aim of the program: Configuring IP address to Routers in Packet Tracer. Explore the following messages: Ping Responses, Destination unreachable, Request timed out, Reply

Topology:



Procedure:

1. First create the topology by placing the 2 of the end devices and one of the routers
2. Create connections between the end devices and router by Connections -> Automatically choose connection type [lighting symbol]
3. In the end devices, create IP addresses for the PC-14 by Desktop -> IP configuration -> Make the IPV4 address 10.0.0.1 and make the Subnet mask 255.0.0.0 and set the default gateway as 10.0.0.1.

4. In the end devices, create IP addresses for the PC-15 by Desktop -> IP configuration -> Make the IPV4 address 20.0.0.1 and make the Subnet mask 255.0.0.0 and set the default gateway as 20.0.0.10.

5. To configure the router: use the following command lines:

The screenshot shows a Cisco Router's Command Line Interface (CLI) window titled "Router3". The window has tabs at the top: Physical, Config, **CLI**, and Attributes. Below the tabs is a sub-header "IOS Command Line Interface". A message box contains the following text:

```
Would you like to enter the initial configuration dialog? [yes/no]:  
Press RETURN to get started!  
  
Router>enable  
Router#config t  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#interface fa0/0  
Router(config-if)#ip address 10.0.0.10 255.0.0.0  
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)#interface fa1/0  
Router(config-if)#ip address 20.0.0.10  
% Incomplete command.  
Router(config-if)#ip address 20.0.0.10 255.0.0.0  
Router(config-if)#no shut  
  
Router(config-if)#  
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up  
  
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up  
exit  
Router(config)#exit  
Router#  
%SYS-5-CONFIG_I: Configured from console by console  
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, FastEthernet0/0  
C    20.0.0.0/8 is directly connected, FastEthernet1/0  
  
Router#
```

At the bottom right of the CLI window are "Copy" and "Paste" buttons. At the bottom left is a "Top" button with a checkbox.

5. Click on one of the end devices, Desktop -> Command Prompt -> Ping 20.0.0.1 [pinging another end device]

Snapshot of Output:

The screenshot shows a window titled "PC14" with a tab bar containing "Physical", "Config", "Desktop" (which is selected), "Programming", and "Attributes". Below the tab bar is a blue header bar with the text "Command Prompt" and a close button ("X"). The main area of the window displays the output of a Cisco Packet Tracer command-line interface. The output shows two ping sessions. The first session, starting at C:\>ping 20.0.0.1, results in a request timed out and three replies from 20.0.0.1 with TTL=127. It also provides ping statistics: Sent = 4, Received = 3, Lost = 1 (25% loss). The second session, starting at C:\>ping 20.0.0.1 again, results in four replies from 20.0.0.1 with TTL=127. It also provides ping statistics: Sent = 4, Received = 4, Lost = 0 (0% loss). The prompt C:\> is visible at the bottom.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data:

Request timed out.
Reply from 20.0.0.1: bytes=32 time<1ms TTL=127
Reply from 20.0.0.1: bytes=32 time<1ms TTL=127
Reply from 20.0.0.1: bytes=32 time<1ms TTL=127

Ping statistics for 20.0.0.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data:

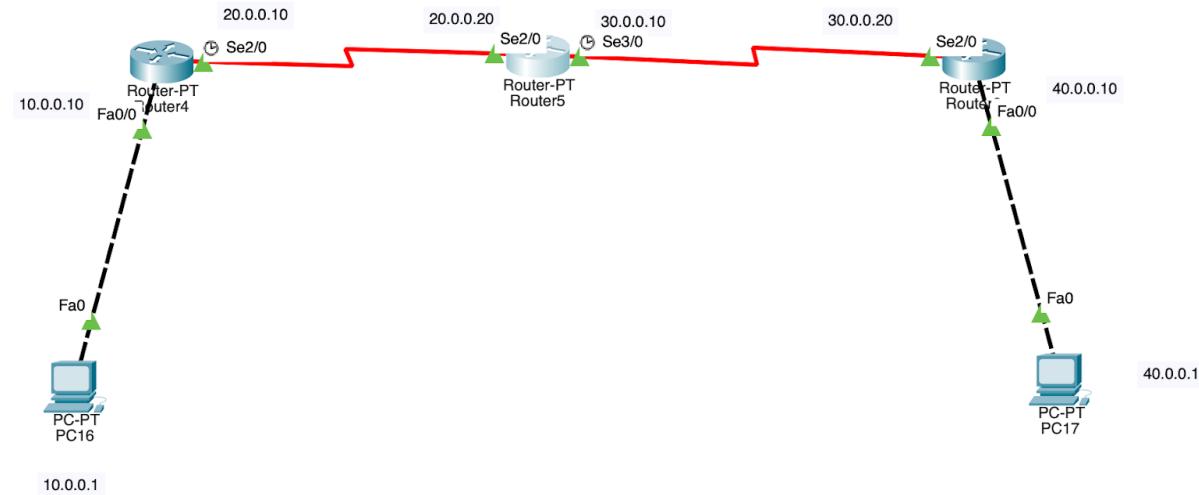
Reply from 20.0.0.1: bytes=32 time<1ms TTL=127

Ping statistics for 20.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

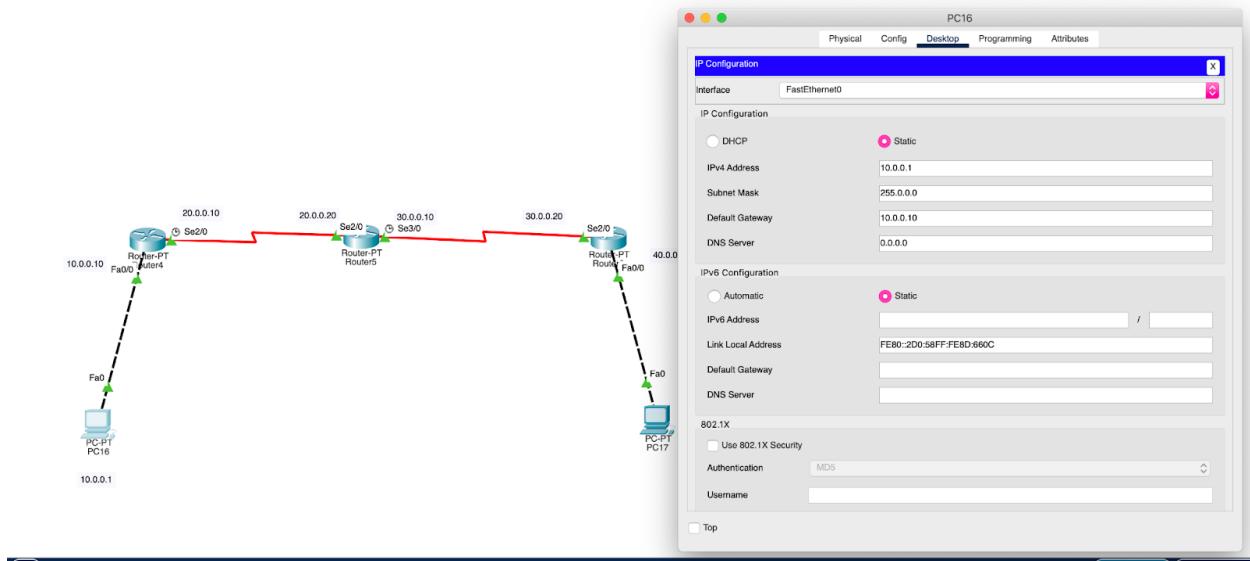
Aim: Connecting multiple routers

Topology:

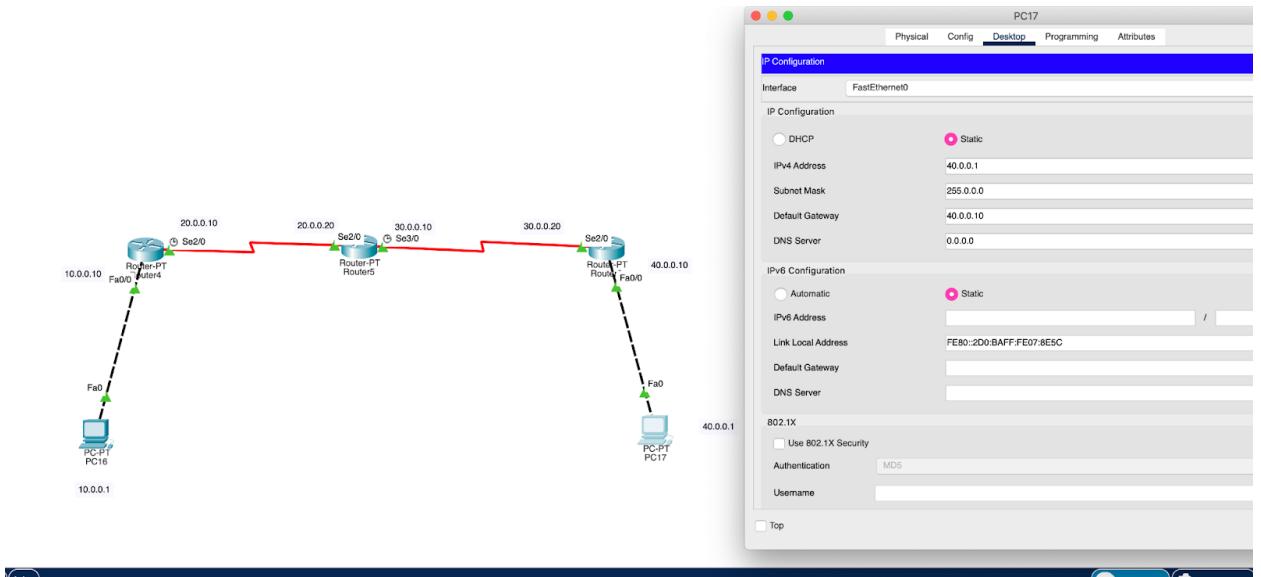


Procedure:

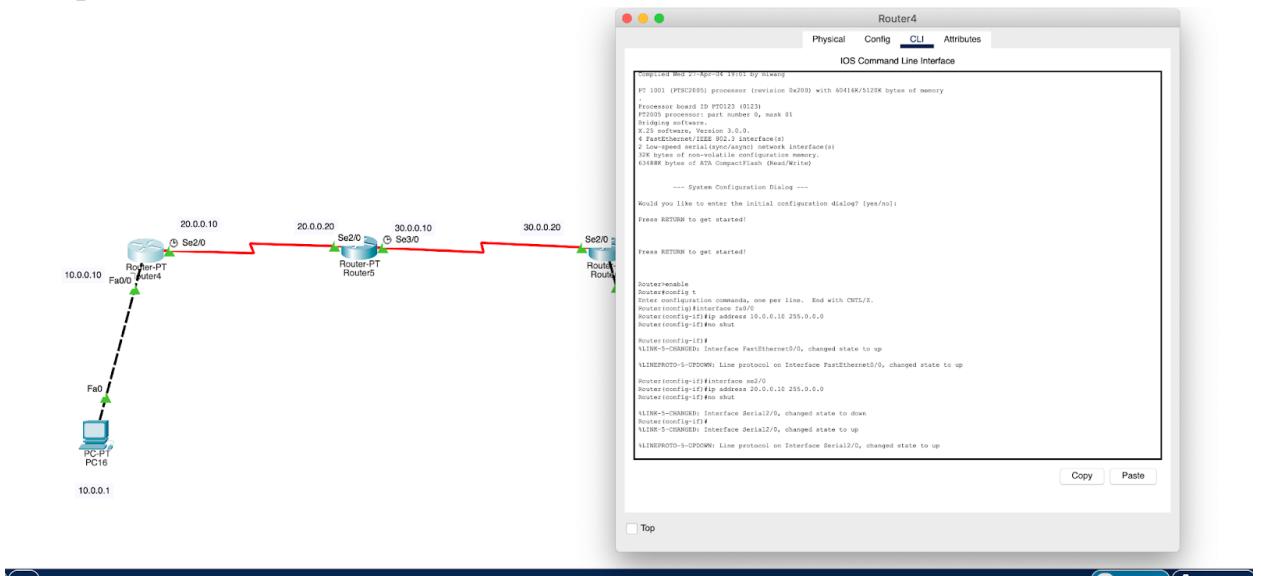
1. Configure IP address of end device PC16



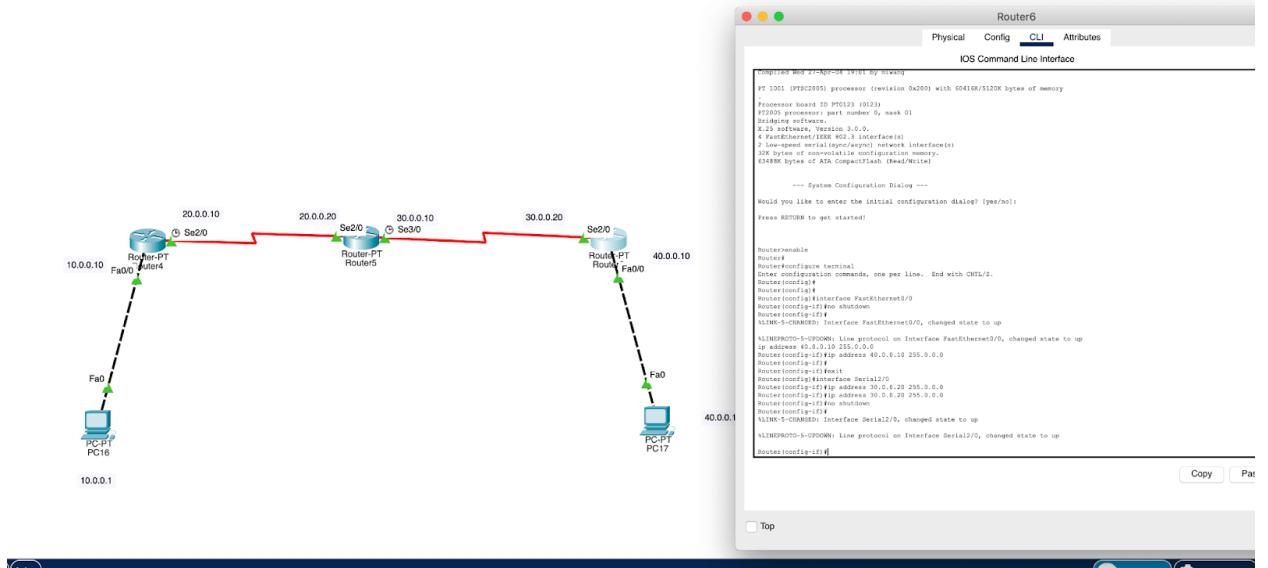
2. Configure IP address of end device PC17



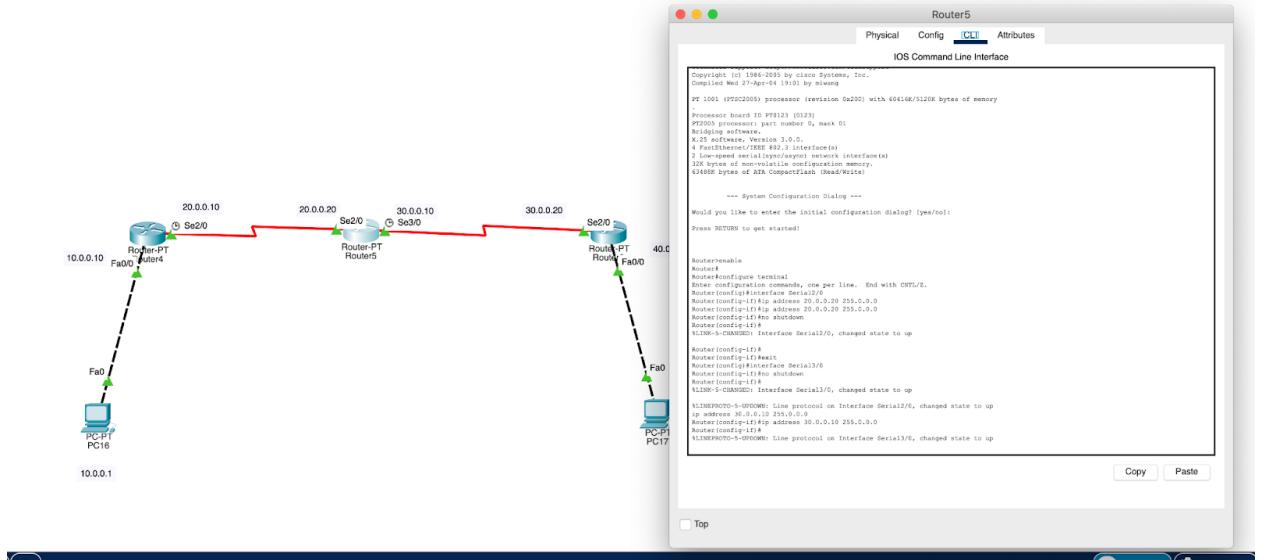
3. Set up router 4 and interface fa0/0 connections and se2/0 connections



4. Set up router 6 and interface fa0/0 and se2/0 connections



5. Set up router 5 and interface se2/0 and se3/0 connections



6. Ping end device PC17 from PC16 using the device->command prompt-> enter ping 40.0.0.1

```
Ping statistics for 40.0.0.10:  
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
    Minimum = 3ms, Maximum = 29ms, Average = 14ms  
  
PC>ping 40.0.0.1  
  
Pinging 40.0.0.1 with 32 bytes of data:  
  
Request timed out.  
Reply from 40.0.0.1: bytes=32 time=78ms TTL=125  
Reply from 40.0.0.1: bytes=32 time=56ms TTL=125  
Reply from 40.0.0.1: bytes=32 time=14ms TTL=125  
  
Ping statistics for 40.0.0.1:  
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),  
Approximate round trip times in milli-seconds:  
    Minimum = 14ms, Maximum = 78ms, Average = 49ms  
  
PC>ping 40.0.0.1  
  
Pinging 40.0.0.1 with 32 bytes of data:  
  
Reply from 40.0.0.1: bytes=32 time=3ms TTL=125  
Reply from 40.0.0.1: bytes=32 time=4ms TTL=125  
Reply from 40.0.0.1: bytes=32 time=19ms TTL=125  
Reply from 40.0.0.1: bytes=32 time=4ms TTL=125  
  
Ping statistics for 40.0.0.1:  
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
    Minimum = 3ms, Maximum = 19ms, Average = 7ms
```

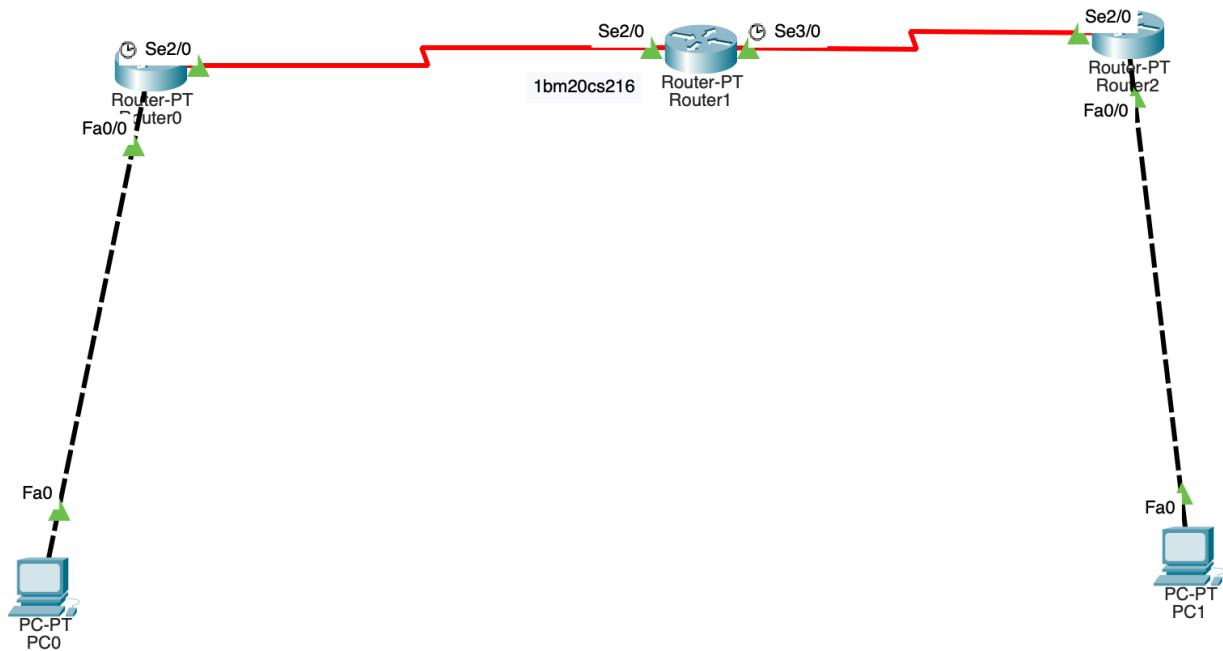
Output:

```
Ping statistics for 40.0.0.10:  
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
    Minimum = 3ms, Maximum = 29ms, Average = 14ms  
  
PC>ping 40.0.0.1  
  
Pinging 40.0.0.1 with 32 bytes of data:  
  
Request timed out.  
Reply from 40.0.0.1: bytes=32 time=78ms TTL=125  
Reply from 40.0.0.1: bytes=32 time=56ms TTL=125  
Reply from 40.0.0.1: bytes=32 time=14ms TTL=125  
  
Ping statistics for 40.0.0.1:  
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),  
Approximate round trip times in milli-seconds:  
    Minimum = 14ms, Maximum = 78ms, Average = 49ms  
  
PC>ping 40.0.0.1  
  
Pinging 40.0.0.1 with 32 bytes of data:  
  
Reply from 40.0.0.1: bytes=32 time=3ms TTL=125  
Reply from 40.0.0.1: bytes=32 time=4ms TTL=125  
Reply from 40.0.0.1: bytes=32 time=19ms TTL=125  
Reply from 40.0.0.1: bytes=32 time=4ms TTL=125  
  
Ping statistics for 40.0.0.1:  
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
    Minimum = 3ms, Maximum = 19ms, Average = 7ms
```

Experiment No 3

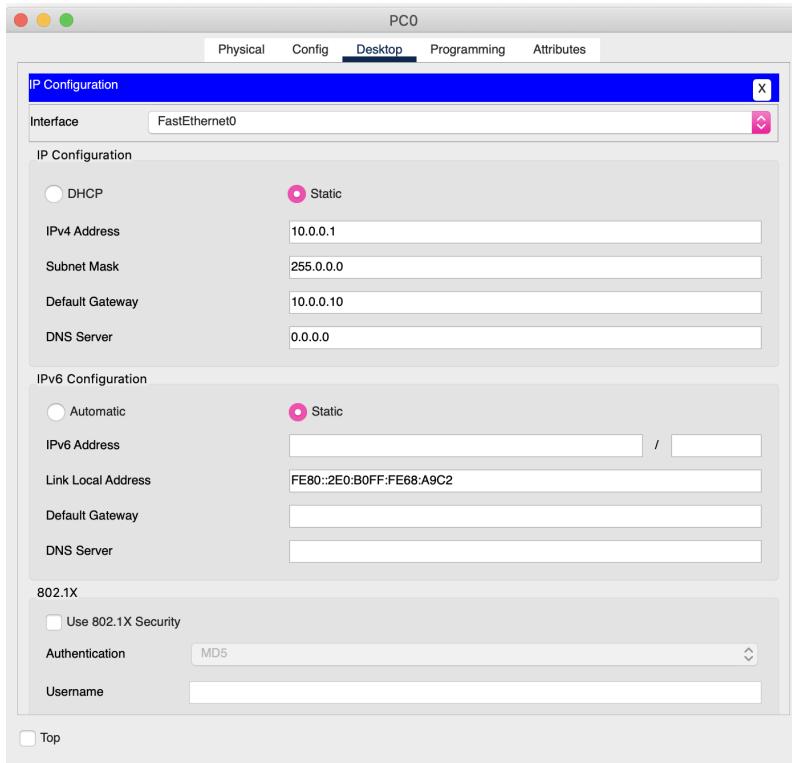
Aim of the program: Configuring default route to the Router

Topology:

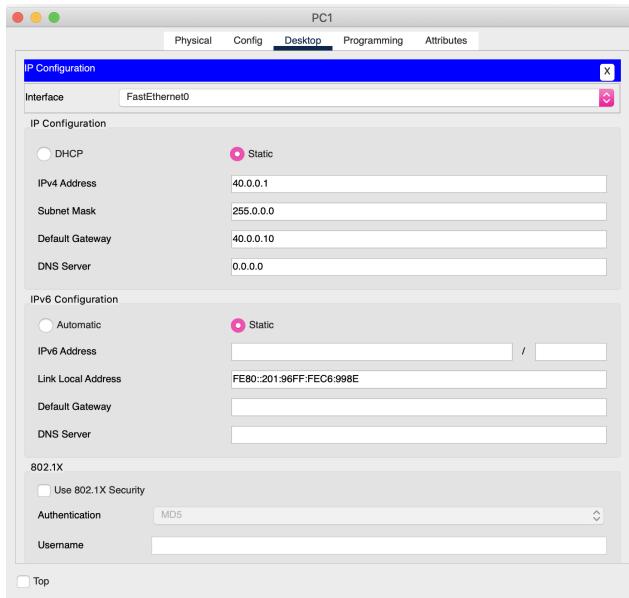


Procedure:

1. Configure IP address of end devices PC18 and PC19
 - a. for PC0

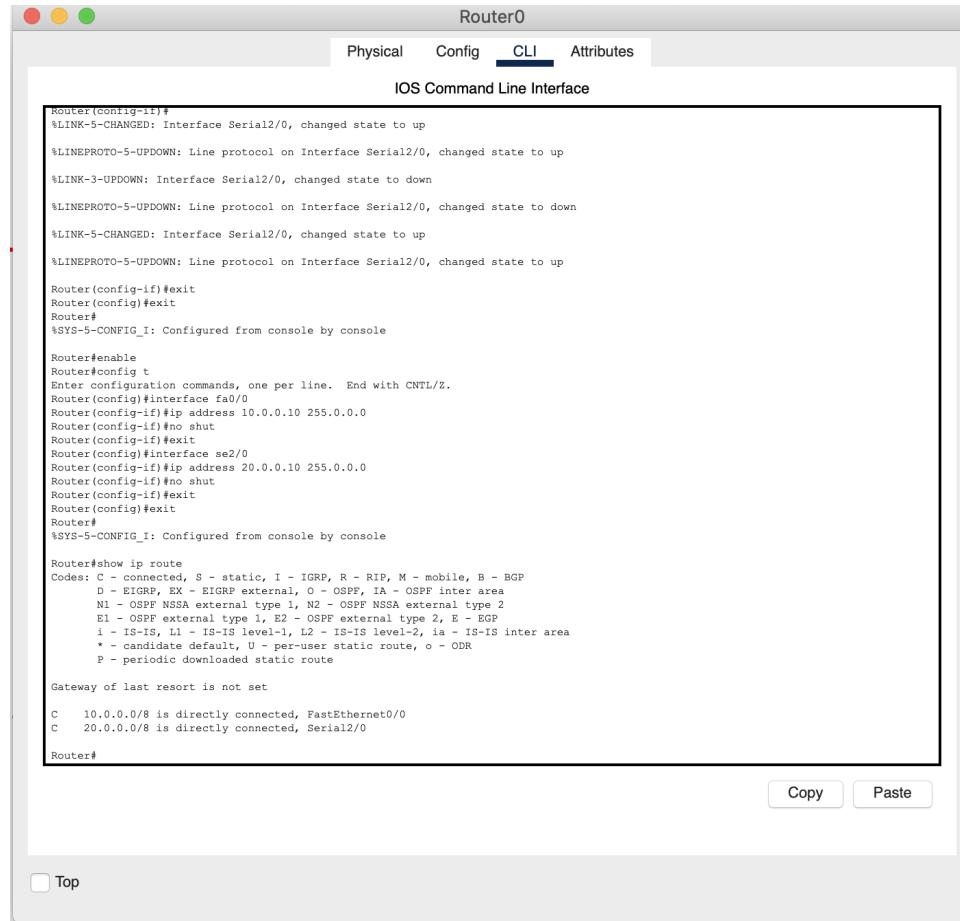


- b. for PC1



2. Set up network connections for the routers using the CLI

a. Router 0



The screenshot shows a terminal window titled "Router0" with the "CLI" tab selected. The window displays the IOS Command Line Interface. The user has entered several commands to configure the router's interfaces and routes:

```
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  
%LINK-3-UPDOWN: Interface Serial2/0, changed state to down  
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to down  
%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)#exit  
Router#  
%SYS-5-CONFIG_I: Configured from console by console  
Router#enable  
Router#config t  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#interface fa0/0  
Router(config)#ip address 10.0.0.10 255.0.0.0  
Router(config-if)#shut  
Router(config-if)#exit  
Router(config)#interface se2/0  
Router(config)#ip address 20.0.0.10 255.0.0.0  
Router(config-if)#shut  
Router(config-if)#exit  
Router(config)#exit  
Router#  
%SYS-5-CONFIG_I: Configured from console by console  
Router#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, FastEthernet0/0  
C 20.0.0.0/8 is directly connected, Serial2/0  
Router#
```

At the bottom right of the terminal window are "Copy" and "Paste" buttons. At the bottom left is a "Top" button.

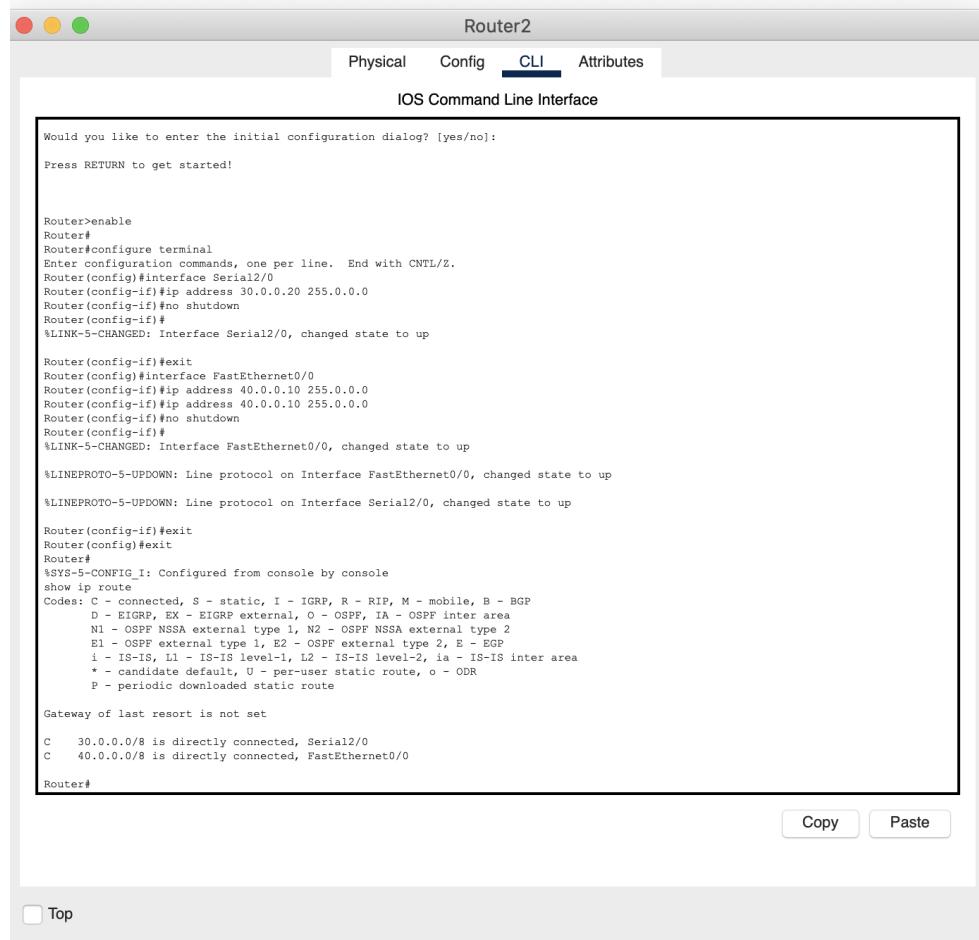
b. Router 1

The screenshot shows a Cisco Router 1 interface. The title bar says "Router1". Below it is a menu bar with "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area is titled "IOS Command Line Interface". It contains the following configuration commands:

```
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#ip address 20.0.0.20 255.0.0.0
Router(config-if)#ip address 20.0.0.20 255.0.0.0
Router(config-if)#shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to administratively down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to down
no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#ip address 30.0.0.10 255.0.0.0
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
ip address 30.0.0.10 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
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    20.0.0.0/8 is directly connected, Serial2/0
C    30.0.0.0/8 is directly connected, Serial3/0
Router#
```

At the bottom right of the command window are "Copy" and "Paste" buttons. At the bottom left is a "Top" button.

c. Router 2



The screenshot shows the Router2 CLI interface. The title bar says "Router2". Below it is a menu bar with "Physical", "Config", "CLI" (which is selected), and "Attributes". The main window is titled "IOS Command Line Interface". It displays the following configuration commands:

```
Would you like to enter the initial configuration dialog? [yes/no]:  
Press RETURN to get started!  
  
Router>enable  
Router#  
Router#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#interface Serial2/0  
Router(config-if)#ip address 30.0.0.20 255.0.0.0  
Router(config-if)#no shutdown  
Router(config-if)#  
%LINK-5-CHANGED: Interface Serial2/0, changed state to up  
  
Router(config-if)#exit  
Router(config)#interface FastEthernet0/0  
Router(config-if)#ip address 40.0.0.10 255.0.0.0  
Router(config-if)#ip address 40.0.0.10 255.0.0.0  
Router(config-if)#no shutdown  
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  
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up  
  
Router(config-if)#exit  
Router(config)#exit  
Router#  
%SYS-5-CONFIG_I: Configured from console by console  
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, la - 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    30.0.0.0/8 is directly connected, Serial2/0  
C    40.0.0.0/8 is directly connected, FastEthernet0/0  
  
Router#
```

At the bottom right of the command window are "Copy" and "Paste" buttons. At the bottom left is a "Top" button.

3. Use default route to teach the routers about the other network connections

- Router 0 to 20.0.0.20 gateway network

```

Router#config<1>
Router(config)>ip address 10.0.0.10 255.0.0.0
Router(config)>no shut
Router(config)>exit
Router#config<1>
Router(config)>interface serial2/0
Router(config-if)>ip address 20.0.0.10 255.0.0.0
Router(config-if)>no shut
Router(config-if)>exit
Router#config<1>
Router(config)>exit
Router#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, FastEthernet0/0
C 20.0.0.0/8 is directly connected, Serial1/0

Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 0.0.0.0 0.0.0.0 20.0.0.20
Router(config)#exit
Router#config<1>
Router(config)>exit
Router#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 20.0.0.20 to network 0.0.0.0

C 10.0.0.0/8 is directly connected, FastEthernet0/0
C 20.0.0.0/8 is directly connected, Serial1/0
S* 0.0.0.0/0 [1/0] via 20.0.0.20

Router#

```

Top

- Router 1 to 20.0.0.10 and 30.0.0.20 gateway network

```

Router#config<1>
LINK-5-CHANGED: Interface Serial3/0, changed state to up
LINK-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
Router(config-if)>exit
Router(config)>exit
Router#config<1>
Router(config)>exit
Router#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 20.0.0.0/8 is directly connected, Serial1/0
C 30.0.0.0/8 is directly connected, Serial1/0

Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 0.0.0.0 0.0.0.0 20.0.0.10
Router(config)#ip route 0.0.0.0 0.0.0.0 30.0.0.20
Router(config)#exit
Router#config<1>
Router(config)>exit
Router#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 20.0.0.10 to network 0.0.0.0

C 20.0.0.0/8 is directly connected, Serial1/0
C 30.0.0.0/8 is directly connected, Serial1/0
S* 0.0.0.0/0 [1/0] via 20.0.0.10
S* 0.0.0.0/0 [1/0] via 30.0.0.20

Router#

```

Top

c. Router 2 to 30.0.0.10 gateway network

The screenshot shows the Router2 CLI interface. The title bar says "Router2". Below it is a navigation bar with tabs: Physical, Config, **CLI**, and Attributes. The main area is titled "IOS Command Line Interface". A large black rectangular box contains the command-line session:

```
%LINK-5-CHANGED: Interface FastEthernet0/0, 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(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
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    30.0.0.0/8 is directly connected, Serial2/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0

Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 0.0.0.0 0.0.0.0 30.0.0.10
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#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 30.0.0.10 to network 0.0.0.0
C    30.0.0.0/8 is directly connected, Serial2/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0
S*   0.0.0.0/0 [1/0] via 30.0.0.10
Router#
```

Below the terminal window are two buttons: "Copy" and "Paste".

Top

4. Ping router gateways and from PC0 to PC1

Snapshot of Output:

The screenshot shows a window titled "PC0" with a tab bar at the top. The "Desktop" tab is selected. Below the tabs is a blue header bar labeled "Command Prompt". The main area contains the output of a Cisco Packet Tracer command-line interface. The output shows two ping sessions. The first session pings 40.0.0.1, resulting in one lost packet (25% loss) with a round-trip time of approximately 89ms. The second session pings 40.0.0.1 again, resulting in no lost packets (0% loss) with a round-trip time of approximately 29ms. The command prompt ends with "C:\>".

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Request timed out.
Reply from 40.0.0.1: bytes=32 time=92ms TTL=125
Reply from 40.0.0.1: bytes=32 time=68ms TTL=125
Reply from 40.0.0.1: bytes=32 time=109ms TTL=125

Ping statistics for 40.0.0.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 68ms, Maximum = 109ms, Average = 89ms

C:\>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Reply from 40.0.0.1: bytes=32 time=57ms TTL=125
Reply from 40.0.0.1: bytes=32 time=51ms TTL=125
Reply from 40.0.0.1: bytes=32 time=6ms TTL=125
Reply from 40.0.0.1: bytes=32 time=4ms TTL=125

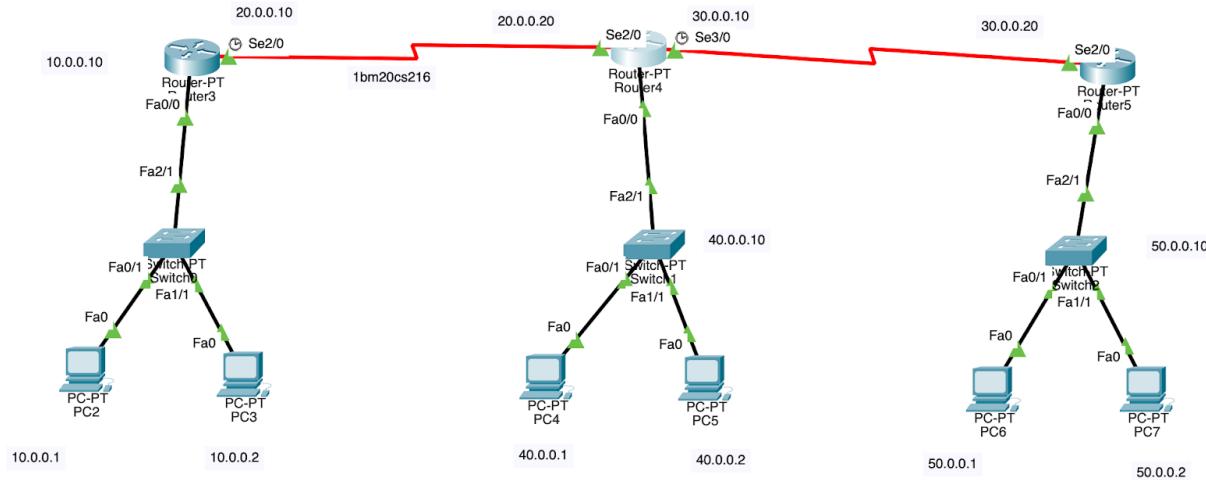
Ping statistics for 40.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 4ms, Maximum = 57ms, Average = 29ms

C:\>
```

Top

Aim: Default routing for routers with switches

Topology:



Procedure:

1. Assign IP address to all the end devices
2. Set up the router networks
 - a. Router 3

```

Router3
Physical Config CLI Attributes
IOS Command Line Interface

--- System Configuration Dialog ---
Would you like to enter the initial configuration dialog? [yes/no]:
Press RETURN to get started!

Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fa0/0
Router(config-if)#ip address 10.0.0.10 255.0.0.0
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)#interface se2/0
Router(config-if)#ip address 20.0.0.10 255.0.0.0
Router(config-if)#no shut
%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router(config-if)*exit
Router(config)*exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
show ip route
Codes: C - connected, S - static, I - ISGP, R - RIP, M - mobile, B - BGP
       E - 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, FastEthernet0/0
Router#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Copy Paste
 Top

```

b. Router 4

The screenshot shows a Cisco Router 4 interface with the following details:

- Router4**: The router's name.
- Physical Config CLI Attributes**: The tabs at the top, with **CLI** selected.
- IOS Command Line Interface**: The main window displaying the CLI session.

The CLI session output is as follows:

```
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    20.0.0.0/8 is directly connected, Serial2/0

Router#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fa0/0
Router(config-if)#ip address 40.0.0.10 255.0.0.0
Router(config-if)#no shutdown

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)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
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    20.0.0.0/8 is directly connected, Serial2/0
C    30.0.0.0/8 is directly connected, Serial3/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0

Router#
```

At the bottom right of the CLI window are **Copy** and **Paste** buttons.

Top

c. Router 5

The screenshot shows a Cisco IOS Command Line Interface window titled "Router5". The window has tabs at the top: Physical, Config, CLI (which is selected), and Attributes. Below the tabs is a section titled "IOS Command Line Interface". The main area contains the following text:

```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface se2/0
Router(config-if)#ip address 30.0.0.20 255.0.0.0
Router(config-if)#no shutdown

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

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

^
% Invalid input detected at '^' marker.

Router(config-if)#interface fa0/0
Router(config-if)#ip address 50.0.0.10 255.0.0.0
Router(config-if)#no shutdown

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
show ip route
^
% Invalid input detected at '^' marker.

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

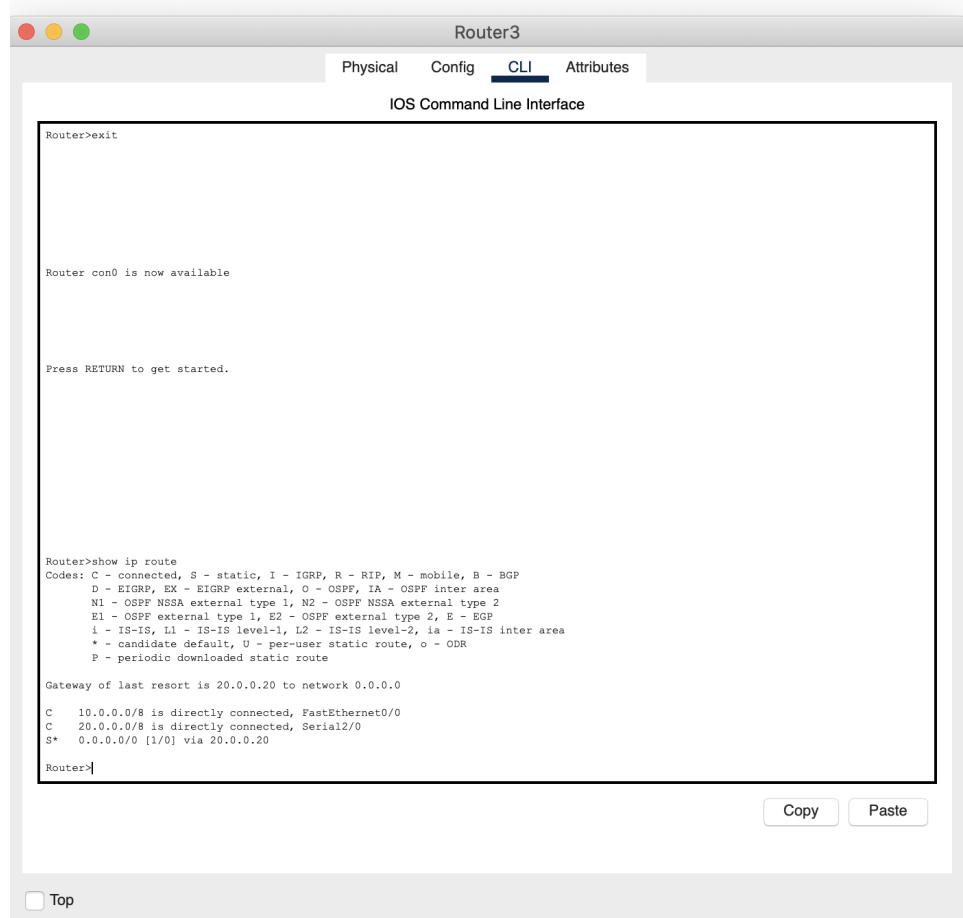
C    30.0.0.0/8 is directly connected, Serial2/0
C    50.0.0.0/8 is directly connected, FastEthernet0/0

Router#
```

At the bottom right of the CLI window are "Copy" and "Paste" buttons. At the bottom left is a "Top" button.

3. Teach the routers about the other networks

a. Router 3



The screenshot shows the Router3 configuration interface with the 'CLI' tab selected. The terminal window displays the following output:

```
Router>exit
Router con0 is now available

Press RETURN to get started.

Router>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 20.0.0.20 to network 0.0.0.0

C 10.0.0.0/8 is directly connected, FastEthernet0/0
C 20.0.0.0/8 is directly connected, Serial2/0
S* 0.0.0.0/0 [1/0] via 20.0.0.20

Router>|
```

At the bottom right of the terminal window are 'Copy' and 'Paste' buttons. Below the terminal window is a 'Top' button.

b. Router 4

The screenshot shows a Mac OS X window titled "Router4". The window has tabs at the top: "Physical", "Config" (which is selected), "CLI", and "Attributes". Below the tabs is a sub-header "IOS Command Line Interface". The main area contains the following text:

```
Router con0 is now available

Press RETURN to get started.

Router>config t
^
% Invalid input detected at '^' marker.

Router>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 20.0.0.10 to network 0.0.0.0

C    20.0.0.0/8 is directly connected, Serial2/0
C    30.0.0.0/8 is directly connected, Serial3/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0
S*   0.0.0.0/0 [1/0] via 20.0.0.10
     [1/0] via 30.0.0.20

Router>
```

At the bottom right of the main window are "Copy" and "Paste" buttons. At the bottom left is a "Top" button.

c. Router 5

Router5

Physical Config **CLI** Attributes

IOS Command Line Interface

```
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
show ip route
^
% Invalid input detected at '^' marker.

Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
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      30.0.0.0/8 is directly connected, Serial2/0
C      50.0.0.0/8 is directly connected, FastEthernet0/0

Router#config
Configuring from terminal, memory, or network [terminal]? terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 0.0.0.0 0.0.0.0 30.0.0.10
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
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 30.0.0.10 to network 0.0.0.0

C      30.0.0.0/8 is directly connected, Serial2/0
C      50.0.0.0/8 is directly connected, FastEthernet0/0
S*    0.0.0.0/0 [1/0] via 30.0.0.10

Router#
```

Top

Copy Paste

Snapshot of Output:

The screenshot shows a Cisco Packet Tracer interface. At the top, there's a menu bar with tabs: Physical, Config, Desktop (which is selected), Programming, and Attributes. Below the menu is a title bar for a window titled "Command Prompt". The main area of the window contains the following text output from a Cisco Packet Tracer Command Line 1.0 session:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 50.0.0.2

Pinging 50.0.0.2 with 32 bytes of data:

Request timed out.
Reply from 50.0.0.2: bytes=32 time=3ms TTL=125
Reply from 50.0.0.2: bytes=32 time=2ms TTL=125
Reply from 50.0.0.2: bytes=32 time=88ms TTL=125

Ping statistics for 50.0.0.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 88ms, Average = 31ms

C:\>ping 50.0.0.2

Pinging 50.0.0.2 with 32 bytes of data:

Reply from 50.0.0.2: bytes=32 time=110ms TTL=125
Reply from 50.0.0.2: bytes=32 time=3ms TTL=125
Reply from 50.0.0.2: bytes=32 time=2ms TTL=125
Reply from 50.0.0.2: bytes=32 time=101ms TTL=125

Ping statistics for 50.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 110ms, Average = 54ms

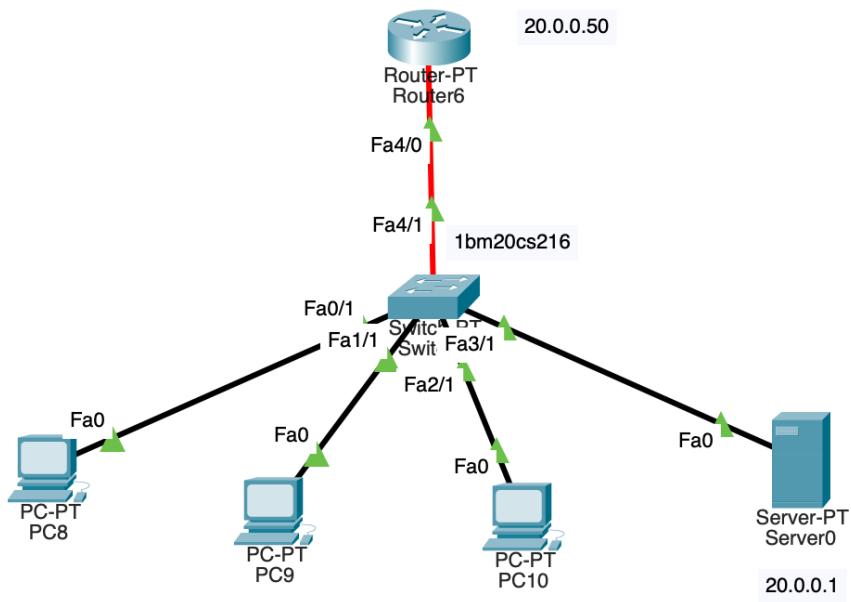
C:\>
```

At the bottom left of the window, there is a checkbox labeled "Top".

Experiment No 4

Aim of the program: Configuring DHCP within a LAN in a packet Tracer

Topology:



Procedure:

1. Set up the server

Server0

Physical Config **Services** Desktop Programming Attributes

SERVICES

- HTTP
- DHCP**
- DHCPv6
- TFTP
- DNS
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP
- IoT
- VM Management
- Radius EAP

DHCP

Interface: FastEthernet0 Service: On Off

Pool Name: serverPool

Default Gateway: 20.0.0.50

DNS Server: 20.0.0.1

Start IP Address: 20 0 0 2

Subnet Mask: 255 0 0 0

Maximum Number of Users: 512

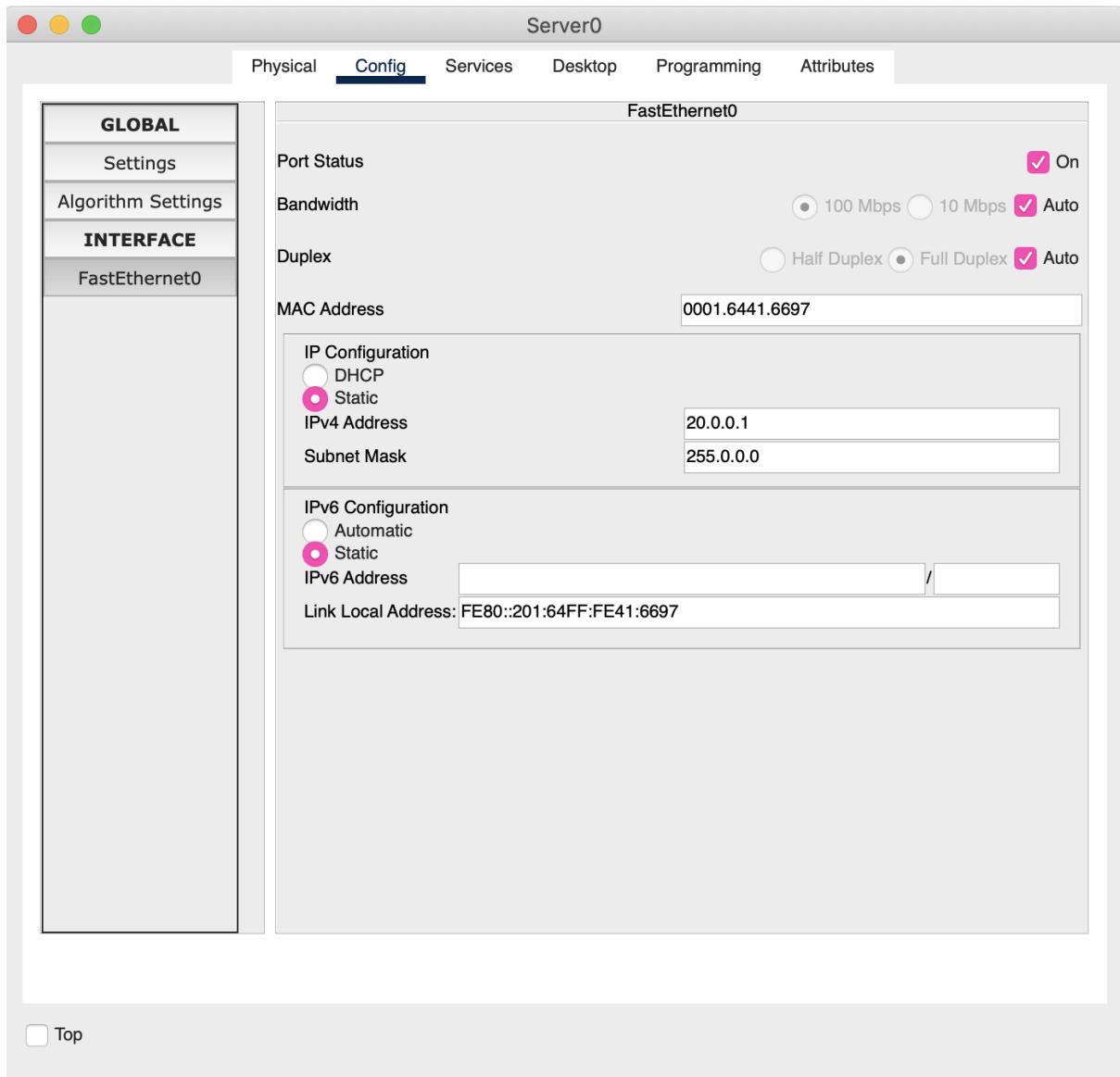
TFTP Server: 0.0.0.0

WLC Address: 0.0.0.0

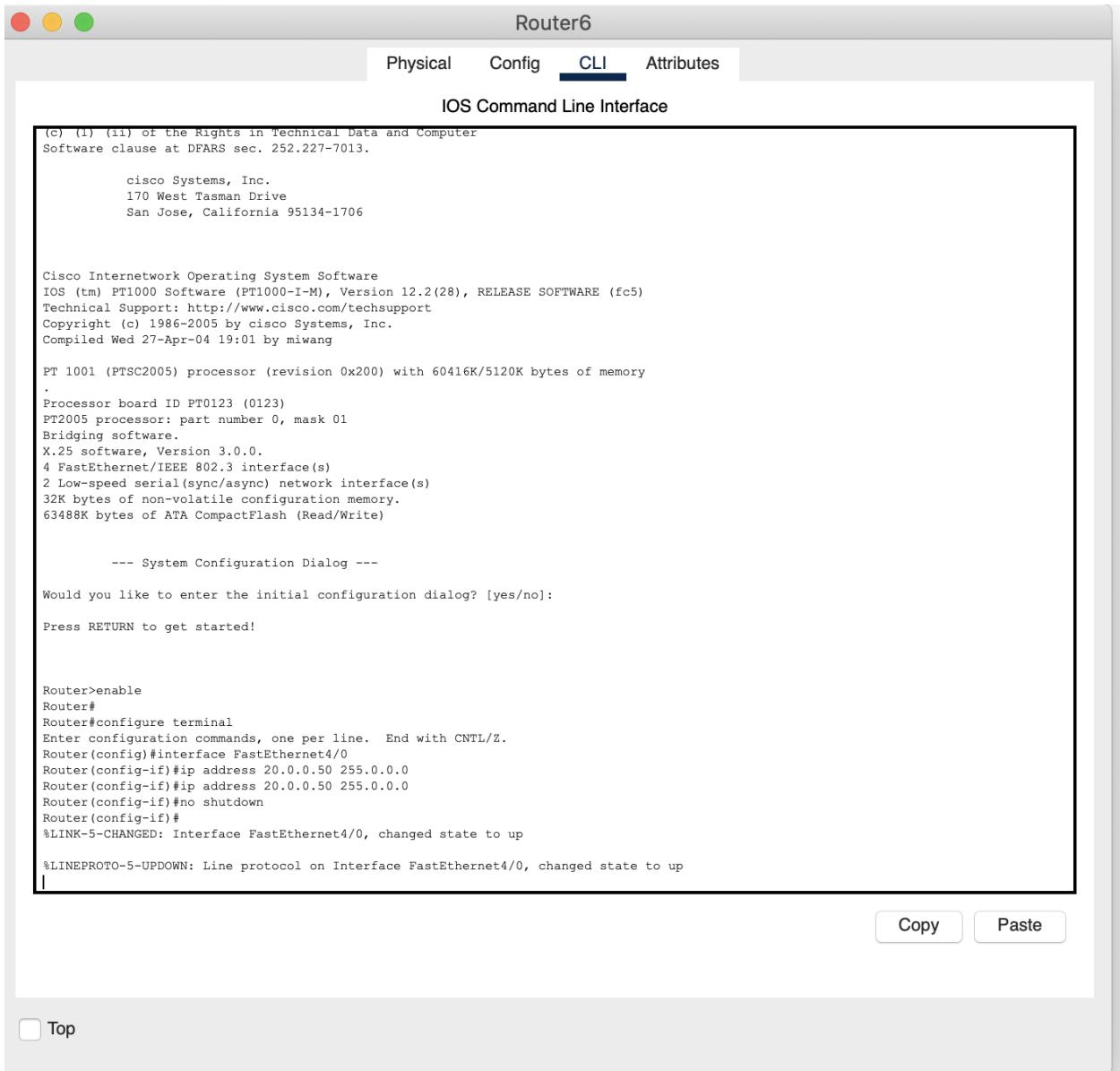
Add Save Remove

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
serverPool	20.0.0.50	20.0.0.1	20.0.0.2	255.0.0.0	512	0.0.0.0	0.0.0.0

Top



2. Set the router



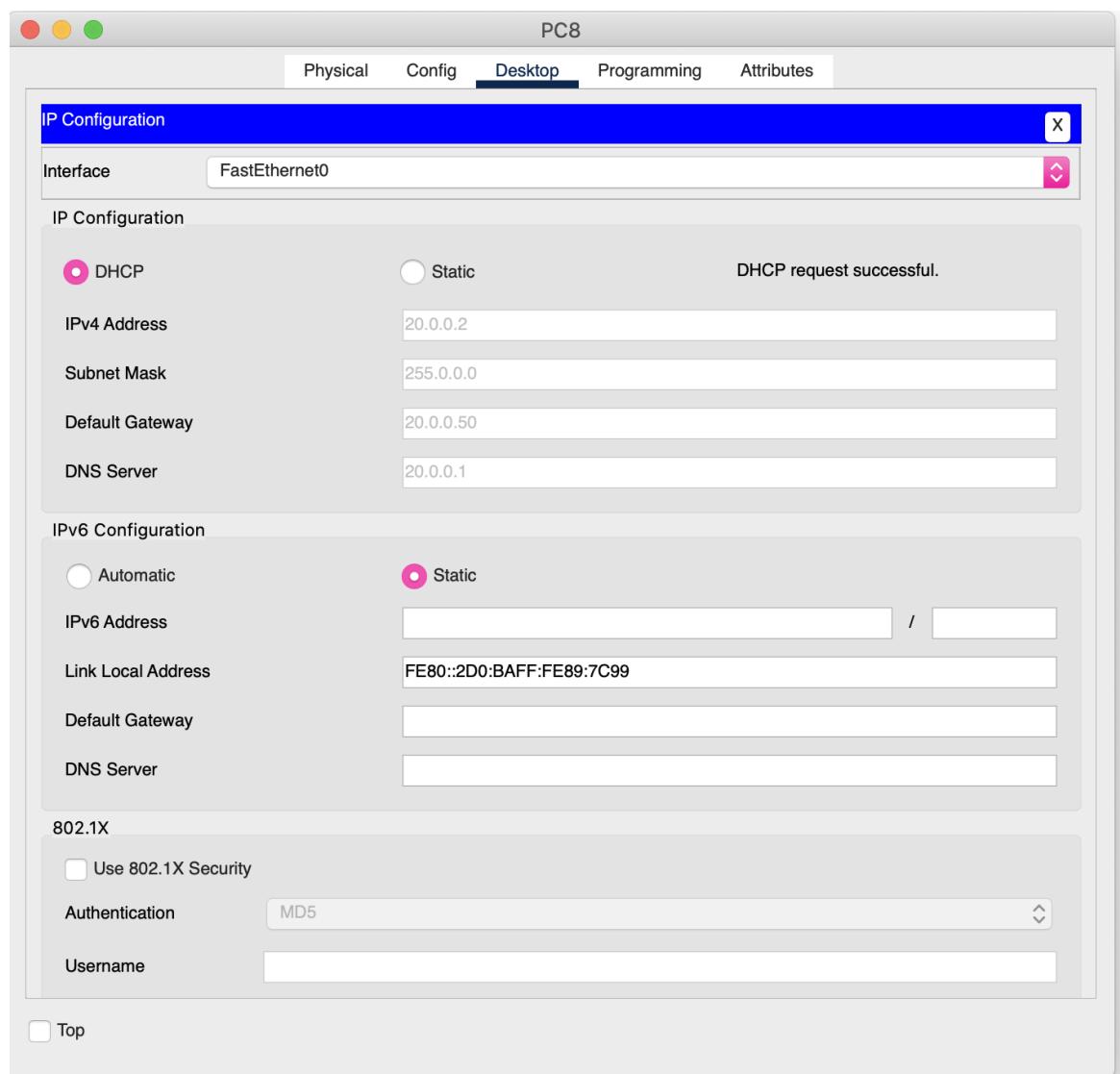
The screenshot shows a Cisco Router6 interface window. The title bar says "Router6". Below it is a menu bar with "Physical", "Config", "CLI" (which is underlined), and "Attributes". The main area is titled "IOS Command Line Interface". It contains several blocks of text:

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- cisco Systems, Inc.
170 West Tasman Drive
San Jose, California 95134-1706
- Cisco Internetwork Operating System Software
IOS (tm) PT1000 Software (PT1000-I-M), Version 12.2(28), RELEASE SOFTWARE (fc5)
Technical Support: <http://www.cisco.com/techsupport>
Copyright (c) 1986-2005 by cisco Systems, Inc.
Compiled Wed 27-Apr-04 19:01 by miwang
- PT 1001 (PTSC2005) processor (revision 0x200) with 60416K/5120K bytes of memory
Processor board ID PT0123 (0123)
PT2005 processor: part number 0, mask 01
Bridging software.
X.25 software, Version 3.0.0.
4 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)
- System Configuration Dialog ---
Would you like to enter the initial configuration dialog? [yes/no]:
Press RETURN to get started!
- Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet4/0
Router(config-if)#ip address 20.0.0.50 255.0.0.0
Router(config-if)#ip address 20.0.0.50 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet4/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet4/0, changed state to up

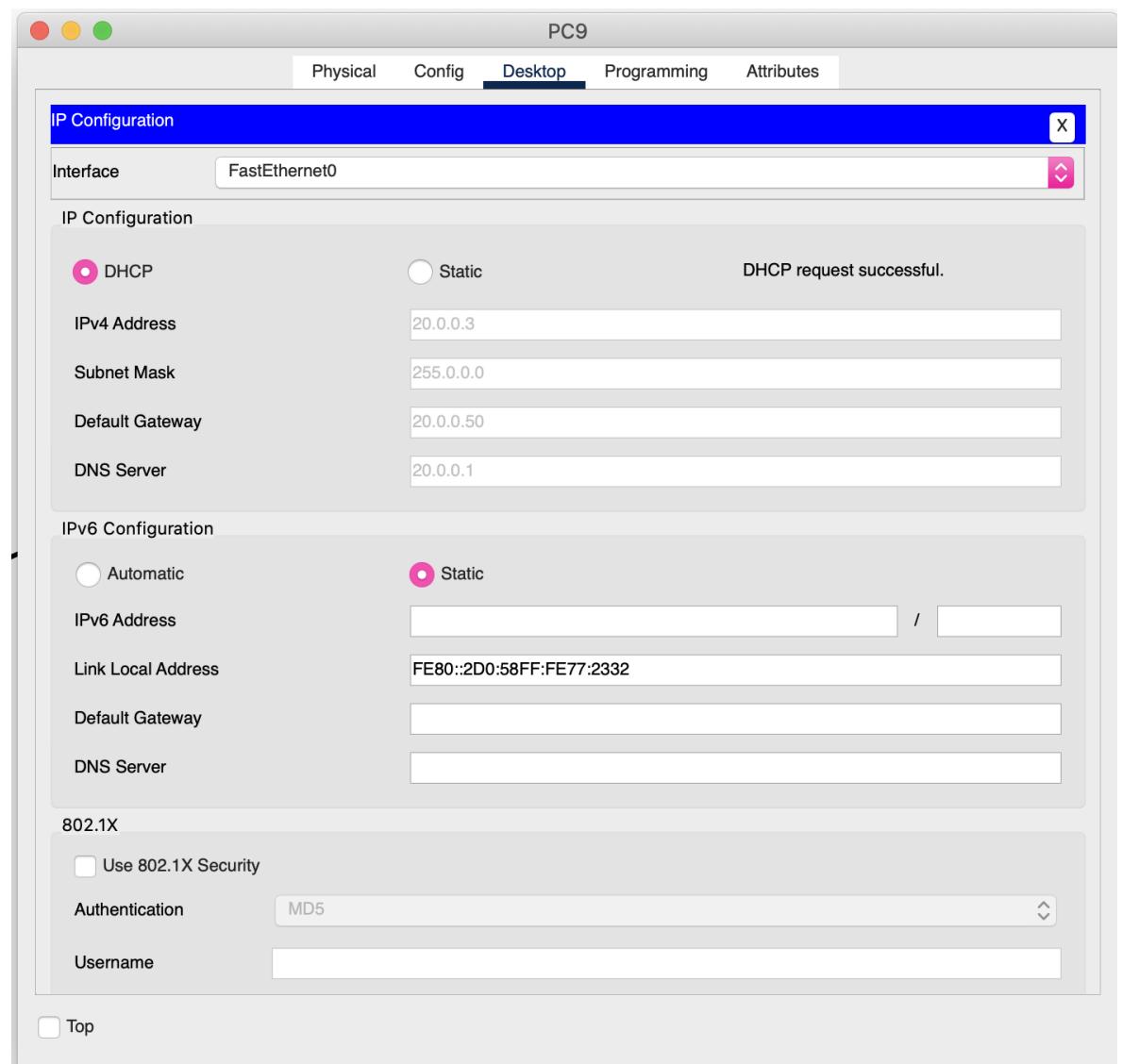
At the bottom right of the window are "Copy" and "Paste" buttons. At the bottom left is a "Top" button.

3. Dynamically set the IP address for the end devices

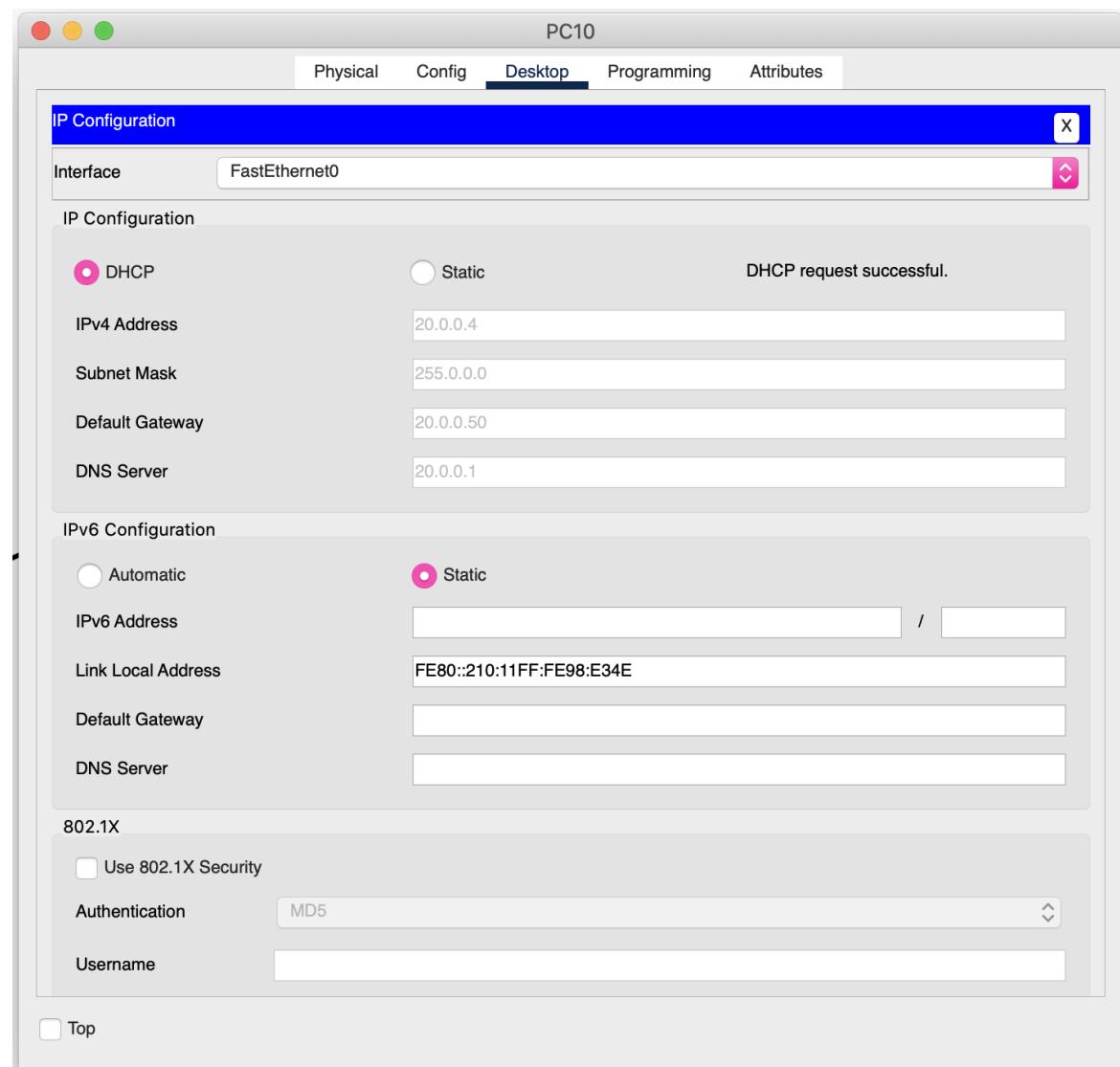
a. PC8



b. PC9



c. PC10



Snapshot of Output:

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 20.0.0.4

Pinging 20.0.0.4 with 32 bytes of data:

Reply from 20.0.0.4: bytes=32 time<1ms TTL=128

Ping statistics for 20.0.0.4:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms

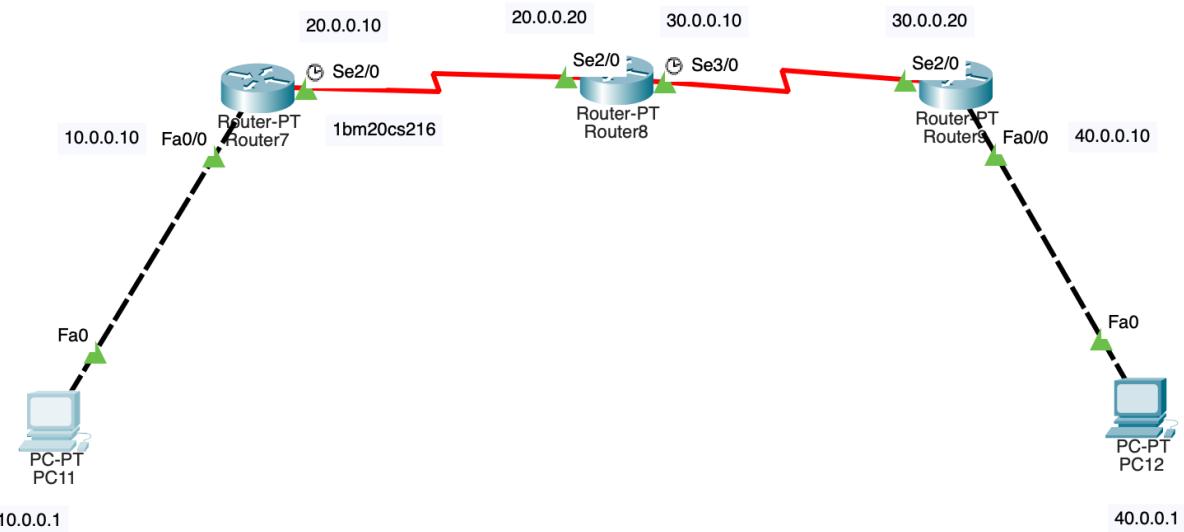
C:\>|

Top

Experiment No 5

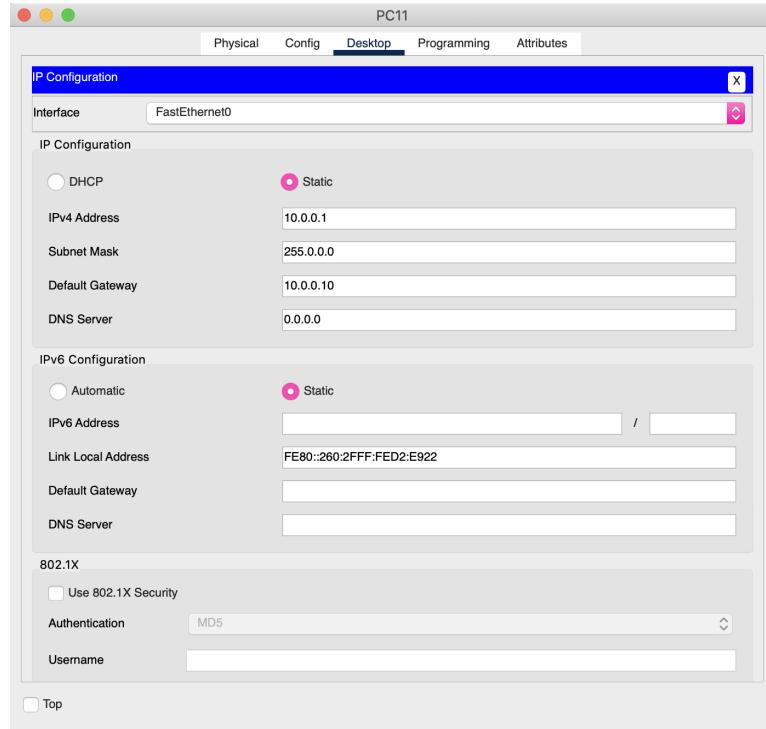
Aim of the program: Configuring RIP Routing Protocol in Routers

Topology:

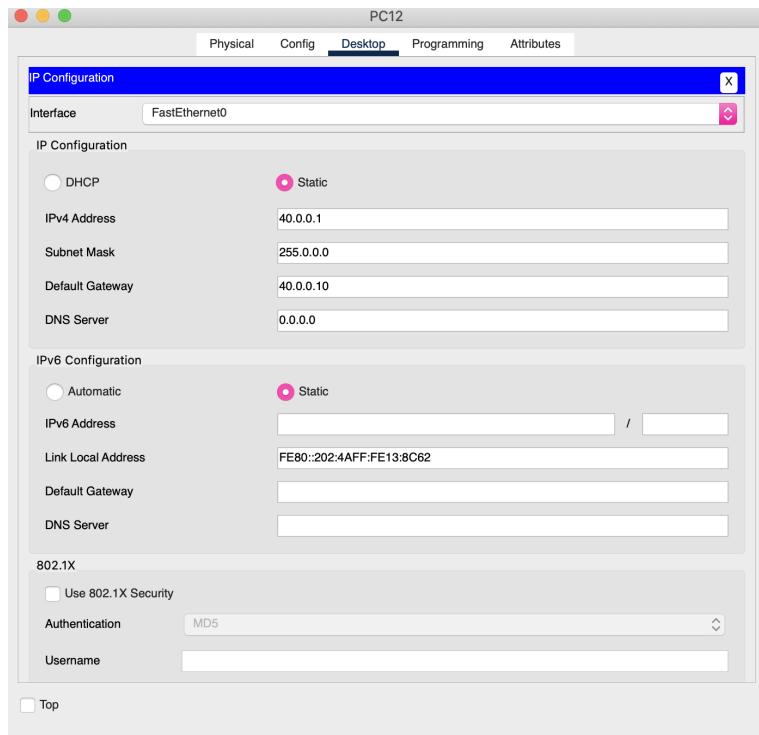


Procedure:

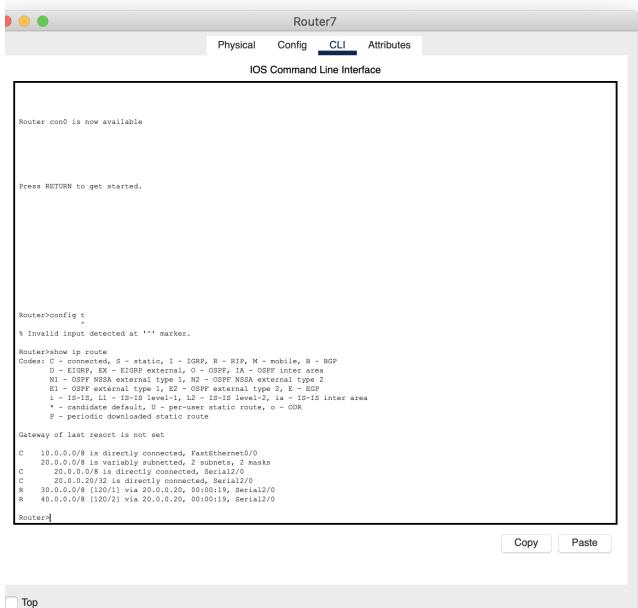
1. PC1->Desktop->ipconfig-> set ip as 10.0.02 and default gateway as 10.0.0.10



2. PC2->Desktop->ipconfig-> set ip as 40.0.0.1 and default gateway as 40.0.0.10



3. Router7->config->cli->enable, config t, interface fa0/0 set ip address as 10.0.0.10, default gateway as 255.0.0.0, encapsulation ppp and no shutdown. then exit. interface se2/0, set ip address as 20.0.0.10, default gateway as 255.0.0.0, encapsulation ppp, clock rate 64000, no shutdown, exit. Then do router rip, do network 10.0.0.0 and network 20.0.0.0, exit, exit, show ip route



Router#

Physical Config **CLI** Attributes

IOS Command Line Interface

Press RETURN to get started!

```
Router>enable
Router>config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fa0/0
Router(config-if)#ip address 10.0.0.10 255.0.0.0
Router(config-if)#no shutdown

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
exit
Router(config)#interface se2/0
Router(config-if)#ip address 20.0.0.10
% Incomplete command.
Router(config-if)#ip address 20.0.0.10 255.0.0.0
Router(config-if)#ip address 20.0.0.10 255.0.0.0
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
show ip route
show ip route
Codes: C - connected, S - static, I - IS-IS, 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 10.0.0.8 is directly connected, FastEthernet0/0

Router#
Router#router rip
^
% Invalid input detected at '^' marker.
```

- Router8->config->cli->enable, config t, interface se2/0 set ip address as 20.0.0.20, default gateway as 255.0.0.0, encapsulation ppp and no shut down. then exit. interface se3/0, set ip address as 30.0.0.10, default gateway as 255.0.0.0, encapsulation ppp, clock rate 64000, no shutdown, exit. Then do router rip, do network 20.0.0.0 and network 30.0.0.0, exit, exit, show ip route

Router8

Physical Config **[CLI]** Attributes

IOS Command Line Interface

```
Cisco Internetwork Operating System Software
IOS (tm) PT1000 Software (PT1000-I-M), Version 12.2(2B), RELEASE SOFTWARE (fc5)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1995-2005 by cisco Systems, Inc.
Compiled Wed 27-Apr-04 19:01 by mwave

PT1001 (PTSC2005) processor (revision 0x200) with 60416K/5120K bytes of memory
...
Processor board ID PT0123 (0123)
PT2005 processor; part number 0, mask 01
Bridging Software.
X.25 Software, Version 3.0.0.
4 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial (sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)

--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: no

Press RETURN to get started!

Router#enable
Router(config)#enable password cisco
Router(config)#enable secret 5 $1$C6GZ$PQHJLWzqfDwvV3uR
Router(config)#line vty 0 4
Router(config-line)#login
Router(config-line)#priv 15
Router(config-line)#exit
Router(config)#line serial 0/0
Router(config-line)#ip address 20.0.0.20 255.0.0.0
Router(config-line)#encapsulation ppp
Router(config-line)#no shutdown
Router(config-line)#exit
Router(config)#line vty 0 4
Router(config-line)#vlinke-5-changed: Interface Serial1/0, changed state to up
Router(config-line)#vlineproto-5-updown: line protocol on Interface Serial1/0, changed state to up

Router(config)#interface serial 0/0
Router(config-if)#ip address 30.0.0.10 255.0.0.0
Router(config-if)#encapsulation ppp
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown
Router(config-if)#exit

Router(config)#
```

Router8

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 20.0.0.0
Router(config-router)#network 30.0.0.0
Router(config-router)#
Router(config-router)#end
Router#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
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 Serial12/0
Router(config-if)#
Router(config-if)#end
Router#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router#
%SYS-5-CONFIG_I: Configured from console by console
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

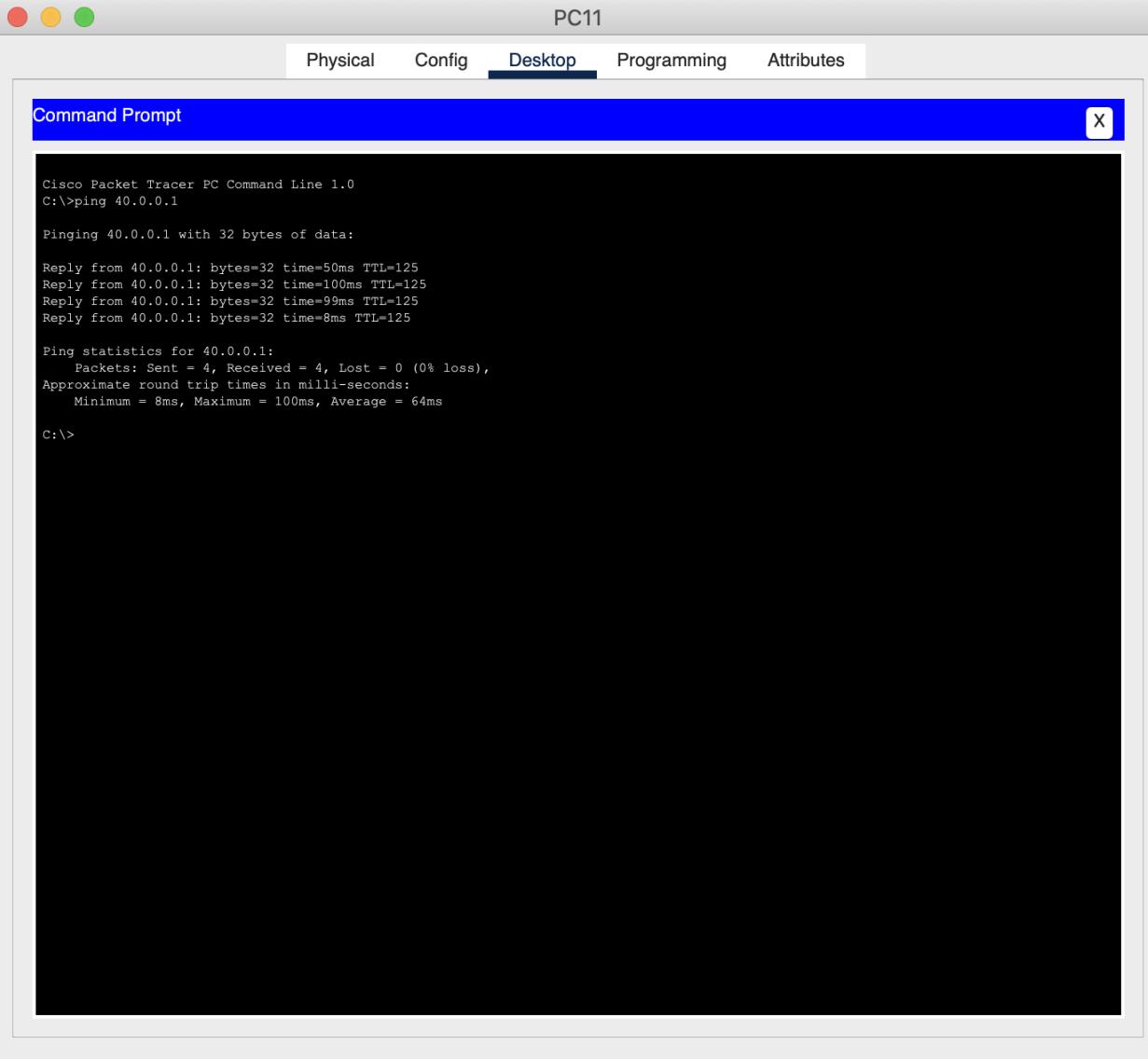
Gateway of last resort is not set

R    10.0.0.0/8 [120/1] via 20.0.0.10, 00:00:11, Serial2/0
      20.0.0.0 is variably subnetted, 2 subnets, 2 masks
C        20.0.0.0/8 is directly connected, Serial2/0
C        20.0.0.10/32 is directly connected, Serial2/0
      30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        30.0.0.0/8 is directly connected, Serial3/0
C        30.0.0.20/32 is directly connected, Serial3/0

Copy Paste
```

- Router9->config->cli->enable, config t, interface se2/0 set ip address as 30.0.0.20, default gateway as 255.0.0.0, encapsulation ppp and no shut down. then exit. interface fa0/0, set ip address as 40.0.0.10, default gateway as 255.0.0.0, encapsulation ppp, clock rate 64000, no shutdown, exit. Then do router rip, do network 30.0.0.0 and network 40.0.0.0, exit, exit, show ip route

Snapshot of Output:



The screenshot shows a window titled "PC11" with a tab bar at the top. The "Desktop" tab is selected. Below the tabs is a blue header bar labeled "Command Prompt". The main area of the window displays the output of a ping command. The text is as follows:

```
Cisco Packet Tracer PC Command Line 1.0
C:>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Reply from 40.0.0.1: bytes=32 time=50ms TTL=125
Reply from 40.0.0.1: bytes=32 time=100ms TTL=125
Reply from 40.0.0.1: bytes=32 time=99ms TTL=125
Reply from 40.0.0.1: bytes=32 time=8ms TTL=125

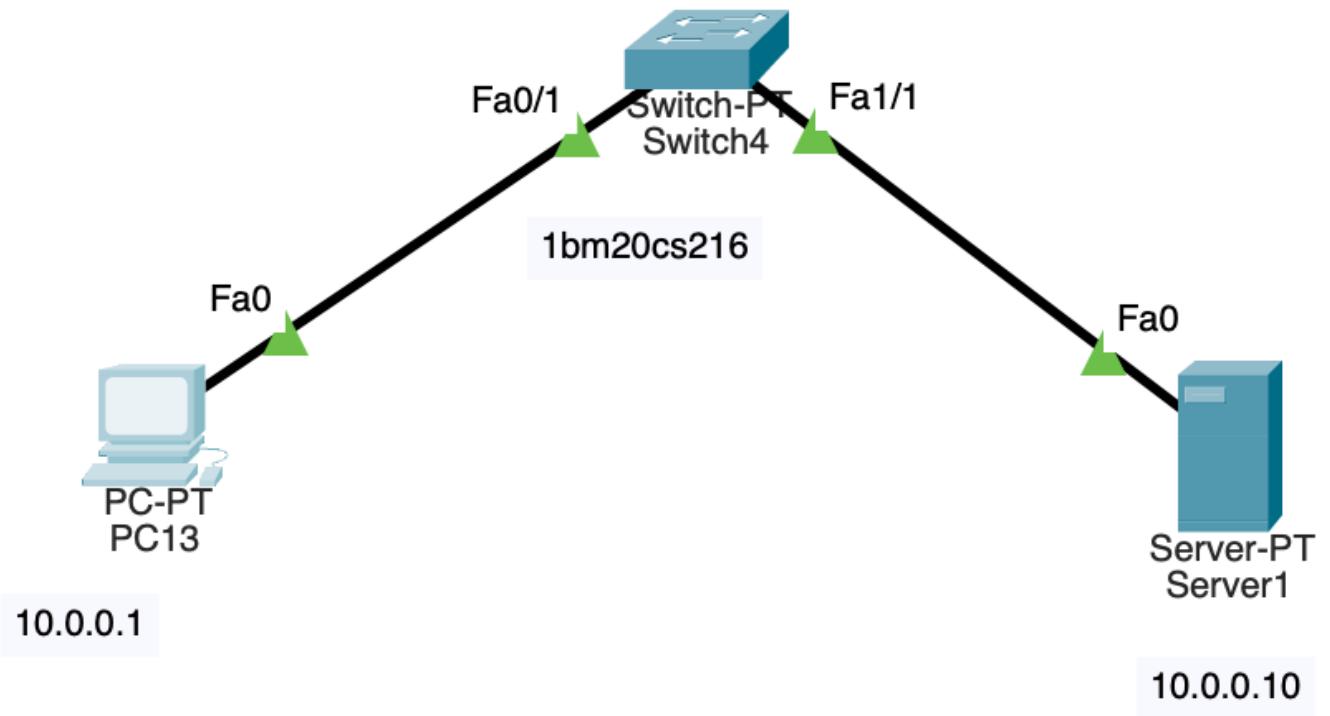
Ping statistics for 40.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 8ms, Maximum = 100ms, Average = 64ms

C:>
```

Top

Experiment No 6

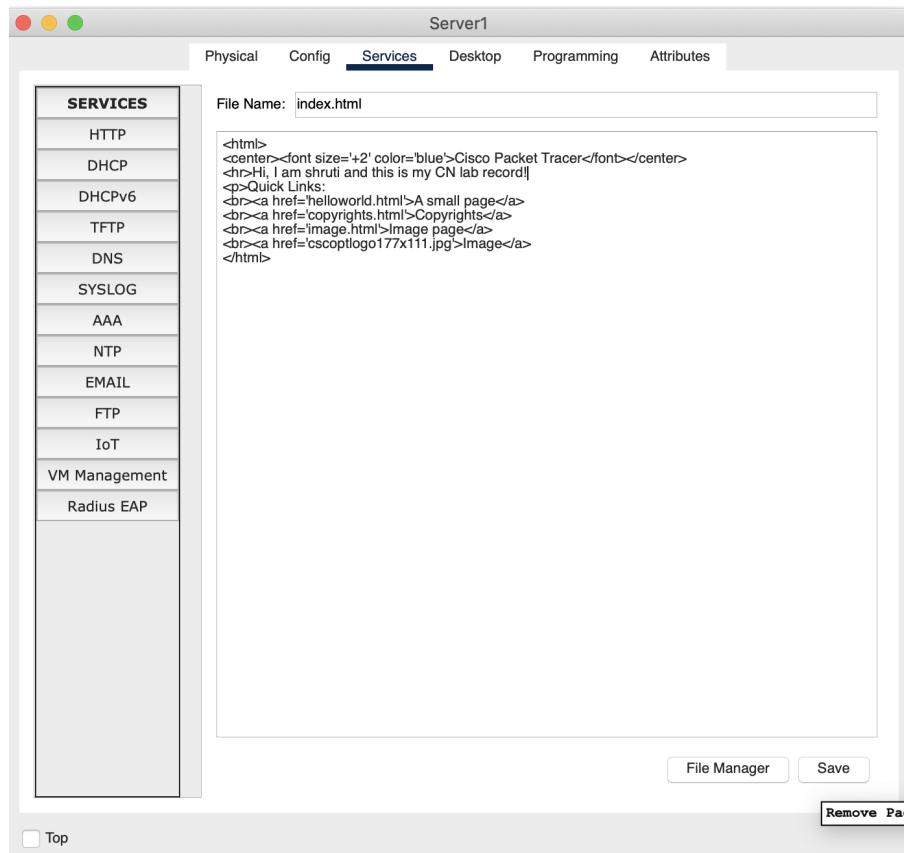
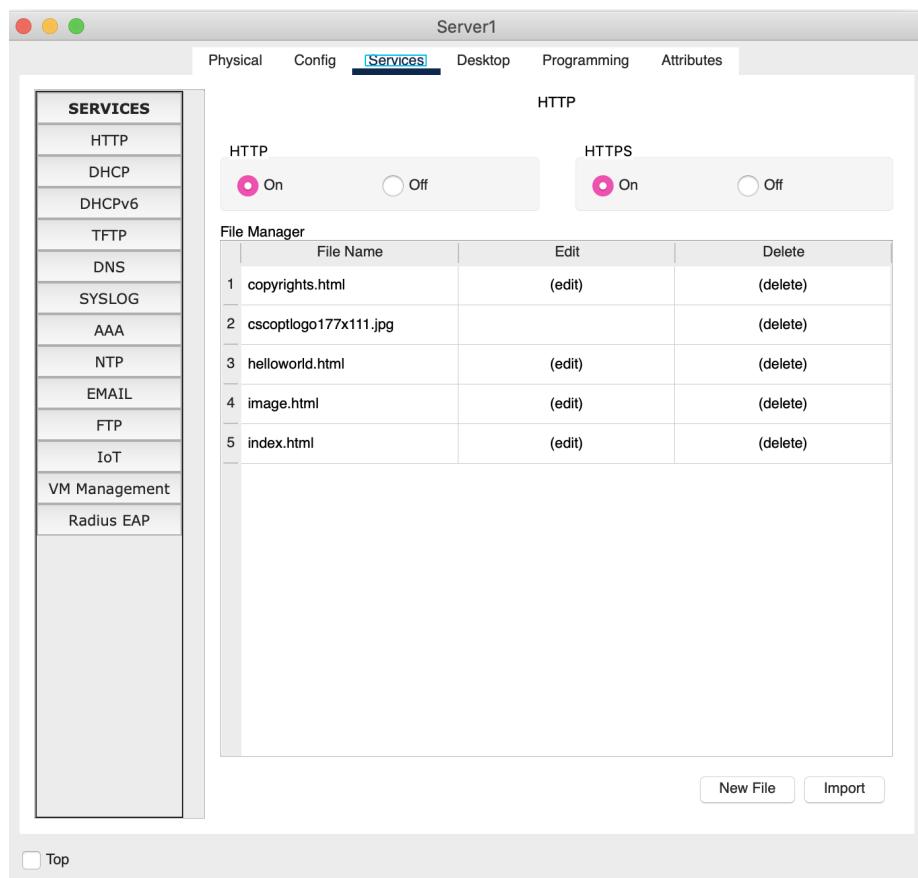
Aim of the program: Demonstration of WEB server and DNS using Packet Tracer
Topology:



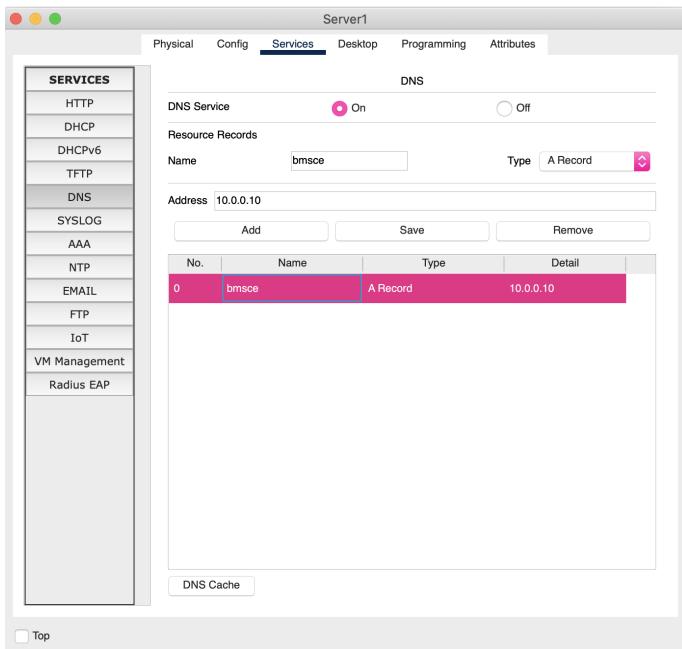
Procedure:

1. Set up the IP address of the end device1 by doing desktop->ip configuration -> IPV4 address -> 10.0.0.1->default gateway->255.0.0.0
2. Set up the IP address of the server by doing desktop->ip configuration -> IPV4 address -> 10.0.0.10->default gateway->255.0.0.0

3. Server->services-> turn on HTTP & HTTPS. Edit index.html and save

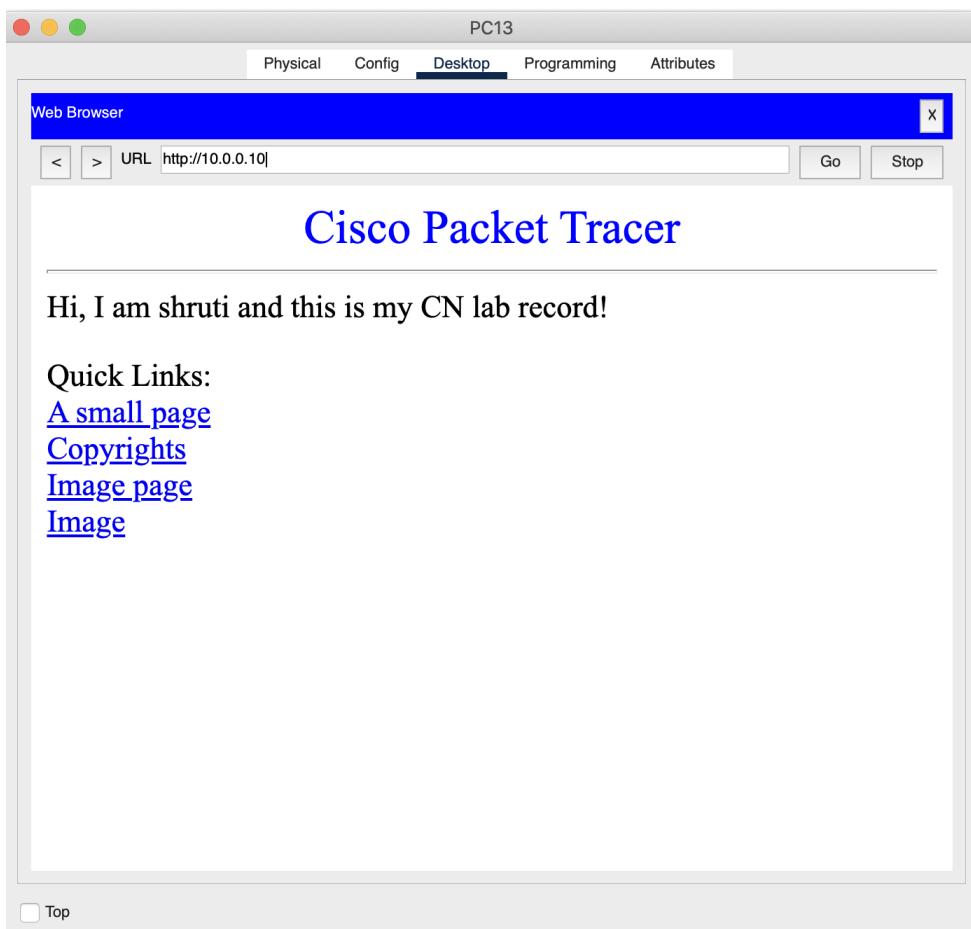


4. Select DNS, turn on and add the domain name bmsce with the address of 10.0.0.10



5. PC13->Desktop->Web Browser-> enter 10.0.0.10 as the address

Snapshot of Output:



CYCLE 2

Experiment No 1

Program: Write a program for error detecting code using CRC-CCITT (16-bits).

Code:

```
import java.util.Scanner;  
import java.io.*;  
public class Main{  
    public static void main(String args[])  
    {  
        Scanner in = new Scanner(System.in);  
        //Input DATA  
        System.out.println("Enter Message/Data bits");  
        String message = in.nextLine();  
        System.out.println("Enter Generator");  
        String generator = in.nextLine();  
        int data[] = new int[message.length()+generator.length()-1];  
        int divisor[] = new int[generator.length()];  
        for(int i=0; i<message.length(); i++)  
        {  
            data[i]=Integer.parseInt(message.charAt(i)+"");  
        }  
        for(int i=0; i<generator.length(); i++)  
        {  
            divisor[i]=Integer.parseInt(generator.charAt(i)+"");  
        }
```

```

}

//CRC calculation
for(int i=0; i<message.length(); i++)
{
    if(data[i]==1) //if 0, you can just skip
        for(int j=0; j<divisor.length; j++)
            data[i+j]^=divisor[j];
}

//Display CRC
System.out.println("The checksum code is: ");
for(int i=0; i<message.length();i++)
    data[i]=Integer.parseInt(message.charAt(i)+"");
for(int i=0; i<data.length; i++)
    System.out.print(data[i]);
System.out.println();

//CHECK for input CRC code
System.out.println("Enter Checksum code");
    message=in.nextLine();
System.out.println("Enter generator");
    generator=in.nextLine();
data = new int[message.length()+generator.length()-1];
divisor = new int[generator.length()];
for(int i=0; i<message.length();i++)

```

```

data[i] = Integer.parseInt(message.charAt(i)+"");
for(int i=0; i<generator.length();i++)
    divisor[i] = Integer.parseInt(generator.charAt(i)+"");

//Calculator of remainder
for(int i=0; i<message.length(); i++)
{
    if(data[i]==1)
        for(int j=0; j<divisor.length; j++)
            data[i+j]^=divisor[j];
}

//validity of data
boolean valid = true;
for(int i=0; i<data.length;i++)
{
    if(data[i] == 1){
        valid = false;
        break;
    }
    if(valid == true)
    {
        System.out.println("Data stream is valid");
    } else {
        System.out.println("Data stream is not valid, CRC error");
    }
}

```

```
    }  
}  
}
```

Output:

```
Enter Message/Data bits  
1000101101  
Enter Generator  
1101  
The checksum code is: 1000101101001  
Enter Checksum code  
1000101101001  
Enter generator  
1101  
Data stream is valid  
|
```

Experiment No. 2

Program: Write a program for distance vector algorithm to find suitable path for transmission.

Code:

```
import java.util.Scanner;  
import java.io.*;  
  
public class Main{  
    private int D[];  
    private int num_ver;  
    public static final int MAX_VALUE = 999;  
    private int parent[];  
    public Main(int num_ver)  
    {  
        this.num_ver = num_ver;  
        D = new int[num_ver+1];  
        parent = new int[num_ver+1];  
    }  
  
    public void bellmanford(int source, int A[][])  
    {  
        for(int node=1; node<=num_ver; node++)  
        {  
            D[node] = MAX_VALUE;  
        }
```

```

parent[node]=-1;
}

D[source]=0;
parent[source]=0;
for(int node=1; node<=num_ver-1; node++)
{
    for(int sn = 1; sn<=num_ver; sn++)
    {
        for(int dn=1; dn<=num_ver; dn++)
        {
            if(A[sn][dn]!=MAX_VALUE)
            {
                if(D[dn]>D[sn]+A[sn][dn])
                {
                    D[dn]=D[sn]+A[sn][dn];
                    parent[dn]=sn;
                }
            }
        }
    }
}

for(int sn=1; sn<=num_ver; sn++)
{
    for(int dn=1; dn<=num_ver; dn++)
    {
}

```

```

        if(A[sn][dn]!=MAX_VALUE)
        {
            if(D[dn]>D[sn]+A[sn][dn])
                System.out.println("Graph contains negative edge cycles: ");
        }
    }

    for(int vertex=1; vertex<=num_ver; vertex++)
    {
        System.out.println("\nDistance of source "+source+" to "+vertex+" is
"+D[vertex]);
        System.out.print("Path: " + source);
        printPath(parent, vertex);
    }
}

public void printPath(int parent[], int j)
{
    if(parent[j]==0)
        return;
    printPath(parent, parent[j]);
    System.out.print(" -> " + j);
}

public static void main(String args[])

```

```

{
    int num_ver=0;
    int source;
    Scanner in = new Scanner(System.in);
    System.out.println("Enter number of vertices: ");
    num_ver = in.nextInt();
    int A[][] = new int[num_ver+1][num_ver+1];
    System.out.println("Enter the adjacency matrix: ");
    for(int sn = 1; sn<=num_ver; sn++)
    {
        for(int dn=1; dn<=num_ver; dn++)
        {
            A[sn][dn] = in.nextInt();
            if(sn == dn)
            {
                A[sn][dn] = 0;
                continue;
            }
            if(A[sn][dn] == 0)
            {
                A[sn][dn] = MAX_VALUE;
            }
        }
    }
    System.out.println("Enter the source vertex: ");
}

```

```
source = in.nextInt();

Main b = new Main(num_ver);

b.bellmanford(source,A);

}

}
```

Output:

```
Enter number of vertices: 4
Enter the adjacency matrix:
999 5 7 3
5 999 999 999
7 999 999 999
3 999 999 999
999 999 999
1
Enter the source vertex:
1
Distance of source 1 to 1 is 0
Path: 1
Distance of source 1 to 2 is 5Path: 1 -> 2
Distance of source 1 to 3 is 7

Path: 1 -> 3
Distance of source 1 to 4 is 3

Path: 1 -> 4|
```

Experiment No. 3

Program: Implement Dijkstra's algorithm to compute the shortest path for a given topology.

Code:

```
#include<stdio.h>
```

```
void dijkstras();
```

```
int c[10][10], n, src;
```

```
void main() {
```

```
    int i,j;
```

```
    printf("\nEnter the num of vertices: \t");
```

```
    scanf("%d", &n);
```

```
    printf("\nEnter the cost matrix: \n");
```

```
    for(i = 1; i <= n; i++) {
```

```
        for(j = 1; j <= n; j++) {
```

```
            scanf("%d", &c[i][j]);
```

```
        }
```

```
    }
```

```
    printf("\nEnter the source node: \t");
```

```
    scanf("%d", &src);
```

```
    dijkstras();
```

```
}
```

```

void dijkstras() {
    int vis[10], dist[10], prev[10], u, j, count, min;
    for(j = 1; j <= n; j++) {
        dist[j] = c[src][j];
        prev[j] = src;
    }
    for(j = 1; j <= n; j++) {
        vis[j] = 0;
    }
    dist[src] = 0;
    vis[src] = 1;
    count = 1;
    while(count != n) {
        min = 9999;
        for(j = 1; j <= n; j++) {
            if(dist[j] < min && vis[j] != 1) {
                min = dist[j];
                u = j;
            }
        }
        vis[u] = 1;
        count++;
        for(j = 1; j <= n; j++) {
            if(min + c[u][j] < dist[j] && vis[j] != 1) {

```

```

    dist[j] = min + c[u][j];
    prev[j] = u;
}
}

for(j = 1; j <= n; j++) {
    printf("\nThe shortest distance is:: \n");
    printf("%d---->%d = %d", src, j, dist[j]);
    printf("\nThe path is:");
    if(j != src){
        int k = j;
        printf("\n");
        printf("%d<-", j);
        while(prev[k] != src) {
            printf("%d<-", prev[k]);
            k = prev[k];
        }
        printf("%d", src);
        printf("\n");
    }
}
}

```

Output:

```
Enter the num of vertices: 5
Enter the cost matrix:
0 2 3 999 999
2 0 15 2 999
3 15 0 999 13
999 2 999 0 9
999 999 13 9 0
Enter the source node: 1
The shortest distance is::
1---->1 = 0
The path is:
The shortest distance is::
1---->2 = 2
The path is:
2<-1

The shortest distance is::
1---->3 = 3
The path is:
3<-1

The shortest distance is::
1---->4 = 4
The path is:
4<-2<-1

The shortest distance is::
1---->5 = 13
The path is:
5<-4<-2<-1
```

Experiment No. 4

Program: Write a program for congestion control using Leaky bucket algorithm.

Code:

```
#include<stdio.h>

#define capacity 50

void main() {
    int timeLimit = 10;
    int bucketCapacity = 0, outputRate = 5;

    while(timeLimit < 100) {
        int newPacket;
        printf("\nEnter new packet size: ");
        scanf("%d", &newPacket);

        if(newPacket < capacity) {
            bucketCapacity = bucketCapacity + newPacket;
            printf("\nBucket capacity currently: %d", bucketCapacity);
            bucketCapacity = bucketCapacity - outputRate;
            printf("\nBucket capacity after output: %d", bucketCapacity);
            timeLimit++;
        } else if(newPacket > capacity || (newPacket + bucketCapacity) > capacity) {
            printf("\nNew packet cannot be added to bucket");
        }
    }
}
```

```
        bucketCapacity = bucketCapacity - outputRate;  
        printf("\nbucket capacity after output: %d", bucketCapacity);  
        timeLimit++;  
    } else if(bucketCapacity < 0) {  
        bucketCapacity = 0;  
        printf("\nbucket capacity after output: %d", bucketCapacity);  
        timeLimit++;  
    }  
}  
}
```

Output:

```
enter new packet size: 10  
bucket capacity currently: 10  
bucket capacity after output: 5  
enter new packet size: 5  
bucket capacity currently: 10  
bucket capacity after output: 5  
enter new packet size: 10  
bucket capacity currently: 15  
bucket capacity after output: 10  
enter new packet size: -1  
bucket capacity currently: 9  
bucket capacity after output: 4  
enter new packet size: 22  
bucket capacity currently: 26  
bucket capacity after output: 21  
enter new packet size: |
```

Experiment No. 5

Program: Using TCP/IP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.

Code:

```
from socket import *

ip='127.0.0.1'
port = 12000

serverSocket = socket(AF_INET,SOCK_STREAM)
serverSocket.bind((ip,port))
serverSocket.listen(1)

while 1:
    connectionSocket, addr = serverSocket.accept()
    print(f"The server is ready to receive @ {addr[0]} : {addr[1]}")

    sentence = connectionSocket.recv(1024).decode()
    print("\n",sentence)
    file=open(sentence,"r")
    l=file.read(1024)
    connectionSocket.send(l.encode())
    print ('\nSent contents of ' + sentence)

    file.close()
    connectionSocket.close()
```

```

from socket import *

ip='127.0.0.1'

port = 12000

clientSocket = socket(AF_INET, SOCK_STREAM)
clientSocket.connect((ip,port))

sentence = input("\nEnter file name: ")
clientSocket.send(sentence.encode())
##filecontents = clientSocket.recv(1024).decode()
##print ('From Server:\n')
##print(filecontents)

clientSocket.close()

```

Output:

```

Enter file name: tcpserver.py
From Server:

from socket import *
serverName="127.0.0.1"
serverPort = 12000
serverSocket = socket(AF_INET,SOCK_STREAM)
serverSocket.bind((serverName,serverPort))
serverSocket.listen(1)
while 1:
    print ("The server is ready to receive")
    connectionSocket, addr = serverSocket.accept()
    sentence = connectionSocket.recv(1024).decode()

    file=open(sentence,"r")
    l=file.read(1024)

    connectionSocket.send(l.encode())
    print ('\nSent contents of ' + sentence)
    file.close()
    connectionSocket.close()

```

```

python tcpserver.py
The server is ready to receive

Sent contents of tcpserver.py
The server is ready to receive

```

Experiment No. 6

Program: Using UDP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.

Code:

```
from socket import *
serverName = 'DESKTOP-BQNHCT5'
serverPort = 12000
clientSocket = socket(AF_INET, SOCK_DGRAM)

sentence = input("Enter file name")
clientSocket.sendto(bytes(sentence,"utf-8"),(serverName, serverPort))
filecontents,serverAddress = clientSocket.recvfrom(2048)
print ('From Server:', filecontents)

clientSocket.close()

from socket import *
serverName = "10.124.7.76"
serverPort = 12000
serverSocket = socket(AF_INET, SOCK_STREAM)
serverSocket.bind((serverName, serverPort))
```

```
serverSocket.listen(1)

print("The server is ready to receive")

while 1:
    connectionSocket, addr = serverSocket.accept()
    sentence = connectionSocket.recv(1024).decode()

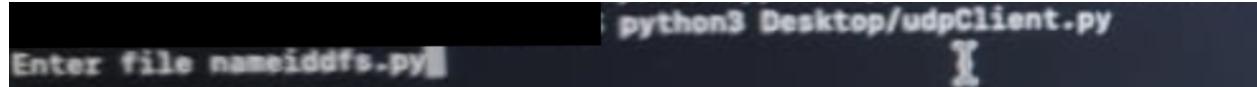
    file = open(sentence, "r")
    l = file.read(1024)
    print("Recieved from client: ", l)

    connectionSocket.send(l.encode())
    file.close()
    connectionSocket.close()
```

Output:



The terminal window shows the command `python3 udpServer.py` being run. The output is "The server is ready to receive".



The terminal window shows the command `python3 Desktop/udpClient.py` being run. The input is "Enter file nameiddfs.py".