

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

“JnanaSangama”, Belgaum -590014, Karnataka.



LAB RECORD

Computer Network Lab (23CS5PCCON)

Submitted by

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in partial fulfilment for the award of the degree of

**BACHELOR OF ENGINEERING
in
COMPUTER SCIENCE AND ENGINEERING**



B.M.S. COLLEGE OF ENGINEERING

(Autonomous Institution under VTU)

BENGALURU-560019

Academic Year 2024-25 (odd)

B.M.S. College of Engineering

Bull Temple Road, Bangalore 560019

(Affiliated To Visvesvaraya Technological University, Belgaum)

Department of Computer Science and Engineering



CERTIFICATE

This is to certify that the Lab work entitled “Computer Network (23CS5PCCON)” carried out by **Shivaraj Kallappa Pujari (1BM22CS259)**, who is Bonafide student of **B.M.S. College of Engineering**. It is in partial fulfilment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum. The Lab report has been approved as it satisfies the academic requirements of the above-mentioned subject and the work prescribed for the said degree.

Prof. Rekha G S Assistant Professor Department of CSE, BMSCE	Dr. Kavitha Sooda Professor & HOD Department of CSE, BMSCE
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Index-Cycle-I

Sl. No.	Date	Experiment Title	Page No.
1	04/10/2024	Create a topology involving multiple hubs and a switch connecting them to simulate with simple PDU.	1
2	18/10/2024	Configure IP address to routers in packet tracer. Explore the following messages: ping responses, destination unreachable, request timed out, reply	6
3	25/10/2024	Configure default route, static route to the router	12
4	08/11/2024	Configure DHCP within a LAN and outside LAN.	19
5	22/11/2024	Configure RIP routing Protocol in Routers	25
6	22/11/2024	Configure OSPF routing protocol	29
7	22/11/2024	Demonstrate the TTL/ Life of a Packet	36
8	08/11/2024	Configure Web Server, DNS within a LAN.	39
9	20/12/2024	To construct simple LAN and understand the concept and operation of Address Resolution Protocol (ARP)	44
10	20/12/2024	To understand the operation of TELNET by accessing the router in server room from a PC in IT office.	47
11	20/12/2024	To construct a VLAN and make the PC's communicate among a VLAN	50
12	20/12/2024	To construct a WLAN and make the nodes communicate wirelessly	53

Github Link:

https://github.com/Shivarajpujari2004/CN_LAB-1BM22CS259

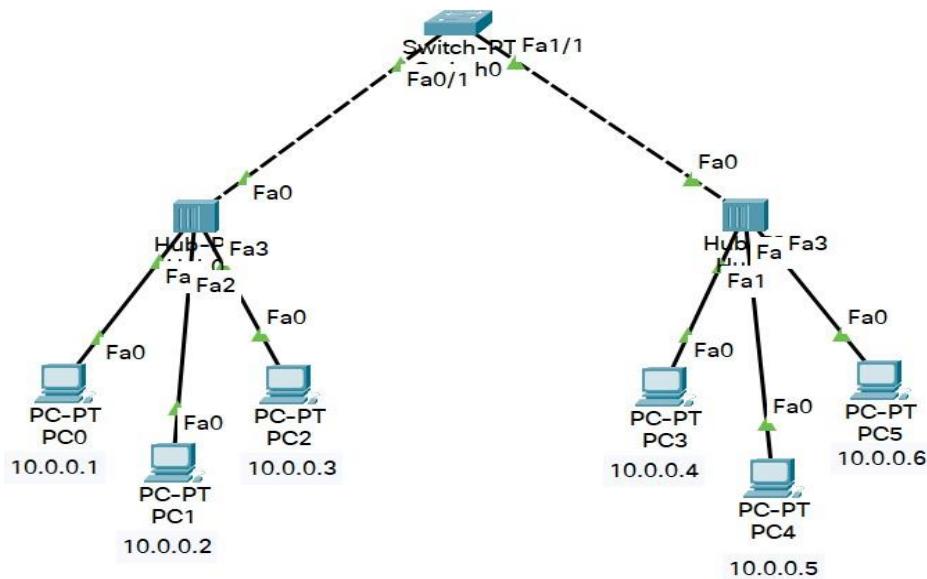
Index-Cycle-II

Sl. No.	Date	Experiment Title	Page No.
1	15/11/2024	Write a program for error detecting code using CRC-CCITT (16-bits).	56
2	15/11/2024	Write a program for congestion control using Leaky bucket algorithm	59
3	20/12/2024	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.	61
4	20/12/2024	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.	64

Cycle-I

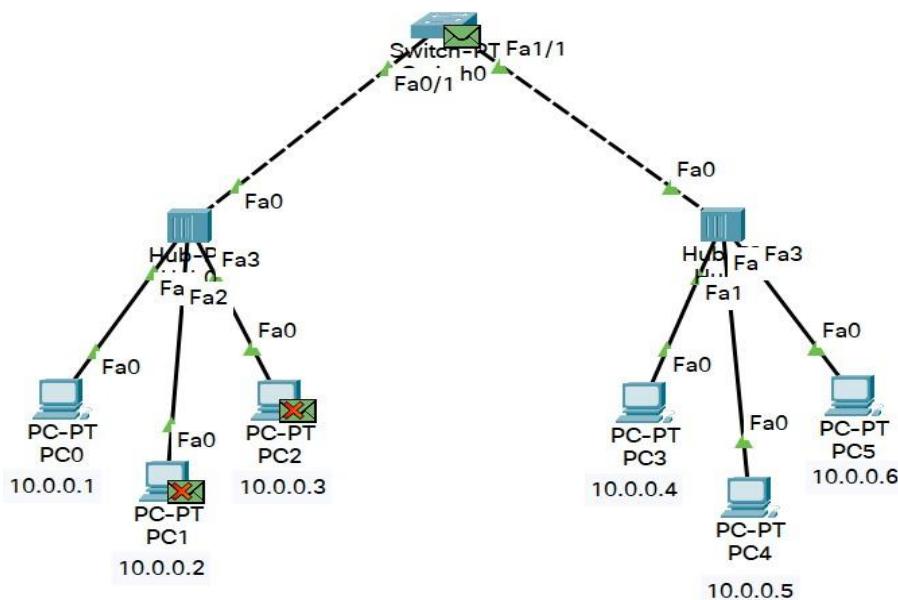
Program 1

- i. Create a topology involving multiple hubs and a switch connecting them to simulate with simple PDU.
- ii. Procedure along with the topology

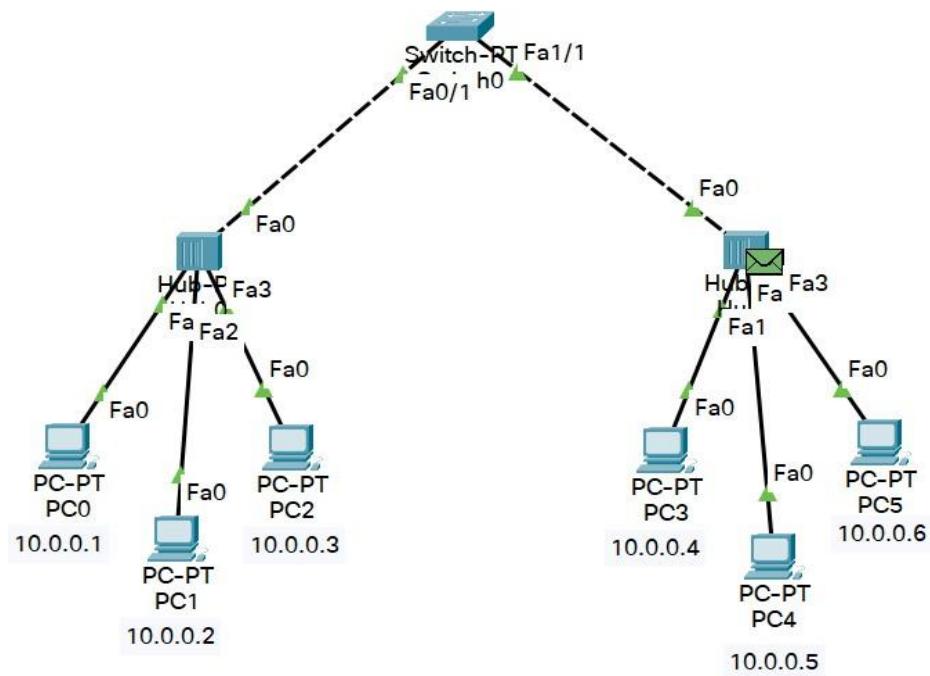


- iii. Screen shots/ output

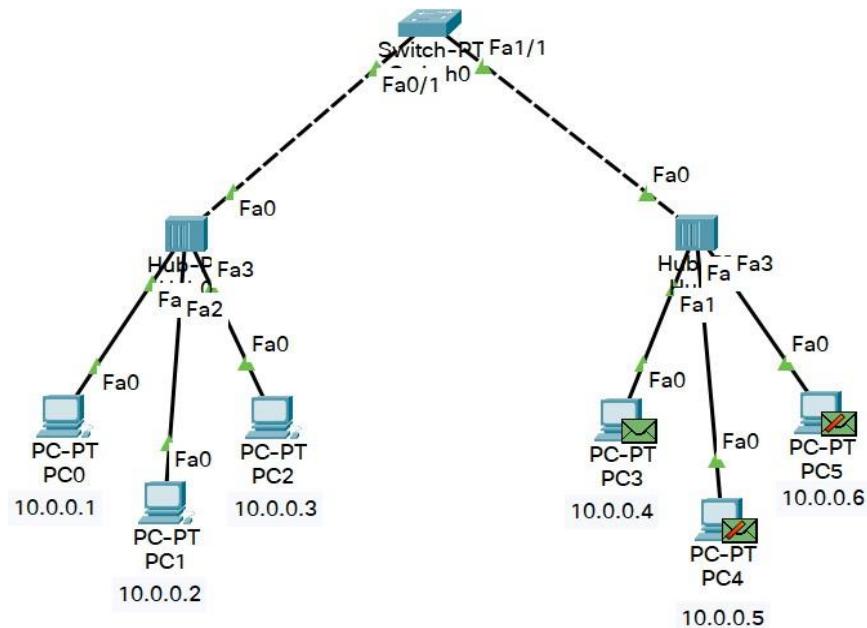
Hub behaviour at sending end



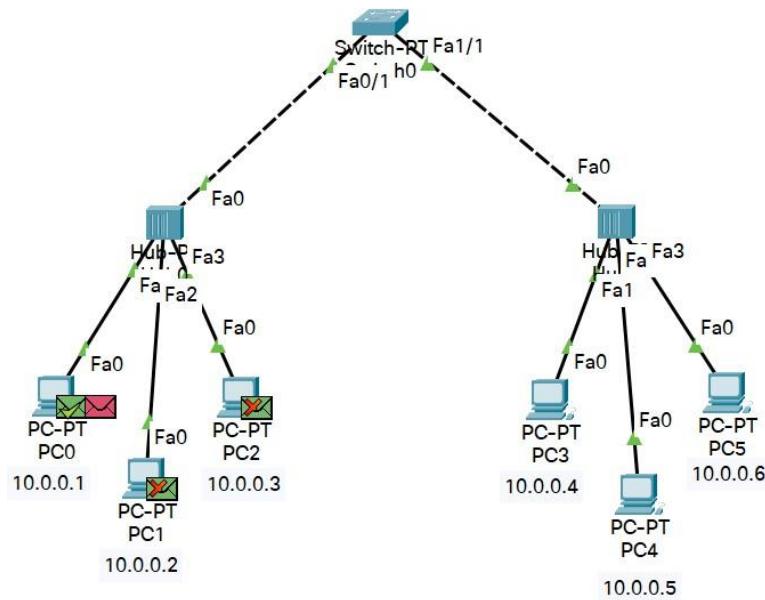
Switch behaviour



Hub behaviour at receiving end



Hub behaviour when back to sender



Ping command to connectivity

A screenshot of a Windows Command Prompt window titled "PC0". The window has tabs for "Physical", "Config", "Desktop", and "Programming", with "Desktop" being the active tab. Below the tabs is a "Command Prompt" window with a blue header. The command entered is "C:\>ping 10.0.0.4". The output shows the ping command being sent to PC3 (IP 10.0.0.4) and receiving four replies from it. The statistics show 100% packet delivery.

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

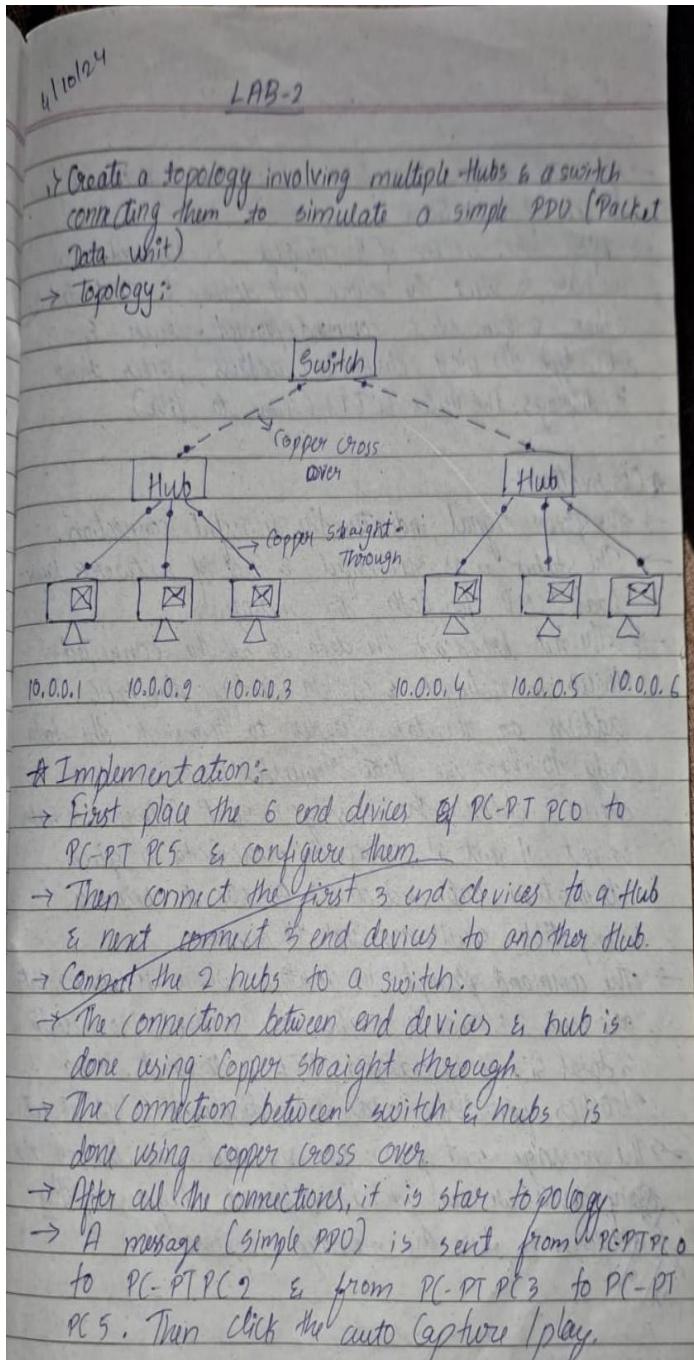
Pinging 10.0.0.4 with 32 bytes of data:

Reply from 10.0.0.4: bytes=32 time<1ms TTL=128
Reply from 10.0.0.4: bytes=32 time<1ms TTL=128
Reply from 10.0.0.4: bytes=32 time=1ms TTL=128
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 = 1ms, Average = 0ms

C:\>
```

iv. Observation :



→ After all various connections, we will see green dots at end of connections.

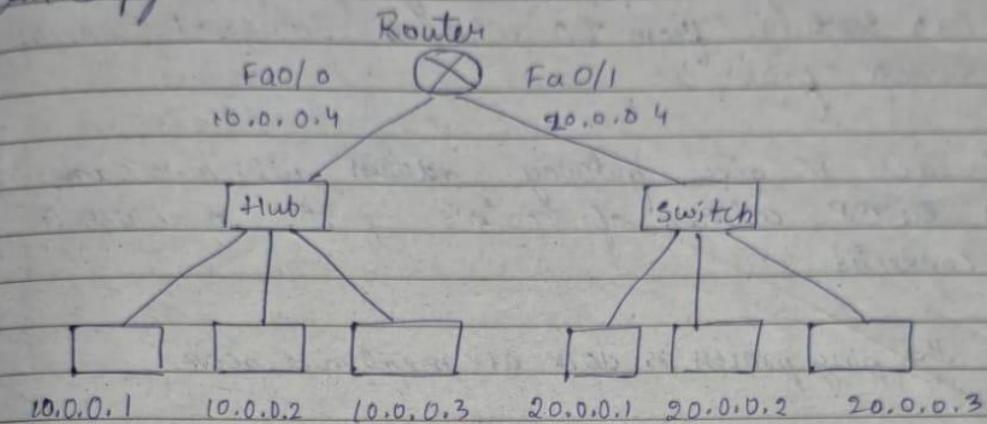
→ After the success of the message is received, now we have to select the source end device & select desktop option & then select command prompt → run & then type the ping destination address, after that it displays the bytes & TTL (Time to live).

*Observation:

- The green signal indicates the successful connection.
- The status was successful & top of networks layer was ICMP for both the messages.
- The hub broadcasts the data to all the connected devices in network & switch identify the MAC address on the data header to transmit the data only to the device that requested it, so switch checks whether the message is sent between 2 hubs or not if sent it sends the message to a given destination hub-end device or else it becomes incompatible & will not send the message.
- The command prompt in desktop where n data packets are sent & n of n replies are received from destn & total size of ip address, TTL is displayed. Ping statistics for destn address is displayed & lost packets.
- The message sent from src & when we click on the any devic, we can see the different layers of the network & where the message is present.

LAB-2 - b

Aim:- Create a topology involving Hub, switch & router
~~Router Configuration~~



Configure routers :-

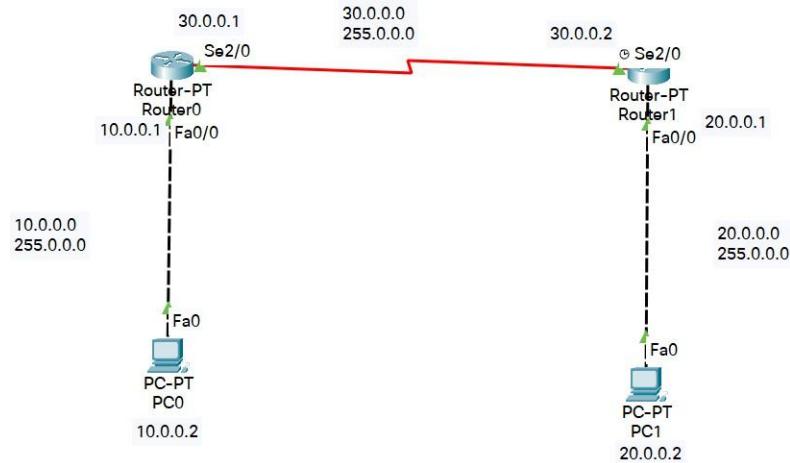
Router > enable

- > config t / configure terminal
- (config-t) > interface fastethernet 0/0
- > ip address 20.0.0.4 255.0.0.0
- > no shutdown
- > exit

- Configure hubs connected PCs with IP address of 10.0.0.1 & so on.
- Configure Switch connected PCs with IP address of 20.0.0.1 & so on.
- Set the gateways for PCs on hub networks as 10.0.0.4
- Set the gateways for PCs on switch networks as 20.0.0.4
- The PCs connected to hub have same network address.
- The PCs connected to switch have same network address i.e. for hubs starting from 10 whereas for the port connected to switch from 20. (10.0.0.0) (20.0.0.0)

Program 2

- i. Configure IP address to routers in packet tracer. Explore the following messages: ping responses, destination unreachable, request timed out, reply.
- ii. Procedure along with the topology



- iii. Screen shots/ output

Router0 configuration

```
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Fa0/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
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)#interface Se2/0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#no shutdown

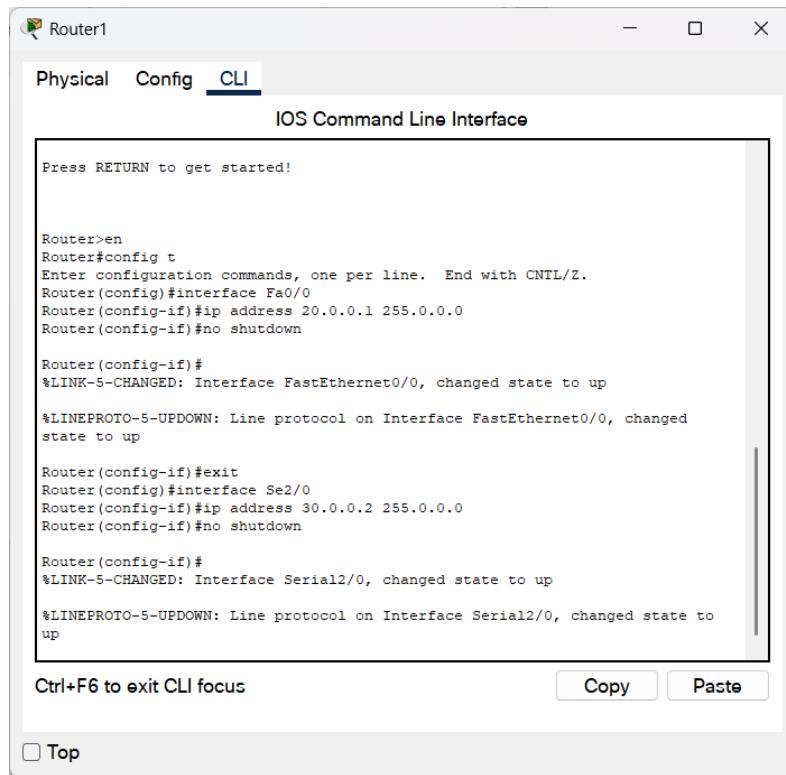
%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

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

Ctrl+F6 to exit CLI focus

Top

Router1 configuration



The screenshot shows the Router1 CLI interface. The title bar says "Router1". Below it is a menu bar with "Physical", "Config", and "CLI" tabs, where "CLI" is selected. The main window is titled "IOS Command Line Interface" and contains the following text:

```
Press RETURN to get started!

Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Fa0/0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
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)#interface Se2/0
Router(config-if)#ip address 30.0.0.2 255.0.0.0
Router(config-if)#no shutdown

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
```

At the bottom of the window, there are buttons for "Ctrl+F6 to exit CLI focus", "Copy", and "Paste". There is also a checkbox labeled "Top".

Ip route command in Router0

```
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 20.0.0.0 255.0.0.0 30.0.0.2
Router(config)#

```

Ip route command in Router1

```
Router#config t
Enter configuration commands, one per line. End with CNTL/Z
Router(config)#ip route 10.0.0.0 255.0.0.0 30.0.0.1
Router(config)#

```

Destination host Unreachable (Before establishing network Fully)

PC1

Physical Config Desktop Programming

Command Prompt X

```
Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 20.0.0.1: Destination host unreachable.

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

Request Timed Out

PC2

Physical Config Desktop Programming

Command Prompt X

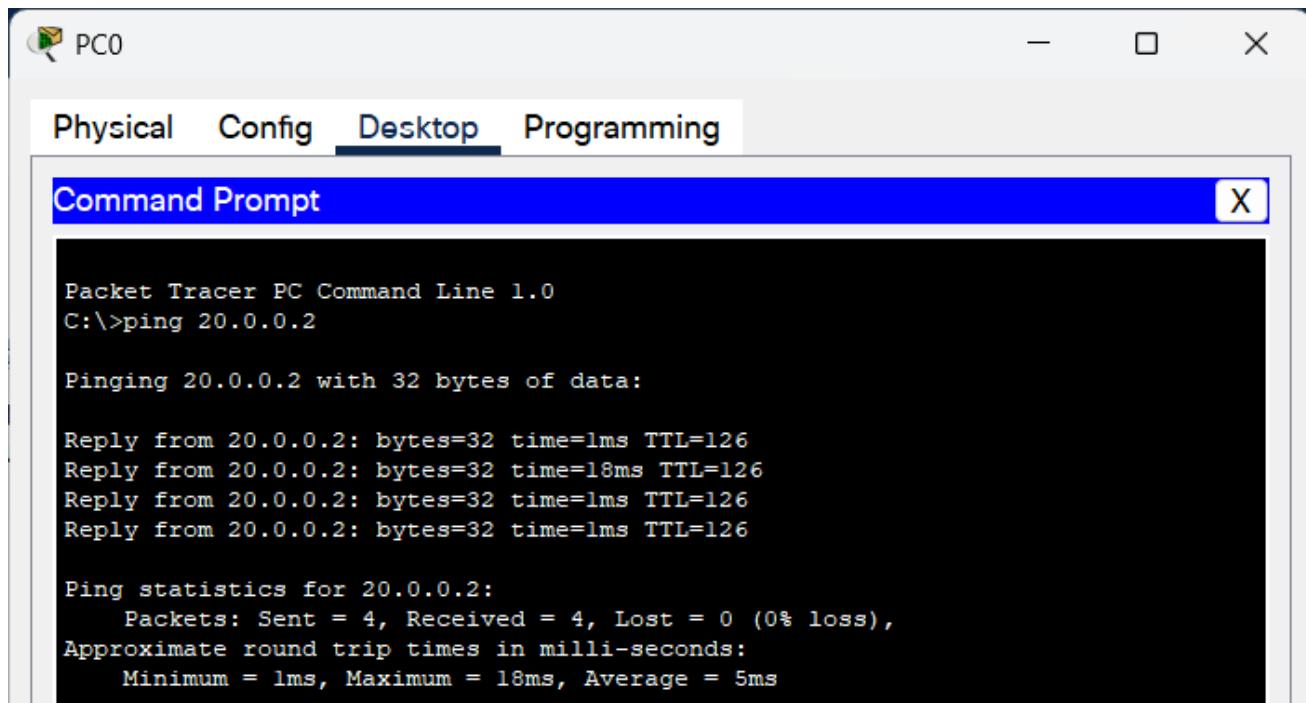
```
Packet Tracer PC Command Line 1.0
C:\>ping 20.0.0.2

Pinging 20.0.0.2 with 32 bytes of data:

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

Ping statistics for 20.0.0.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

Reply from Destination



PC0

Physical Config Desktop Programming

Command Prompt X

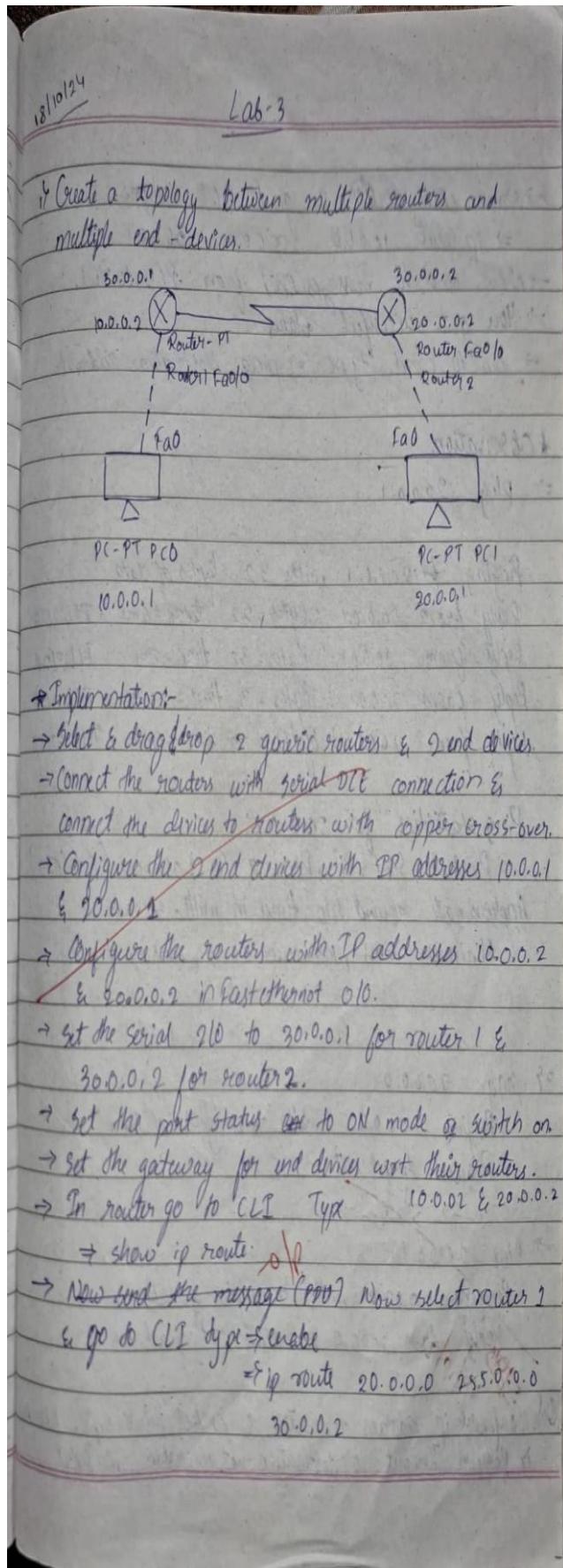
```
Packet Tracer PC Command Line 1.0
C:\>ping 20.0.0.2

Pinging 20.0.0.2 with 32 bytes of data:

Reply from 20.0.0.2: bytes=32 time=1ms TTL=126
Reply from 20.0.0.2: bytes=32 time=18ms TTL=126
Reply from 20.0.0.2: bytes=32 time=1ms TTL=126
Reply from 20.0.0.2: bytes=32 time=1ms TTL=126

Ping statistics for 20.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 18ms, Average = 5ms
```

iv. Observation



→ Now click router 2, go to CLI type
→ ip route 10.0.0.0 255.0.0.0 30.0.0.1
→ Now send the messages(PDU) from PC0 to PC1.
→ You get successful status.
→ Go to cmd type ⇒ ping destination address

* Observation:
⇒ ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data:
Reply from 20.0.0.1: bytes=32 time=6ms TTL=128
Reply from 20.0.0.1: bytes=32 time=6ms TTL=128
Reply from 20.0.0.1: bytes=32 time=6ms TTL=128
Reply from 20.0.0.1: bytes=32 time=6ms TTL=128

Ping statistics for 20.0.0.1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss)
Approximate round trip times in milli-seconds:
Minimum = 6ms, Maximum = 6ms, Average = 6ms

⇒ ping 20.0.0.0

Pinging 20.0.0.0 with 32 bytes of data
Request timed out
→ Stopped

⇒ Ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data
Reply from 20.0.0.1: Destination not reachable

Q1) Configure ip address to routers & packet tracer explore following
→ Request Timeout & destination not reachable in Reply.

ACLI commands

router > enable

router #config t

router (config)

interface fastethernet 2/0

ip address 20.0.0.0 255.0.0.0

no shutdown

exit

→ route# show ip route

Codes: C-connected, S-static, I-IGRP, R-RIP,

H-mobile, B-BGP, D-EIGRP, EX-EIGRP

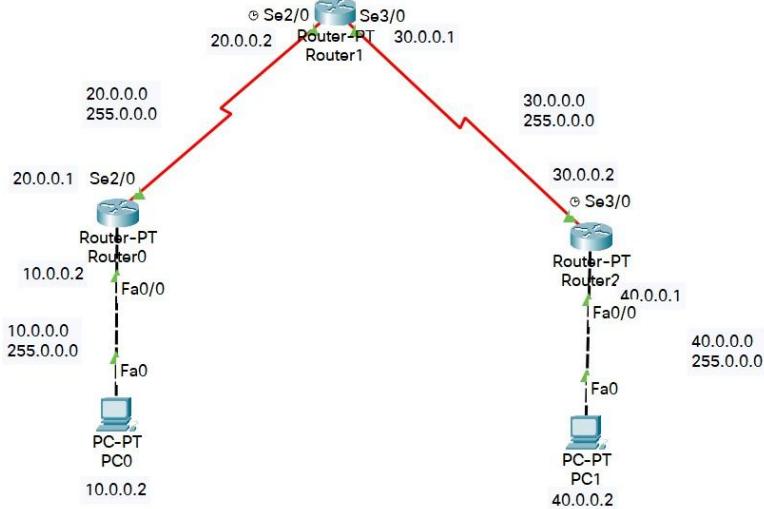
external, O-OSPF, IA-OSPF inter area.

N1-OSPF NSSA external type-1, N2-OSPF NSSA

~~External~~
25/10/2022
external type 2

Program 3

- i. Configure default route, static route to the router
- ii. Procedure along with the topology



- iii. Screen shots/ output

Router0 configuration

```
Router0
Physical Config CLI
IOS Command Line Interface
Would you like to enter the initial configuration dialog? [yes/no]: n
Press RETURN to get started!

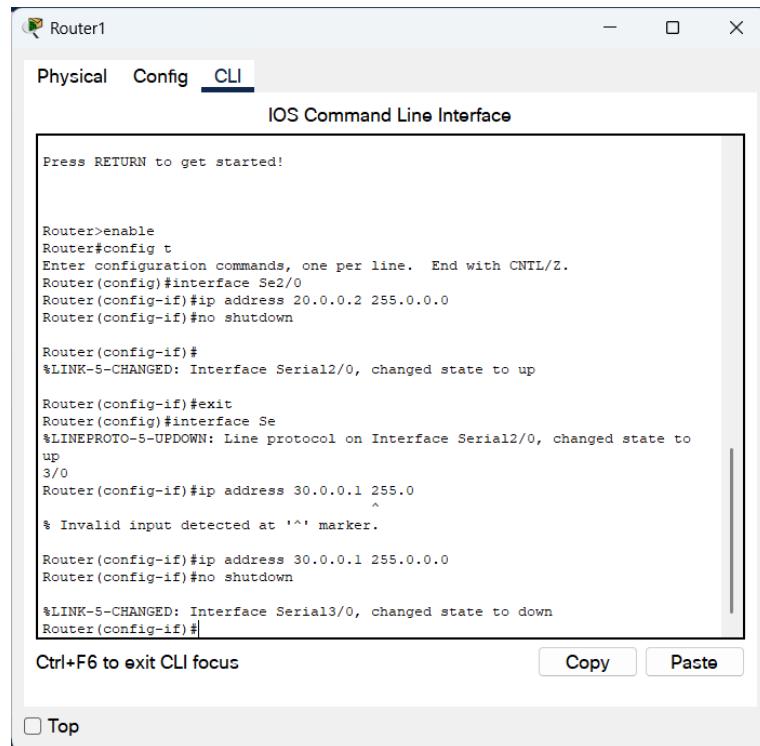
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Fa0/0
Router(config-if)#ip address 10.0.0.2 255.0.0.0
Router(config-if)#no shutdown

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
%IP-4-DUPADDR: Duplicate address 10.0.0.2 on FastEthernet0/0, sourced by 000C.CFC2.65B0

Router(config-if)#exit
Router(config)#interface Se2/0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router(config-if)#
Ctrl+F6 to exit CLI focus
Copy Paste
Top
```

Router1 configuration



The screenshot shows the Cisco IOS Command Line Interface (CLI) for Router1. The window title is "Router1". The tab bar at the top has three tabs: "Physical", "Config", and "CLI", with "CLI" being the active tab. Below the tabs is a sub-header "IOS Command Line Interface". A message box says "Press RETURN to get started!". The main text area contains the configuration commands for Router1:

```
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 20.0.0.2 255.0.0.0
Router(config-if)#no shutdown

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

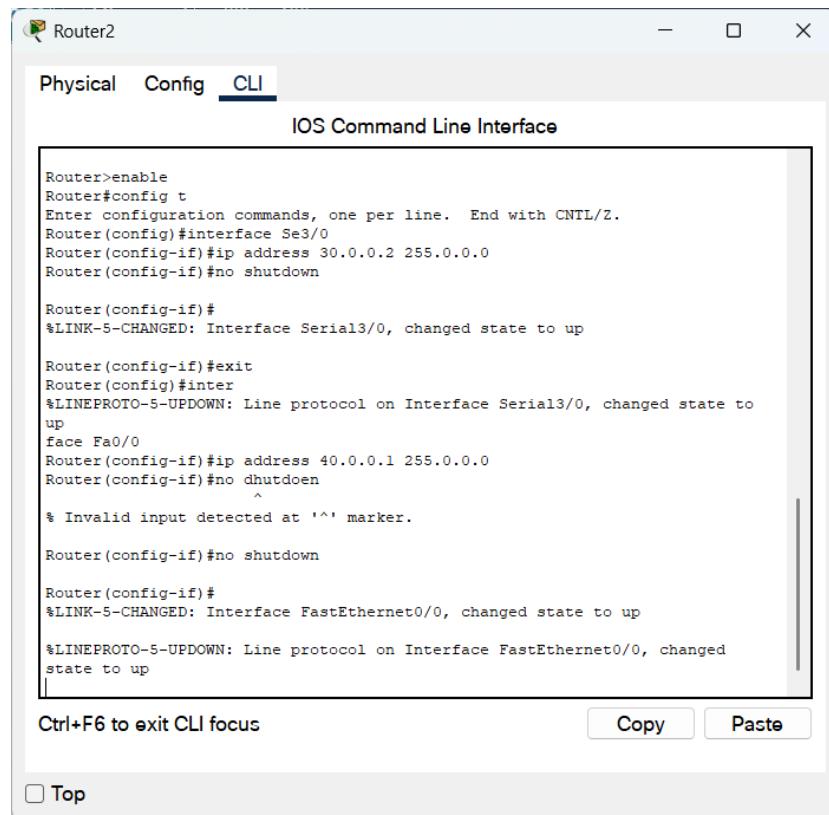
Router(config-if)#exit
Router(config)#interface Se
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to
up
3/0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
        ^
% Invalid input detected at '^' marker.

Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial3/0, changed state to down
Router(config-if)#
Ctrl+F6 to exit CLI focus
```

At the bottom right are "Copy" and "Paste" buttons. At the bottom left is a checkbox labeled "Top".

Router2 configuration



The screenshot shows the Cisco IOS Command Line Interface (CLI) for Router2. The window title is "Router2". The tab bar at the top has three tabs: "Physical", "Config", and "CLI", with "CLI" being the active tab. Below the tabs is a sub-header "IOS Command Line Interface". A message box says "Press RETURN to get started!". The main text area contains the configuration commands for Router2:

```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Se3/0
Router(config-if)#ip address 30.0.0.2 255.0.0.0
Router(config-if)#no shutdown

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

Router(config-if)#exit
Router(config)#inter
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to
up
face Fa0/0
Router(config-if)#ip address 40.0.0.1 255.0.0.0
Router(config-if)#no shutdown
        ^
% Invalid input detected at '^' marker.

Router(config-if)#no shutdown

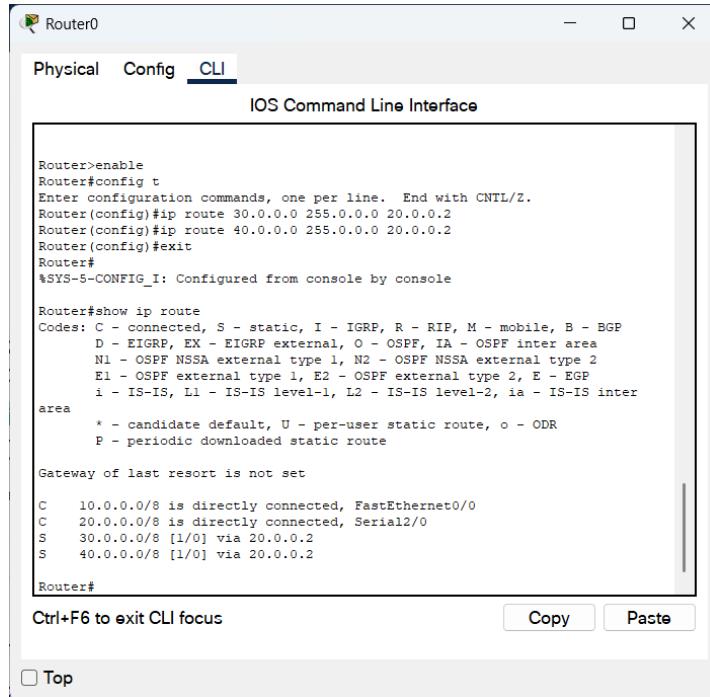
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

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

At the bottom right are "Copy" and "Paste" buttons. At the bottom left is a checkbox labeled "Top".

Static Routing:

Router0



Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 30.0.0.0 255.0.0.0 20.0.0.2
Router(config)#ip route 40.0.0.0 255.0.0.0 20.0.0.2
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

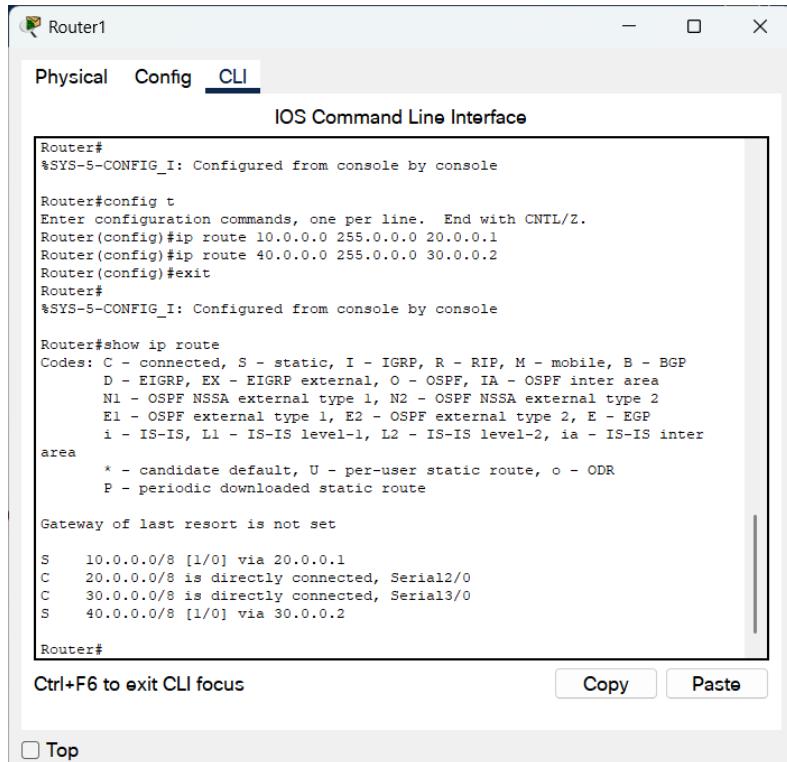
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS 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
S 30.0.0.0/8 [1/0] via 20.0.0.2
S 40.0.0.0/8 [1/0] via 20.0.0.2

Router#

Router1



Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 10.0.0.0 255.0.0.0 20.0.0.1
Router(config)#ip route 40.0.0.0 255.0.0.0 30.0.0.2
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

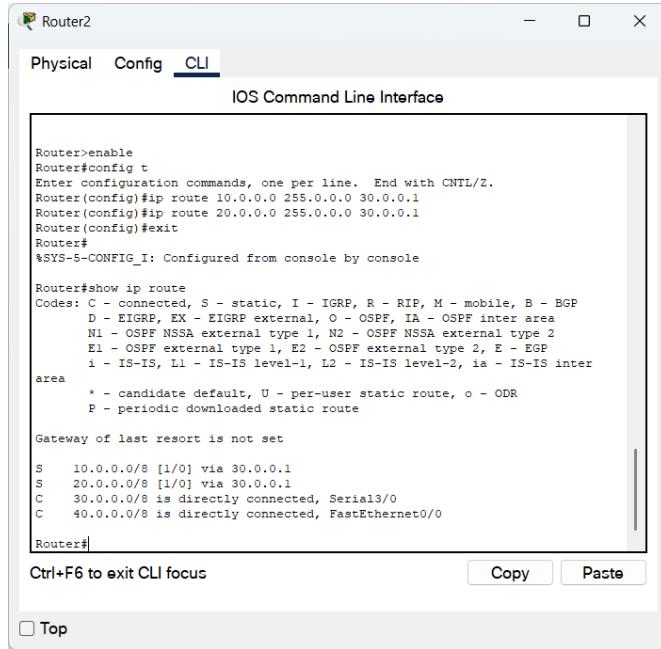
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS 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

S 10.0.0.0/8 [1/0] via 20.0.0.1
C 20.0.0.0/8 is directly connected, Serial2/0
C 30.0.0.0/8 is directly connected, Serial3/0
S 40.0.0.0/8 [1/0] via 30.0.0.2

Router#

Router2



```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 10.0.0.0 255.0.0.0 30.0.0.1
Router(config)#ip route 20.0.0.0 255.0.0.0 30.0.0.1
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

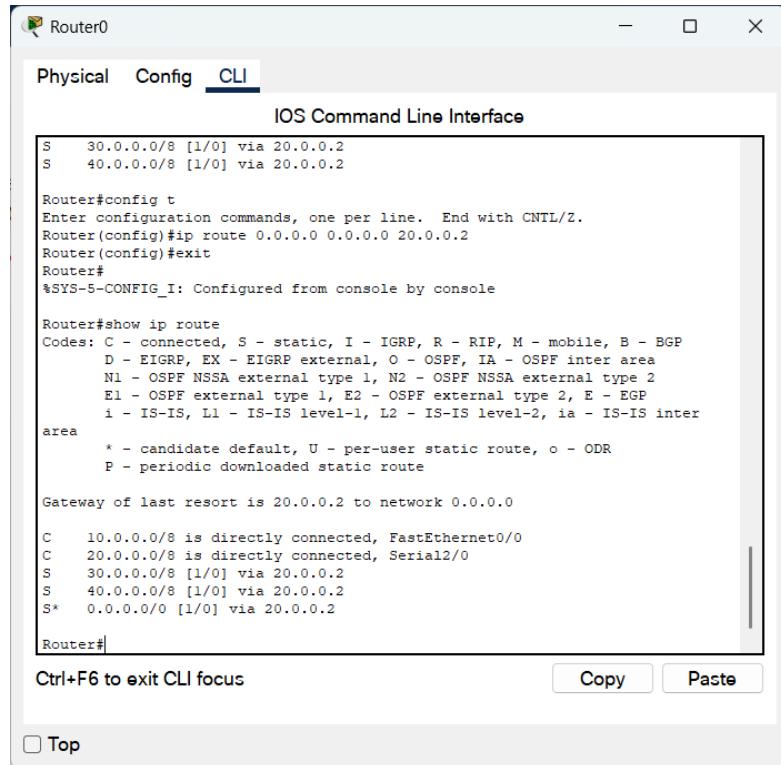
Gateway of last resort is not set

S   10.0.0.0/8 [1/0] via 30.0.0.1
S   20.0.0.0/8 [1/0] via 30.0.0.1
C   30.0.0.0/8 is directly connected, Serial3/0
C   40.0.0.0/8 is directly connected, FastEthernet0/0

Router#
```

Dynamic Routing:

Route0



```
Router0
Physical  Config  CLI
IOS Command Line Interface

S   30.0.0.0/8 [1/0] via 20.0.0.2
S   40.0.0.0/8 [1/0] via 20.0.0.2

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 20.0.0.2
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

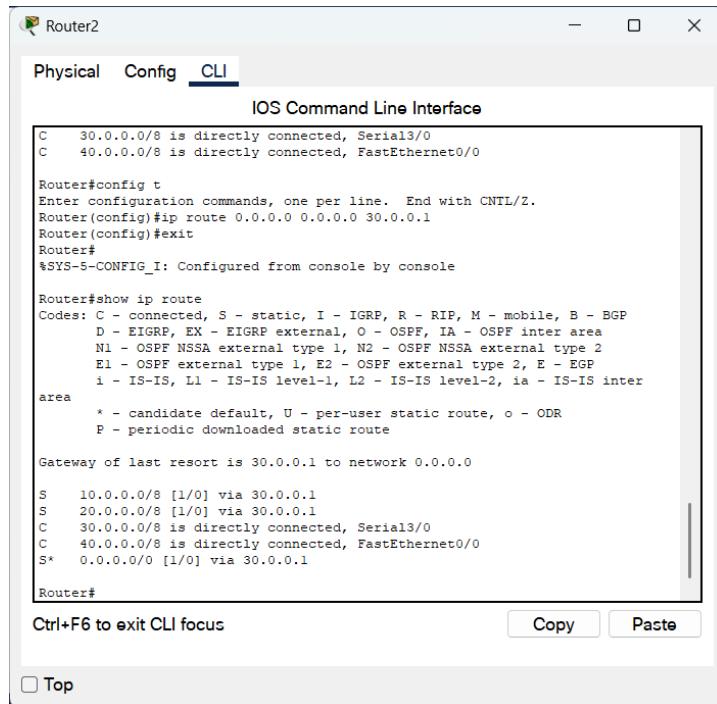
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      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 20.0.0.2 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   30.0.0.0/8 [1/0] via 20.0.0.2
S   40.0.0.0/8 [1/0] via 20.0.0.2
S*  0.0.0.0/0 [1/0] via 20.0.0.2

Router#
```

Router2



The screenshot shows the Router2 CLI interface. The title bar says "Router2". The tabs "Physical" and "Config" are visible, with "Config" being the active tab. The main window displays the IOS Command Line Interface. It shows the following configuration and routing information:

```
C 30.0.0.0/8 is directly connected, Serial3/0
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 30.0.0.1
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 30.0.0.1 to network 0.0.0.0

S 10.0.0.0/8 [1/0] via 30.0.0.1
S 20.0.0.0/8 [1/0] via 30.0.0.1
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 30.0.0.1

Router#
```

At the bottom of the window, there are "Copy" and "Paste" buttons, and a "Top" link.

Pinging:

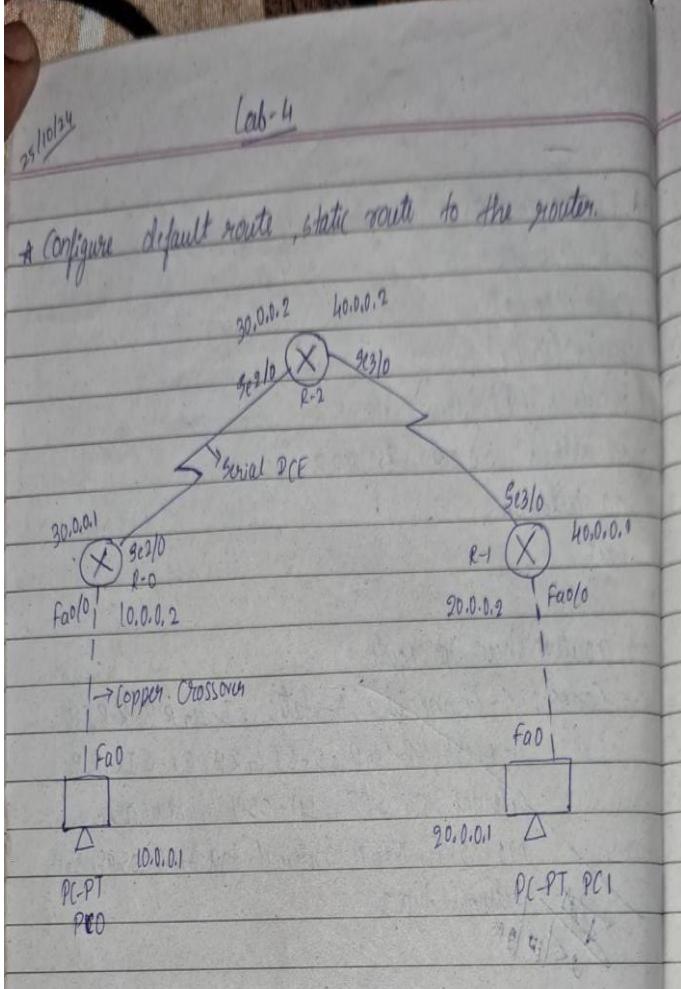
```
C:\>ping 40.0.0.2

Pinging 40.0.0.2 with 32 bytes of data:

Reply from 40.0.0.2: bytes=32 time=21ms TTL=125
Reply from 40.0.0.2: bytes=32 time=17ms TTL=125
Reply from 40.0.0.2: bytes=32 time=25ms TTL=125
Reply from 40.0.0.2: bytes=32 time=2ms TTL=125

Ping statistics for 40.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 25ms, Average = 16ms
```

iv. Observation



* Implementation

- place 2 end devices PC0 & PC1 & connect PC0 with Router R0 & connect PC1 with Router R1
- Connect the routers to Router 2 with serial DCE
- Configure PC0 with 10.0.0.1 fast ethernet, PC1 with 20.0.0.1 with fast ethernet,
- Configure Router R0 with 10.0.0.2 fast ethernet & serial 2/0 with 30.0.0.1 & Router R1 with 20.0.0.2 fast ethernet & 10.0.0.1 serial 3/0
- Configure Router R2 with 30.0.0.2 Serial 6/0 & 40.0.0.2 serial 3/0

→ Then goto click all routers go to config, to enable port status in all fastethernet & serial
 → set the gateway for PC0 as 10.0.0.2
 → set the gateway for PC1 as 20.0.0.2

→ Click router R0 & go to CLI commands, type:

Router (config) # exit

Router (config) # ip route 40.0.0.0 255.0.0.0 30.0.0.2

Router (config) # ip route 20.0.0.0 255.0.0.0 40.0.0.2

→ Click router R1 & go to CLI commands, type:

Router (config) # ip route 20.0.0.0 255.0.0.0 10.0.0.1

Router (config) # ip route 10.0.0.0 255.0.0.0 30.0.0.1

→ Click router R2 & go to CLI commands, type:

Router (config) # ip route 30.0.0.0 255.0.0.0 40.0.0.2

Router (config) # ip route 40.0.0.0 255.0.0.0 30.0.0.1

* Observation:

→ Pass the PDU (message) from PC0 to R2.

→ Go to PC0, click Desktop & go to CMD.

→ PC> ping 30.0.0.1

Pinging 30.0.0.1 with 32 bytes of data:

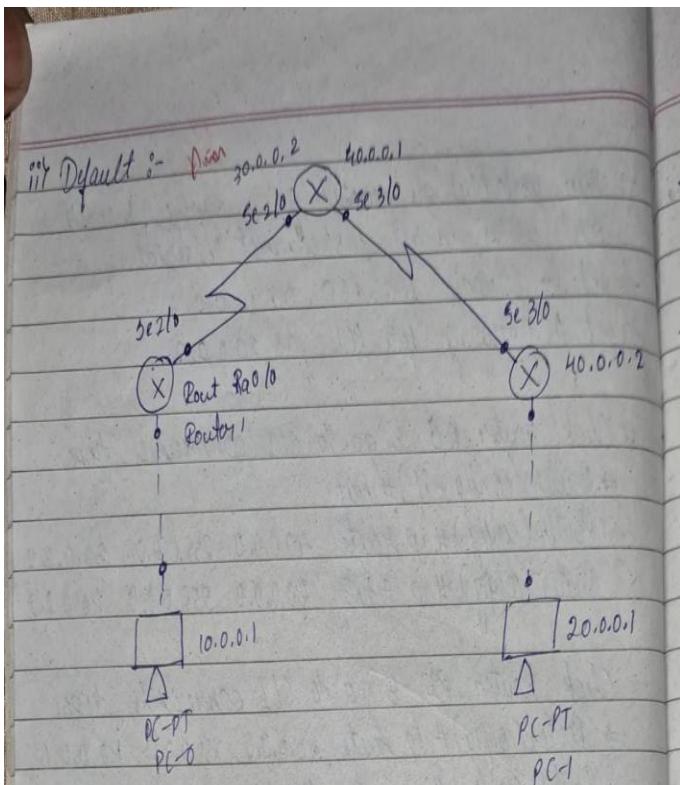
Reply from 30.0.0.1: bytes=32 time=10ms TTL=128

Ding statistics for 30.0.0.1:

Packet: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Min = 10ms, Max = 11ms, Avg = 10ms



* Implementation:

- Place the generic router i.e., 3 routers which creates a networks.
- Also place the end-devices & configure them.
- Connect the Router & PC using copper cross wire & Router to Router using serial DCE.
- Configure P0 & P1 as 10.0.0.1 & 20.0.0.1
- Configure Router 1 with 10.0.0.2 for Fast ethernet 0/0 & S2/0 is 30.0.0.1.
- Similarly Router 2 with 30.0.0.2 for S2/0 & 40.0.0.1 for S3/0 and Router 3 as 40.0.0.2 for S3/0.
- Also give gateways as 10.0.0.2 & 20.0.0.2 for P0 & P1.
- Now select the Router 1 & go to CLI & type the following
 - Router(config)# ip route 0.0.0.0 0.0.0.0 30.0.0.2
 - For Router 2
 - Router(config)# ip route 10.0.0.0 255.0.0.0 30.0.0.1
 - Router(config)# ip route 20.0.0.0 255.0.0.0 40.0.0.2

→ For Router 3

→ Router(config)# ip route 0.0.0.0 0.0.0.0 40.0.0.1

A Observations:

→ After all the router configurations now select P0 & go to command prompt & type

Pc> 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 = 12 ms TTL=125

Reply from 20.0.0.1: bytes = 32 time = 12 ms TTL=125

Reply from 20.0.0.1: bytes = 32 time = 12 ms TTL=125

Ping statistics for 20.0.0.1

Packets: sent = 4, Received = 3, lost = 1 (25% loss)

Approximate round trip times in milli-seconds

Minimum = 11 ms, Maximum = 12 ms, Average = 11.5 ms

→ After we send the PDU from P0 to P1 we get an successful status.

→ To verify the default connection the output should be as follows:

~~Gateway of last resort is 30.0.0.2 to network 0.0.0.0~~

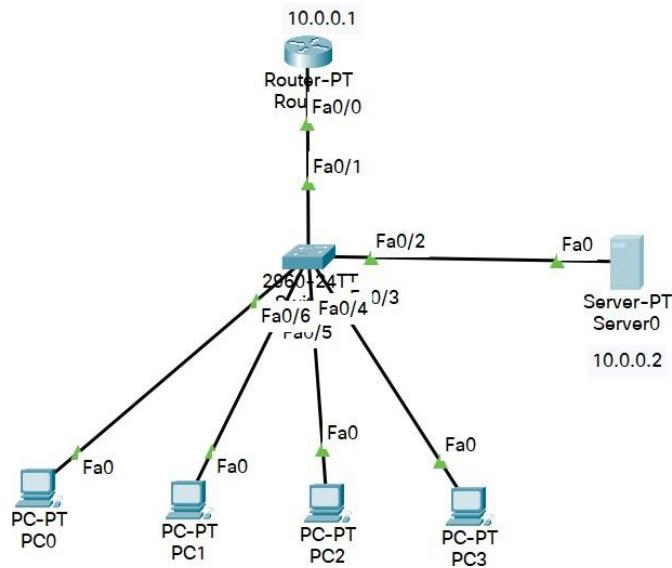
~~10.0.0.0/0 via 30.0.0.2, fastethernet 0/0~~

~~30.0.0.0/0 via 30.0.0.2, serial 2/0~~

~~0.0.0.0/0 [1/0] via 30.0.0.2~~

Program 4

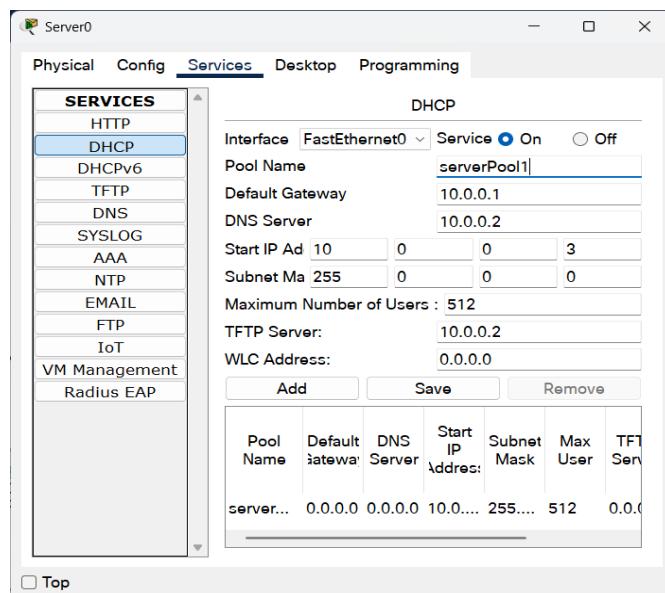
- i. Configure DHCP within a LAN and outside LAN.
- ii. Procedure along with the topology



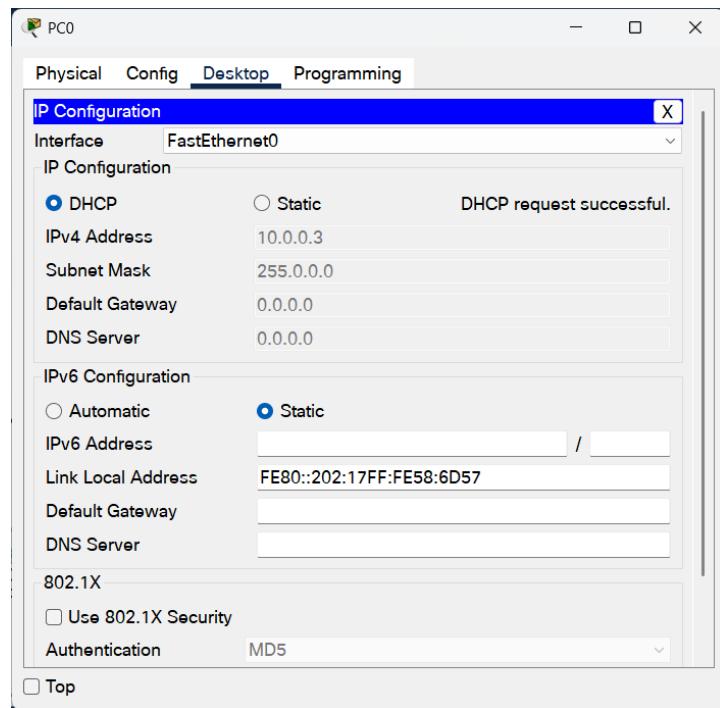
- iii. Screen shots/ output

DHCP Within LAN

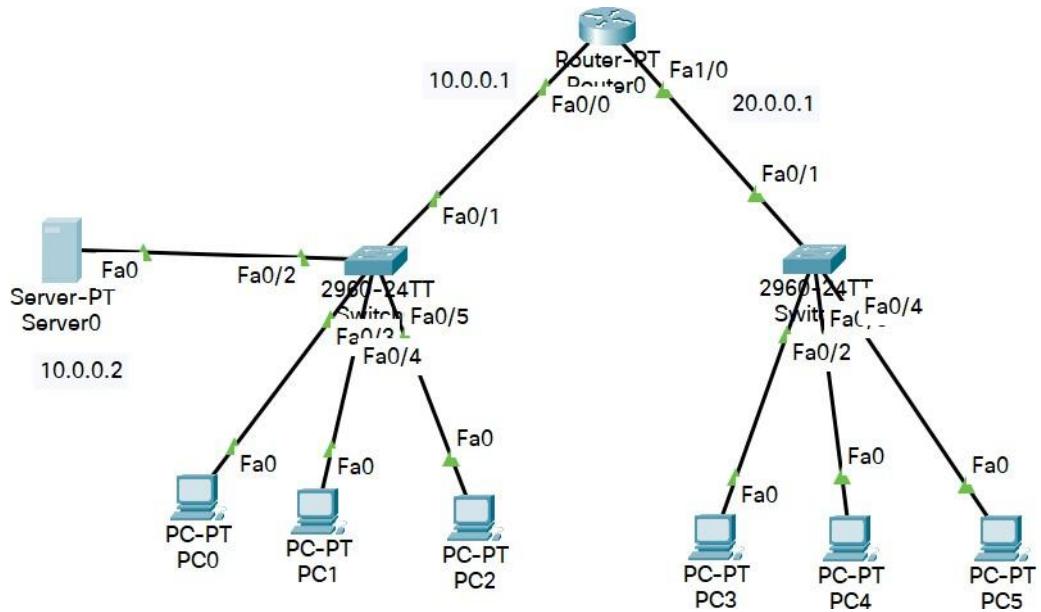
DHCP Configuration



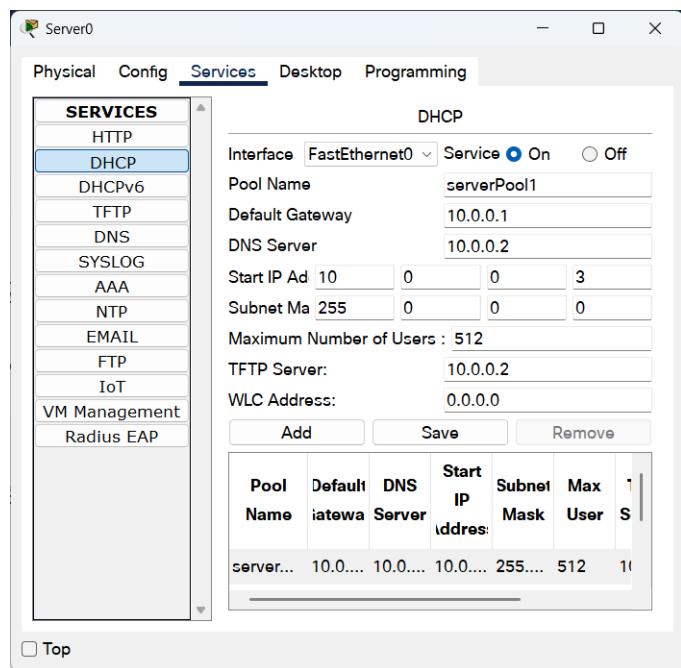
PC settings



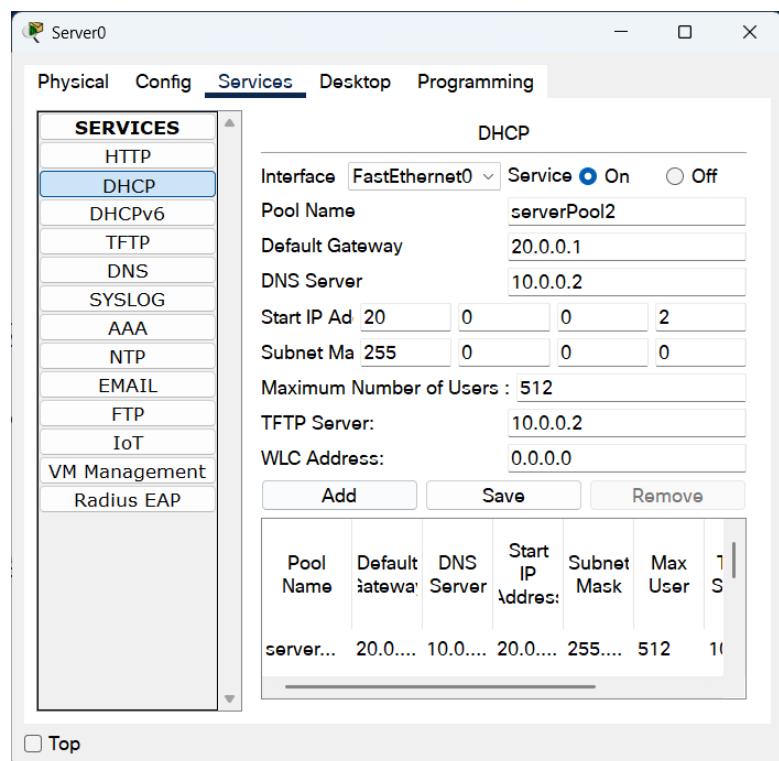
DHCP outside LAN:



DHCP configuration for inside LAN



DHCP configuration for outside LAN

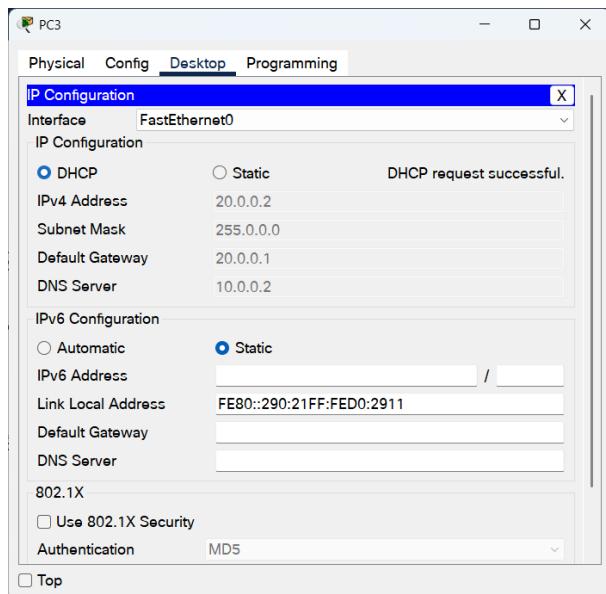


Ip helper command in Router

```
Router(config-if)#exit
Router(config)#interface Fa1/0
Router(config-if)#ip helper-address 10.0.0.2
Router(config-if)#

```

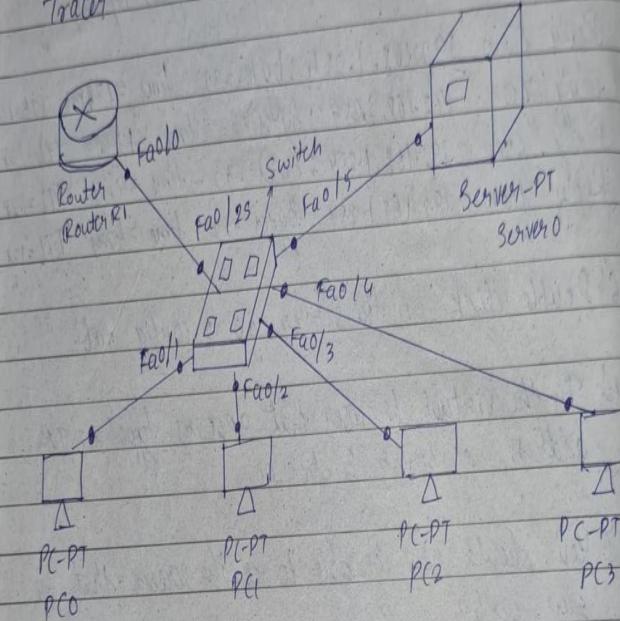
PC setting in another network



iv. Observation

Only how to configure DHCP within a LAN in a packet

Tracer



* Implementation & Observations:-

1) Configure router interface with ip 10.0.0.1 and subnet mask 255.0.0.0

2) Click on gateway in server → config, then assign gateway of 10.0.0.1

3) Then click on Fast ethernet & assign ip address & subnet mask 10.0.0.2 and subnet mask 255.0.0.0 for server.

4) Click on DHCP

Just give the default gateway as 10.0.0.1

DNS server just give our server ip address as 10.0.0.2

5) Then just edit start ip address, give as 10.0.0.10 & subnet mask 255.0.0.0

6) In maximum number of user, just give how many ip address you want in this pool. i.e. 500

7) Assign TFTP server ip address, just give our servers ip address 10.0.0.2

8) And Click save

9) Now, click on any of PC → then click on Desktop → IP configuration & choose DHCP wait for some time if your DHCP request failed then try few more times. This is how you should get.

* Result:

PC 0

physical [config] Desktop

IP Configuration

DHCP

static

DHCP request successful

IP address

10.0.0.14

Subnet mask

255.0.0.0

Default gateway

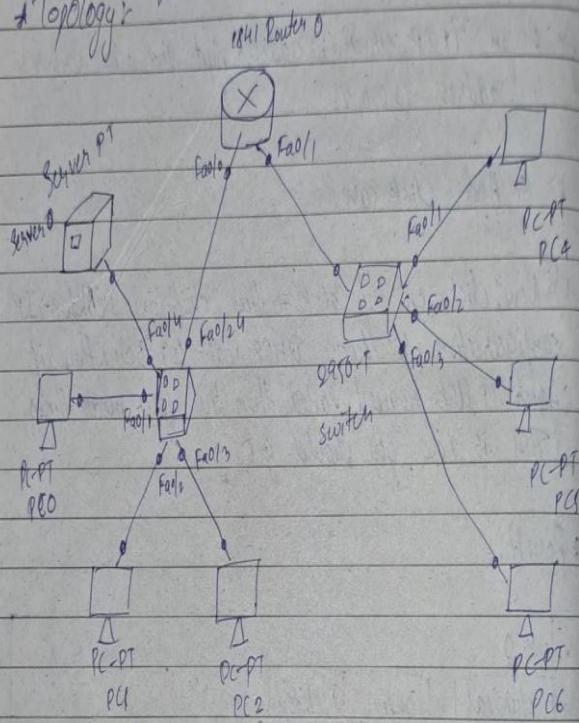
10.0.0.1

DNS server

10.0.0.2

Q) How to get IP from DHCP that is some other networks using IP helper address

* Topology:



* Implementation & observations

1) Drag 2 switches, 1 router, 1 server & 6 end devices in logical workspace.

2) Configure router interface fastethernet 0/0 & fastethernet 0/1 with ip address

3) Click on server → then give the gateway ip address i.e., 10.0.0.1

4) Then click on fast ethernet assign ip address 10.0.0.2 & subnet mask 255.0.0.0. DHCP will automatically assign 10 network for default pool. We don't have to create pool for 10 network again. Just we need to give ip for dns, gateway & TFTP then we may configure starting ip address or leave it same.

5) Now, click on PC in a LAN with servers & check whether DHCP working fine in this network. Click on any PC → Desktop → IP configuration → choose DHCP, then you will get ip from DHCP server for this PC

6) Default gateway → 10.0.0.1

DNS server → 10.0.0.2

start ip address → 10.0.0.10

Subnet mask → 255.0.0.0

Max no. of users → 100

TFTP server → 10.0.0.2

Click on add & save

7) Router (config) # interface fastethernet 0/1

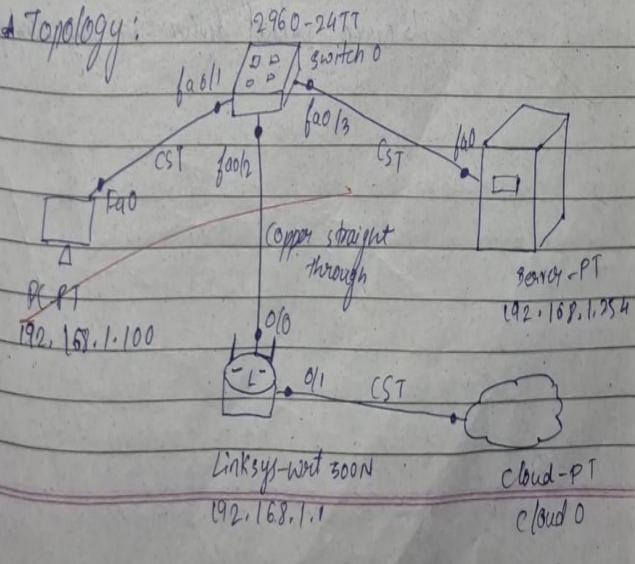
Router (config-if) # ip helper-address 10.0.0.2

Router (config-if) # exit

8) Click on any PC → Desktop → IP configuration → choose DHCP. Now we get ip address from DHCP server

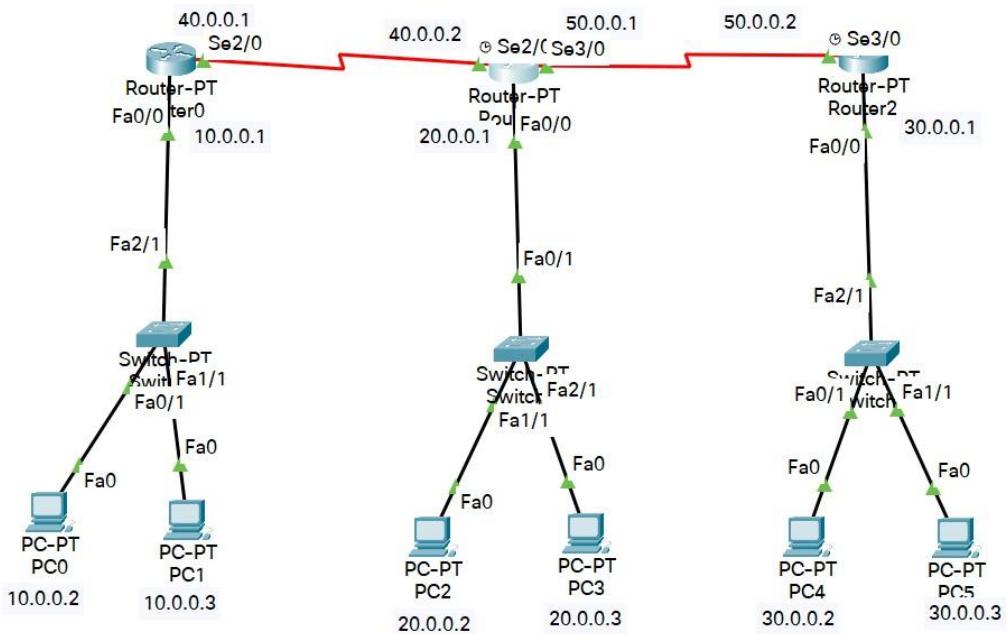
Q) Part-II : DNS

* Topology:



Program 5

- i. Configure RIP routing Protocol in Routers
- ii. Procedure along with the topology



- iii. Screen shots/ output

Router0

```
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 10.0.0.0
Router(config-router)#network 40.0.0.0
Router(config-router)#end
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    40.0.0.0/8 is directly connected, Serial2/0
```

Router1

```
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 40.0.0.0
Router(config-router)#network 50.0.0.0
Router(config-router)#network 20.0.0.0
Router(config-router)#end
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

R    10.0.0.0/8 [120/1] via 40.0.0.1, 00:00:08, Serial2/0
C    20.0.0.0/8 is directly connected, FastEthernet0/0
R    30.0.0.0/8 [120/1] via 50.0.0.2, 00:00:10, Serial3/0
C    40.0.0.0/8 is directly connected, Serial2/0
C    50.0.0.0/8 is directly connected, Serial3/0
```

Router2

```
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 30.0.0.0
Router(config-router)#network 50.0.0.0
Router(config-router)#end
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

R    10.0.0.0/8 [120/2] via 50.0.0.1, 00:00:28, Serial3/0
R    20.0.0.0/8 [120/1] via 50.0.0.1, 00:00:28, Serial3/0
C    30.0.0.0/8 is directly connected, FastEthernet0/0
R    40.0.0.0/8 [120/1] via 50.0.0.1, 00:00:28, Serial3/0
C    50.0.0.0/8 is directly connected, Serial3/0
```

Pinging:

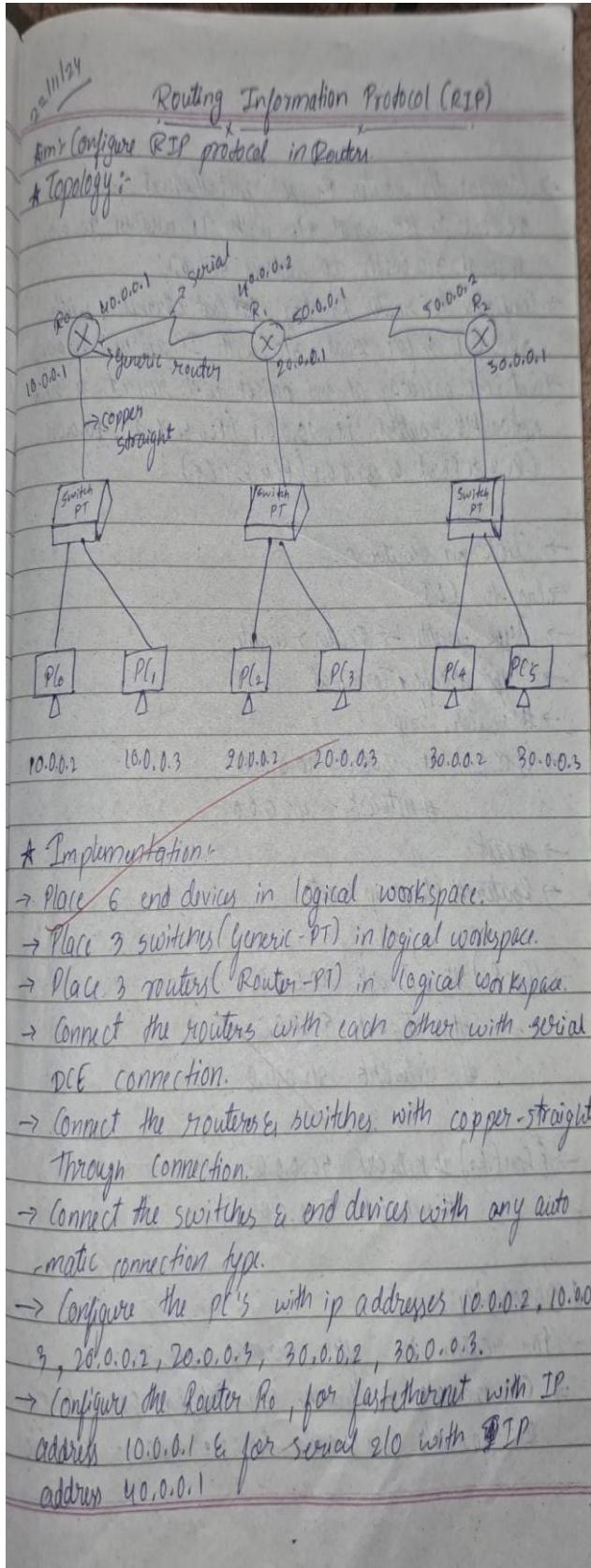
```
Packet Tracer PC Command Line 1.0
C:\>ping 20.0.0.2

Pinging 20.0.0.2 with 32 bytes of data:

Request timed out.
Reply from 20.0.0.2: bytes=32 time=9ms TTL=126
Reply from 20.0.0.2: bytes=32 time=1ms TTL=126
Reply from 20.0.0.2: bytes=32 time=9ms TTL=126

Ping statistics for 20.0.0.2:
  Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
  Minimum = 1ms, Maximum = 9ms, Average = 6ms
```

iv. Observation



→ Configure the router R1 for fast ethernet with 20.0.0.1 & for serial 2/0 with IP address 40.0.0.2
 & serial 3/0 with IP address 50.0.0.1

→ Configure the router R2 for fast ethernet with 30.0.0.1 & for serial 3/0 with IP address 50.0.0.2

→ Set the gateway of end devices with respect to their network's routers i.e. 10.0.0.1 (PC6 & PC1), 20.0.0.1 (PC2 & PC3) & 30.0.0.1 (PC4 & PC5)

→ Click on Router 0

→ Go to CLI

→ Type enable → Router > enable.

→ Type config terminal

→ #router rip

→ (For R0) # network 10.0.0.0
 # network 40.0.0.0

→ #exit

→ Router # show ip route

→ (For R1) # network 40.0.0.0
 # network 50.0.0.0
 # network 20.0.0.0

→ (For R2) # network 50.0.0.0
 # network 30.0.0.0

* Observation:

→ For router R0, after show ip route =>

=> C: 10.0.0.0/8 is directly connected, Fast Ethernet 0/0
 R 20.0.0.0/8 [100/1] via 40.0.0.2, 00:00:16, Serial 2/0

R 30.0.0.0.18 [12012] via 40.0.0.2, 00:00:16, Serial 2/0
C 40.0.0.0.18 is directly connected, Serial 2/0
R 50.0.0.0.18 [12011] via 40.0.0.2, 00:00:16, Serial 2/0

→ For Router R₁

→ R 10.0.0.0.18 [12011] via 40.0.0.1, 00:00:16, Serial 2/0
C 20.0.0.0.18 is directly connected, Fast Ethernet 0/0
R 30.0.0.0.18 [12011] via 50.0.0.2, 00:00:05, serial 3/0
C 40.0.0.0.18 is directly connected, Serial 2/0
C 50.0.0.0.18 is directly connected, Serial 3/0

→ For Router R₂

→ R 10.0.0.0.18 [12012] via 50.0.0.1, 00:00:10, Serial 3/0
R 20.0.0.0.18 [12011] via 50.0.0.1, 00:00:10, Serial 3/0
C 30.0.0.0.18 is directly connected, Fast Ethernet 0/0
R 40.0.0.0.18 [12011] via 50.0.0.1, 00:00:10, Serial 3/0
C 50.0.0.0.18 is directly connected, Serial 3/0.

→ Now click on PC0, go to CMD.

→ PC > ping 30.0.0.2

Pinging 30.0.0.2 with 32 bytes of data:

Request Timed out

Reply from 30.0.0.2: bytes = 32 time = 6 ms TTL = 125

Reply from 30.0.0.2: bytes = 32 time = 2 ms TTL = 125

Reply from 30.0.0.2: bytes = 32 time = 2 ms TTL = 125

Ping Statistics for 30.0.0.2:

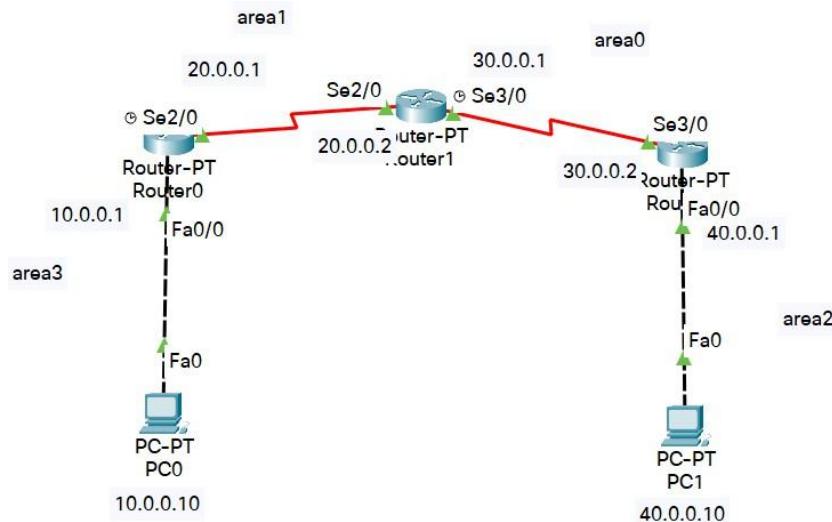
Packet: sent = 4, Received = 3, Lost = 1 (25% loss)

Approximate round trip times in milli-seconds:

Minimum = 2 ms, Maximum = 6 ms, Average = 3 ms.

Program 6

- i. Configure OSPF routing protocol
- ii. Procedure along with the topology



- iii. Screen shots/ output

Encapsulation:

Router0

```
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 10.0.0.1 255.0.0.0
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)#interface Se2/0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#encapsulation ppp
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)#

```

Router1

```
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 20.0.0.2 255.0.0.0
Router(config-if)#encapsulation ppp
Router(config-if)#no shutdown

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

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

Router(config-if)#exit
Router(config)#interface Se3/0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#encapsulation ppp
Router(config-if)#clock rate 64000
Router(config-if)#no dhutdown
^
% Invalid input detected at '^' marker.

Router(config-if)#no shutdown
```

Router2

```
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 40.0.0.1 255.0.0.0
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
%IP-4-DUPADDR: Duplicate address 40.0.0.1 on FastEthernet0/0, sourced by
000D.BDDA.0123

Router(config-if)#exit
Router(config)#interface Se3/0
Router(config-if)#ip address 30.0.0.2 255.0.0.0
Router(config-if)#encapsulation ppp
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
```

OSPF Routing Protocol

Router0

```
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#router-id 1.1.1.1
Router(config-router)#network 10.0.0.0 0.255.255.255 area 3
Router(config-router)#network 20.0.0.0 0.255.255.255 area 1
Router(config-router)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#sho
00:27:19: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial2/0 from LOADING to FULL, Loading Done
w 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
     20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        20.0.0.0/8 is directly connected, Serial2/0
C        20.0.0.2/32 is directly connected, Serial2/0
O  IA 30.0.0.0/8 [110/128] via 20.0.0.2, 00:00:02, Serial2/0
O  IA 40.0.0.0/8 [110/129] via 20.0.0.2, 00:00:02, Serial2/0
```

Router1

```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#router-id 2.2.2.2
Router(config-router)#network 20.0.0.0 0.255.255.255 area 1
Router(config-router)#network 30.0.0.0 0.255.255.255 area 0
Router(config-router)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console

00:26:21: %OSPF-5-ADJCHG: Process 1, Nbr 3.3.3.3 on Serial3/0 from LOADING to FULL, Loading Done
00:27:18: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial2/0 from LOADING to FULL, Loading Done

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

     20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        20.0.0.0/8 is directly connected, Serial2/0
C        20.0.0.1/32 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        30.0.0.2/32 is directly connected, Serial3/0
O  IA 40.0.0.0/8 [110/65] via 30.0.0.2, 00:02:00, Serial3/0
```

Router2

```
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#router-id 3.3.3.3
Router(config-router)#network 40.0.0.0 0.255.255.255 area 2
Router(config-router)#network 30.0.0.0 0.255.255.255 area 0
Router(config-router)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#
00:26:19: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial3/0 from LOADING to FULL, Loading Done

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

O IA 20.0.0.0/8 [110/128] via 30.0.0.1, 00:02:45, Serial3/0
  30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C     30.0.0.0/8 is directly connected, Serial3/0
C     30.0.0.1/32 is directly connected, Serial3/0
C     40.0.0.0/8 is directly connected, FastEthernet0/0
```

Configure Loopback address

Router0

```
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface loopback 0

Router(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to
up

Router(config-if)#ip address 172.16.1.252 255.255.0.0
Router(config-if)#no shutdown
```

Router1

```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface loopback 0

Router(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to
up

Router(config-if)#ip address 172.16.1.253 255.255.0.0
Router(config-if)#no shutdown
Router(config-if)#

```

Router2

```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface loopback 0

Router(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to
up

Router(config-if)#ip address 172.16.1.254 255.255.0.0
Router(config-if)#no shutdown
Router(config-if)#+
```

Create Virtual Link

Router0

```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#area 1 virtual-link 2.2.2.2
Router(config-router)#+
```

Router1

```
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
01:11:01: %OSPF-4-ERRRCV: Received invalid packet: mismatch area ID, from
backbone area must be virtual-link but not found from 20.0.0.2, Serial2/0

01:11:11: %OSPF-4-ERRRCV: Received invalid packet: mismatch area ID, from
backbone area must be virtual-link but not found from 20.0.0.2, Serial2/0

Router(config)#route
01:11:21: %OSPF-4-ERRRCV: Received invalid packet: mismatch area ID, from
backbone area must be virtual-link but not found from 20.0.0.2, Serial2/0
r ospf 1
Router(config-router)#
01:11:31: %OSPF-4-ERRRCV: Received invalid packet: mismatch area ID, from
backbone area must be virtual-link but not found from 20.0.0.2, Serial2/0

Router(config-router)#area 1 v
01:11:41: %OSPF-4-ERRRCV: Received invalid packet: mismatch area ID, from
backbone area must be virtual-link but not found from 20.0.0.2, Serial2/0
irtual-link 1.1.1.1
Router(config-router)#
01:11:56: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on OSPF_VL0 from LOADING to
FULL, Loading Done
```

Pinging

```
C:\>ping 40.0.0.10

Pinging 40.0.0.10 with 32 bytes of data:

Reply from 40.0.0.10: bytes=32 time=24ms TTL=125
Reply from 40.0.0.10: bytes=32 time=18ms TTL=125
Reply from 40.0.0.10: bytes=32 time=18ms TTL=125
Reply from 40.0.0.10: bytes=32 time=20ms TTL=125

Ping statistics for 40.0.0.10:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 18ms, Maximum = 24ms, Average = 20ms
```



```
R2(config)# interface serial 1/1  
R2(config-if)# ip address 30.0.0.1 255.0.0.0  
R2(config-if)# encapsulation ppp  
R2(config-if)# clock rate 64000  
R2(config-if)# no shutdown  
R2(config-if)# exit
```

In Router R3,

```
R3(config)# interface serial 1/0  
R3(config-if)# ip address 30.0.0.2 255.0.0.0  
R3(config-if)# encapsulation ppp  
R3(config-if)# no shutdown  
R3(config-if)# exit
```

```
R3(config)#  
R3(config)# interface fastethernet 2/0  
R3(config-if)# ip address 40.0.0.1 255.0.0.0  
R3(config-if)# no shutdown  
R3(config-if)# exit
```

* Now, enable ip routing by configuring ospf routing protocol in all routers.

→ In Router R1,

```
R1(config)# router ospf 1  
R1(config)# router-id 1.1.1.1  
R1(config-router)# network 10.0.0.0 0.255.255.255 area 0  
R1(config-router)# network 20.0.0.0 0.255.255.255 area 1  
R1(config-router)# exit
```

→ In Router R2,

```
R2(config)# router ospf 1  
R2(config)# router-id 2.2.2.2  
R2(config-router)# network 20.0.0.0 0.255.255.255 area 1  
R2(config-router)# network 30.0.0.0 0.255.255.255 area 0  
R2(config-router)# exit
```

You have to configure router-id when you configure ospf. It is used to identify the router

→ Router# show ip route

Codes : -connected, S-static, O-OSPF, IA-OSPF
inter area

Gateway of last resort is not set

C 10.0.0.1/8 is directly connected, FastEthernet 2/0
C 20.0.0.0/8 is directly connected, Serial 1/0
O IA 40.0.0.0/8 [110/124] via 20.0.0.2, 00:04:23,
Serial 1/0
O IA 30.0.0.0/8 [110/128] via 20.0.0.2, 00:07:29,
Serial 1/0

→ R1(config-if)# interface loopback 0

R1(config-if)# ip add 172.16.1.252 255.255.0.0

R1(config-if)# no shutdown

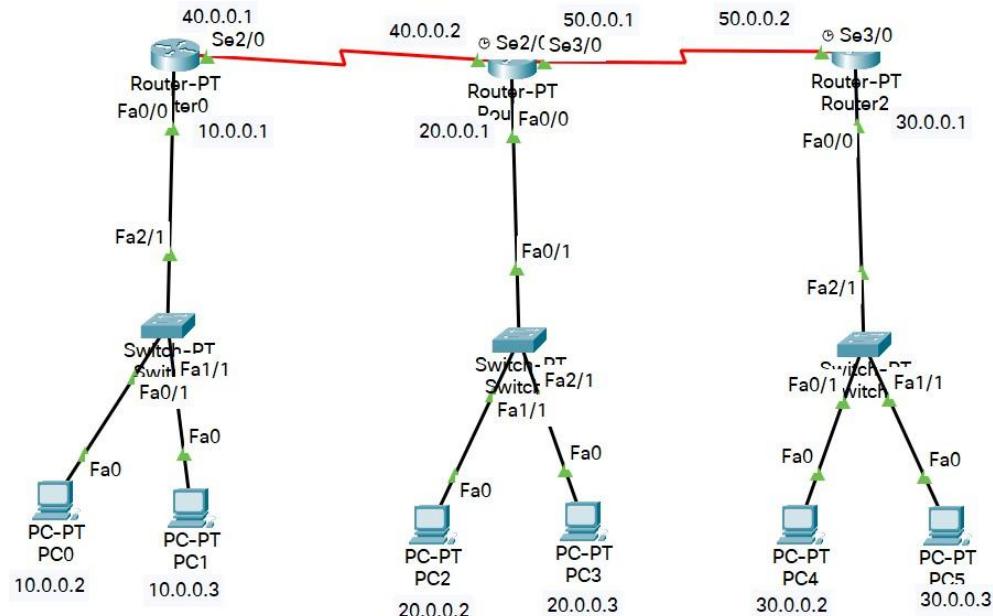
→ R2(config-if)# interface loopback 0

R2(config-if)# ip add 172.16.1.253 255.255.0.0

R2(config-if)# no shutdown

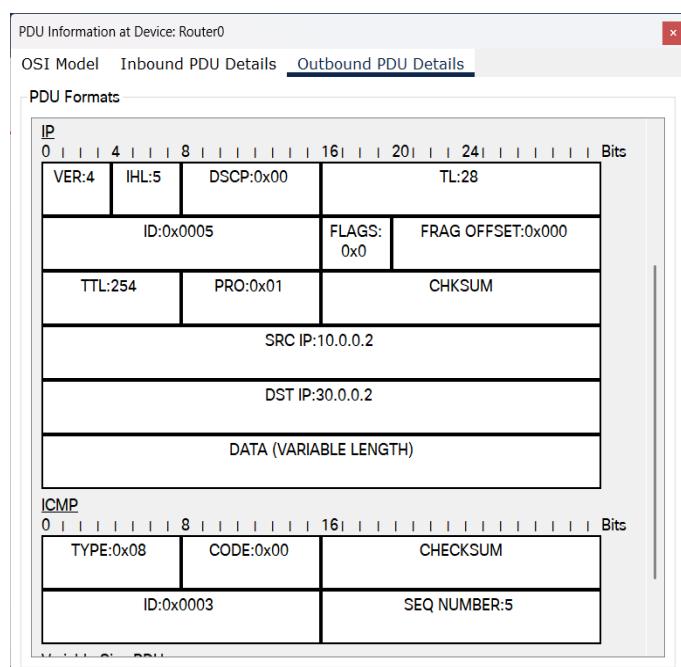
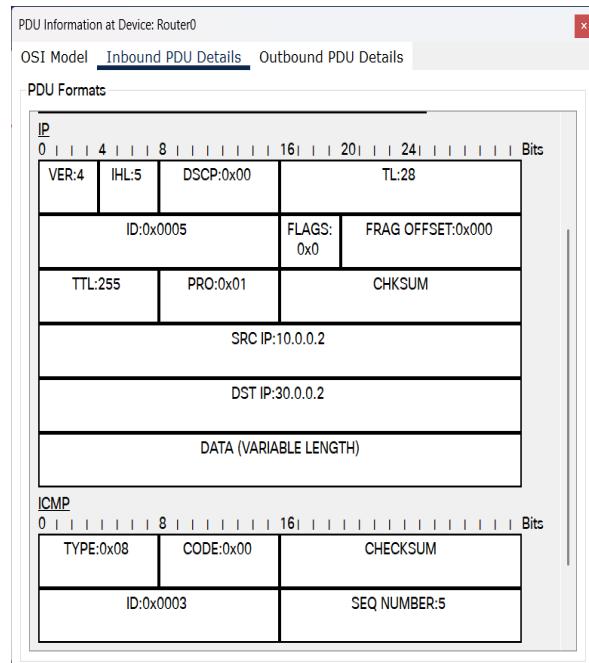
Program 7

- Demonstrate the TTL/ Life of a Packet
- Procedure along with the topology

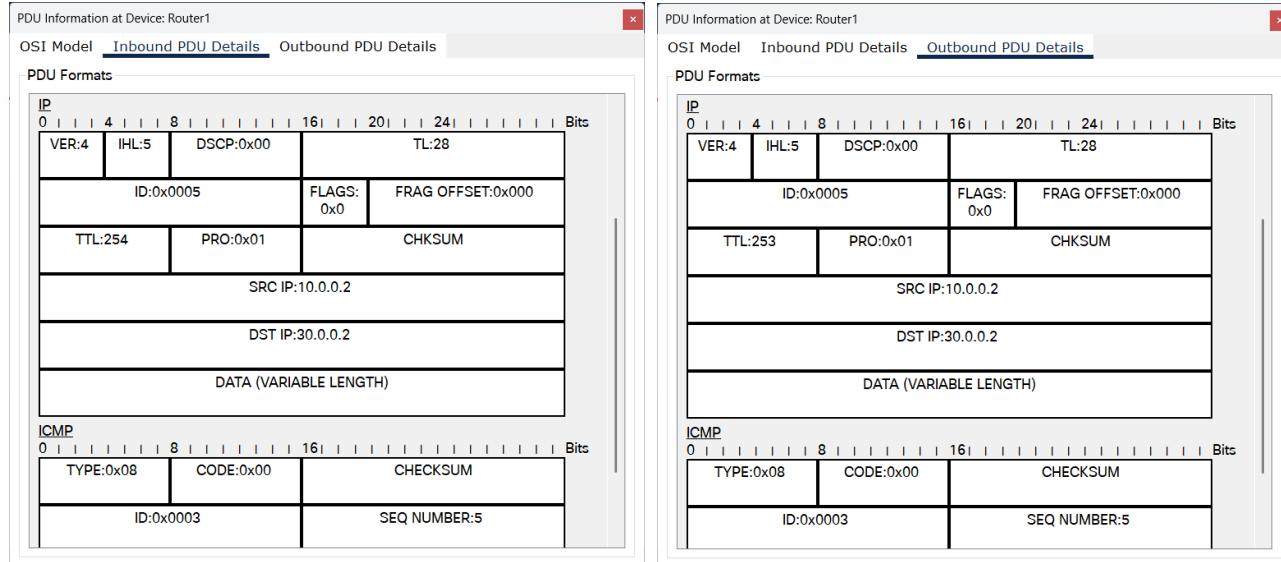


- Screen shots/ output

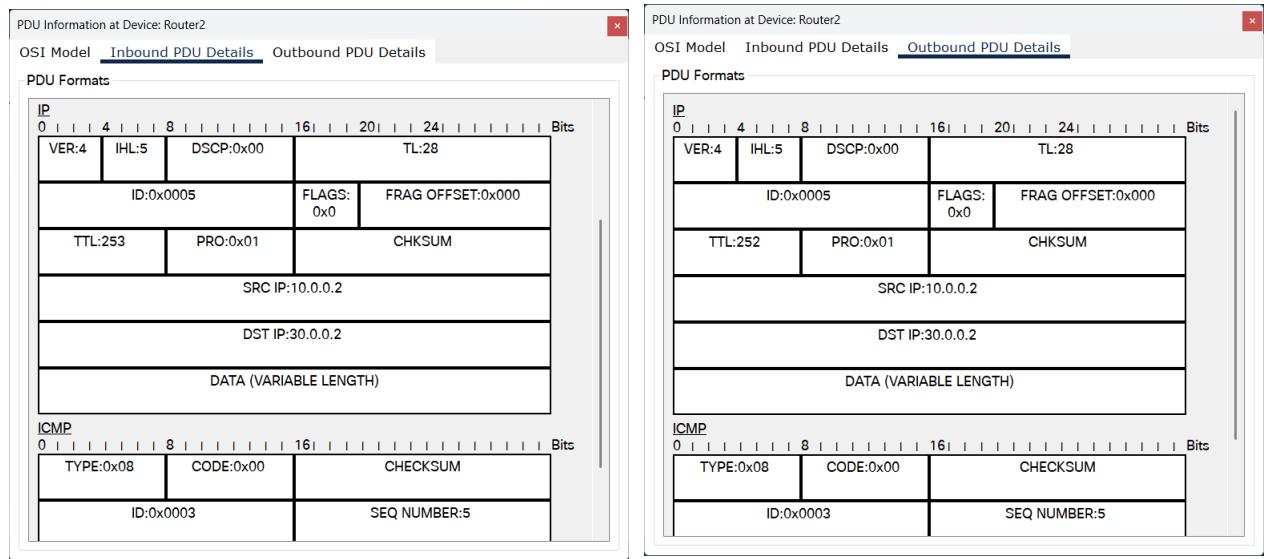
Packet at Router0



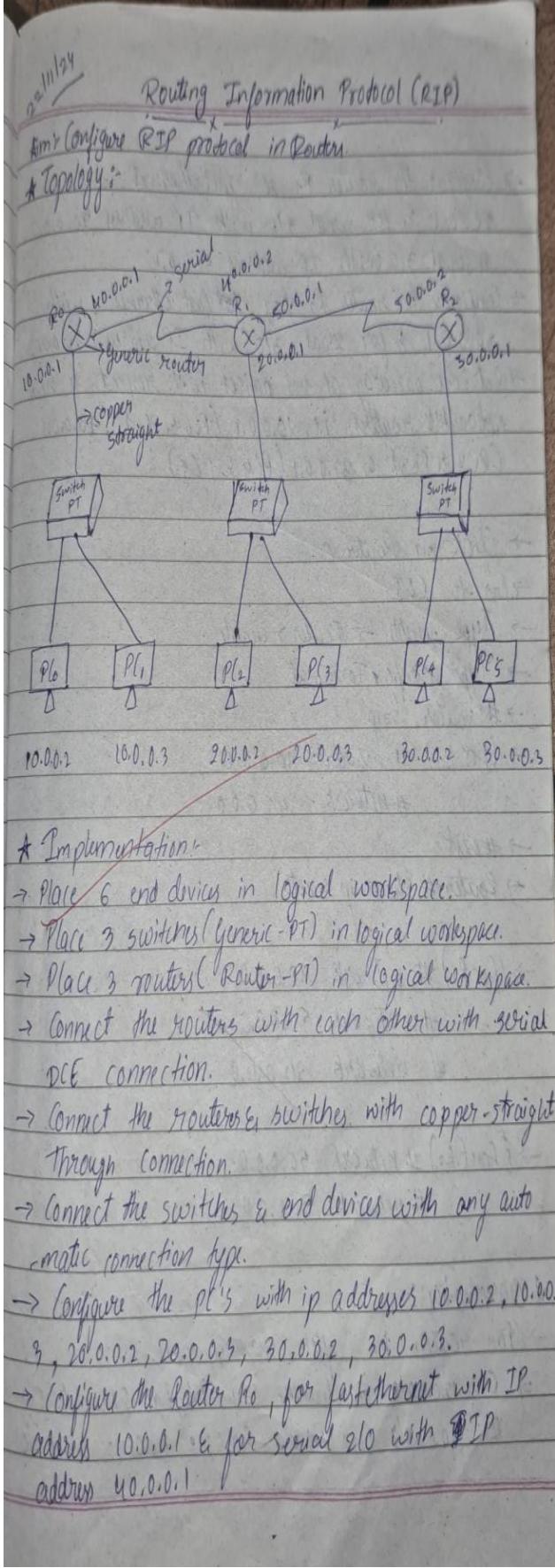
Packet at Router1



Packet at Router2



iv. Observation



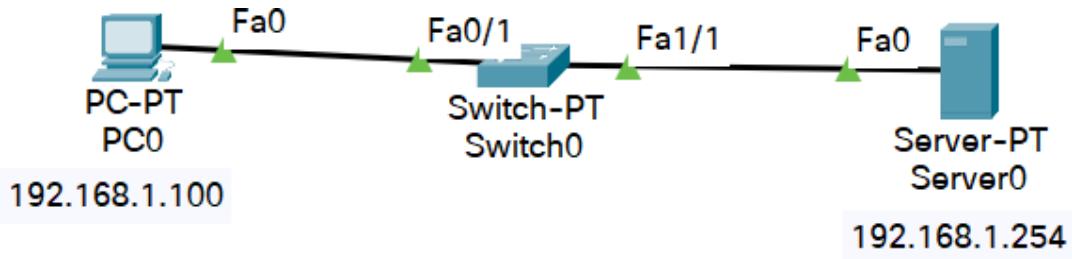
* Checking TTL :-

- For the same topology as above
- Go to simulation mode.
- Click on PDU & send from 10.0.0.2 to 30.0.0.3
- Auto / Capture / Play it until it reaches success.
- Click on the color code & observe the TTL
- It started at 255 before encountering a router.
- When it reaches a router encountering incoming is 255 outgoing will be 254.
- The same way for other 2 routers & reaches the destination if it is 252

~~22/11/24~~

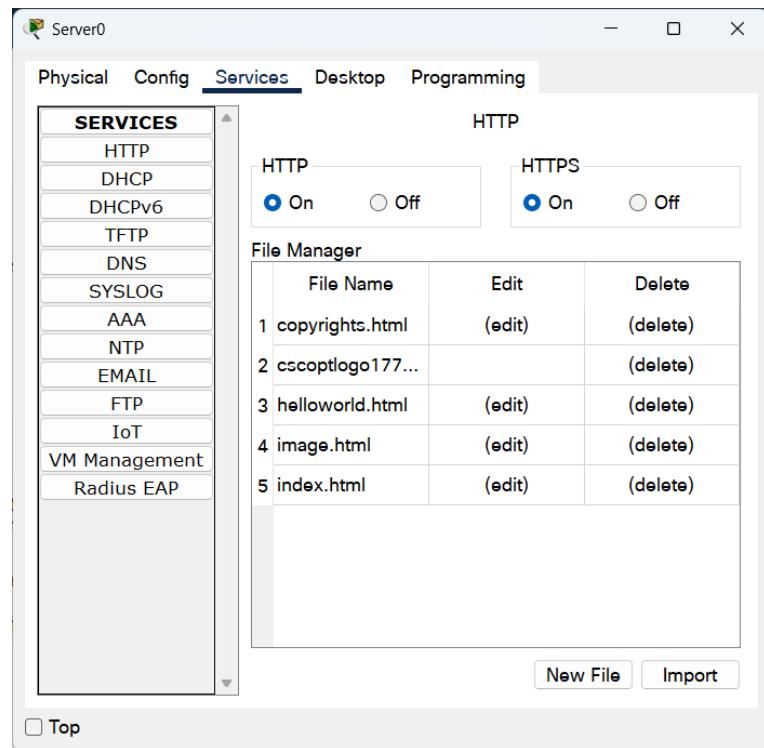
Program 8

- i. Configure Web Server, DNS within a LAN.
- ii. Procedure along with the topology

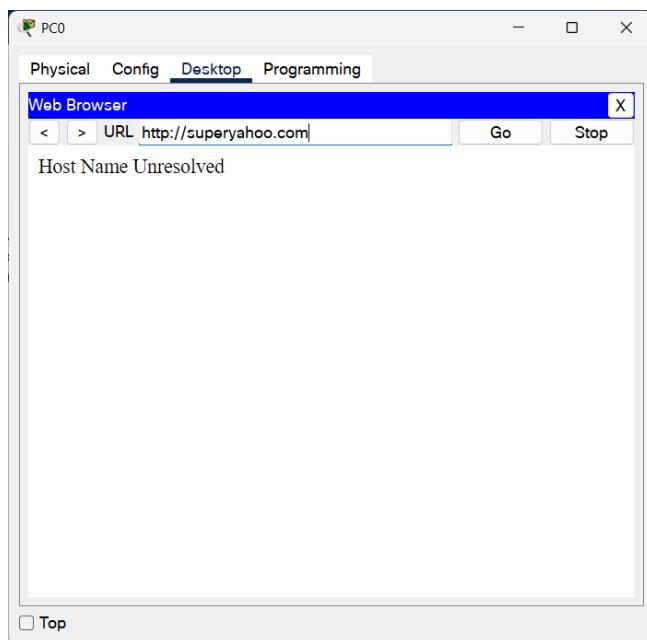
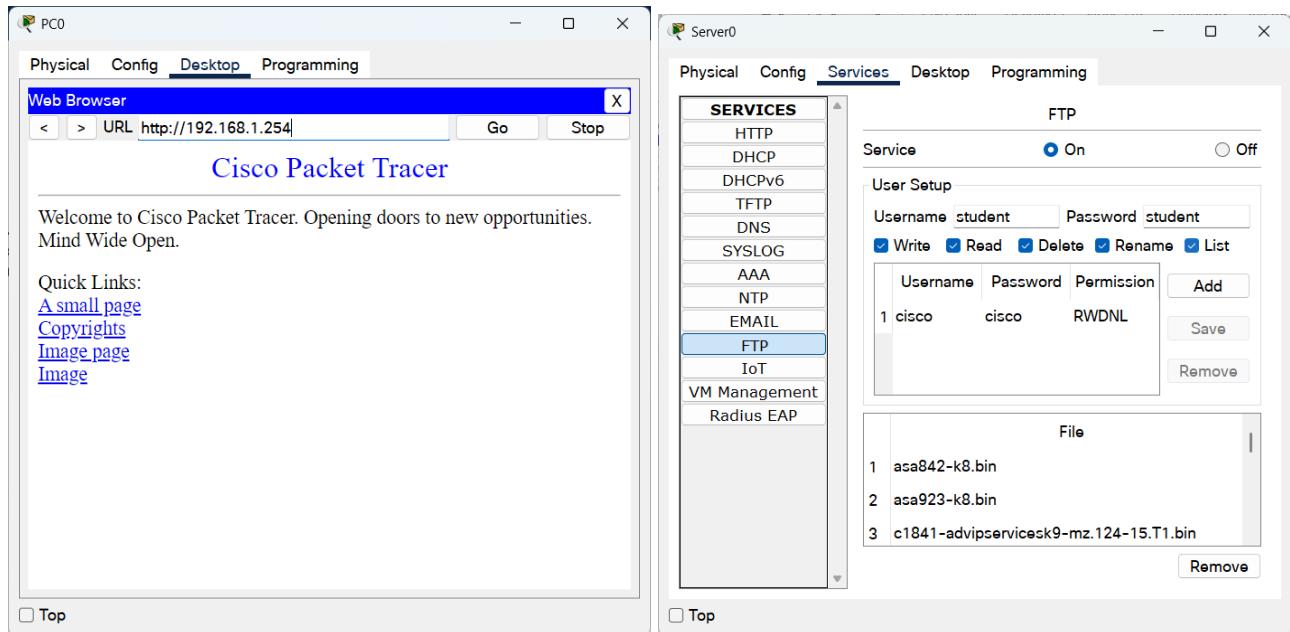


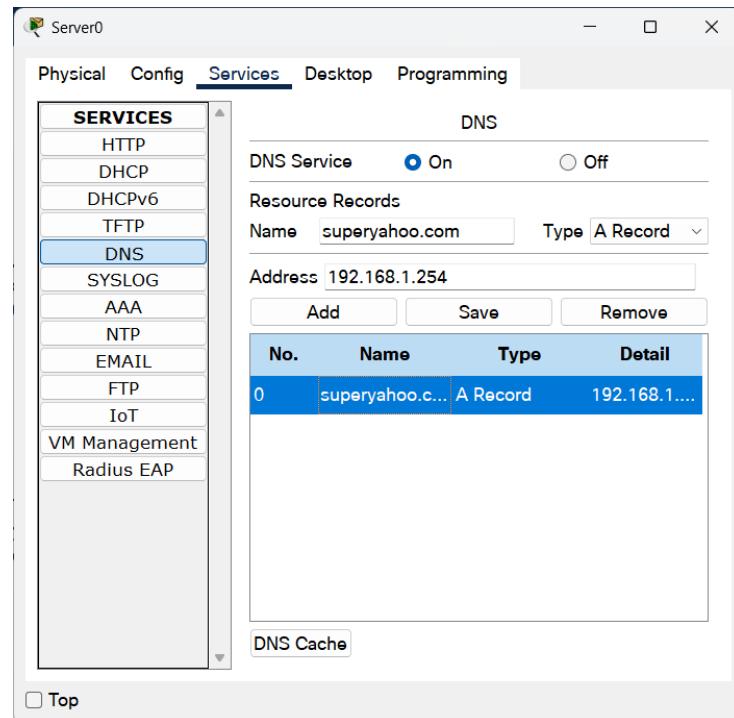
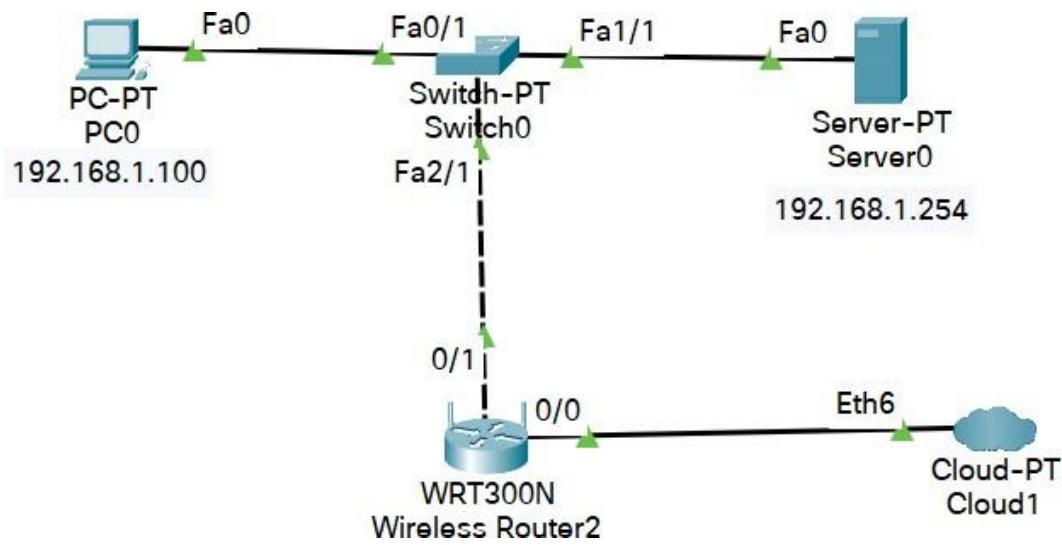
- iii. Screen shots/ output

Server's services

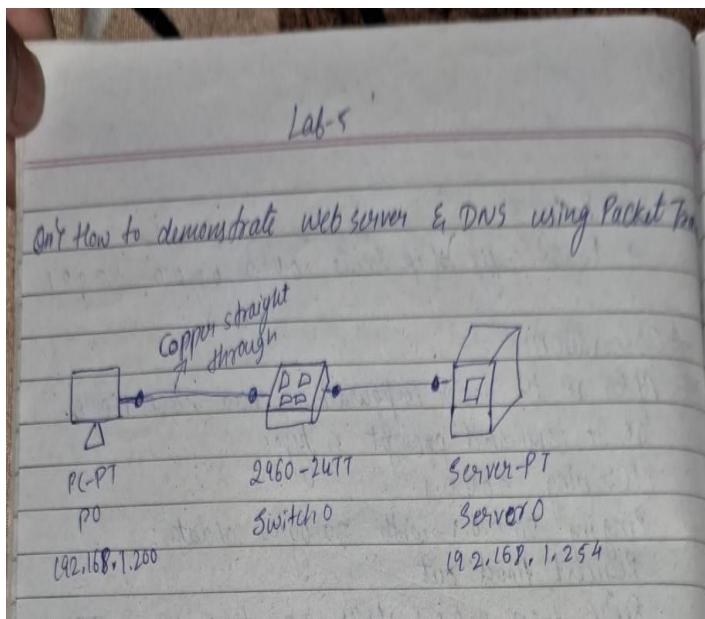


PC's Web Browser





iv. Observation



* Implementation & Observations:

1) Click on end devices & then click on a generic PC & place it in the logical workspace; click on switches & place it, click on generic Server and place it in the logical workspace.

2) Assign IP addresses to PC - 192.168.1.200
Server - 192.168.1.254

3) Click on interface → fast ethernet on left hand side, make sure that port status is ON.

4) To set up PC, double click on it, go to the config tab. Go to fast ethernet on left side. Make sure the port is turned on under static ip address enter 192.168.1.200

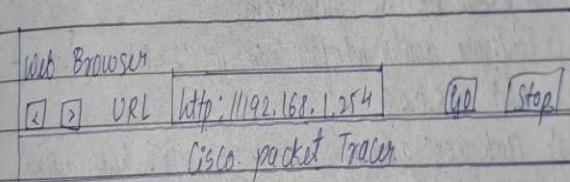
5) We will now ping from PC to server to make sure that we have a connection.

N>ping 192.168.1.254
Pinging 192.168.1.254 with 32 bytes of data.
Reply from 192.168.1.254: bytes=32 time=1ms TTL=128
Reply from 192.168.1.254: bytes=32 time=4ms TTL=128
Reply from 192.168.1.254: bytes=32 time=4ms TTL=128
Reply from 192.168.1.254: bytes=32 time=4ms TTL=128

6) Double click on the server, go to config tab

7) In the virtual browser that appears type in IP address of server & click go

8) You should now be able to see the screen that we saw earlier



Quick links:

A small page

Copyrights

Image page

Image

9) You are now connected to FTP server.

5) Now, click on PC in a LAN with server & check whether DHCP working fine in this network, Click on any PC → Desktop → IP configuration → Choose DHCP, then you will get ip from DHCP server for this PC

6) Default gateway → 20.0.0.1

DNS server → 10.0.0.2

Start ip address → 20.0.0.10

Subnet mask → 255.0.0.0

Max no. of users → 100

TFTP server → 10.0.0.2

Click on add & save

7) Router (config) # interface fastethernet 0/1

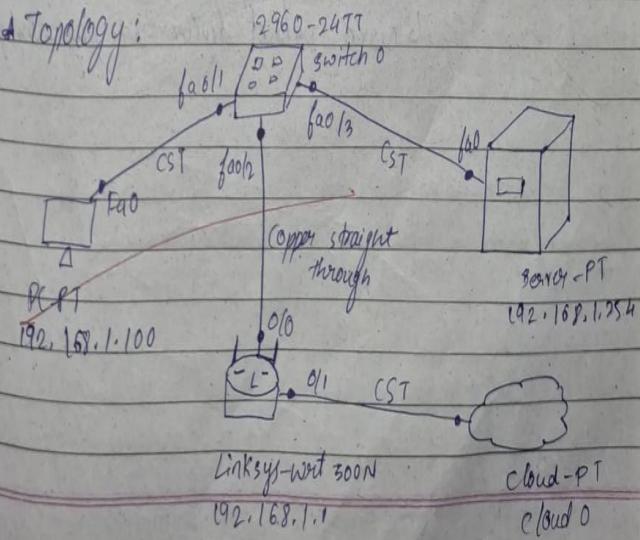
Router (config)# ip base-address 10.0.0.2

Router (config)# exit

8) Click on any PC → Desktop → IP configuration → Choose DHCP. Now we get ip address from DHCP server

Ques Part-II : DNS

* Topology:



→ Create a LAN using a generic PC, server, 2960-24TT switch, WRT300N wireless device, a cloud using copper straight through config PC → 192.168.1.254 - fastethernet 0/1, server → 192.168.1.254 - fastethernet 0/3, WRT300N → 192.168.1.1 - fastethernet 0/1

→ switch to WRT300N - Ethernet 2

WRT300N to Cloud - Ethernet 2

→ Server → Gateway → 192.168.1.1

↳ web server → http → Cisco packet tracer - html code

PC → Gateway → 192.168.1.1

→ Server → dns → dns service → ON

↳ resource records → Name - superyahoo.com

→ address - 192.168.1.254

→ add

→ PC → desktop → IP configuration → DNS server -

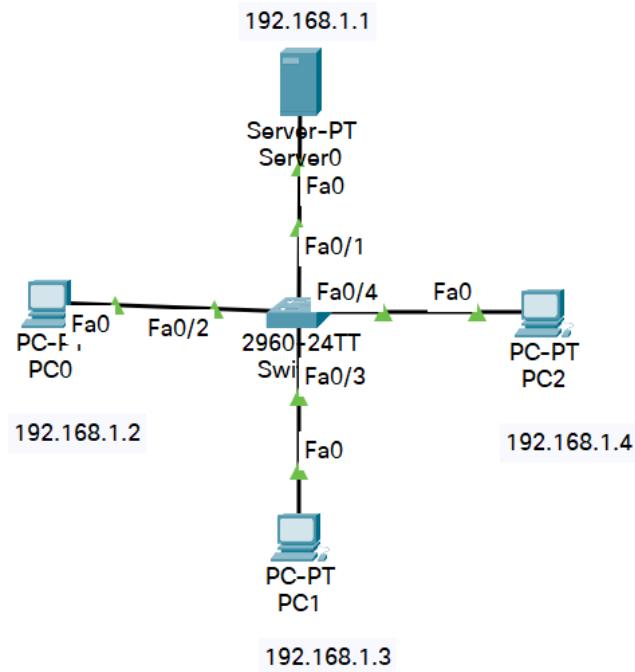
192.168.1.254

↳ web browser → URL : superyahoo.com

↳ cisco packet tracer - web page - display

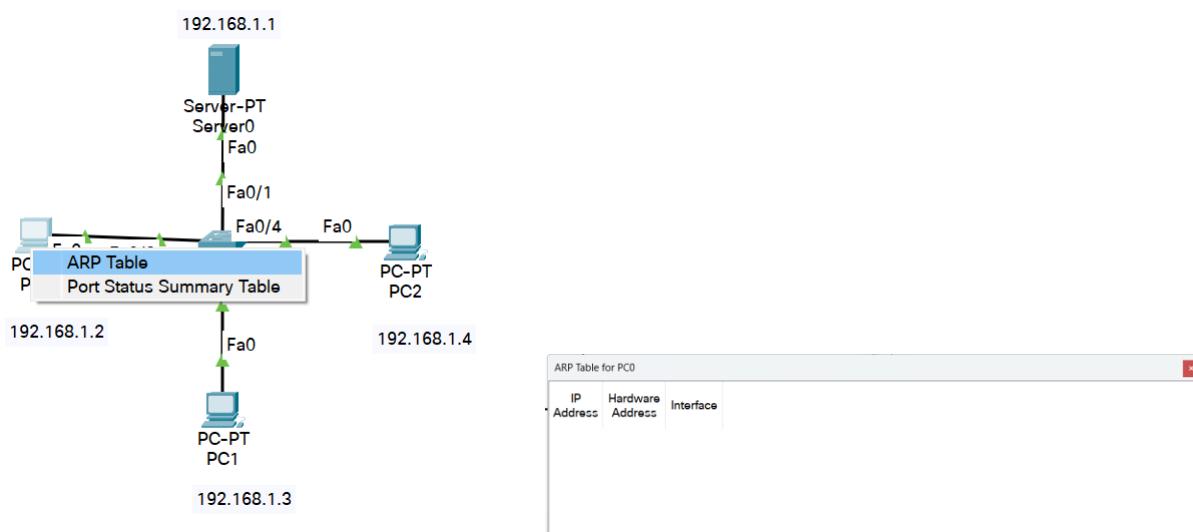
Program 9

- i. To construct simple LAN and understand the concept and operation of Address Resolution Protocol (ARP)
- ii. Procedure along with the topology

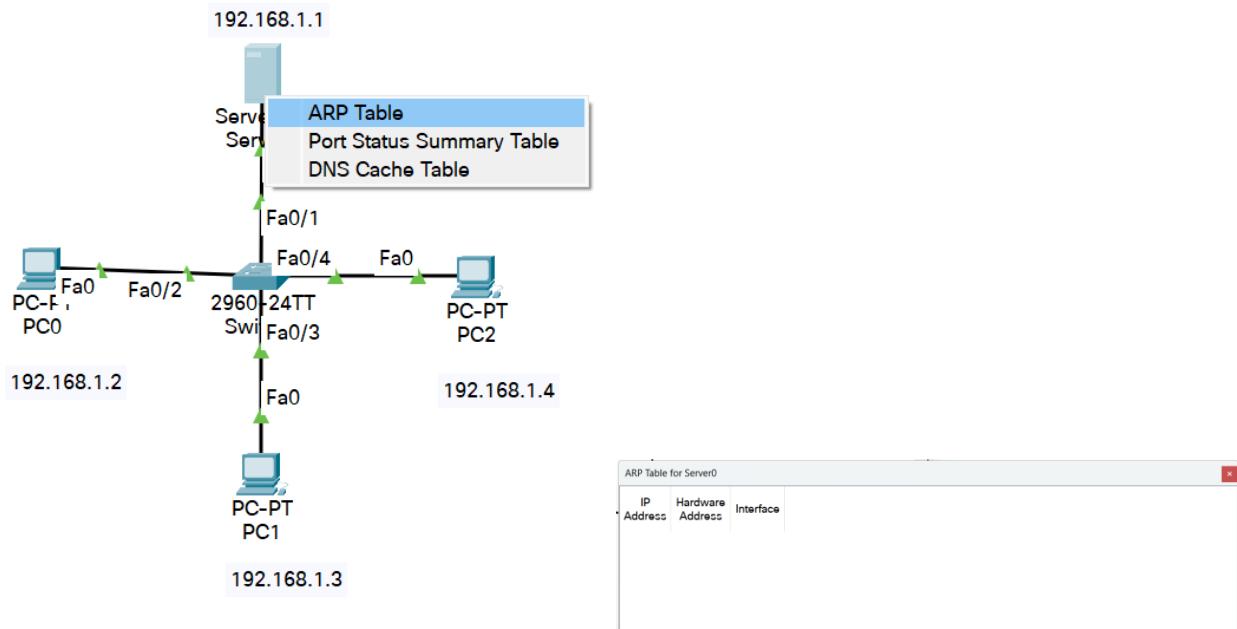


- iii. Screen shots/ output

ARP Table of PC



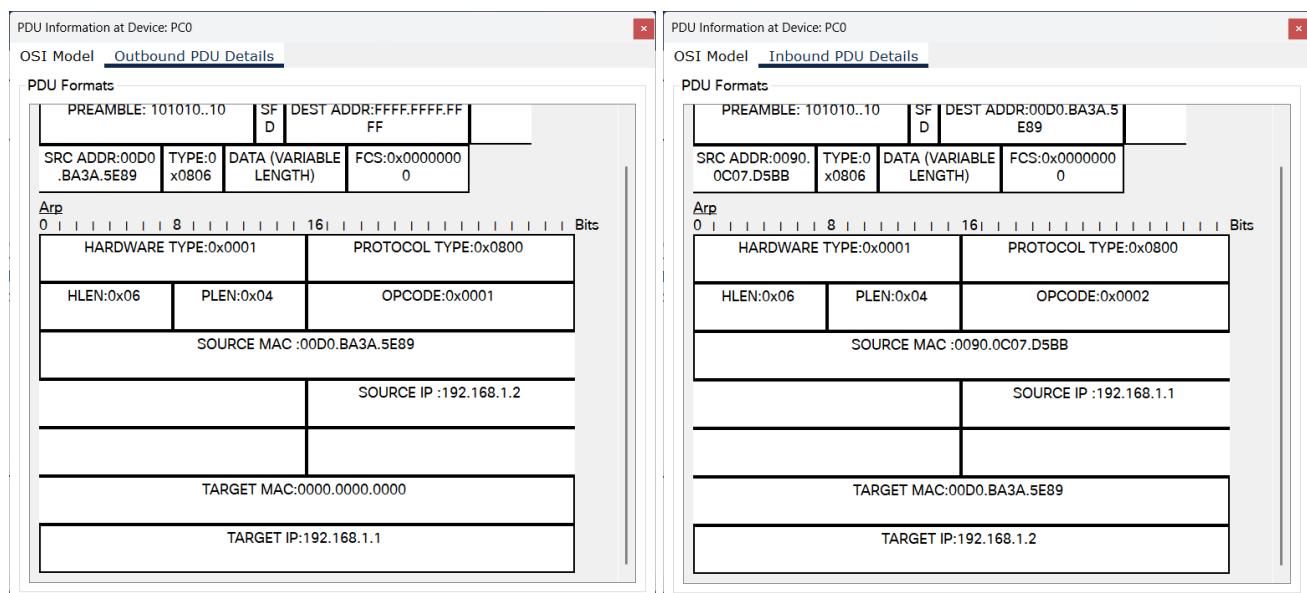
ARP Table of Server



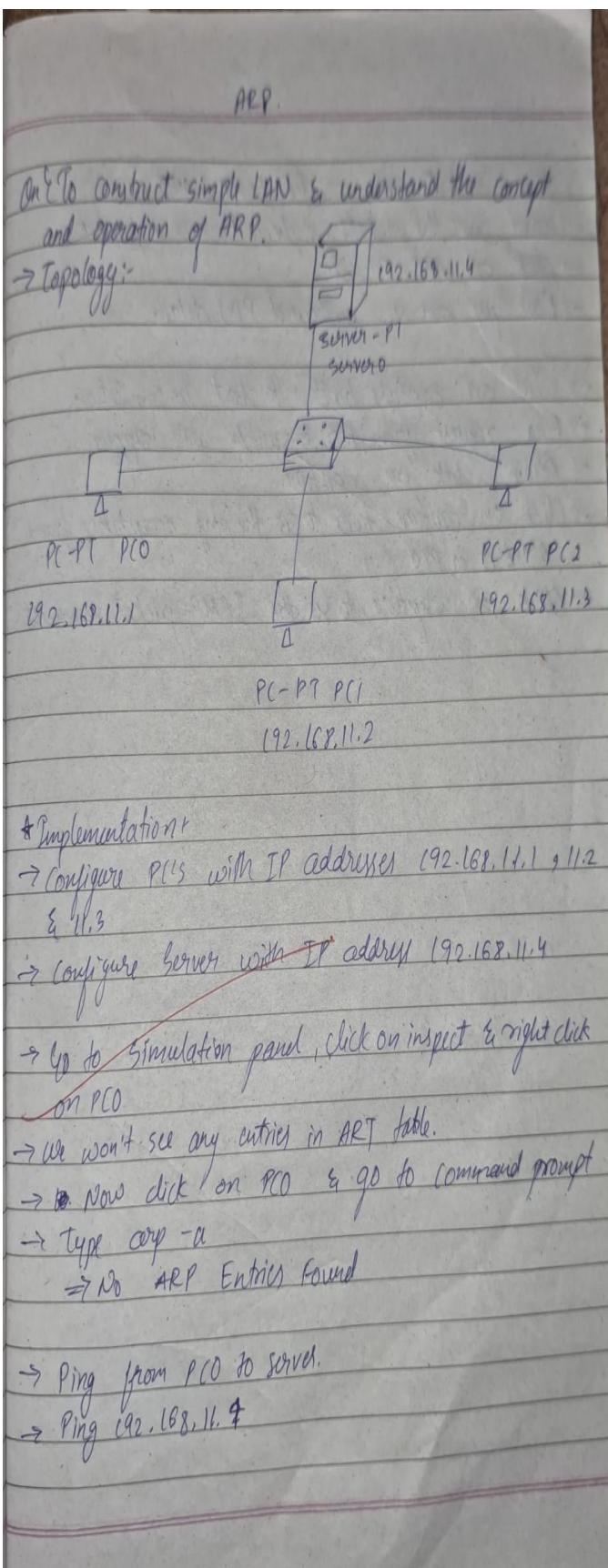
Command at PC

```
Packet Tracer PC Command Line 1.0
C:\>arp -a
No ARP Entries Found
C:\>
```

Pinging in Simulation Mode



iv. Observation



→ Two packets are created ICMP & ARP

→ Hover over the packets to check the type of packet

→ Click on ARP packet

→ Now you can see outbound PDU details.

→ Click on capture button to start the simulation.

→ Ping request from PC0 to switch will happen

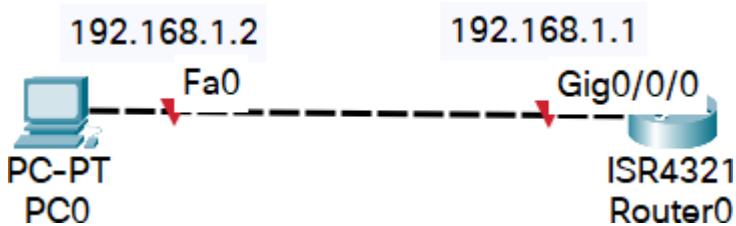
→ Again click on capture.

→ Click on capture twice to see the phy acceptance from Server to PC0

→ Click on capture to see the ICMP packet movements

Program 10

- i. To understand the operation of TELNET by accessing the router in server room from a PC in IT office.
- ii. Procedure along with the topology



- iii. Screen shots/ output

Router

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R1
R1(config)#enable secret hello
R1(config)#interface g0/0/0
R1(config-if)#ip address 192.168.1.1 255.255.255.0
R1(config-if)#no shutdown

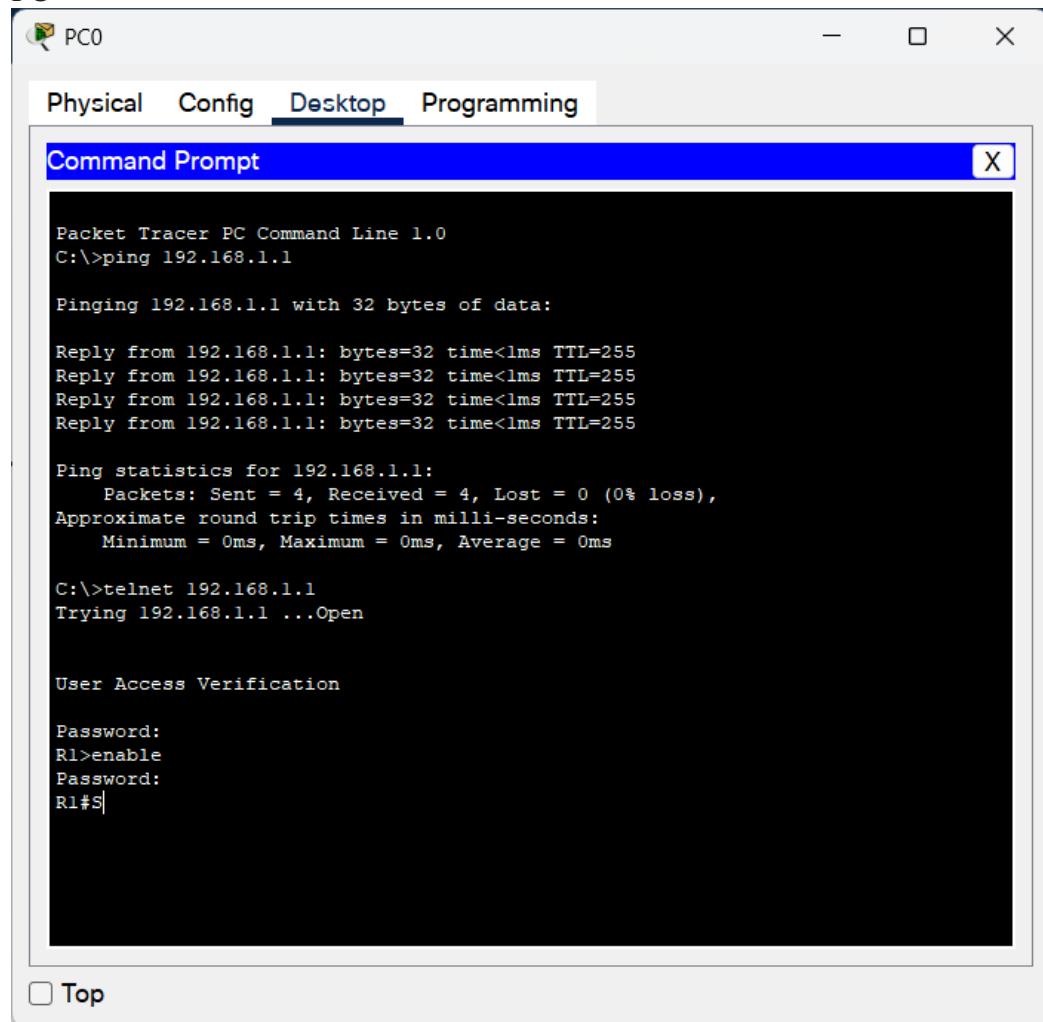
R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up

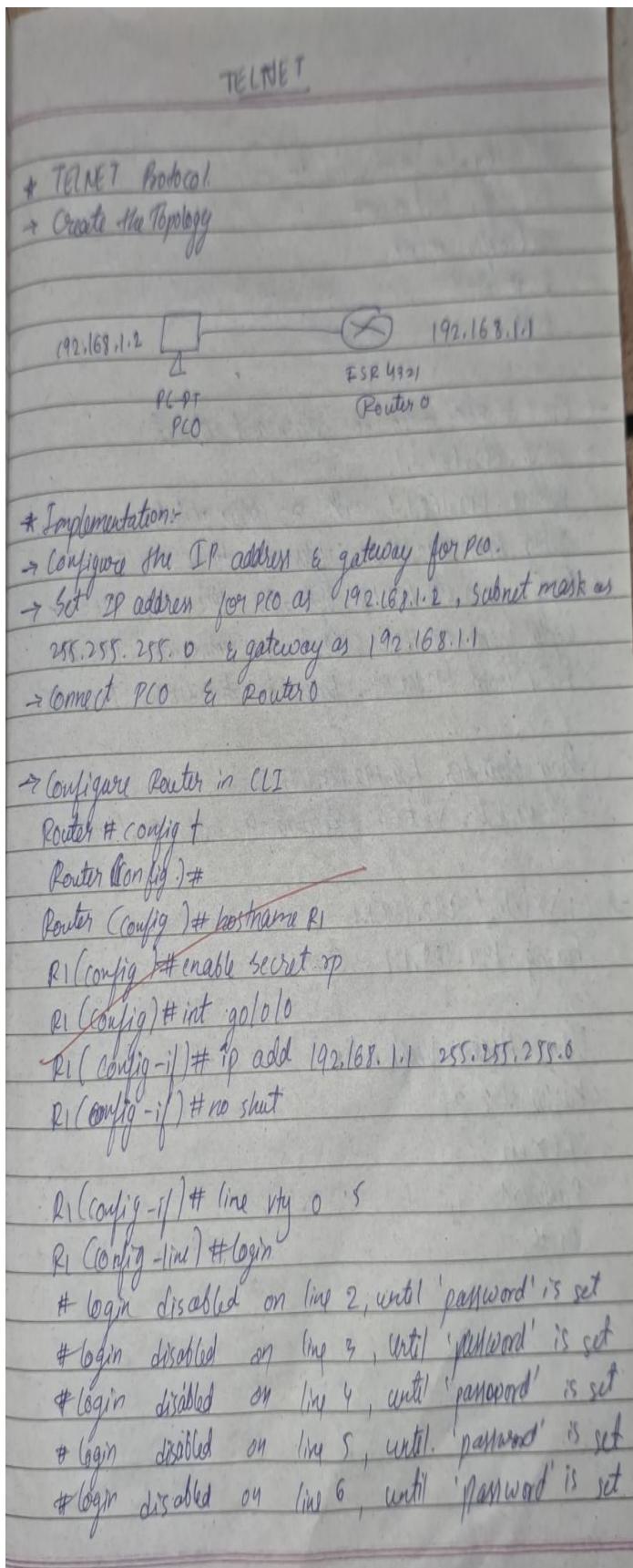
R1(config-if)#line vty 0 5
R1(config-line)#login
% Login disabled on line 2, until 'password' is set
% Login disabled on line 3, until 'password' is set
% Login disabled on line 4, until 'password' is set
% Login disabled on line 5, until 'password' is set
% Login disabled on line 6, until 'password' is set
% Login disabled on line 7, until 'password' is set
R1(config-line)#password pass
R1(config-line)#end
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#wr
Building configuration...
[OK]
R1#
```

PC



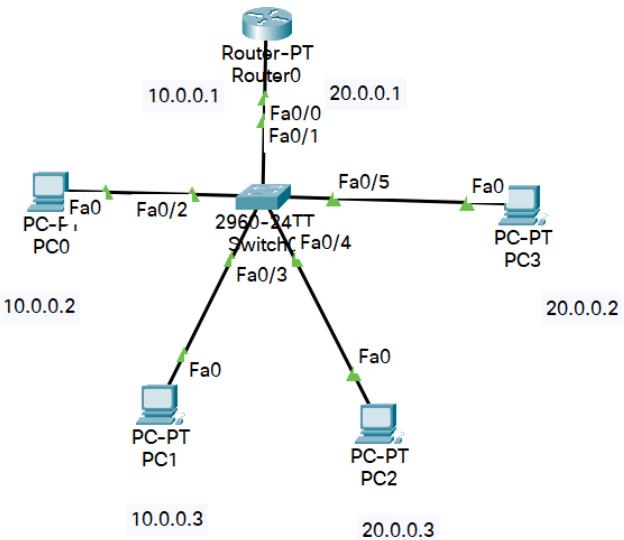
iv. Observation



R1(config-line) # password tp
R1(config-line) # exit
R1(config) # exit
R1# wr
R1#

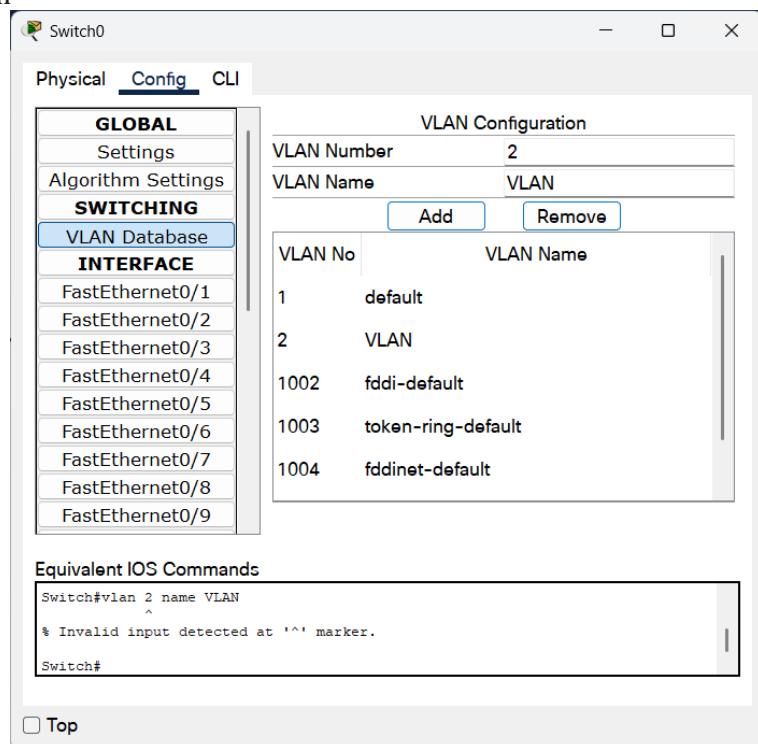
Program 11

- i. To construct a VLAN and make the PC's communicate among a VLAN
- ii. Procedure along with the topology

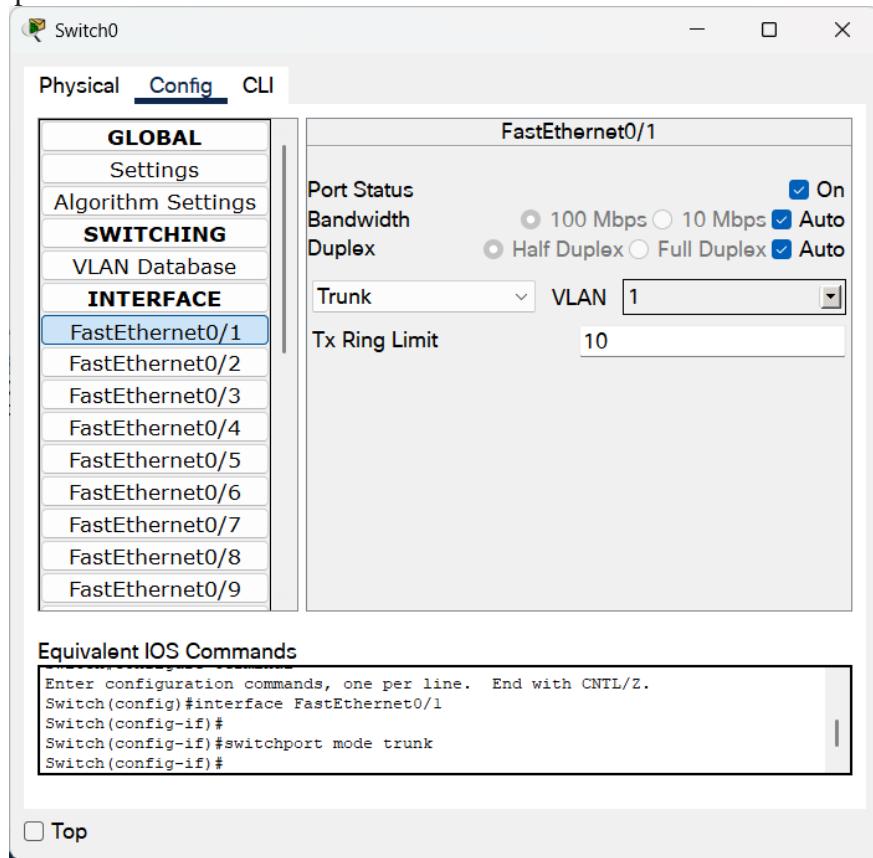


- iii. Screen shots/ output

Switch Configuration



Configuration of port connected to router



Configuration of ports connected to other networks

This screenshot shows the configuration interface for "Switch0" with two separate windows side-by-side.

Left Window (FastEthernet0/4 Configuration):

- Global Settings:** Port Status is On, Bandwidth is Auto (100 Mbps selected), Duplex is Auto (Half Duplex selected).
- Access Configuration:** Access mode is set to VLAN 2.
- Tx Ring Limit:** Set to 10.
- Equivalent IOS Commands:**

```

Switch(config)#interface FastEthernet0/4
Switch(config-if)#
Switch(config-if)#
Switch(config-if)#switchport access vlan 2
Switch(config-if)#

```

Top

Right Window (FastEthernet0/5 Configuration):

- Global Settings:** Port Status is On, Bandwidth is Auto (100 Mbps selected), Duplex is Auto (Full Duplex selected).
- Access Configuration:** Access mode is set to VLAN 2, with specific VLAN mappings listed: 1:default, 2:VLAN, and 1002:fddi-default.
- Tx Ring Limit:** Set to 10.
- Equivalent IOS Commands:**

```

Switch(config)#interface FastEthernet0/5
Switch(config-if)#
Switch(config-if)#
Switch(config-if)#switchport access vlan 2
Switch(config-if)#

```

Top

Configuartion of Router

```

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 10.0.0.1 255.0.0.0
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)#interface Fa0/0.1
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.1, changed
state to up

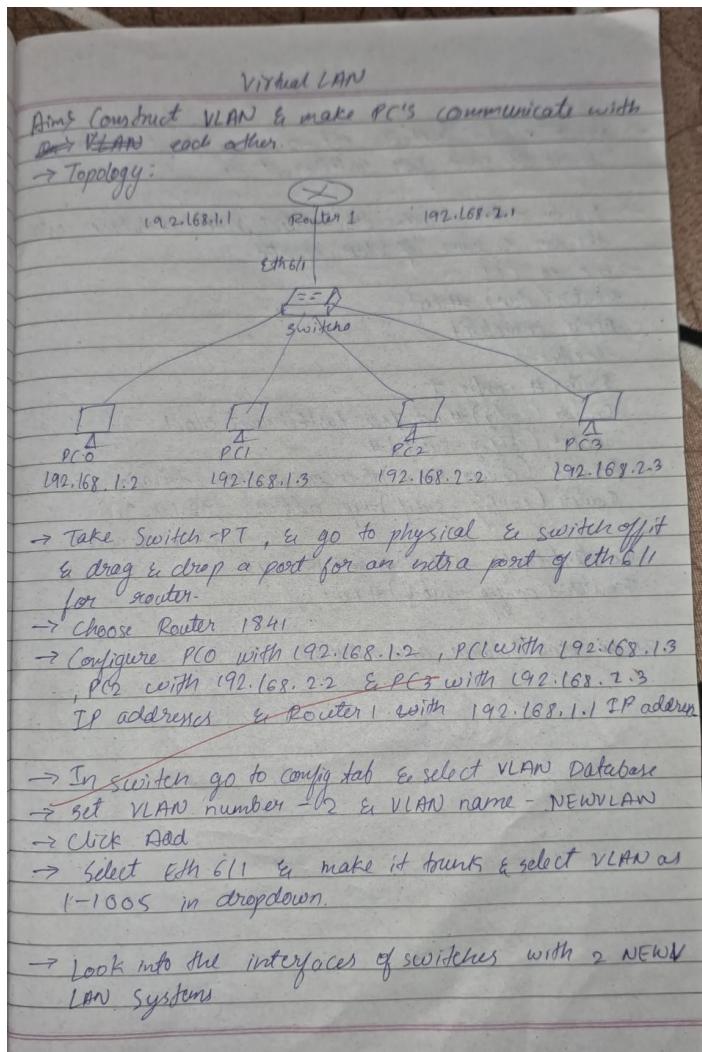
Router(config-subif)#encapsulation dot1q 2
Router(config-subif)#ip address 20.0.0.1 255.0.0.0
Router(config-subif)#no shutdown
Router(config-subif)#exit
Router(config)#

```

Ctrl+F6 to exit CLI focus

Top

iv. Observation



→ Next click fastethernet 2/1 & select VLAN-2 & do the same for fastethernet 3/1

→ Go to router - config tab - select VLAN database entry the name & name of VLAN created

→ Go to CLI

Router(vlan) #exit
Apply completed
Exiting...
Router# config t

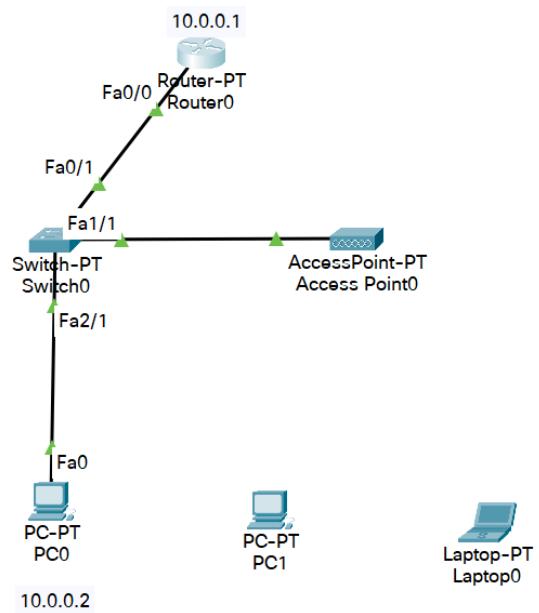
Router(config)#interface fastethernet 0/0.1
Router(config-subif)#
Router(config-subif)#encapsulation dot1q 2
Router(config-subif)#ip address 192.168.2.1 255.255.255.0

Router(config-subif)#exit no shut
Router(config-subif)#exit

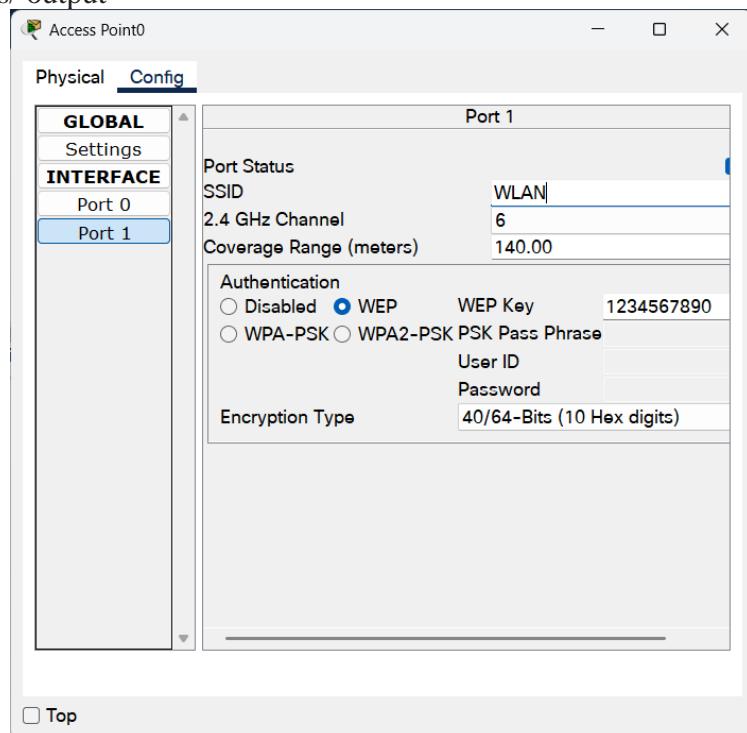
→ Now ping between any 2 devices.

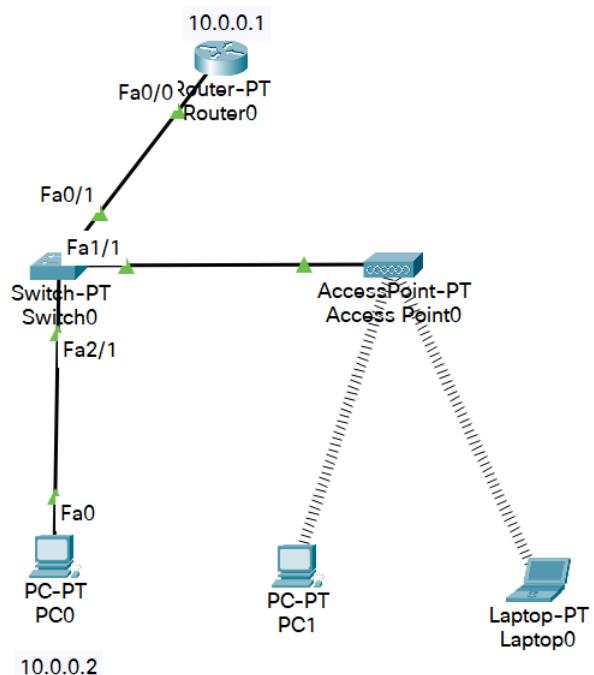
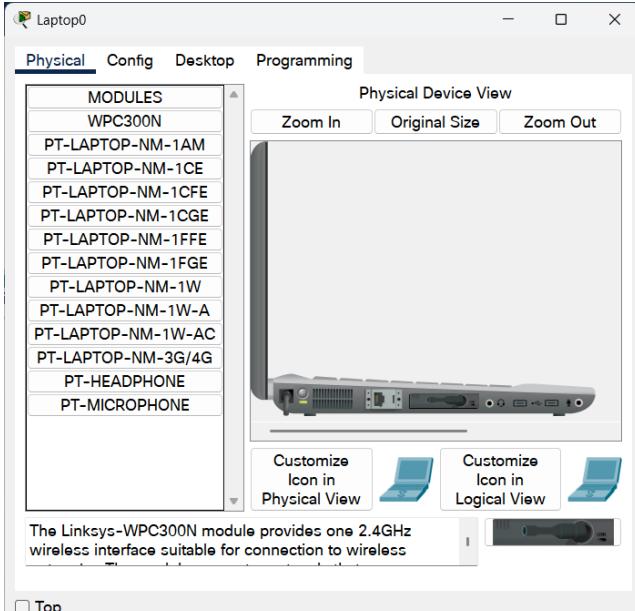
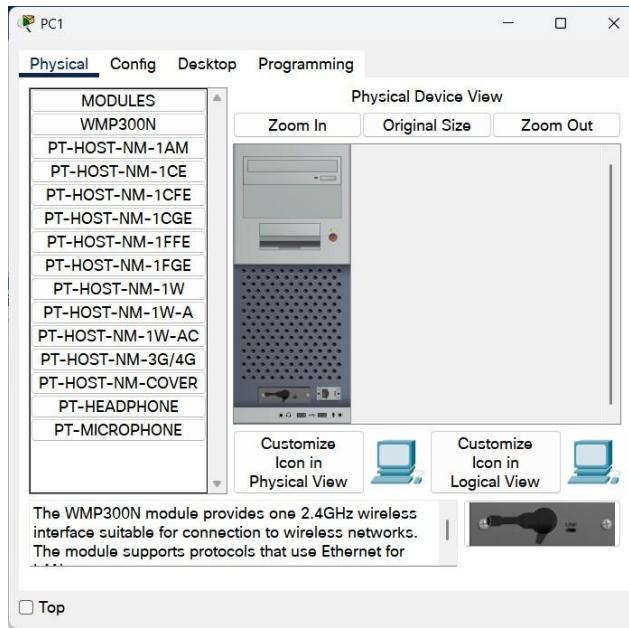
Program 12

- i. To construct a WLAN and make the nodes communicate wirelessly.
 - ii. Procedure along with the topology



- ### iii. Screen shots/ output





Ping:

```

Laptop0
Physical Config Desktop Programming
Command Prompt
Packet Tracer PC Command Line 1.0
C:\>

C:\>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

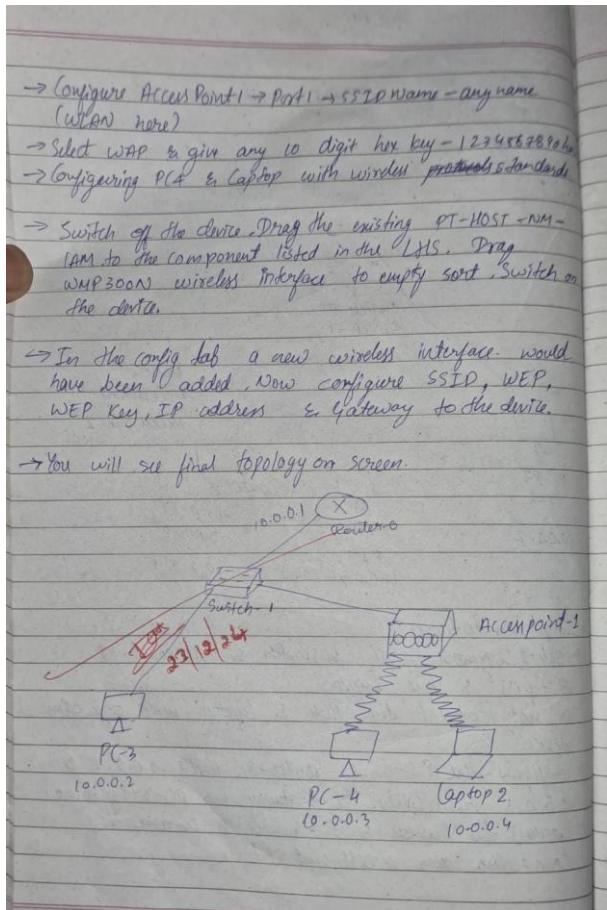
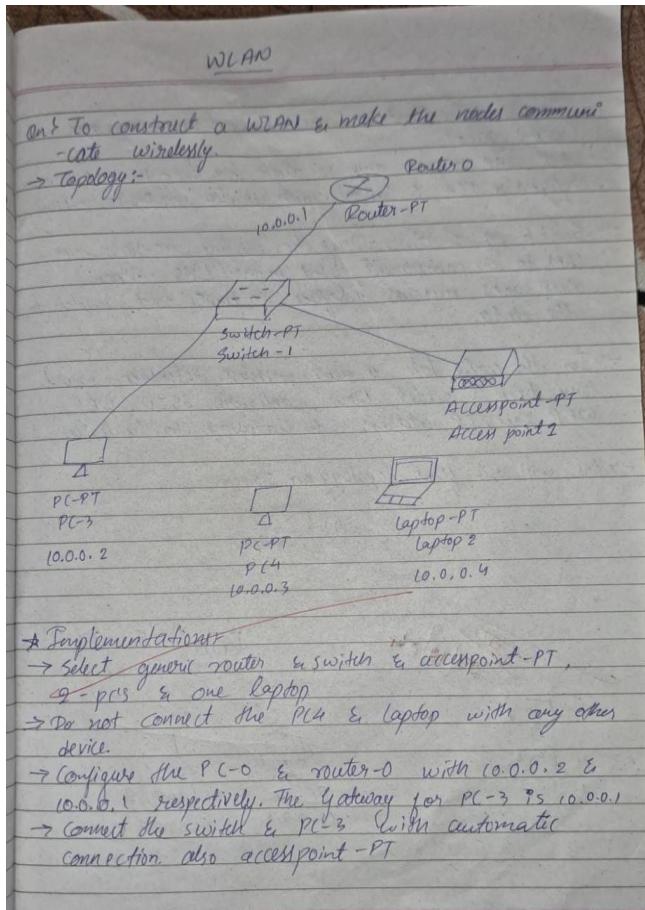
Reply from 10.0.0.3: bytes=32 time=40ms TTL=128
Reply from 10.0.0.3: bytes=32 time=25ms TTL=128
Reply from 10.0.0.3: bytes=32 time=26ms TTL=128
Reply from 10.0.0.3: bytes=32 time=24ms TTL=128

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 24ms, Maximum = 40ms, Average = 28ms

C:\>

```

iv. Observation



Cycle-II

Program 1

- i. Write a program for error detecting code using CRC-CCITT (16-bits).
- ii. Procedure

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

int crc(char *ip, char *op, char *poly, int mode) {
    strcpy(op, ip);

    if (mode) {
        for (int i = 1; i < strlen(poly); i++) {
            strcat(op, "0");
        }
    }

    // Perform XOR on the message with the selected polynomial
    for (int i = 0; i < strlen(ip); i++) {
        if (op[i] == '1') {
            for (int j = 0; j < strlen(poly); j++) {
                if (op[i + j] == poly[j])
                    op[i + j] = '0';
                else
                    op[i + j] = '1';
            }
        }
    }

    // Check for errors. Return 0 if error detected
    for (int i = 0; i < strlen(op); i++) {
        if (op[i] == '1')
            return 0;
    }

    return 1;
}

int main() {
    char ip[50], op[50], recv[50];
    char poly[] = "1000100000100001";

    printf("Enter the input message in binary: ");
    scanf("%s", ip);
```

```

        crc(ip, op, poly, 1);

        printf("The transmitted message is: %s%s\n", ip, op + strlen(ip));

        printf("Enter the received message in binary: ");
        scanf("%s", recv);

        if (crc(recv, op, poly, 0)) {
            printf("No error in data\n");
        } else {
            printf("Error in data transmission has occurred\n");
        }

        return 0;
    }

```

iii. Screen shots/ output

```

D:\cpp\Untitled1.exe      X + ▾

Enter the input message in binary: 11111
The transmitted message is: 111111110001111011110
Enter the received message in binary: 1111
Error in data transmission has occurred

Process returned 0 (0x0)  execution time : 7.354 s
Press any key to continue.
|
```

```

D:\cpp\Untitled1.exe      X + ▾

Enter the input message in binary: 11111
The transmitted message is: 111111110001111011110
Enter the received message in binary: 11111
No error in data

Process returned 0 (0x0)  execution time : 7.201 s
Press any key to continue.
|
```

iv. Observation

LAB-6

→ Write a program for Error Detection using CRC
 CITT (16 bits)

Code:

```
#include <iostream>
#include <cstring>
using namespace std;

int crc (char *ip, char *op, char *poly, int mode) {
    strcpy (op, ip);
    if (mode == 1) {
        for (int i=0 ; i< strlen (poly)-1 ; i++) {
            strcat (op, "0");
        }
    }
    int msg_len = strlen (op);
    int poly_len = strlen (poly);
    for (int i=0 ; i<=msg_len-poly_len ; i++) {
        if (op[i] == '1') {
            for (int j=0 ; j< poly_len ; j++) {
                if (op[i+j] == poly[j]) {
                    op[i+j] = '0';
                }
            }
        }
        else {
            op[i+j] = '1';
        }
    }
    for (int i=msg_len-poly_len+1 ; i< msg_len ; i++) {
        if (op[i] == '1')
            return 0;
    }
}
```

return 1;

```
int main () {
    char ip[50], op[50], poly[50];
    char poly [] = "1000100000100001";
    cout << "Enter the input message in Binary";
    cin >> ip;
    crc(ip, op, poly, 1);
    cout << "The transmitted message is ";
    cout << ip << op << endl;
    cout << "Enter the received message ";
    cin >> recv;
    if (crc(recv, op, poly, 0)) {
        cout << "No error" << endl;
    }
    else {
        cout << "Error" << endl;
    }
}
return 0;
```

→ Output:

→ Enter the input message in binary: 10101
 The transmitted message is: 101010100001010010100
 Enter the received message in binary: 101010100001010010
 No error.

→ Enter input message: 10101
 Transmitted message is: 1010100101110110010
 Enter the received msg: 10111011101100
 Error.

Program 2

- i. Write a program for congestion control using Leaky bucket algorithm
- ii. Procedure

```
#include <stdio.h>

int main() {
    int no_of_queries, storage, output_pkt_size;
    int input_pkt_size, bucket_size, size_left;
    storage = 0;
    no_of_queries = 4;
    bucket_size = 10;
    input_pkt_size = 4;
    output_pkt_size = 1;

    for (int i = 0; i < no_of_queries; i++) {
        size_left = bucket_size - storage;

        if (input_pkt_size <= size_left) {
            // Update storage
            storage += input_pkt_size;
        } else {
            printf("Packet loss = %d\n", input_pkt_size);
        }

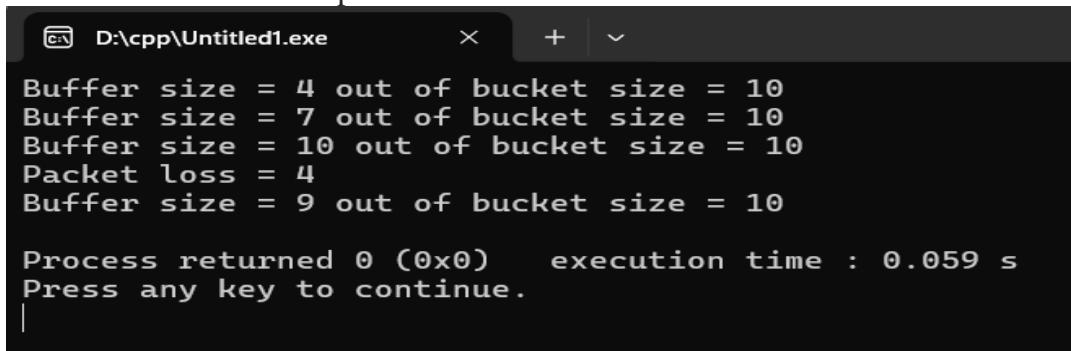
        printf("Buffer size = %d out of bucket size = %d\n",
               storage, bucket_size);

        // Packets leaving the bucket
        storage -= output_pkt_size;

        // Ensure storage doesn't go negative
        if (storage < 0) {
            storage = 0;
        }
    }

    return 0;
}
```

iii. Screen shots/ output



```
D:\cpp\Untitled1.exe
Buffer size = 4 out of bucket size = 10
Buffer size = 7 out of bucket size = 10
Buffer size = 10 out of bucket size = 10
Packet loss = 4
Buffer size = 9 out of bucket size = 10

Process returned 0 (0x0)   execution time : 0.059 s
Press any key to continue.
```

iv. Observation

Any Leaky Bucket Algorithm:

```
#include <bits/stdc++.h>
using namespace std;

int main() {
    int no_of_queries, storage, output_pkt_size;
    int input_pkt_size, bucket_size, size_left;

    storage = 0;
    no_of_queries = 4;
    bucket_size = 10;
    input_pkt_size = 4;

    output_pkt_size = 1;
    for (int i=0; i< no_of_queries; i++) {
        size_left = bucket_size - storage;
        if (input_pkt_size <= size_left) {
            storage += input_pkt_size;
        } else {
            printf("Packet loss=%d\n", input_pkt_size);
        }
        printf("Buffer size=%d out of bucket size=%d\n", storage, bucket_size);
    }
}
```

storage -= output_pkt_size;
 return 0;

→ Output:

Buffer size = 4 out of bucket size = 10
 Buffer size = 7 out of bucket size = 10
 Buffer size = 10 out of bucket size = 10
 Packet loss = 4
 Buffer size = 9 out of bucket size = 10

~~10~~
~~15~~ | 1 | 4

Program 3

- i. 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.
- ii. Procedure

```
clientTCP.py
from socket import *
serverName = '127.0.0.1'
serverPort = 12000
clientSocket = socket(AF_INET, SOCK_STREAM)
clientSocket.connect((serverName,serverPort))
sentence = input("\nEnter file name: ")

clientSocket.send(sentence.encode())
filecontents = clientSocket.recv(1024).decode()
print ('\nFrom Server:\n')
print(filecontents)
clientSocket.close()
```

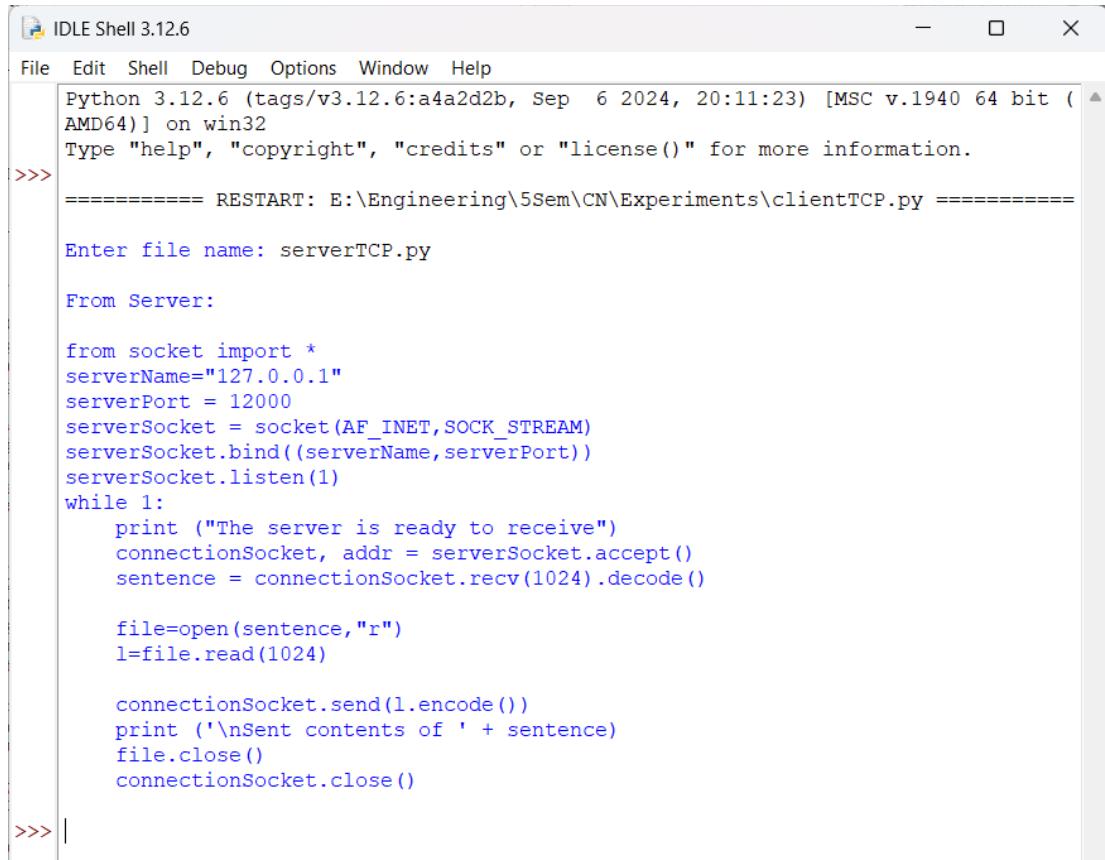
```
serverTCP.py
from socket import *
serverName="127.0.0.1"
serverPort = 12000
serverSocket = socket(AF_INET,SOCK_STREAM)
serverSocket.bind((serverName,serverPort))
serverSocket.listen(1)
while 1:
    print ("The server is ready to receive")
    connectionSocket, addr = serverSocket.accept()
    sentence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

iii. Screen shots/ output

Client



```
IDLE Shell 3.12.6
File Edit Shell Debug Options Window Help
Python 3.12.6 (tags/v3.12.6:a4a2d2b, Sep 6 2024, 20:11:23) [MSC v.1940 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.

>>> ===== RESTART: E:\Engineering\5Sem\CN\Experiments\clientTCP.py =====

Enter file name: serverTCP.py

From Server:

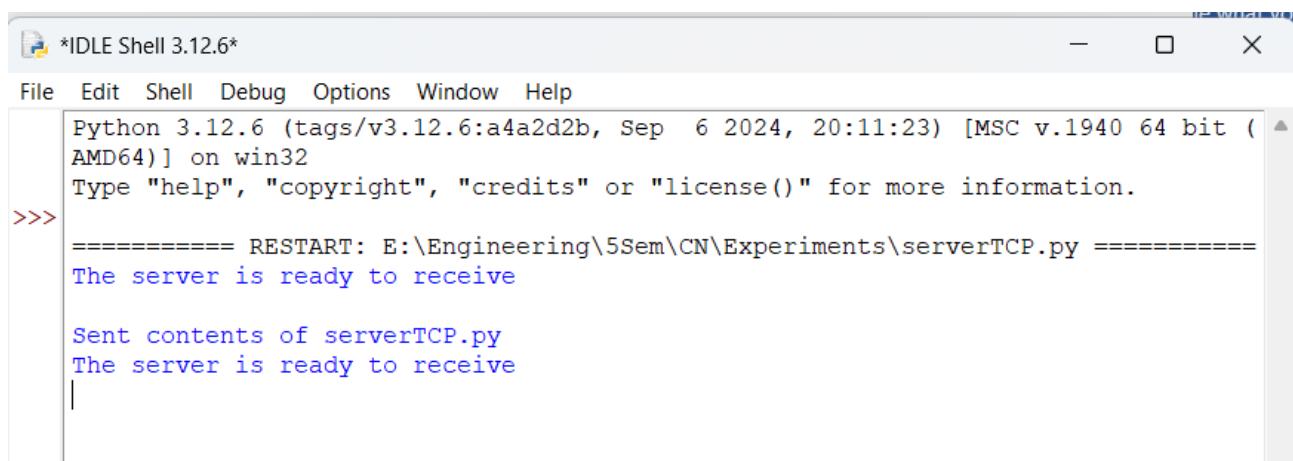
from socket import *
serverName="127.0.0.1"
serverPort = 12000
serverSocket = socket(AF_INET,SOCK_STREAM)
serverSocket.bind((serverName,serverPort))
serverSocket.listen(1)
while 1:
    print ("The server is ready to receive")
    connectionSocket, addr = serverSocket.accept()
    sentence = connectionSocket.recv(1024).decode()

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

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

>>>
```

Server



```
*IDLE Shell 3.12.6*
File Edit Shell Debug Options Window Help
Python 3.12.6 (tags/v3.12.6:a4a2d2b, Sep 6 2024, 20:11:23) [MSC v.1940 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.

>>> ===== RESTART: E:\Engineering\5Sem\CN\Experiments\serverTCP.py =====
The server is ready to receive

Sent contents of serverTCP.py
The server is ready to receive
```

iv. Observation

Qn Using TCP/IP sockets, write a client -server programs to make client sending the filename to the server to send back the contents of requested file if present.

→ Client TCP.py:

```
from socket import *
serverName = '127.0.0.1'
serverPort = 12000
clientSocket = socket(AF_INET, SOCK_STREAM)
clientSocket.connect((serverName, serverPort))
sentence = input("Enter file name")
filecontents = clientSocket.recv(1024).decode()
print("From Server\n")
print(filecontents)
clientSocket.close()
```

→ Server TCP.py

```
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("Server is ready")
cs, addr = serverSocket.accept()
sen = cs.recv(1024).decode()
file = open(sen, "r")
f = file.read(1024)
print("Sent contents of "+sen)
file.close()
cs.close()
```

Output: The Server is ready to receive
Sent contents of ServerTCP.py
The Server is ready to receive

Program 4

- i. 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.

- ii. Procedure

clientUDP.py

```
from socket import *
serverName = "127.0.0.1"
serverPort = 12000
clientSocket = socket(AF_INET, SOCK_DGRAM)

sentence = input("\nEnter file name: ")

clientSocket.sendto(bytes(sentence,"utf-8"),(serverName, serverPort))

filecontents,serverAddress = clientSocket.recvfrom(2048)
print ('\nReply from Server:\n')
print (filecontents.decode("utf-8"))
# for i in filecontents:
#     print(str(i), end = "")
clientSocket.close()
clientSocket.close()
```

serverUDP.py

```
from socket import *
serverPort = 12000
serverSocket = socket(AF_INET, SOCK_DGRAM)
serverSocket.bind(("127.0.0.1", serverPort))
print ("The server is ready to receive")
while 1:
    sentence, clientAddress = serverSocket.recvfrom(2048)
    sentence = sentence.decode("utf-8")
    file=open(sentence,"r")
    con=file.read(2048)
```

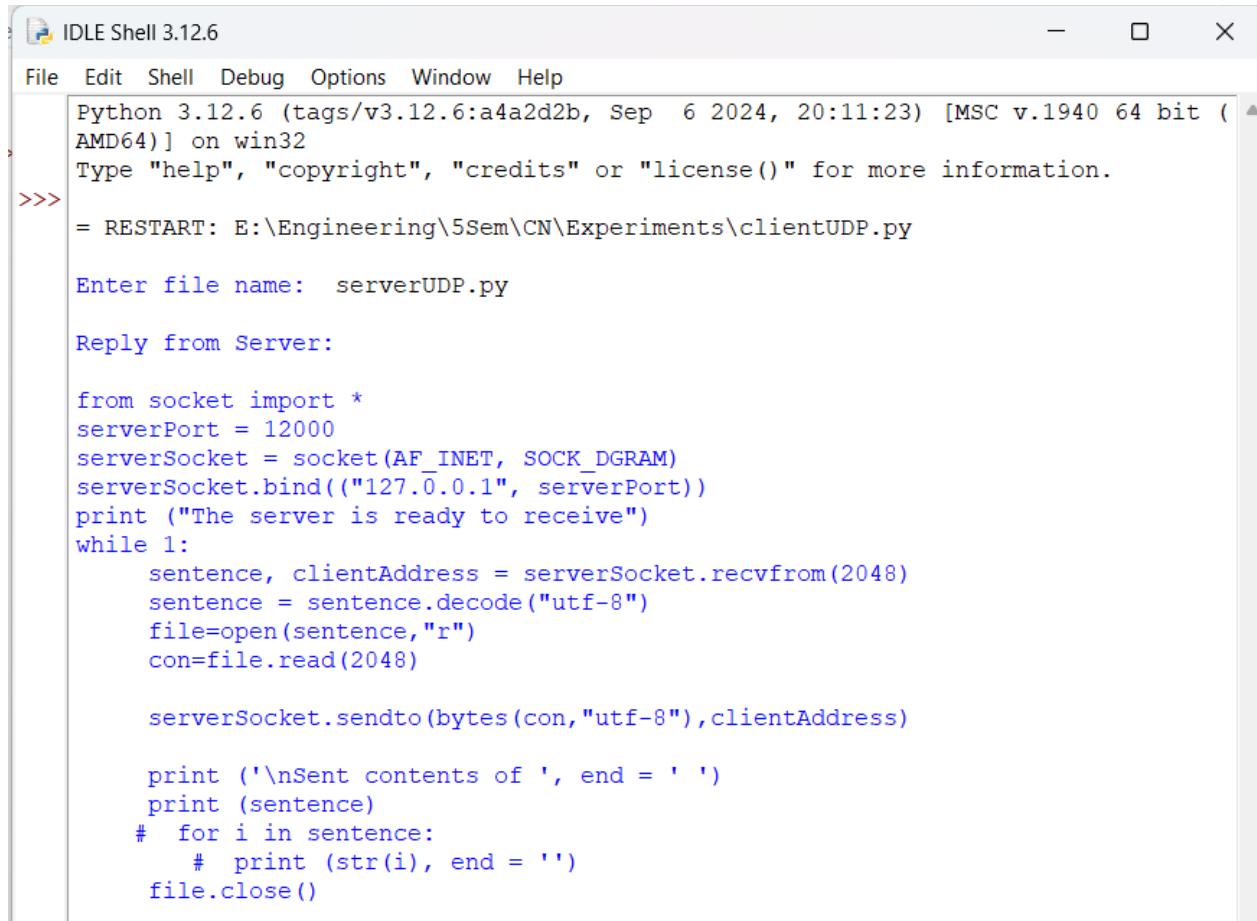
```
serverSocket.sendto(bytes(con,"utf-8"),clientAddress)
```

```
print ('\nSent contents of ', end = ' ')
print (sentence)
# for i in sentence:
```

```
# print (str(i), end = '')
file.close()
```

iii. Screen shots/ output

Client



```
IDLE Shell 3.12.6
File Edit Shell Debug Options Window Help
Python 3.12.6 (tags/v3.12.6:a4a2d2b, Sep  6 2024, 20:11:23) [MSC v.1940 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: E:\Engineering\5Sem\CN\Experiments\clientUDP.py

Enter file name:  serverUDP.py

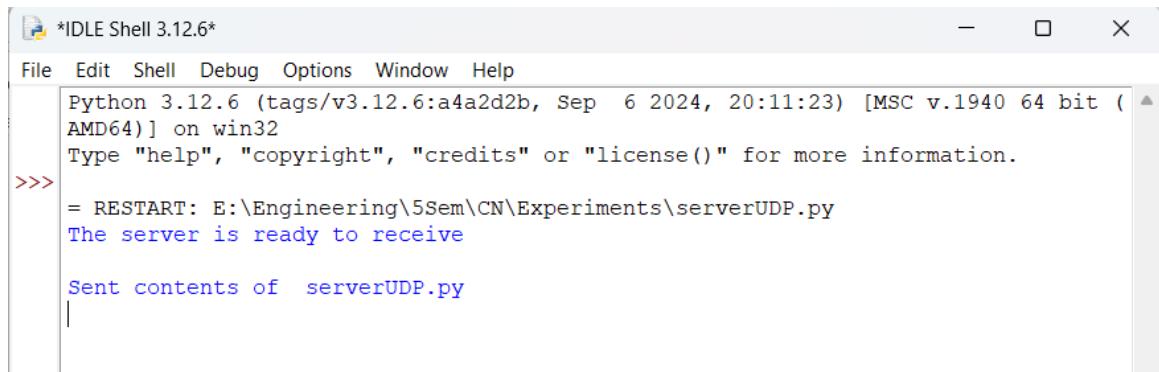
Reply from Server:

from socket import *
serverPort = 12000
serverSocket = socket(AF_INET, SOCK_DGRAM)
serverSocket.bind(("127.0.0.1", serverPort))
print ("The server is ready to receive")
while 1:
    sentence, clientAddress = serverSocket.recvfrom(2048)
    sentence = sentence.decode("utf-8")
    file=open(sentence,"r")
    con=file.read(2048)

    serverSocket.sendto(bytes(con,"utf-8"),clientAddress)

    print ('\nSent contents of ', end = ' ')
    print (sentence)
#   for i in sentence:
#       print (str(i), end = '')
    file.close()
```

Server



```
*IDLE Shell 3.12.6*
File Edit Shell Debug Options Window Help
Python 3.12.6 (tags/v3.12.6:a4a2d2b, Sep  6 2024, 20:11:23) [MSC v.1940 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: E:\Engineering\5Sem\CN\Experiments\serverUDP.py
The server is ready to receive

Sent contents of  serverUDP.py
```

iv. Observation

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

→ ClientUdp.py

```
from socket import *
```

```
SN = "127.0.0.1"
```

```
SP = 12000
```

```
CS = socket (AF_INET, SOCK_DGRAM)
```

```
Sentence = input ("Enter filename")
```

```
CS.sendto (bytes (Sentence, "utf-8"), (SN, SP))
```

```
filecontents, ServerAdd = CS.recvfrom (2048)
```

```
print ("Reply from Server")
```

```
print (f'C. decode("utf-8"))
```

```
CS.close()
```

```
CS.close()
```

→ ServerUdp.py

~~from socket import *~~~~SP = 12000~~~~SS = socket (AF_INET, SOCK_DGRAM)~~~~SS.bind (("127.0.0.1", SP))~~~~print ("Ready")~~~~while 1:~~~~SEN, CA = SS.recvfrom (2048)~~~~SEN = S. decode ("utf-8")~~~~file = open (SEN, "r")~~~~CON = file.read (2048)~~~~SS.sendto (bytes (CON, "utf-8"), CA)~~~~print ('In Sent Contents of ', end = '')~~~~print (SEN)~~~~file.close ()~~

→ Output :- The server is ready to receive

Sent. Contents of Server Udp.py

The server is ready to receive