

**VISVESVARAYA TECHNOLOGICAL
UNIVERSITY**

“JnanaSangama”, Belgaum -590014, Karnataka.



LAB REPORT

on

COMPUTER NETWORKS (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
Sep-2024 to Jan-2025

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 **Raghavendra N (1BM22CS213)**, 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.

Surabhi S Assistant Professor Department of CSE, BMSCE	Dr. Kavitha Sooda Professor & HOD Department of CSE, BMSCE
--	--

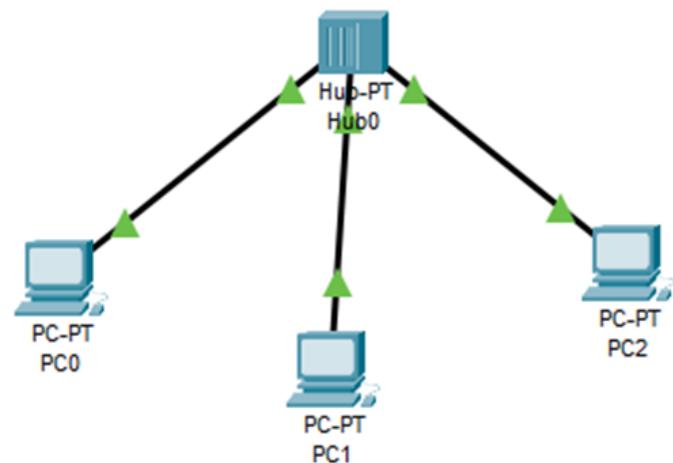
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Lab 1

Hub and Switch Experiment

Hub behaviour



Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
<input checked="" type="radio"/>	Successful	PC0	PC1	ICMP	 	0.000	N	0	(edit)	

Ping message

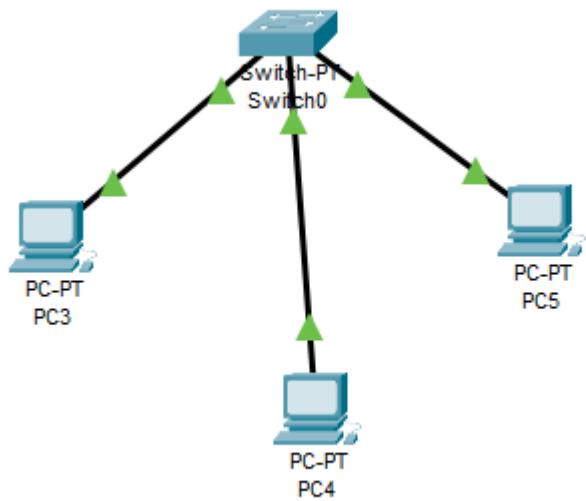
```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Switch Behaviour



Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
<input checked="" type="checkbox"/>	Successful	PC3	PC5	ICMP	 	0.000	N	0	(edit)	

Ping message

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.5

Pinging 10.0.0.5 with 32 bytes of data:

Reply from 10.0.0.5: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Observation

WEEK - 01 >

26/09/2024
Bafna Gold
Date: _____ Page: _____

Create a topology and simulate sending a simple PDU from source to destination using hub and switch as connecting devices and demonstrate Ping message.

```

graph LR
    S[switch] --- PC0[PC 0]
    S --- PC1[PC 1]
    subgraph IP_Cfg [IP configuration]
        PC0
        PC1
    end
    
```

Command Prompt

→ ipconfig.	→ ip config.
→ ipconfig/all	→ ipconfig /all
→ ping 20.20.20.2	→ Ping 20.20.20.1

② =>

```

graph TD
    Server[Server] --- S[switch]
    S --- PC0[PC 0]
    S --- PC1[PC 1]
    
```

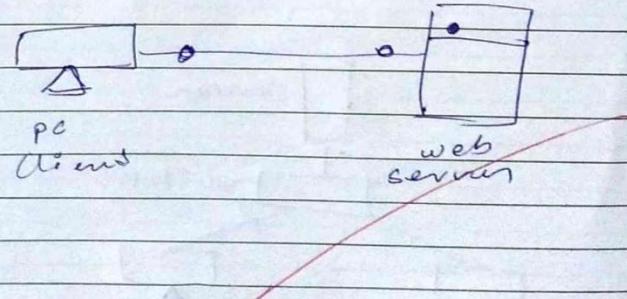
Server → Switch → DSCP → Server or
 → Default Gateway : 20.20.20.1
 → DNS Server: 0.0.0.0
 → Start IP address. 1172 | 6 | 168 | 10 | 0
 → Subnet Mask :

Creating first network

- (1) add devices:- Generic PC & Generic Server
- (2) connect devices and see whether lights are green
(or) red using copper cross-over and.
Copper straight-through cable.
- (3) configure PC → change IP address 192.168.0.140
change DNS server 192.168.0.105
- (4) configure Server → change name to Web Server
set IP address to 192.168.0.105

II Sending simple test message in Read the note

- (1) open the previous file
- (2) Add simple PDU to send ping to the server
- (3) Toggle the PDU List window to view the message
- (4) Label the scenario
- (5) Create a new scenario
- (6) Manage scenarios (Delete)



LAB- 02

3/10/2024

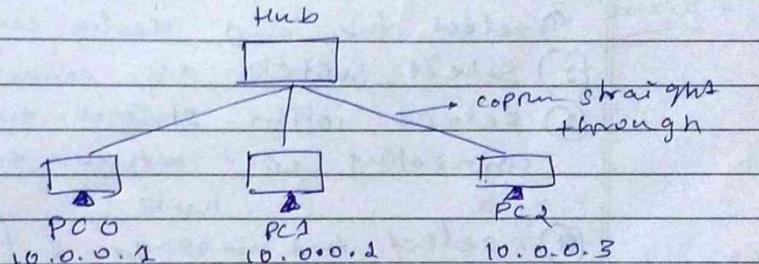
Buflna Gold
Date: _____
Page: _____

Title :- packed traces using hub and switch topology

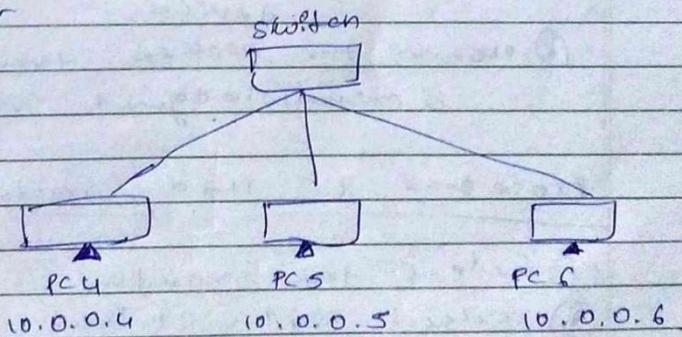
Aim :- Create a topology and simulate sending a simple PDU from source to destination using hub and switch as connecting devices and demonstrate ping message.

Topology :-

Hub :-



switch :-



Hub :-

procedure :-

- (1) Select the end device and change their IP address suitably
- (2) Select hub as connecting devices
- (3) select copper-straight-through as the connecting wire b/w end devices & hubs

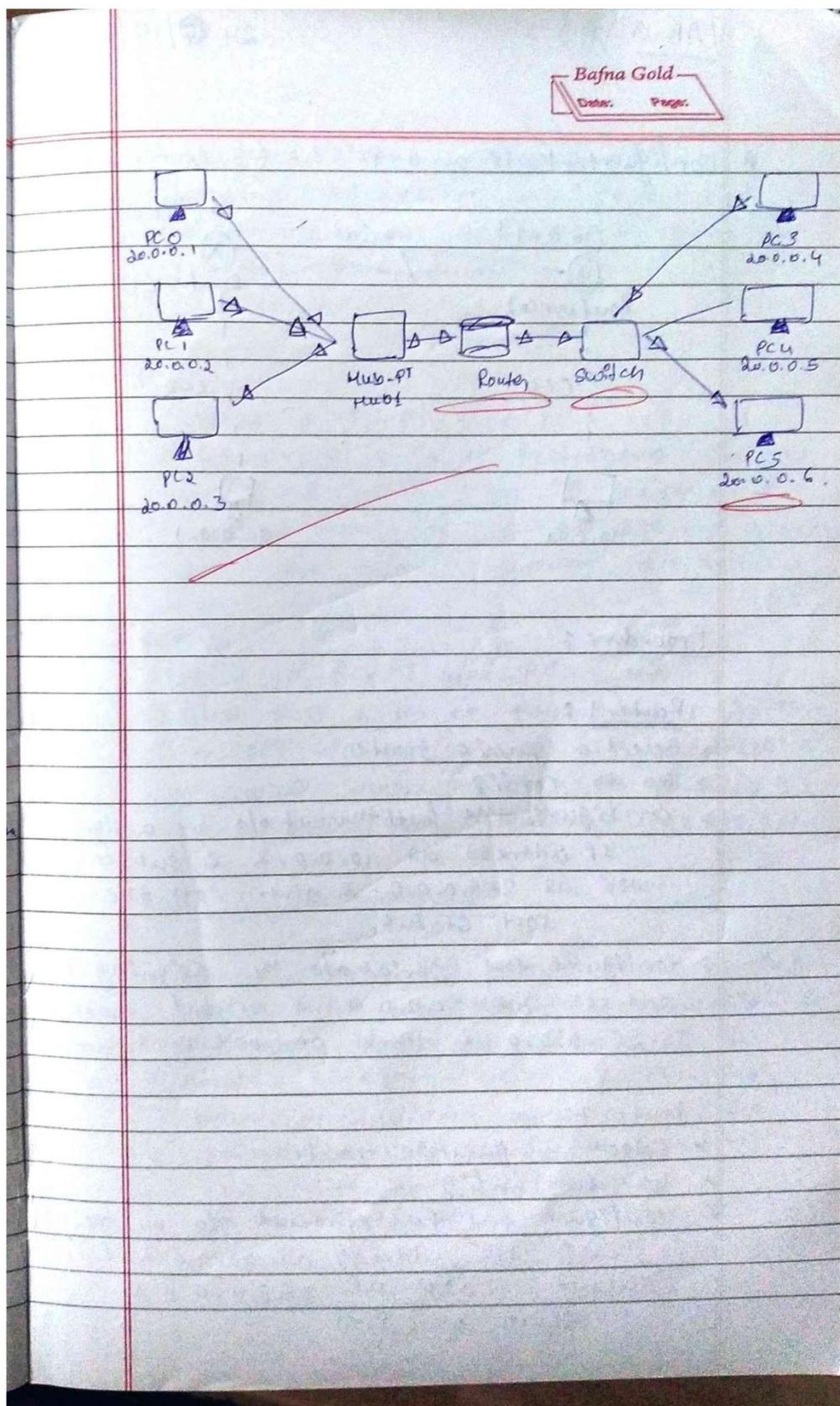
- (4) Connect the last terminal to hub port
- (5) select the message & first click on source device and destination device
- (6) observe over the packet transmission and acknowledgement receiving procedure

Procedure for switch

- (1) select the end device change IP config
- (2) Select switch as connecting device
- (3) select copper straight through as the connecting wire between end devices & hub
- (4) select the message & first click on source device and then destination device.
- (5) observe the packet transmission and acknowledgement receiving procedure

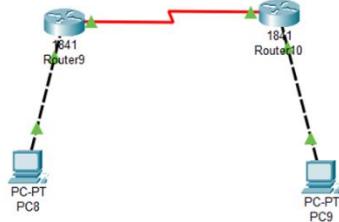
Procedure to add router :-

- (1) Select the router
- (2) select copper straight
- (3) set the ip configuration
- (4) send message hub pc to switch pc.
- (5) observe the packet transmission and acknowledgement receiving procedure



Lab 2

Static routing experiment



Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
Successful		PC8	PC9	ICMP	orange	0.000	N	0	(edit)	

Router0 configuration

```
Router9
Physical Config CLI Attributes
IOS Command Line Interface
for management of the system, extended setup will ask you
to configure each interface on the system
Would you like to enter basic management setup? [yes/no]:
Press RETURN to get started!

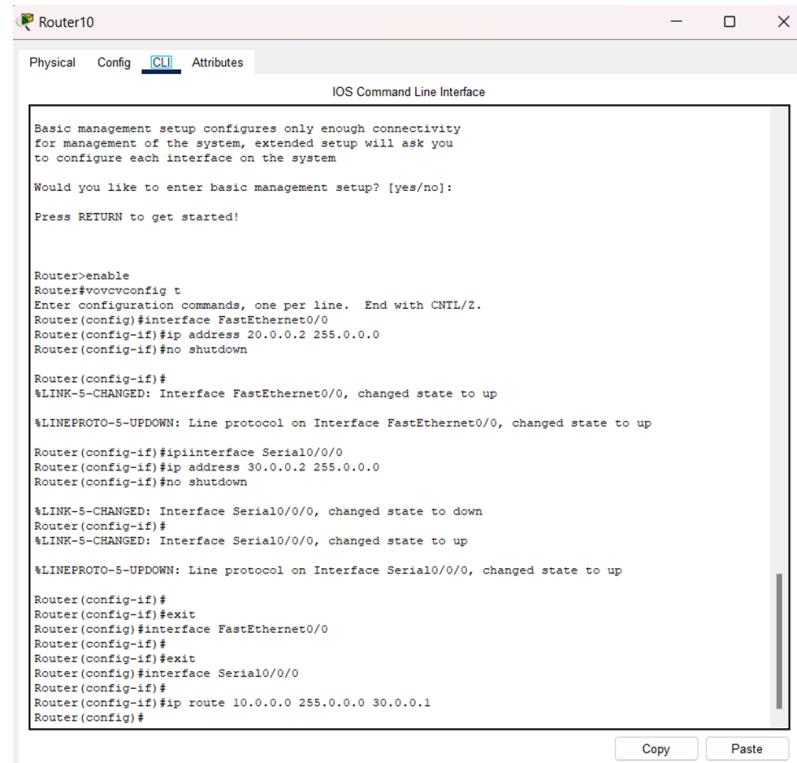
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 10.0.0.2 255.0.0.0
Router(config-if)#no shutdown

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

Router(config-if)#interface Serial0/0
%Invalid interface type and number
Router(config)#interface Serial0/0/0
Router(config-if)#ip address 30.0.0.1
% Incomplete command.
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

Router(config-if)#ip route 20.0.0.0 255.0.0.0 30.0.0.2
Router(config)#
Copy Paste
```

Router1 configuration



The screenshot shows a window titled "Router1" with the "CLI" tab selected. The window title bar includes "Physical", "Config", "CLI", and "Attributes". Below the title bar is a menu bar with "IOS Command Line Interface". The main area displays the following configuration commands:

```
Basic management setup configures only enough connectivity
for management of the system, extended setup will ask you
to configure each interface on the system

Would you like to enter basic management setup? [yes/no]:  
Press RETURN to get started!

Router>enable
Router#vovcconfig t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
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 FastEthernet0/0, changed state to up

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

Router(config-if)#ipinterface Serial0/0/0
Router(config-if)#ip address 30.0.0.2 255.0.0.0
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

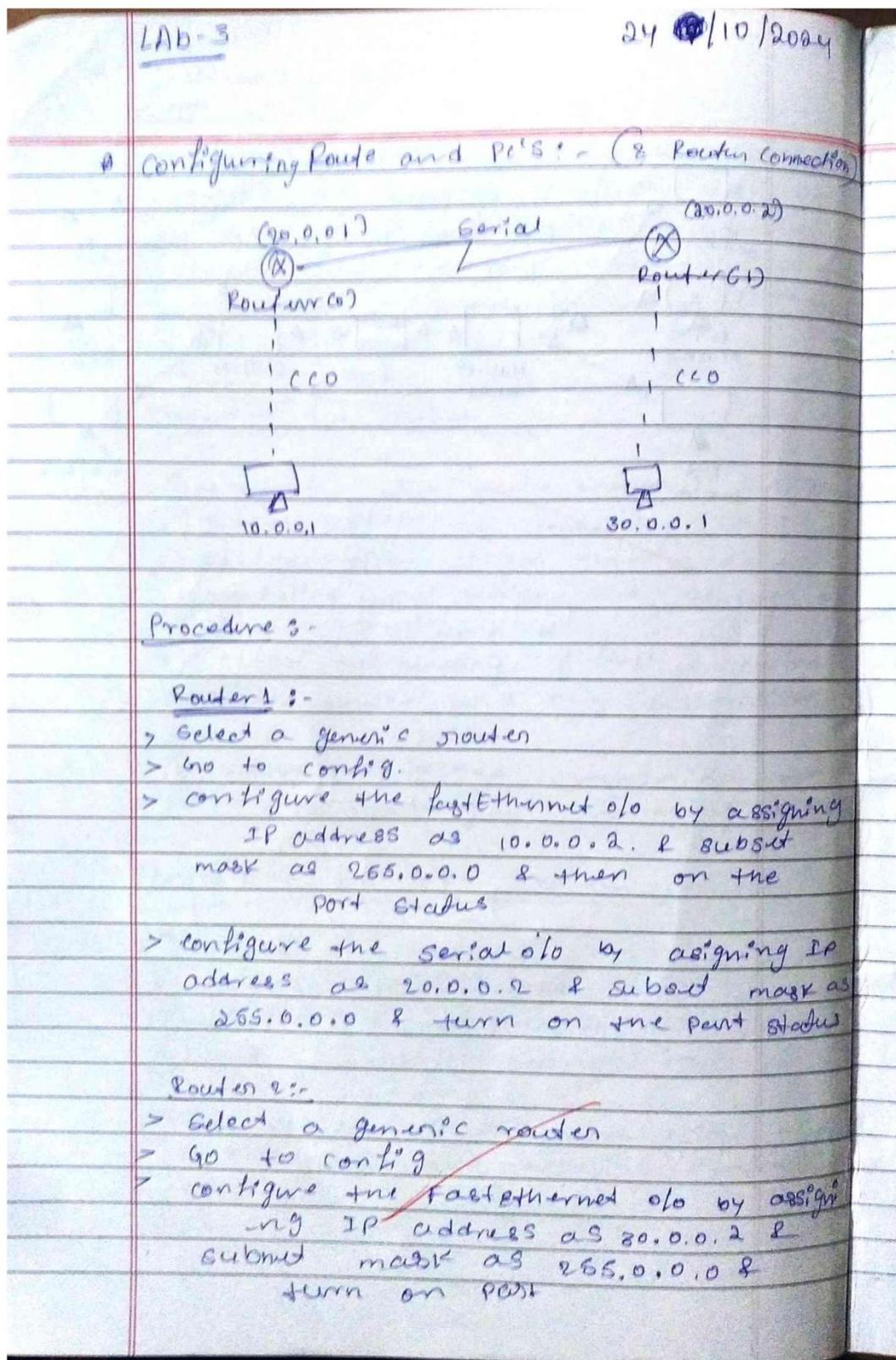
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#ipinterface Serial0/0/0
Router(config-if)#
Router(config-if)#ip route 10.0.0.0 255.0.0.0 30.0.0.1
Router(config)#

```

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

Observation



> Configure the Serial 0/0 by assigning IP address as 30.0.0.2 & subnet mask as 255.0.0.0 & turn on the Port Study

PCA :-

Select a PC-PT type PC

Select PCA & go to Fastethernet 0 in the config & assign on IP address & subnet mask for PCA as 255.0.0.0 set the default gateway as 20.0.0.2

PCB :-

Select a PC-PT type PC

Select PCB & go to Fastethernet 0 in the config & assign on IP address & subnet mask for PCB as 255.0.0.0 set the default gateway 192.168.2.1

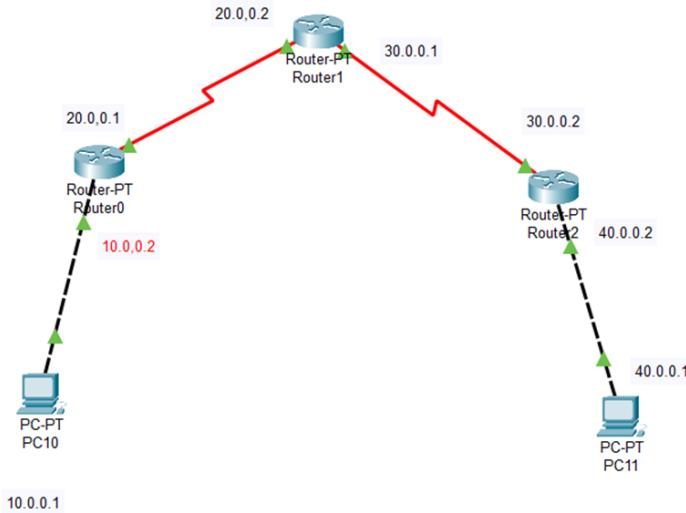
Making connections :-

Connect the PCA to Router 1 using the copper cross over connection & similarly for connecting PCB & Router 2 again using copper cross over connection. and the for connecting Router 1 & Router 2 we used the connection

~~serial DCE + O connect~~

Lab 3

Dynamic routing experiment



Router0 configuration

```
Router0
Physical Config CLI Attributes
IOS Command Line Interface
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#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 10.0.0.2 255.0.0.0
Router(config-if)#no shutdown

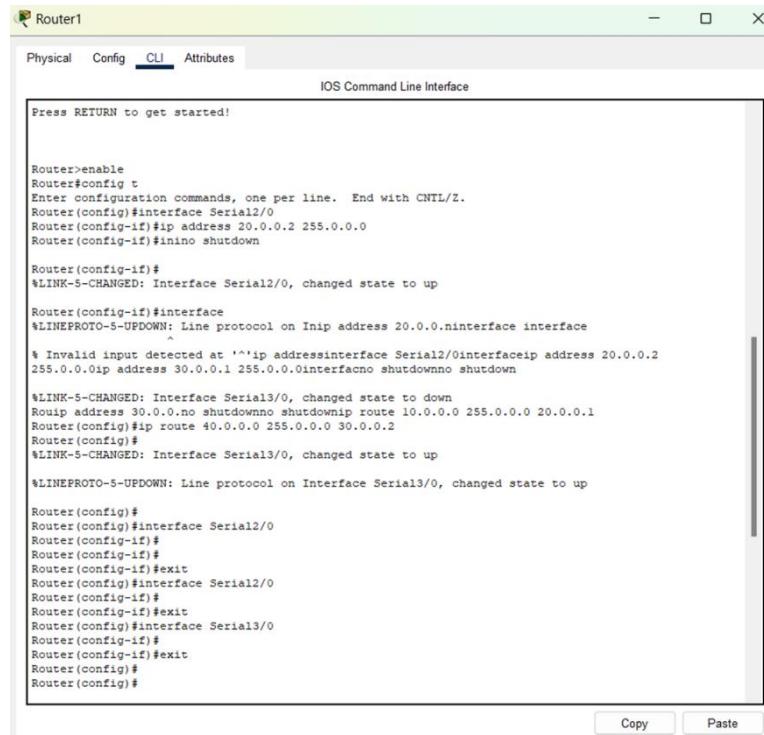
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
Router(config-if)#
%SIS-5-CONFIG_I: Configured from console by console

Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial2/0
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)#ip route 40.0.0.0 255.0.0.0 20.0.0.2
Router(config)#

```

Router1 configuration



Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial2/0
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)#interface
%LINEPROTO-5-UPDOWN: Line protocol on Inip address 20.0.0.2interface interface
^
% Invalid input detected at '^'ip addressinterface Serial2/0interfaceip address 20.0.0.2
255.0.0.0ip address 30.0.0.1 255.0.0.0interfacefacno shutdownno shutdown

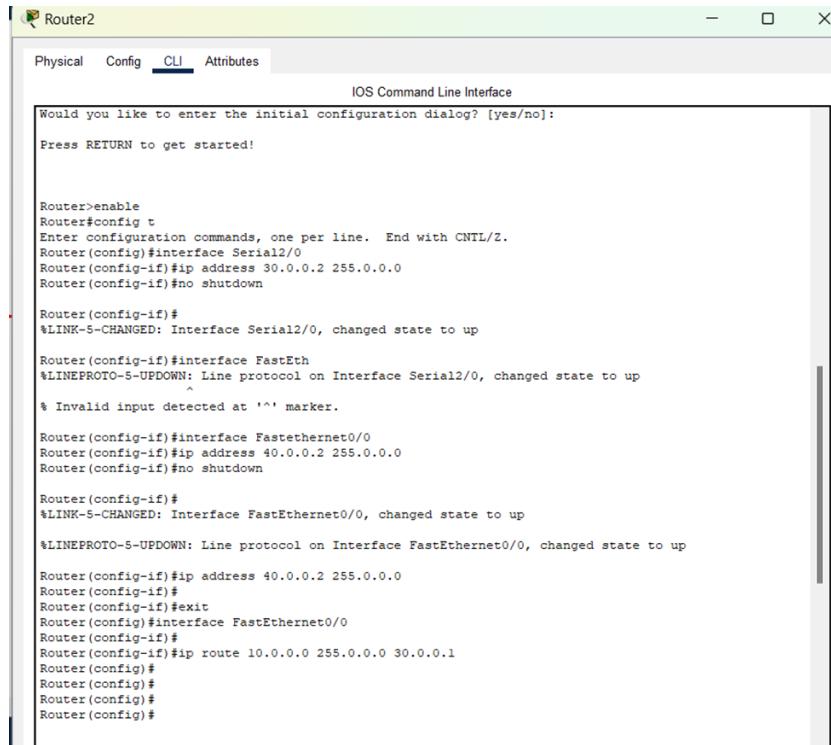
%LINK-5-CHANGED: Interface Serial3/0, changed state to down
Rouip address 30.0.0.no shutdownno shutdownip route 10.0.0.0 255.0.0.0 20.0.0.1
Router(config)#ip route 40.0.0.0 255.0.0.0 30.0.0.2
Router(config)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

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

Router(config)#
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
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)#
Router(config)#

Copy Paste

Router2 configuration



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 Serial2/0
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

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

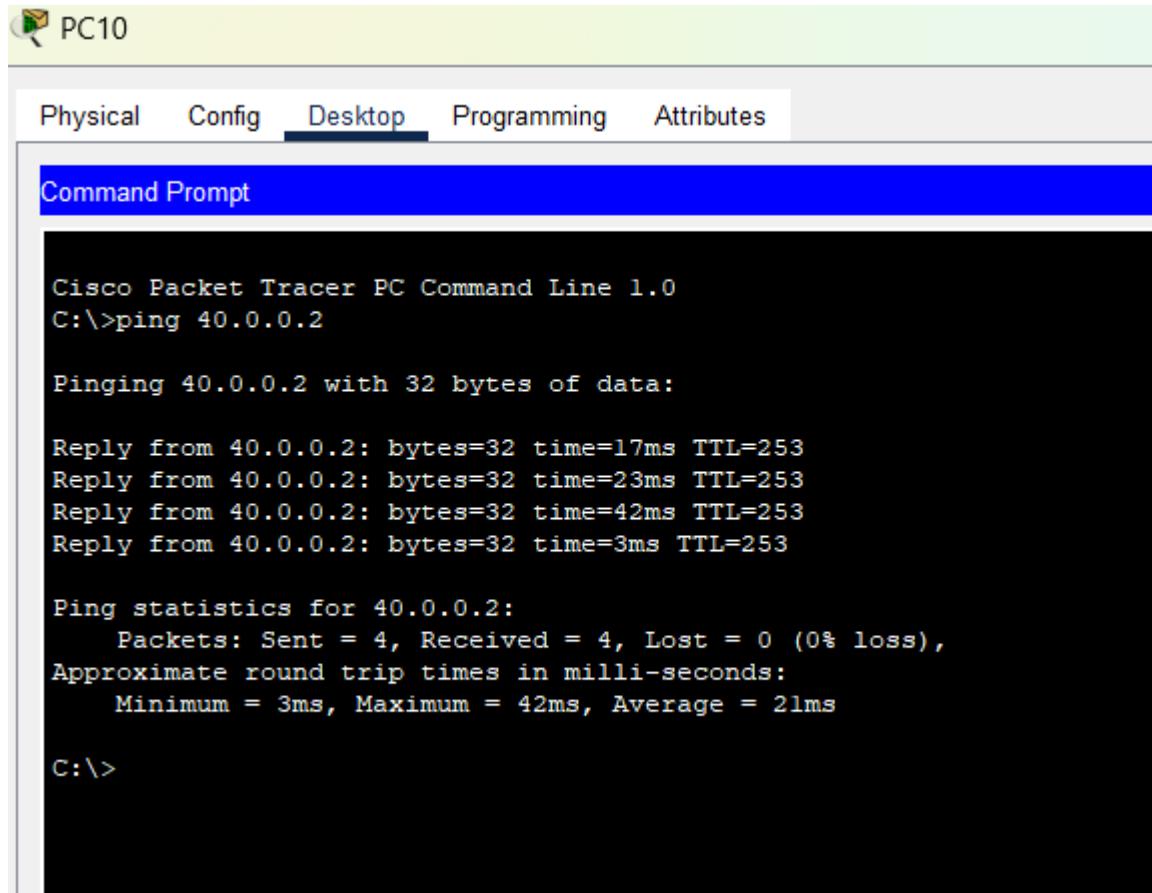
Router(config-if)#interface Fastethernet0/0
Router(config-if)#ip address 40.0.0.2 255.0.0.0
Router(config-if)#no shutdown

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

Router(config-if)#ip address 40.0.0.2 255.0.0.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#ip route 10.0.0.0 255.0.0.0 30.0.0.1
Router(config)#
Router(config)#
Router(config)#
Router(config)#

Pinging:



The screenshot shows the Cisco Packet Tracer PC Command Line interface. The title bar says "PC10". Below it is a menu bar with tabs: Physical, Config, Desktop, Programming, and Attributes. The "Desktop" tab is currently selected, indicated by a blue underline. Below the menu is a blue header bar with the text "Command Prompt". The main window area contains the following text output from a ping command:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 40.0.0.2

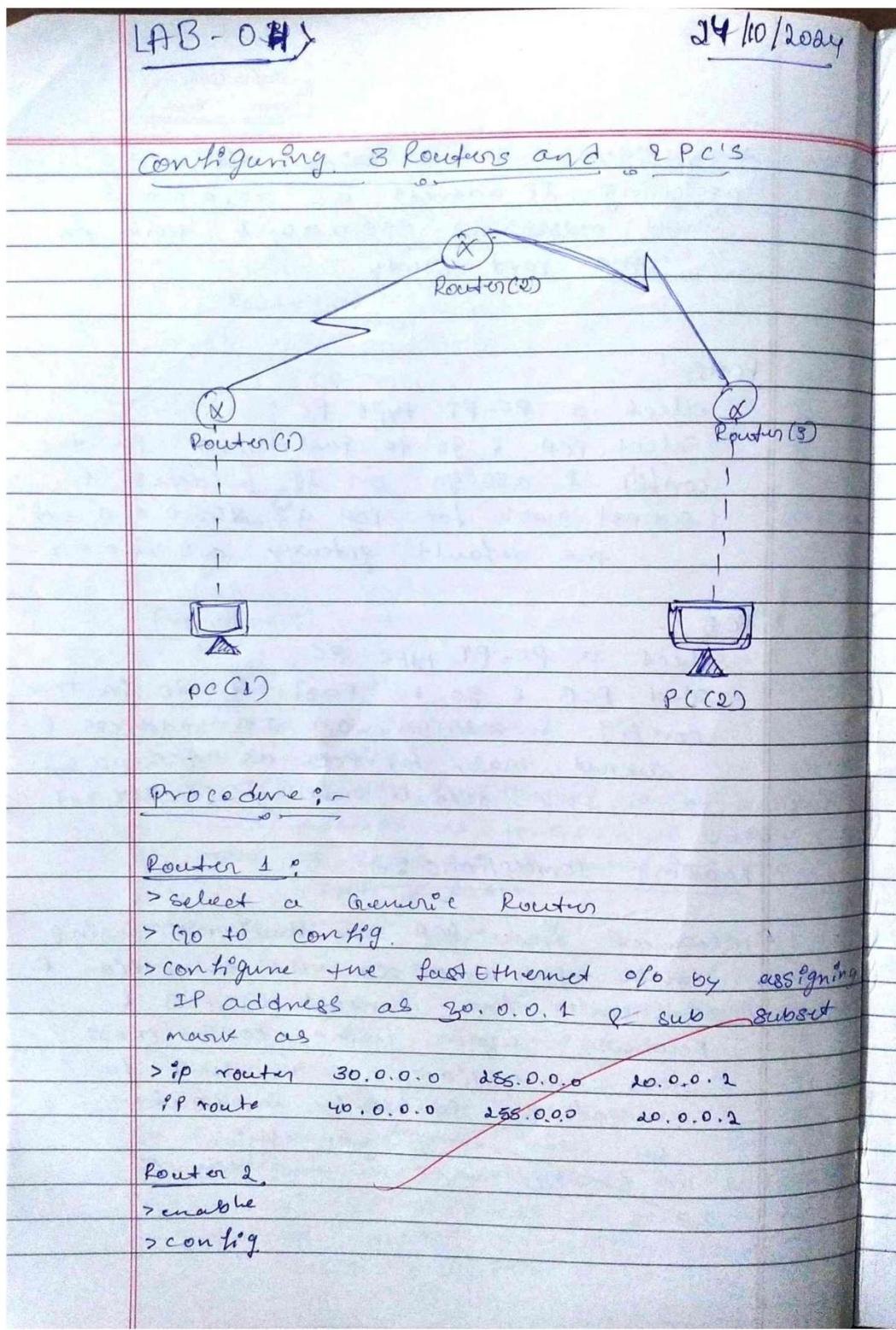
Pinging 40.0.0.2 with 32 bytes of data:

Reply from 40.0.0.2: bytes=32 time=17ms TTL=253
Reply from 40.0.0.2: bytes=32 time=23ms TTL=253
Reply from 40.0.0.2: bytes=32 time=42ms TTL=253
Reply from 40.0.0.2: bytes=32 time=3ms TTL=253

Ping statistics for 40.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 3ms, Maximum = 42ms, Average = 21ms

C:\>
```

Observation



interface serial 0/0

ip route 10.0.0.0 255.0.0.1 20.0.0.1

> interface .

Router 3:-

> select a generic router

> go to config

> configure the fast ethernet 0/1

by assigning mask as 255.0.0.0 & turn on port

> configure the serial 0/1 by assigning mask as 10.0.0.1 & 10.0.0.2 & subnet mask as 255.0.0.0 & 255.0.0.0 respectively & turn on the port status

PC C1 :-

> select a PC-PT type PC

> select PC1 & go to fast ethernet 0 in the config & assign an IP address 20.0.0.1 & subnet mask for PC1 as 255.0.0.0 set the default gateway as 20.0.0.1

PC(2) :-

> select a PC-PT type PC

> select PC2 & go to fast ethernet 1 in the config & assign an IP address 20.0.0.2 & subnet mask for PC2 as 255.0.0.0 set the default gateway as 20.0.0.1

CLI :- Router1

show ip route

enable

config

interface serial 0/0
ip route 20.0.0.0 255.0.0.0 20.0.0.2
ip route 20.0.0.0 255.0.0.0 20.0.0.2

CLI :- Router 2

enable

config +

interface serial 0/0

ip route 10.0.0.0 255.0.0.0 20.0.0.1

exit

interface serial 0/0

ip route 20.0.0.0 255.0.0.0 20.0.0.2

exit .

Router 3 :-

enable

config +

interface serial 0/0

ip route 20.0.0.0 255.0.0.0 30.0.0.1

ip route 10.0.0.0 255.0.0.0 30.0.0.1

exit

Promt & PCN :-

-pinging 20.0.0.1 with 32 bytes of each
Request time out

Replay from 20.0.0.1 = bytes = 52

time = 12ms TTL = 126

Replay from 20.0.0.1 = bytes = 82

time = 12ms TTL = 126

Replay from 20.0.0.1 = bytes = 32

time = 1ms TTL = 126

Ping statistics for 20.0.0.1

packets : sent=4, received=3, lost=1
(25% loss),

approx round trip time in ms min: 1ms,
max: 18ms, Avg: 8ms.

→ Observations:-

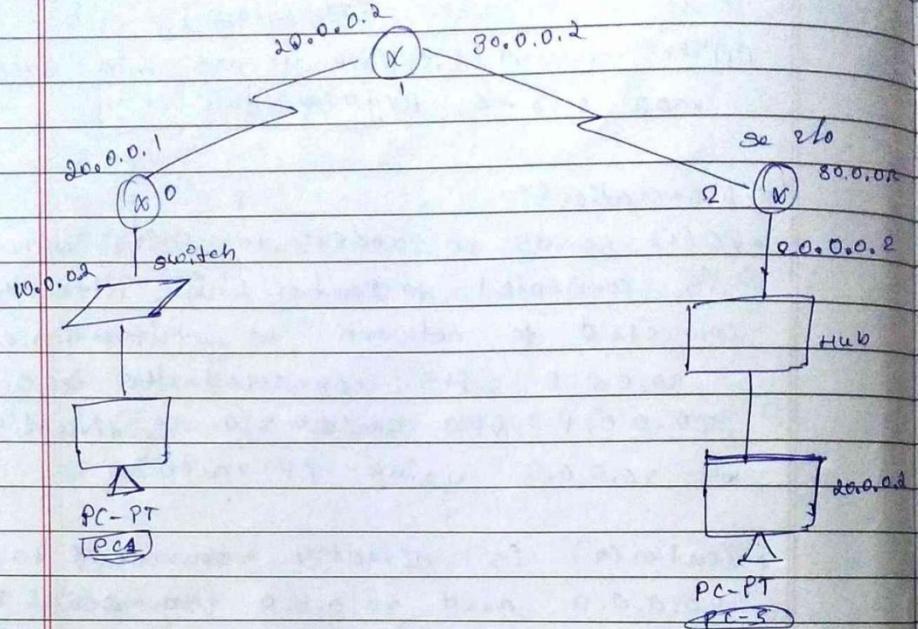
• PC(1) sends 40 packets to PC(2) where
is connected to Router 1 is, directly
connected to network to network 10.0.0.0 &
20.0.0.0 it's connected to 30.0.0.0 &
20.0.0.1 via serial 2/0 indirectly
by 20.0.0.2 using IP route.

• Router(2) is directly connected to
20.0.0.0 and 30.0.0.0 via serial 2/6
through 20.0.0.1 & 20.0.0.0, through
30.0.0.2 using IP route.

Router(3) is directly connected to 10.0.0.0
and 20.0.0.0 network through 30.0.0.1
using IP route.

Now PC(1) can send to PC(2) successfully

Configuring 3 routers & Default Y :-



Procedure :-

Take 2 PC : PC1 \Rightarrow IP address 10.0.0.1

PC2 \Rightarrow IP address 20.0.0.2

1 switch, 1 hub, 3 route to config.

Take router 1 \Rightarrow Fa 0/0 \Rightarrow 10.0.0.2

Se 2/0 \Rightarrow 20.0.0.1

router 1 \rightarrow Se 2/0 \Rightarrow 20.0.0.2

Se 3/0 \Rightarrow 30.0.0.1

router 2 \rightarrow Se 2/0 \Rightarrow 30.0.0.2

Fa 0/0 \Rightarrow 20.0.0.1

& add gate address to PC1 & PC2 as

10.0.0.2 & 20.0.0.1

Router 1 \Rightarrow IP route 0.0.0.0 . 0.0.0.0 20.0.0.1

IP route 0.0.0.0 , 0.0.0.0 30.0.0.2

Router 2 \Rightarrow IP route 0.0.0.0 0.0.0.0 30.0.0.1

Router 0 \Rightarrow IP route 0.0.0.0 , 0.0.0.0 , 20.0.0.2

\rightarrow Go to cmd of PC II

Ping 20.0.0.2. with 32 bytes of data

Reply from 20.0.0.1 bytes = 32 time = 2ms TTL = 125

Reply from 20.0.0.1 bytes = 32 time = 2ms TTL = 125

Reply from 20.0.0.1 bytes = 32 time = 2ms TTL = 125

Reply from 20.0.0.1 bytes = 32 time = 2ms TTL = 125

Ping statistics for 20.0.0.2:

Packets: Sent = 4, Received = 4, Lost = 0

Approx round trip time in milli sec:

min = 2ms, max = 11ms Avg = 5

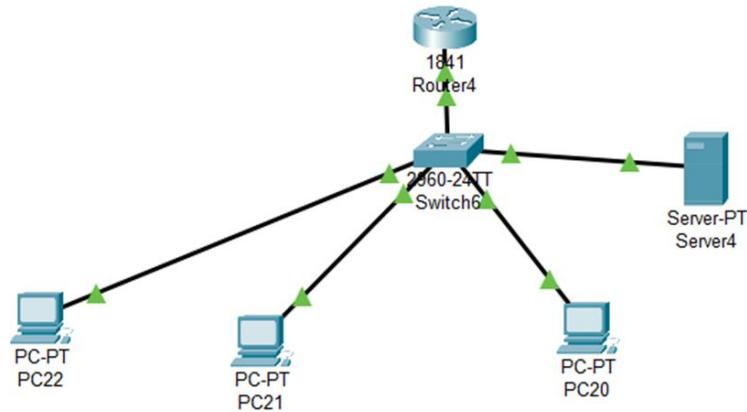
\rightarrow Observations:-

In the static route method we have to route the packets using network address.

Q3
14-11

Lab 4

DHCP LAN within and outside a network



DHCP Configuration

Server4

Physical Config Services Desktop Programming Attributes

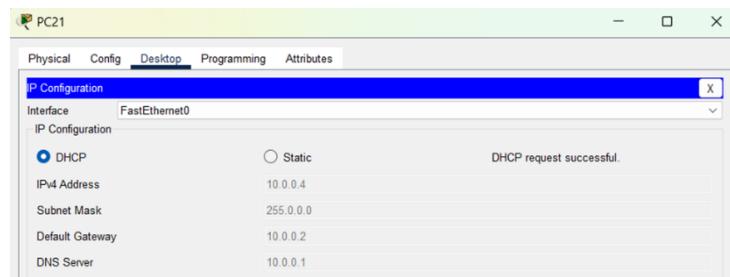
SERVICES

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

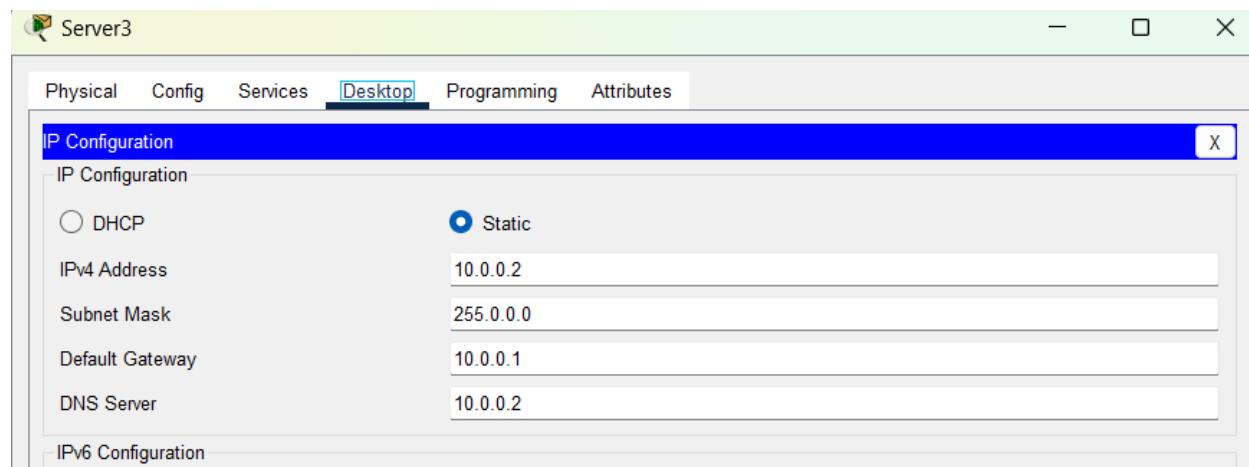
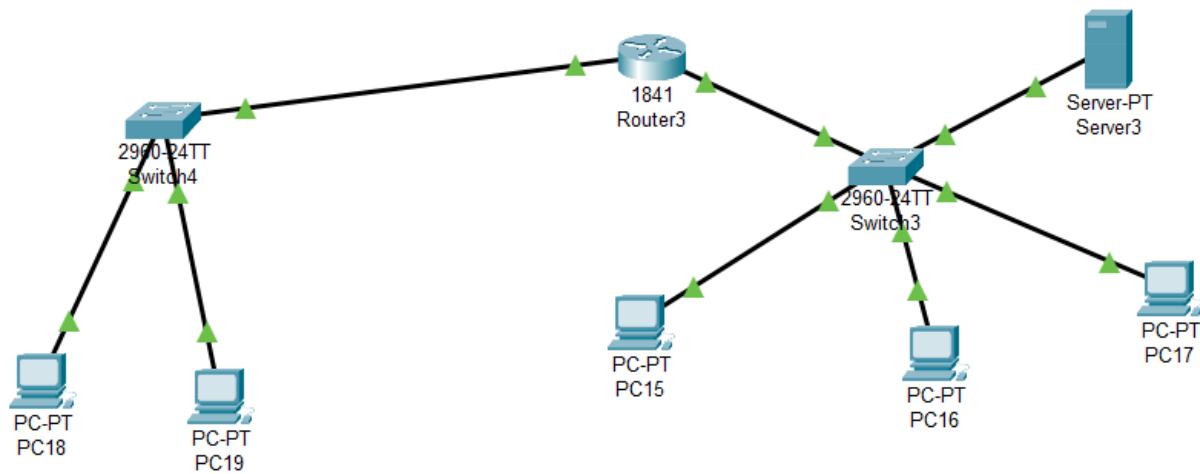
DHCP

Interface	FastEthernet0	Service	<input checked="" type="radio"/> On	<input type="radio"/> Off			
Pool Name	serverPool						
Default Gateway	10.0.0.2						
DNS Server	10.0.0.1						
Start IP Address :	10	0	0	0			
Subnet Mask:	255	0	0	0			
Maximum Number of Users :	512						
TFTP Server:	10.0.0.1						
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	10.0.0.2	10.0.0.1	10.0.0.0	255.0.0.0	512	10.0.0.1	0.0.0.0

PC settings



DHCP outside Network:



Router3

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Press RETURN to get started.

Press RETURN to get started!

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/1
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#

Copy Paste
```

Router3

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Press RETURN to get started.

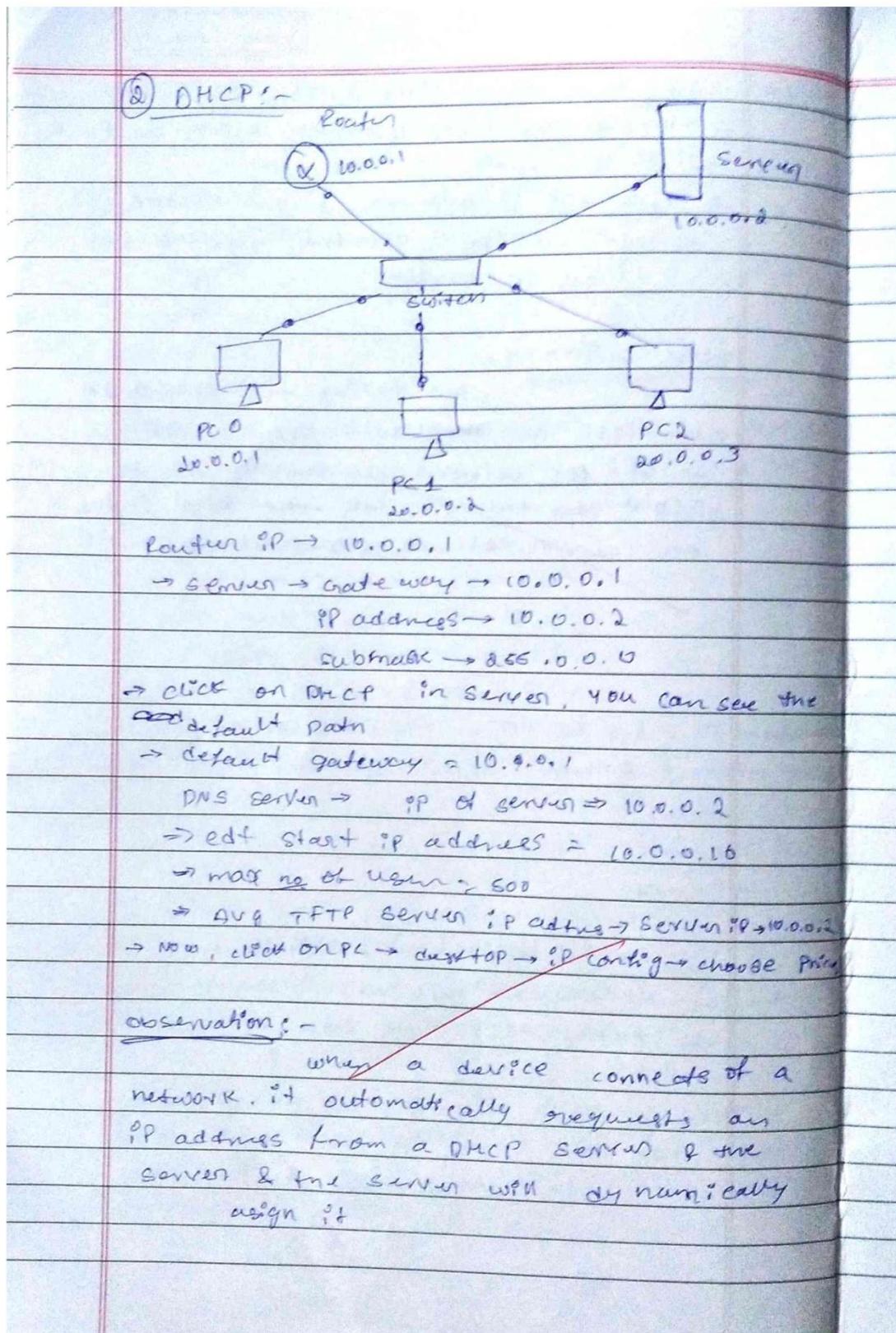
Press RETURN to get started!

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/1
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

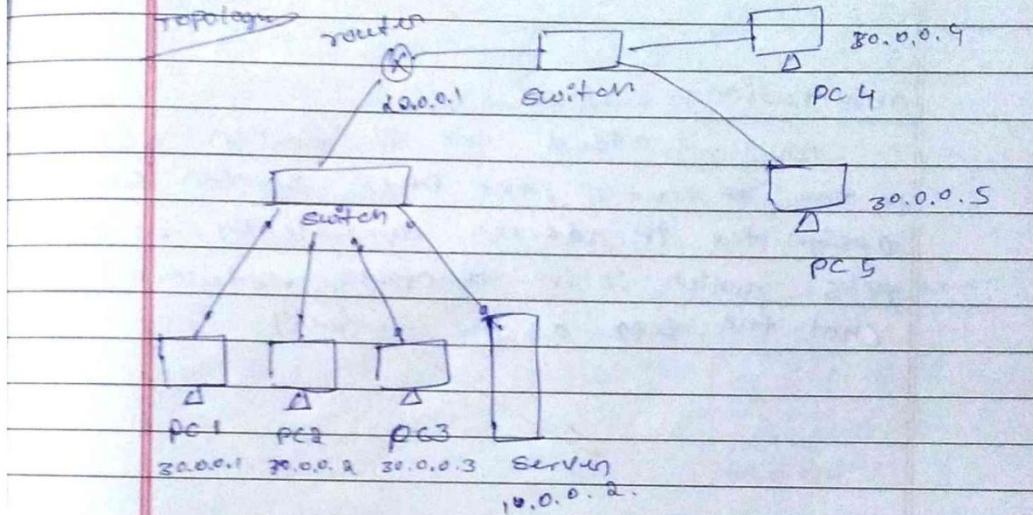
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#interface FastEthernet0/1
Router(config-if)#ip helper-address 10.0.0.2
Router(config-if)#exit
Router(config)#

Copy Paste
```

Observation



④ Aim: To get IP from DHCP that is present in same other network using IP helper address



for Router

interface fastethernet 0/1

IP address 20.0.0.1 , 255.0.0.0

no shutdown

exit

click server → config → DHCP

add pool 20 network

default gateway → 20.0.0.1

DNS server → 10.0.0.2

~~IP address :- 20.0.0.10~~

Subnet mask → 255.0.0.0

no. of user → 560

TFTP server → 10.0.0.2

to connect to outer LAN

Router # interface fastethernet 0/1

IP helper → address 20.0.0.2

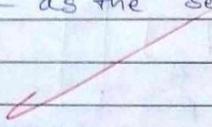
exit

CPU on PC \rightarrow Router \rightarrow IP config

Analog DHCP

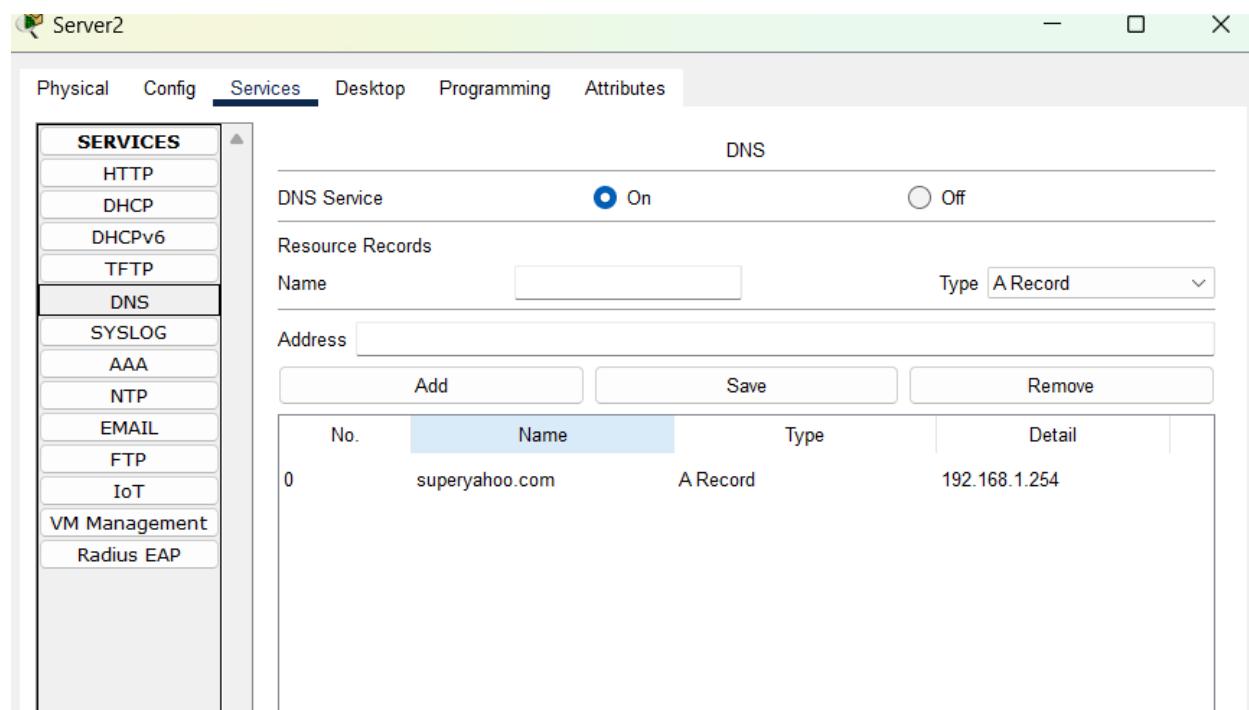
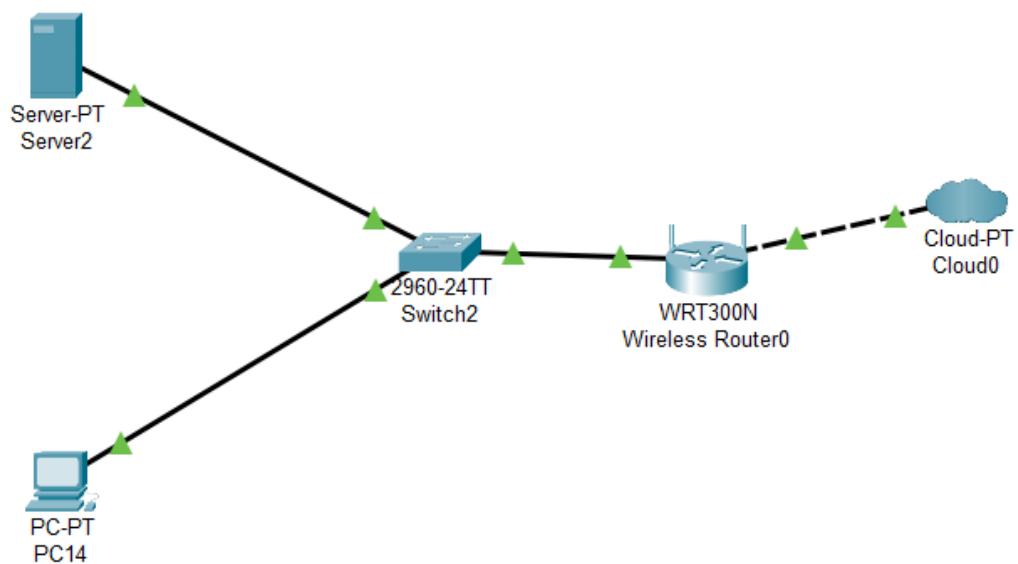
Observation:

As we added the IP helper address to the router, the DHCP server can assign the IP address dynamically to the PC's which is in another network (not the same as the server)



Lab 5

Domain Name System(DNS)



Observation

Week 5)

07/11/2024

Demonstrating web server and DNS using packet tracer.

Diagram showing a network setup:

```

graph LR
    PC[PC] --- SW((Switch))
    SW --- FA1[fa0/1]
    SW --- FA2[fa0/2]
    FA1 --- SERVER[Server]
    FA2 --- PCB[PC]
    
```

The diagram shows a PC connected to a Switch. The Switch has two ports labeled fa0/1 and fa0/2. Port fa0/1 is connected to a Server, and port fa0/2 is connected to another PC labeled PCB. IP addresses are assigned to the interfaces:

- PC: 192.168.1.200
- Switch: fa0/1 (192.168.1.254), fa0/2 (192.168.1.254)
- Server: 192.168.1.254
- PCB: 192.168.1.200

Steps :-

- ① Connect Server, Switch with copper straight through cable. connect switch & PC-PT with copper straight through cable.

Server → 192.168.1.254
 PC → 192.168.1.200

and cmd prompt PC-PT

ping -IP address PC-PT

ping 192.168.1.254

Pinging 192.168.1.254 with 32 bytes of data:
 Reply from 192.168.1.254: bytes=32 time=178ms TTL=255

time=4ms
 time=4ms
 time=9ms

~~Ping Statistics for 192.168.1.254:~~

~~packets= Sent=4, Received=4, Lost=0~~
~~Max=4ms, min=178ms, Avg=48ms.~~

→ In Server note Service click on HTTP
 → create a new file and add the html code & save with html extension

- To test our web browser click on PC & click on web browser box
- type the IP address given in the URL browser we come see the webpage we saved in server.

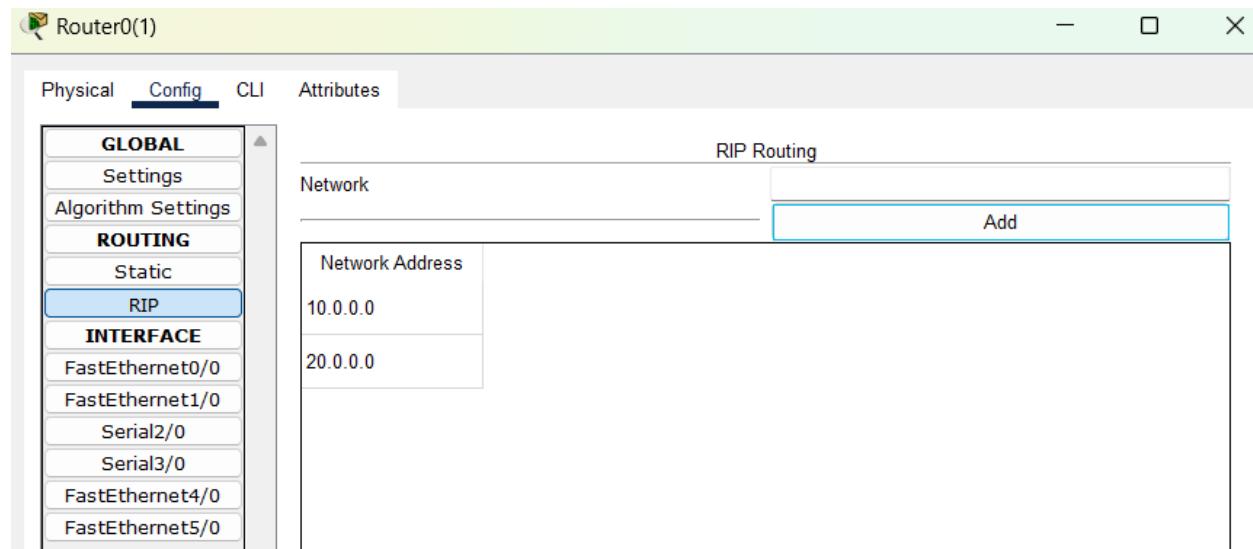
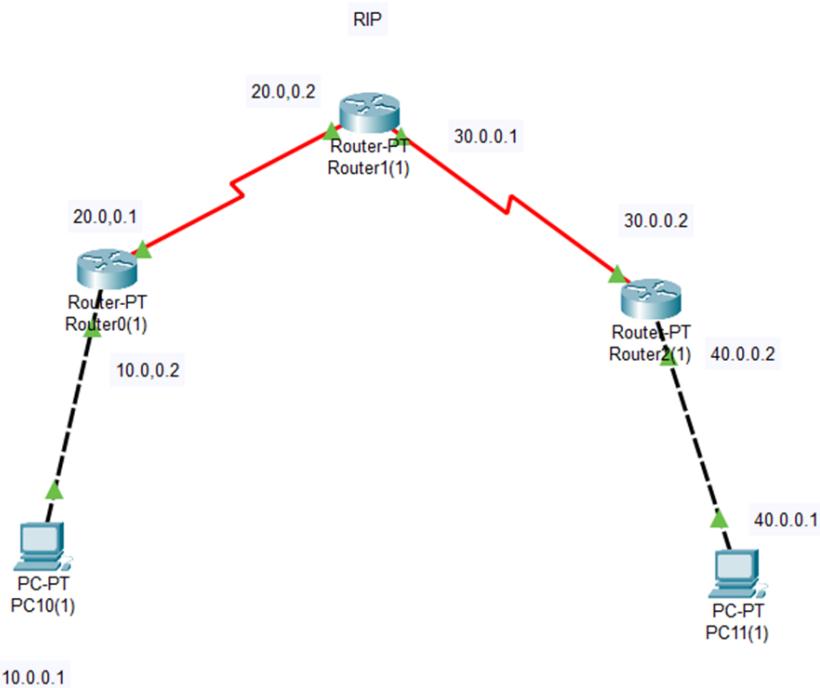
Observation :-

Upon typing the server IP address in the web browser box

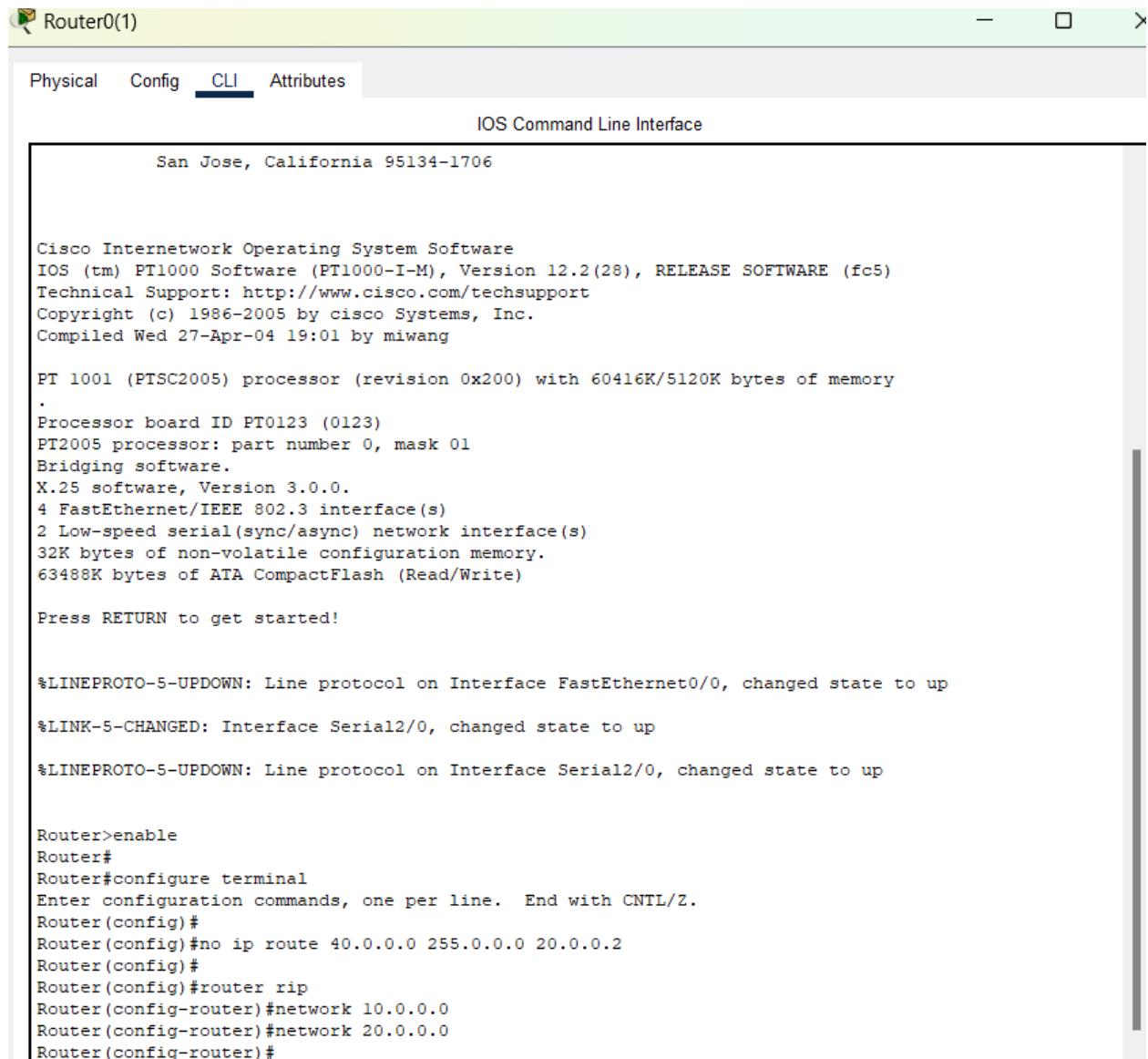
→ URL box between web server will be visible on the PC. All the HTML pages on server can be accessed using PC

Lab 6

Routing Information Protocol(RIP)



CLI:



The screenshot shows a window titled "Router0(1)" with a tab bar containing "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs, it says "IOS Command Line Interface". The main area displays the following text:

```
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)

Press RETURN to get started!

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface Serial2/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#no ip route 40.0.0.0 255.0.0.0 20.0.0.2
Router(config)#
Router(config)#router rip
Router(config-router)#network 10.0.0.0
Router(config-router)#network 20.0.0.0
Router(config-router)#

```

Router2(1)

Physical Config **CLI** Attributes

IOS Command Line Interface

```
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)

Press RETURN to get started!

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface Serial2/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#no ip route 10.0.0.0 255.0.0.0 30.0.0.1
Router(config)#router rip
Router(config-router)#network 30.0.0.0
Router(config-router)#network 40.0.0.0
```

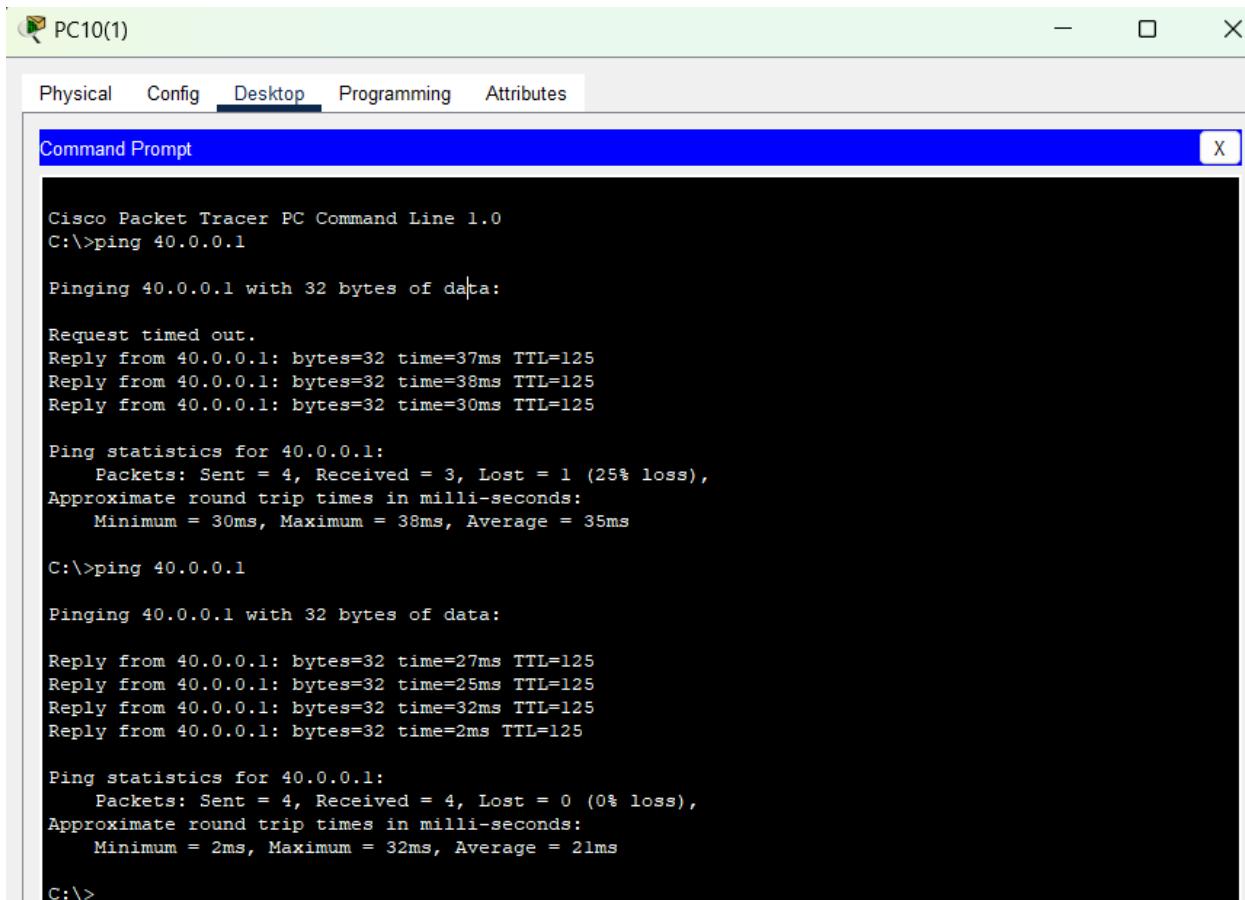
Router1(1)

Physical Config **CLI** Attributes

IOS Command Line Interface

```
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)  
  
Press RETURN to get started!  
  
%LINK-5-CHANGED: Interface Serial3/0, changed state to up  
%LINK-5-CHANGED: Interface Serial2/0, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up  
  
Router>enable  
Router#  
Router#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#  
Router(config)#no ip route 10.0.0.0 255.0.0.0 20.0.0.1  
Router(config)#no ip route 40.0.0.0 255.0.0.0 30.0.0.2  
Router(config)#router rip  
Router(config-router)#network 10.0.0.0  
Router(config-router)#no network 10.0.0.0  
Router(config-router)#network 20.0.0.0  
Router(config-router)#network 30.0.0.0  
Router(config-router)#exit
```

Ping message:



The screenshot shows a Cisco Packet Tracer Command Line interface window titled "PC10(1)". The window has tabs for Physical, Config, Desktop (which is selected), Programming, and Attributes. The main area is a "Command Prompt" window with a blue header bar containing "Command Prompt" and a close button "X". The command line output 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:

Request timed out.
Reply from 40.0.0.1: bytes=32 time=37ms TTL=125
Reply from 40.0.0.1: bytes=32 time=38ms TTL=125
Reply from 40.0.0.1: bytes=32 time=30ms 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 = 30ms, Maximum = 38ms, Average = 35ms

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=27ms TTL=125
Reply from 40.0.0.1: bytes=32 time=25ms TTL=125
Reply from 40.0.0.1: bytes=32 time=32ms TTL=125
Reply from 40.0.0.1: bytes=32 time=2ms 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 = 2ms, Maximum = 32ms, Average = 21ms

C:\>
```

Observation

LAB - 6

Date: 14/11/2024
Page: _____
Bafna Gold

Aim :- Configuring RIP routing protocol in system of 3 routers

TOPOLOGY :-

Procedure :-

- ① Select two PCs and 3 routers, connect the PCs to two routers using copper cross over wires and connect the routers to another router with serial DCE with timer
- ② set the IP address of both the PCs as 10.0.0.1 & 40.0.0.1 respectively and their gateway as 10.0.0.10 & 40.0.0.10 respectively
- ③ Router 1 Configuration :-
 - > enable
 - > config t
 - # interface fastethernet 0/0
 - # ip address 10.0.0.10 255.0.0.0
 - # no shut
 - # exit
 - # interface serial 2/0
 - # ip address 20.0.0.10 255.0.0.0
 - # encapsulation app
 - # clock rate 60000
 - # no shut
 - # exit

Router A configuration

```
>enable  
>config t  
#interface fastethernet 0/0  
#ip address 10.0.0.10 255.0.0.0  
#no shut  
#exit  
#interface serial 3/0  
#ip address 30.0.0.20 255.0.0.0  
#encapsulation app  
#no shut  
#exit
```

Router B -

```
>enable  
>config t  
#interface serial 2/0  
#ip address 20.0.0.20 255.0.0.0  
#encapsulation ppp  
#no shut  
#exit  
#interface serial 3/0  
#ip address 30.0.0.10 255.0.0.0  
#encapsulation app  
#clockrate 64000  
#no shut  
#exit
```

(a) Now network router configuration for Routing Information Protocol (RIP) is done as follows

Router 1,

```
#router rip  
#network 10.0.0.0  
#network 20.0.0.0  
#exit
```

Point 2:-

#1 800t-en-r; P

network 30.0.0.0

network 10.0.0.0

exit +

Routen 3! -

#roufari-riP

network 20.0.0.0

network 30.0.0.0

#exit

⑤ After RIP configuration of all router we check the routing table of all by giving

For router o:-

Show IP route

P 10.0.0.0/8 via 20.0.0.10, 00:00:13 serial2/0

20.0.0.0/8 is variably subnetted, 2 subnets

2 marks

C 30.0.0.0/8 is directly connected serial 8lo

C 30.p.v.0132 is directly connected serial 36

R 40.0.0.0 18 via 30.0.0.20, 00:00:10, serial 80

⑥ Now, ping 20.0.0.1 from the command prompt of 20.0.0.1 and vice versa

Result

~~from 10.0.0.1 > Ping 10.0.0.1~~

~~plinging to 0.0.1 with 32 bytes at delta:~~

Request timed out

Reply from 10.0.0.1: bytes=32 time=12ms TTL=12

time = 2ms \rightarrow

→ u , time = 2 ms ←

My answers for 10.01.2015

partida 1 went 3 hr, Received \$3.00

average driving time in minutes between

minimum = 2 ms, max burst = 12 ms, Average = 2 ms

from $(A, B, D, E) \rightarrow$ plus up, B, E, !

fitting $\mu, \sigma, \alpha, \beta$ with 32 modes of data;

copy from L.A. 9.21; bytes=30 time=2ms TTL=128

14

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四庫全書

ping statistics for user, o.1%

Packet received 24, Received 24, last 20

approximate round trip time in milli.seconds;

minimum = 2 ms, maximum = 8 ms, average = 2 ms

Observation:

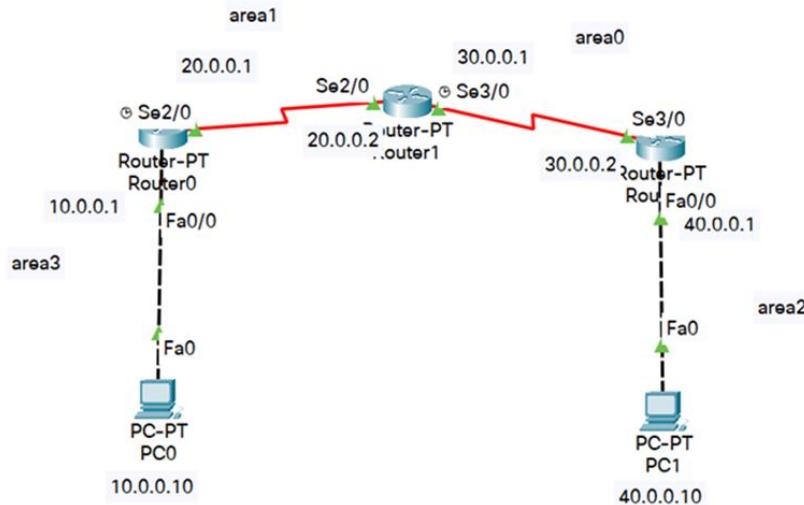
After pinging 10.0.0.1 from 10.0.0.1 IP route was successful and the message was passed from one PC to other PC.

* If gateway is not configured then ping may fail & hence all the packets will be received.

~~RIP configuration of all routers should be verified from monitoring portfile.~~

Lab 7

OSPF Protocol



```
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)#

```

```

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 shutdown
^
% Invalid input detected at '^' marker.

Router(config-if)#no shutdown

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

```

```

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

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

```

```
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
virtual-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
```

Ping message:

```
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
```

Observation

LAB - 10

19/12/24
Bafna Gold
Date: _____ Page: _____

Aim - Configuring OSPF Protocol for a system of 3 routers.

Topology:

Procedure :-

- (1) Select the two PC's and three routers and join the 2 PC's to the routers with copper cross over wires
- (2) Join the 2 routers to the third router with crossed copper wire.
- (3) Configure the PC's and gateways with IP's
- (4) Configure the routers as per the topology above with the IP addresses
- (5) Encapsulation PPP and clock rate need to be set as done in RIP protocol.
- (6) Configuring each router with OSPF Protocol

For Router A -

```
>enable
>config t
```

```
R1(config)# router OSPF 1  
R1(config)# router-id 1.1.1.1  
R1(config)# network 10.0.0.0 0.255.255.255 area 0  
R1(config)# network 20.0.0.0 0.255.255.255 area 1 3  
R1(config) #exit
```

Router 0

```
>config t  
#router OSPF 1  
# router-id 2.2.2.2  
# network 20.0.0.0 0.255.255.255 area 1 3  
# network 30.0.0.0 0.255.255.255 area 0
```

Router 2

```
>config t  
# router aspf 1  
# router-id 3.3.3.3  
# network 30.0.0.0 0.255.255.255 area 0  
# network 40.0.0.0 0.255.255.255 area 2  
# exit t
```

② Configuring the interface

```
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 address 172.16.1.252 255.255.0.0  
R2(config-if)# no shutdown
```

R3(config-if)# interface loopback 0

R3(config-if)# ip address 192.16.1.254 255.255.0.0

R3(config-if)# no shutdown

R3# show ip route

C 0.0.0.0/8 is directly connected

C 0.0.0.0/8 is directly connected serial 8/0

0.0.0.0/8 is directly connected serial 8/0

C 0.0.0.0/32 is directly connected.

8) In Router R1

R1(config)# router asf 1

R1(config-router)# area 3 virtual-link 2.2.2.2

9) Router R2,

R2(config)# router asf 2

R2(config-router)# area 1 virtual-link 1.1.1.1

R2(config-router)# exit

Now a virtual link is established between area 3 and area 0

a) Show IP routes must be configured in all routers
for router 2

0 IA 10.0.0.0/8 via 20.0.0.1, 00:00:01, Serial 2/0

20.0.0.0/8 is vertically subnetted, 2 subnets
2 masks

C 20.0.0.0/8 is directly connected, Serial 2/0

C 20.0.0.1/31 is directly connected, Serial 2/0

20.0.0.1/31 is directly connected, Serial 2/0
2 masks

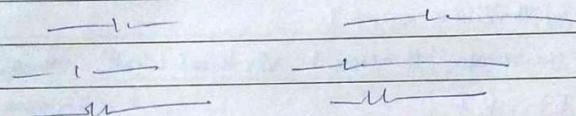
C 192.168.0.1 is directly connected, Serial 810
C 192.168.0.2 is directly connected, Serial 310
O 1A 192.168.0.1/8 via 192.168.0.2, 00:00:00
Serial 810
C 192.168.0.1/16 is directly connected, loopback.

Result

> ping 192.168.0.10

Pinging 192.168.0.10 with 32 bytes of data:

Reply from 192.168.0.10: bytes=32 time=9ms TTL=125



> ping statistics for 192.168.0.10:

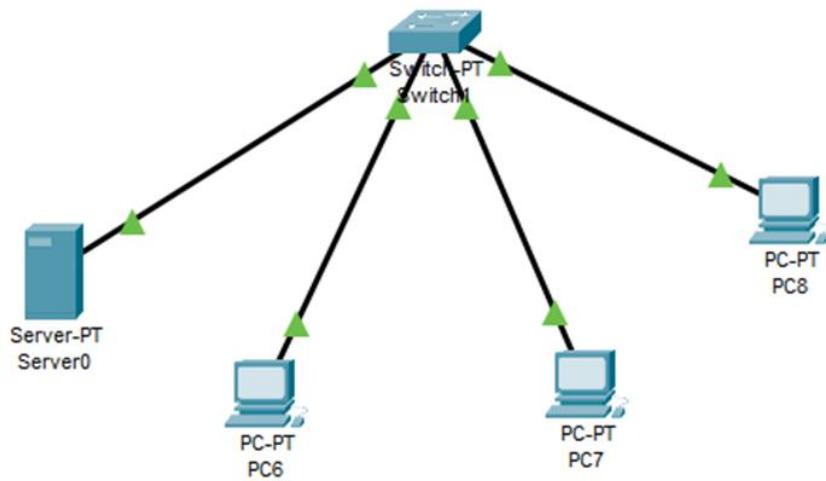
packets: sent=4, received=4, lost=0

approximate round trip times in milliseconds:

minimum=7ms, maximum=12ms, Average=8ms

Lab 8

ARP Protocol



ARP Table for PC6

IP Address	Hardware Address	Interface
10.0.0.1	0030.A39D.3726	FastEthernet0
10.0.0.3	000A.F3E1.439D	FastEthernet0
10.0.0.4	0000.0CE7.65A0	FastEthernet0

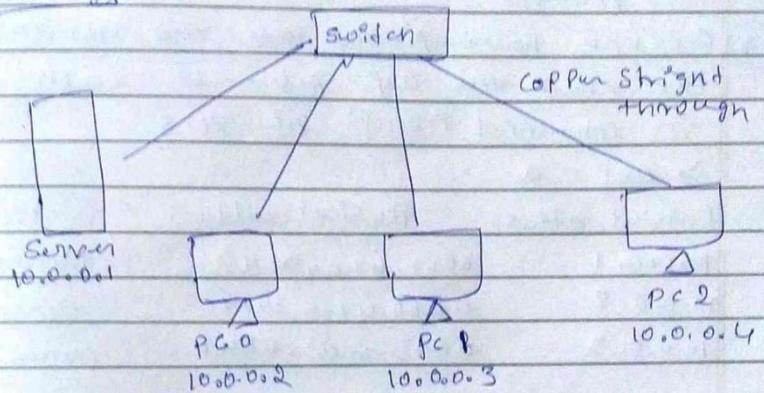
```
Switch>show mac address-table  
Mac Address Table
```

Vlan	Mac Address	Type	Ports
---	-----	-----	-----
1	0000.0ce7.65a0	DYNAMIC	Fa3/1
1	0004.9ab2.e211	DYNAMIC	Fa1/1
1	000a.f3e1.439d	DYNAMIC	Fa2/1
1	0030.a39d.3726	DYNAMIC	Fa0/1

Observation

Aim: To construct simple LAN and understand the concept and operation of Address Resolution Protocol (ARP)

Topology:



Procedure:

- ① Select a switch and 3 pc's and connect them to the switch as shown in the topology above.
- ② connect them with copper-straight through wire
- ③ set the IP address of Switch and pc's as shown
- ④ Select the inspect tool from the tool bar and open the ARP tables of all the devices
- ⑤ Then, ping the devices from the command prompt of other devices and click on capture in simulation mode to know the packet routing.

(6) with every ping the arp table of devices get filled with MAC addresses of the corresponding devices.

(7) Even the switch learns about the MAC address of all devices during pinging process

(8) Once you have pinged all the devices, You can check the arp table of each device in command prompt of PC's

→ arp -a

Internet address	Physical address	TYPE
10.0.0.1	0050.67a4.0043	Dynamic
10.0.0.2	0060.47e5.1424	Dynamic
10.0.0.3	0005.5eaf.0b46	Dynamic

(9) In the Switch → CLI, You can check the MAC address of the devices as follows

switch> show mac address-table
MAC address table.

VLAN	MAC address	TYPE	ports
1	0005.5eaf.0b46	Dynamic	Fa 2/1
1	000c.88e6.6aec	Dynamic	Fa 8/1
1	0060.47e5.0032	Dynamic	Fa 2/1
1	0060.47e5.1424	Dynamic	Fa 1/1

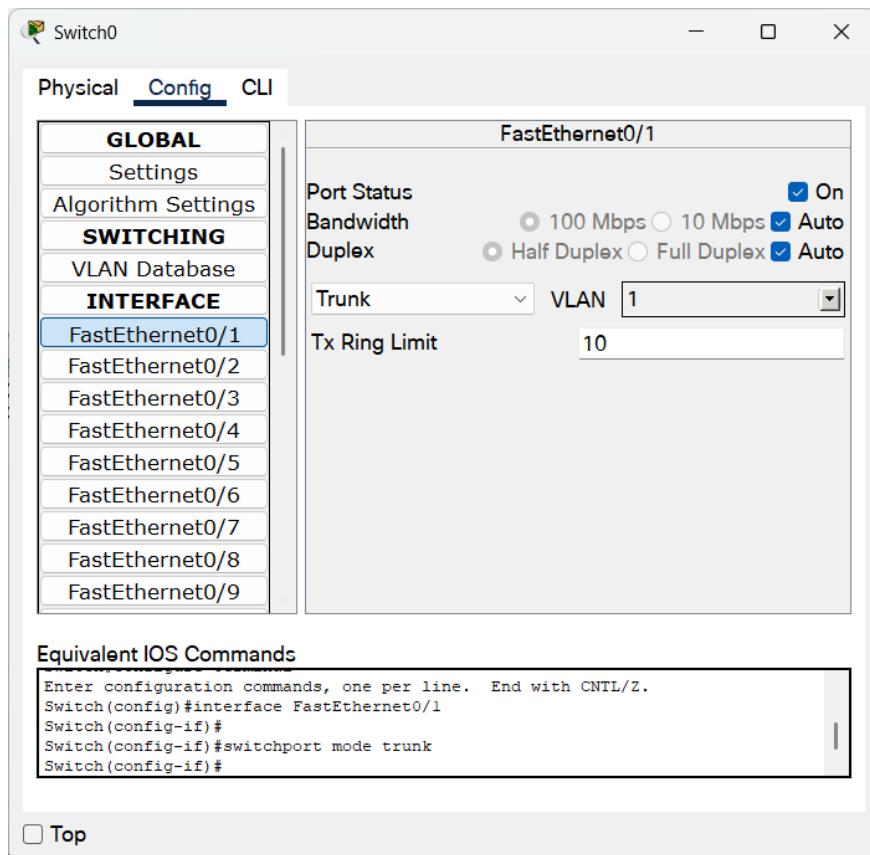
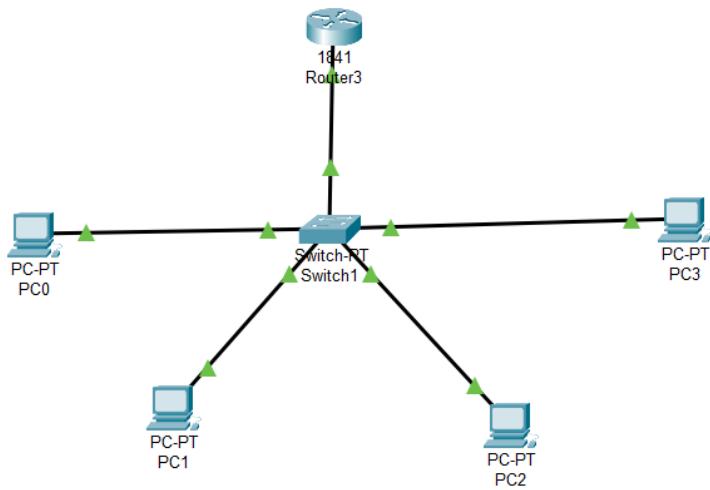
Observation

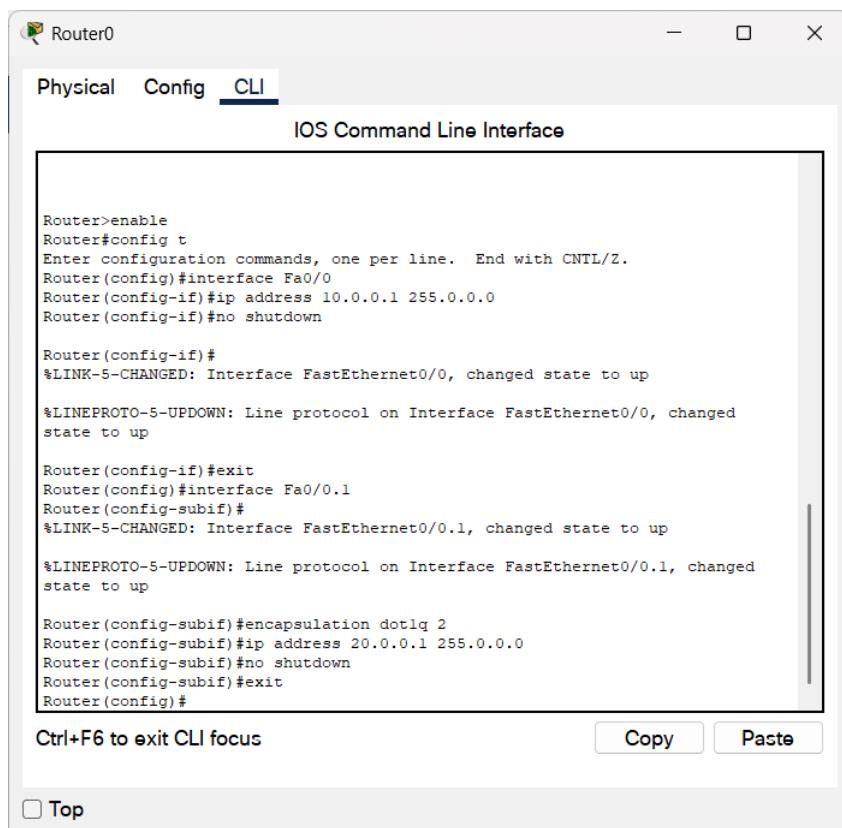
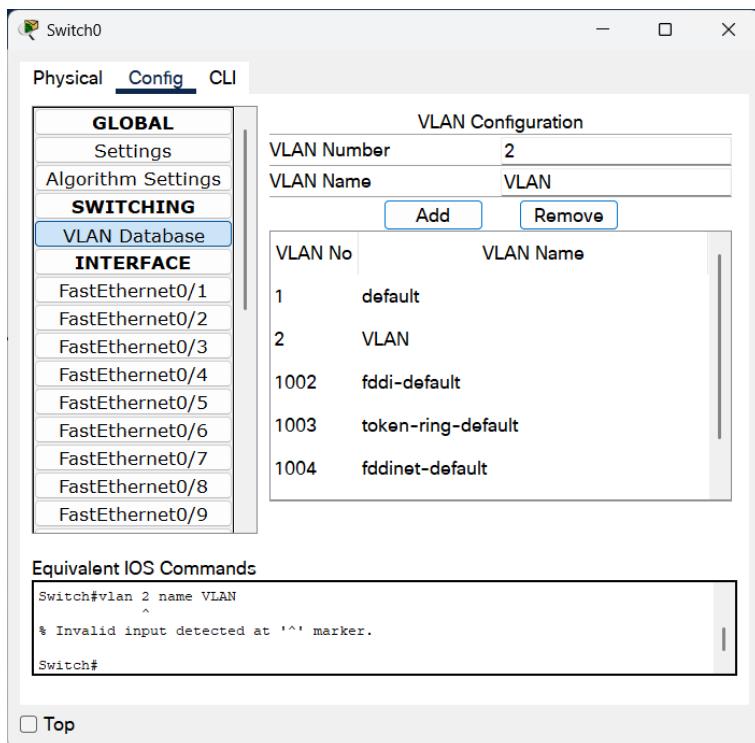
ARP protocol is communication protocol used for discovering the link layer address such as a MAC address, After pinging every device learns about the MAC

Address of the pinged devices and the switch stores these mac addresses in the ARP table for future pinging. ARP learns about the MAC addresses by pinging all the devices and the right IP address responding with the acknowledgement.

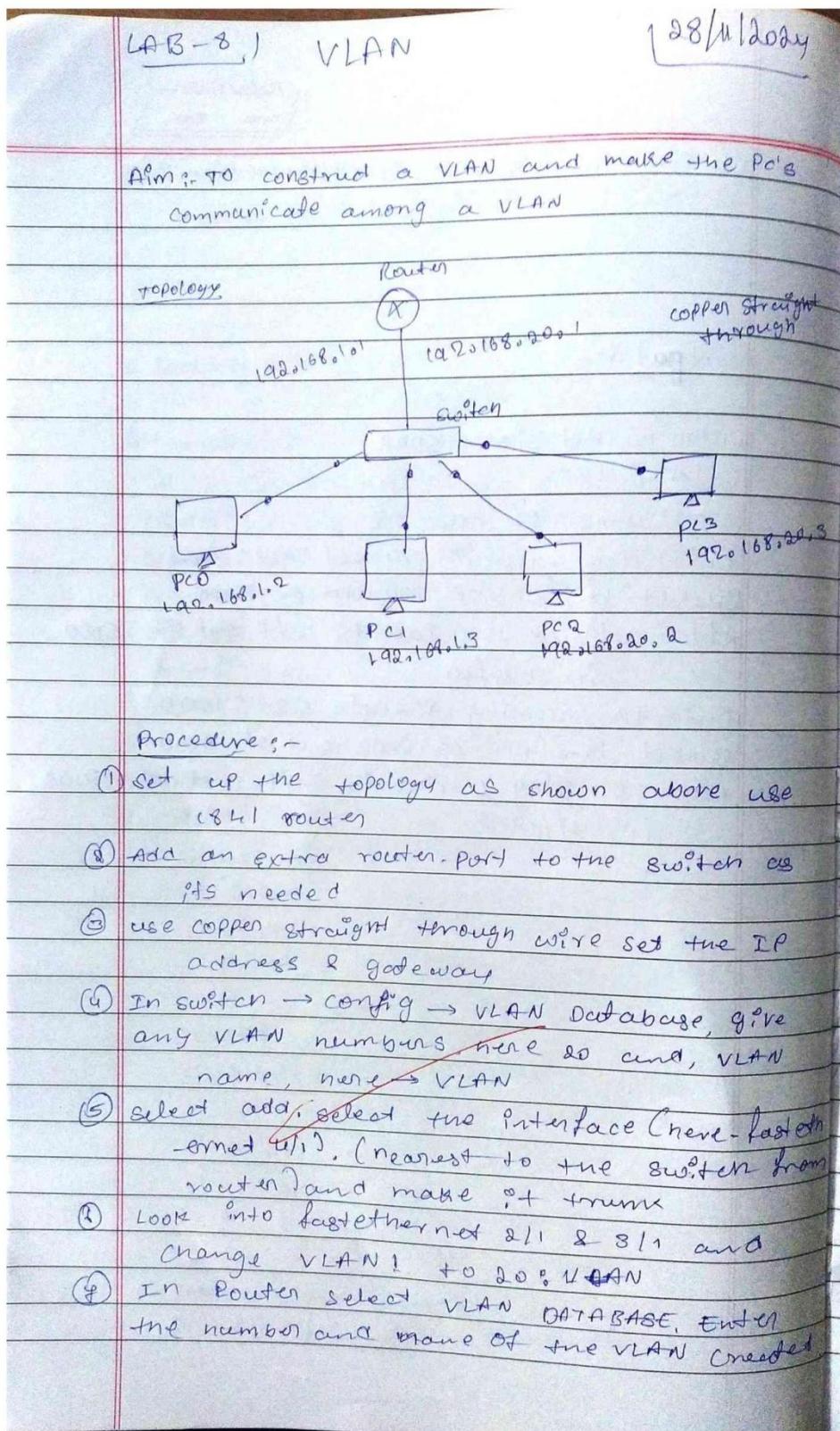
Lab 9

VLAN Experiment





Observation



In CLI at router

Router (config) # exit

Apply completed

Exiting...

Router# config +

Router (config) # interface fastethernet 0/0

Router (config-if) # ip address 192.168.1.1

Router (config-if) # no snat 255.255.255.0

Router (config) # interface fastethernet 0/0.1

Router (config-subif) # encapsulation dot1q 20

Router (config-subif) # ip address 192.168.20.1

255.255.255.0

Router (config-subif) # no snat

Router (config-subif) # exit

Result

(in PC0)

PC > Ping 192.168.20.3

Pinging 192.168.20.3 with 32 bytes of data

Replay from 192.168.20.3: bytes=32 time=1ms TTL=128

Replay from 192.168.20.3: bytes=32 time=1ms TTL=128

Replay from 192.168.20.3: bytes=32 time=0ms TTL=128

Replay from 192.168.20.3: bytes=32 time=0ms TTL=128

ping : statistics for 192.168.20.3

packets: sent 24, received: 24, lost: 0

approximate round trip time in milliseconds

minimum=0ms, maximum=1ms, average=0

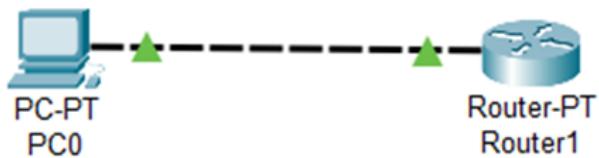
Observation :-

- ① VLANs - virtual local area network is any broadcast domain that is partitioned and isolated in a completed network at the data link layer.
- ② It is a virtualised connection that connects multiple devices and networks no dug from different LANs into one locally logical network.

BB
28.11

Lab 10

TELNET experiment



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#
```

PC0

Physical Config Desktop Programming

Command Prompt X

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>telnet 192.168.1.1
Trying 192.168.1.1 ...Open

User Access Verification

Password:
R1>enable
Password:
R1#S|
```

Top

Observation

Bafna Gold
Date: _____ Page: _____

Aim: To understand the operation of TELNET by accessing the router in server room, from PC in IT office.

Topology

10.0.0.2 10.0.0.1

Procedure:-

- ① Configure topology as above use copper cross over wire to connect both configure IP address and gateway and the router generally
- ② In router CLI
 - Router # config enable
 - Router # config t
 - Router (config)# hostname r1
 - r1 (config) # enable secret 1
 - r1 (config) # interface fastethernet 0/0
 - r1 (config) # ip address 10.0.0.1 255.0.0.0
 - r1 (config-if) # no shut
 - r1 (config-if) # line vty 0 5
 - r1 (config-line) # login
 - No login disabled on line 132 until password set

133 134 135 136 137

ri (config-line) # Password po

ri (config-line) # exit

ri # wt

Building configuration

Result

In pco

PC > Ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data:

Reply from 10.0.0.1 : bytes=32 time:21ms TTL=896.
.....H..... time:6ms ..H.....
.....H..... time=6ms ..H.....
.....H..... time=10ms ..H.....

Ping statistics from 10.0.0.1 :

Packet: sent=4 , Received=4 . Lost=0

Approximate roundtrip time in milliseconds:

minimum=6 ms , maximum=21 ms , Average=12 ms

PC > telnet 10.0.0.1

Trying 10.0.0.1 open

User access verification

password: (TYPED PO)

ri > enable

password: (TYPED PI)

ri # show ip route

Code:

Gateway of last resort is not set

C 10.0.0.0/8 is directly connected Fast eth0
- net 0/0.

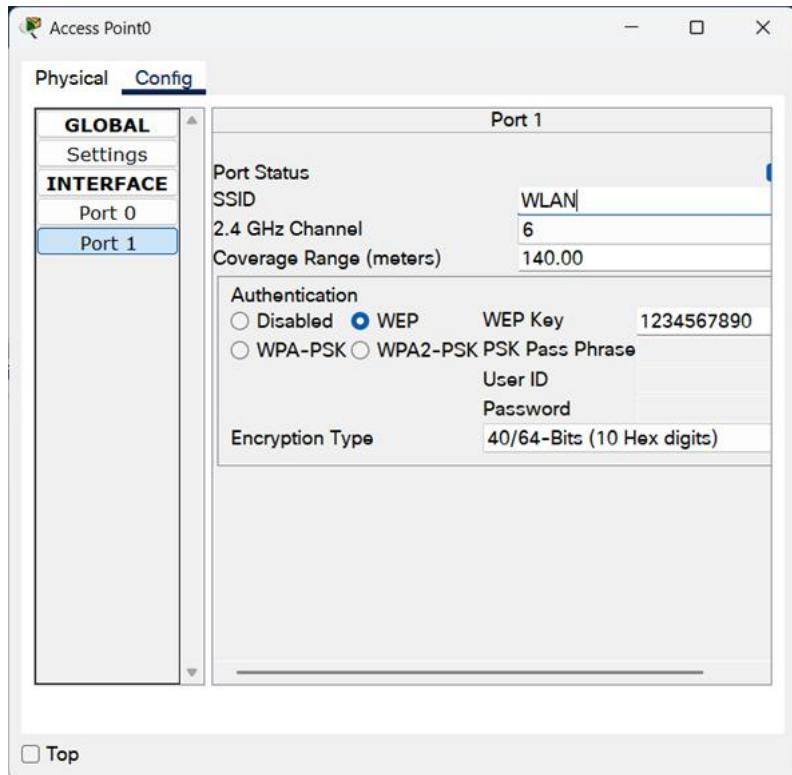
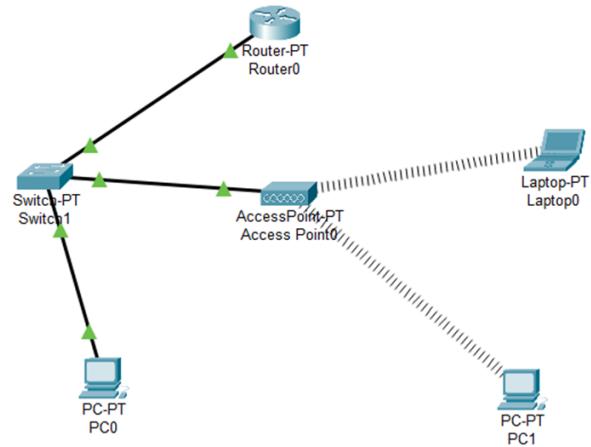
ri #

Observation :-

- ① TELNET is used by terminal emulation programs that allow you to log into a remote host
- ② we logged into 10.0.0.1 IP device through 10.0.0.2 IP device
- ③ The password typed is not visible

Lab 11

WLAN Experiment



Ping Message

Laptop0

Physical Config Desktop Programming

Command Prompt X

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

C:\>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

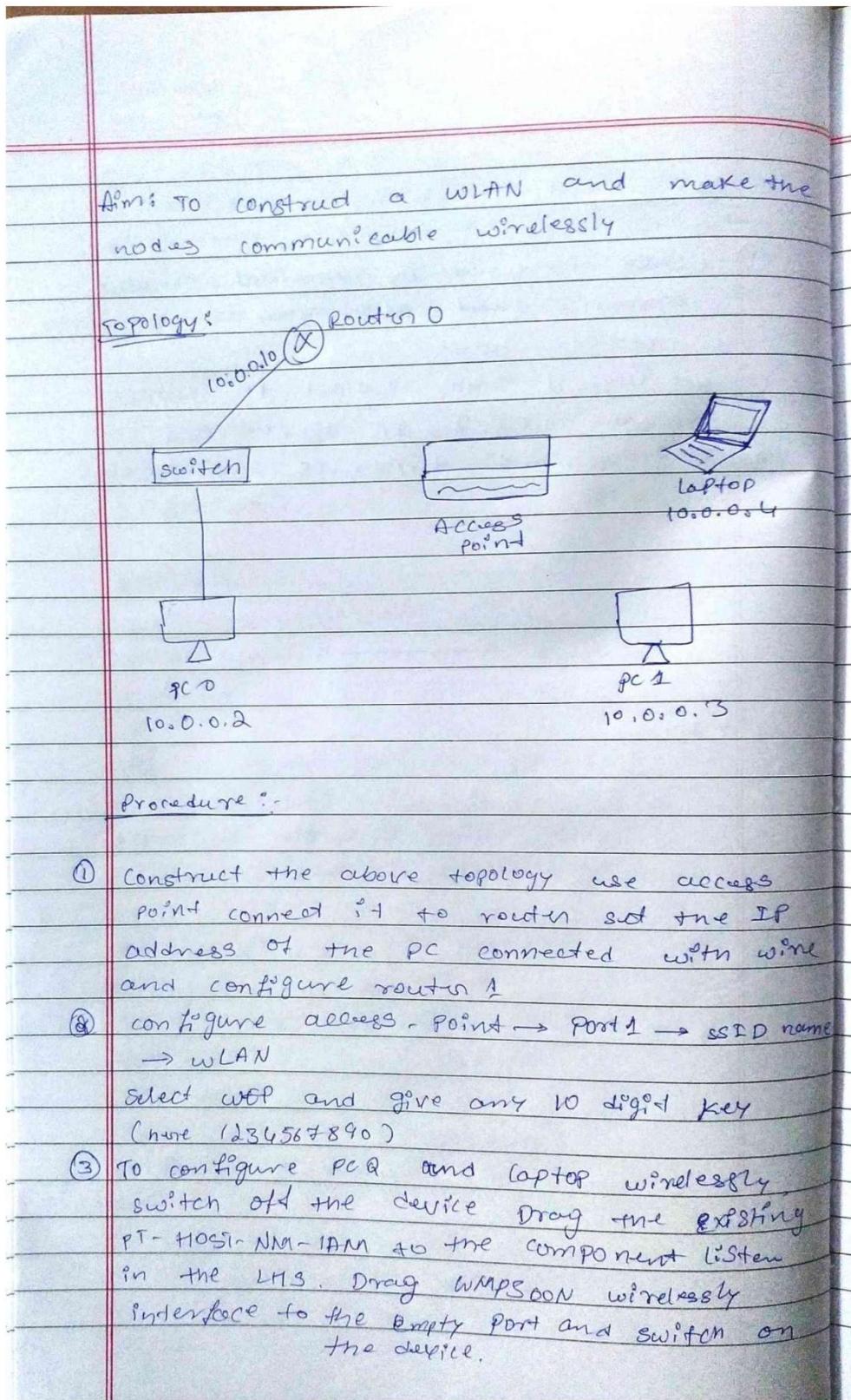
Reply from 10.0.0.3: bytes=32 time=40ms TTL=128
Reply from 10.0.0.3: bytes=32 time=25ms TTL=128
Reply from 10.0.0.3: bytes=32 time=26ms TTL=128
Reply from 10.0.0.3: bytes=32 time=24ms TTL=128

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:\>
```

Top

Observation



Now, in the config tab, a new wireless interface would have been added to configure SSID, WEP, WEP key, IP address & gateway to the device.

Router > enable

config

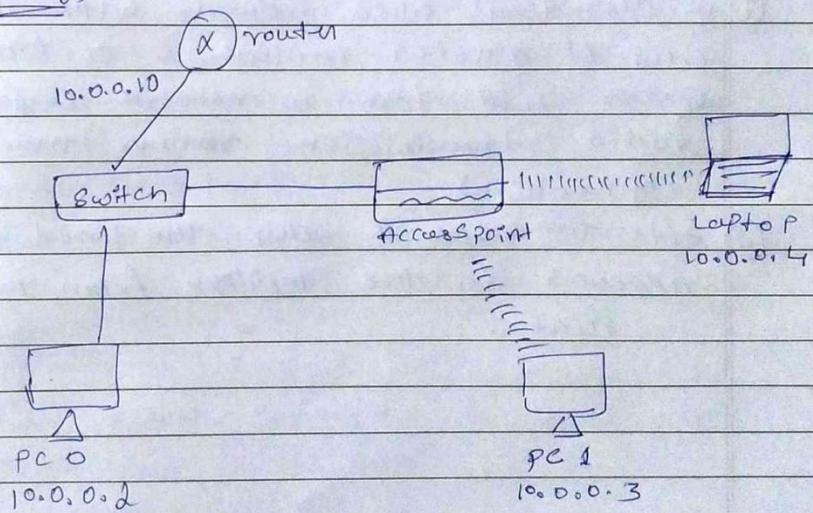
interface fastethernet 0/0

ip address 10.0.0.10 255.0.0.0

no shut

Result

Topology



Result - in PC 0

PC > Ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data.

Reply from 10.0.0.3: bytes=32 time=81ms TTL=64ms
 time=13ms —>
 time=6ms —>
 time=0ms —>

Ping statistics for 10.0.0.3

packets sent=4, received=4, lost=0

Approximate roundtrip time in milliseconds

minimum=6ms, maximum=81ms, best=against

Observation:-

- (1) wireless local area network WLAN is a group of allocated computers or other devices that form a network based on radio transmission rather than wired connections
- (2) After the WLAN is setup, the lined connection appears in the topology from the access point.

Lab 12

CRC implementation

```
#include <stdio.h>
#include <string.h>
#define N strlen(poly)

char data[30];
char checksum[30];
char poly[10];
int datalen, i, j;

void XOR() {
    for (j = 1; j < N; j++) { // XOR operation starts from the second bit
        checksum[j] = (checksum[j] == poly[j]) ? '0' : '1';
    }
}

void crc() {
    // Copy the first N bits of data to checksum
    for (i = 0; i < N; i++) {
        checksum[i] = data[i];
    }

    do {
        if (checksum[0] == '1') {
            XOR(); // Perform XOR if the first bit is 1
        }

        // Shift left by one position
        for (j = 0; j < N - 1; j++) {
            checksum[j] = checksum[j + 1];
        }

        // Append the next bit from data
        checksum[j] = data[i++];
    } while (i <= datalen + N - 1); // Continue until all bits are processed
}

void receiver() {
    printf("\nEnter the received data: ");
    scanf("%s", data);
```

```

printf("Received Data: %s\n", data);

datalen = strlen(data);
crc();
// Check if the checksum contains any non-zero bits
for (i = 0; (i < N - 1)&&(checksum[i]!="1"); i++);
if(i<N-1)
printf("\nerror detected in received data.\n");
else
printf("\nNo error detected in received data.\n");
}

int main() {
printf("Enter the data bits: ");
scanf("%s", data);

printf("Enter the generator polynomial: ");
scanf("%s", poly);

datalen = strlen(data);

// Append (N-1) zero bits to the data
for (i = datalen; i < datalen + N - 1; i++) {
    data[i] = '0';
}
data[datalen + N - 1] = '\0'; // Null-terminate the string

crc();

printf("CRC Code: %s\n", checksum);

receiver();

return 0;
}

```

```
Enter the data bits: 101010
Enter the generator polynomial: 1011
CRC Code: 001
```

```
Enter the received data: 10001000
Received Data: 10001000

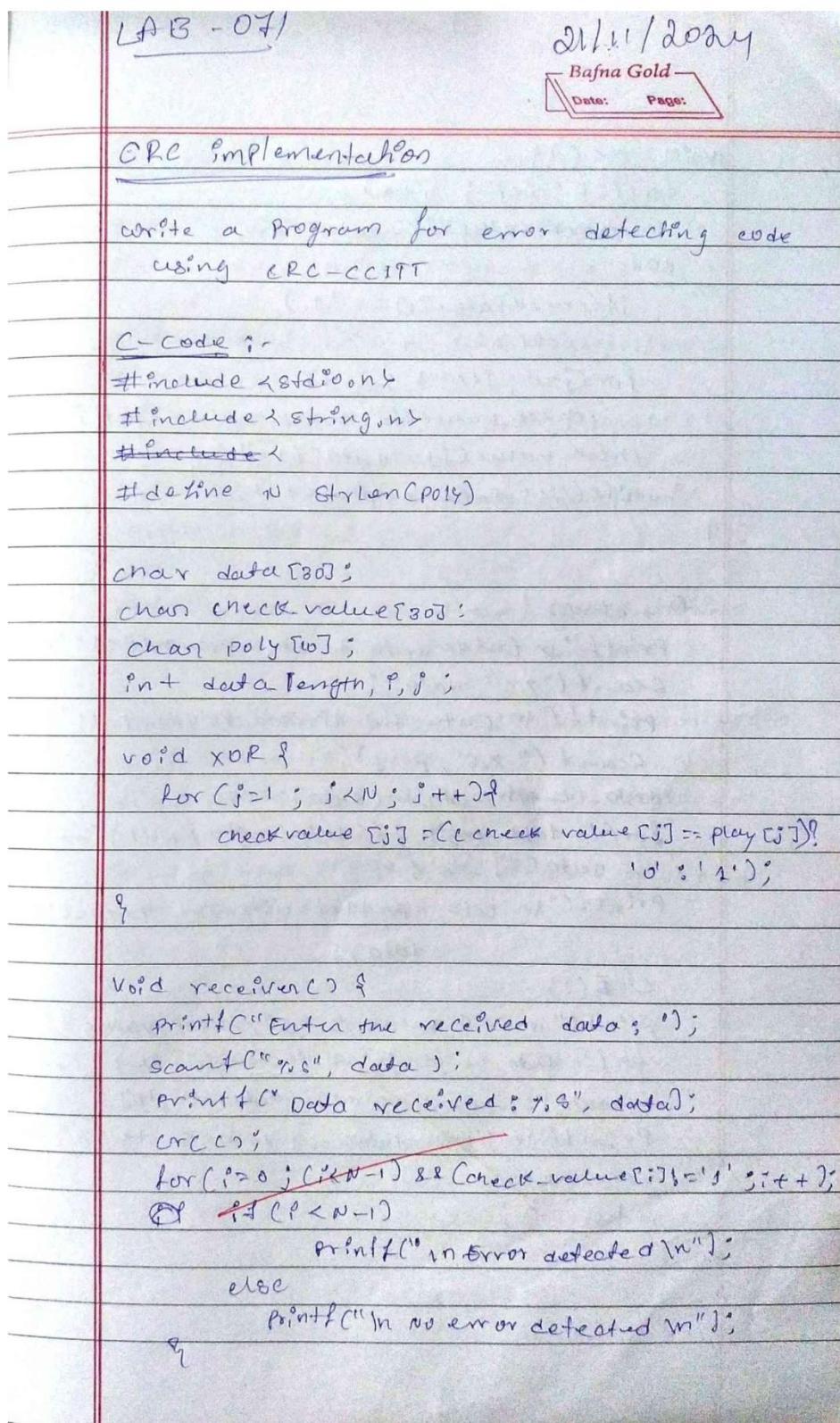
error detected in received data.
```

```
Enter the data bits: 101100
Enter the generator polynomial: 1001
CRC Code: 001
```

```
Enter the received data: 101100001
Received Data: 101100001
```

```
No error detected in received data.
```

Observation



```

void crc() {
    for(i=0; i<n; i++)
        check_value[i] = data[i];
    do {
        if(check_value[0] == '1')
            XOR();
        for(j=0; j<n-1; j++)
            check_value[j] = check_value[j+1];
        check_value[n] = data[n+j];
    } while(i < data_length+n+1);
}

int main() {
    printf("Enter data to be transmitted:");
    scanf("%s", data);
    printf("Enter the divisor Polynomial:");
    scanf("%s", poly);
    data_length = strlen(data);
    for(i=data_length; i<data_length+n-1; i++)
        data[i] = '0';
    printf("Data padded with n-1 zeroes:\n", data);
    CRC();
    printf("CRC value is %s", check_value);
    for(i=data_length; i<data_length+n-1; i++)
        data[i] = check_value[i-data_length];
    printf("Final dataword to be sent: %s", data);
    receiver();
    return 0;
}

```

Output :-

Enter data to be transmitted : 101010

Enter the divisor polynomial : 1001

Data padded with n1 zeros : 101010000

CRC value is : 001

Final codeword to be sent : 101010001

Enter the received data : 10001000

Error detected

Enter data to be transmitted : 101100

Enter the divisor polynomial : 1001

Data padded with n1 zeros : 101100000

CRC value is : 001

Final codeword to be sent : 101100001

Enter the received data : 101100001

No error detected.

8
2-11

Lab 13

Leaky bucket problem

```
#include <stdio.h>

int main() {
    int incoming, outgoing, bucket_size, n, store = 0;

    printf("Enter bucket size: ");
    scanf("%d", &bucket_size);

    printf("Enter outgoing rate: ");
    scanf("%d", &outgoing);

    printf("Enter the number of packets: ");
    scanf("%d", &n);

    while (n--) {
        printf("Enter the incoming packet size: ");
        scanf("%d", &incoming);

        if (incoming + store > bucket_size) {
            printf("Dropped %d number of packets\n", (incoming + store - bucket_size));
            store = bucket_size;
        } else {
            store += incoming;
        }

        printf("Bucket buffer size %d out of %d\n", store, bucket_size);

        store -= outgoing;

        if (store < 0) {
            store = 0;
        }

        printf("After outgoing %d packets left out of %d in buffer\n", store, bucket_size);
    }

    return 0;
}
```

```

Enter bucket size: 5000
Enter outgoing rate: 2000
Enter the number of packets: 2
Enter the incoming packet size: 3000
Bucket buffer size 3000 out of 5000
After outgoing 1000 packets left out of 5000 in buffer
Enter the incoming packet size: 1000
Bucket buffer size 2000 out of 5000
After outgoing 0 packets left out of 5000 in buffer

```

Observation

write a program for congestion control using
 leaky bucket algorithm

C code :-

```

#include <stdio.h>

int main() {
  int incoming,outgoing,buck_size,n,store=0;
  printf("Enter bucket size : ");
  scanf("%d",&buck_size);
  printf("Enter outgoing size : ");
  scanf("%d",&outgoing);
  printf("Enter number of inputs : ");
  scanf("%d",&n);

  while(n!=0){
    printf("Enter the incoming packet sizes : ");
    scanf("%d",&incoming);
    if(incoming <= (buck_size-store)){
      store += incoming;
      printf("Bucket buffer size %d out of %d\n",
            store,buck_size);
    }else{
      printf("Dropped %d no of packets\n",
            incoming-(buck_size-store));
      printf("Bucket buffer size %d out of %d\n",
            store,buck_size);
      store = buck_size;
    }
    store -= outgoing;
    printf("After outgoing %d packets left out of "

```

add in buffer 'n', store, buck_size);
n--;

9

9

Output :-

Enter bucket size: 5000

Enter outgoing rate: 2000

Enter number of inputs: 8

Enter the incoming packet size: 3000

Bucket buffer size 3000 out of 5000

After outgoing 1000 packets left out of 5000
in buffer

Enter the incoming packets size: 1000

Bucket buffer size 2000 out of 5000

After outgoing 0 packets left out of 5000
in buffer.

Lab 14

TCP packet transfer

ServerTCP.py

```
from socket import *
serverName='DESKTOP-HMP0DEC'
serverPort = 12533
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)
    connectionSocket.send(l.encode())
    file.close()
    connectionSocket.close()
```

ClientTCP.py

```
from socket import *
serverName = 'DESKTOP-HMP0DEC'
serverPort = 12533
clientSocket = socket(AF_INET, SOCK_STREAM)
clientSocket.connect((serverName,serverPort))
sentence = input("Enter file name")
clientSocket.send(sentence.encode())
filecontents = clientSocket.recv(1024).decode()
print ('From Server:', filecontents)
clientSocket.close()
```

```

○ PS C:\Users\prajw\Desktop\Prajwal\Prajwal_P> python sertcp.py
The server is ready to receive
Sent contents of test.txt
The server is ready to receive
Sent contents of sertcp.py
The server is ready to receive

```

```

● PS C:\Users\prajw\Desktop\Prajwal\Prajwal_P> python clitcp.py
Enter file name: test.txt
From Server: Simulated message from SERVER
● PS C:\Users\prajw\Desktop\Prajwal\Prajwal_P> python clitcp.py
○ Enter file name: sertcp.py
From Server: from socket import *
serverName="localhost"
serverPort = 12533
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()

```

Observation

LAB 11

26/12/2024

Bafna Gold

Data: Page:

Aim: Using TCP / IP sockets, write a client-Server

Python program :-

clientTCP.py

```

from socket import *
ServerName = '127.0.0.1'
ServerPort = 12000
clientSocket = socket(AF_INET, SOCK_STREAM)
clientSocket.connect((serverName, ServerPort))
sentence = input("Enter the file name: ")
clientSocket.send(sentence.encode())
filecontents = clientSocket.recv(1024).decode()
print("From Server: " + 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, "w")  
l = file.read(1024)
```

```
connectionSocket.send(l, encode(l))  
print("In send contents of "+sentence)  
file.close()  
connectionSocket.close()
```

Result :-

Client window :

Enter the file name : sentenceCP.py
contents of the file are displayed

Server window :

The Server is ready to receive

Sent contents of sentenceCP.py
the Server is ready to receive

Lab 15

UDP packet transfer

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)

    file=open(sentence,"r")
    l=file.read(2048)

    serverSocket.sendto(bytes(l,"utf-8"),clientAddress)
    print("sent back to client",l)
    file.close()
```

ClientUDP.py

```
from socket import *
serverName = "127.0.0.1"
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()
```

```
PS C:\Users\prajw\Desktop\Prajwal\Prajwal_P> python serudp.py
The server is ready to receive
sent back to client simulated message from SERVER
sent back to client from socket import *
serverName='localhost'
serverPort = 12533
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)
    connectionSocket.send(l.encode())
    file.close()
    connectionSocket.close()
```

```
PS C:\Users\prajw\Desktop\Prajwal\Prajwal_P> python cliudp.py
Enter file name: test.txt
From Server: b'simulated message from SERVER'
PS C:\Users\prajw\Desktop\Prajwal\Prajwal_P> python cliudp.py
Enter file name: sertcp.py
From Server: b'from socket import *\nserverName='localhost'\nserverPort = 12
533\nserverSocket = socket(AF_INET,SOCK_STREAM)\nserverSocket.bind((serverName
,serverPort))\nserverSocket.listen(1)\nprint ("The server is ready to receive"
)\nwhile 1:\n    connectionSocket, addr = serverSocket.accept()\n    sentence
= connectionSocket.recv(1024).decode()\n    file=open(sentence,"r")\n    l=fil
e.read(1024)\n    connectionSocket.send(l.encode())\n    file.close()\n    con
nectionSocket.close()'
```

Observation

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Aim : using UDP SOCKETS , client-server program

Python program

Client UDP.py

```
from Socket import *
serverName = '127.0.0.1'
serverPort = 12000
clientSocket = socket(AF_INET, SOCK_DGRAM)
sentence = input("Enter file name : ")
clientSocket.sendto(sentence.encode("utf-8"), (serverName, serverPort))
fileContents, serverAddress = clientSocket.recvfrom(4096)
print("\nReply from Server :")
print(fileContents.decode("utf-8"))
# for i in fileContents:
#     print(str(i), end=' ')
clientSocket.close()
```

Server UDP.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("Insert contents of 'and' = ' '")
print(sentence)
for i in sentence:
    print(str(i), end=' ')
file.close()
```

result:

client window :

Enter the file name : serverTCP.py
contents of the file are displayed

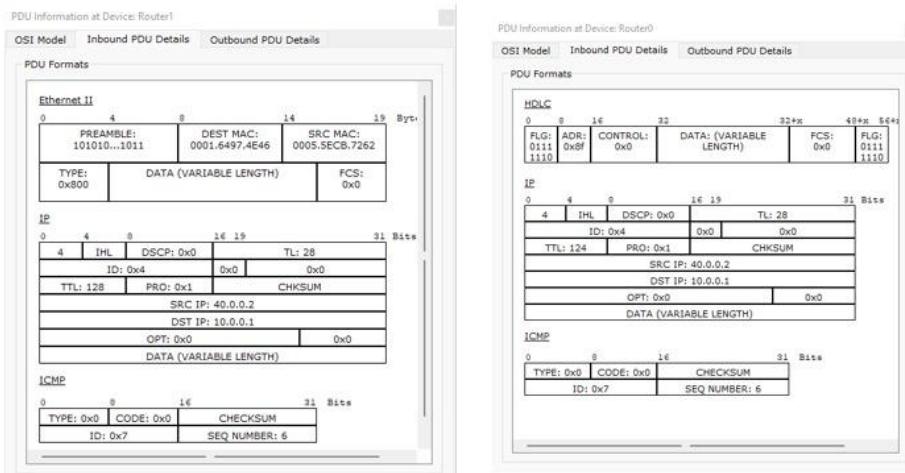
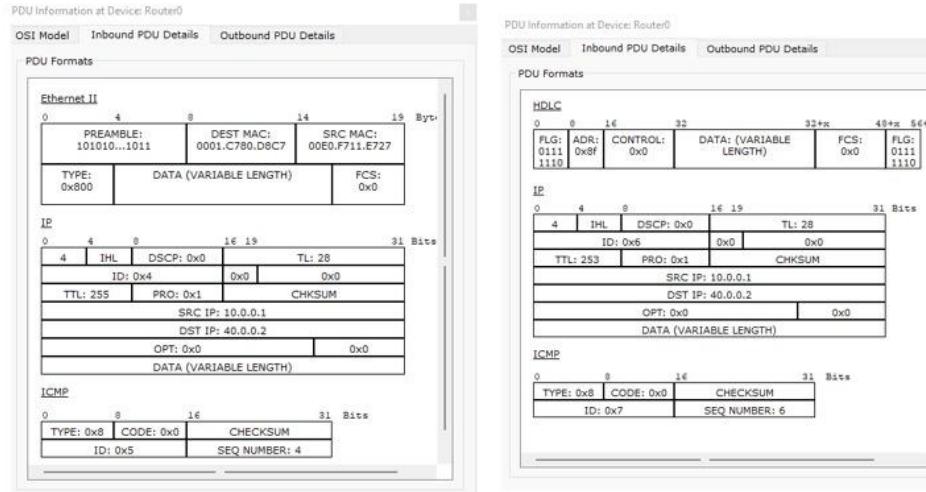
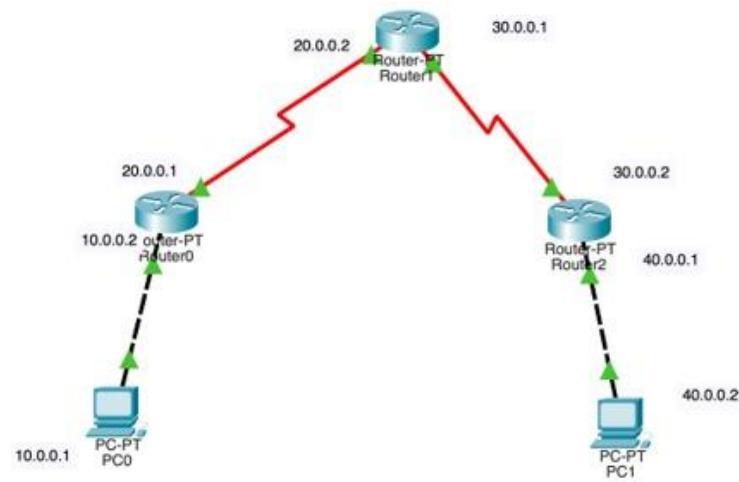
Server window :

The Server is ready to receive

Sent contents of serverTCP.py
The Server is ready to receive

Lab 16

TTL/ Life of a Packet



Observation

LAB - 9)

Bafna Gold
 Date: _____ Page: _____

Aim - To demonstrate the TTL / life of a packet

Topology

Procedure :-

- (1) Create a 2 Po and 3 router configuration as shown in the topology
- (2) Use serial DTE between routers and copper cross over between routers and PC
- (3) Configure the IP address and gateway of PC and configure all the routers

For router 0

```

> enable
# config t
# interface Serial 2/0
# ip address 20.0.0.20 255.0.0.0
# no shut
# exit
  
```

ip route 0.0.0.0 0.0.0.0 0.0.0.0
ip route 10.0.0.0 255.0.0.0 9.0.0.10
exit

router A

enable

config

interface serial 0/0

ip address 10.0.0.10 255.0.0.0

no shutdown

exit

interface serial 1/0

ip address 10.0.0.10 255.0.0.0

no shutdown

exit

ip address interface serial 2/0

ip address 10.0.0.10 255.0.0.0

ip route 0.0.0.0 255.0.0.0 10.0.0.10

ip route 10.0.0.0 255.0.0.0 10.0.0.10

exit

router B

enable

config

interface serial 0/0

ip address 10.0.0.20 255.0.0.0

no shutdown

exit

interface fastethernet 0/0

ip address 10.0.0.20 255.0.0.0

no shutdown

exit

1st IP route 10.0.0.0 255.0.0.0 80.0.0.10
2nd IP route 20.0.0.0 255.0.0.0 80.0.0.10

- (4) Select simulation mode, select simple PDU and acknowledgement from PC to router and router to PC.
- (5) Click on PDU during every transition to see the inbound and outbound PDU details; observe the difference in the TTL.

Result :-

PDU information at PC:

Outbound PDU details:

TTL = 255

PDU information at Router 0

Inbound PDU details:

TTL = 255

Outbound PDU details:

TTL = 254

PDU information at Router 1

Inbound PDU details:

TTL = 254

Outbound PDU details:

TTL = 253

PDU information at Router 2

Inbound PDU details:

TTL = 253

Outbound PDU details:

TTL = 252.

OBSERVATION:-

The TTL is reduced by 1 in every router. TTL is a mechanism which limits the number of hops between source and destination.