

VISVESVARAYATECHNOLOGICALUNIVERSITY

“JnanaSangama”, Belgaum -590014, Karnataka.



LAB RECORD

Computer Network Lab (23CS5PCCON)

Submitted by

CHIRAG C S (1BM22CS079)

in partial fulfillment for the award of the degree of

**BACHELOROFENGINEERING
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 **Chirag C S (1BM22CS079)**, who is a 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.

Dr. Nandhini Vineeth Associate Professor Department of CSE, BMSCE	Dr. Kavitha Sooda Professor & HOD Department of CSE, BMSCE
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Index

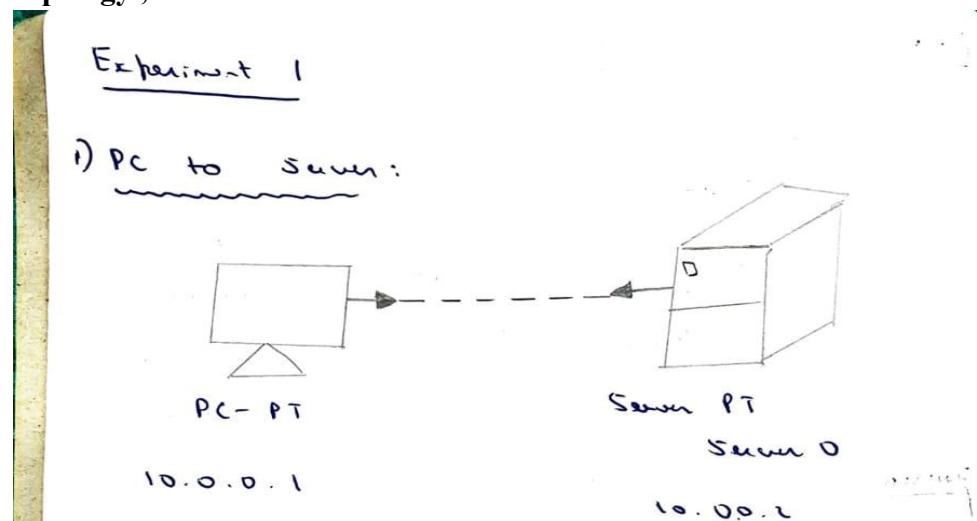
Sl. No.	Date	Experiment Title	Page No.
1	09-10-24	Create a topology and simulate sending a simple PDU from source to destination using hub and switch as connecting devices and demonstrate ping messages.	5-8
2	09-10-24	Configure IP address to routers in packet tracer. Explore the following messages: ping responses, destination unreachable, request timed out, reply.	9-12
3	16-10-24	Configure default route, static route to the Router (Part 1).	13-17
4	23-10-24	Configure default route, static route to the Router (Part 2).	18-21
5	13-11-24	Configure DHCP within a LAN and outside LAN.	22-26
6	20-11-24	Configure RIP routing Protocol in Routers .	27-31
7	20-11-24	Demonstrate the TTL/ Life of a Packet.	32-36
8	27-11-24	Configure OSPF routing protocol.	37-40
9	18-12-24	Configure Web Server, DNS within a LAN.	41-43
10	18-12-24	To construct a simple LAN and understand the concept and operation of Address Resolution Protocol (ARP).	44-46
11	18-12-24	To understand the operation of TELNET by accessing the router in the server room from a PC in the IT office.	47-49
12	18-12-24	To construct a VLAN and make the PC's communicate among a VLAN.	50-54
13	18-12-24	To construct a WLAN and make the nodes communicate wirelessly.	55-58
14	18-12-24	Write a program for error detecting code using CRC-CCITT (16-bits).	59-60
15	18-12-24	Write a program for congestion control using Leaky bucket algorithm.	61-63

16	18-12-24	Using TCP/IP sockets, write a client-server program to make the client send the file name and the server to send back the contents of the requested file if present.	64-65
17	18-12-24	Using UDP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.	66-67

Program 1

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

Topology , Procedure and Observation:



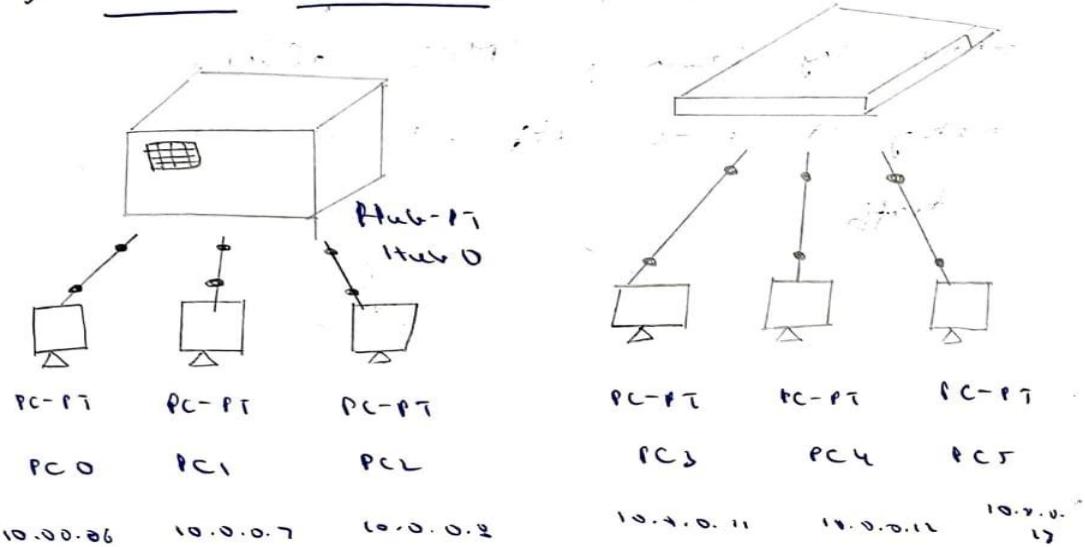
Aim: To set up a point network between a PC & a server, facilitating direct communication to observe data exchange.

Topology: A PC is connected to server using ~ crossover ethernet cable.

IP address of PC - 10.0.0.1
Server - 10.0.0.2

Observation: Direct communication allows PC to communicate with server, which is typically in small networks for tasks such as file sharing, service requests or testing server network.

2) Hub & Switch



Aim: To create simple network consisting of 3 PCs connected to a central hub & another network with 3 PCs connected to a switch. This connection will help observe the behaviour of data transmission using hub & switch devices.

Topology: 3 PCs are connected to a hub & switch using straight through cables.

Observation: Hubs transmit broadcast packets to all the devices which may cause unnecessary traffic.

Switch forwards packets only to appropriate
device by learning MAC address,
making it more efficient in delivering
traffic.

switch
on/off
S/H

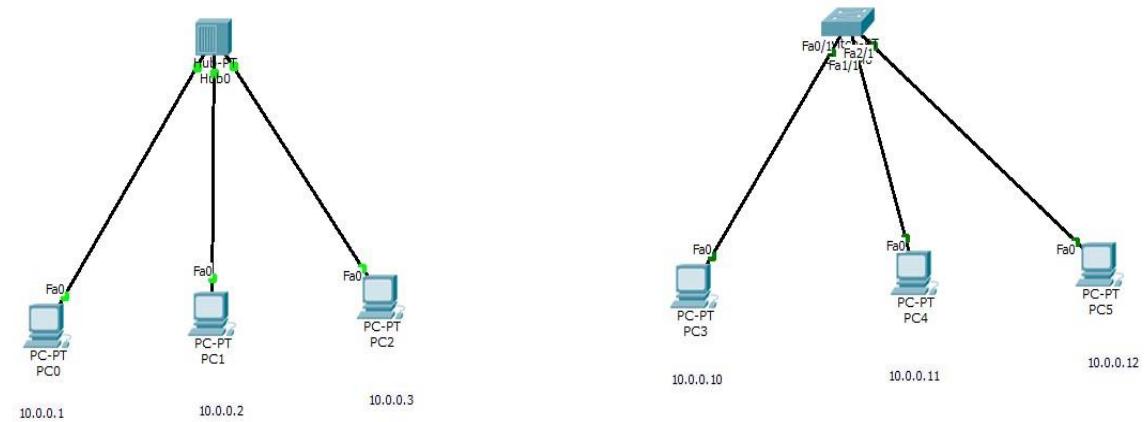
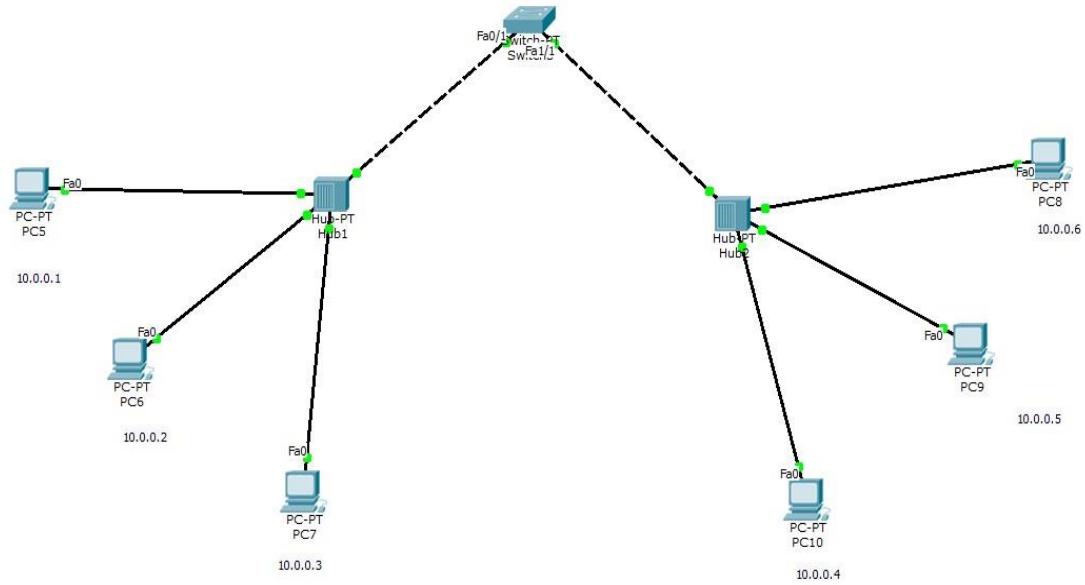
192.168.1.25 192.168.1.24 192.168.1.23 192.168.1.22 192.168.1.21 192.168.1.20
192.168.1.26 192.168.1.27 192.168.1.28 192.168.1.29 192.168.1.30 192.168.1.31
192.168.1.32 192.168.1.33 192.168.1.34 192.168.1.35 192.168.1.36 192.168.1.37

Switch performs switching function at layer 2
by reading destination MAC address and
forwarding to the port where the destination
MAC address is found. It also performs
switching function for broadcast and multicast
packets which are sent to all ports.

Switches can be interconnected to form a network
of switches called Switched LAN or Switched
Ethernet.

Advantages of Switches include:
1. Improved performance due to shared media
2. Improved security due to MAC filtering

Screen Shots:



Program 2

Aim: Configure IP address to routers in packet tracer. Explore the following messages: ping responses, destination unreachable, request timed out, reply.

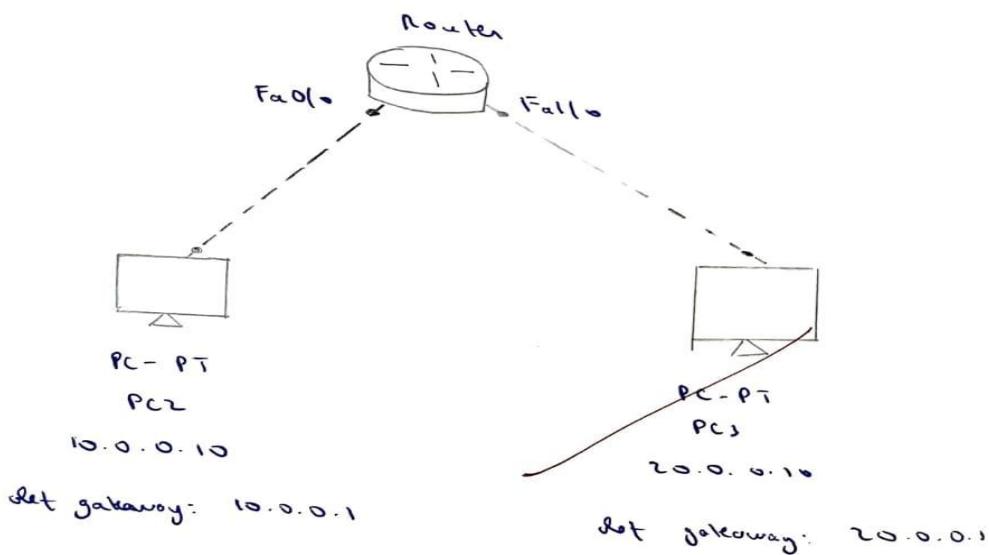
Topology , Procedure and Observation:

EXPERIMENT 2

9/10/24

Aim: To connect two different PCs on two different networks using a router

Topology:



Procedure:

- 1) Two PCs (PC0 & PC1) are assigned with IP's 10.0.0.10 and 20.0.0.10 and gateway 10.0.0.1 & 20.0.0.1 respectively.

2) Open CLI in router & enter the following:

Router > enable

Router # config +

Router (config) # interface fastethernet 0/0

Router (config-if) # ip address 10.0.0.1

255.0.0.0

Router (config-if) # no shutdown

exit

Router (config) # interface fastethernet 1/0

Router (config-if) # ip address 20.0.0.1

255.0.0.0

Router (config-if) # no shutdown

exit.

3) Ping another system or interface from

the command prompt of PC6 or PC1

wry command

ping 10.0.0.10

Observation:

Command prompt gives output

Pinging 10.0.0.10 with 32 bytes of Data
Request from 10.0.0.10 to 10.0.0.10

Ping statistics for 10.0.0.10
Packets sent = 4, Received = 4, Lost = 0

Approximate round trip times in milliseconds
(0% loss)

Minimum = 0ms, Maximum = 2ms, Average

The following level of IP route has been observed.

Router > Crable

Router # Show ip route

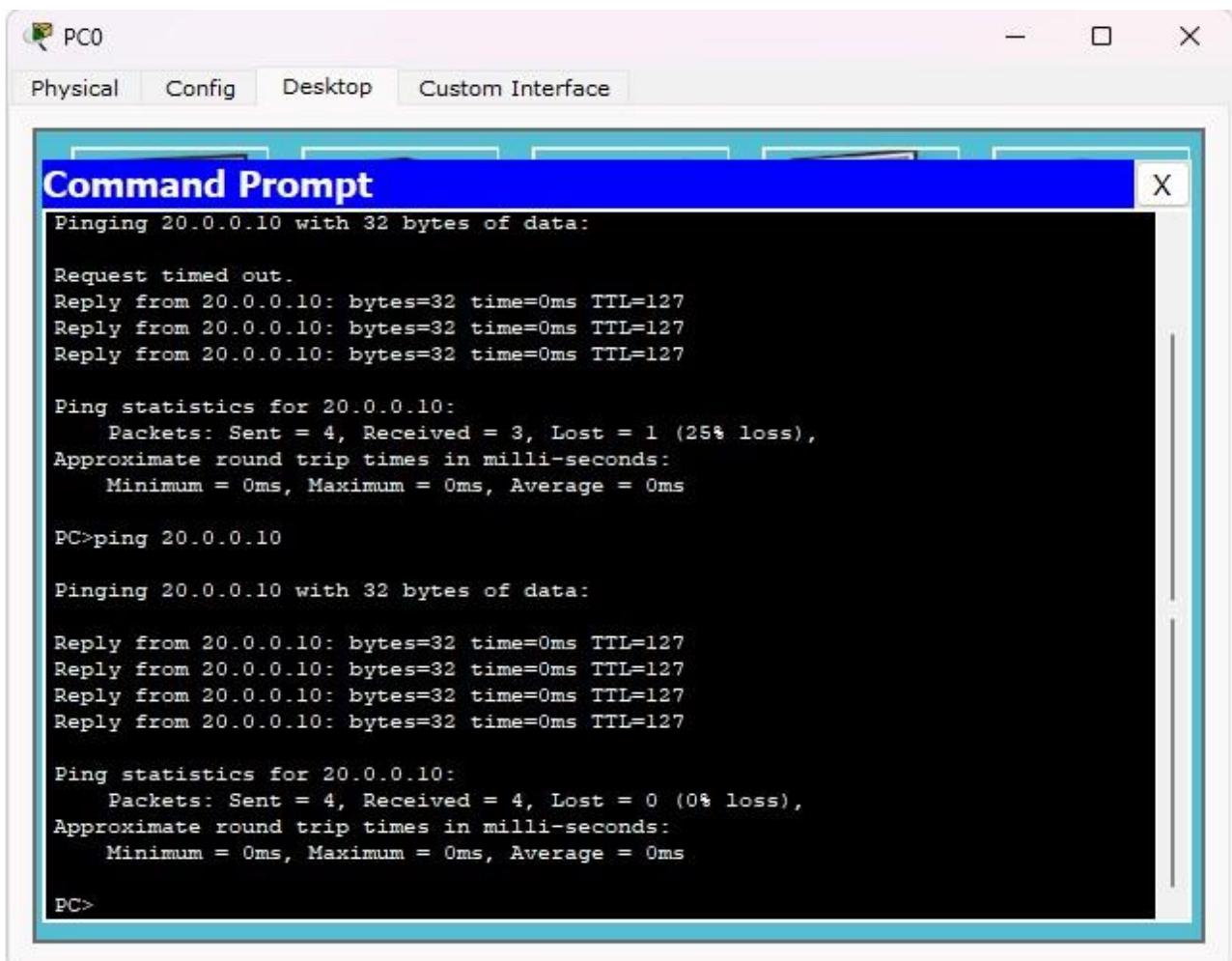
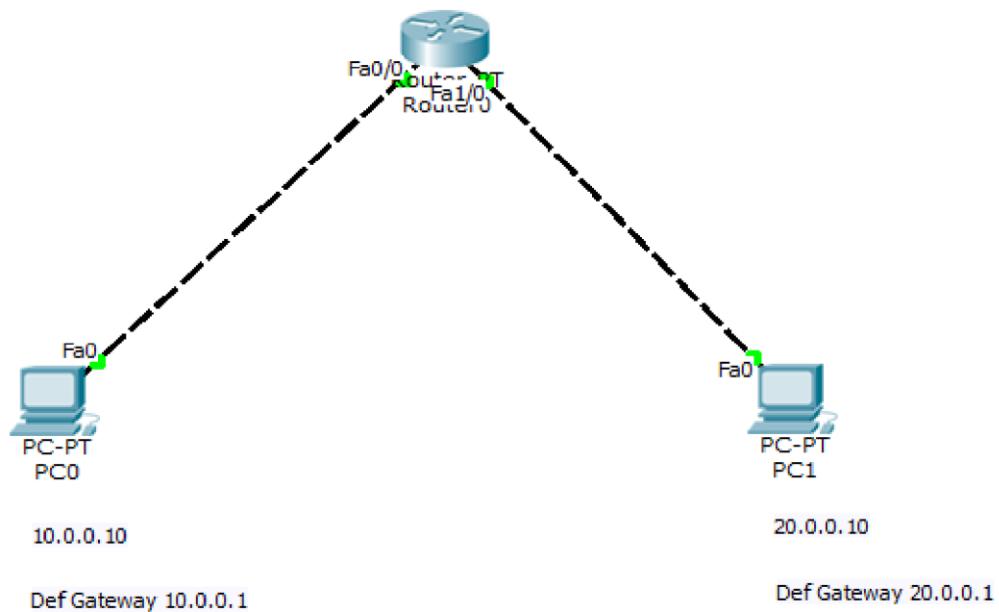
Codes: C - connected.

Not away of last resort is not ~~in~~ net

C 10.0.0.0/8 is directly connected, FastEthernet 0/0

C 20.0.0.0/8 is directly connected, FastEthernet 1/0

Screen Shots:



Program 3

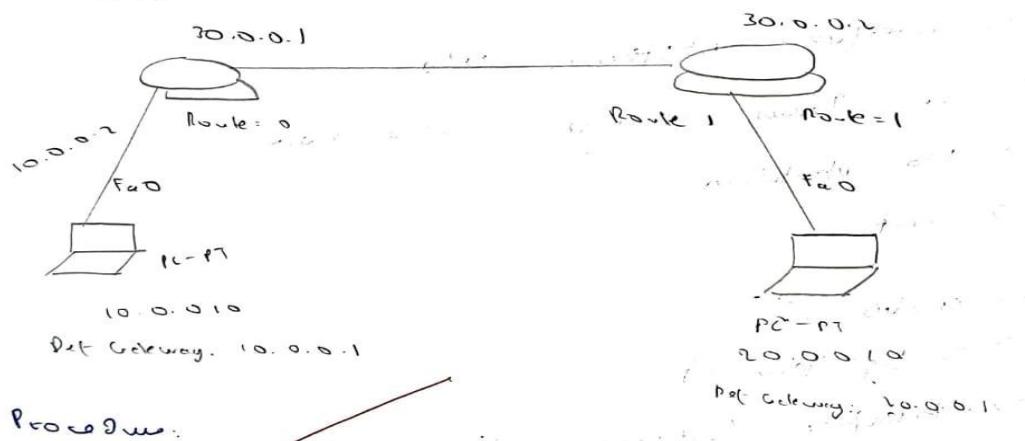
Aim: Configure default route, static route to the Router(Part 1).

Topology , Procedure and Observation:

LAB - 03

Aim: To configure IP Addresses to route in packet truck. Explore following messages responses destination unreachable.

Topology:



Procedure:

- 1) Drag & drop 2 generic router and Drag & drop 2 PCs.
- 2) Connect the routers and PCs using copper cross over cable.
- 3) Connect the 2 routers using Serial DCE wins.
- 4) Set the gateway as 10.0.0.2 for IP address as 10.0.0.1 to PC1

- 5) Set the gateway as 20.0.0.2 &
IP address as 20.0.0.1 to PC 2

- ⑥ Execute the following commands in CCI

PC → ①

→ enable
→ config terminal
→ interface fastethernet 0/0
→ IP address 10.0.0.1 255.0.0.
→ no shutdown
→ exit.

→ enable
→ config terminal
→ interface fastethernet 1/0
→ IP address 20.0.0.1 255.0.0.0
→ no shutdown
→ exit.

- ⑦ Execute the following command in CCI

exit till u get Router>

5 then enter

wlan 0

c 10.0.0.0/8 is Directly connected,
Fast ethernet 0/0.

c 20.0.0.0/8 is Directly connected,
serial 2/0.

① Go to the Router → ①

↳ CIS execute the following commands:

→ # interface serial 2/0
→ # ip address 30.0.0.1 netmask 255.0.0.0
→ no shutdown.

② Go to router → ②

↳ CIS execute the following commands:

→ interface serial 2/0
→ IP address 30.0.0.2 netmask 255.0.0.0
→ no shutdown.

Output:

Pinging Different network

from PC ②

Ping 10.0.0.1

Reply from 10.0.0.2 Destination host
unreachable.

Ping statistics for 10.0.0.1

Packets: Sent = 4, Received = 0

Loss = 4 (100% loss)

From PC ②

Ping 30.0.0.1

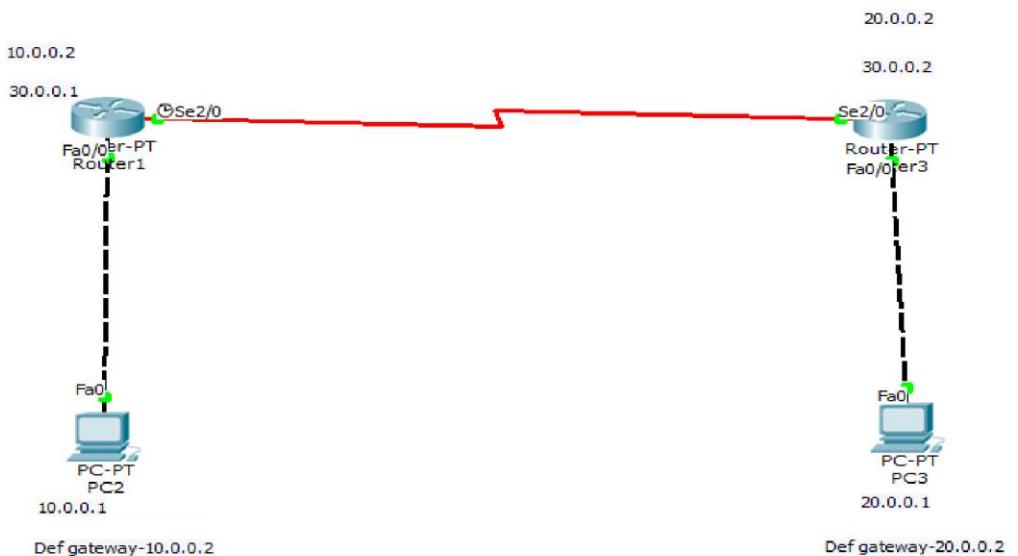
Request time out

Ping statistics for 30.0.0.2

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

(100% loss).

Screen Shots:



PC2

Physical Config Desktop Custom Interface

Command Prompt

```

Reply from 10.0.0.2: Destination host unreachable.
Reply from 10.0.0.2: Destination host unreachable.
Reply from 10.0.0.2: Destination host unreachable.

Ping statistics for 20.0.0.1:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
PC>ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data:

Reply from 10.0.0.2: Destination host unreachable.

Ping statistics for 20.0.0.1:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
PC>ping 20.0.0.2

Pinging 20.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: Destination host unreachable.

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

```

Program 4

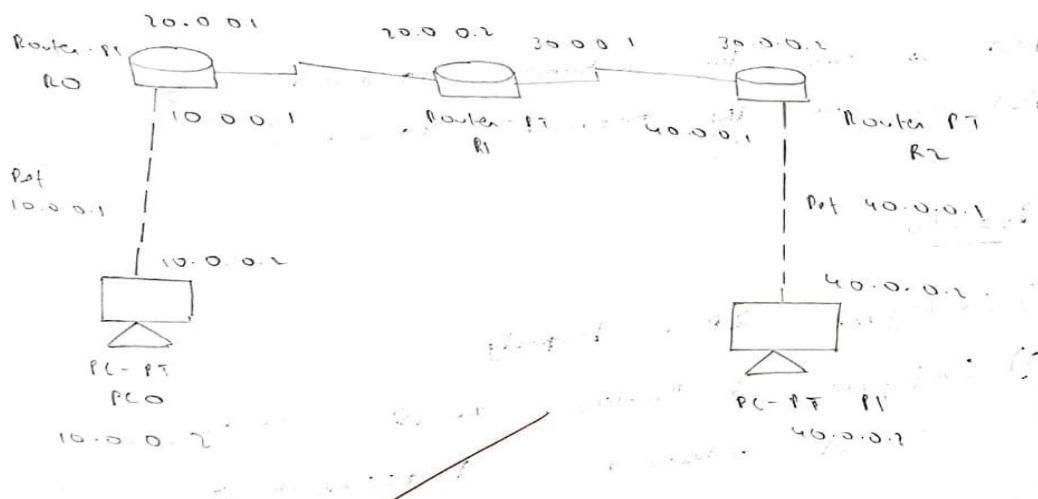
Aim: Configure default route, static route to the Router(Part 2).

Topology , Procedure and Observation:

Experiment 3

Aim: Configure Default Route, Static Route to the Router

Topology: 3 Routers with 2 PCs at opposite ends.



PC0: Fa0/0 - 10.0.0.2

IP - 10.0.0.2, Def Gateway - 10.0.0.1

PC1: Fa0/0 - 40.0.0.2

IP - 40.0.0.2, Def Gateway - 40.0.0.1

R0:

Fa0/0 - 10.0.0.1

Serial 1/0 - 20.0.0.1

R2:

Fast ethernet 0/0 : 40.0.0.1

Serial 2/0 : 30.0.0.2

R3:

Serial 2/0 : 20.0.0.2

Serial 3/0 : 10.0.0.1

PC0 is on the network 10.0.0.0

PC1 is on the network 40.0.0.0

Procedure:

1) Configure 2 PCo properly.

2) Configure 3 Routers according to their
correct intentions - Fastethernet & Serial

3) Default route R1:

ip route 10.0.0.0 255.0.0.0 20.0.0.1

ip route 40.0.0.0 255.0.0.0 30.0.0.2

4) Static route R2:

ip route 0.0.0.0 0.0.0.0 20.0.0.2

5) Static route R3:

ip route 0.0.0.0 0.0.0.0 30.0.0.1

Observations:

R1:

show ip route

C 10.0.0.0/8 is directly connected, FastEthernet 0/0

C 20.0.0.0/24 is directly connected, Serial 2/0

S 0.0.0.0/0 (110) via 20.0.0.2

R2:

show ip route

C 30.0.0.0/8 is directly connected, Serial 2/0

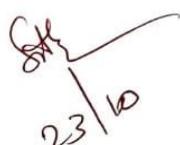
C 40.0.0.0/8 is directly connected, FastEthernet 0/0.

S 0.0.0.0/0 (110) via 30.0.0.1

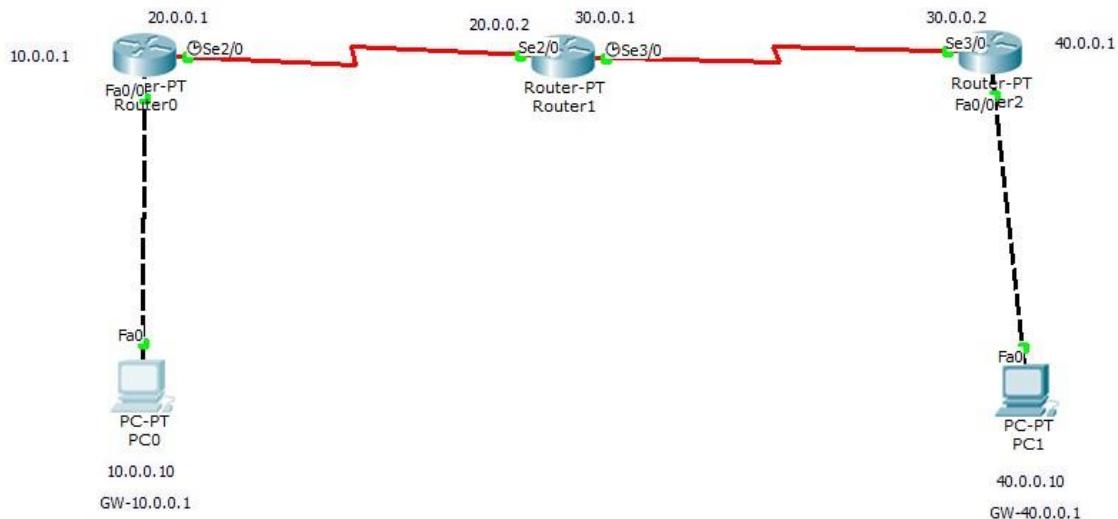
PC0

Displaying 40.0.0.2

Details: $D_{out} = 4$, $H_{new} = 4$, $C_{out} = 0$ ($0 \cdot L_{out}$)



Screen Shots:



PC> ping 40.0.0.10

Pinging 40.0.0.10 with 32 bytes of data:

Request timed out.
Reply from 40.0.0.10: bytes=32 time=7ms TTL=125
Reply from 40.0.0.10: bytes=32 time=6ms TTL=125
Reply from 40.0.0.10: bytes=32 time=5ms TTL=125

Ping statistics for 40.0.0.10:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 5ms, Maximum = 7ms, Average = 6ms

PC> ping 40.0.0.10

Pinging 40.0.0.10 with 32 bytes of data:

Reply from 40.0.0.10: bytes=32 time=8ms TTL=125
Reply from 40.0.0.10: bytes=32 time=7ms TTL=125
Reply from 40.0.0.10: bytes=32 time=9ms TTL=125
Reply from 40.0.0.10: bytes=32 time=6ms 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 = 6ms, Maximum = 9ms, Average = 7ms

PC>

Program 5

Aim: Configure DHCP within a LAN and outside LAN.

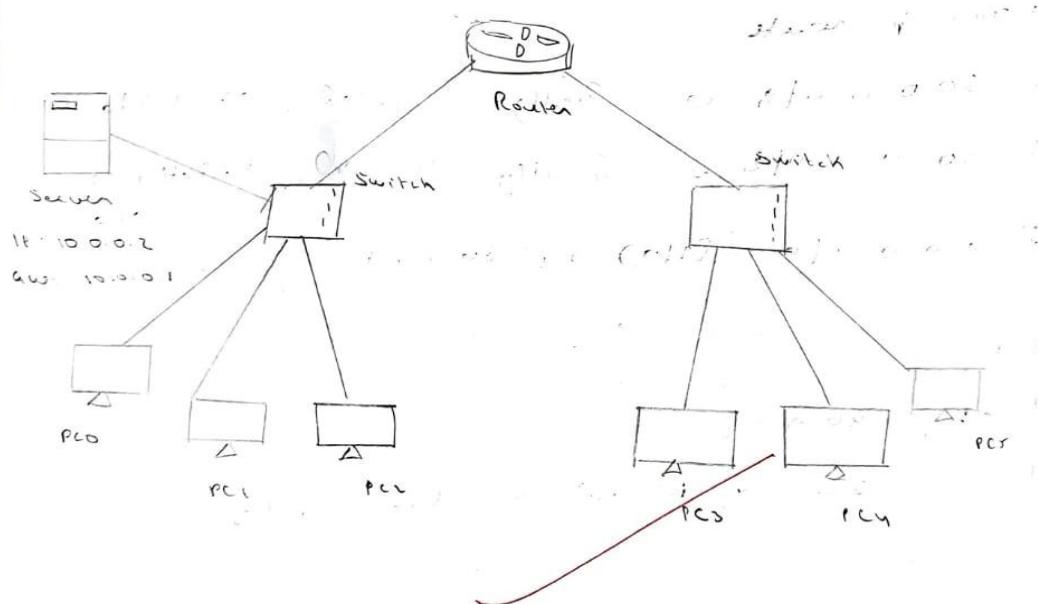
Topology , Procedure and Observation:

Experiment - 5

Configure DHCP within a LAN and outside LAN

Aim: To connect various end devices
through switches & routers.

Topology:



Procedure:

- 1) Place a switch, a server, ³ two PCs and configure them.
- 2) Construct another network similar to the above explained.
- 3) Under DHCP in config create a pool such that none is:
switch 1 is, Default gw: 10.0.0.1 and Start ip as 10.0.0.2
- 4) Click on DHCP under IP config in PC 0, 1, 2 & 3. IP address will be set dynamically.

Observation:

~~DHCP request successful~~
IP address 10.0.0.2

Procedure (2)

- 1) To enable DHCP for outside connection switch is configured as such

Router Config fastEthernet 0/0

Router (config-if) # ip address 10.0.0.1
255.0.0.0

Router (config-if) # ip helper-address

10.0.0.2

Router (config-if) no shutdown

exit

Router (config) interface fastEthernet 0/0

Router (config-if) address 20.0.0.1
255.0.0.0

Router (config-if) # ip helper-address

Router (config-if) # no shutdown

exit.

i) Dynamically enable ip address for

the device

Observation:

i) IP address dynamically set

ii) On bringing network 2 devices

from network 1 :

Pinging 20.0.0.9 with 32 bytes of

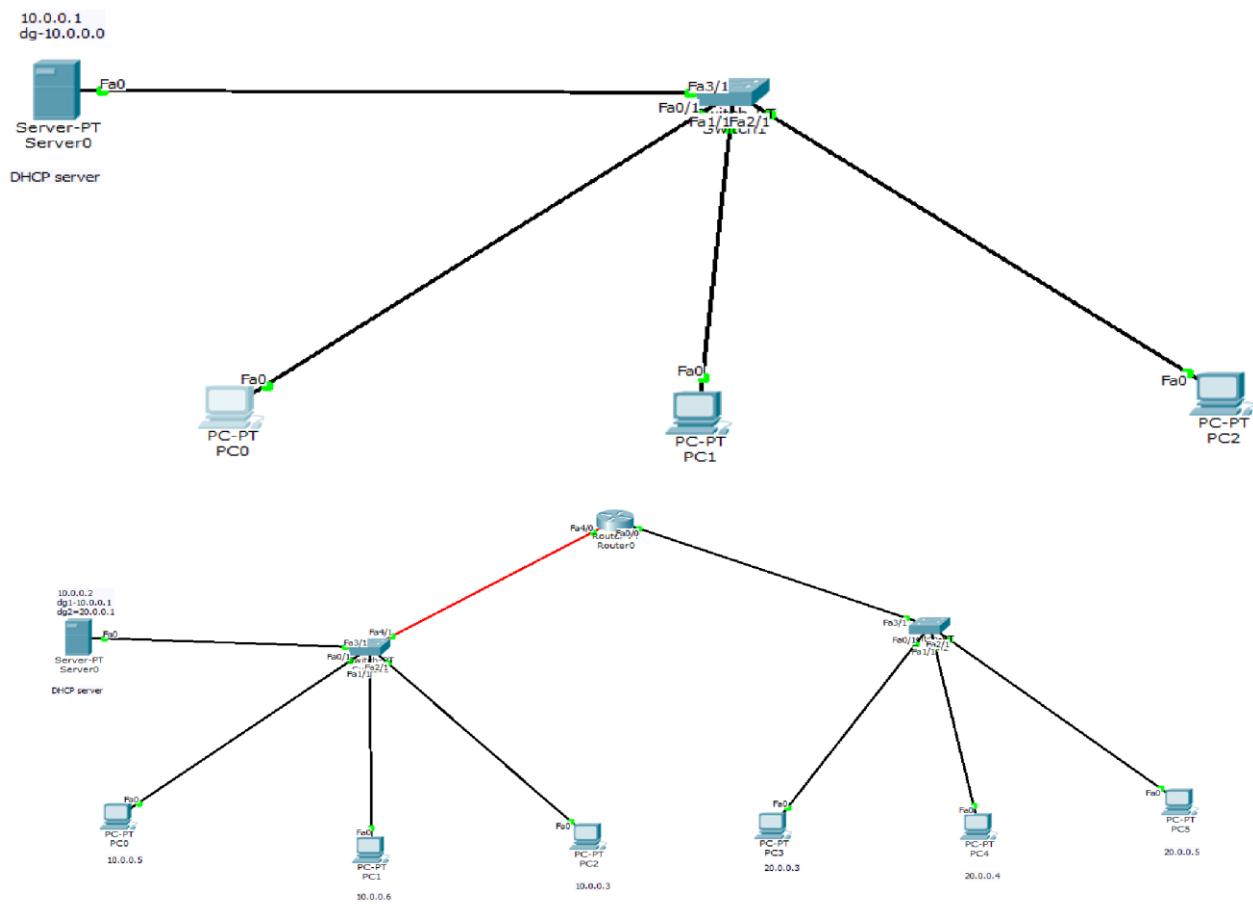
data

Packets: sent = 4, Received = 4, lost = 0

(0% lost).

8th
13/11/2014

Screen Shots:



```

PC0
Physical Config Desktop Custom Interface

Command Prompt
Packet Tracer PC Command Line 1.0
PC>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=0ms TTL=128
Reply from 10.0.0.4: bytes=32 time=0ms TTL=128
Reply from 10.0.0.4: bytes=32 time=0ms 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

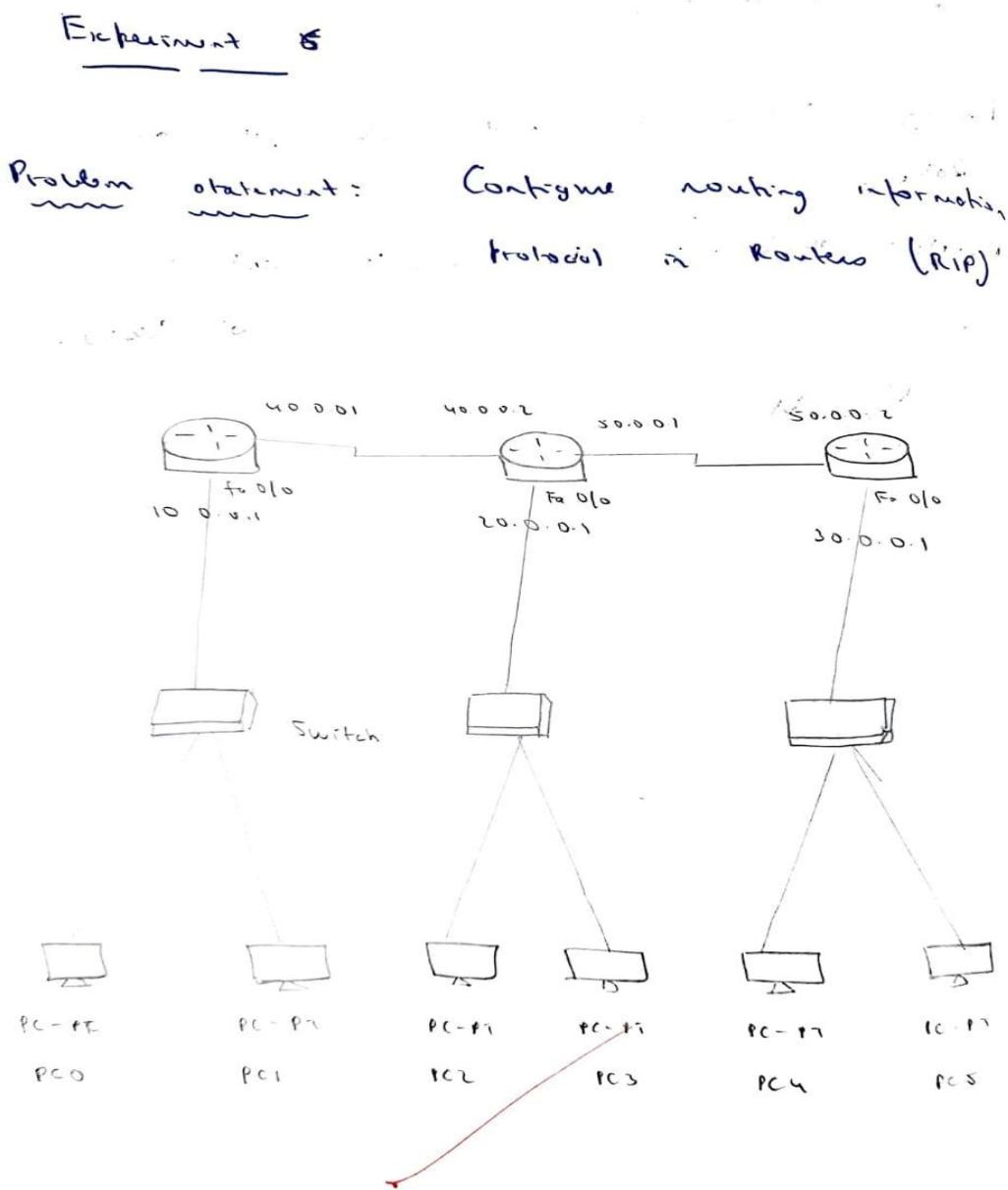
PC>

```

Program 6

Aim: Configure RIP routing Protocol in Routers .

Topology , Procedure and Observation:



Procedure:

- 1) Place 3 Routers (CISCO), 3 Concentrator Switches to 6 PCs
- 2) Connect the Routers to the corresponding switches & connect 2 PCs to one switch.
- 3) Use "Automatically" choose Connection Type
- 4) Configure the Tel Device and define gateway.
- 5) Configure the router using CLI and check for green light for all connections.

For Router 0:

Router > enable

Router # config terminal

Router (config)# router rip

Router (config-router)# network 10.0.0.0

Router (config-router)# network 40.0.0.0

Router (config)# exit.

For Router 1:

Router > enable

Router # config terminal

Router (config) # router rip

Router (config-router) # network 40.0.0.0

Router (config-router) # network 50.0.0.0

Router (config-router) # network 30.0.0.0

Router (config) # exit.

For Router 2:

Router > enable

Router # config terminal

Router (config) # router rip

Router (config-router) # network 50.0.0.0

Router (config-router) # network 30.0.0.0

Router (config) # exit.

Demonstrate the TTL life of a packet

Packet :

Observation:

① Before routing information protocol.

In Router 2 :

Show ip route:

C 30.0.0.0/8 via 2.2.2.2 Directly connected, Fast

Ethernet 0/1

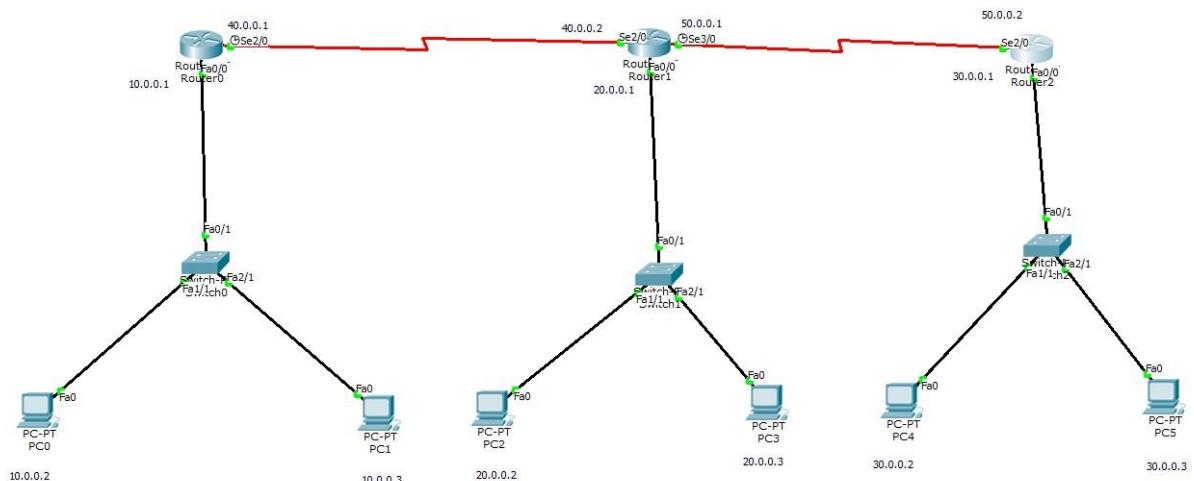
C 50.0.0.0/8 via 2.2.2.2 Directly connected, serial

2/0

R 10.0.0.0/3 [Serial] via 50.0.0.1, 0

Frame

Screen Shots:



PC0

Physical Config Desktop Custom Interface

Command Prompt

```
Pinging 30.0.0.2 with 32 bytes of data:
Request timed out.
Reply from 30.0.0.2: bytes=32 time=7ms TTL=125
Reply from 30.0.0.2: bytes=32 time=6ms TTL=125
Reply from 30.0.0.2: bytes=32 time=7ms TTL=125

Ping statistics for 30.0.0.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 6ms, Maximum = 7ms, Average = 6ms

PC>ping 30.0.0.2

Pinging 30.0.0.2 with 32 bytes of data:

Reply from 30.0.0.2: bytes=32 time=4ms TTL=125
Reply from 30.0.0.2: bytes=32 time=7ms TTL=125
Reply from 30.0.0.2: bytes=32 time=7ms TTL=125
Reply from 30.0.0.2: bytes=32 time=7ms TTL=125

Ping statistics for 30.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 7ms, Average = 6ms

PC>
```

Program 7

Aim: Demonstrate the TTL/ Life of a Packet .

Topology , Procedure and Observation:

Exp - 6

Demonstrate the TTL life of a Packet :

- ① Demonstrate the TTL using some topology technology
- ② Send a simple PDU (Packet Distribution Unit) for end devices 192.0.2 to 30.0.0.2 in Simulation mode.
- ③

Observations

① Router 0

Inbound Details : TTL: 255

Outbound Details : TTL: 254

② Router 1

Inbound Details : TTL: 254

Outbound Details : TTL: 253

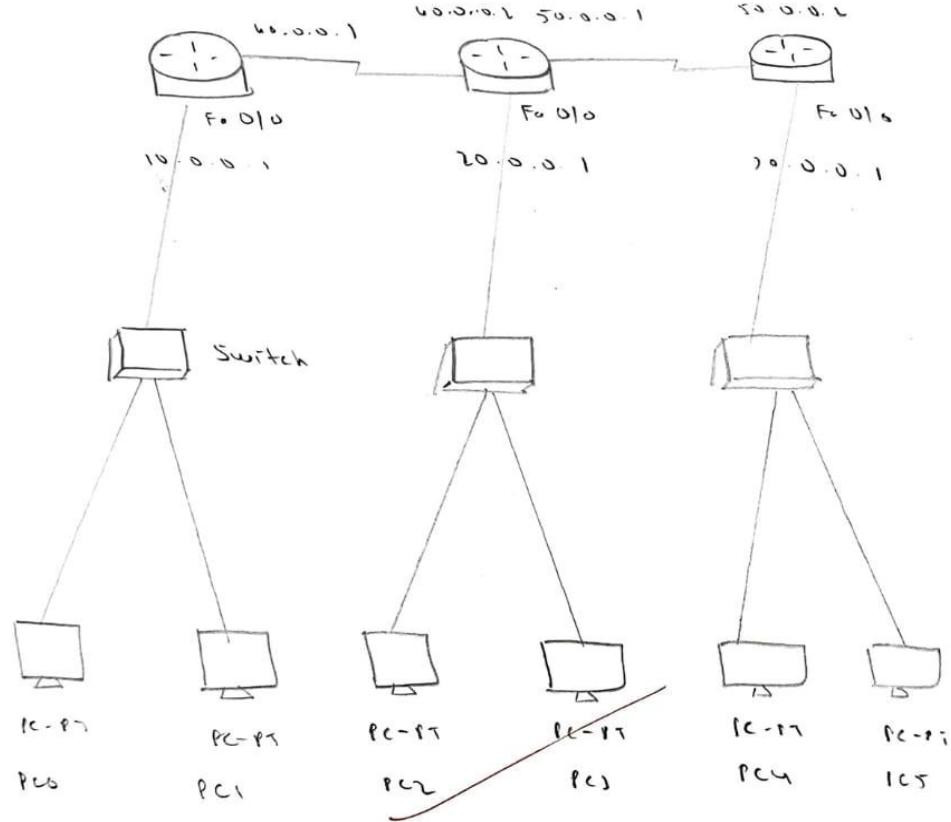
③ Router 2

Inbound Details : TTL: 253

Outbound Details : TTL: 252

TTL decreases after passing through every router.

Topology:



Procedure (Continue)

~~8th~~ ✓
20th

51

→ Configure the devices as the above
topology.

→ Configure the routers as well

Screen Shots:

PDU Information at Device: Router0

OSI Model Inbound PDU Details Outbound PDU Details

At Device: Router0
Source: PC0
Destination: PC3

In Layers	Out Layers
Layer7	Layer7
Layer6	Layer6
Layer5	Layer5
Layer4	Layer4
Layer 3: IP Header Src. IP: 10.0.0.2, Dest. IP: 20.0.0.3 ICMP Message Type: 8	Layer 3: IP Header Src. IP: 10.0.0.2, Dest. IP: 20.0.0.3 ICMP Message Type: 8
Layer 2: Ethernet II Header 000A.41E3.E33A >> 0010.11A0.4697	Layer 2: HDLC Frame HDLC
Layer 1: Port FastEthernet0/0	Layer 1: Port(s): Serial2/0

1. FastEthernet0/0 receives the frame.

[Challenge Me](#) [<< Previous Layer](#) [Next Layer >>](#)

PDU Information at Device: Router0

OSI Model Inbound PDU Details Outbound PDU Details

PDU Formats

Ethernet II					
0	4	8	14	19	Bytes
PREAMBLE: 101010...1011		DEST MAC: 0010.11A0.4697		SRC MAC: 000A.41E3.E33A	
TYPE: 0x800		DATA (VARIABLE LENGTH)			FCS: 0x0

IP					
0	4	8	16	19	31 Bits
4	IHL	DSCP: 0x0	TL: 28		
ID: 0xa		0x0	0x0		
TTL: 255	PRO: 0x1	CHKSUM			
SRC IP: 10.0.0.2					
DST IP: 20.0.0.3					
OPT: 0x0			0x0		
DATA (VARIABLE LENGTH)					

ICMP			
0	8	16	31 Bits
TYPE: 0x8	CODE: 0x0	CHECKSUM	

PDU Information at Device: Router0

x

OSI Model Inbound PDU Details Outbound PDU Details

PDU Formats

HDLC

0	8	16	32	32+x	48+x	56+x
FLG: 0111 1110	ADR: 0x8f	CONTROL: 0x0	DATA: (VARIABLE LENGTH)	FCS: 0x0	FLG: 0111 1110	

IP

0	4	8	16	19	31 Bits
4	IHL	DSCP: 0x0		TL: 28	
		ID: 0xa	0x0	0x0	
TTL: 254		PRO: 0x1		CHKSUM	
		SRC IP: 10.0.0.2			
		DST IP: 20.0.0.3			
		OPT: 0x0		0x0	
		DATA (VARIABLE LENGTH)			

ICMP

0	8	16	31 Bits
TYPE: 0x8	CODE: 0x0	CHECKSUM	
ID: 0x5		SEQ NUMBER: 10	

Program 8

Aim: Configure OSPF routing protocol.

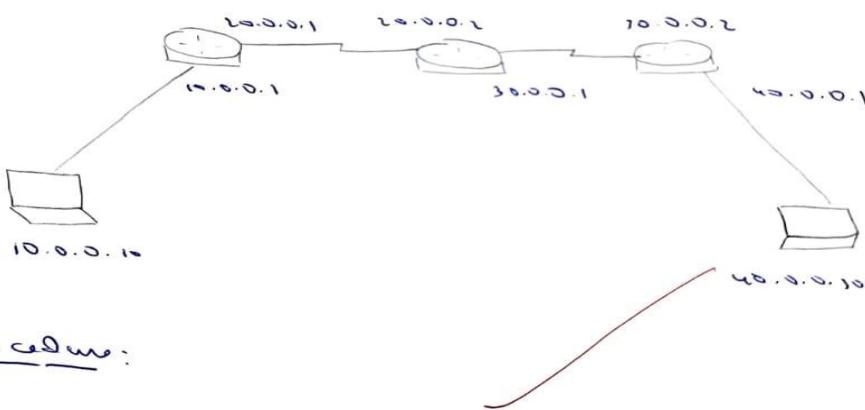
Topology , Procedure and Observation:

Experiment 8

Configure OSPF routing protocol

Aim: To demonstrate OSPF, routing protocol
with several routers & networks

Topology:



Procedure:

- 1) Configure all the devices as given above in the topology
- 2) Enter the following commands:
 - 1) Router (config-if) # creatapulation 111
(To all the ports with clock 0 symbol):
 - 2) Router (config-if) # clock rate 64000

- 2) Enter the OSPF commands:
- 1) Router (config) # router ospf 1
 - 2) Router (config-router) # router-id 1.1.1.1
(or any arbitrary id)
 - 3) Router (config-router) # network
~~1.1.1.1 0.0.0.0 area 0~~
X.0.0.0 0.255.255.255 area Y
- 3) Enter the loopback commands:
- 1) Router (config) # interface loopback 0
 - 2) Router (config-if) # ip address 172.16.1.252
~~255.255.0.0~~
 - 3) Router (config-if) # no shutdown
- ~~255.255.0.0~~

4) Create Virtual link

- 1) R1 (config) # router ospf 1
- 2) R2 (config) #
- 3) R1 (config-router) # area 1 virtual-link
2.2.2.1

→ R2 (config) # router osft 1

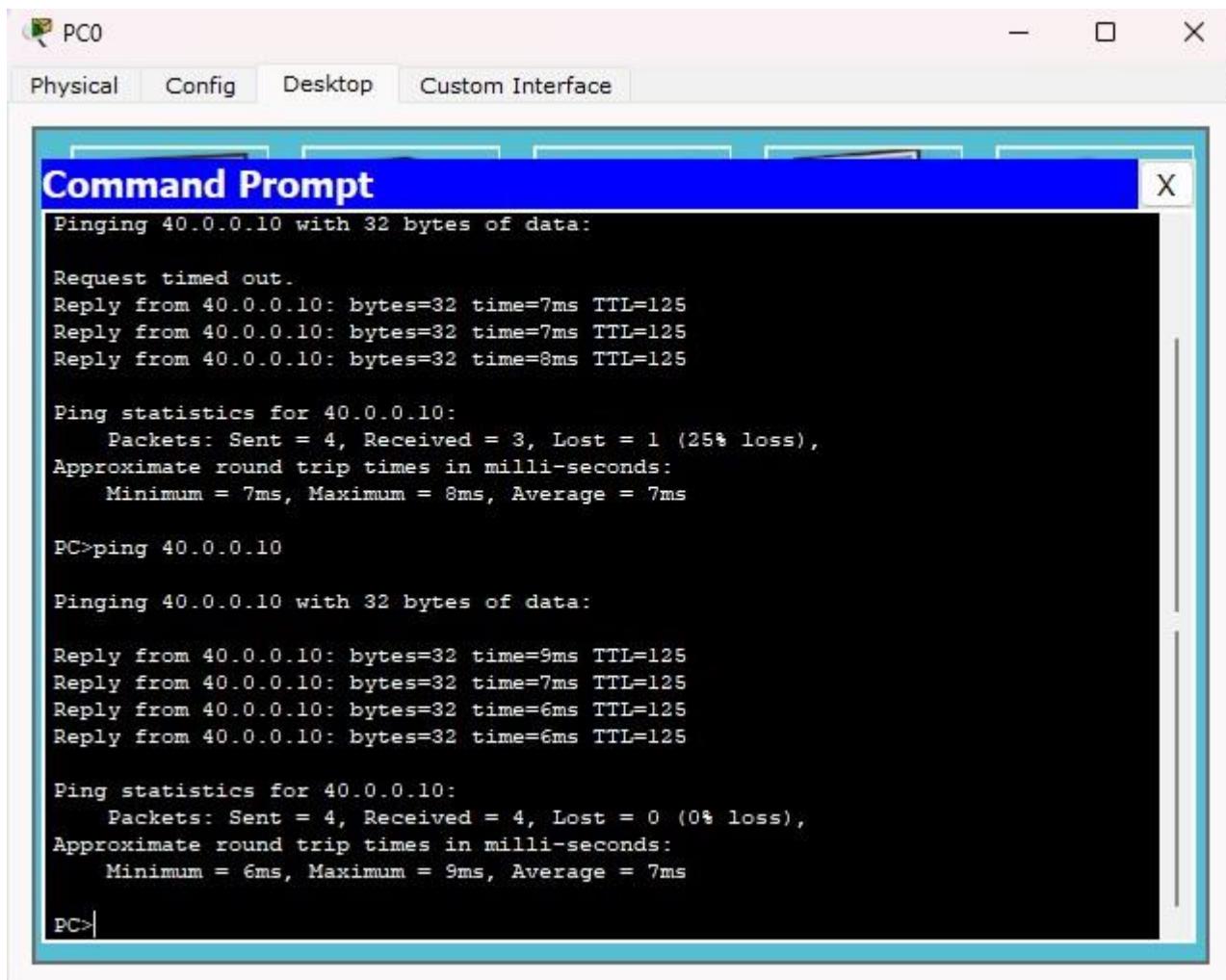
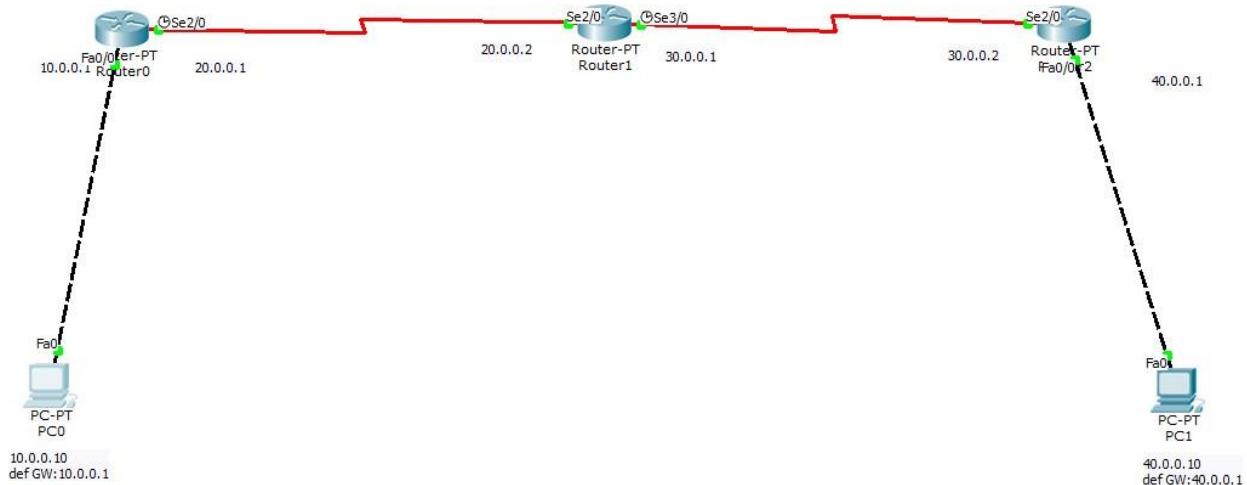
→ R2 (config-router) # area 1 virtual-link

Observation:

After entering show ip routes in R3

- D 1A 10.0.0.0/3 via 30.0.0.1, serial 2/0
- D 1A 20.0.0.0/8 via 30.0.0.1, serial 2/0
- C 30.0.0.0/32 → Directly connected, Serial 2/0
- C 30.0.0.1/32 → Directly connected, Serial 2/0
- C 40.0.0.0/8 → Directly connected, fastethernet
- C 192.16.0.0/16 → Directly connected, loopback 0

Screen Shots:



Program 9

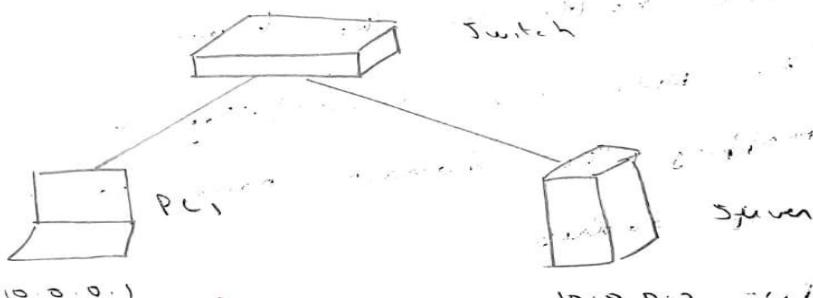
Aim: Configure Web Server, DNS within a LAN.

Topology , Procedure and Observation:

DNS

Configure Web Server, DNS within a LAN

Topology



Procedure:

1) Set up the LAN as shown in the topology

2) Go to Server → Service → DNS

Name: BM5

Address: 10.0.0.2

3) Add the mapping of domain name by address

4) Go to PC → config → global → setting → DNS screen: 10.0.0.2

(The server that provides the DNS mapping)

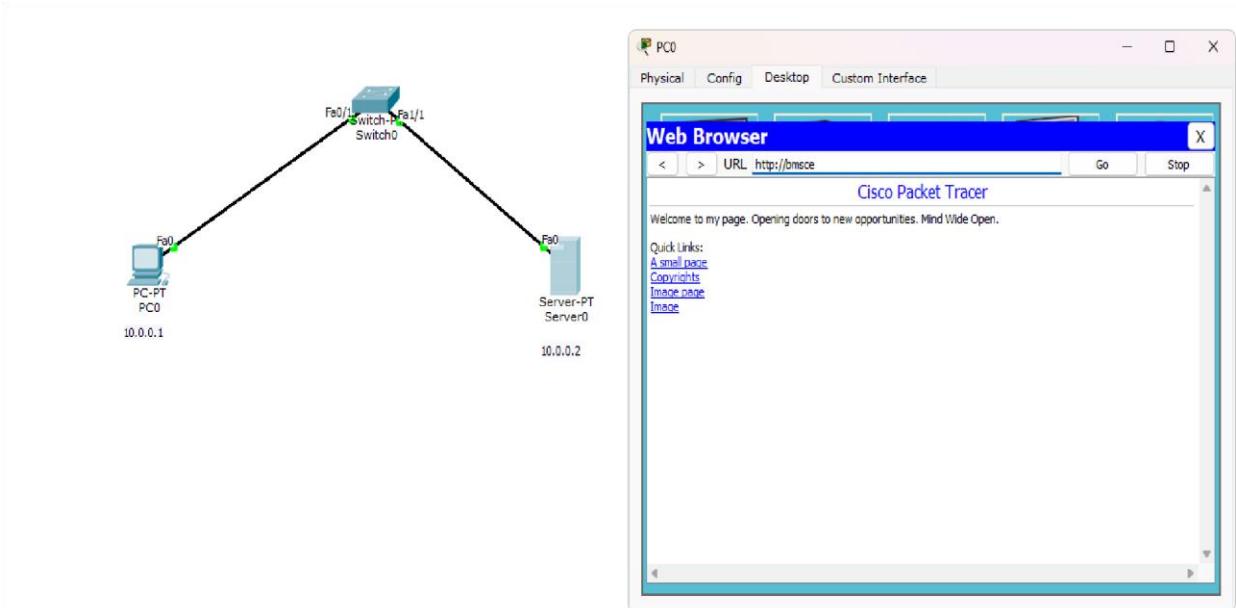
Go to PC \rightarrow Desktop \rightarrow Web Browser

Type the URL: <https://192.168.1.10>

Observation:

- \rightarrow The webpage hosted by the server were visible on the browser
- \circ The DNS was successfully in mapping the domain name to the IP address
- \circ DNS Server is a server that contains a Domain name: IP address mapping to which the end devices sent request to map the name to IP Address.

Screen Shots:



Program 10

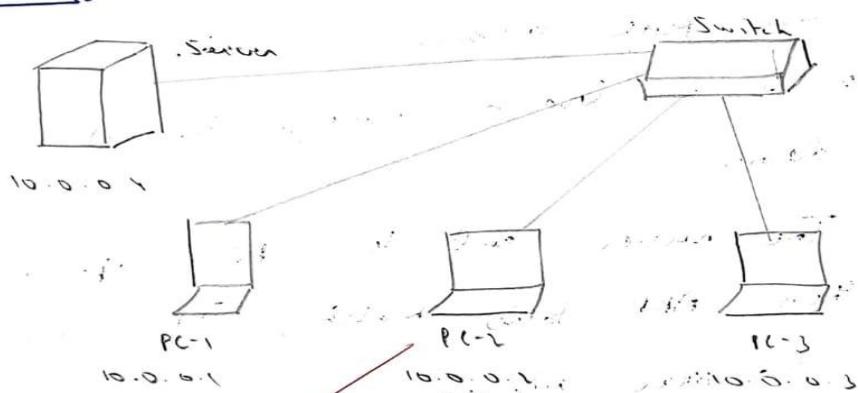
Aim: To construct simple LAN and understand the concept and operation of Address Resolution Protocol (ARP)

Topology , Procedure and Observation:

ARP

To construct a simple LAN to understand the concept & operation of ARP protocol.

Topology



Procedure

- 1) Create the topology as shown above
- 2) Configure the PCs & the server.
- 3) Click on Inspect mode (q) → and device → open ARP Table.
- 4) Send a Data Packet from any end device say server to PC -> 10.0.0.3
- 5) Open simulation mode to capture last step of Data transfer.

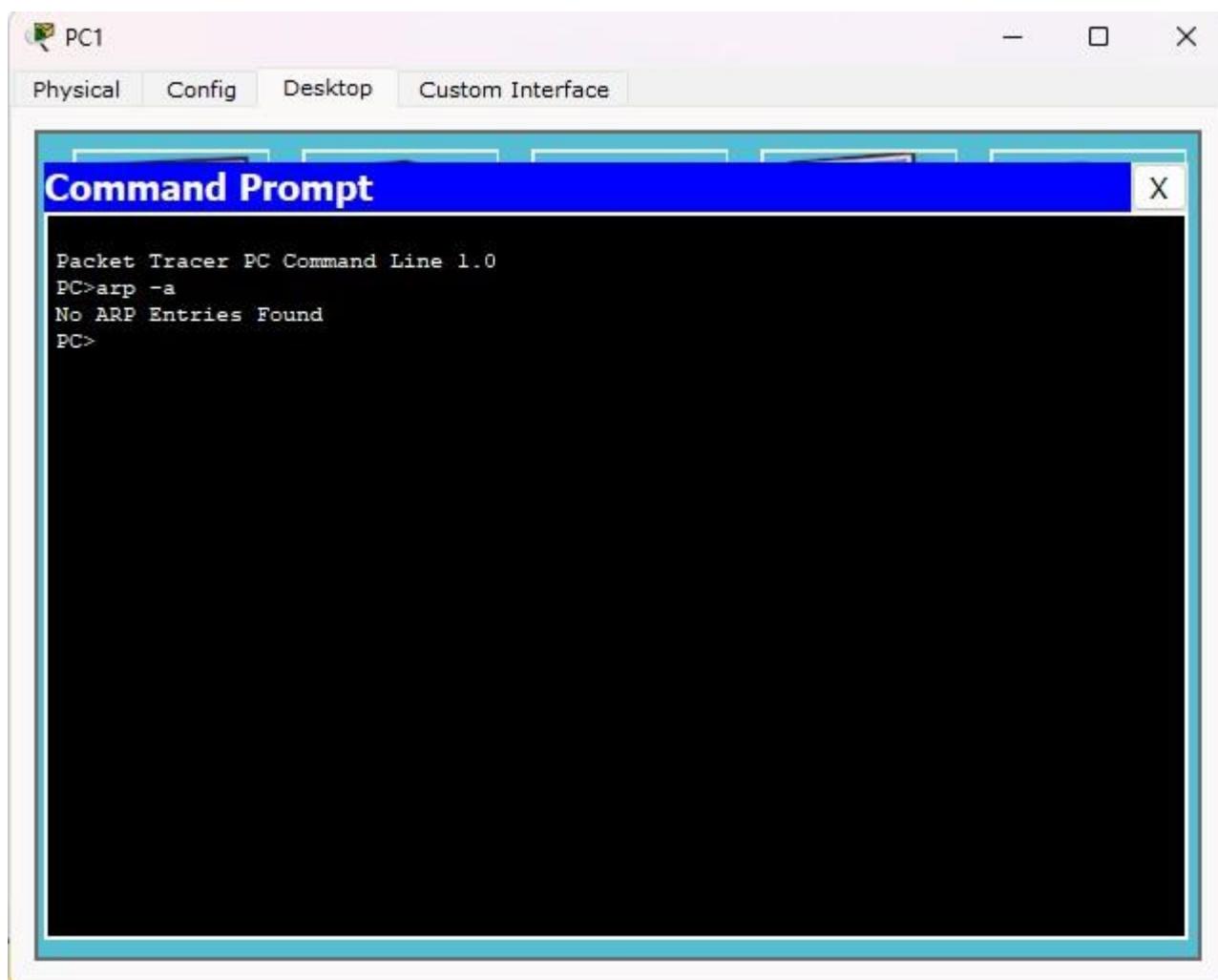
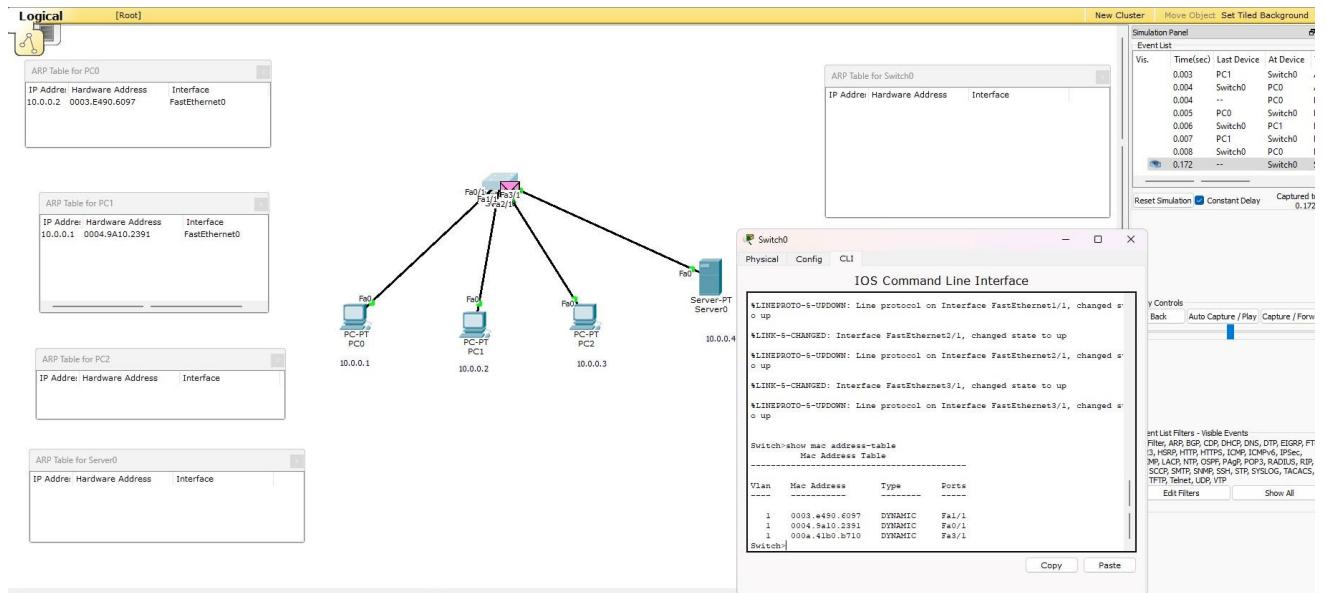
Observation

- The ARP Table of all end devices are initially empty.
- When the data packet from server arrives at the switch since the source MAC address is unknown, it sends a broadcast message to all devices.
- The server and the PC updates their ARP tables matching IP address to MAC address.
- Over time the ARP tables grows by data packets received.
- ~~Consider the ARP table~~
Similarly other ARP tables are updated.

ARP table for 10.0.0.4

IP Address		Hardware Address		Interface
10.0.0.3		00:0C:26:47:E5		Fastethernet 0

Screen Shots:



Program 11

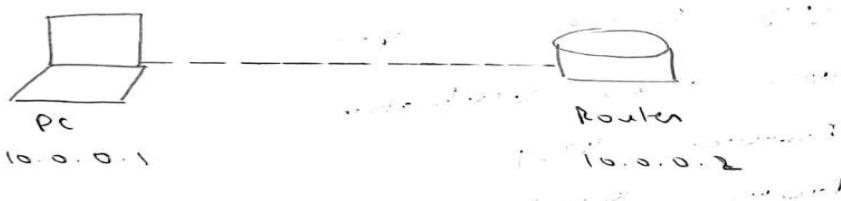
Aim: To understand the operation of TELNET by accessing the router in the server room from a PC in the IT office.

Topology , Procedure and Observation:

TELNET

To understand the operation of telnet,
by accessing the router in server room
from a PC in office.

Topology :



Procedure:

- 1) Create the topology , as given in
do above & configure the devices
- 2) In Router:

```
router enable
router config t
router # host name Rq
R1 # enable secret 1234
interface fast ethernet 0/0
ip address 10.0.0.2 255.0.0.0
no shut
line vty 0 3
```

login

password 4321 } 2nd bw

Next to the password is a question mark.

- .) In PC → Command prompt
- .) First try ping to see if devices are connected

PC's telnet (0.0.0.2)

Trying 0.0.0.2 open

User access verification

Password: 4321

Password: 4321

R1 > enable

Password: 1234

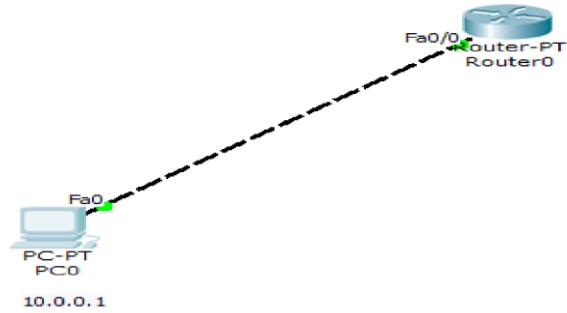
R1 # show ip route

C 0.0.0.0/0 is directly connected, Fast Ethernet 0/0.

Observation:

- .) The admin in a PC is able to run command as if he would be in CLI's session from a PC.
- .) Telnet allows user to establish a remote session with another device.

Screen Shots:



Command Prompt

```
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time=0ms TTL=255

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

PC>telnet 10.0.0.2
Trying 10.0.0.2 ...Open

User Access Verification

Password:
R1>enable
Password:
R1#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

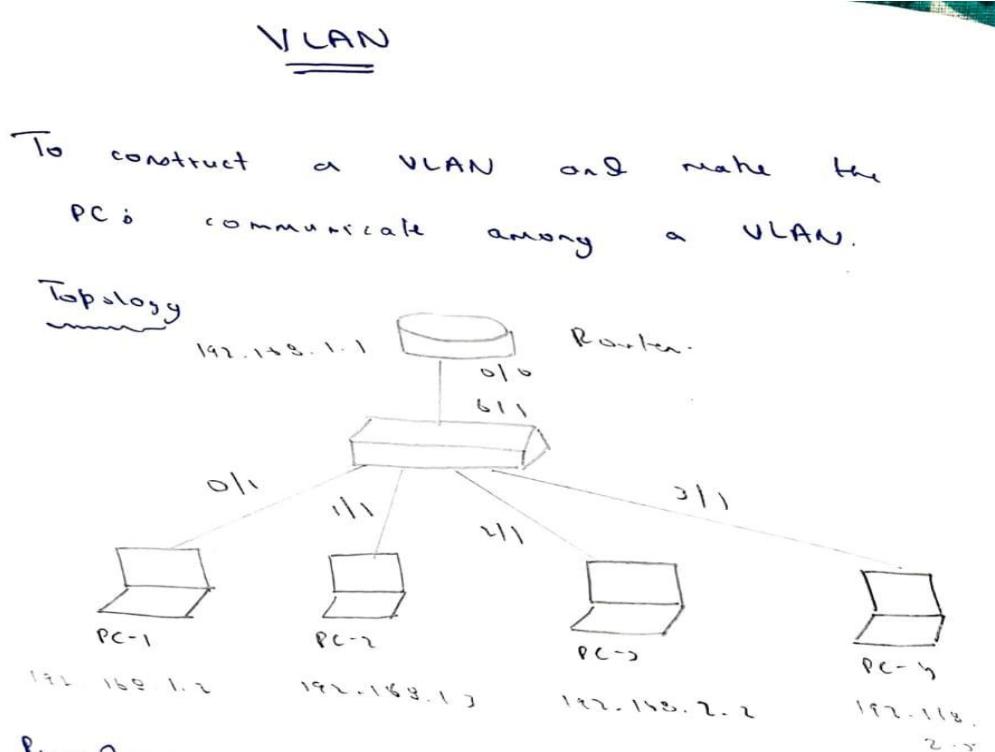
Gateway of last resort is not set

C    10.0.0.0/8 is directly connected, FastEthernet0/0
R1#|
```

Program 12

Aim: To construct a VLAN and make the PC's communicate among a VLAN.

Topology , Procedure and Observation:



Procedure:

- 1) Place a router, a switch and 4 PCs and make connections as drawn in topology
- 2) Connect the four PCs to the switch via fast ethernet
- 3) Since only 4 fast ethernet ports are available in a switch, we have to add one ethernet port.
- 4) Switch off the power button of switch & add ethernet port to switch.

- ⇒ Switch on the power both
- ⇒ Connect the router to the switch via ethernet.
- ⇒ In the switch, go to config tab and:
 - ⇒ Select VLAN Database
 - ⇒ Give VLAN no "say 2"
 - ⇒ Give VLAN name "say "cse"
 - ⇒ Add it to the Database (now)
- ⇒ Select the switch S go to config
 - ⇒ go to ethernet
 - ⇒ make it the trunk.
- ⇒ ~~Configure the PCo as shown in topology~~
- ⇒ Select Switch:
 - ⇒ Go to config
 - ⇒ Go to fastethernet 2/1
 - ⇒ Set VLAN no as 2. & name
as "cse"
- ⇒ Similarly, set VLAN id 2. for fastethernet 2/1 interface

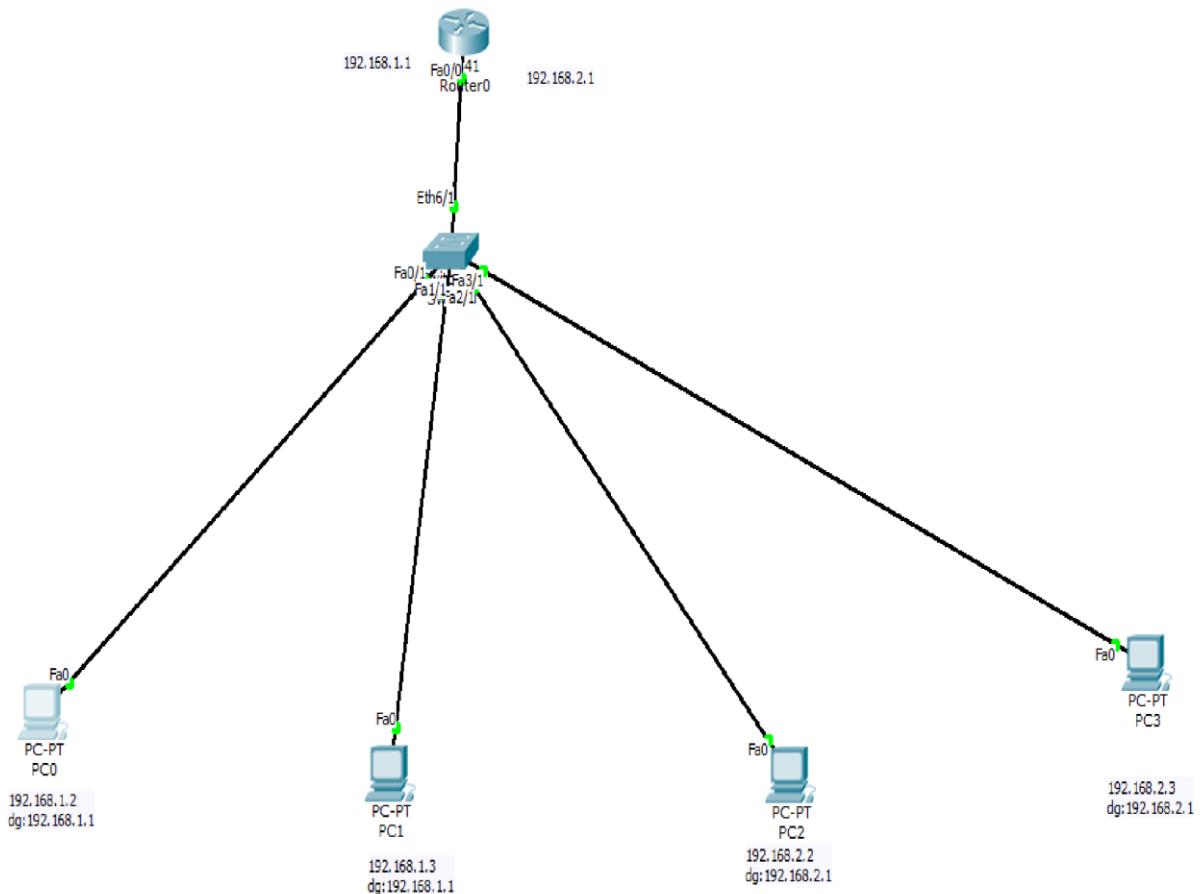
- Configure the Router.
-) interface fastethernet 0/0
-) IP address 192.168.1.1 255.255.255.0
-) no shutdown
-) exit

- Now to configure the router VLAN
-) interface fastethernet 0/0
-) encapsulation Dot1Q 192.168.1.1
-) ip address 192.168.2.1 255.255.255.0
-) no shutdown
-) exit

Observation

-) VLAN divide a single switch into multiple logical switches.
-) Broadcast sent by device in one VLAN do not reach device in another VLAN
-) When the device are pinged within same VLAN
-) Pinging 192.168.1.3 from 192.168.1.2
-) The Data packet will go to the router
-) The switch forwards the packet without the

Screen Shots:



Command Prompt

```
Packet Tracer PC Command Line 1.0
PC>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.2.2: bytes=32 time=0ms TTL=127
Reply from 192.168.2.2: bytes=32 time=0ms TTL=127
Reply from 192.168.2.2: bytes=32 time=4ms TTL=127

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 4ms, Average = 1ms

PC>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time=0ms TTL=127
Reply from 192.168.2.2: bytes=32 time=0ms TTL=127
Reply from 192.168.2.2: bytes=32 time=2ms TTL=127
Reply from 192.168.2.2: bytes=32 time=0ms TTL=127

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 2ms, Average = 0ms

PC>ping 192.168.2.3

Pinging 192.168.2.3 with 32 bytes of data:

Request timed out.
Reply from 192.168.2.3: bytes=32 time=3ms TTL=127
Reply from 192.168.2.3: bytes=32 time=2ms TTL=127
Reply from 192.168.2.3: bytes=32 time=1ms TTL=127

Ping statistics for 192.168.2.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 3ms, Average = 2ms

PC>ping 192.168.2.3

Pinging 192.168.2.3 with 32 bytes of data:

Reply from 192.168.2.3: bytes=32 time=0ms TTL=127
Reply from 192.168.2.3: bytes=32 time=0ms TTL=127
Reply from 192.168.2.3: bytes=32 time=2ms TTL=127
Reply from 192.168.2.3: bytes=32 time=0ms TTL=127

Ping statistics for 192.168.2.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 2ms, Average = 0ms

PC>
```

Program 13

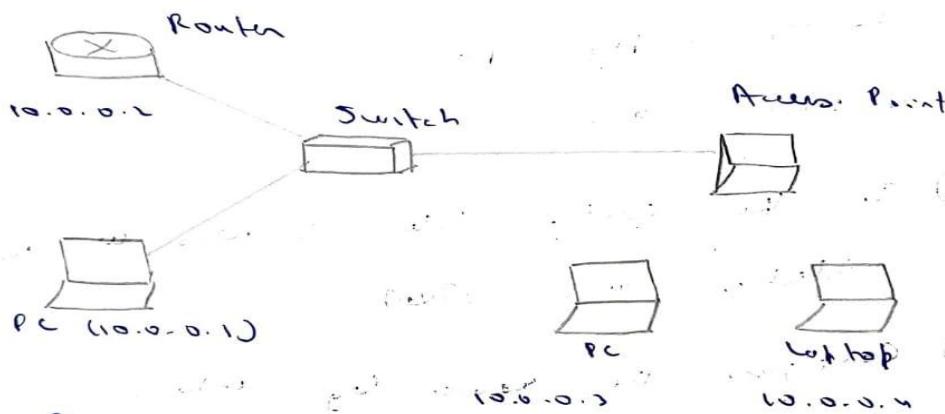
Aim: To construct a WLAN and make the nodes communicate wirelessly.

Topology , Procedure and Observation:

WLAN

To construct a wireless LAN so that
make the nodes communicate
wirelessly.

Topology :



Procedure:

- 1) Create the topology as shown above & configure the device.
- 2) Configure Access point.

Access point → config. → Port 1:

SSID : 6 my

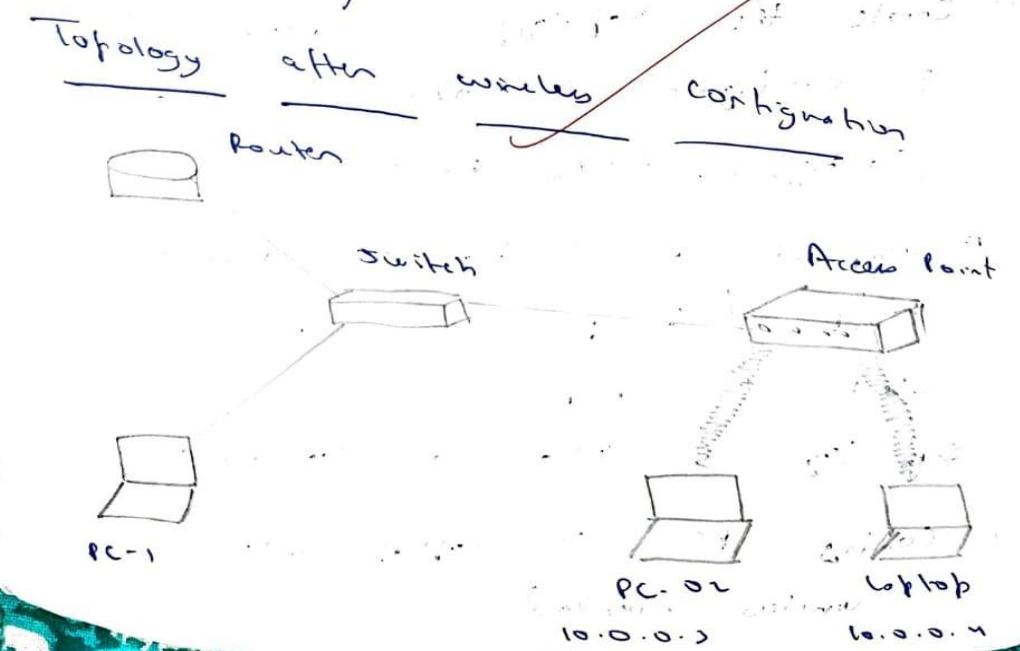
Select @ wpa

Sch key : 1234567890 (10 number)

- 3) Config PC & Laptop with wireless standard.

→ switch off device

- .) Drag the existing IT-less NM-LAB to the component in the MHSI library at physical, physical
- .) Drag WMP 300N wireless interface to the empty point
- .) switch on.
- .) In the config file, a new wireless interface was added.
- .) Configure the device by entering SSID, GNR, WEP key, IP Address, Subnet mask, gateway.



Ping from every device to every other device to check for connection.

Operation

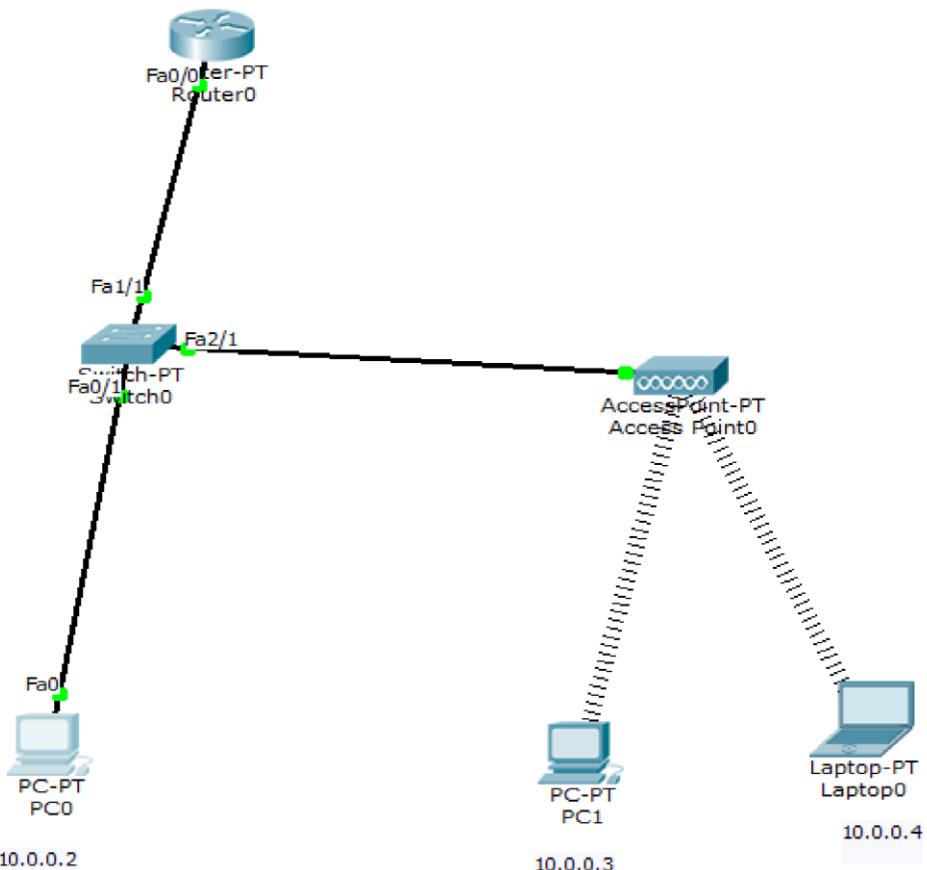
- ① we measurable be ping from every device to every other device.
- ② ping 10.0.0.3 and 10.0.0.1
10.0.0.3 → Access Point
- ③ WMP 200N wireless interfaces

Wireless network interface that enable devices to communicate with access point using wireless signals.



Access Point
also known as wireless router or wireless hub.

Screen Shots:



PC0

Physical Config Desktop Custom Interface

Command Prompt

```

Packet Tracer PC Command Line 1.0
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=22ms TTL=128
Reply from 10.0.0.3: bytes=32 time=6ms TTL=128
Reply from 10.0.0.3: bytes=32 time=3ms TTL=128
Reply from 10.0.0.3: bytes=32 time=7ms 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 = 3ms, Maximum = 22ms, Average = 9ms

PC>ping 10.0.0.4

Pinging 10.0.0.4 with 32 bytes of data:

Reply from 10.0.0.4: bytes=32 time=19ms TTL=128
Reply from 10.0.0.4: bytes=32 time=5ms TTL=128
Reply from 10.0.0.4: bytes=32 time=6ms TTL=128
Reply from 10.0.0.4: bytes=32 time=7ms 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 = 5ms, Maximum = 19ms, Average = 9ms

PC>

```

PART-B

Program 14

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

Code and Output:

Error detection code using	CRC-CCITT
def ecc (Data, gen-pol):	
podd-data = '0' + Data + '0' + (len(
Data) >= 1)	
check-value = podd-data[-len(gen-pol):]	
for i in range (len(Data)):	
if check-value[i] == '1':	
check-value = xor (check-value,	
gen-pol)	
check-value = check-value[0:-1]	
podd-data[-len(gen-pol) + i] =	
len (gen-pol) - 1 - len (podd-data[1:]),	
else '0')	
return check-value[1:]	
def xor (a, b):	
return ''.join ('0' if x==y else '1'	
for x, y in zip (a, b))	

```

if -main-- == __name__ == "main" :
    data = input ("Enter Data : ")
    genpoly = input ("Enter generator polynomial : ")
    cec_value = ecc (data, genpoly)
    print ("cec value : ", cec_value)
    transmit_data = Data + cec_value
    print ("Transmit Data : ", transmit_data)

    received_data = input ("Enter received Data : ")
    remainder = ecc (received_data, genpoly)
    if remainder == 0 :
        print ("Data is valid")
    else :
        print ("Data is invalid")

```

Program 15

Write a program for congestion control using Leaky bucket algorithm.

Code and Output:

<u>Leaky</u>	<u>Bucket</u>	<u>Algorithm</u>	(PART - B)
--------------	---------------	------------------	------------

In the network layer, before the network can make quality of service guarantees, it must know what traffic is being guaranteed. One of the main causes of congestion is that traffic pattern

There are two types of traffic

→ Leaky Bucket

→ Token Bucket

Eg: $n = 1000$, packet = 200, 700, 500, 400, 200

Since $n \Rightarrow$ size of the bucket at the head of the queue in $n > 200$

$n = 1000 - 200 = 800$ front size

of 200 is sent into the network:

200, 700, 500, 400

Now again, $n >$ size of the packet at the head of the queue is in $n > 400$

$\therefore n = 800 - 400 = 400$.

Code:

import time

import random

def leaky-bucket (packet, bucket-size,
output-rate):

remaining = 0

for packet in packets:

if packet > bucket-size:

 return "REJECTED"

 print(f"Bucket or size < packet) bytes

 exceeds bucket capacity < bucket-size)

 sys.exit("REJECTED")

elif packet + remaining > bucket-size:

 print(f"Bucket capacity exceeded

 with packet-size < packet) bytes -

 REJECTED)

else :

 remaining += packet

 print(f"New packet of {size} < packet)

 will add to bucket")

 print(f"Bytes in bucket: ({remaining})")

while remaining > 0:

time.sleep(1)

if remaining == output_rate:

print(f"Transmitting {remaining} bytes")

remaining = 0

else:

print(f"Transmitting {output_rate} bytes")

remaining -= output_rate

print(f"Bytes remaining is {remaining}.")

remaining += (remaining / 3)

and so on until transmit

remaining = (remaining * 2) / 3

so if you want to send 1000 bytes

you have to send 1000 bytes

and then 666.6666666666667 bytes

and so on

so if you want to send 1000 bytes

you have to send 1000 bytes

and then 666.6666666666667 bytes

and so on until you get 0 bytes

Program 16

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

Code and Output:

CLIENT - TCP

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

SERVER - TCP

```
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 = socket. ~~socket~~ accept() connectionSocket, addr = socket. accept()
content = connectionSocket.recv(1024). decode()
file = open(content, "r")
content = file.read()
file.close()
connectionSocket.send(str.encode(content))
connectionSocket.close()

Program 17

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

Code and Output:

CLIENT UDP

```
from 'socket' import *
serverName = "127.0.0.1"
serverPort = 12000
clientSocket = socket(AF_INET, SOCK_DGRAM)
request = input("Enter file name:")
clientSocket.sendto(request, (serverName, serverPort))
fileContent, serverAddress = clientSocket.recvfrom(4096)
print(fileContent)
clientSocket.close()
```

SERVER UDP

```
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 True:
    message, clientAddress = serverSocket.recvfrom(4096)
    print(message)
```

while True:

new fence, client Address: never socketed?
recv from (2042)

rec'd from (zone)

7

with other substances, such as (for instance, Na_2O).

file contains ... file.read(2048)

... (file Contents. etc.),

client policies)

front (front) weight is about $\frac{1}{3}$ front and $\frac{2}{3}$ rear.

(file contents)

so on I would get around and I just

except FileNotFoundError as e:

errorMessage = "File not found!"

never taught . will be (error message : credit),
client address)

Want C-File not found error
want to client..