# VISVESVARAYA TECHNOLOGICAL UNIVERSITY

**"JnanaSangama", Belgaum -590014, Karnataka.**

## LAB REPORT
## on

# COMPUTER NETWORKS

***Submitted by***

**B C SURAG (1BM21CS037)**

***in partial fulfillment 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-**
**560019JUN-2023 to**
**SEP-2023**

**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 NETWORKS” was carried out by **B C SURAG(1BM21CS037),** who is a bonafide student of **B. M. S. College of Engineering.** It is in partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum during the year 2023. The Lab report has been approved as it satisfies the academic requirements with respectto a **Computer Networks - (22CS4PCCON)** work prescribed for the said degree.

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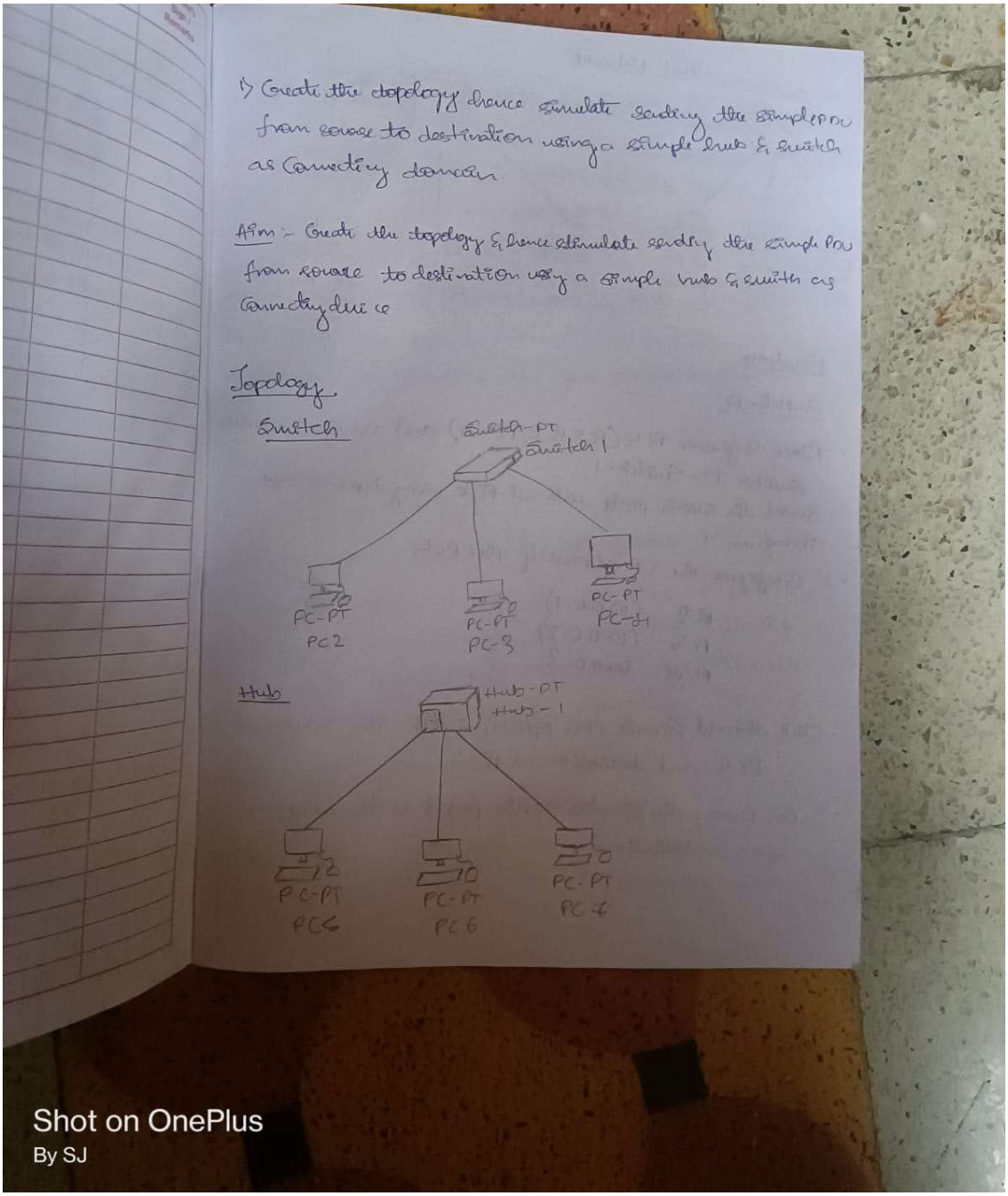
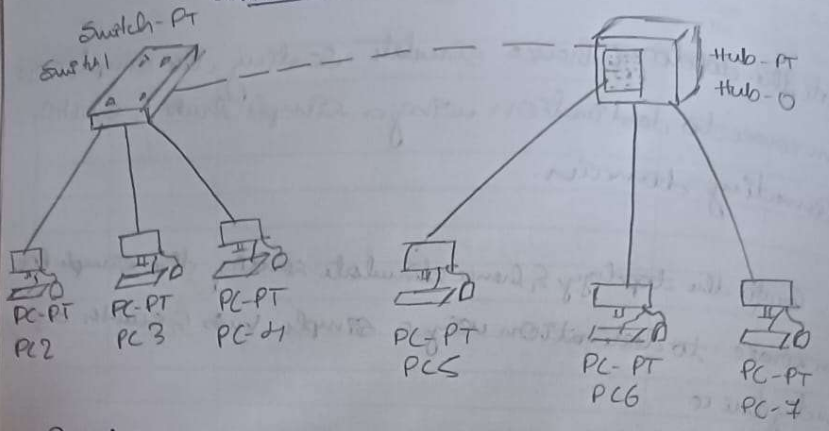
## WEEK1


1) Create the topology hence simulate sending the simple PDU from source to destination using a simple hub & switch as connecting devices
Aim - Create the topology & hence stimulate sending the simple PDU from source to destination using a simple hub & switch as connecting device
Topology
Switch
Switch-PT
Switch 1
PC-PT
PC2
PC-PT
PC-3
PC-PT
Hub
Hub-PT
Hub-1
PC-PT
PC6
PC-PT
PC-7
Shot on OnePlus
By SJ

## Mixed - Network




### Procedure

### Switch-PC

-> Place 3 generic PCs (PC2, PC3, PC-4) and a generic switch
Switch PT-Switch-1

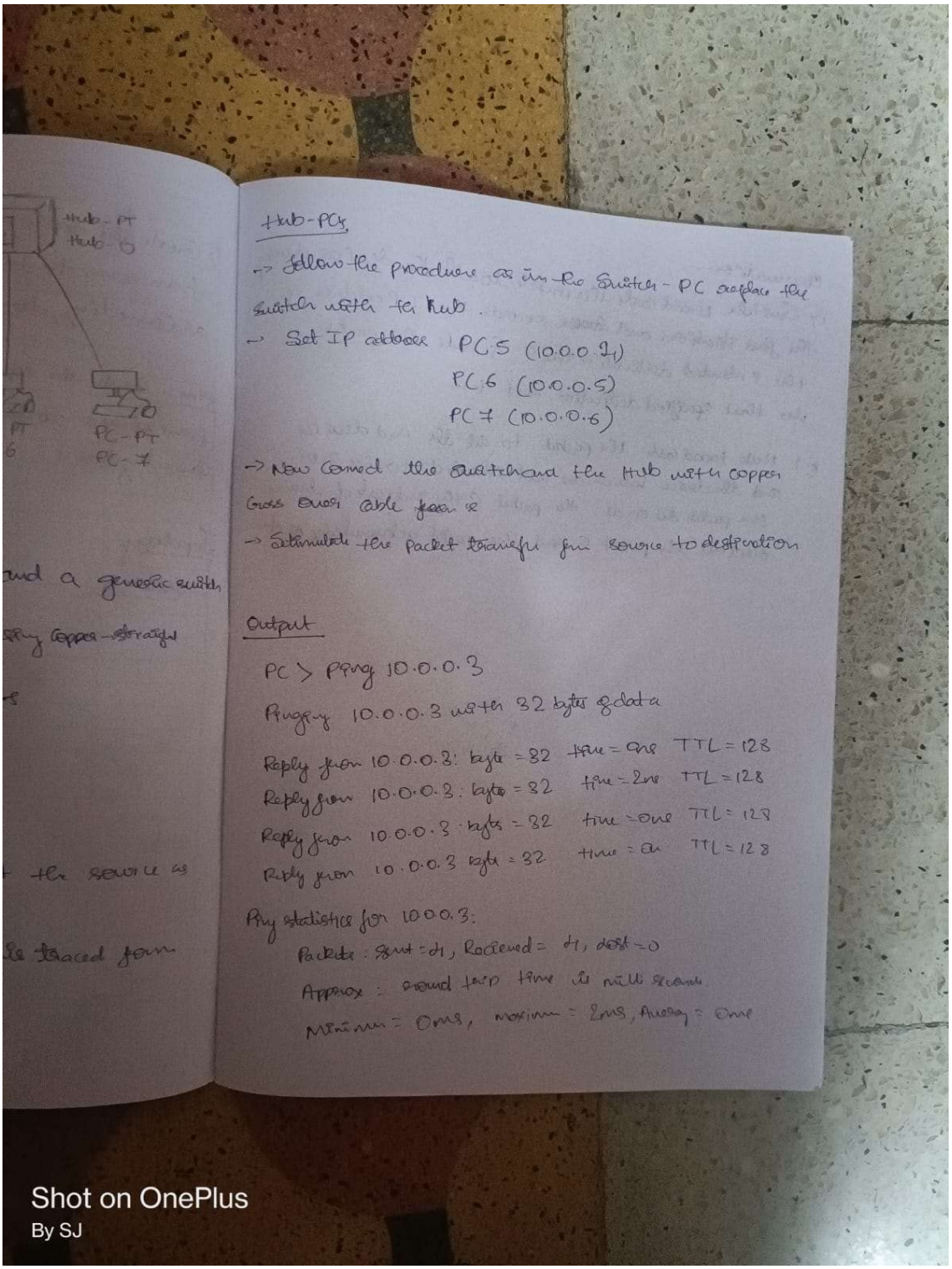
-> Connect the switch ports with all PCs using copper-straight Through wire

-> Configure the IP address of the PCs

PC2 (10.0.0.1)
PC3 (10.0.0.2)
PC4 (10.0.0.3)

-Click the add Simple PDU option, select the source as PC2 and destination as PC-4

-> On Running the Simulation the packet is traced from source to destination




Hub-PCs

-> Follow the procedure as in the Switch-PC and place the switch with the hub.

-> Set IP address PC5 (10.0.0.4)
PC6 (10.0.0.5)
PC7 (10.0.0.6)

-> Now connect the switch and the Hub with copper cross over cable from it

-> Stimulate the packet transfer from source to destination

Output

PC > Ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data

Reply from 10.0.0.3: byte = 32 time = 0ms TTL = 128
Reply from 10.0.0.3: byte = 32 time = 2ms TTL = 128
Reply from 10.0.0.3 byte = 32 time = 0ms TTL = 128
Reply from 10.0.0.3 byte = 32 time = 0ms TTL = 128

Ping statistics for 10.0.0.3:
Packets: Sent = 4, Received = 4, lost = 0
Approx: round trip time in milli seconds
Minimum = 0ms, maximum = 2ms, Average = 0ms

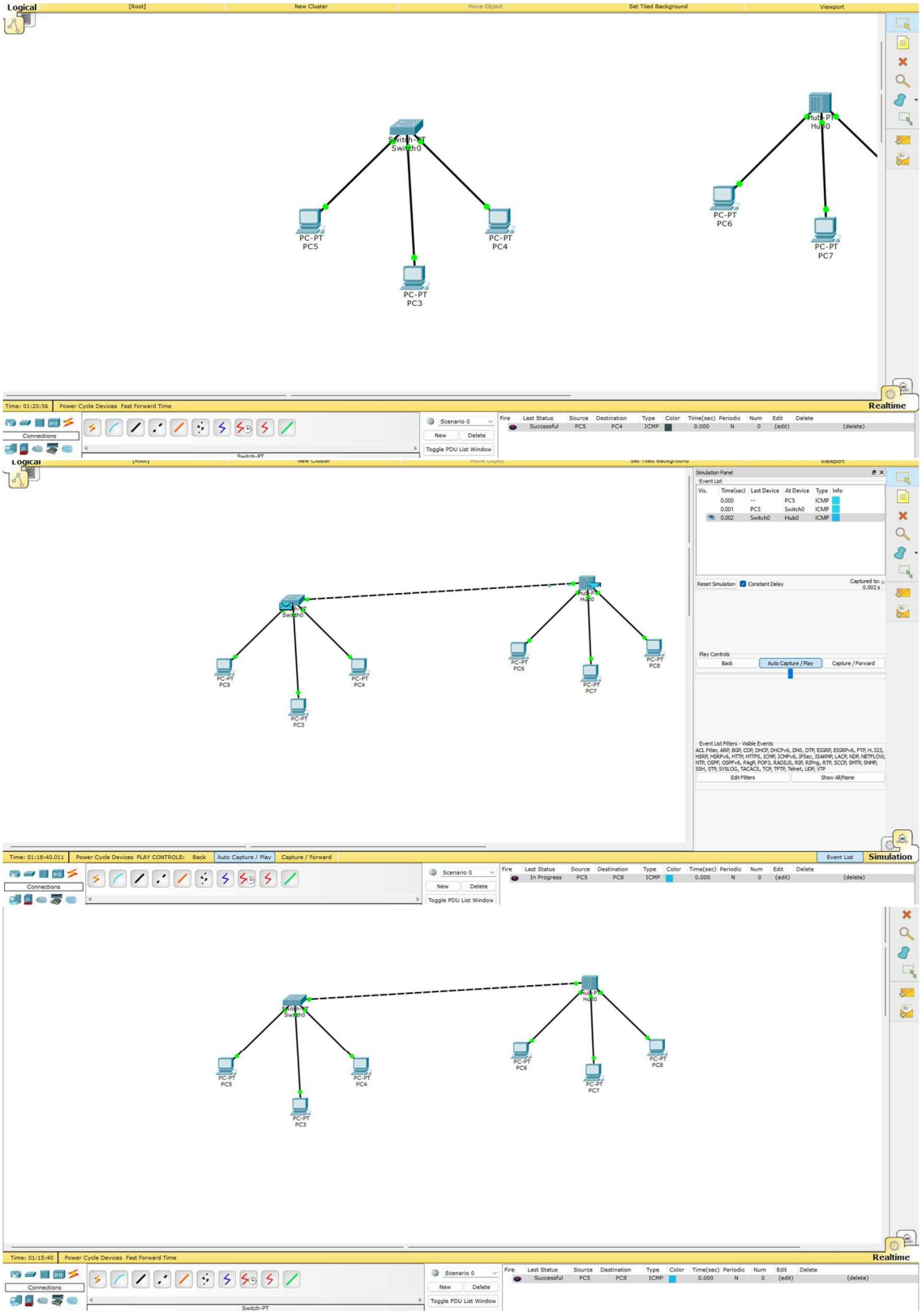
Observation.

i) Switch broadcasts the packets to all the devices during the first iteration and records the IP address of the intended destination device & sends the packet to that specified destination next time

ii) Hub broadcasts the packet to all the end devices and the device which are not intended to receive the packets discards the packet & the indicated device receives the packet & send the packet acknowledgement

NLA
5/6/2023

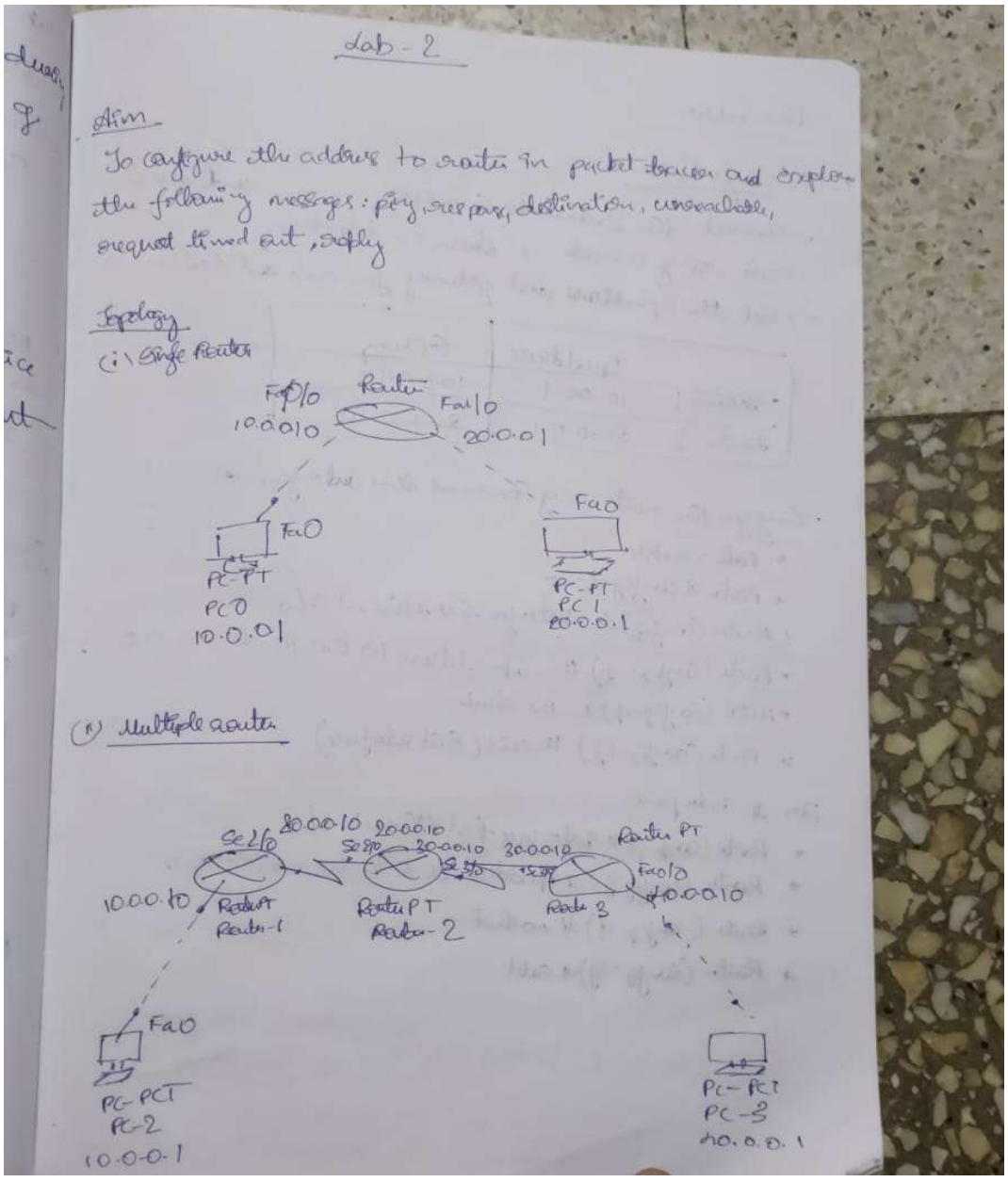
Output Simulation



# WEEK 2

Configure IP address to routers (one and three) in packet tracer. Explore the following messages: ping responses, destination unreachable, request timed out, reply.

OBSERVATION:



Procedure

(i) Single Router

-> Connect the 2 networks consisting of PCs end devices each using a router as shown in topology

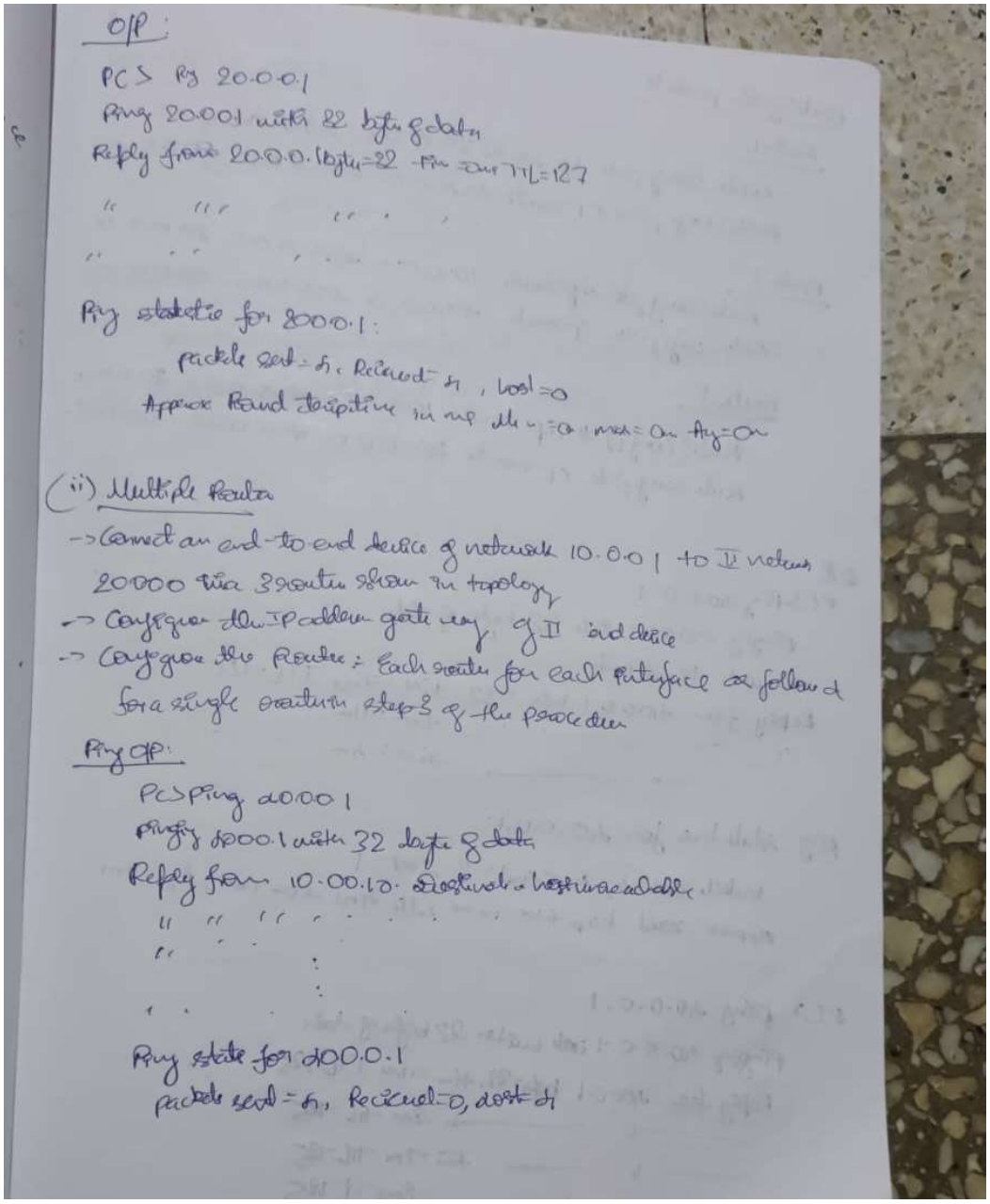
-> Set the Ipaddress and gateway for each end device

| | Ipaddress | Gateway |
|---|---|---|
| Device 1 | 10.0.0.1 | 10.0.0.10 |
| Device 2 | 20.0.0.1 | 20.0.0.10 |

- Configure the router using Command line Interface as
  - Router > enable
  - Router # config t
  - Router (config) # interface fast ethernet 0/0
  - Router (config-if) # ip address 10.0.0.10 255.0.0.0
  - Router (config-if) # no shut
  - Router (config-if) # exit (Exit interface)

For II interface

- Router (config) # interface fast Ethernet 1/0
- Router (config if) # ipaddress 20.0.0.10 - 255.0.0.0
- Router (config if) # no shut
- Router (config-if) # exit



O/P:

PC> Pg 20.0.0.1

Ping 20.0.0.1 with 32 bytes of data

Reply from 20.0.0.1 bytes=32 time=2ms TTL=127

" " " "

" " " "

Ping statistics for 20.0.0.1:

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

Approx Round trip time in ms Min = 0, max = 2ms Avg = 0ms

(ii) Multiple Routers

-> Connect an end-to-end device of network 10.0.0.1 to IV network 20.0.0.0 via 3 routers shown in topology

-> Configure the IP address gateway of II end device

-> Configure the Routers: Each router for each interface as followed for a single router in step 3 of the procedure

Ping O/P:

PC> Ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data

Reply from 10.0.0.10: Destination host unreachable.

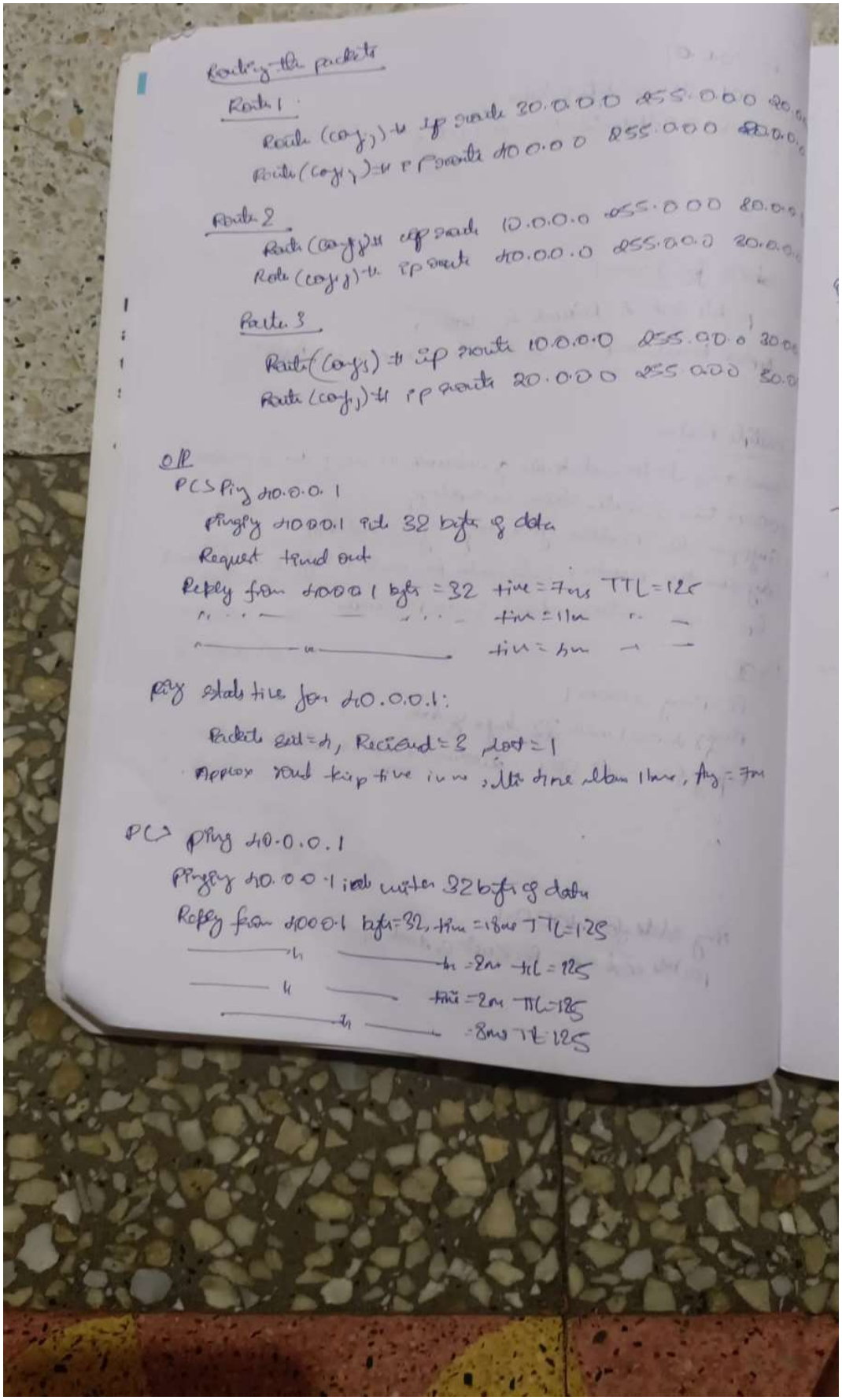
" " " " " "

" " " "

" " " "

Ping statistics for 20.0.0.1

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



Routing the packets

Router 1:

Route (config)# ip route 30.0.0.0 255.0.0.0 20.0.0.2

Route (config)# ip route 40.0.0.0 255.0.0.0 [illegible]

Router 2

Route (config)# ip route 10.0.0.0 255.0.0.0 20.0.0.1

Route (config)# ip route 40.0.0.0 255.0.0.0 30.0.0.2

Router 3

Route (config)# ip route 10.0.0.0 255.0.0.0 30.0.0.1

Route (config)# ip route 20.0.0.0 255.0.0.0 30.0.0.2

OR

PC> Ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data

Request timed out

Reply from 40.0.0.1 bytes=32 time=7ms TTL=125

time=11ms

time=5ms

Ping statistics for 40.0.0.1:

Packets: Sent=4, Received=3, Lost=1

Approx round trip time in milli seconds: Minimum=5ms, Maximum=11ms, Average=7ms

PC> Ping 40.0.0.1

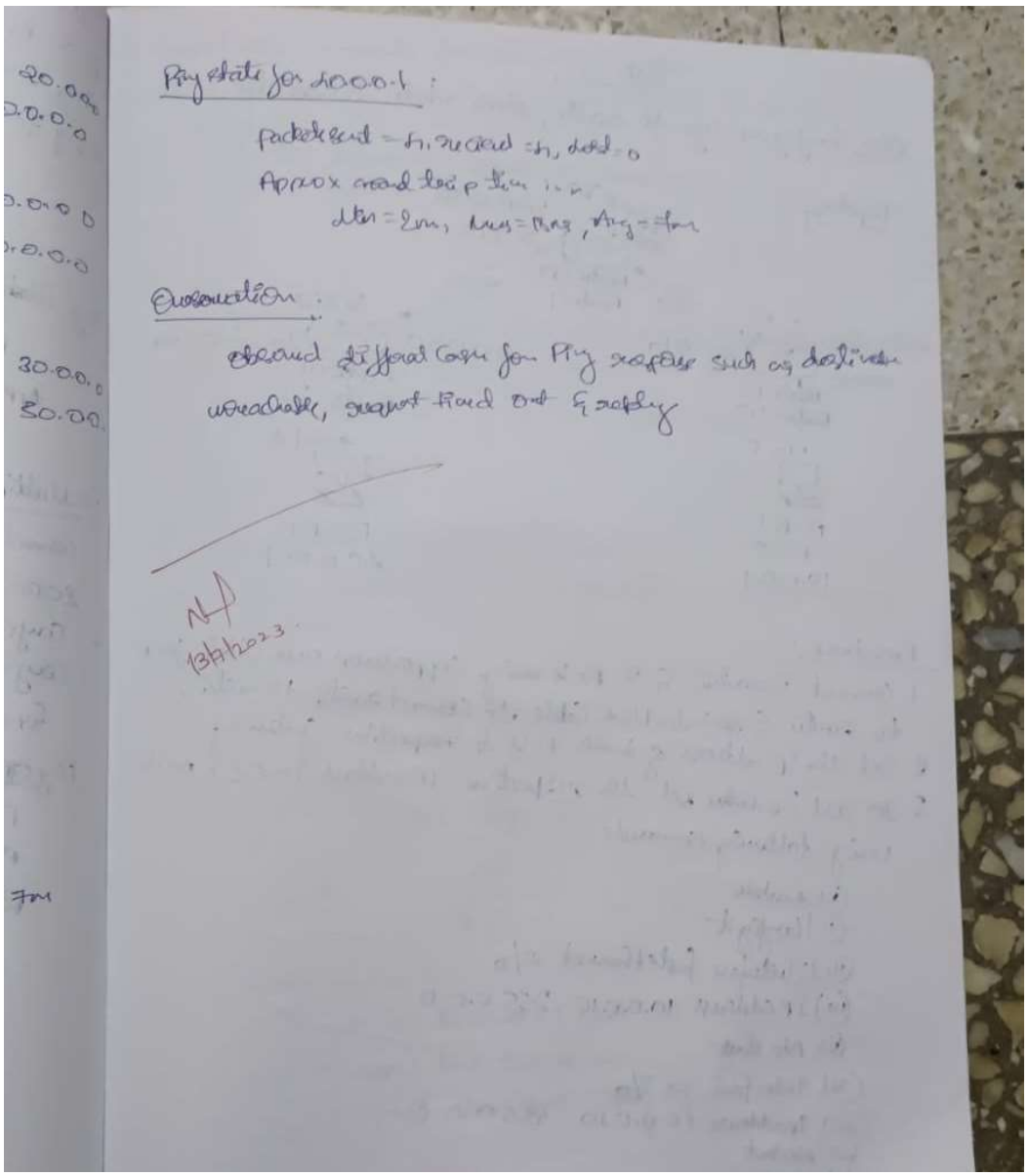
Pinging 40.0.0.1 with 32 bytes of data

Reply from 40.0.0.1 bytes=32, time=18ms TTL=125

time=8ms TTL=125

time=2ms TTL=125

time=8ms TTL=125



Ping state for 10.0.0.1 :

Packet sent = 4, received = 4, lost = 0

Approx round trip time in ms

Min = 2ms, Max = 8ms, Avg = 4ms

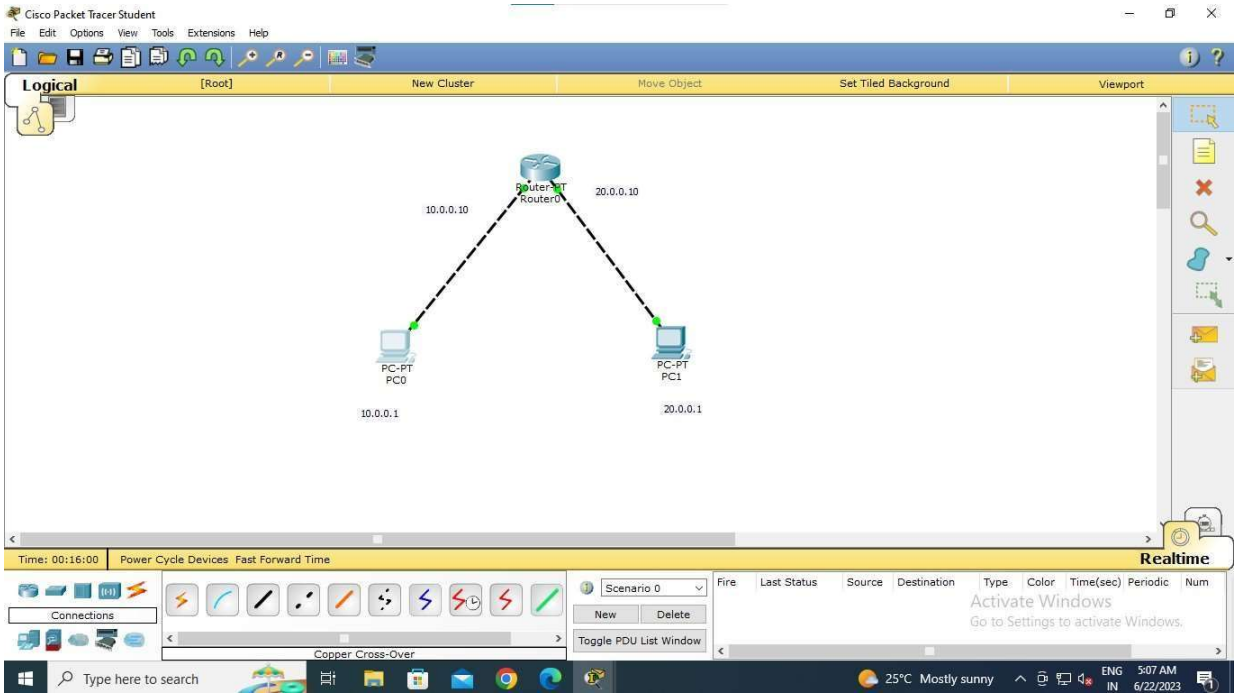
Observation :

Observed different cases for Ping response such as destination unreachable, request timed out & replay

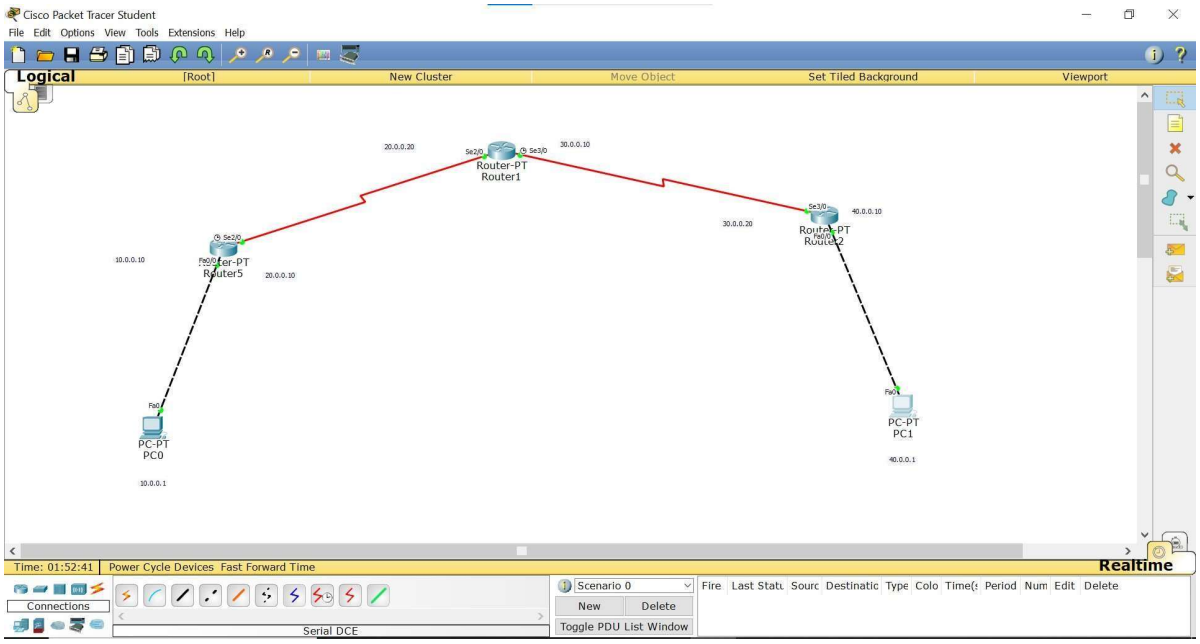
13/1/2023

# TOPOLOGY:

## PROGRAM 2.1

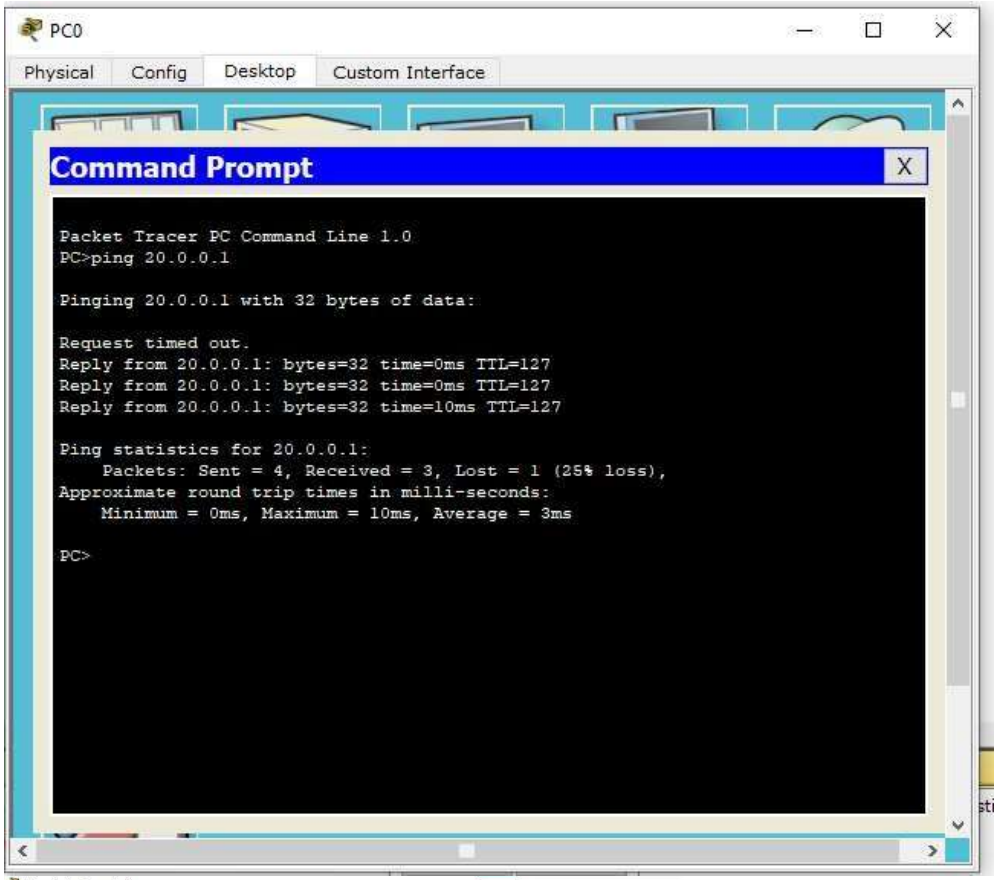


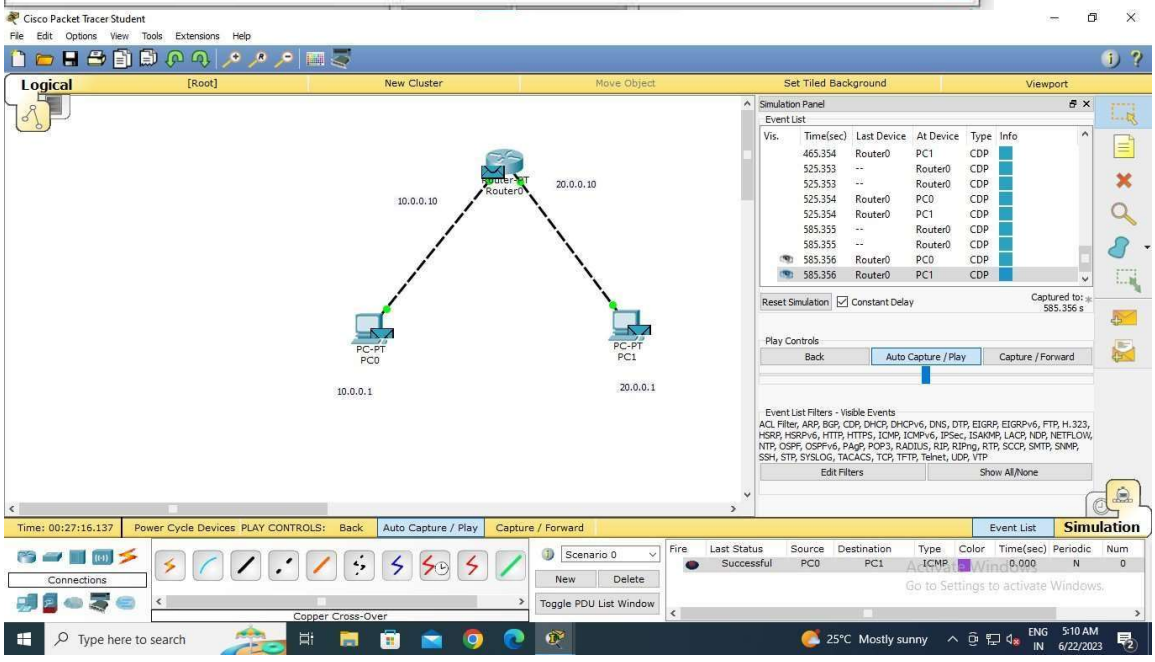

## PROGRAM 2.2



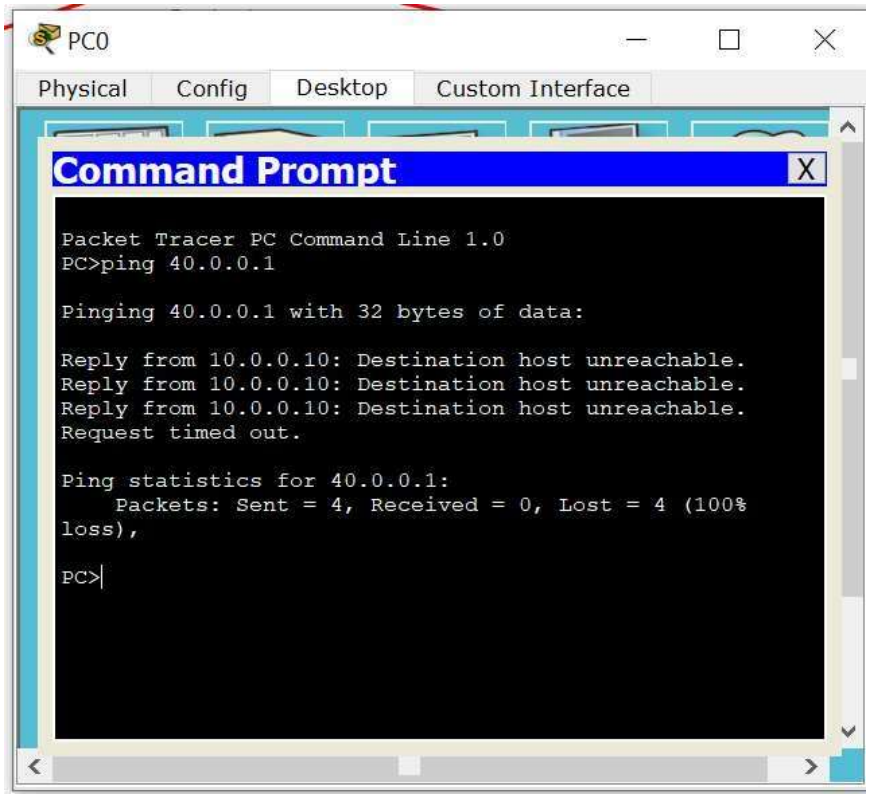
OUTPUT:

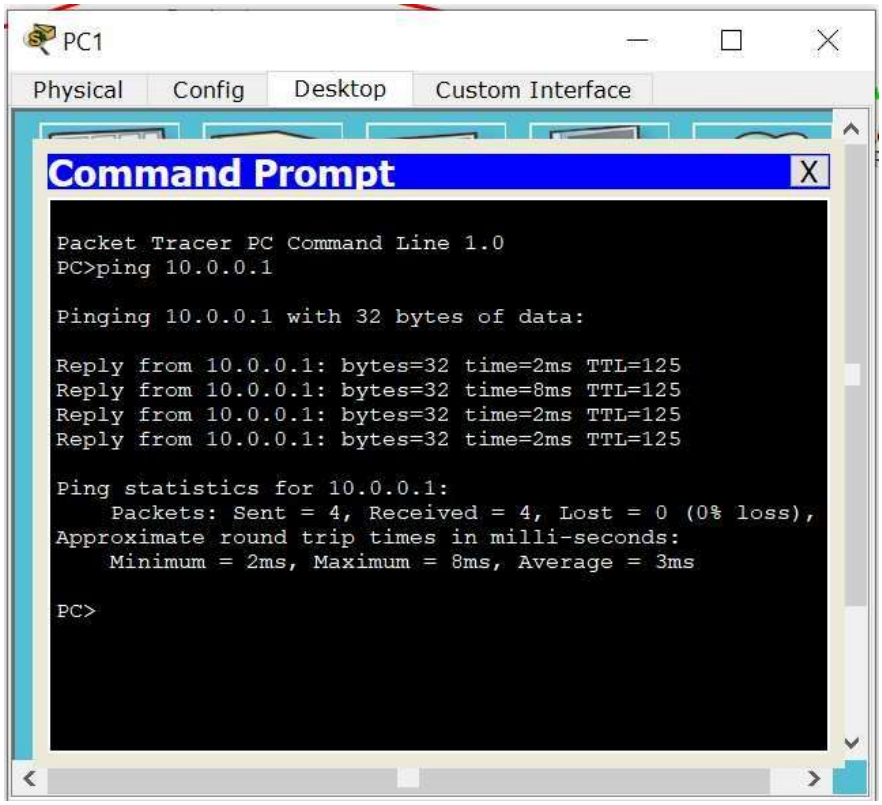
PROGRAM 2.1

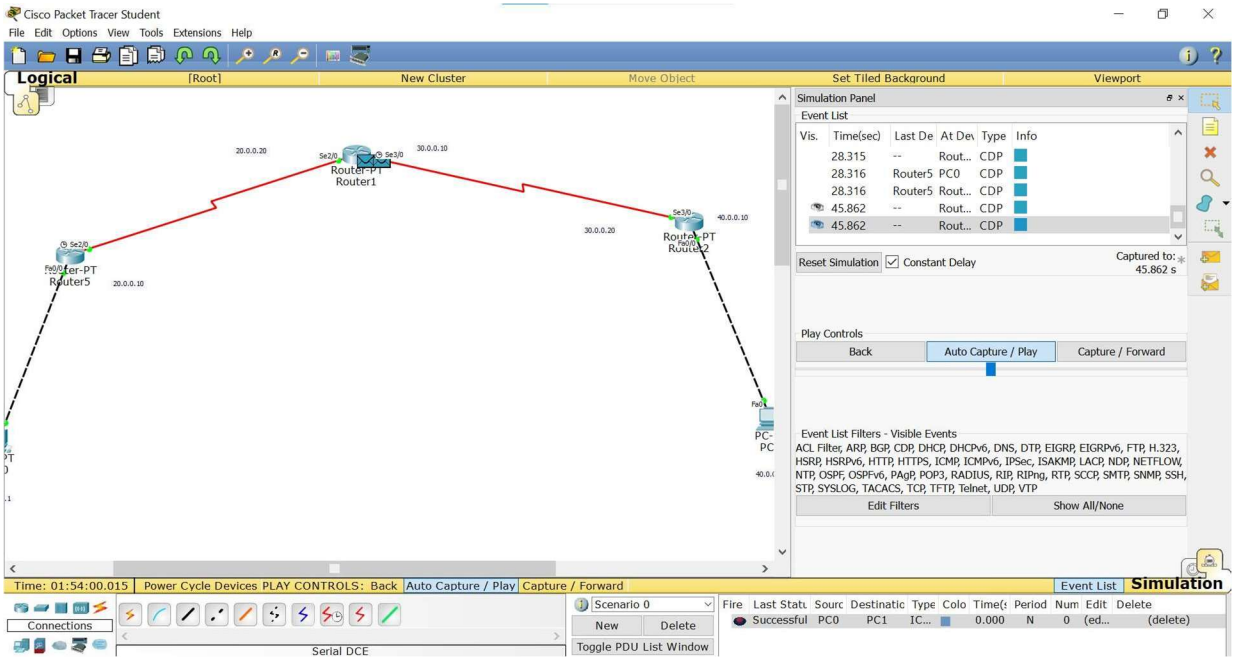


PROGRAM 2.2


PC0
Physical
Config
Desktop
Custom Interface
Command Prompt
Packet Tracer PC Command Line 1.0
PC>ping 40.0.0.1
Pinging 40.0.0.1 with 32 bytes of data:
Reply from 10.0.0.10: Destination host unreachable.
Reply from 10.0.0.10: Destination host unreachable.
Reply from 10.0.0.10: Destination host unreachable.
Request timed out.
Ping statistics for 40.0.0.1:
Packets: Sent = 4, Received = 0, Lost = 4 (100%
loss),
PC>

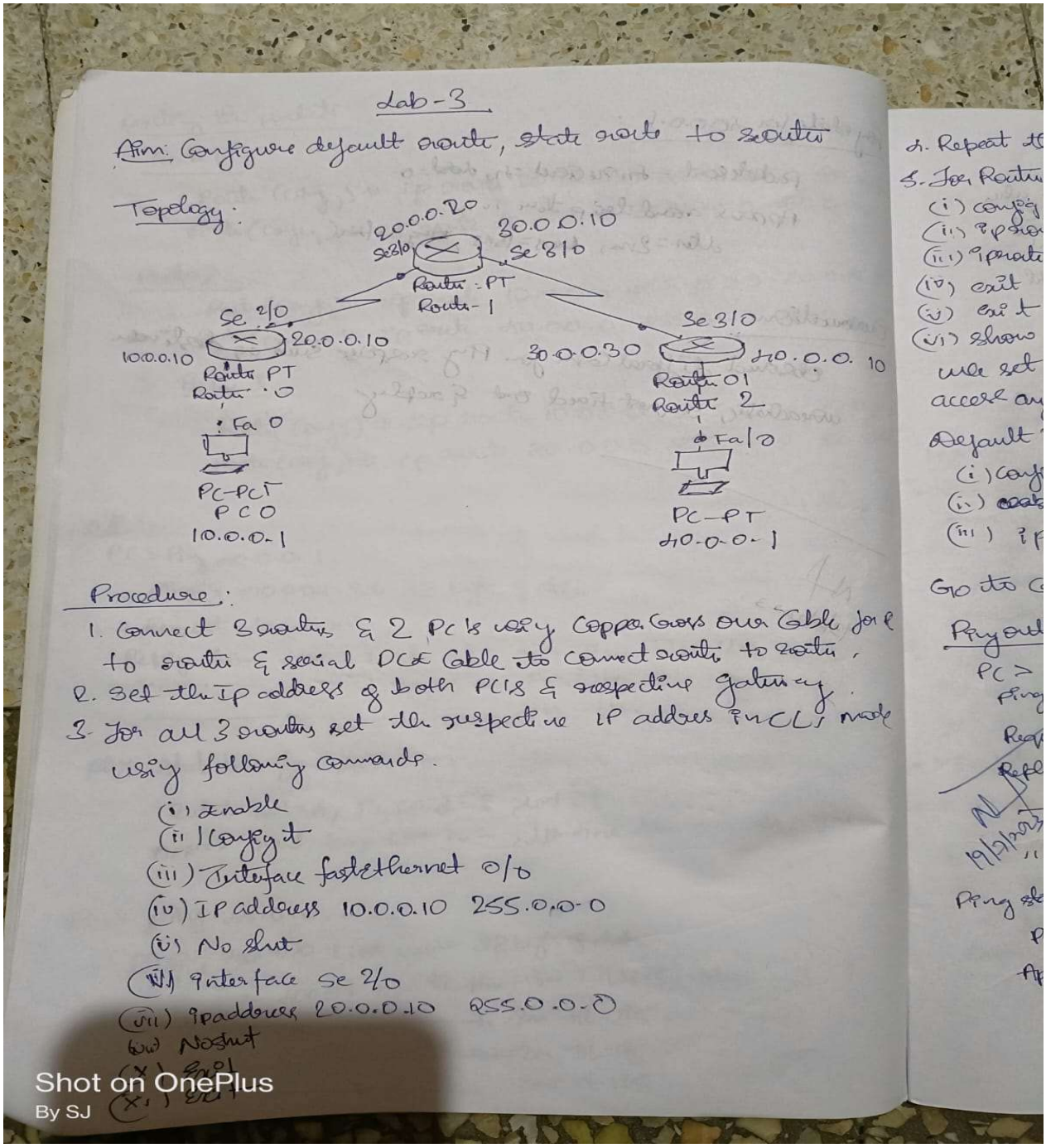

PC1
Physical
Config
Desktop
Custom Interface
Command Prompt
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.1
Pinging 10.0.0.1 with 32 bytes of data:
Reply from 10.0.0.1: bytes=32 time=2ms TTL=125
Reply from 10.0.0.1: bytes=32 time=8ms TTL=125
Reply from 10.0.0.1: bytes=32 time=2ms TTL=125
Reply from 10.0.0.1: bytes=32 time=2ms TTL=125
Ping statistics for 10.0.0.1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 2ms, Maximum = 8ms, Average = 3ms
PC>


Cisco Packet Tracer Student
File Edit Options View Tools Extensions Help
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Router-PT
Router1
Router-PT
Router2
Router-PT
Router5
PC-PT
PC
20.0.0.20
30.0.0.10
30.0.0.20
40.0.0.10
20.0.0.10
Simulation Panel
Event List
Vis. Time(sec) Last De At De Type Info
28.315 -- Rout... CDP
28.316 Router5 PC0 CDP
28.316 Router5 Rout... CDP
45.862 -- Rout... CDP
45.862 -- Rout... CDP
Reset Simulation
Constant Delay
Captured to: 45.862 s
Play Controls
Back
Auto Capture / Play
Capture / Forward
Event List Filters - Visible Events
ACL Filter, ARP, BGP, CDP, DHCP, DHCPv6, DNS, DTP, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPSec, ISAKMP, LACP, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, RADIUS, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, VTP
Edit Filters
Show All/None
Time: 01:54:00.015
Power Cycle Devices PLAY CONTROLS: Back
Auto Capture / Play
Capture / Forward
Event List
Simulation
Connections
Serial DCE
Scenario 0
New
Delete
Toggle PDU List Window
Fire Last Statu Sourc Destinatic Type Colo Time(s Period Num Edit Delete
Successful PC0 PC1 IC... 0.000 N 0 (ed... (delete)

# WEEK 3

Configure default route, static route to the Router.

OBSERVATION:



4. Repeat the Commands for the other routers

5. For Router 1 set the route of its adjacent router statically

(i) config t
(ii) ip route 10.0.0.0 255.0.0.0 20.0.0.10
(iii) ip route 40.0.0.0 255.0.0.0 30.0.0.20
(iv) exit
(v) exit
(vi) show ip route

We set default ip route to router 0 & router 2 which tells it can access any ip address with any subnet mask address

Default ip route is set by following Command.

(i) config t
(ii) enable ip route 0.0.0.0 0.0.0.0 20.0.0.20 (R-0)
(iii) ip route 0.0.0.0 0.0.0.0 30.0.0.10 (R-1)

Go to Command prompt in PC give ping to send message

Ping output

PC > Ping 40.0.0.1
Pinging 40.0.0.1 with 32 bytes of data:
Request timed out.
Reply from 40.0.0.1 : bytes = 32 time = 2ms TTL = 125
" " : bytes = 32 time = 9ms TTL = 126
" " : bytes = 32 time = 2ms TTL = 125

Ping state for 40.0.0.1
Packets sent = 4, Received = 3 (lost = 1)
Approximate round loop time in ms
Min = 2ms Max 9ms Avg = 4ms

Observations

A default route is given to router which takes effect when no other route is available for an ip address destination. If packet to be send, default first checks ip address, if it is not available it checks its routing table packet is forwarded to next hop towards destination.
This process repeats till it reach destination.

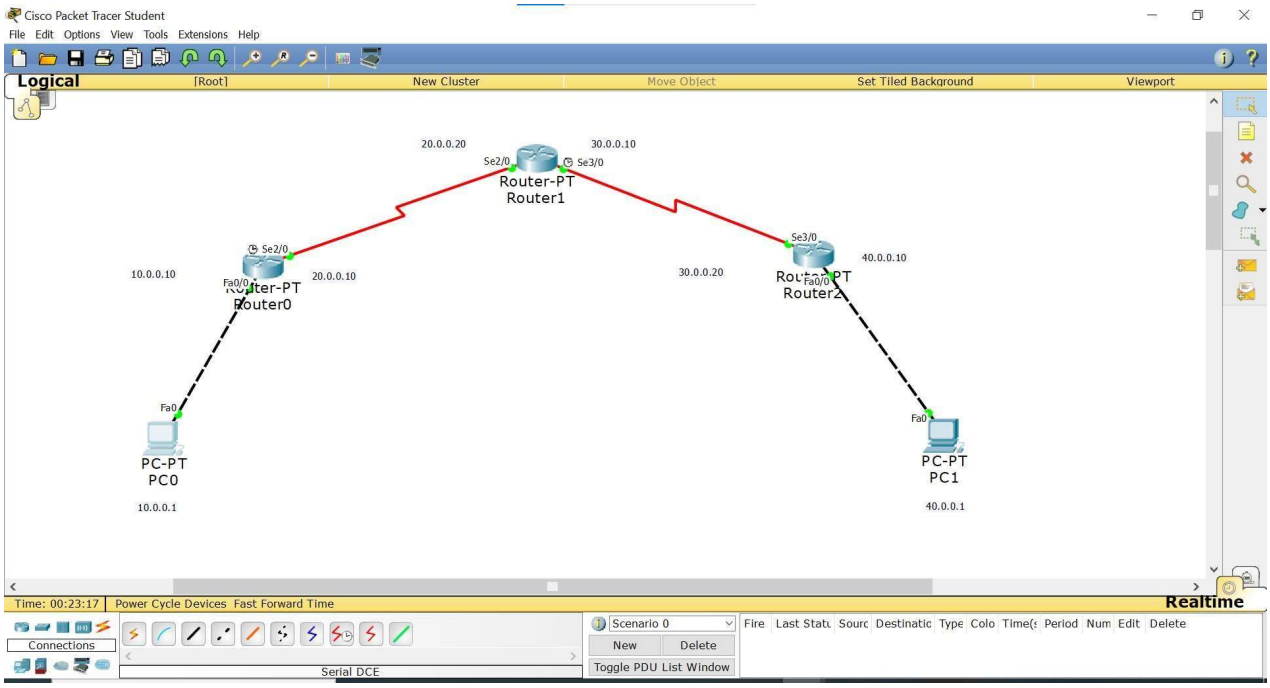
Aim: Configure

Topology:

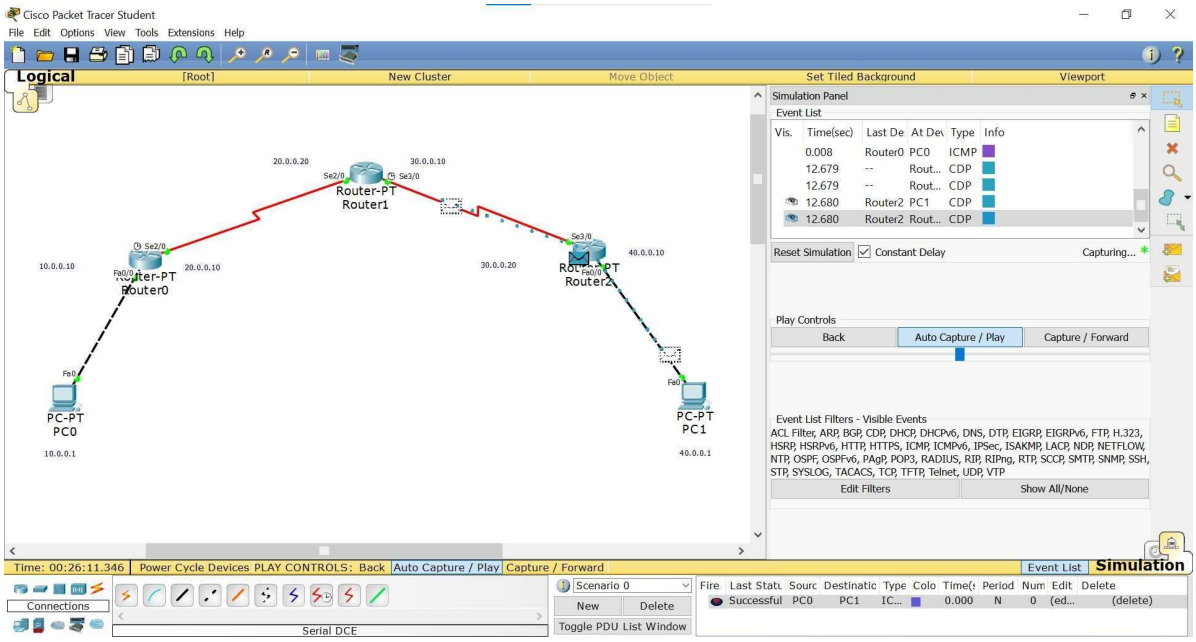
Procedure:
-> Connect through
-> Go to
-> Set ip
fast ether
-> Click
Select
get PHC
-> Repeat
-> Go to

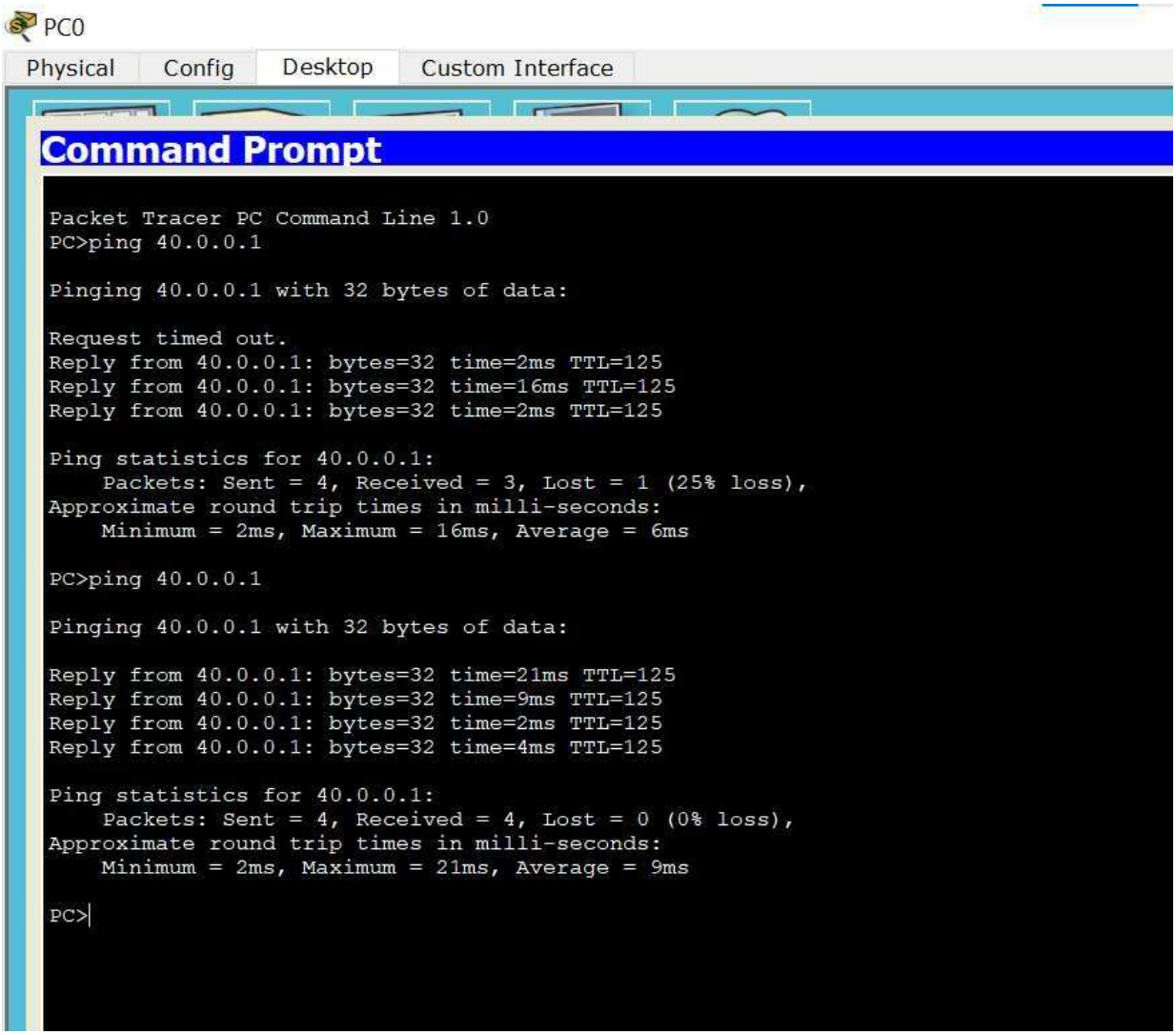
Output
PC> P
Ping
Reply
"
"
"

# TOPOLOGY:




# OUTPUT:

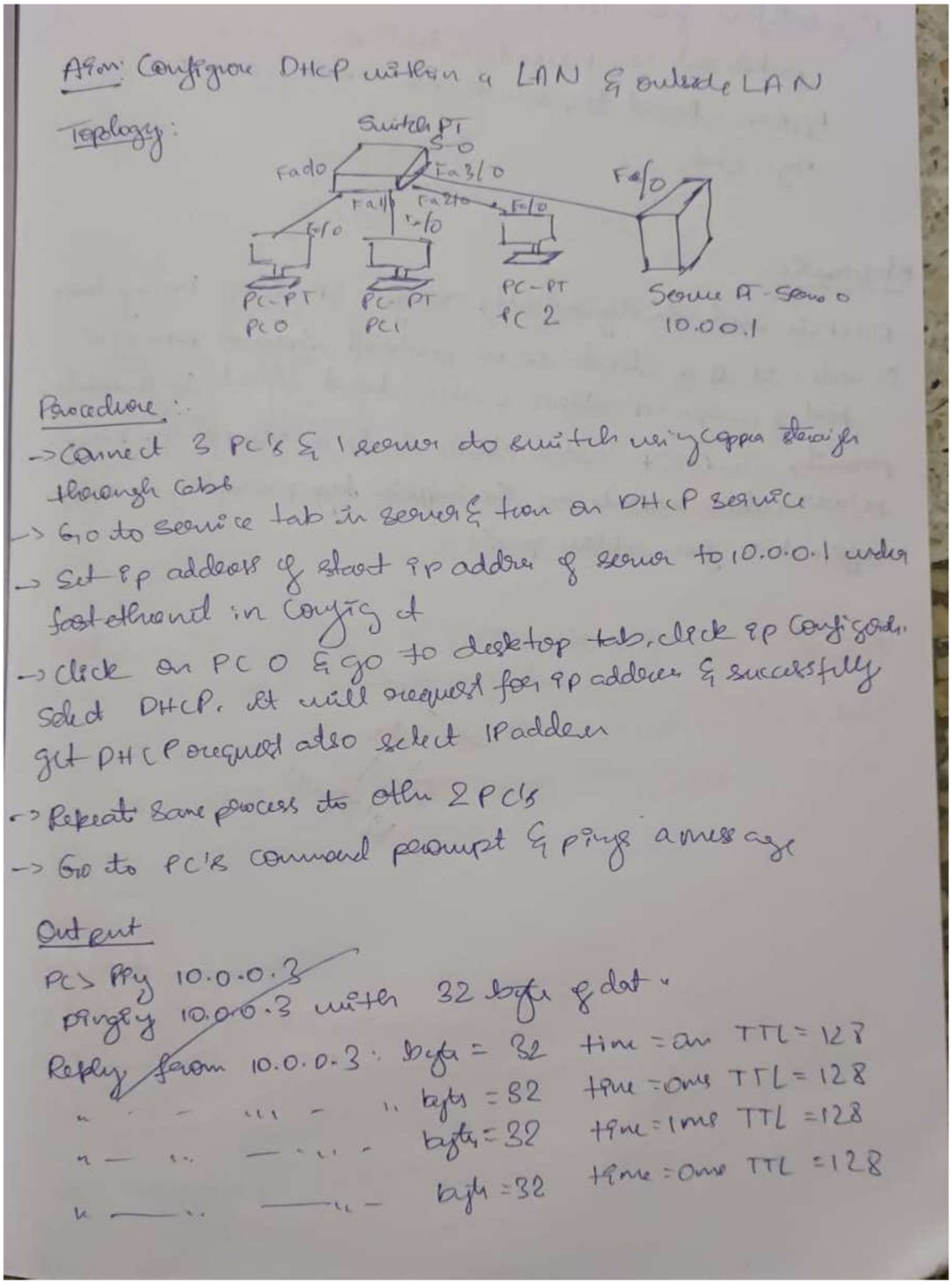



PC0
Physical
Config
Desktop
Custom Interface
Command Prompt
Packet Tracer PC Command Line 1.0
PC>ping 40.0.0.1
Pinging 40.0.0.1 with 32 bytes of data:
Request timed out.
Reply from 40.0.0.1: bytes=32 time=2ms TTL=125
Reply from 40.0.0.1: bytes=32 time=16ms TTL=125
Reply from 40.0.0.1: bytes=32 time=2ms TTL=125
Ping statistics for 40.0.0.1:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 2ms, Maximum = 16ms, Average = 6ms
PC>ping 40.0.0.1
Pinging 40.0.0.1 with 32 bytes of data:
Reply from 40.0.0.1: bytes=32 time=21ms TTL=125
Reply from 40.0.0.1: bytes=32 time=9ms TTL=125
Reply from 40.0.0.1: bytes=32 time=2ms TTL=125
Reply from 40.0.0.1: bytes=32 time=4ms TTL=125
Ping statistics for 40.0.0.1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 2ms, Maximum = 21ms, Average = 9ms
PC>

# WEEK 4

Configure DHCP within a LAN and outside LAN.

OBSERVATION:



Ping satisfied from 10.0.0.3:

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

Approx Round trip time in ms. min = 0ms, max = 1ms

Avg = 0ms

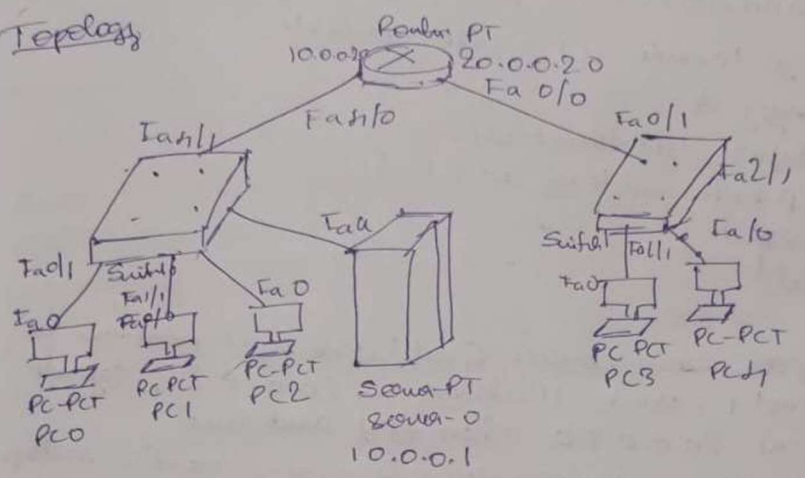
Observation:

DHCP is used to dynamically assigns IP address to any device or node. It is a client-server protocol. Server manages a pool of unique IP address & also about client configuration parameter. In DHCP enabled clients sends a request to DHCP server which responds to the request by providing IP config information from address pools.

19/7/2023

Aim: Configure DHCP within a LAN and outside LAN

Topology




Procedure:

1. Add a router, a switch & 2 PCs to previous program & connect the router to both switches.
2. Set the server IP address & services & with help of server set the first 3 PCs IP address with following commands.
   (i) No
   (ii) enable
   (iii) Configure
   (iv) interface fast ethernet 1/0
   (v) IP address 10.0.0.20 255.0.0.0
   (vi) no shut
   (vii) exit
   (viii) interface fast ethernet 0/0
   (ix) IP address 20.0.0.20 255.0.0.0
   (x) No shut
   (xi) Exit

(xii) exit
(xiii) show ip route

4. Now go to server & set gateway as 10.0.0.20
5. Again go to router CLI & follow commands
   (i) Config t
   (ii) interface fastethernet 0/0
   (iii) ip helper-address 10.0.0.1
   (iv) noshut
   (v) exit

6. Now go to server services & add one more pool name as server Pool-1, start IP address as 20.0.0.2 & default gateway as 20.0.0.20. Then add and save
7. Now set other 2PCs IP address by going to their desktop IP Configuration & select DHCP which will automatically generate its IP address
8. Now the Network is complete & ready to send packets from PC to other by typing Phy IP address in cmd

Output:

PC> Phy 20.0.0.2

Pinging 20.0.0.2 with 32 bytes of data

Request timed out

Reply from 20.0.0.2: bytes=32 time=ans TTL=127
" " bytes:32 time=ans TTL=127
" " " bytes:32 time=ms TTL=127

Ping stats for 20.0.0.2:

Packets sent = 4, Received = 3 Lost = 1

Approx Round trip time in ms: One way: One way:

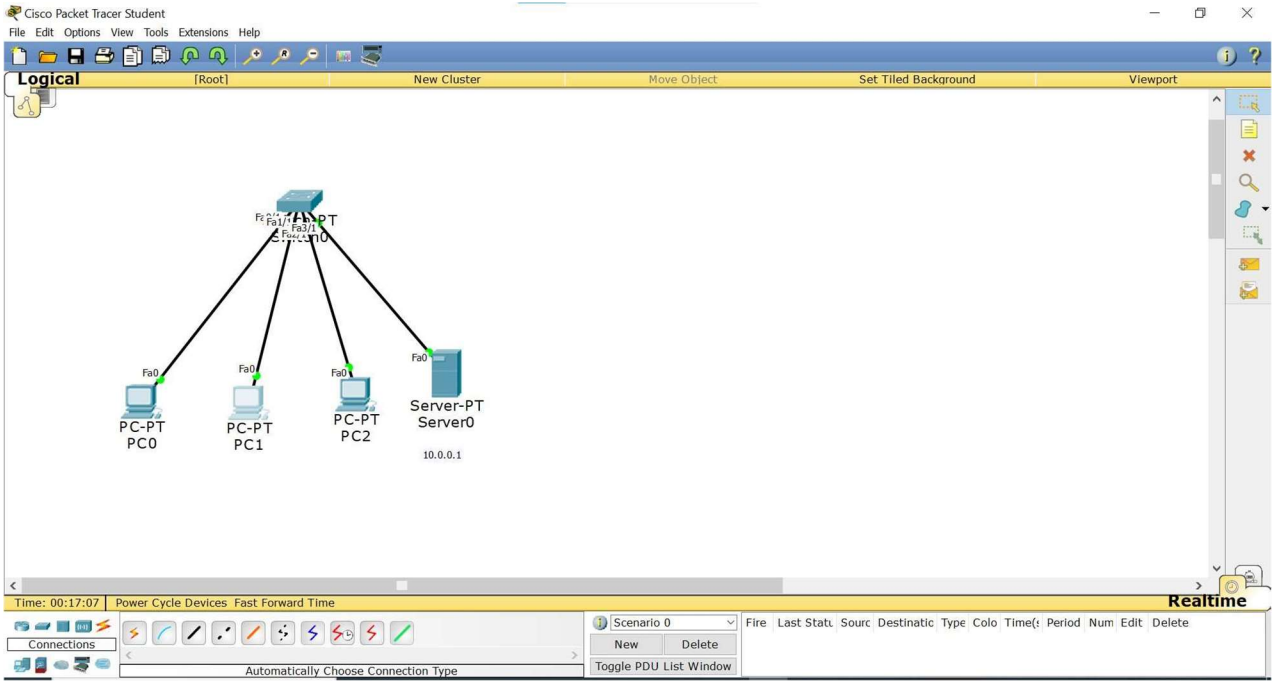
Observation:

DHCP is used to assign IP address dynamically to different devices. To assign continuous IP address we create a server pool. where we assign the starting address and a default gateway no. For PC's under d/f switches we create a d/f server pool again & start. This takes care of delivering the packets to correct destination IP address & also sends back ack to original device.

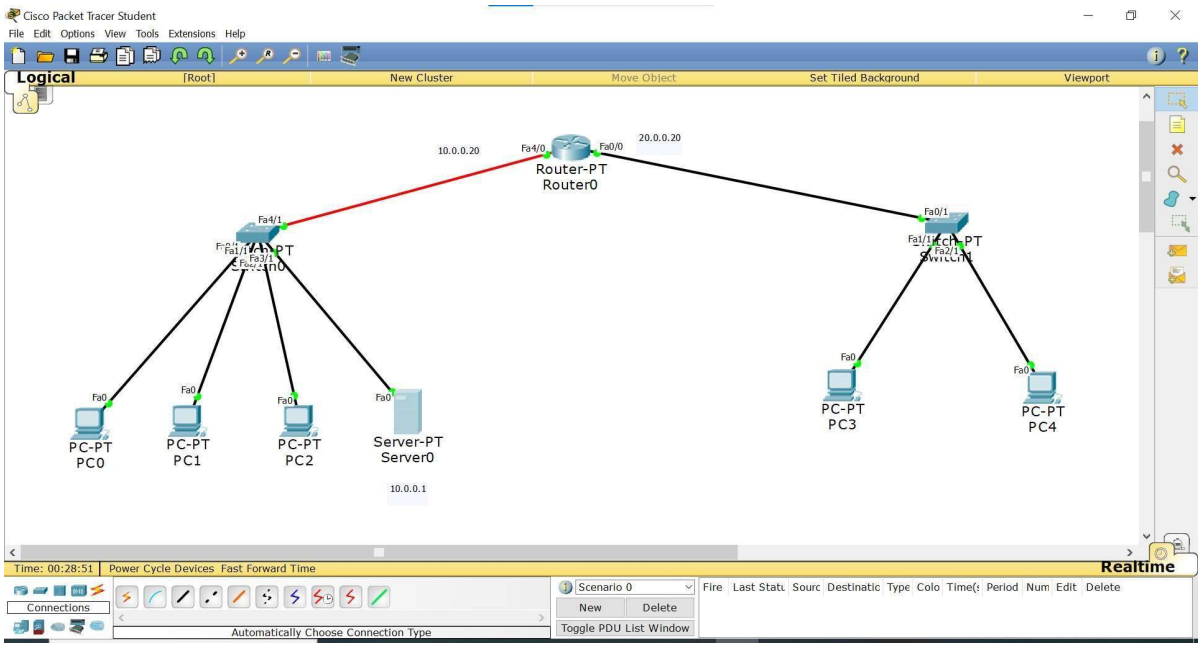
NP
19/7/2023.

TOPOLOGY:

PROGRAM 4.1:

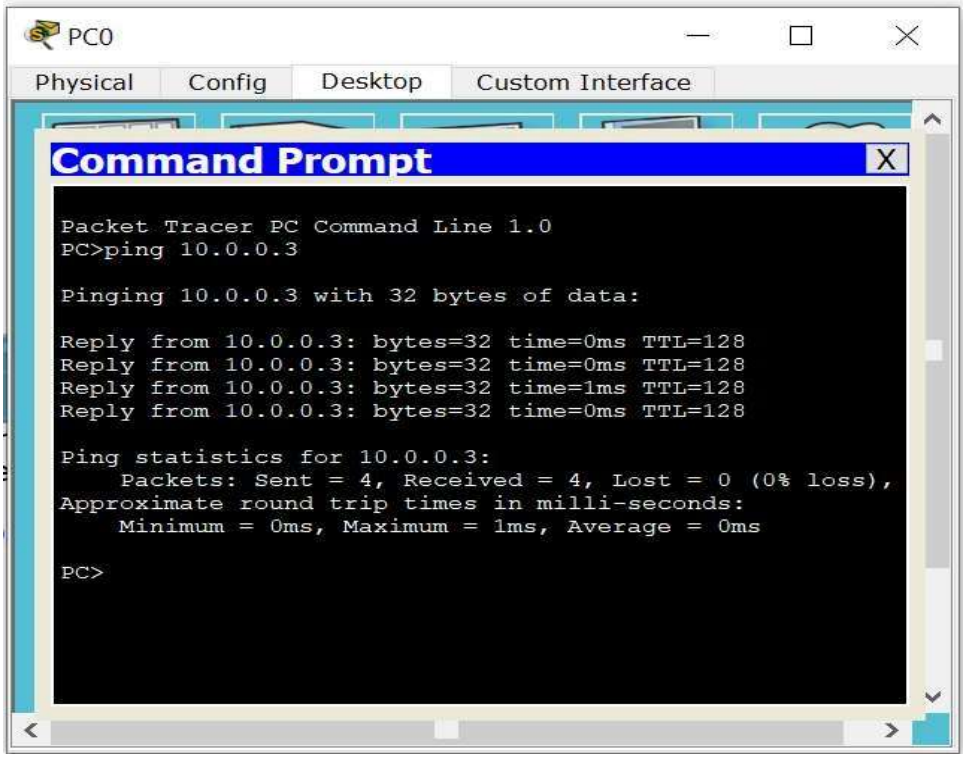


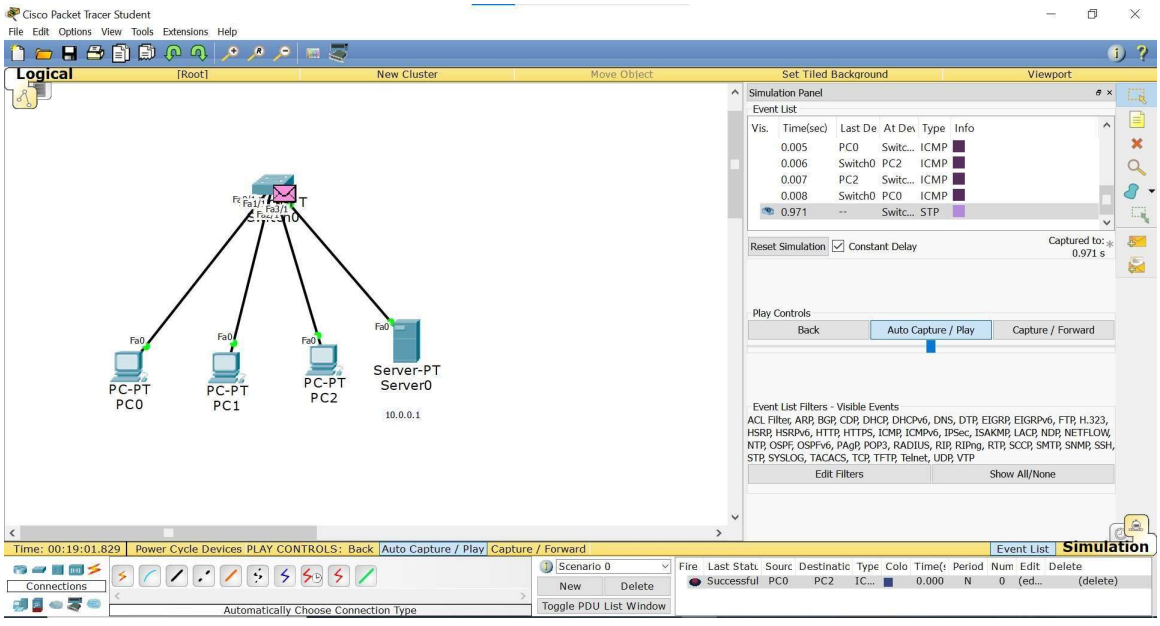

PROGRAM 4.2:



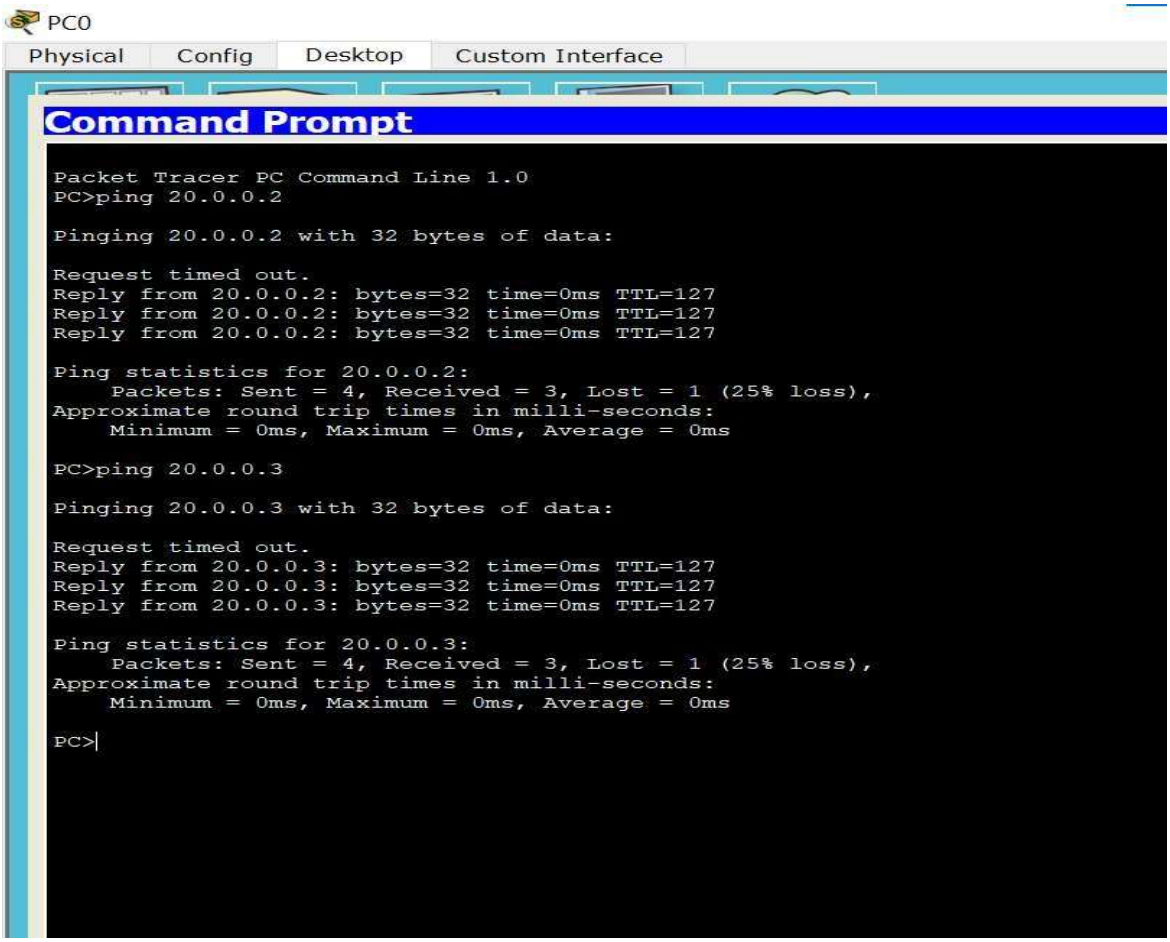
OUTPUT:

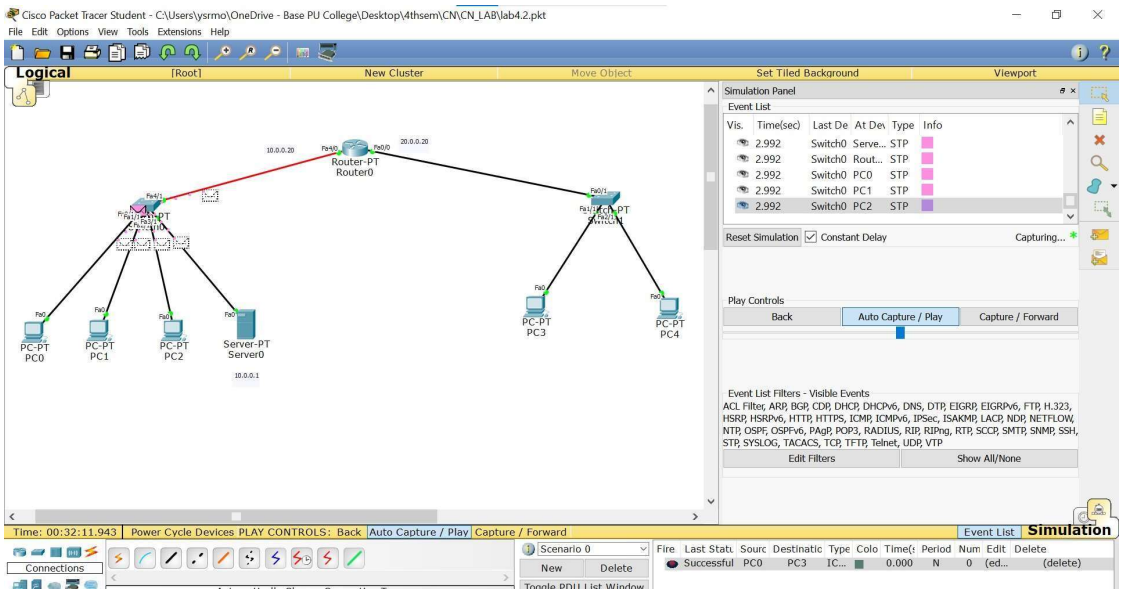
PROGRAM 4.1:



# PROGRAM 4.2:

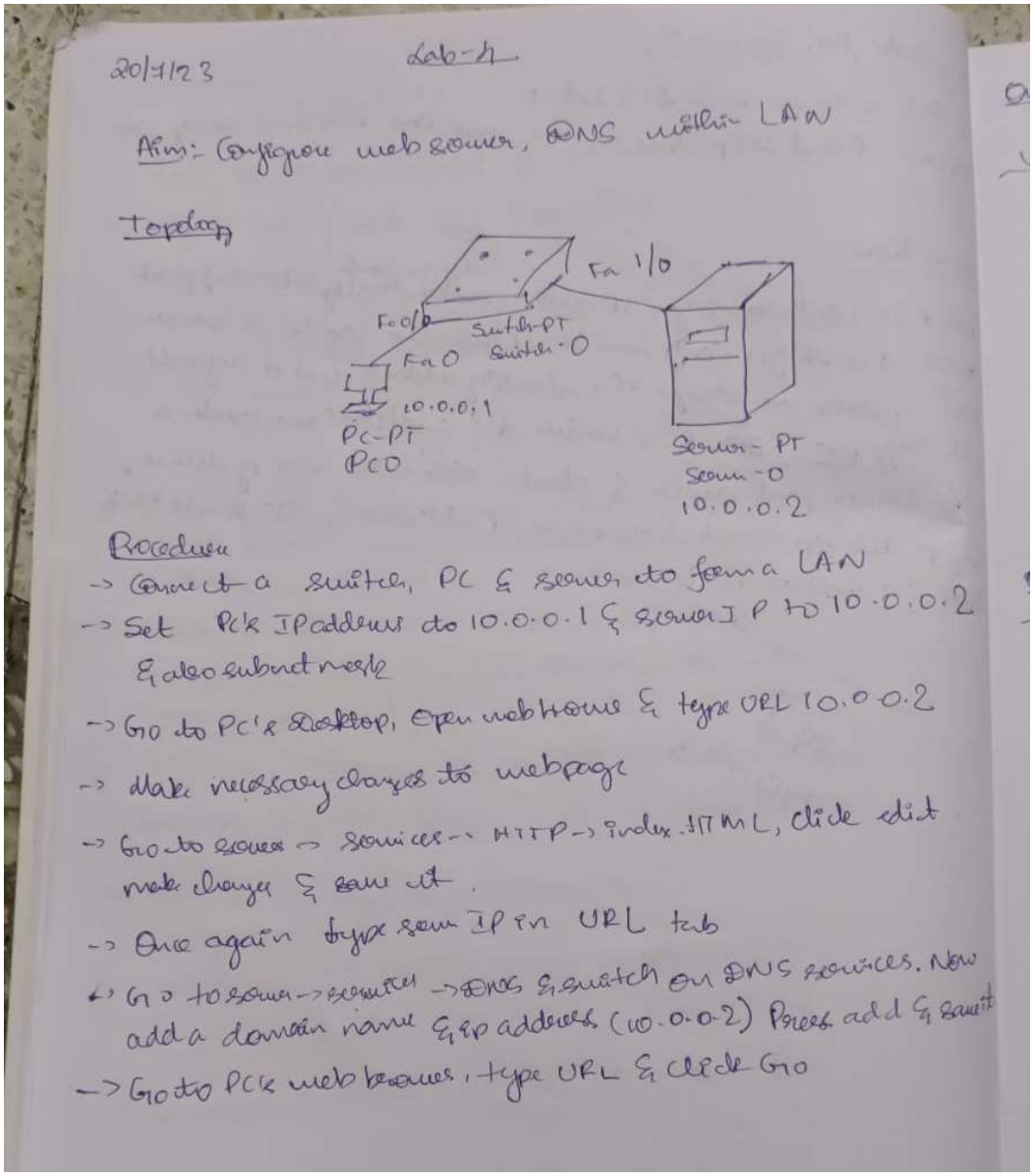

PC0
Physical
Config
Desktop
Custom Interface
Command Prompt
Packet Tracer PC Command Line 1.0
PC>ping 20.0.0.2
Pinging 20.0.0.2 with 32 bytes of data:
Request timed out.
Reply from 20.0.0.2: bytes=32 time=0ms TTL=127
Reply from 20.0.0.2: bytes=32 time=0ms TTL=127
Reply from 20.0.0.2: bytes=32 time=0ms TTL=127
Ping statistics for 20.0.0.2:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
PC>ping 20.0.0.3
Pinging 20.0.0.3 with 32 bytes of data:
Request timed out.
Reply from 20.0.0.3: bytes=32 time=0ms TTL=127
Reply from 20.0.0.3: bytes=32 time=0ms TTL=127
Reply from 20.0.0.3: bytes=32 time=0ms TTL=127
Ping statistics for 20.0.0.3:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
PC>


Logical
Router-PT
Router0
PC-PT
PC0
PC-PT
PC1
PC-PT
PC2
Server-PT
Server0
PC-PT
PC3
PC-PT
PC4
Simulation Panel
Event List
Reset Simulation
Constant Delay
Play Controls
Back
Auto Capture / Play
Capture / Forward
Edit Filters
Show All/None
Simulation

# WEEK 5

Configure Web Server, DNS within a LAN.

OBSERVATION:



Output

Web Browser

< > URL http://xxxx Go Stop

My CV

B. C Suraj
USN: 1BM21CS034

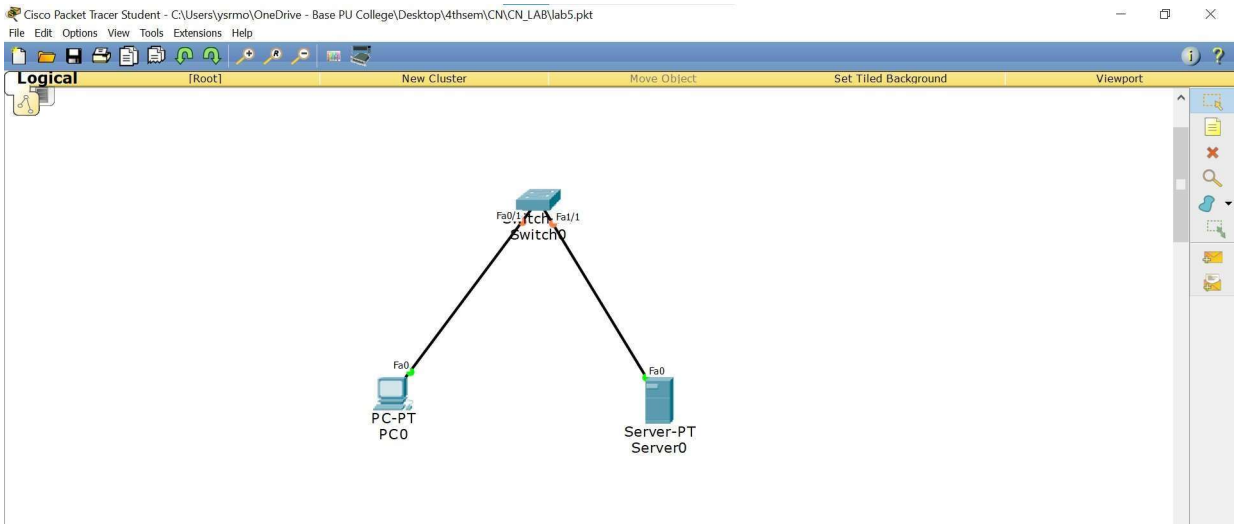
Languages: C/Java/Python
Image.

Observation

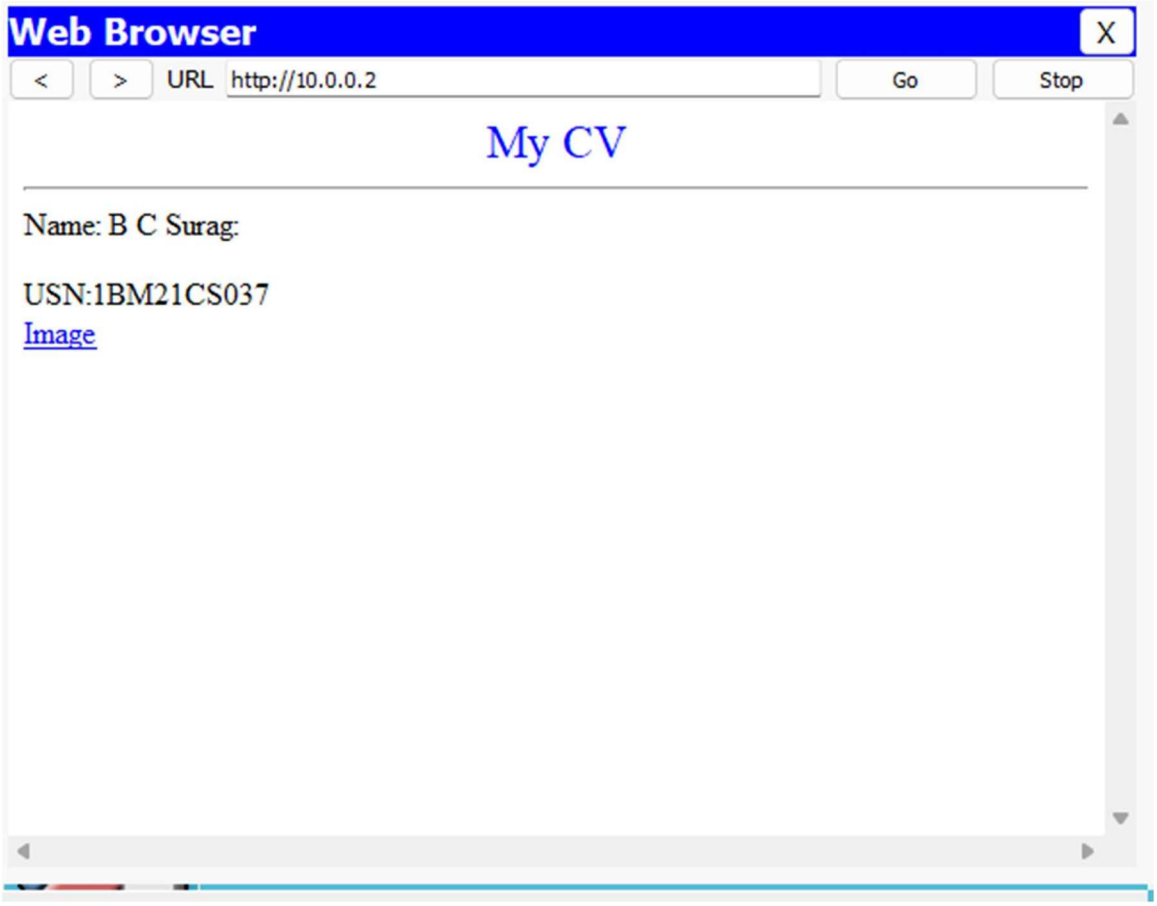
To reach a web page you need to type IP address as URL but what we type is domain name of DNS. Since it is difficult to remember IP address DNS server checks through for a matching IP address for respective domain name & renders web page.

2/12/2023

TOPOLOGY:




OUTPUT:



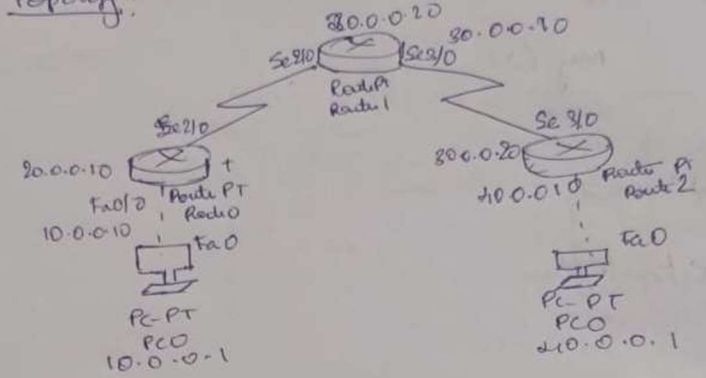
# WEEK 6

Configure RIP routing Protocol in Routers.

OBSERVATION:

Aim: Configure RIP routing Protocol in Router

Topology:




Procedure

→ Create a Network using 3 routers & 2 PC's Routers are connected using Serial DCE Cable & Connection between PC & router is using Copper-Crossover Cable.

→ Set IP address & gateway of both PC's

10.0.0.1 10.0.0.10 - PC 0

40.0.0.1 40.0.0.10 - PC 1

→ Go to CLI of Routers & follow these Commands

(i) NO
(ii) Enable
(iii) Config t
(iv) Interface fa0/0
(v) IP address 10.0.0.10 255.0.0.0
(vi) No shut
(vii) Exit
(viii) Interface serial 2/0
(ix) IP address 20.0.0.10 255.0.0.0
(x) Encapsulation PPP.

(xi) Clock rate 64000
(xii) No shut

-> Go to router 0 CLI & follow these commands

(i) Config t
(ii) router rip
(iii) network 10.0.0.0
(iv) network 20.0.0.0
(v) exit

-> Repeat this to all routers

-> Go to PC 0 command prompt and ping PC 1

Output:

PC > ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data:

Request timed out

Reply from 10.0.0.1: bytes=32 time: 1ms TTL=125

——— ——— bytes=32 time=5ms TTL=125

——— ——— bytes=32 time: 10ms TTL=125

Ping Statistics for 10.0.0.1

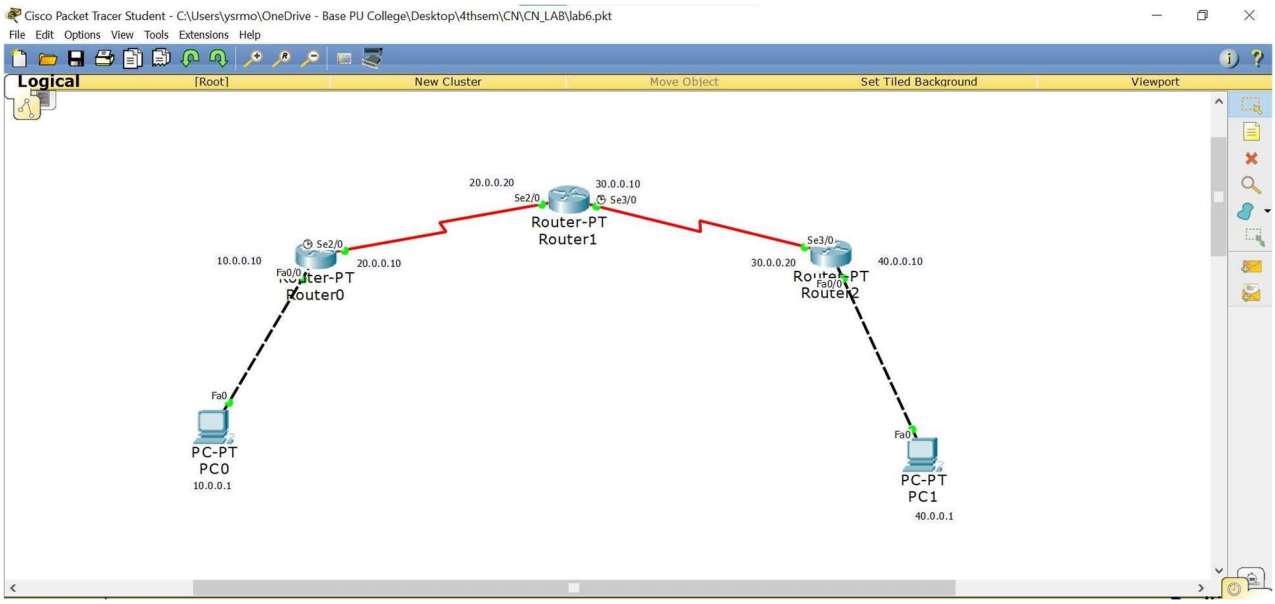
Packets: Sent = 4, Received = 3, Lost = 1

Approximate round trip time in ms: Minimum = 5ms, Maximum = 10ms, Average = 7ms

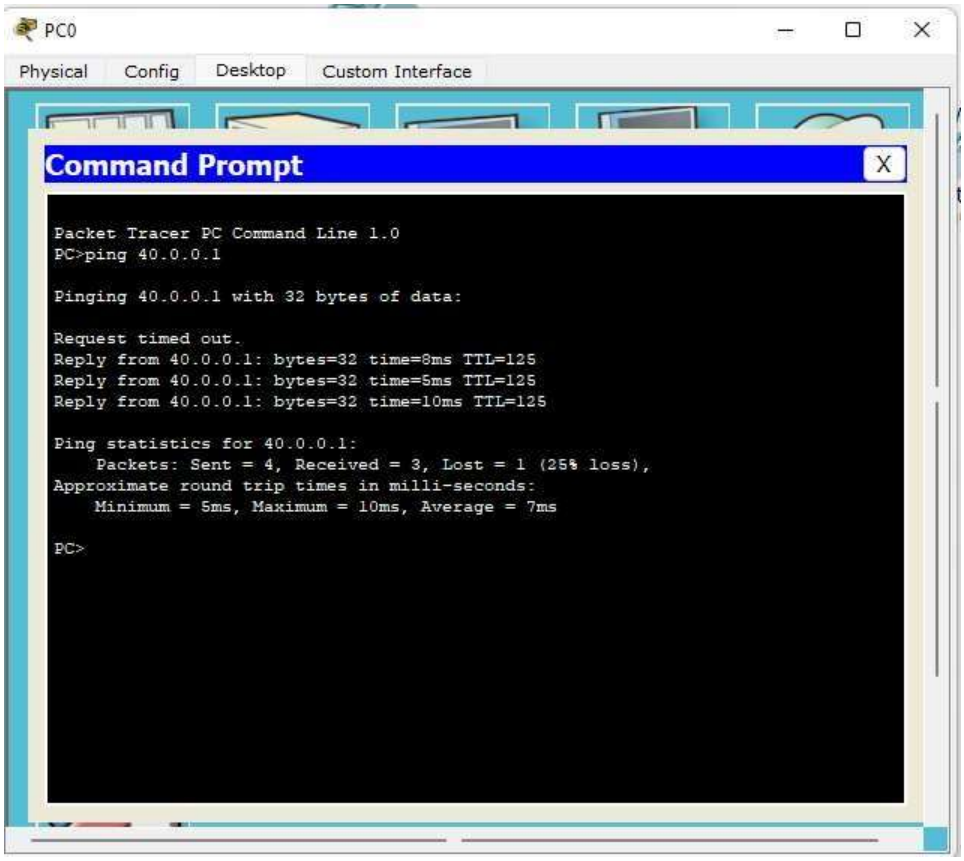
Observation:

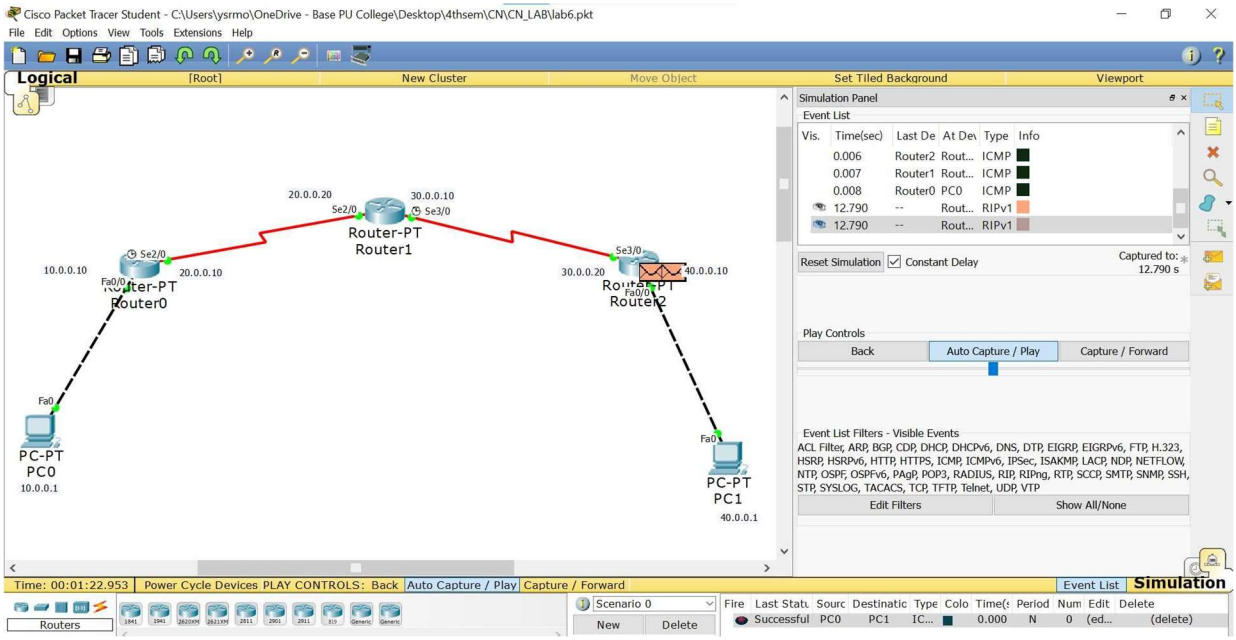
Routing Information Protocol (RIP) is a dynamic Routing Protocol that uses hop count as routing metric to find best path between source & destination. It is a distance vector routing Protocol. Hop count is no of routers b/w source & destination.

TOPOLOGY:




OUTPUT:

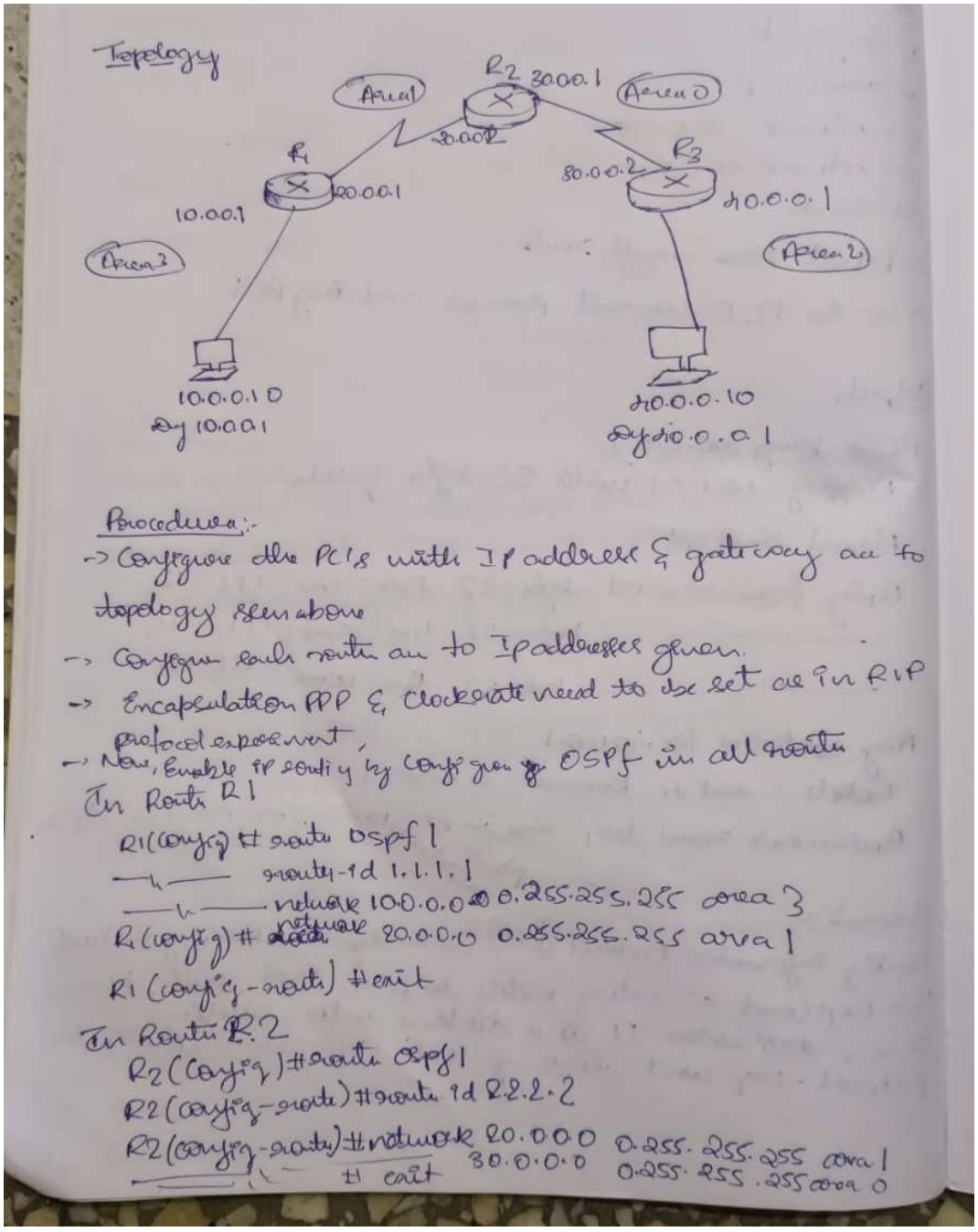


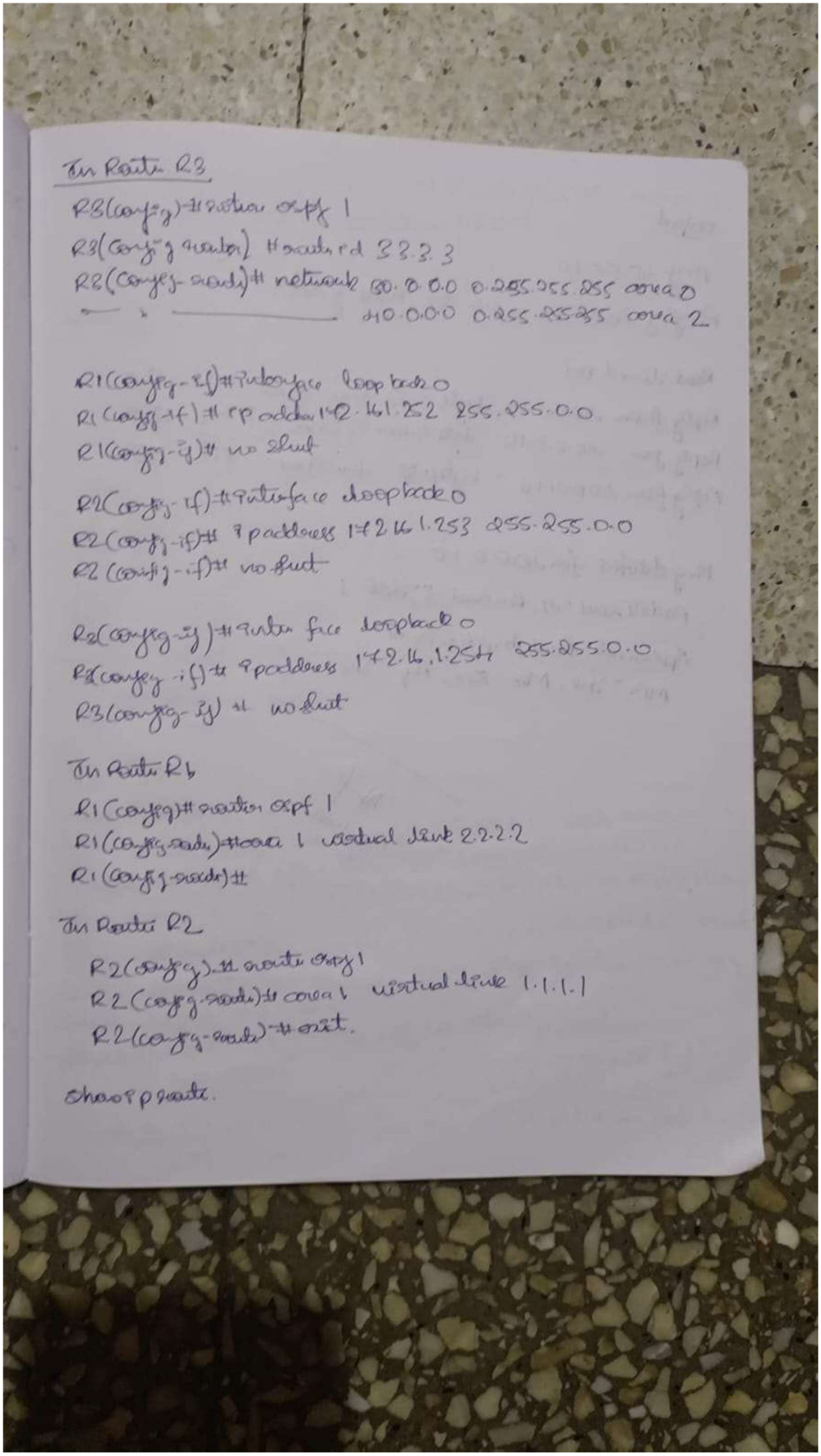

Cisco Packet Tracer Student - C:\Users\ysrmo\OneDrive - Base PU College\Desktop\4thsem\CN\CN_LAB\lab6.pkt
File Edit Options View Tools Extensions Help
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Router-PT
Router1
Router-PT
Router0
Router-PT
Router2
PC-PT
PC0
10.0.0.1
PC-PT
PC1
40.0.0.1
20.0.0.20
30.0.0.10
10.0.0.10
20.0.0.10
30.0.0.20
40.0.0.10
Simulation Panel
Event List
Vis. Time(sec) Last De At Dev Type Info
0.006 Router2 Rout... ICMP
0.007 Router1 Rout... ICMP
0.008 Router0 PC0 ICMP
12.790 -- Rout... RIPv1
12.790 -- Rout... RIPv1
Reset Simulation
Constant Delay
Captured to: 12.790 s
Play Controls
Back
Auto Capture / Play
Capture / Forward
Event List Filters - Visible Events
ACL Filter, ARP, BGP, CDP, DHCP, DHCPv6, DNS, DTP, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPSec, ISAKMP, LACP, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, RADIUS, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, VTP
Edit Filters
Show All/None
Time: 00:01:22.953
Power Cycle Devices PLAY CONTROLS: Back
Auto Capture / Play
Capture / Forward
Event List
Simulation
Routers
Scenario 0
New
Delete
Fire Last Statu Sourc Destinatic Type Colo Time(s Period Num Edit Delete
Successful PC0 PC1 IC... 0.000 N 0 (ed... (delete)

# WEEK 7

Configure OSPF routing protocol.

OBSERVATION:





On Router R3

R3(config)#router ospf 1
R3(config-router)#router-id 3.3.3.3
R3(config-router)#network 30.0.0.0 0.255.255.255 area 0
———— " ———— 10.0.0.0 0.255.255.255 area 2

R1(config-if)#interface loopback 0
R1(config-if)#ip address 172.16.1.252 255.255.0.0
R1(config-if)#no shut

R2(config-if)#interface loopback 0
R2(config-if)#ip address 172.16.1.253 255.255.0.0
R2(config-if)#no shut

R3(config-if)#interface loopback 0
R3(config-if)#ip address 172.16.1.254 255.255.0.0
R3(config-if)#no shut

On Router R1

R1(config)#router ospf 1
R1(config-router)#area 1 virtual-link 2.2.2.2
R1(config-router)#

On Router R2

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

show ip route.

Output

Ping 10.0.0.10

Pinging 10.0.0.10 with 32 bytes of data

Request timed out.

Reply from 10.0.0.10: bytes = 32 time = 15ms TTL = 125

Reply from 10.0.0.10: bytes = 32 time = 2ms TTL = 125

Reply from 10.0.0.10: bytes = 32 time = 9ms TTL = 125

Ping statistics for 10.0.0.10:

Packets sent = 4, Received = 3, lost = 1

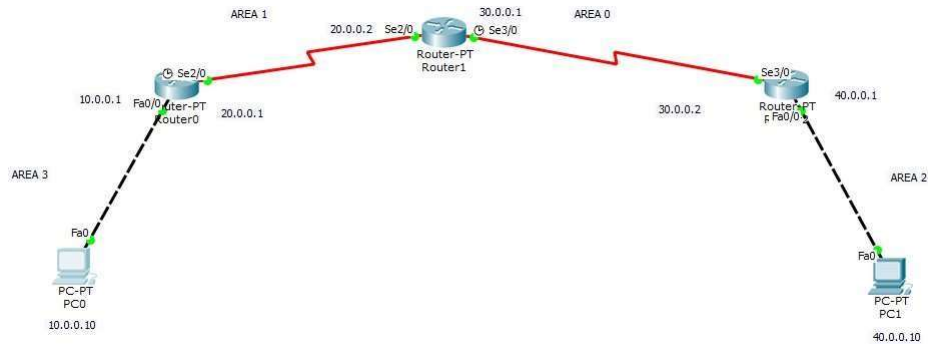
Approximate Round trip time in ms

Min = 2ms, Max = 15ms, Avg = 8ms.

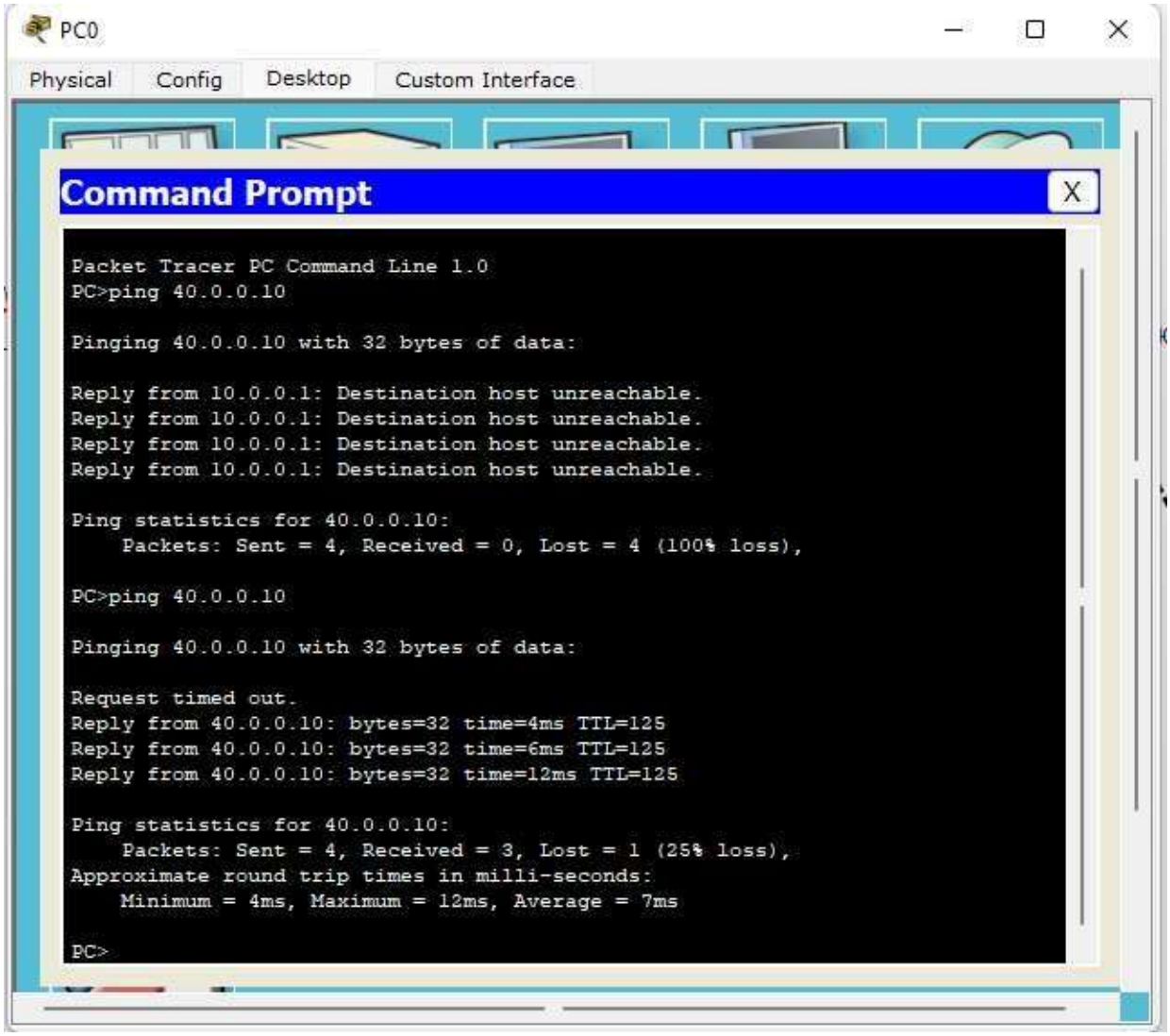
NP

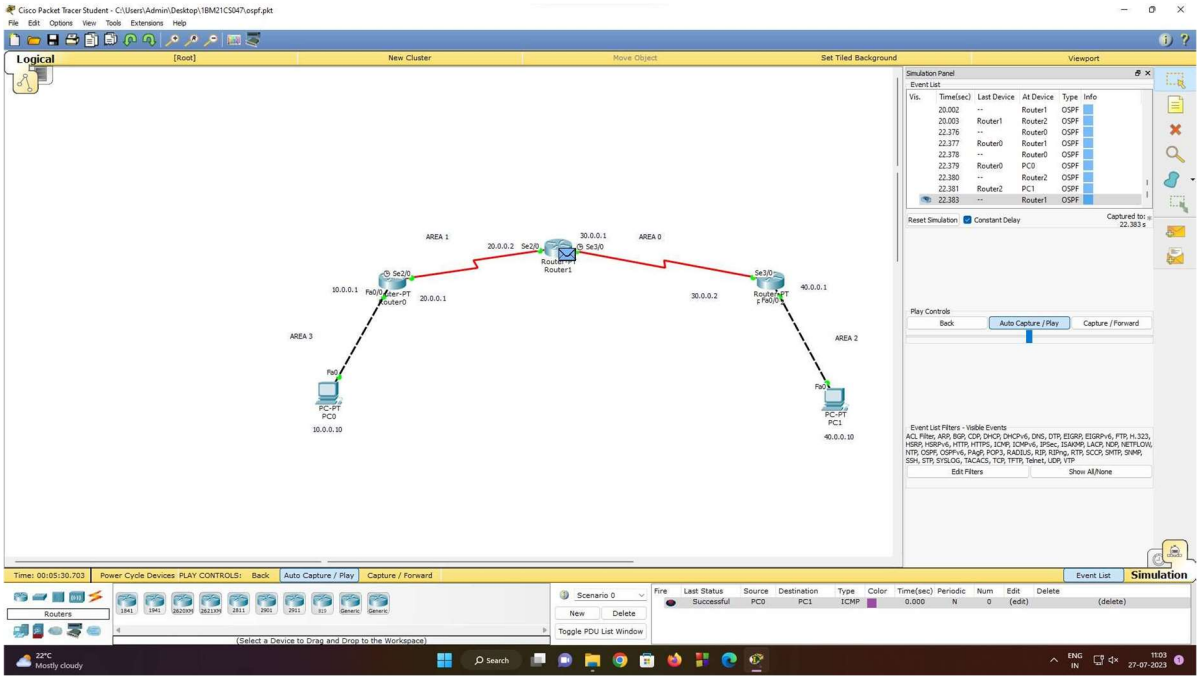
31/8/2023

TOPOLOGY:




OUTPUT:

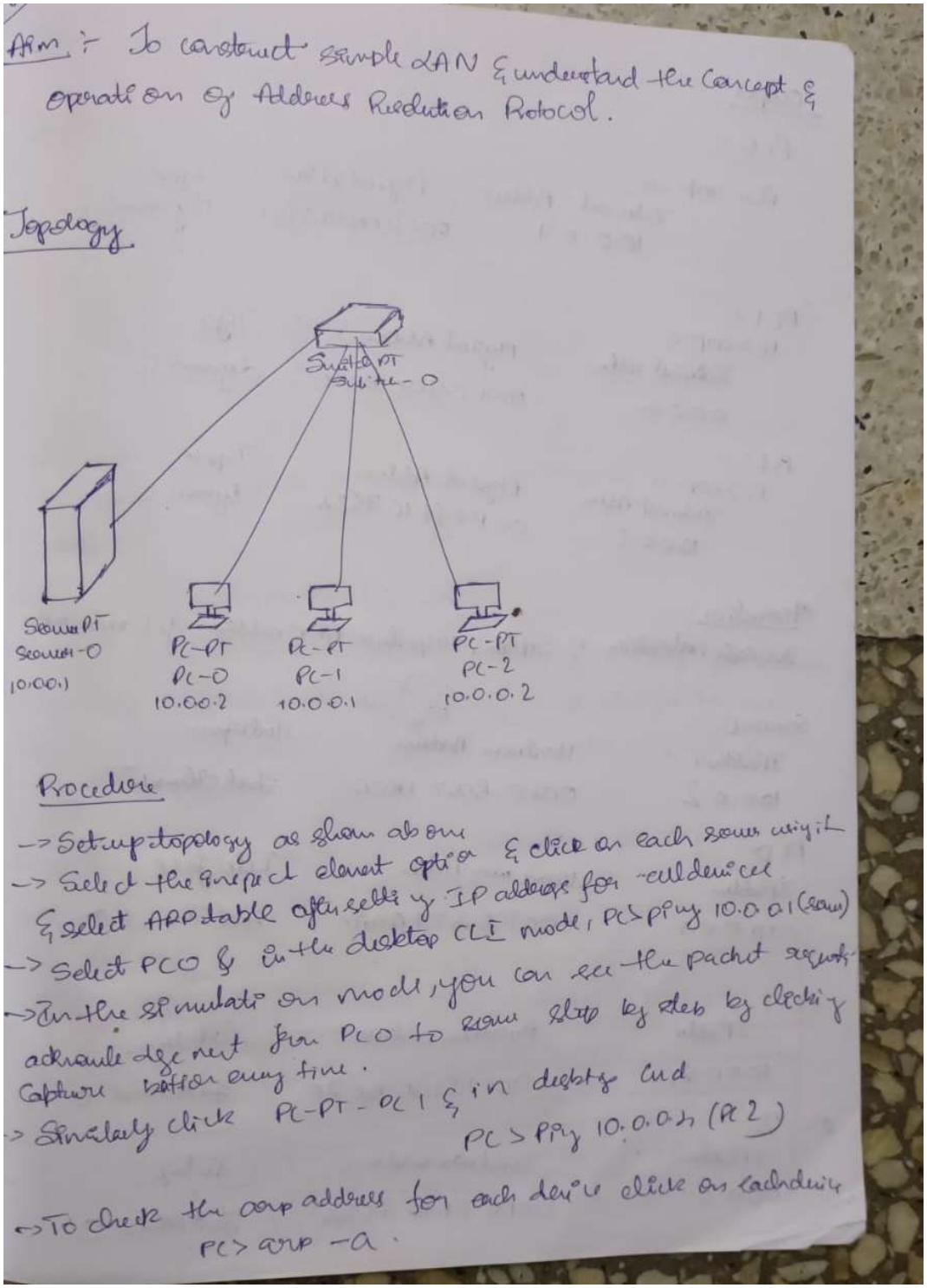



Cisco Packet Tracer Student - C:\Users\Admin\Desktop\1BM21CS047\ospf.pkt
File Edit Options View Tools Extensions Help
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
AREA 1
AREA 0
AREA 3
AREA 2
20.0.0.2
Se2/0
30.0.0.1
Se3/0
Router1
Router0
10.0.0.1
Fa0/0
20.0.0.1
30.0.0.2
40.0.0.1
PC-PT
PC0
10.0.0.10
PC1
40.0.0.10
Simulation Panel
Event List
Vis. Time(sec) Last Device At Device Type Info
20.002 -- Router1 OSPF
20.003 Router1 Router2 OSPF
22.376 -- Router0 OSPF
22.377 Router0 Router1 OSPF
22.378 -- Router0 OSPF
22.379 Router0 PC0 OSPF
22.380 -- Router2 OSPF
22.381 Router2 PC1 OSPF
22.383 -- Router1 OSPF
Reset Simulation
Constant Delay
Play Controls
Back
Auto Capture / Play
Capture / Forward
Event List Filters - Visible Events
Edit Filters
Show All/None
Time: 00:05:30.703
Power Cycle Devices PLAY CONTROLS: Back Auto Capture / Play Capture / Forward
Event List
Simulation
Routers
(Select a Device to Drag and Drop to the Workspace)
Scenario 0
New
Delete
Toggle PDU List Window
Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit Delete
Successful PC0 PC1 ICMP 0.000 N 0 (edit) (delete)
22°C
Mostly cloudy
Search
ENG
IN
11:03
27-07-2023

# WEEK 8

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

OBSERVATION:



Output

PC0 :

PC> cmd -a

| Internet Address | Physical address | Type |
|---|---|---|
| 10.0.0.1 | 0003.e479.9ac | dynamic |

PC1 :

PC> cmd -a

| Internet address | Physical Address | Type |
|---|---|---|
| 10.0.0.2 | 0001.C90E.be7C | dynamic |

PC2 :

PC> cmd -a

| Internet Address | Physical Address | Type |
|---|---|---|
| 10.0.0.3 | 00D0.ff1C.752A | dynamic |

Observation :

In each instance of capture, respective ARP address get added

Server0

| IP address | Hardware Address | Interface |
|---|---|---|
| 10.0.0.2 | 00E0.B057.1B0A | Fast Ethernet |

PC0

| IP address | Hardware Address | Interface |
|---|---|---|
| 10.0.0.1 | 0003.E479.A9AC | Fast Ethernet 0 |

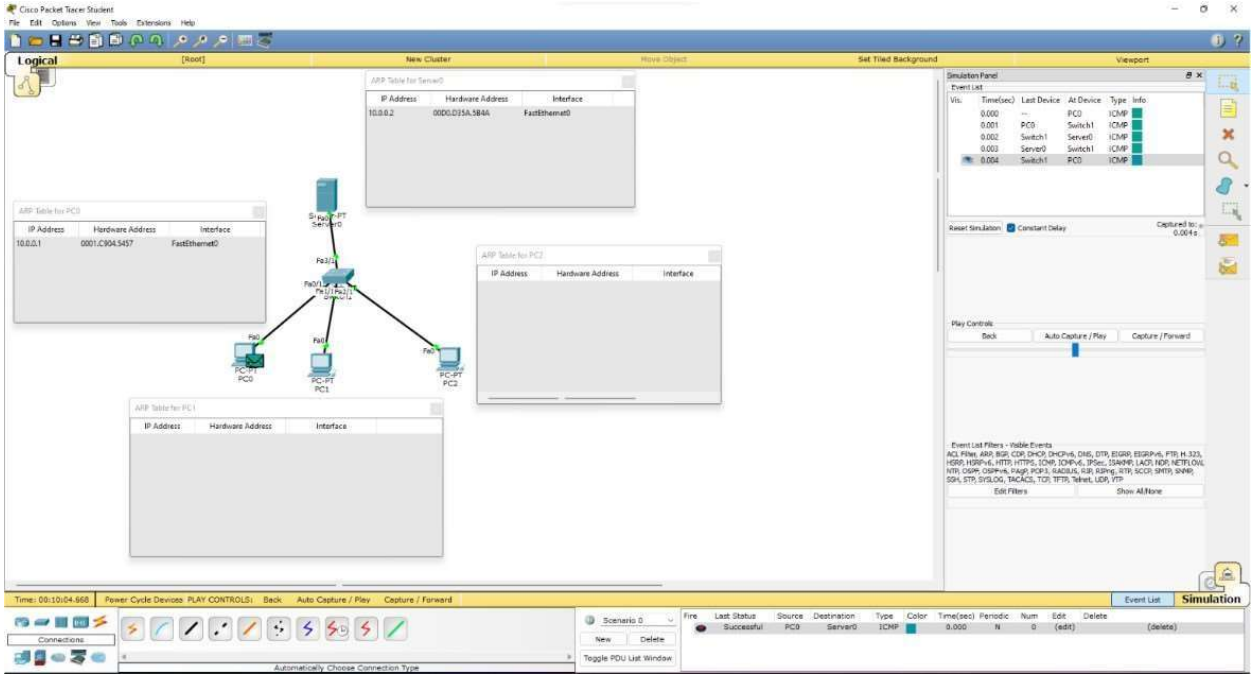
PC-1

| IP address | Hardware address | Interface |
|---|---|---|
| 10.0.0.2 | 0001.C90E.BE7C | FastEthernet 0 |

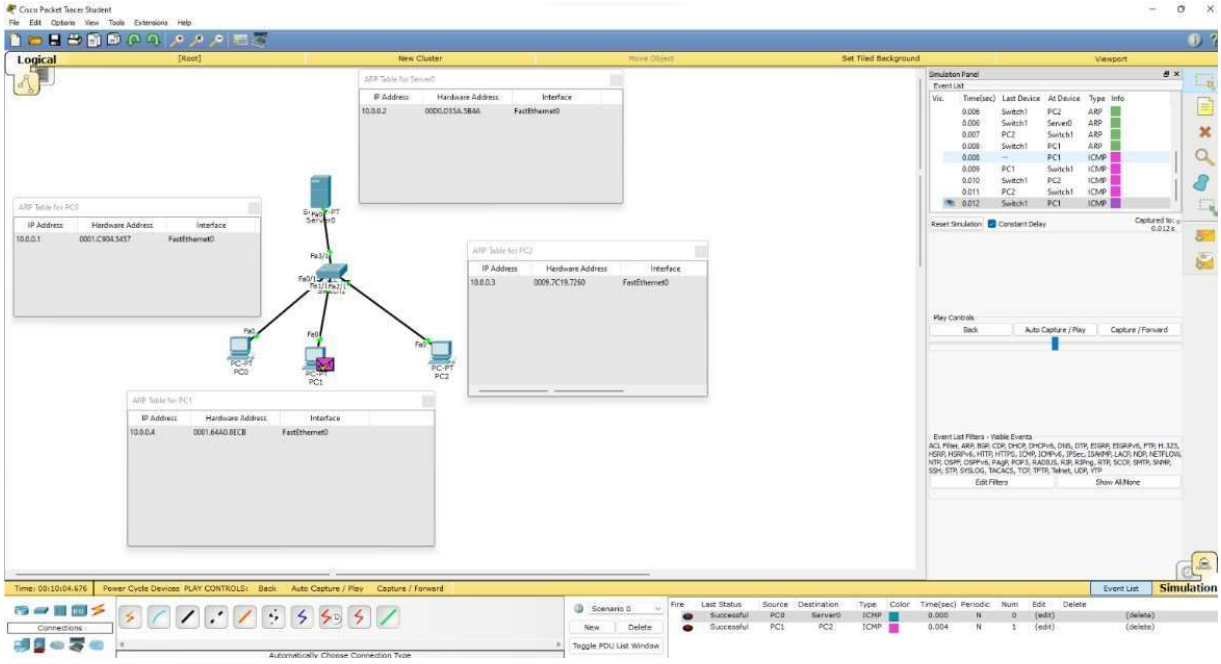
PC-2

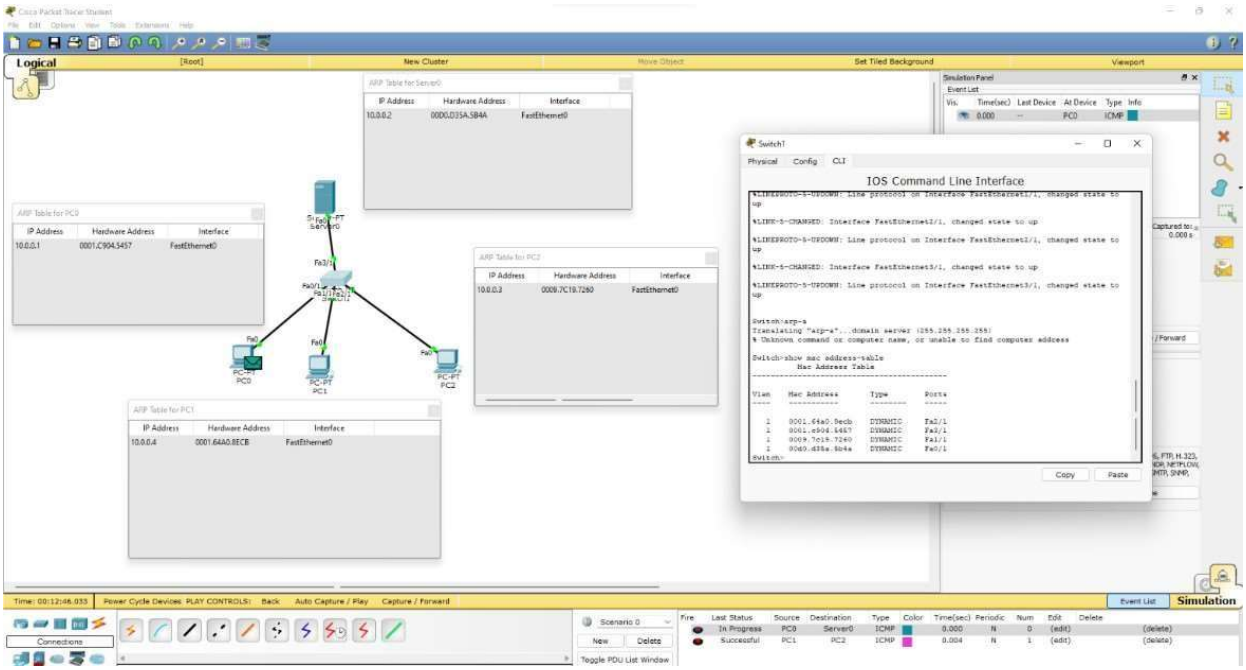
| IP address | Hardware address | Interface |
|---|---|---|
| 10.0.0.3 | 00D0.FF1C.752A | Fast Ethernet 0 |

TOPOLOGY:



OUTPUT:




Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Switch1
Physical
Config
CLI
IOS Command Line Interface
Copy
Paste
Simulation

# WEEK 9

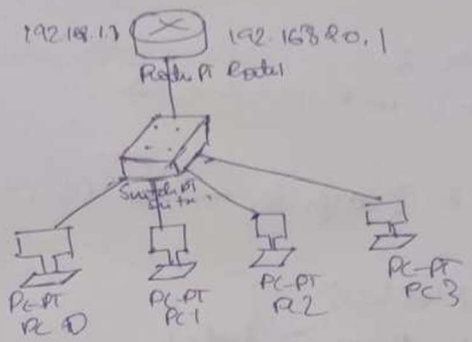
To construct a VLAN and make a pc communicate among VLAN.

OBSERVATION:

9/

Aim :- To Construct VLANs & make PC's communicate among VLAN

Topology




Procedure :

-> Create a topology as shown & choose 1841 router & 2960-24TT switch
-> Set up IP address of router & in PCs, we use class C address,
-> In switch go to config tab & select VLAN database give any VLAN no like 2 & name as VLAN
-> Give interface FastEthernet 0/1 & make it
-> Next select the switch under it interface which has interface 0/3 & 0/4. click on each of them & set VLAN no to 2.
-> Go to router -> configure & select VLANs DB, & enter VLAN & no 2
-> Go to router CLI & paste following command,

```
Config t
interface fa 0/0
IP address 192.168.1.1 255.255.255.0
No shut
exit
config t
interface fa 0/1
encapsulation dot1q 2
ip address 192.168.20.1 255.255.255.0
```

No shut
exit

Ping message from PC to another VLAN PC

Output

PC> Ping 192.168.20.3

Pinging 192.168.20.3 with 32 bytes of data:

Request timed out.

Reply from 192.168.20.3 bytes=32 time=0ms TTL=127

:

Ping stats for 192.168.20.3

Packets sent = 4, Recieved = 3 lost = 1

RTT, min = 0ms Max = 5ms Avg = 1ms

Observation

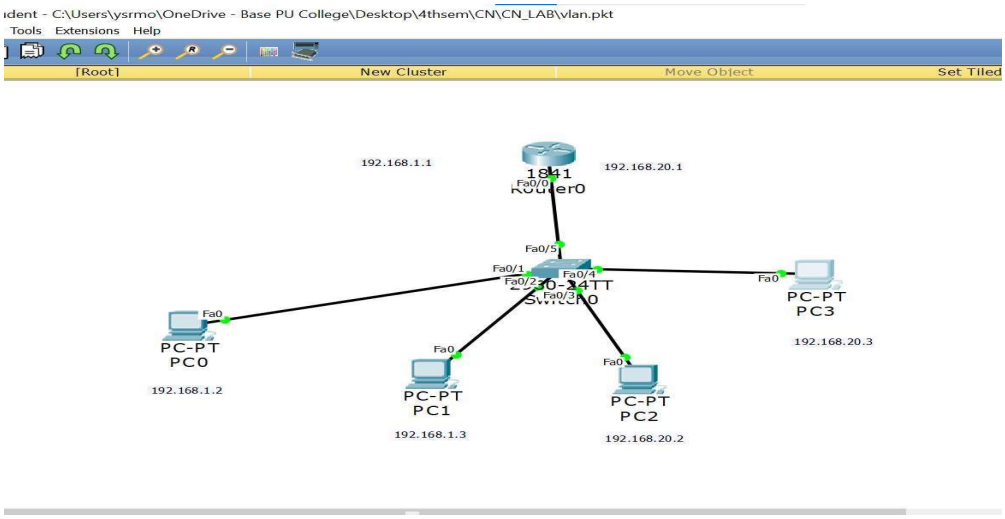
→ We can have one device on one VLAN & another device connected to the same switch they will only hear the broadcast traffic from within VLANS as if they were entitled to 2 switches

→ VLAN's doesn't use IP instead use subnet / class C type

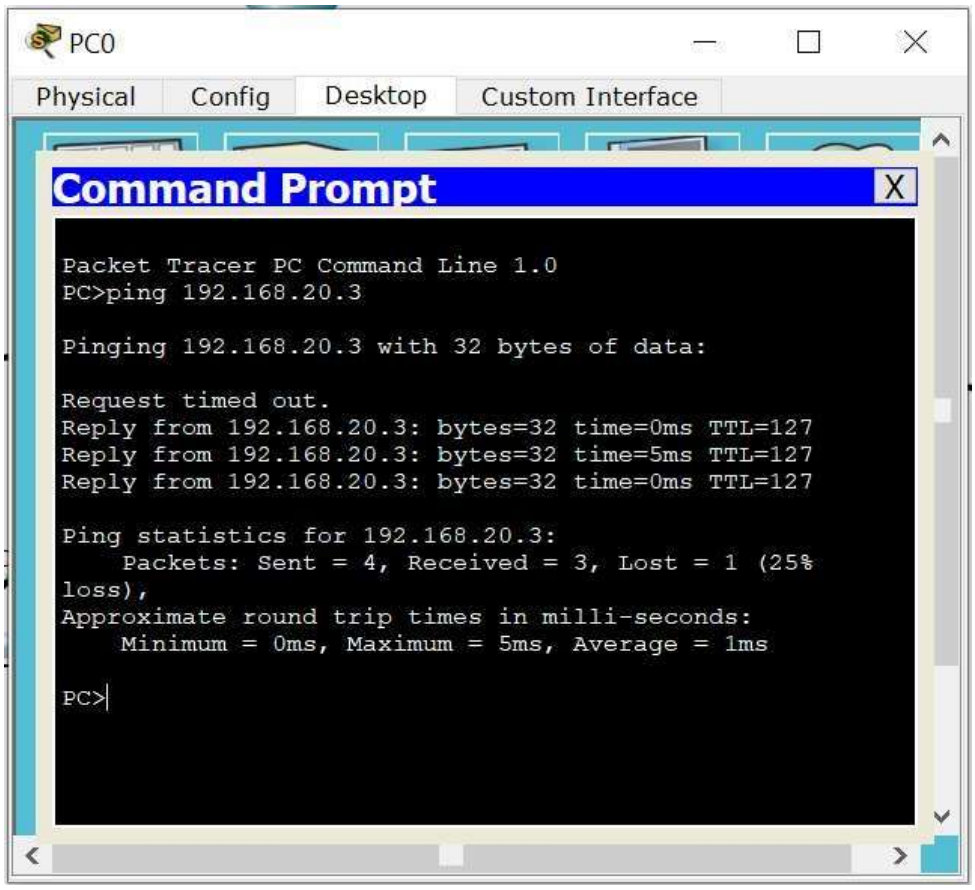
→ Into VLAN really gives a flexible tool to logically subdivide the network that has potential to enhance security & performance

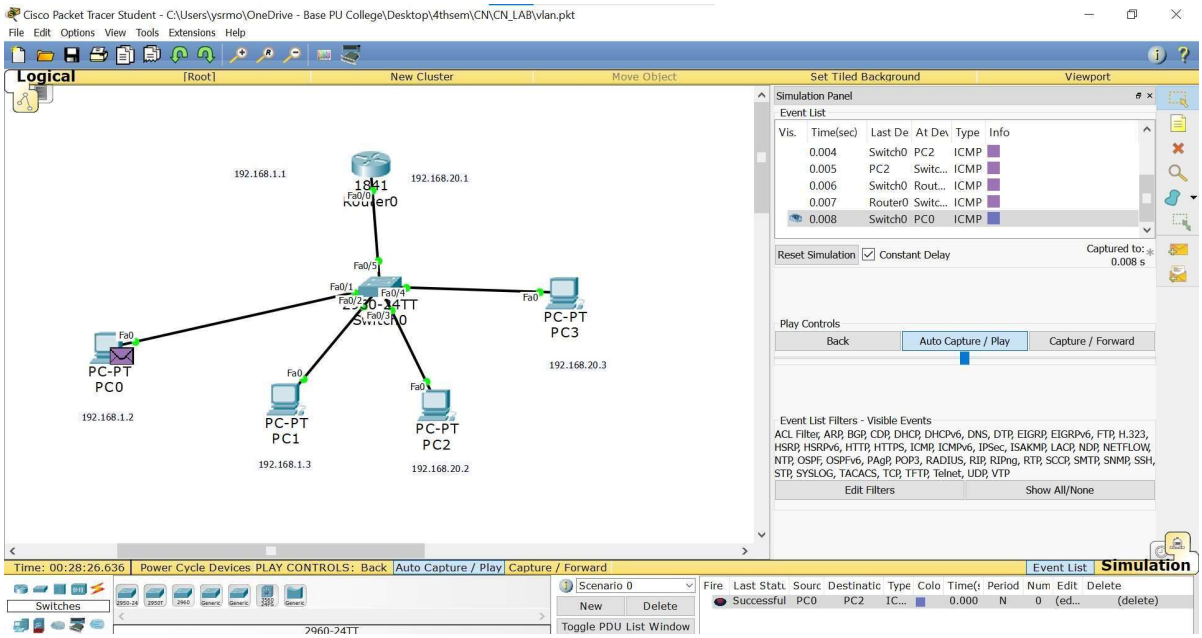
NLP
01/09/2023

TOPOLOGY:


ident - C:\Users\ysrmo\OneDrive - Base PU College\Desktop\4thsem\CN\CN_LAB\vlan.pkt
Tools Extensions Help
[Root]
New Cluster
Move Object
Set Tiled
192.168.1.1
192.168.20.1
1841
Router0
Fa0/0
Fa0/5
Fa0/1
Fa0/2
Fa0/4
Fa0/3
2950-24TT
Switch0
Fa0
PC-PT
PC0
192.168.1.2
Fa0
PC-PT
PC1
192.168.1.3
Fa0
PC-PT
PC2
192.168.20.2
Fa0
PC-PT
PC3
192.168.20.3

OUTPUT:


PC0
Physical
Config
Desktop
Custom Interface
Command Prompt
X
Packet Tracer PC Command Line 1.0
PC>ping 192.168.20.3
Pinging 192.168.20.3 with 32 bytes of data:
Request timed out.
Reply from 192.168.20.3: bytes=32 time=0ms TTL=127
Reply from 192.168.20.3: bytes=32 time=5ms TTL=127
Reply from 192.168.20.3: bytes=32 time=0ms TTL=127
Ping statistics for 192.168.20.3:
Packets: Sent = 4, Received = 3, Lost = 1 (25%
loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 5ms, Average = 1ms
PC>


Logical
192.168.1.1
192.168.20.1
PC-PT PC0
192.168.1.2
PC-PT PC1
192.168.1.3
PC-PT PC2
192.168.20.2
PC-PT PC3
192.168.20.3
Simulation Panel
Event List
Reset Simulation
Constant Delay
Play Controls
Back
Auto Capture / Play
Capture / Forward
Edit Filters
Show All/None
Simulation

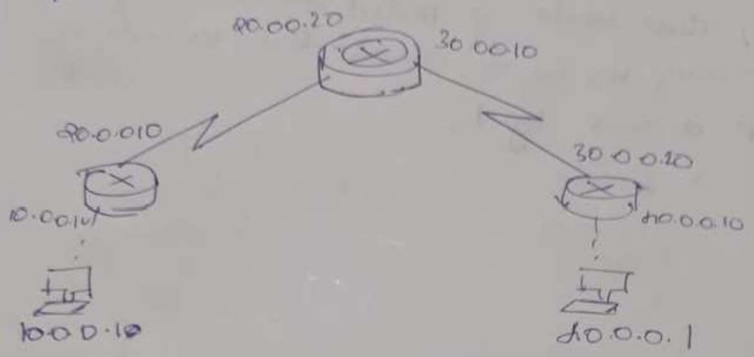
# WEEK 10

Demonstrate the TTL/ Life of a Packet.

OBSERVATION:

Aim :- To Demonstrate the TTL/Life of Packet

Topology




Procedure

-> Create the above topology

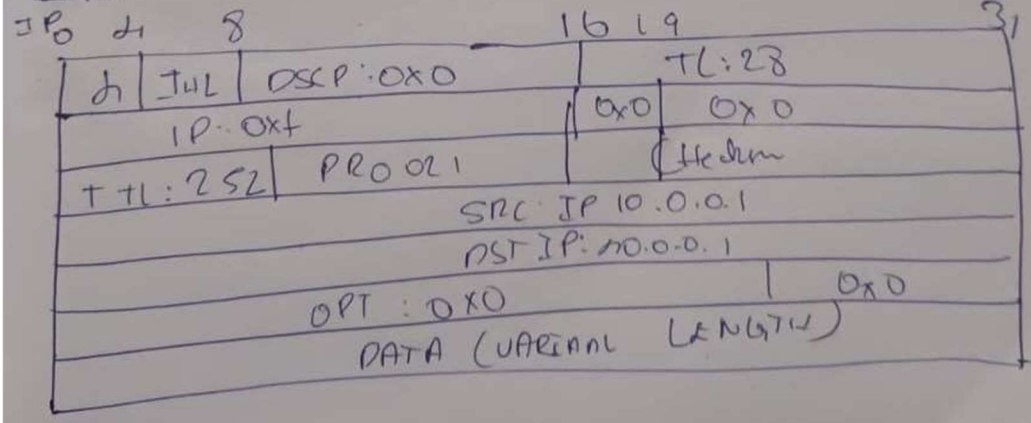
-> Go to simulation mode, Add PDU & send message for Protocol

-> Click on Capture button each time & Check the packet header

-> Each time when Capture is clicked you can observe simulation of packet for Outside to other

-> Click on packet each time & observe header file for TTL

Output

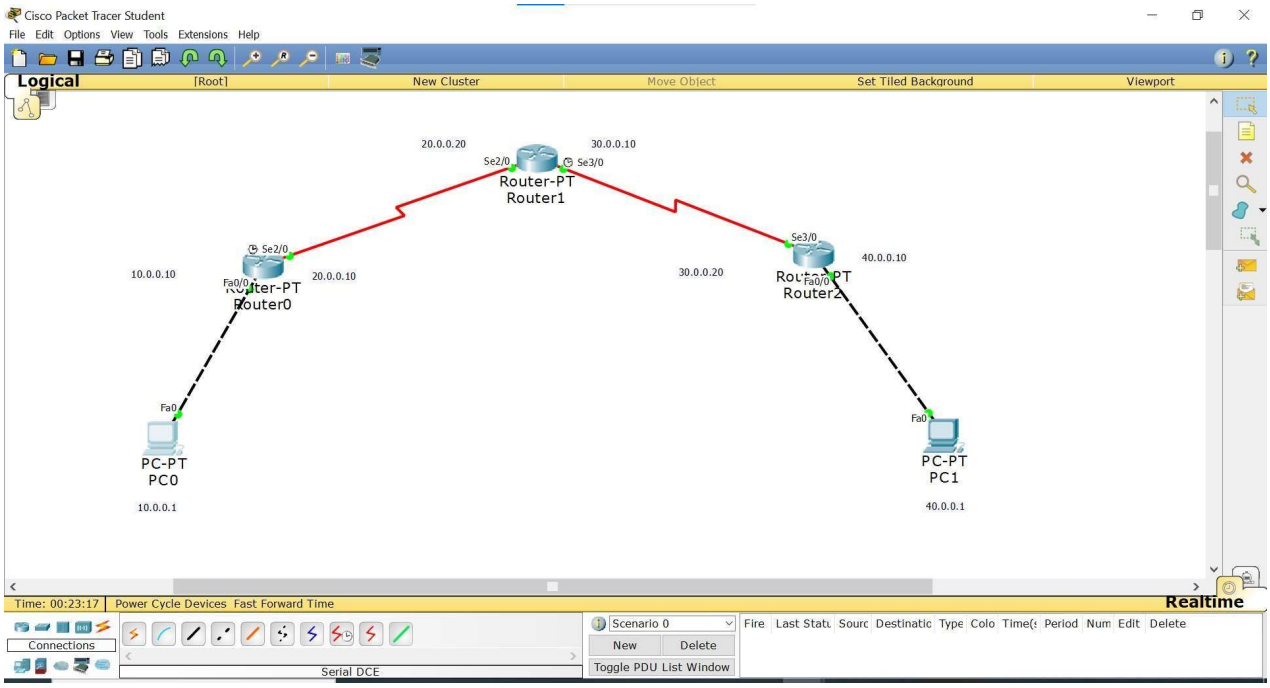


Observations

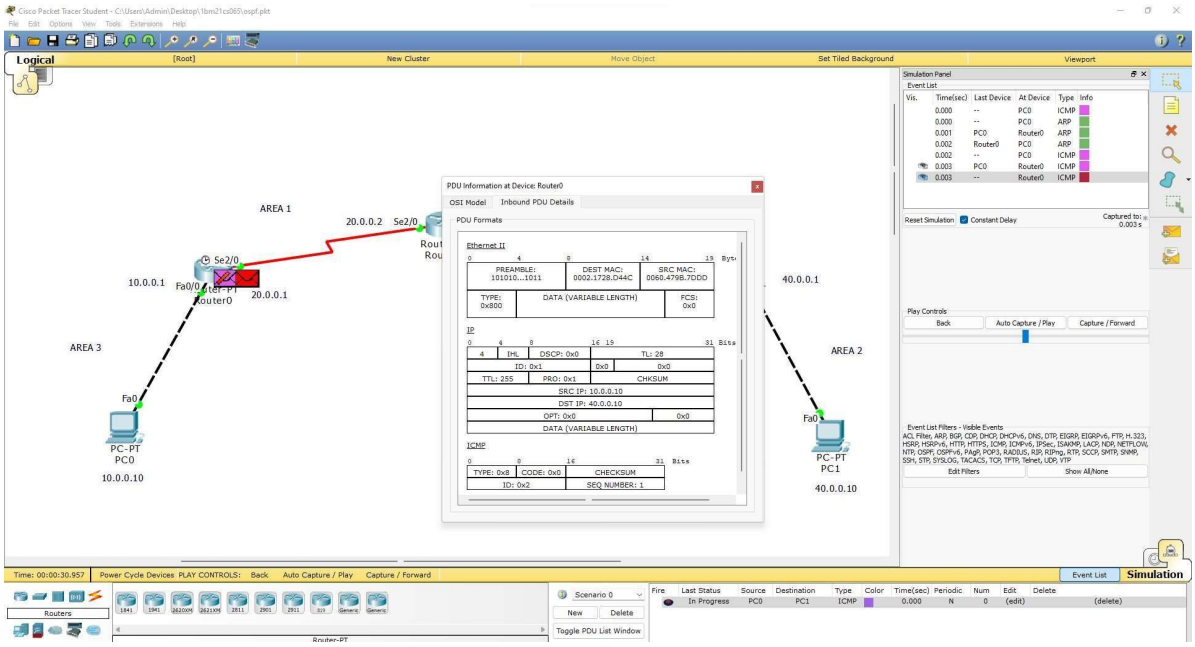
we can observe that, when ping is simulated using single POX, check header of packet, transition of packet. For every hop we can observe that the value of TTL in IP decreases by 1.

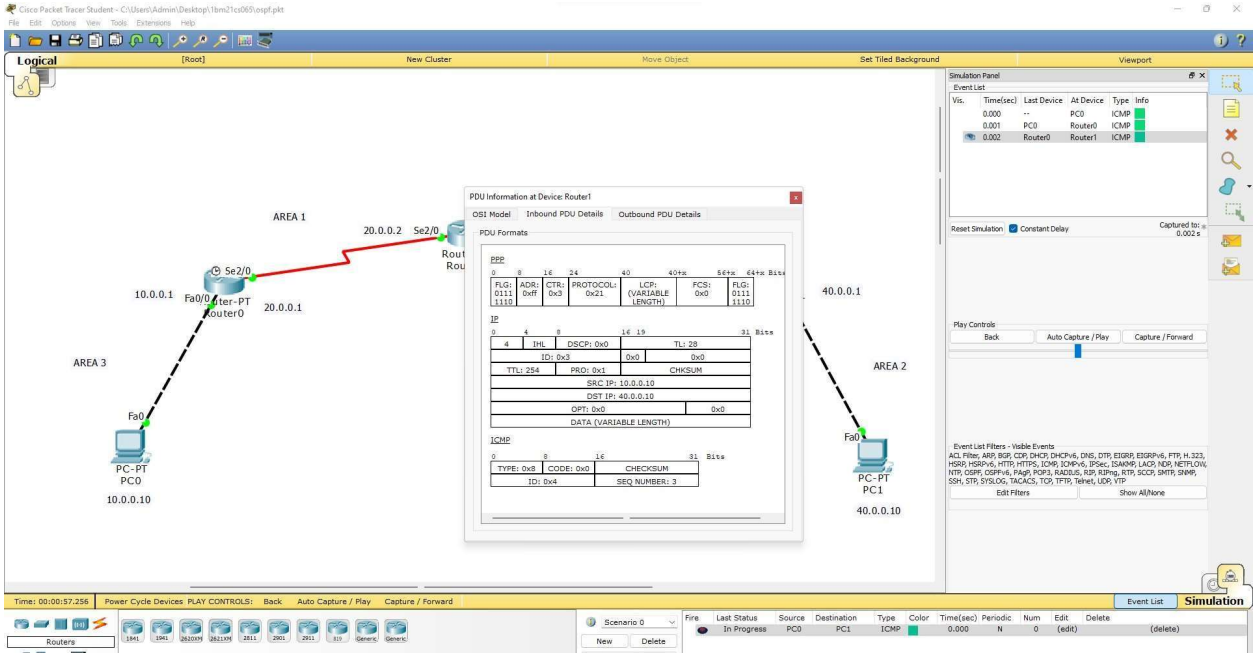
NP
01/09/2023

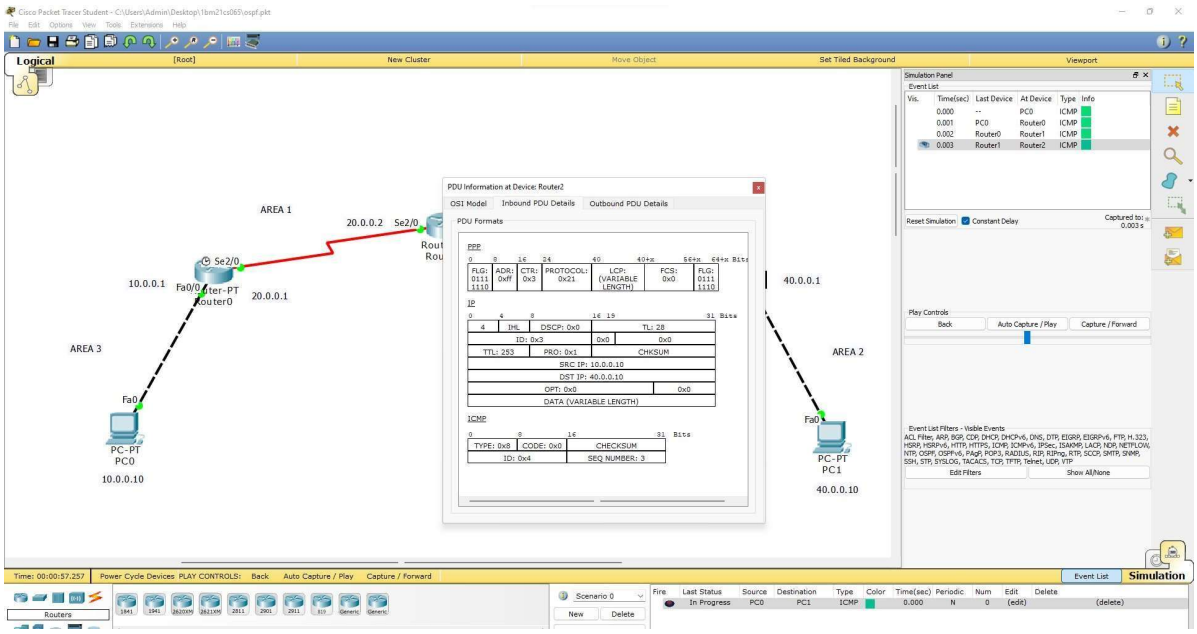
TOPOLOGY:

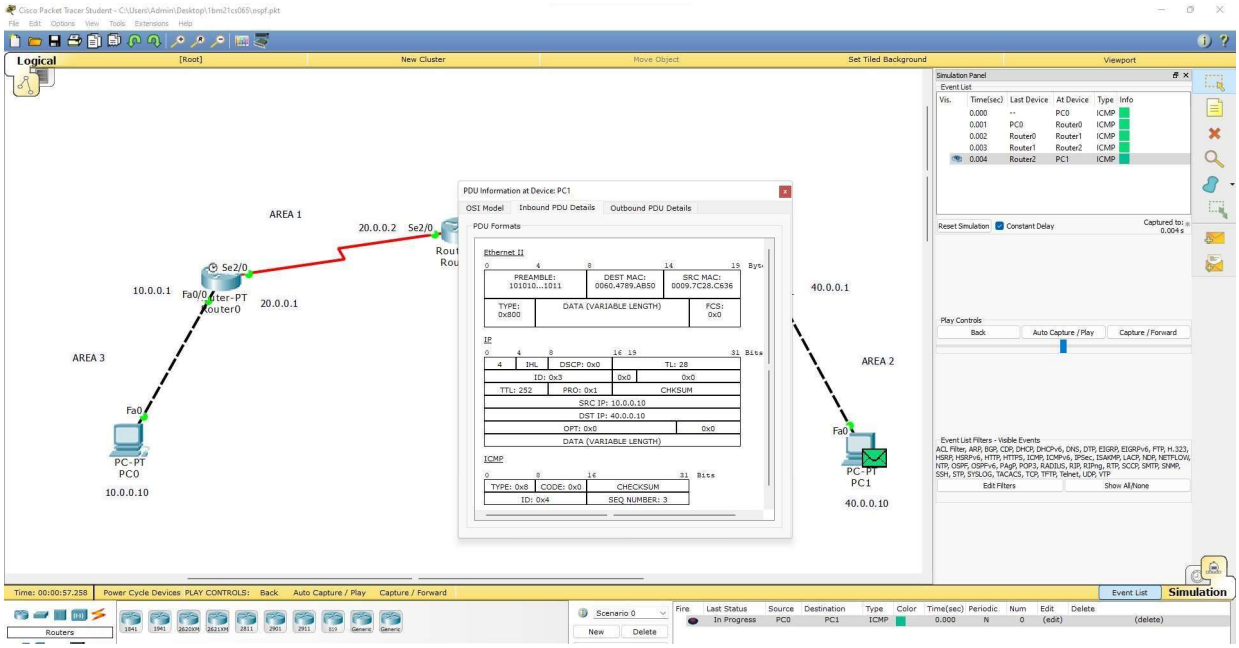



OUTPUT:




Logical
AREA 1
AREA 2
AREA 3
20.0.0.2
Se2/0
10.0.0.1
Fa0/0
Router-PT
Router0
20.0.0.1
40.0.0.1
Fa0
PC-PT
PC0
10.0.0.10
PC-PT
PC1
40.0.0.10
PDU Information at Device: Router1
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
PPP
IP
ICMP
Simulation Panel
Event List
Play Controls
Simulation

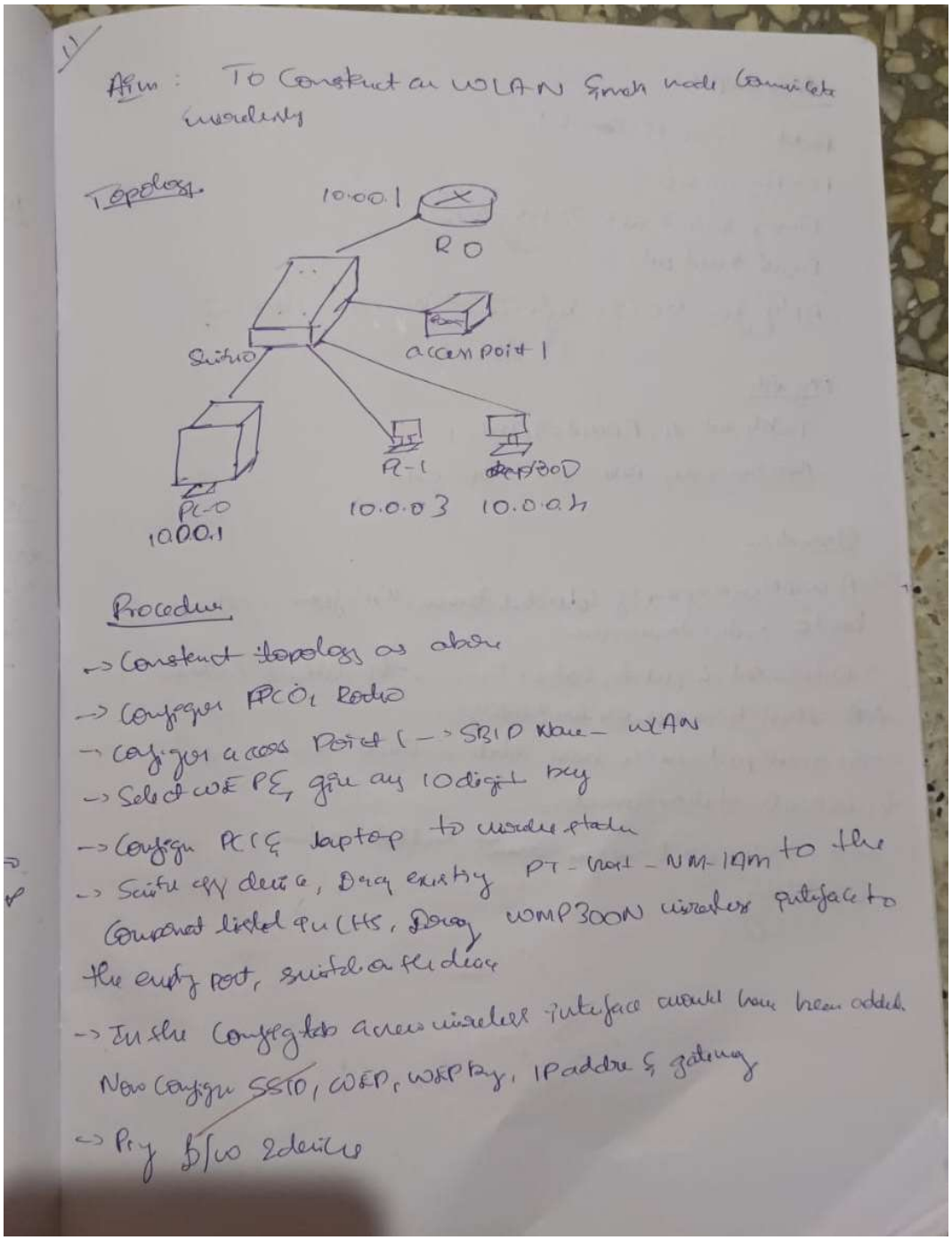

Logical
AREA 1
AREA 2
AREA 3
20.0.0.2
Se2/0
10.0.0.1
Fa0/0
Router-PT
Router0
20.0.0.1
40.0.0.1
Fa0
PC-PT
PC0
10.0.0.10
PC-PT
PC1
40.0.0.10
PDU Information at Device: Router2
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
PPP
IP
ICMP
Simulation Panel
Event List
Play Controls
Simulation


Logical
AREA 1
AREA 2
AREA 3
20.0.0.2
Se2/0
10.0.0.1
Fa0/0
20.0.0.1
40.0.0.1
Router0
Fa0
PC-PT
PC0
10.0.0.10
PC-PT
PC1
40.0.0.10
PDU Information at Device: PC1
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
Ethernet II
PREAMBLE: 101010...1011
DEST MAC: 0060.4789.AB50
SRC MAC: 0009.7C28.C636
TYPE: 0x800
DATA (VARIABLE LENGTH)
FCS: 0x0
IP
DSCP: 0x0
TL: 28
ID: 0x3
TTL: 252
PRO: 0x1
CHKSUM
SRC IP: 10.0.0.10
DST IP: 40.0.0.10
OPT: 0x0
ICMP
TYPE: 0x8
CODE: 0x0
CHECKSUM
ID: 0x4
SEQ NUMBER: 3
Simulation Panel
Event List
Reset Simulation
Constant Delay
Play Controls
Back
Auto Capture / Play
Capture / Forward
Edit Filters
Show All/None
Time: 00:00:57.258
Power Cycle Devices
PLAY CONTROLS:
Routers
Scenario 0
New
Delete
In Progress
ICMP
Simulation

# WEEK 11

To construct a WLAN and make the nodes communicate wirelessly

OBSERVATION:



Ping output

Packet Tracer PC Command I

PC> Ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Request timed out

Reply from 10.0.0.3: bytes=32 time=0ms TTL=127

Ping stats

Packets sent = 4, Received = 3, Lost = 1

Minimum = 0ms, Maximum = 1ms, Average = 0ms

Observation :-

-> A WLAN is a group of interconnected devices that form a network based on radio transmission

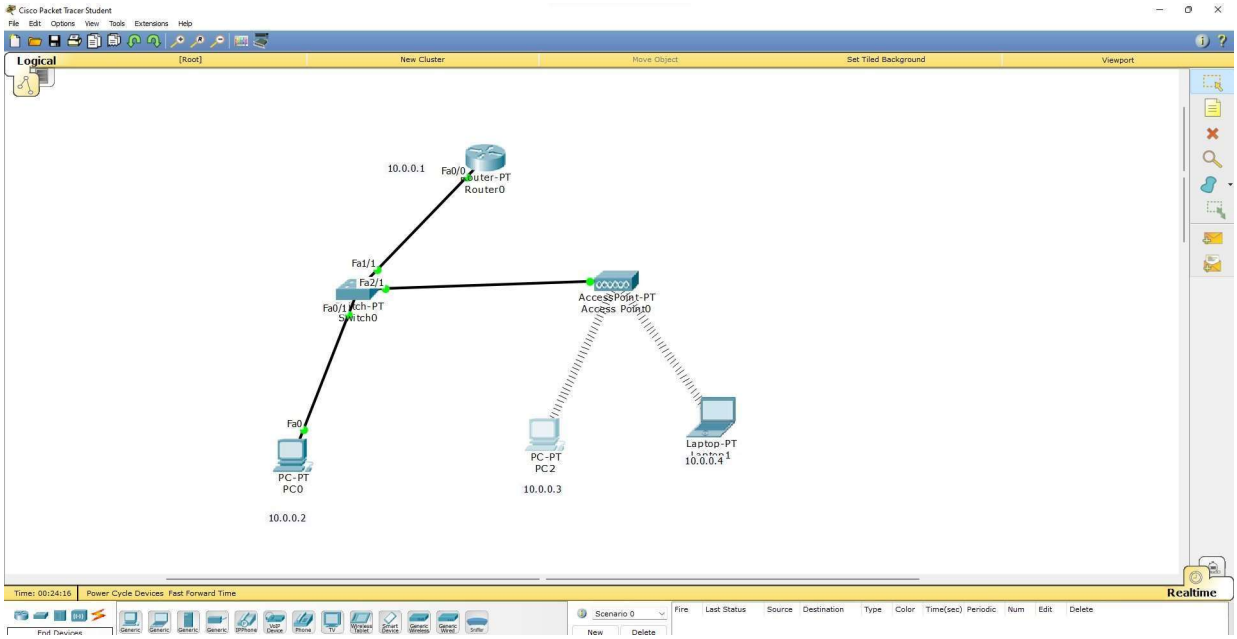
-> Data is sent in packets, containing layer with header & protocol MAC address to end points for security.

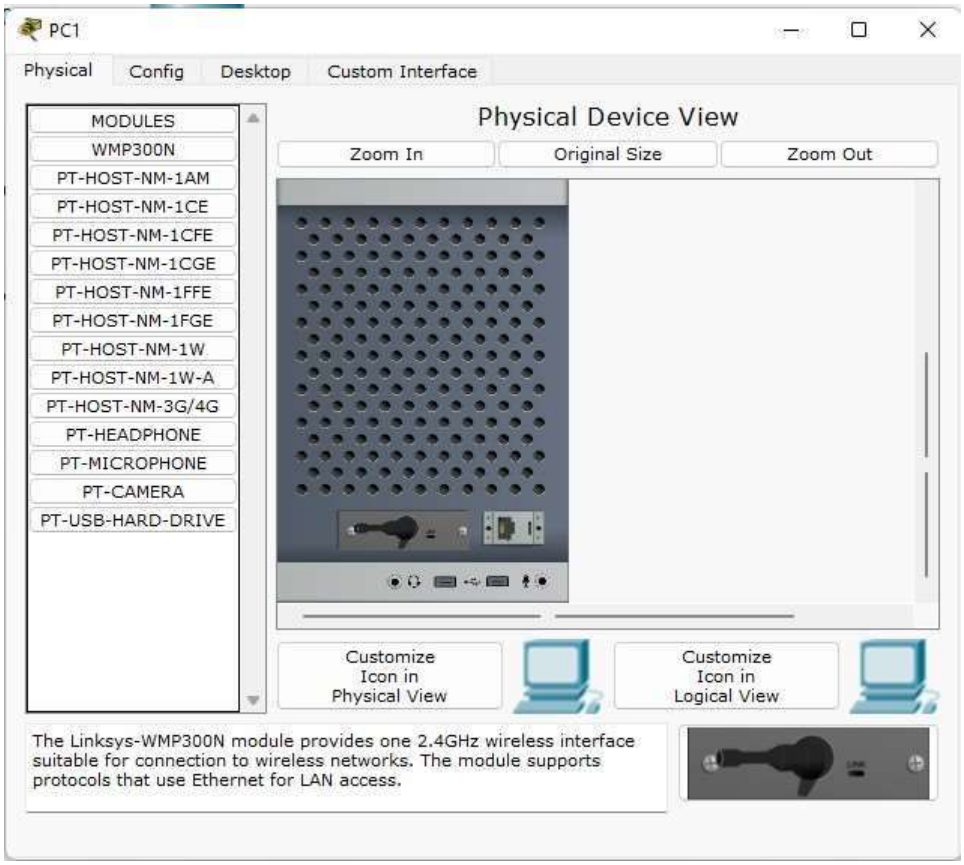
-> The access point is the base station or host server as hub to which other stations connect

-> With 1 access point we can connect multiple networks wirelessly.

ALP
01/09/2023

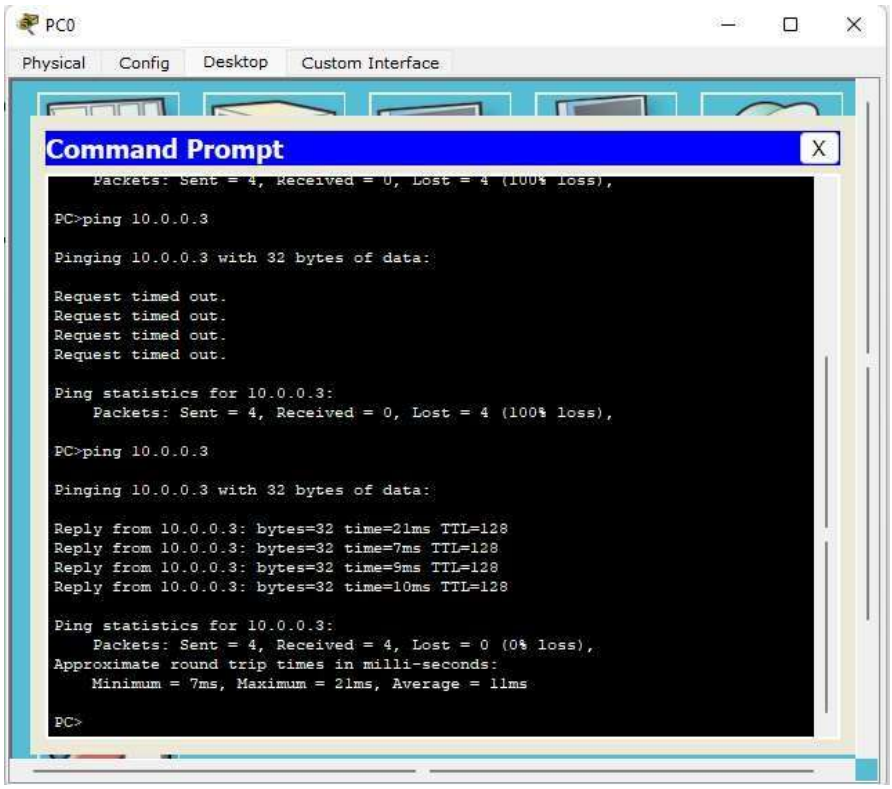
TOPOLOGY:


Cisco Packet Tracer Student
Logical
10.0.0.1
Router-PT
Router0
Fa1/1
Fa2/1
Switch-PT
Switch0
Access Point-PT
Access Point0
Fa0
PC-PT
PC0
10.0.0.2
PC-PT
PC2
10.0.0.3
Laptop-PT
10.0.0.4
Realtime


PC1
Physical
Config
Desktop
Custom Interface
MODULES
WMP300N
PT-HOST-NM-1AM
PT-HOST-NM-1CE
PT-HOST-NM-1CFE
PT-HOST-NM-1CGE
PT-HOST-NM-1FFE
PT-HOST-NM-1FGE
PT-HOST-NM-1W
PT-HOST-NM-1W-A
PT-HOST-NM-3G/4G
PT-HEADPHONE
PT-MICROPHONE
PT-CAMERA
PT-USB-HARD-DRIVE
Physical Device View
Zoom In
Original Size
Zoom Out
Customize Icon in Physical View
Customize Icon in Logical View
The Linksys-WMP300N module provides one 2.4GHz wireless interface suitable for connection to wireless networks. The module supports protocols that use Ethernet for LAN access.


Laptop0
Physical
Config
Desktop
Custom Interface
MODULES
WPC300N
PT-LAPTOP-NM-1AM
PT-LAPTOP-NM-1CE
PT-LAPTOP-NM-1CFE
PT-LAPTOP-NM-1CGE
PT-LAPTOP-NM-1FFE
PT-LAPTOP-NM-1FGE
PT-LAPTOP-NM-1W
PT-LAPTOP-NM-1W-A
PT-LAPTOP-NM-3G/4G
PT-HEADPHONE
PT-MICROPHONE
PT-CAMERA
PT-USB-HARD-DRIVE
Physical Device View
Zoom In
Original Size
Zoom Out
Customize Icon in Physical View
Customize Icon in Logical View
The Linksys-WPC300N module provides one 2.4GHz wireless interface suitable for connection to wireless networks. The module supports protocols that use Ethernet for LAN access.

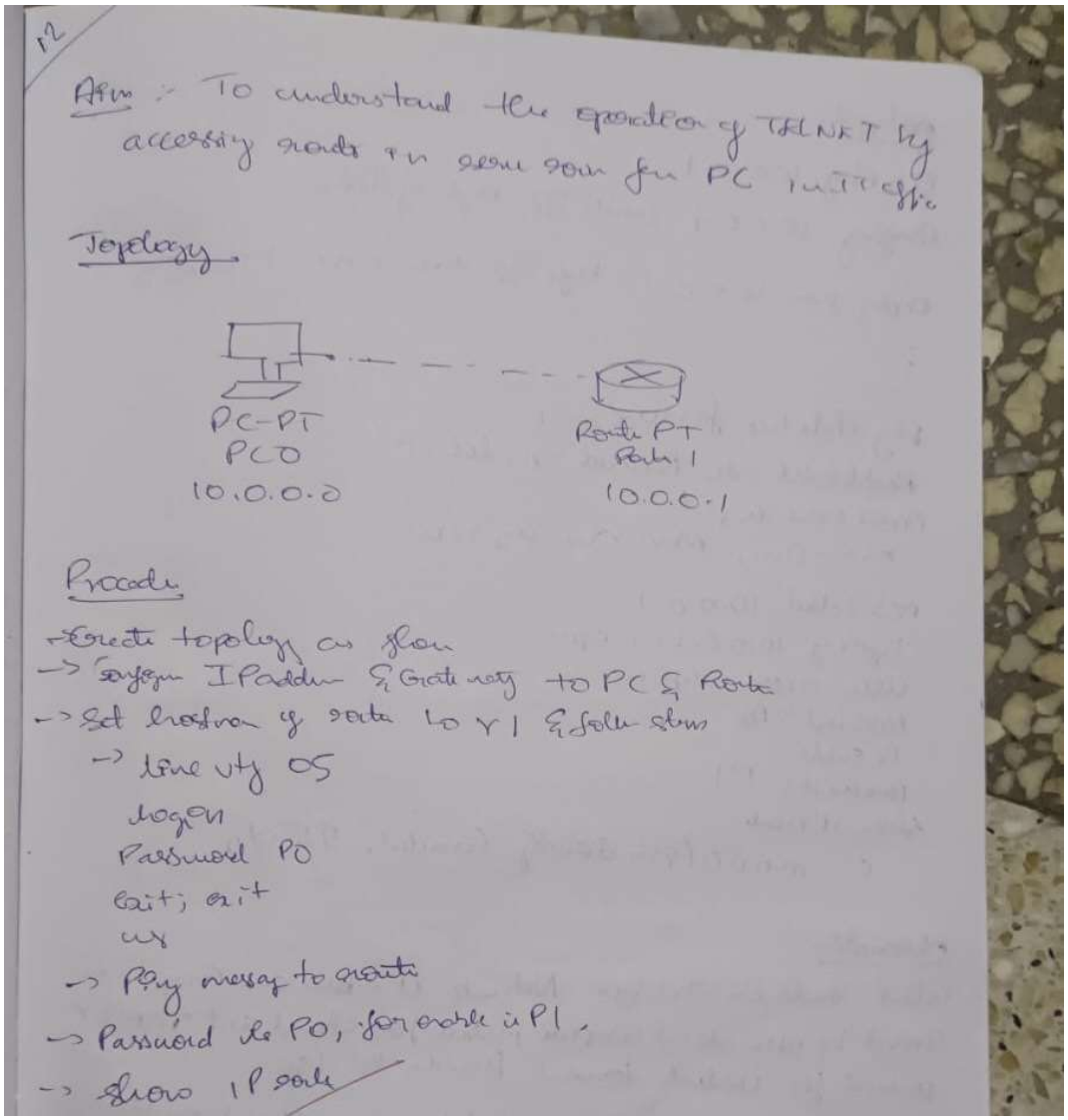
OUTPUT:

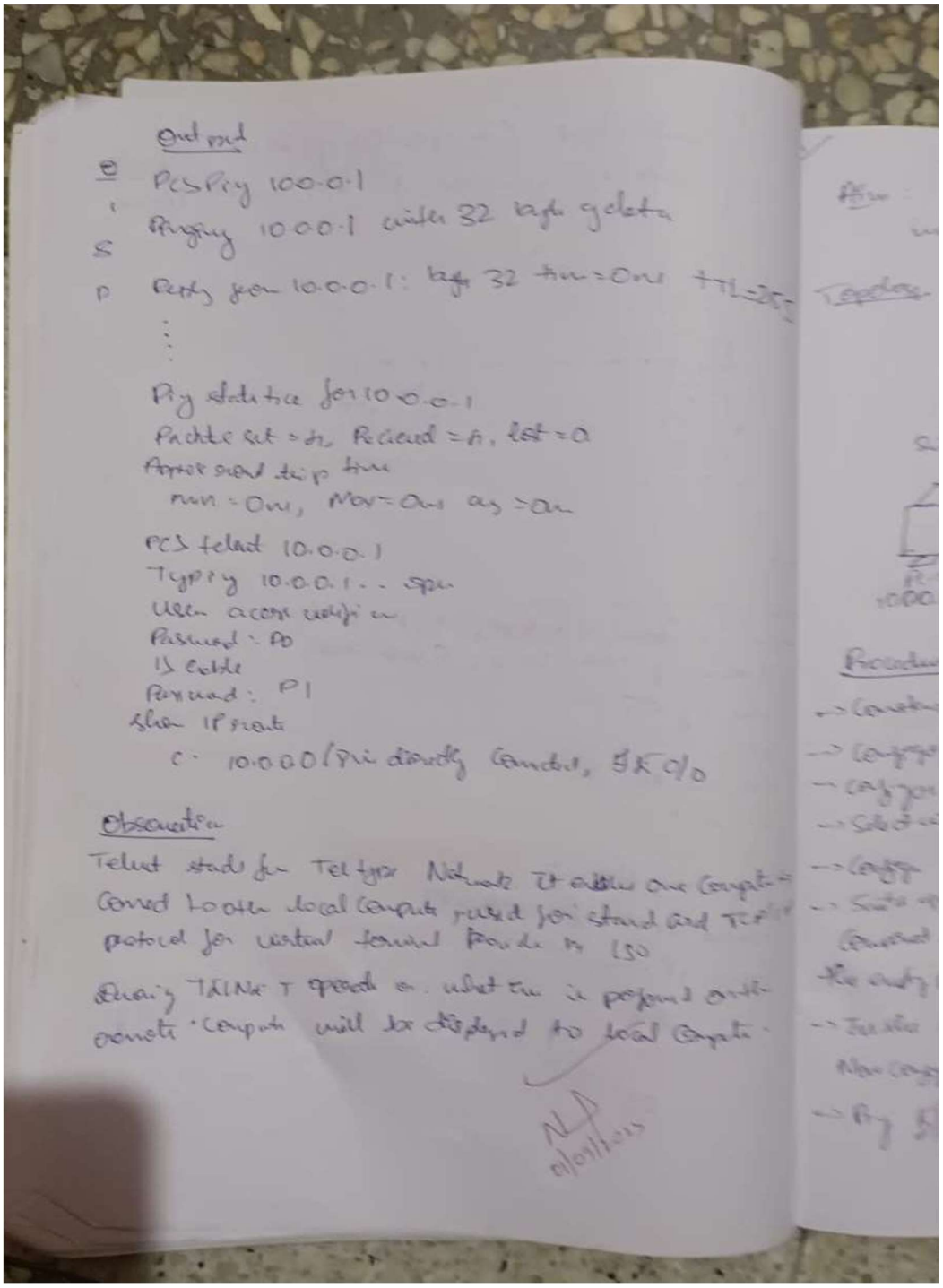

PC0
Physical
Config
Desktop
Custom Interface
Command Prompt
X
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
PC>ping 10.0.0.3
Pinging 10.0.0.3 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 10.0.0.3:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
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=21ms TTL=128
Reply from 10.0.0.3: bytes=32 time=7ms TTL=128
Reply from 10.0.0.3: bytes=32 time=9ms TTL=128
Reply from 10.0.0.3: bytes=32 time=10ms 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 = 7ms, Maximum = 21ms, Average = 11ms
PC>

# WEEK 12

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

OBSERVATION:





Output

PC>Ping 100.0.1

Pinging 10.0.0.1 with 32 byte data

Reply from 10.0.0.1: byte 32 time=0ms TTL=25

Ping statistics for 10.0.0.1

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

Approximate trip time

min = 0ms, Max = 0ms avg = 0ms

PC> telnet 10.0.0.1

Trying 10.0.0.1 ... open

User access verification

Password: PO

IS Cable

Password: P1

show IP route

C 10.0.0.0/Pri directly connected, 5K c/o

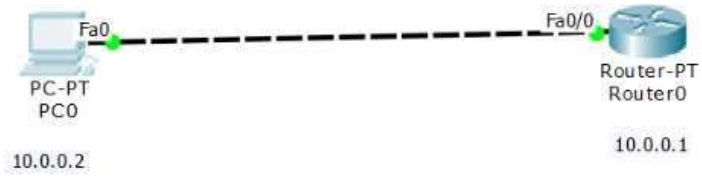
Observation

Telnet stands for Teletype Network. It allows one computer connected to a local computer called for standard TCP protocol for virtual terminal Router in ISO

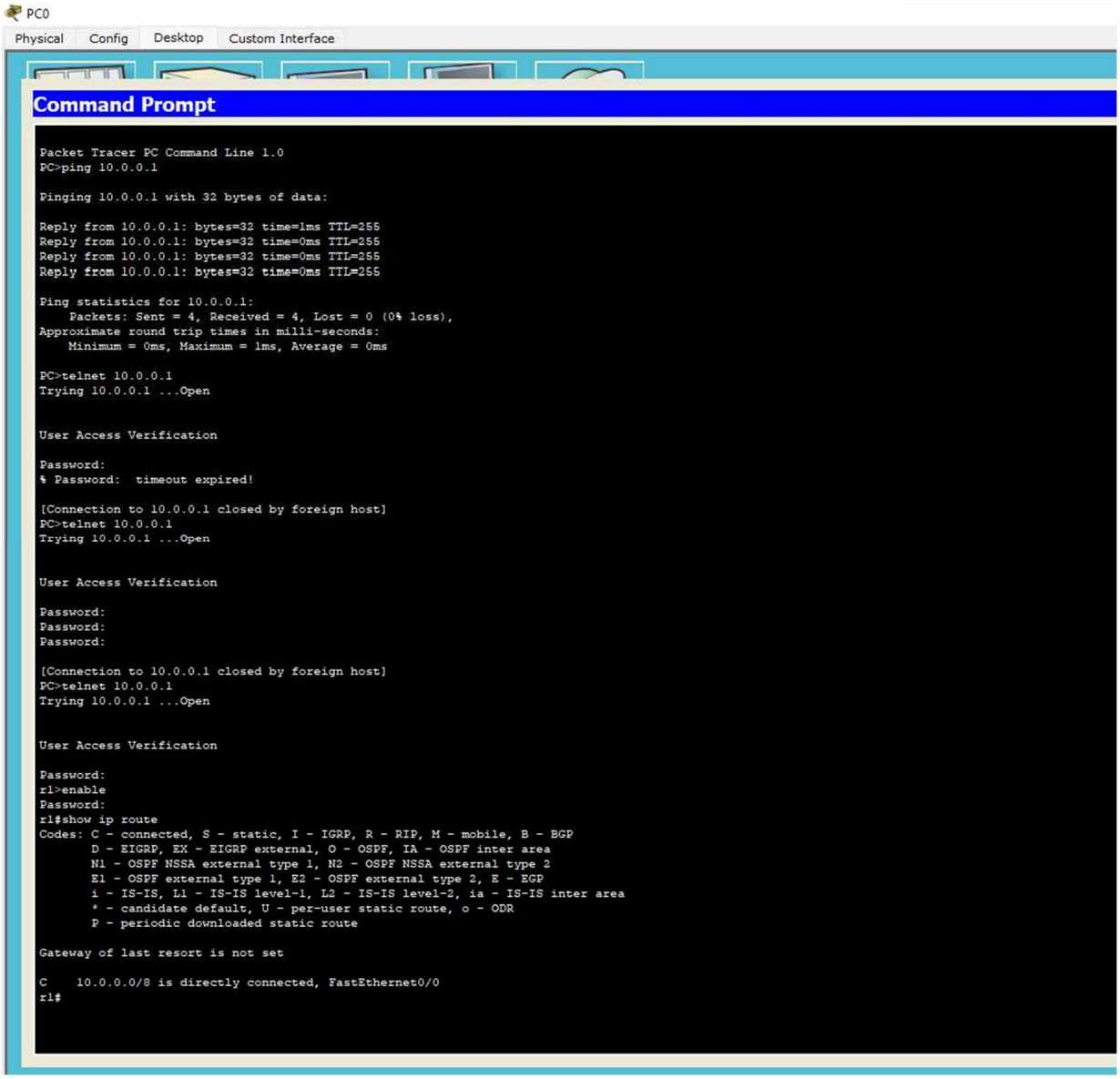
During TELNET speech on what the is performed on remote computer will be displayed to local computer.

NP algorithm

TOPOLOGY:



OUTPUT:


PC0
Physical
Config
Desktop
Custom Interface
Command Prompt
Packet Tracer PC Command Line 1.0
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=1ms TTL=255
Reply from 10.0.0.1: bytes=32 time=0ms TTL=255
Reply from 10.0.0.1: bytes=32 time=0ms TTL=255
Reply from 10.0.0.1: bytes=32 time=0ms TTL=255
Ping statistics for 10.0.0.1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 1ms, Average = 0ms
PC>telnet 10.0.0.1
Trying 10.0.0.1 ...Open
User Access Verification
Password:
% Password: timeout expired!
[Connection to 10.0.0.1 closed by foreign host]
PC>telnet 10.0.0.1
Trying 10.0.0.1 ...Open
User Access Verification
Password:
Password:
Password:
[Connection to 10.0.0.1 closed by foreign host]
PC>telnet 10.0.0.1
Trying 10.0.0.1 ...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#

# WEEK 13

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

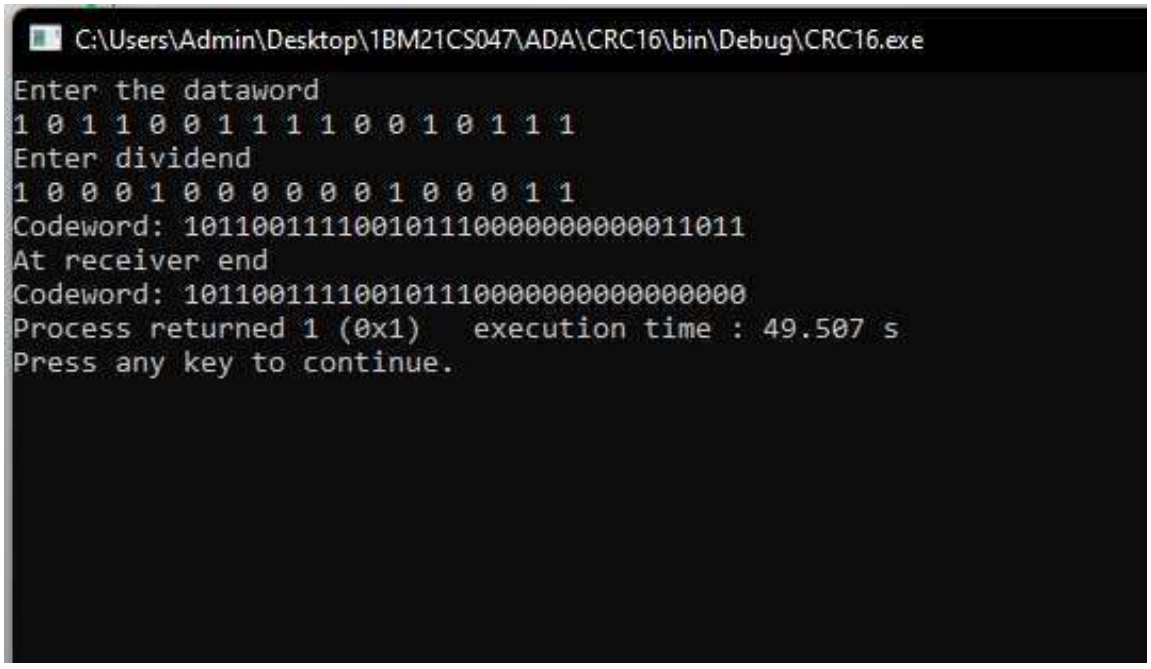
CODE:

```
#include<stdio.h>
int arr[17];

void xor(int x[], int y[])
{
    int k=0;
    for(int i=1;i<16;i++)
    {
        if(x[i]==y[i])
            arr[k++]=0;
        else
            arr[i]=1;
    }
}

void main()
{
    int dd[17],div[33],ze[17],i,k;

    printf("Enter the dataword \n");
    for(i=0;i<17;i++)
        scanf("%d",&div[i]);

    for(i=i;i<33;i++)
        div[i]=0;

    for(i=0;i<17;i++)
        ze[i]=0;
    printf("Enter dividend \n");
```

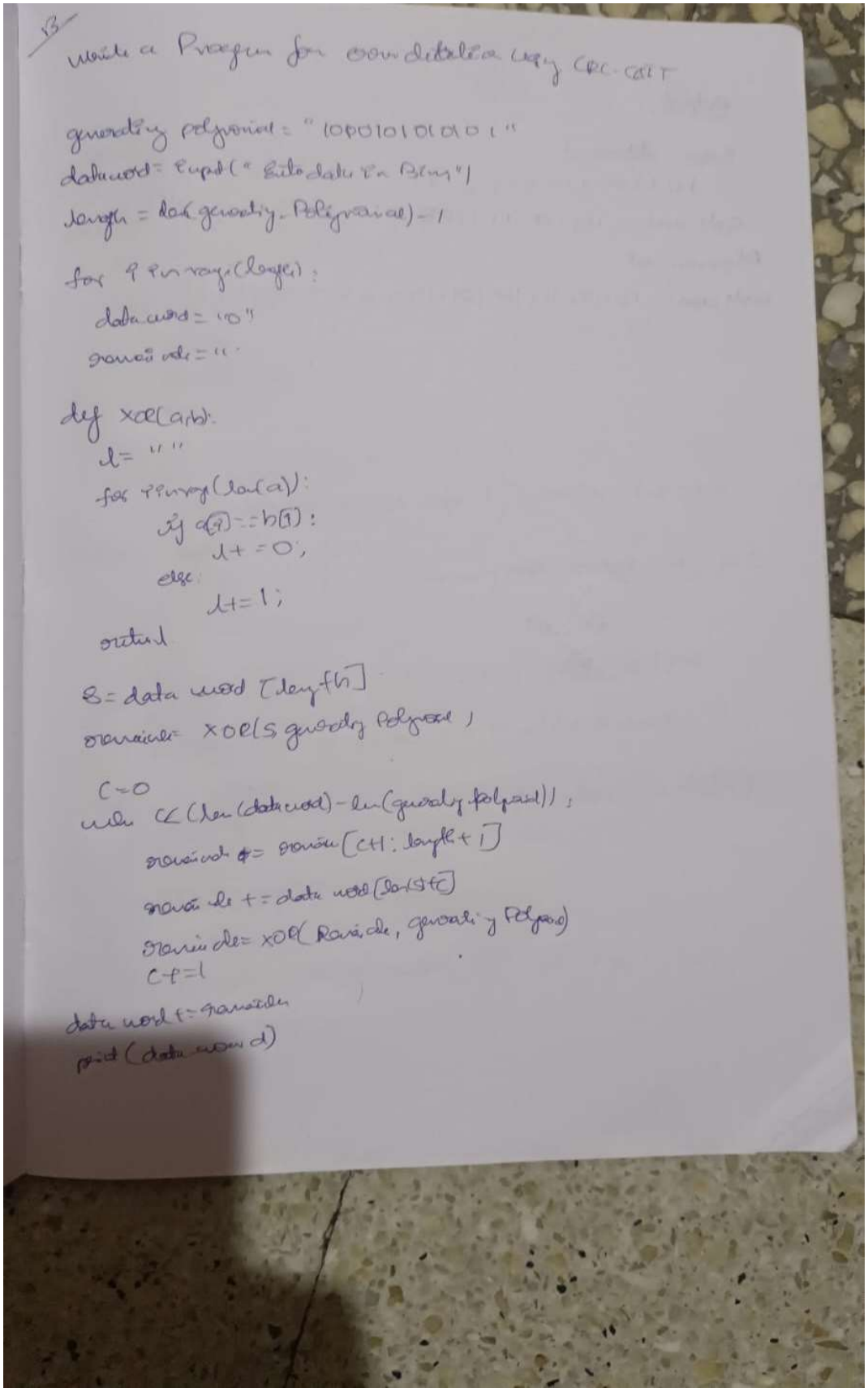
```
for(i=0;i<17;i++)
    scanf("%d",&dd[i]);

i=0;
k=0;
    for(i=i;i<17;i++)
        arr[k++]=div[i];
while(i<33)
{
    if(arr[0]==0)
        xor(arr,ze);
    else
        xor(arr,dd);

    arr[16]=div[i++];

}
k=0;
for(i=17;i<33;i++)
    div[i]=arr[k++];
printf("Codeword: ");
    for(i=0;i<33;i++)
        printf("%d",div[i]);

for(i=0;i<17;i++)
    arr[i]=0;

printf("\nAt receiver end \n");

 k=0;
    for(i=i;i<17;i++)
        arr[k++]=div[i];
while(i<33)
{
    if(arr[0]==0)
```

```
            xor(arr,ze);
        else
            xor(arr,dd);

        arr[16]=div[i++];

    }
    k=0;
    for(i=17;i<33;i++)
        div[i]=arr[k++];

    printf("Codeword: ");
        for(i=0;i<33;i++)
            printf("%d",div[i]);
}
```

OUTPUT:



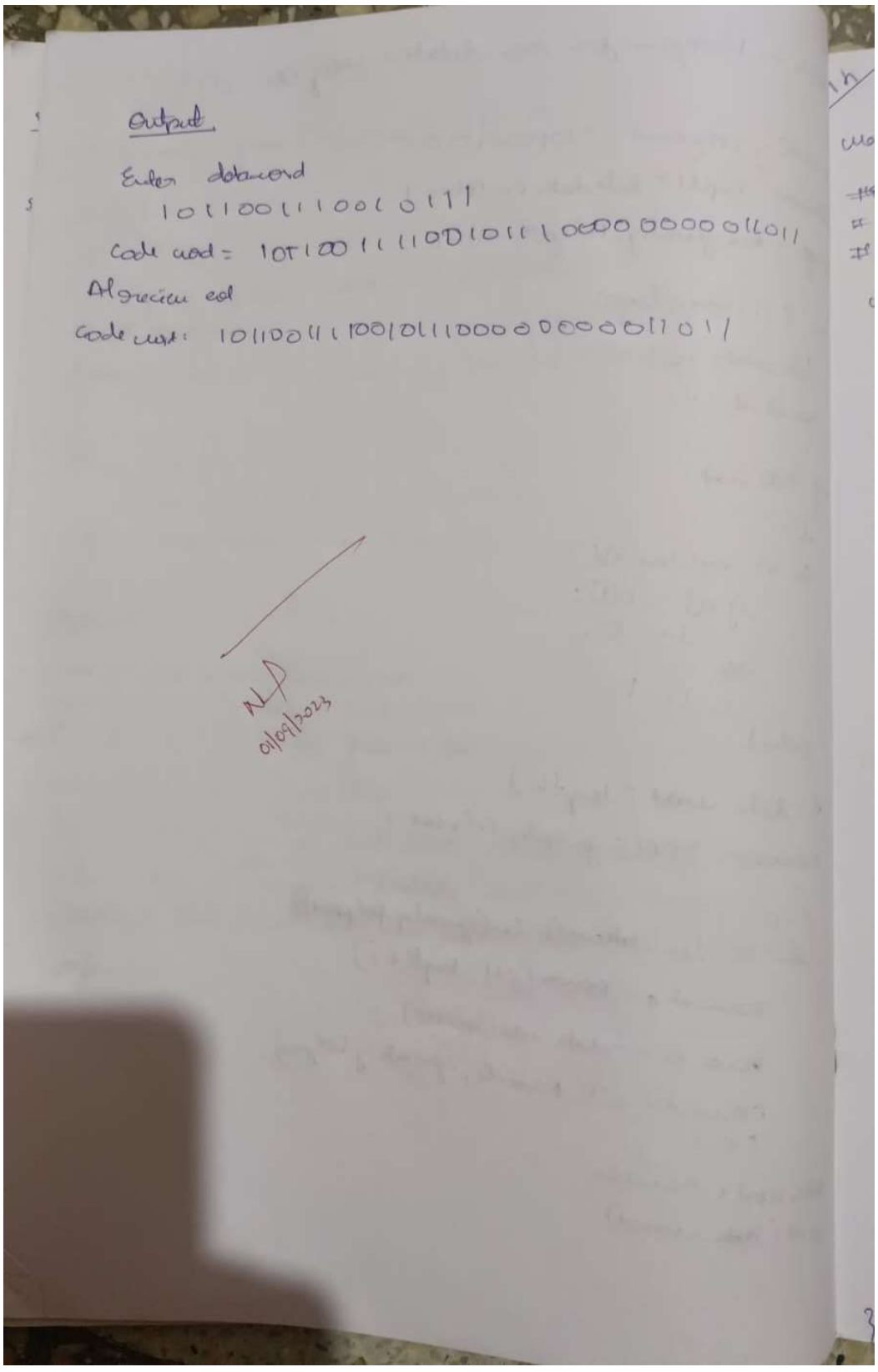
OBSERVATION:



13

Write a Program for cyclic redundancy check CRC-CCITT

```
generating polynomial = "10001010000 1"
dataword = input("Enter data in Binary")
length = len(generating_Polynomial) - 1

for i in range(length):
    dataword = '0'
    remainder = ''

def xor(a,b):
    result = ''
    for i in range(len(a)):
        if a[i] == b[i]:
            result += '0'
        else:
            result += '1'
    return result

s = dataword[length]
remainder = xor(s, generating_Polynomial)

c = 0
while c < (len(dataword) - len(generating_Polynomial)):
    remainder = remainder[c+1 : length+1]
    remainder += dataword[length+c]
    remainder = xor(remainder, generating_Polynomial)
    c += 1
dataword += remainder
print(dataword)
```


Output
Enter dataword
1011001110010111
Code word = 10110011110010111000000000011011
Algorithm end
Code word: 10110011100101110000000011011
NLP
01/09/2023

# WEEK 14

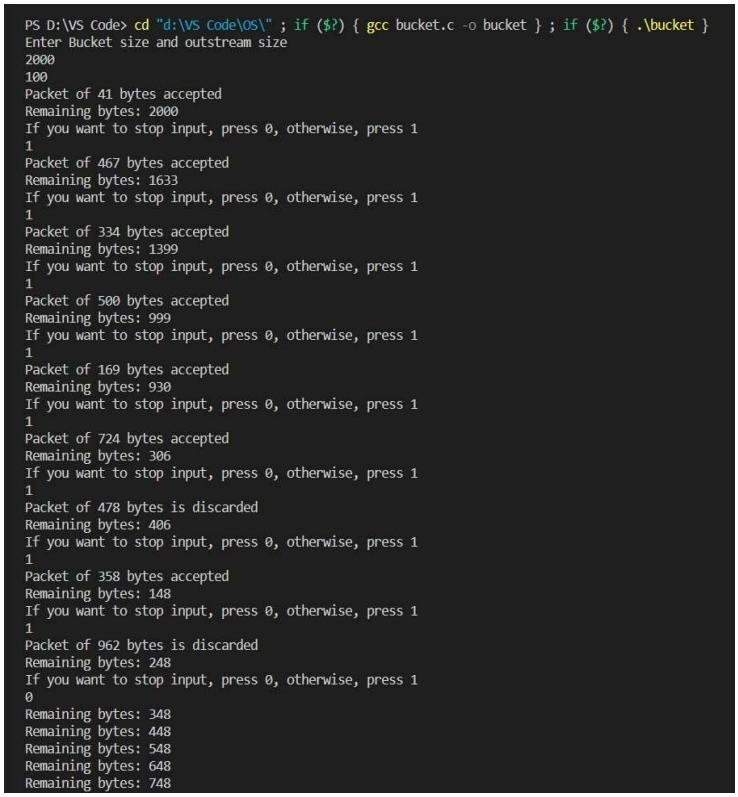
Write a program for congestion control using Leaky bucket algorithm.

CODE:

```
#include <stdio.h>
#include <stdlib.h> // Include this for the rand() function
int main()
{
   int buckets, outlets, k = 1, num, remaining;
   printf("Enter Bucket size and outstream size\n");
   scanf("%d %d", &buckets, &outlets);
   remaining = buckets;
   while (k)
   {
      num = rand() % 1000; // Generate a random number between 0 and
999
      if (num < remaining)
      {
         remaining = remaining - num;
         printf("Packet of %d bytes accepted\n", num); // Added missing
variable
      }
      else
      {
         printf("Packet of %d bytes is discarded\n", num);
      }
      if (buckets - remaining > outlets)
      {
         remaining += outlets; // Fixed the calculation
      }
      else
         remaining = buckets;
      printf("Remaining bytes: %d \n", remaining);
```

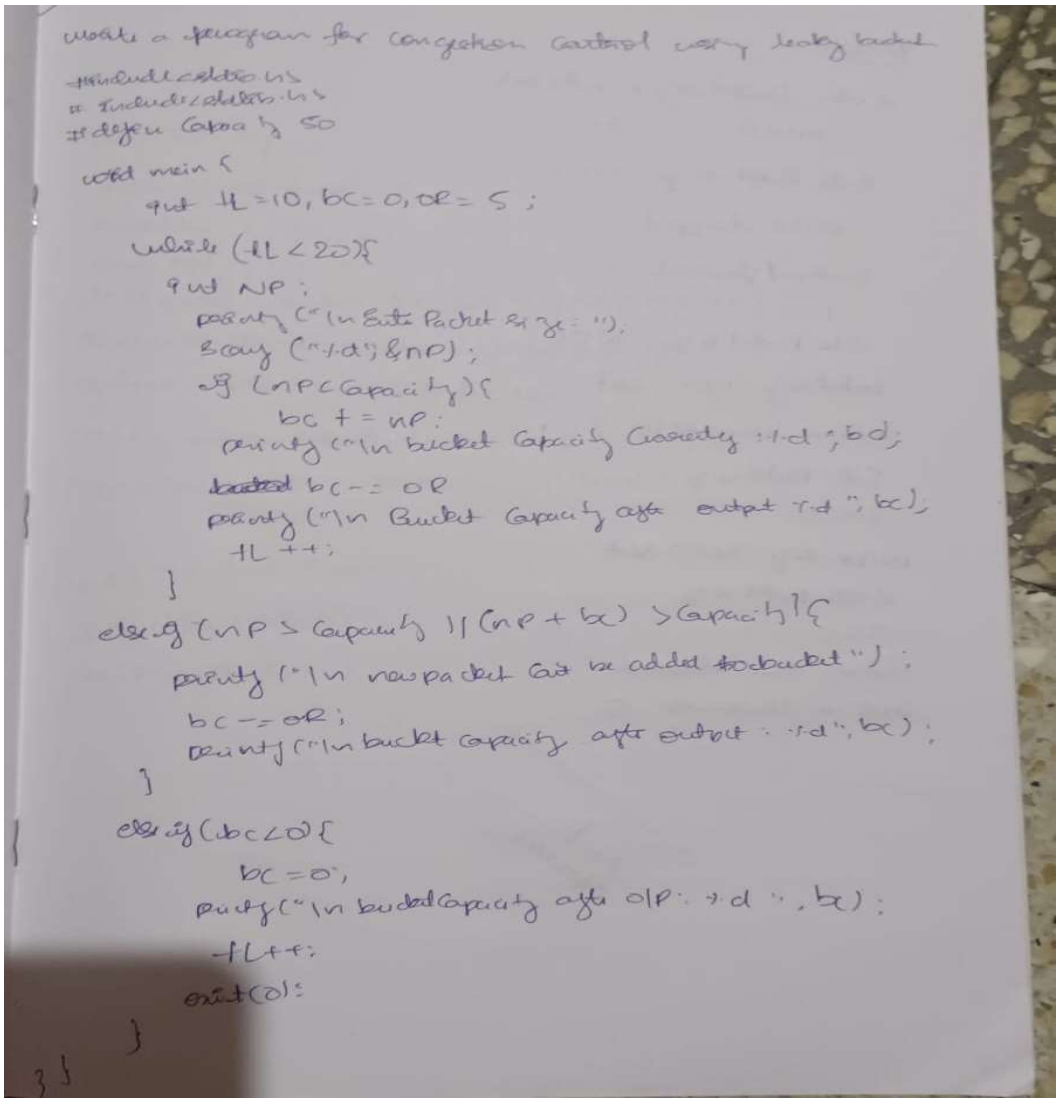
```
        printf("If you want to stop input, press 0, otherwise, press 1\n");
        scanf("%d", &k);
    }
    while (remaining < buckets) // Fixed the condition
    {
        if (buckets - remaining > outlets)
        {
            remaining += outlets; // Fixed the calculation
        }
        else
            remaining = buckets;
        printf("Remaining bytes: %d \n", remaining);
    }
    return 0; // Added a return statement to indicate successful completion
}
```

OUTPUT:



```
Remaining bytes: 348
Remaining bytes: 448
Remaining bytes: 548
Remaining bytes: 648
Remaining bytes: 748
Remaining bytes: 848
Remaining bytes: 948
Remaining bytes: 1048
Remaining bytes: 1148
Remaining bytes: 1248
Remaining bytes: 1348
Remaining bytes: 1448
Remaining bytes: 1548
Remaining bytes: 1648
Remaining bytes: 1748
Remaining bytes: 1848
Remaining bytes: 1948
Remaining bytes: 2000
PS D:\VS Code\OS> []
```

OBSERVATION:



Output:

Enter bucket size & leak rate
1000 250
Enter Packet size : 5000
Packet dropped
Continue? (yes=1) ?
1
Enter Packet size : 1000
Packet size 1000 sent
Continue transmission ? : 1
Enter Packet size
3000
Packet size 3000 sent
Enter Packet size
750
Packet 750 dropped:
Continue transmission 0

01/09/2023

# WEEK 15

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

CODE:

ClientTCP.py

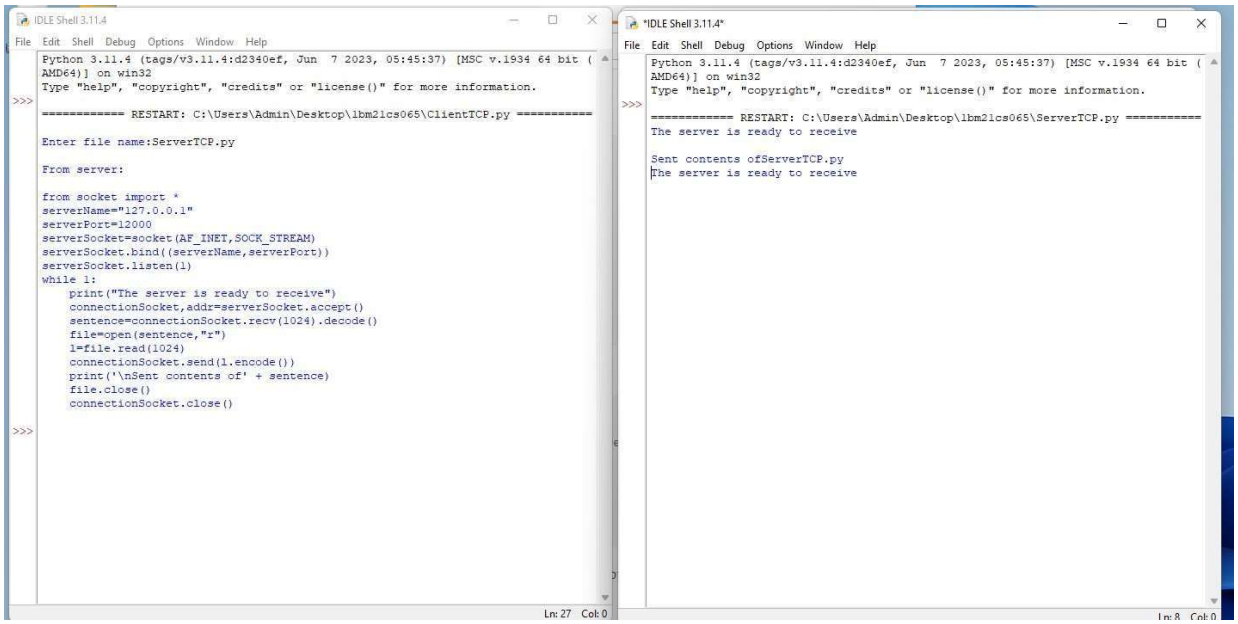
```
from socket import *
serverName = “127.0.0.1”
serverPort = 12000
clientSocket = socket(AF_INET, SOCK_STREAM)
clientSocket.connect((serverName,serverPort))
sentence = input(“\nEnter file name: “)
clientSocket.send(sentence.encode())
filecontents = clientSocket.recv(1024).decode()
print (“\nFrom Server:\n”)
print(filecontents)
clientSocket.close()
```

ServerTCP.py

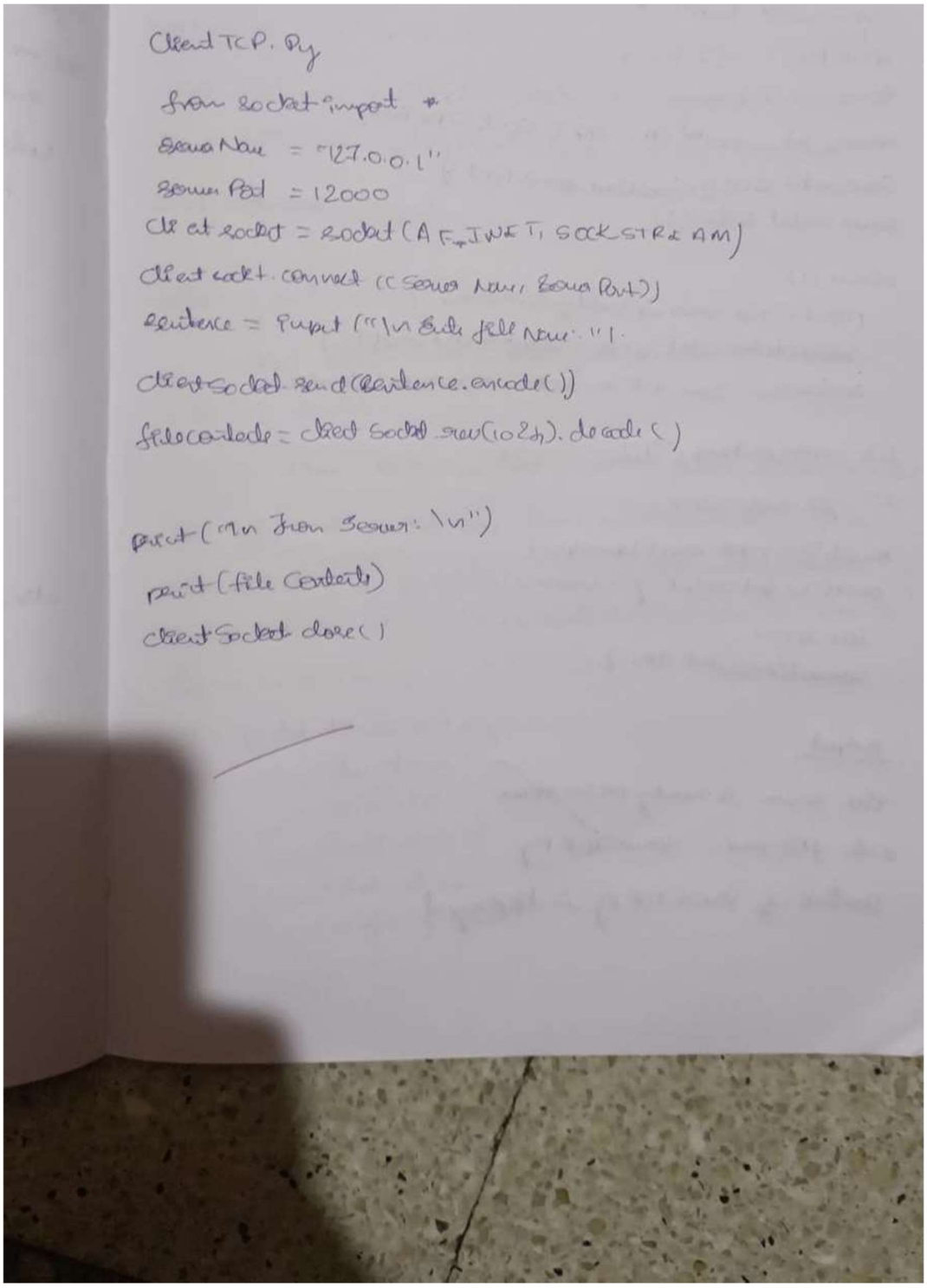
```
from socket import *
serverName=”127.0.0.1”
serverPort = 12000
serverSocket = socket(AF_INET,SOCK_STREAM)
serverSocket.bind((serverName,serverPort))
serverSocket.listen(1)
while 1:
print (“The server is ready to receive”)
connectionSocket, addr = serverSocket.accept()
sentence = connectionSocket.recv(1024).decode()
file=open(sentence,”r”)
l=file.read(1024)
```

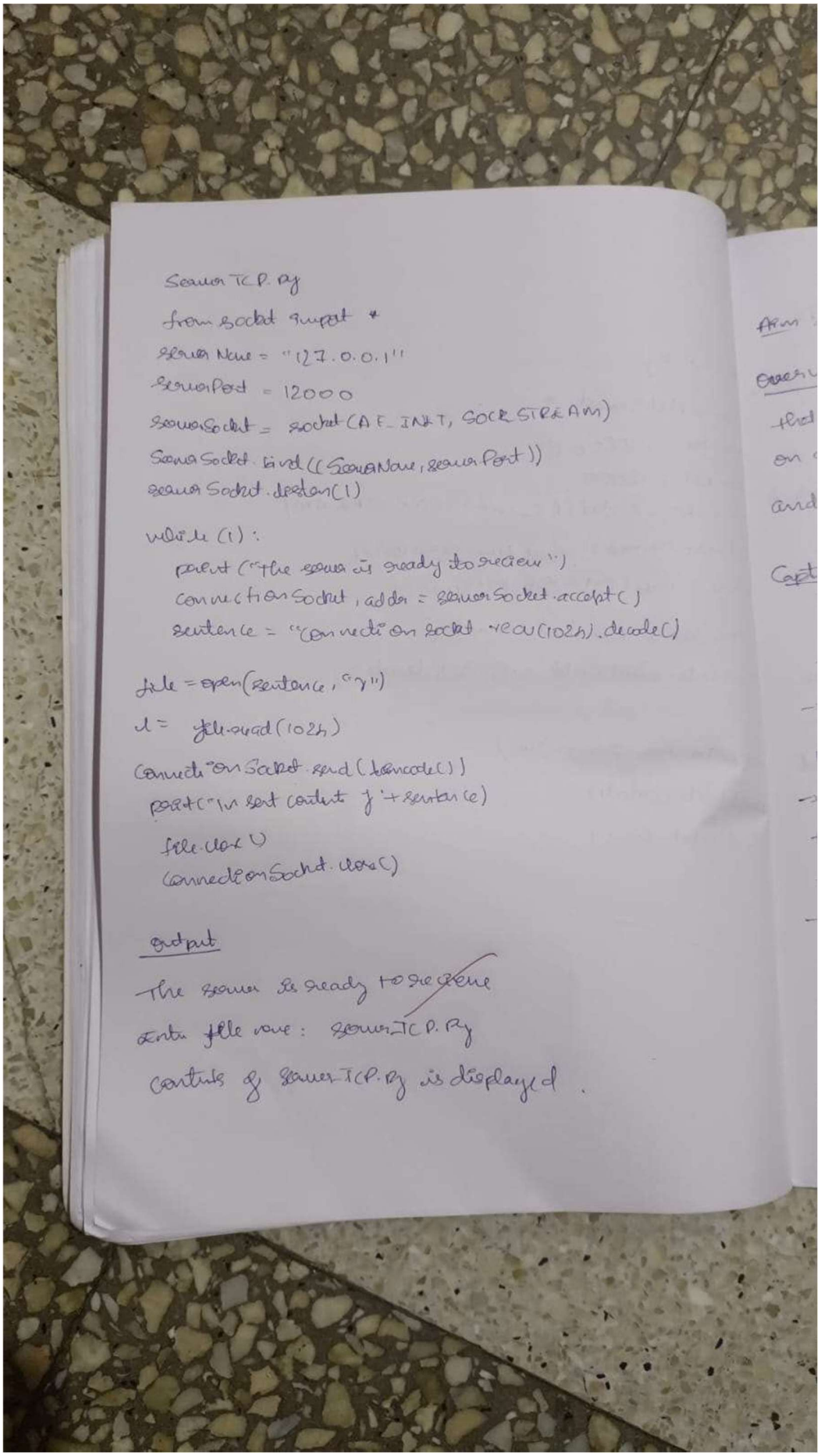
```
connectionSocket.send(l.encode())
print (“\nSent contents of “ + sentence)
file.close()
connectionSocket.close()
```

OUTPUT:



OBSERVATION:





Server TCP.py

```
from socket import *
serverName = "127.0.0.1"
serverPort = 12000
serverSocket = socket(AF_INET, SOCK_STREAM)
serverSocket.bind((serverName, serverPort))
serverSocket.listen(1)

while (1):
    print("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("\n Sent contents of " + sentence)
    file.close()
    connectionSocket.close()
```

output

```
The server is ready to receive
Enter file name : server_TCP.py
contents of server_TCP.py is displayed.
```

Wireshark

Aim :- To explore wireshark.

Overview :- Wireshark is an open source application that captures & displays data travelling back & forth on a network. Wireshark is a packet sniffer and network analyzer.

Capturing Packets

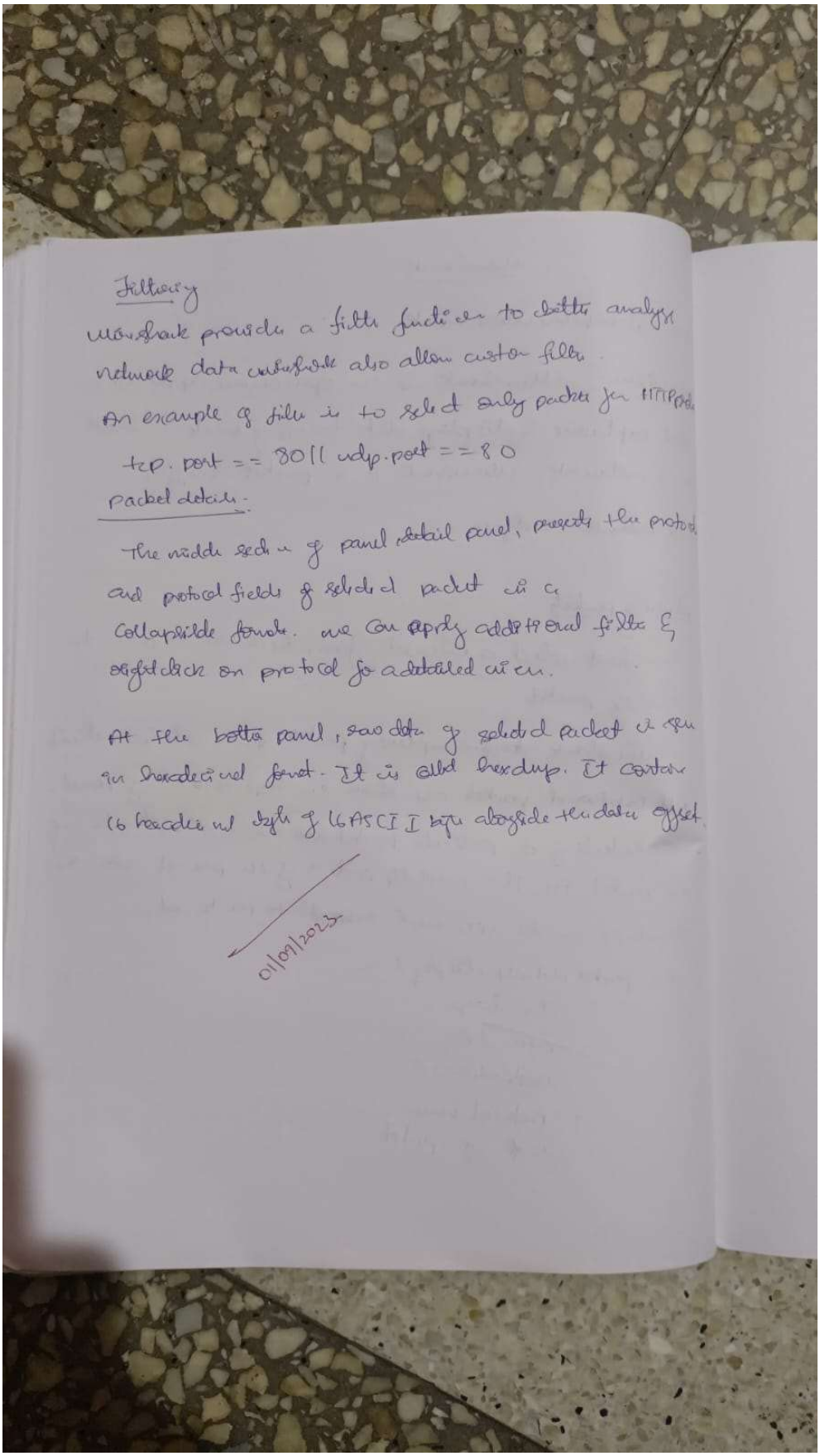
-> First select a network from which we require to sniff packets.

-> Wireshark begins capturing packets from selected network. All captured packets are shown in top section of panel.

-> On selecting a particular packet, we observe the structure of the packet in the middle section of the panel. Various structures can be seen with respect to protocol.

-> The packet details displayed as

- -> Time stamp
- ~~-> Source IP~~
- -> Destination IP
- -> Protocol name
- -> Length of packet



Filtering

Wireshark provides a filtering function to better analyze network data. Wireshark also allows custom filters.

An example of filter is to select only packets for HTTP port

tcp.port == 80 || udp.port == 80

Packet details:-

The middle section of panel is detail panel, presents the protocol and protocol fields of selected packet in a collapsible format. We can apply additional filters by right click on protocol for a detailed view.

At the bottom panel, raw data of selected packet is given in hexadecimal format. It is called hexdump. It contains 16 hexadecimal digits of 16 ASCII bytes alongside the data offset.

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