VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

COMPUTER NETWORKS

Submitted by
DHANUSH H V (1BM21CS052)

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-560019
JUN-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**" carried out by **DHANUSH H V(1BM21CS052) ,** who is 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 academic semester May-2023 to July-2023. The Lab report has been approved as it satisfies the academic requirements in respect of **COMPUTER NETWORKS (22CS4PCCON)** work prescribed for the said degree.

Name of the Lab-In charge: prof. Swathi

Assistant Professor
Department of CSE
BMSCE, Bengaluru

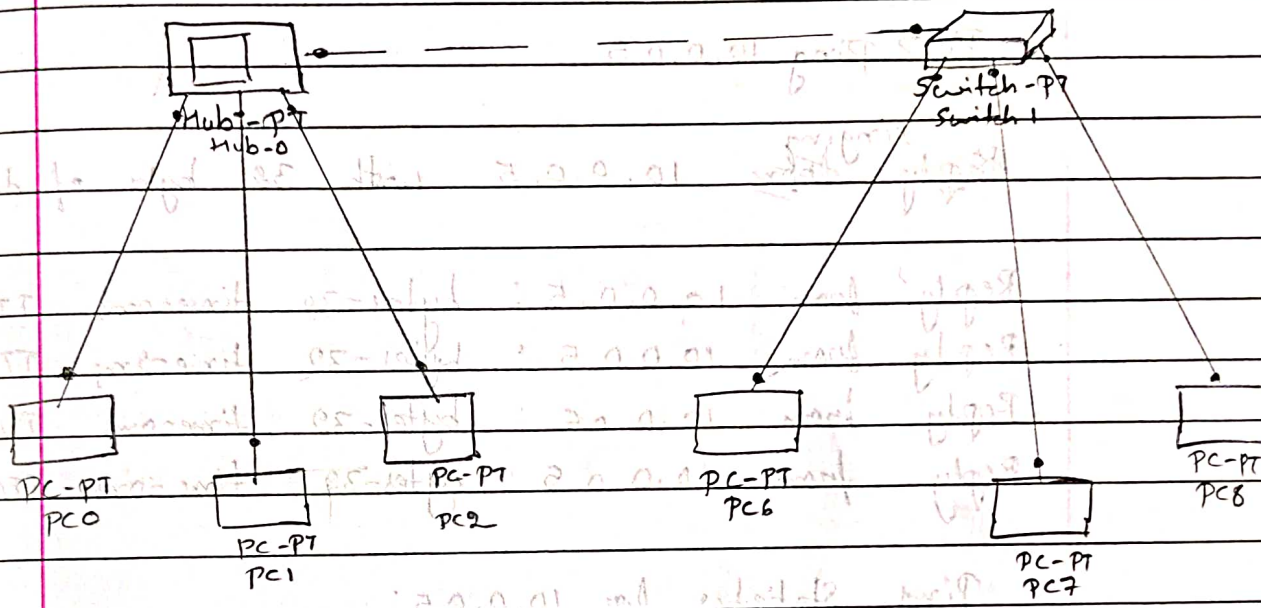
Dr. Jyothi S Nayak

Professor and Head
Department of CSE
BMSCE, Bengaluru

Date __/__/__
Page _____

Aim:

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



Procedure:

→ Connect 3 or more PC's and connect it to different ports of the hub

→ Also connect 2 or more PC's to Switch.

→ Click on each PC, select desktop and then select IP configuration. Write down the IP address and the subnet mask of that PC.

→ To see the process of how packets are transferred, give simple PDU ~~to both PCs~~ between 2 PC's and then run simulation.

→ To check whether the connection is successful or not, ping destination PC from Source PC. For this click on source PC0, then select Desktop and then go to command prompt.

Date __/__/__
Page

⇒ Write in command prompt window, "ping" followed by the IP address given to destination PC. The packets sent, received and lost will be shown.

Observation:

PC> Ping 10.0.0.5

Pinging
Reply ~~from~~ 10.0.0.5 with 32 bytes of data:

Reply from 10.0.0.5 : bytes=32 time=0ms TTL=128
Reply from 10.0.0.5 : bytes=32 time=2ms TTL=128
Reply from 10.0.0.5 : bytes=32 time=0ms TTL=128
Reply from 10.0.0.5 : bytes=32 time=0ms TTL=128

Ping Statistics for 10.0.0.5:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 2ms, Average = 0ms.

Switch:

	Ip address	
Port-0		
Fast ethernet 0	10.0.0.1	PC-1
port-1		
Fast ethernet 0	10.0.0.2	PC-2
port-2		
Fast ethernet-0	10.0.0.3	PC-3.

Date __/__/__
Page _____

Conclusion :

We connected pc's through a Cisco-Switch and verified the packet transfer by pinging pc

15/6/2023

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:

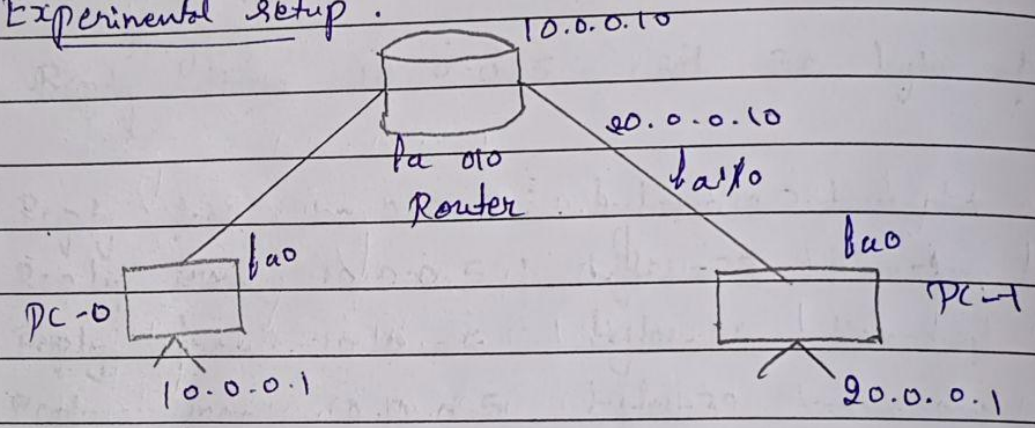
Date __/__/__
Page

Experiment 2

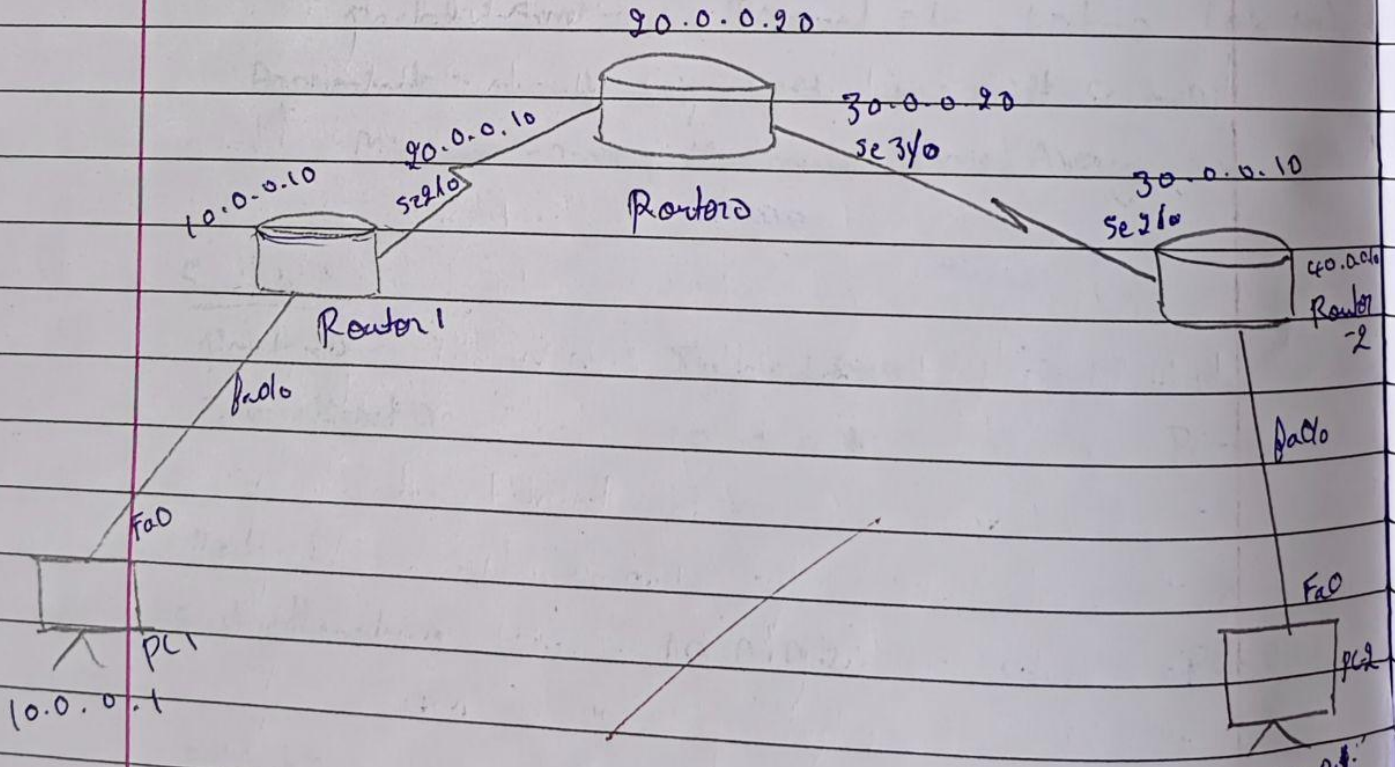
Aim:
Configure IP address to routers in packet tracer. Explore the following messages ping response, destination unreachable, request timed out, reply.

Topology:

Experimental setup:



Router Topology:



Date __/__/__
Page _____

Procedure :-

Take 2 pc and place them as shown in the topology, 2 different IP address (10.0.0.01 and 40.0.0.01) as they belong to 2 different networks

Place 2 routers belonging to these 2 networks (10.0.0.10 and 40.0.0.10) being their gateways and place the 3rd router in between to connect the 2 networks.

Set gateways for 2 pcs and then going to the CLI interface for each router specify the IP route for file to transfer using the commands.

Router > enable
Router > # config terminal
Router config : interface <port>
Router config-if : IP address <ip> <Subnet mask>.
Router (config) : no shut

Do this for all three routers

Then go to terminal of either pc and try to ping to the other one. The message fails to deliver due to not setting up network static routes and next hop

> ip route <network-id> <mask> <next-hop>
> ip route 40.0.0.0 255.0.0.0 10.0.0.10
(for router 1)

This is done so that router recognizes which pathway to take when packet is received for particular destination.

Result:

(i) >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
Reply from 10.0.0.10: Destination host unreachable

Ping Statistics:
Packet sent = 4 : Recieved = 0 : loss = 100 (100: loss)

(ii) >Ping 40.0.0.1

Pinging 40.0.0.01 with 32 bytes of data.

Request timed out
Reply from 40.0.0.10 bytes = 32 time = 2ms TTL
Reply from 40.0.0.10 bytes = 32 time = 2ms TTL
Reply from

Date __/__/__
Page _____

Observation

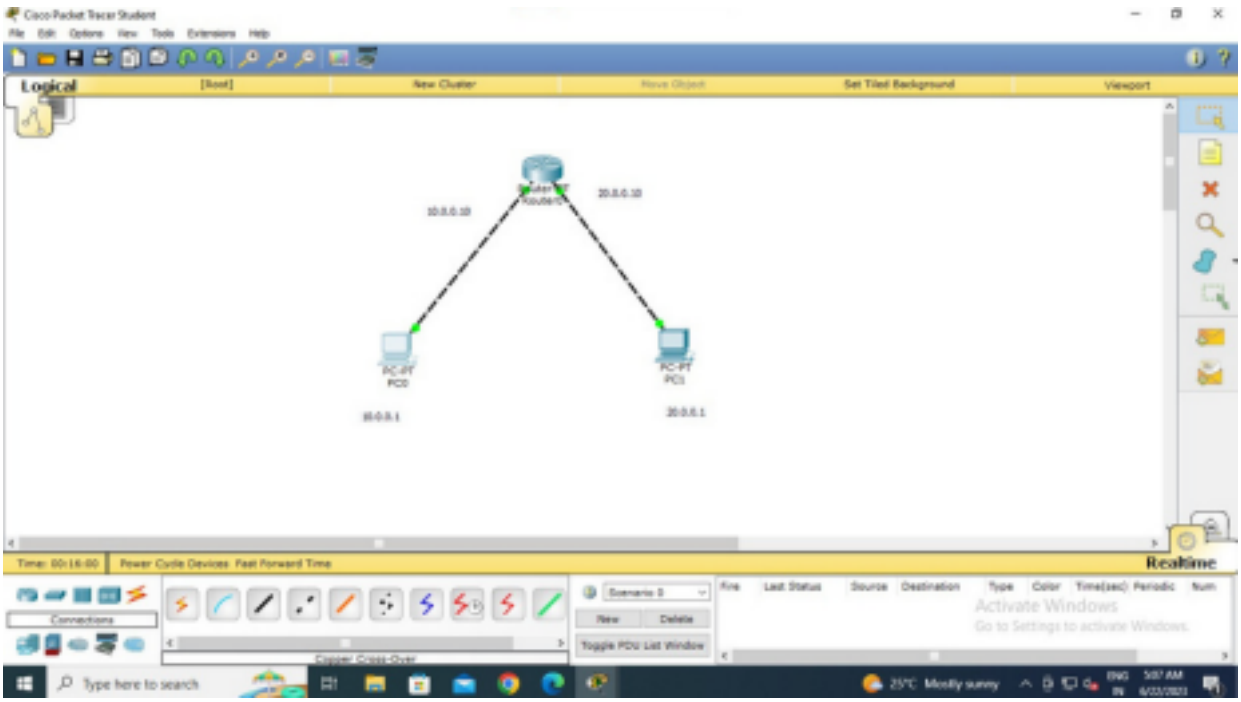
The router connects LAN to the internet. It connects "different networks" with different ids.

Packets are forwarded to the destination through network hopping.

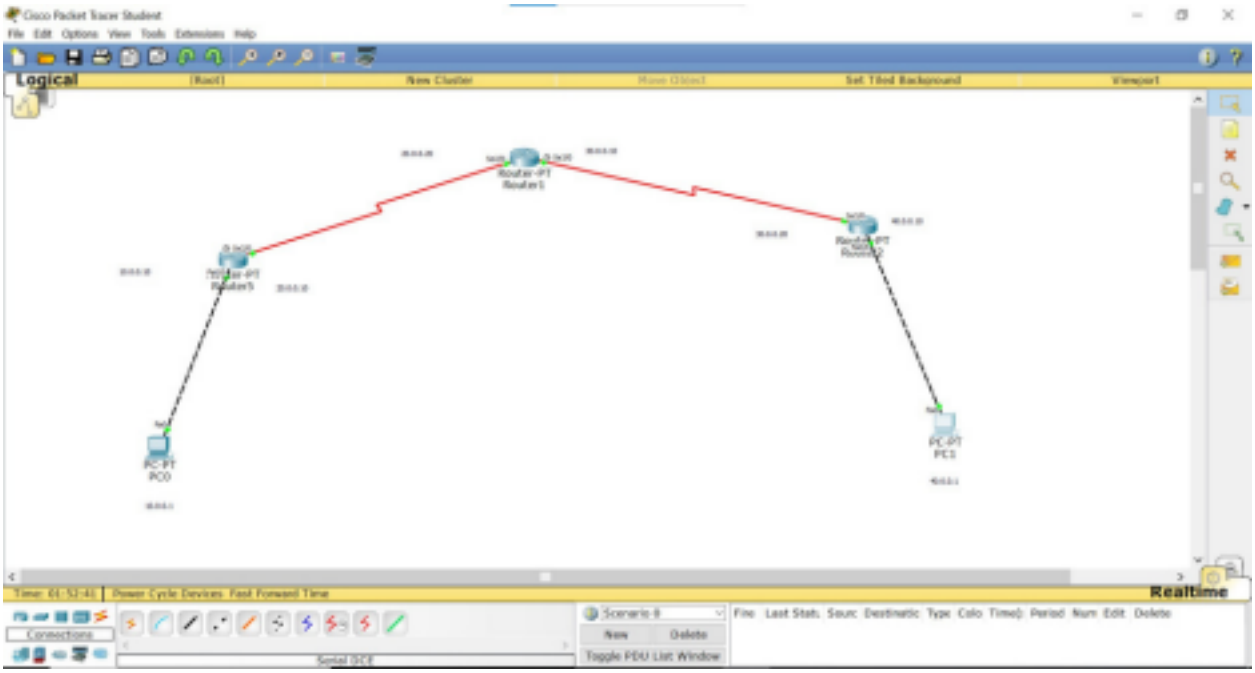
Serial ports are used to connect 2 routers the connecting cables.

TOPOLOGY:

PROGRAM 2.1

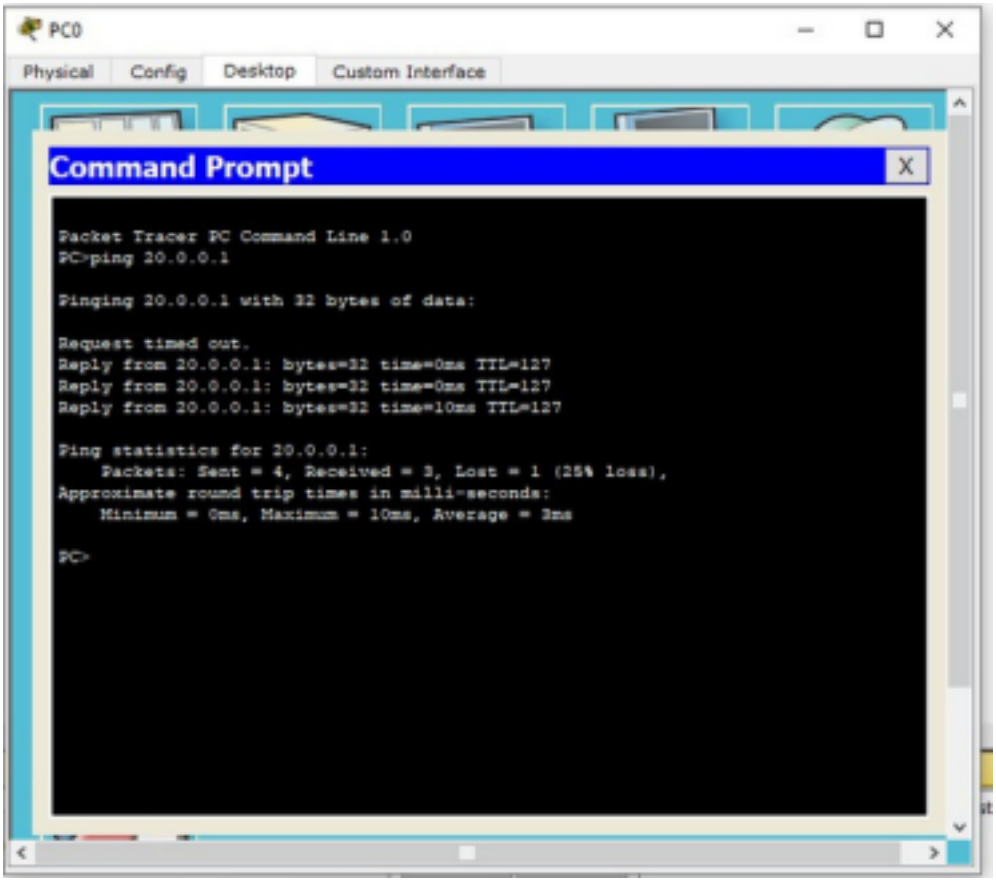


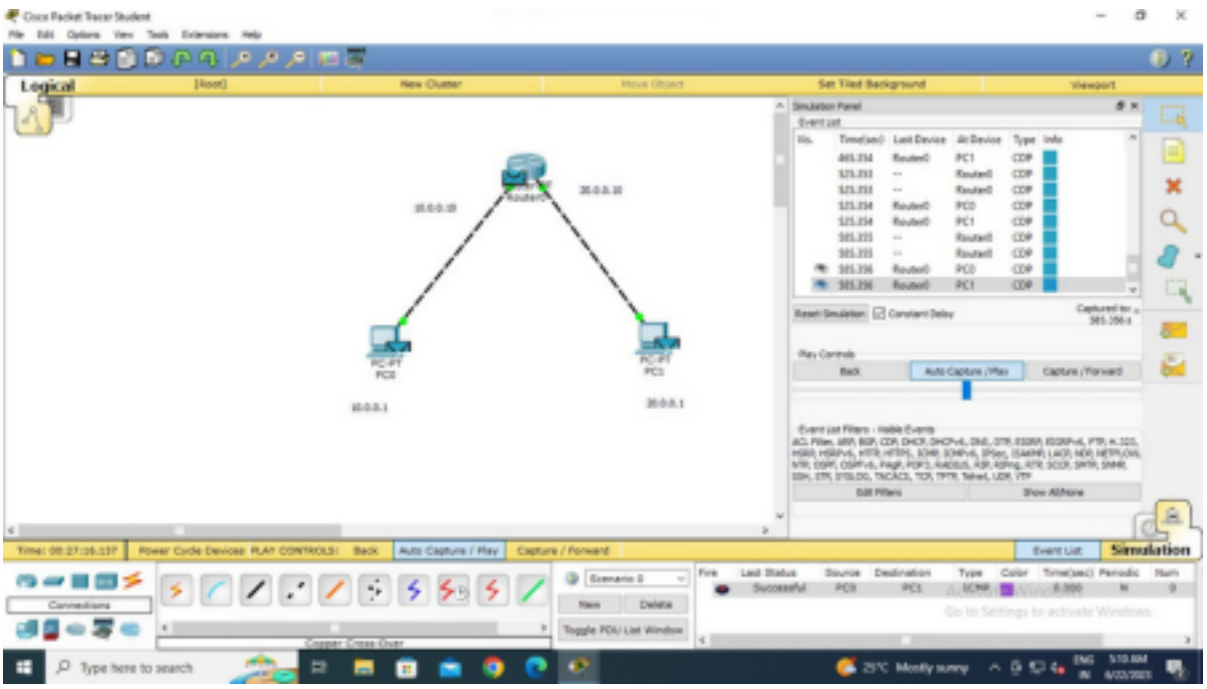
PROGRAM 2.2



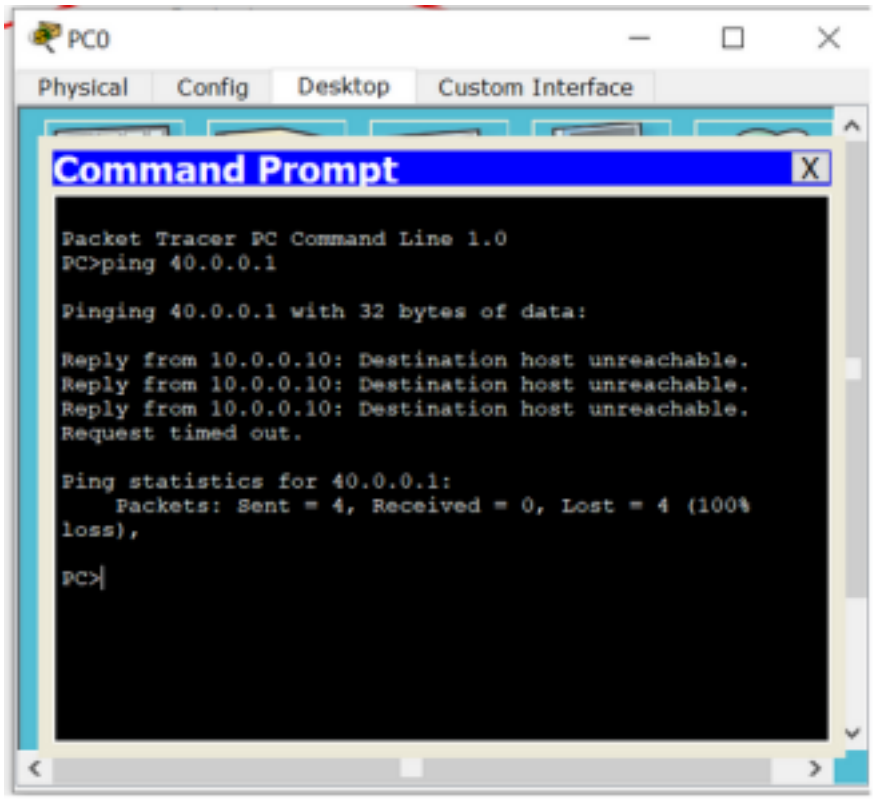
OUTPUT:

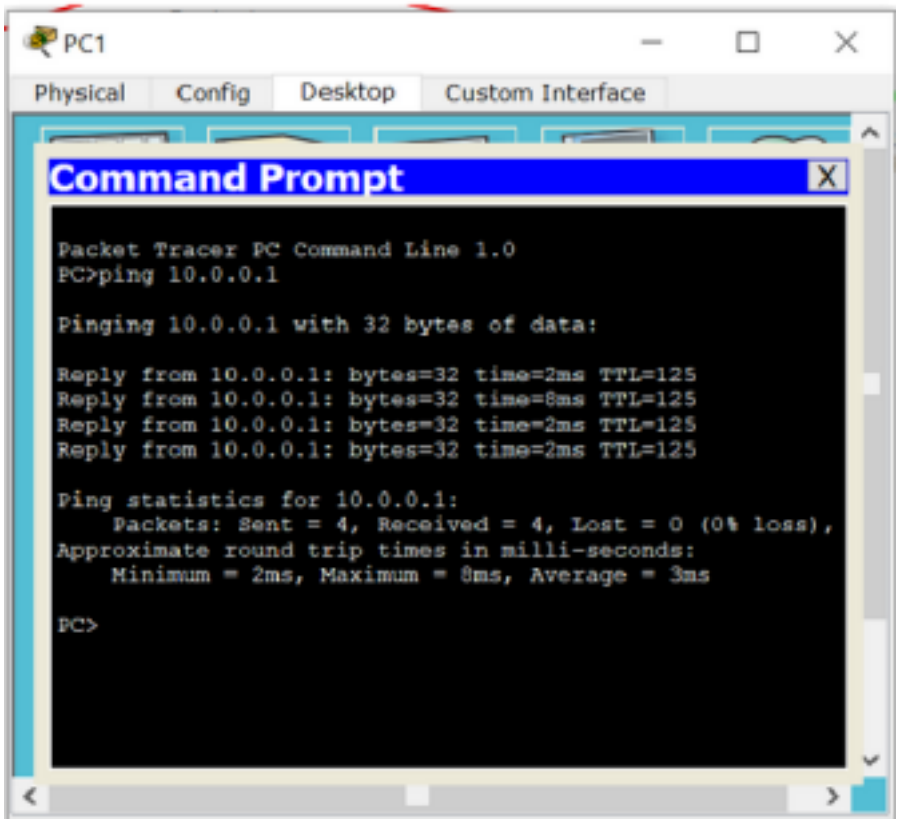
PROGRAM 2.1

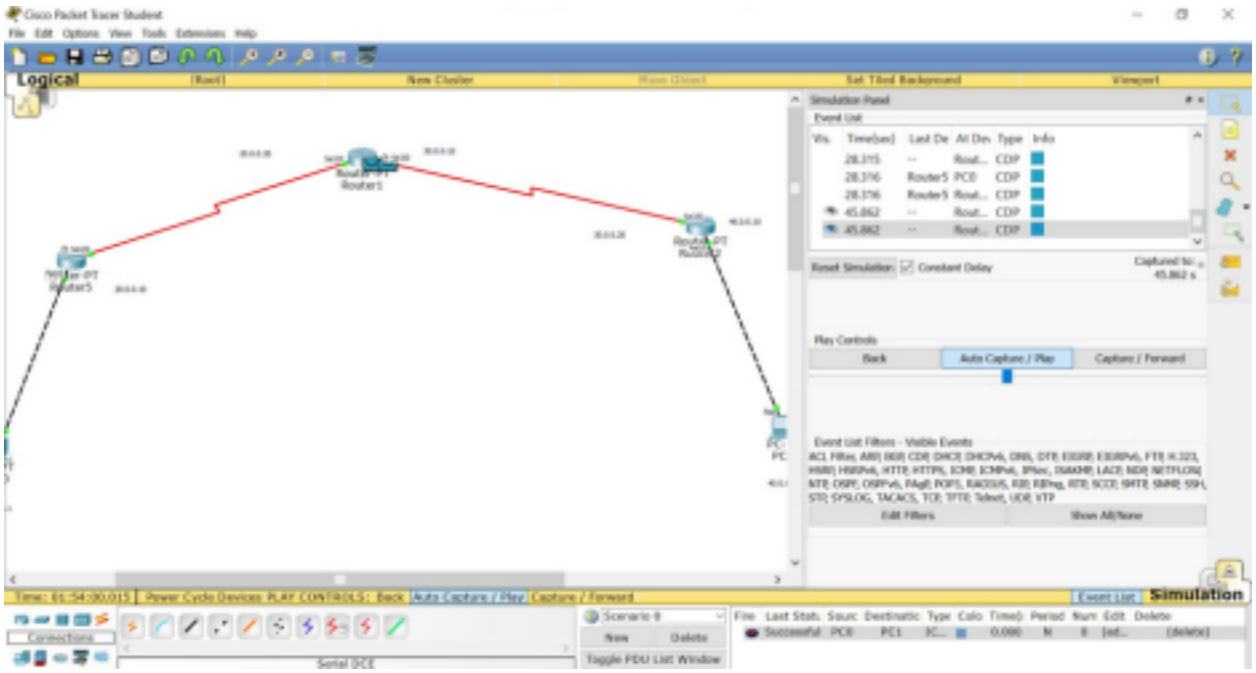

PC0
Physical
Config
Desktop
Custom Interface
Command Prompt
Packet Tracer PC Command Line 1.0
PC>ping 20.0.0.1
Pinging 20.0.0.1 with 32 bytes of data:
Request timed out.
Reply from 20.0.0.1: bytes=32 time=0ms TTL=127
Reply from 20.0.0.1: bytes=32 time=0ms TTL=127
Reply from 20.0.0.1: bytes=32 time=10ms TTL=127
Ping statistics for 20.0.0.1:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 10ms, Average = 3ms
PC>


Logical
Simulation

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
Router1
Router5
PC
Simulation Panel
Event List
Reset Simulation
Constant Delay
Play Controls
Back
Auto Capture / Play
Capture / Forward
Edit Filters
Show All/None
Simulation
Connections
Serial DCE
Toggle PDU List Window

WEEK 3

Configure default route, static route to the

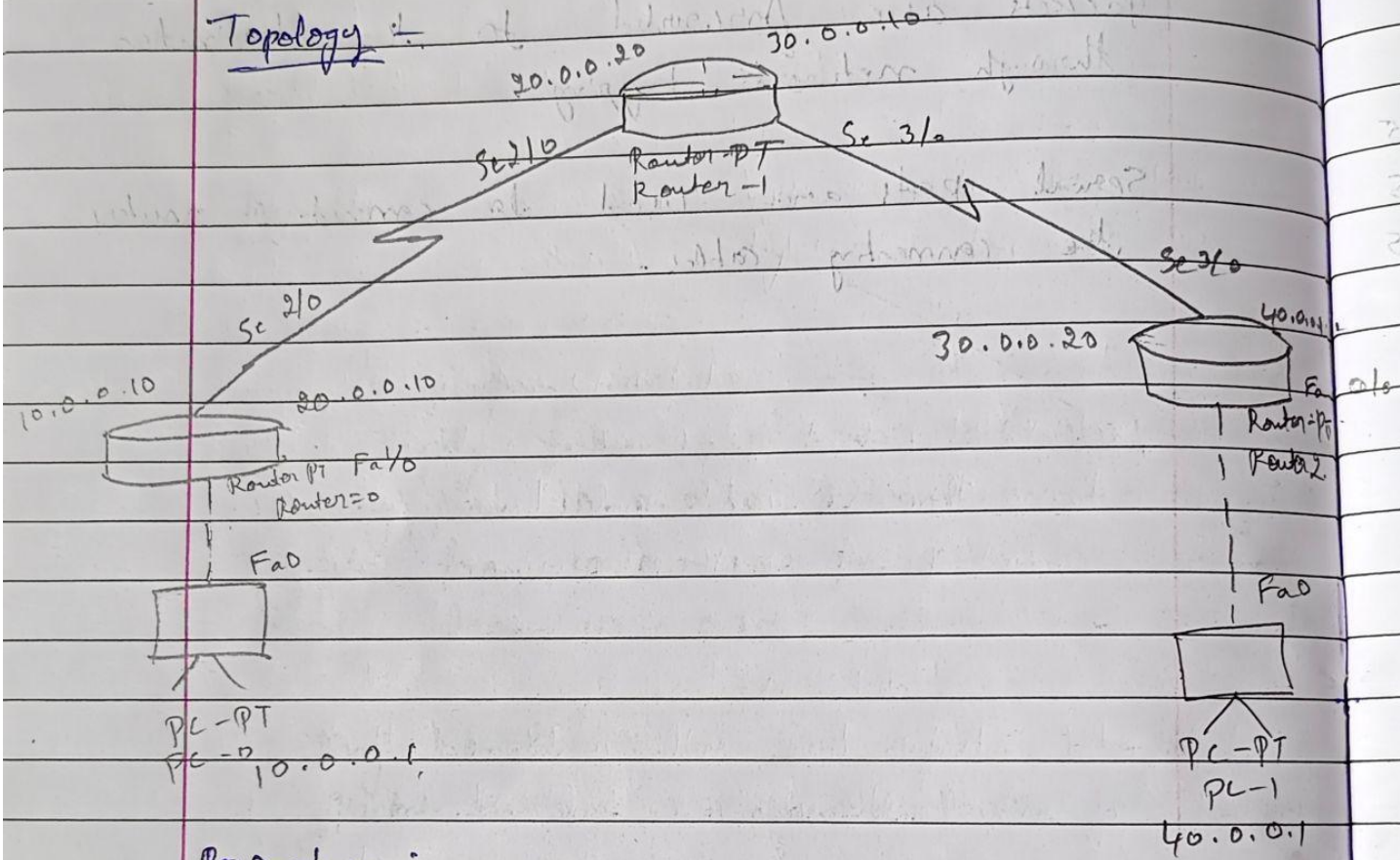
Router. OBSERVATION:

Date 13/7/23
Page

Program – 3.1

AIM: Configure default route, static route to the Router.

Topology:



Procedure:

- Connect 3 Routers and 2 pc's using copper cross-over cable for pc to router and a serial DCE cable to connect router to router.
- Set the IP address of both pc's and respective gateway ~~router~~ number.
- For all 3 Routers set the respective 2 IP address eg in CLI mode by using these commands.

Date __/__/__
Page _____

Step 4: Ip address 10.0.0.10 255.0.0.0
Step 5: No Shut
Step 6: Exit
Step 7: Interface se 2/0
Step 8: IP address 20.0.0.10: 255.0.0.0
Step 9: No shut
Step 10: Exit
Step 11: Exit.

- Repeat these Commands for other two routers with their respective Ip addresses.
- For Router 1, set the Ip route of other Ip addresses statically by using following steps.

Step 1: Config T
Step 2: Ip route 10.0.0.0 255.0.0.0 20.0.0.10
Step 3: Ip route 40.0.0.0 255.0.0.0 30.0.0.20
Step 4: Exit.
Step 5: Exit
Step 6: Show Ip route

- For Router 0 & Router 2 we set defaults Ip routes which means it can access any Ip address with any subnet mask.
- Set the default IP route by following these commands.

Step 1: Config T
Step 2: Ip route 0.0.0.0 0.0.0.0 20.0.0.20
Step 3: IP route 0.0.0.0 0.0.0.0 30.0.0.10

- Step 2 is given for Router 0 & step 3 command for

Date __/__/__
Page

PING output:

Packet Tracer PC command Line 1.0

PC> ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

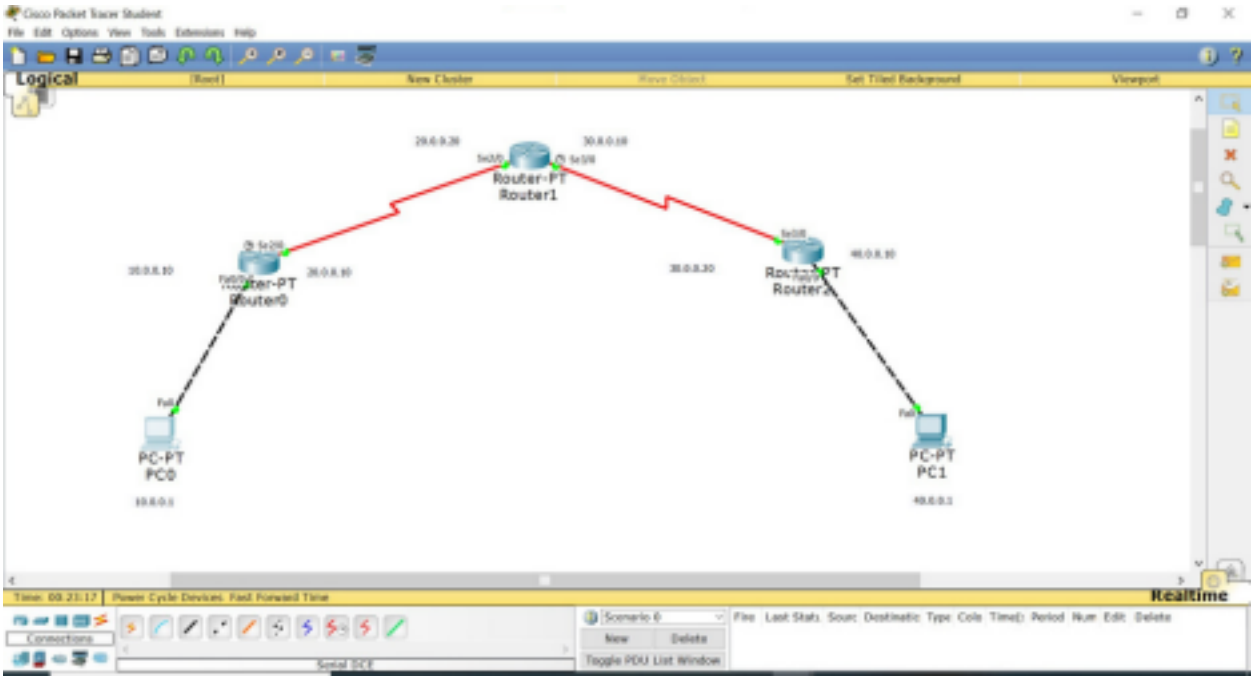
Request timed out.
Reply from 40.0.0.1 : bytes=32 time=2ms TTL=125
Reply from 40.0.0.1 : bytes=32 time=16ms TTL=125
Reply from 40.0.0.1 : bytes=32 time=2ms TTL=125

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.

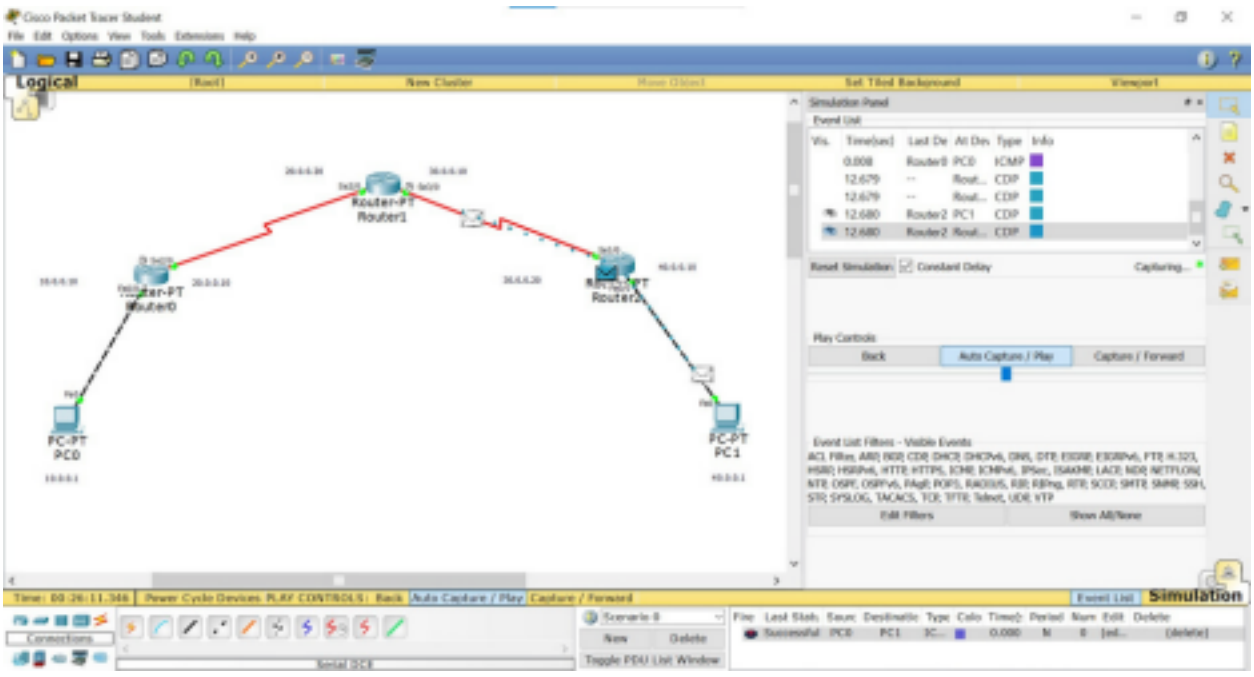
Observation

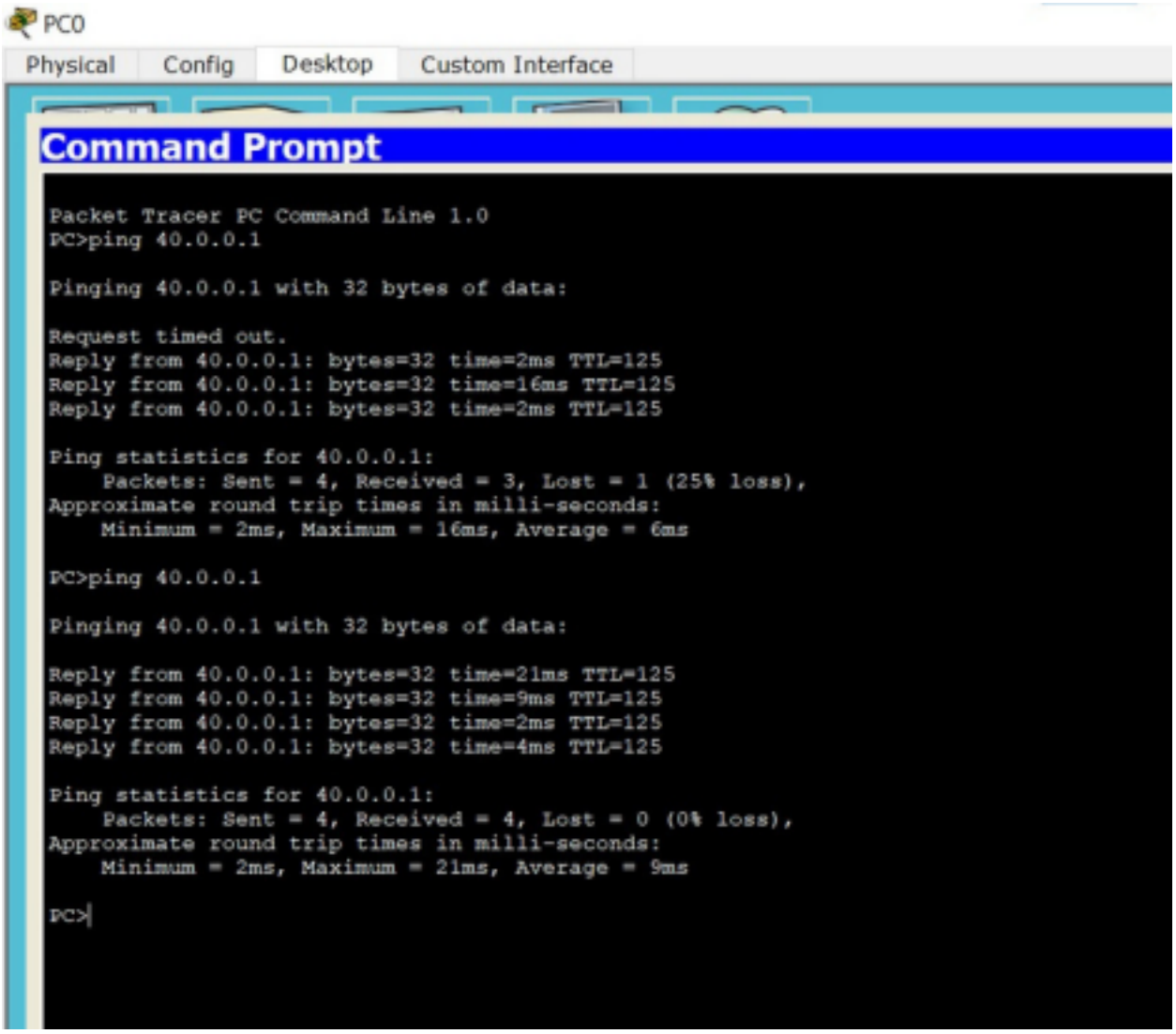
- A default route is the route which takes effect when no other route is available for an IP address destination.
- If a packet is recieved, the device first checks the IP destination address, if the IP destination address is not found the device checks its routing table.
- If the remote destination Subnet is not listed then the packet is forwarded to the next hop toward the destination using the default

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>

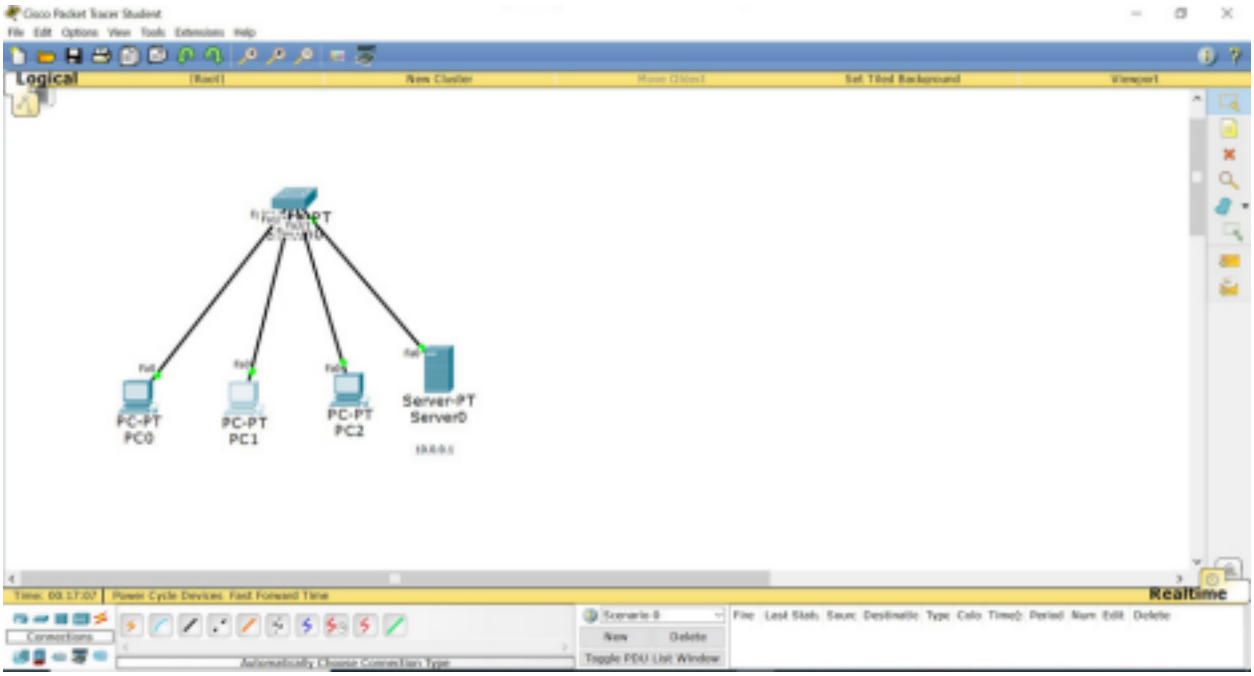
WEEK 4

Configure DHCP within a LAN and outside

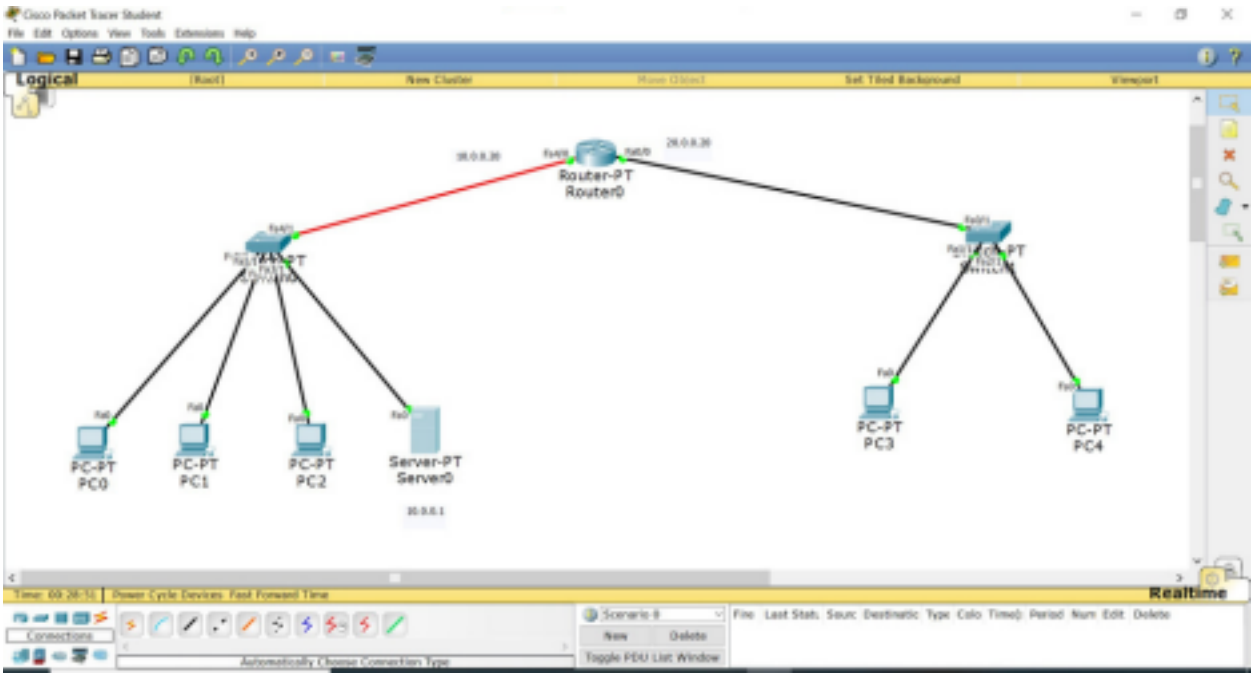
LAN. OBSERVATION:

TOPOLOGY:

PROGRAM 4.1:

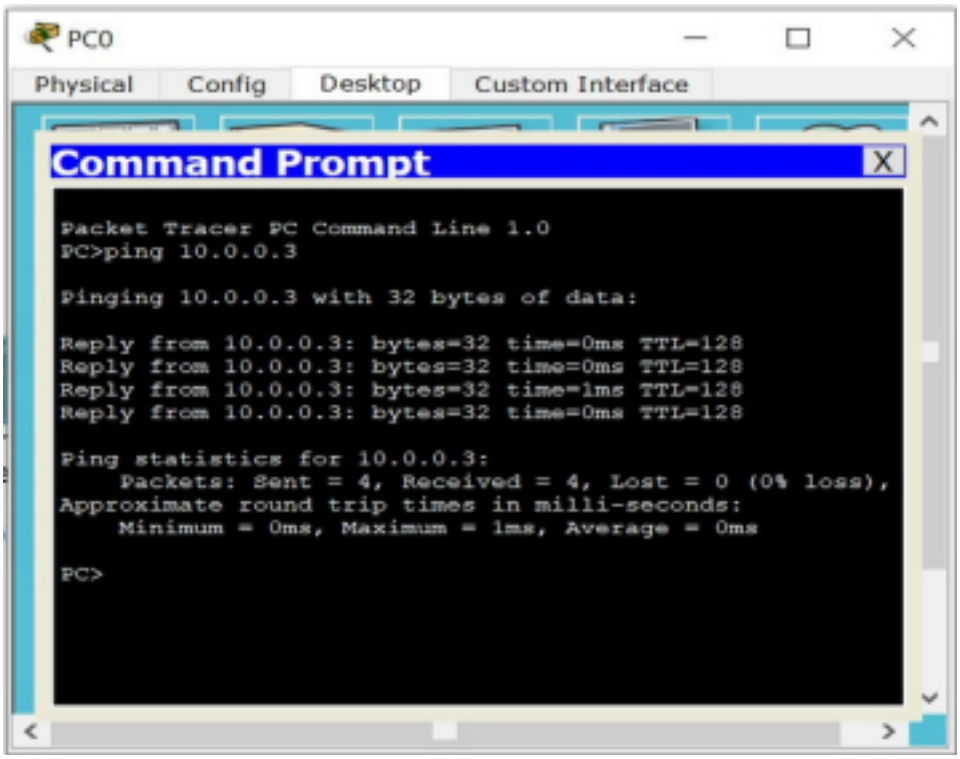


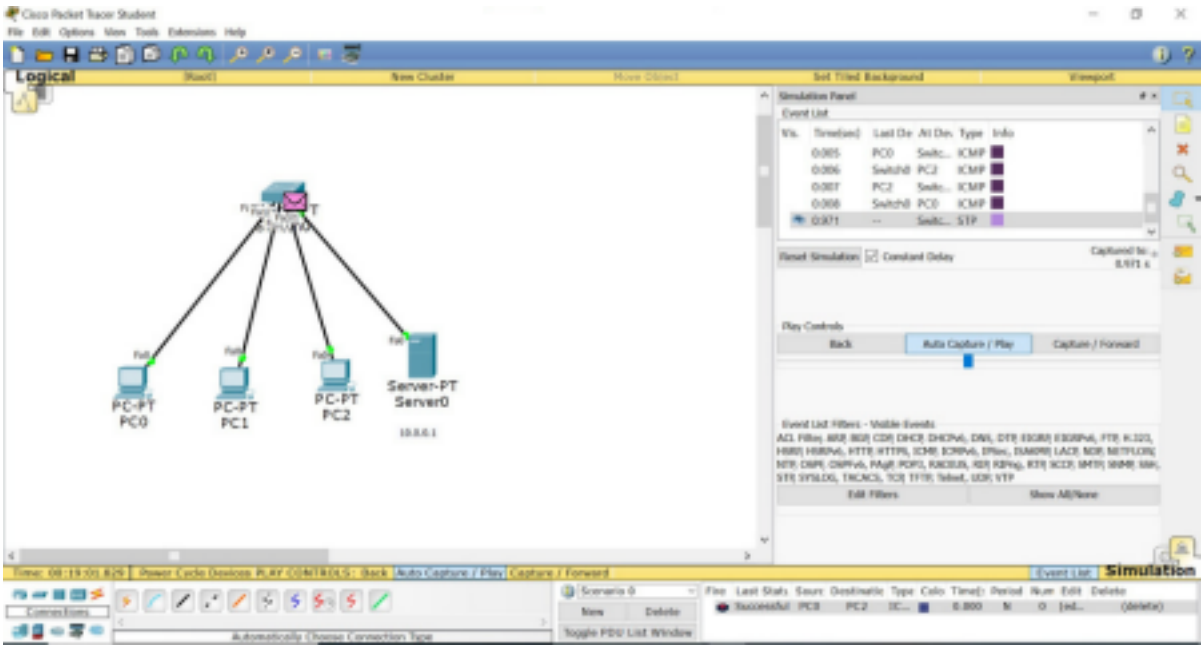
PROGRAM 4.2:



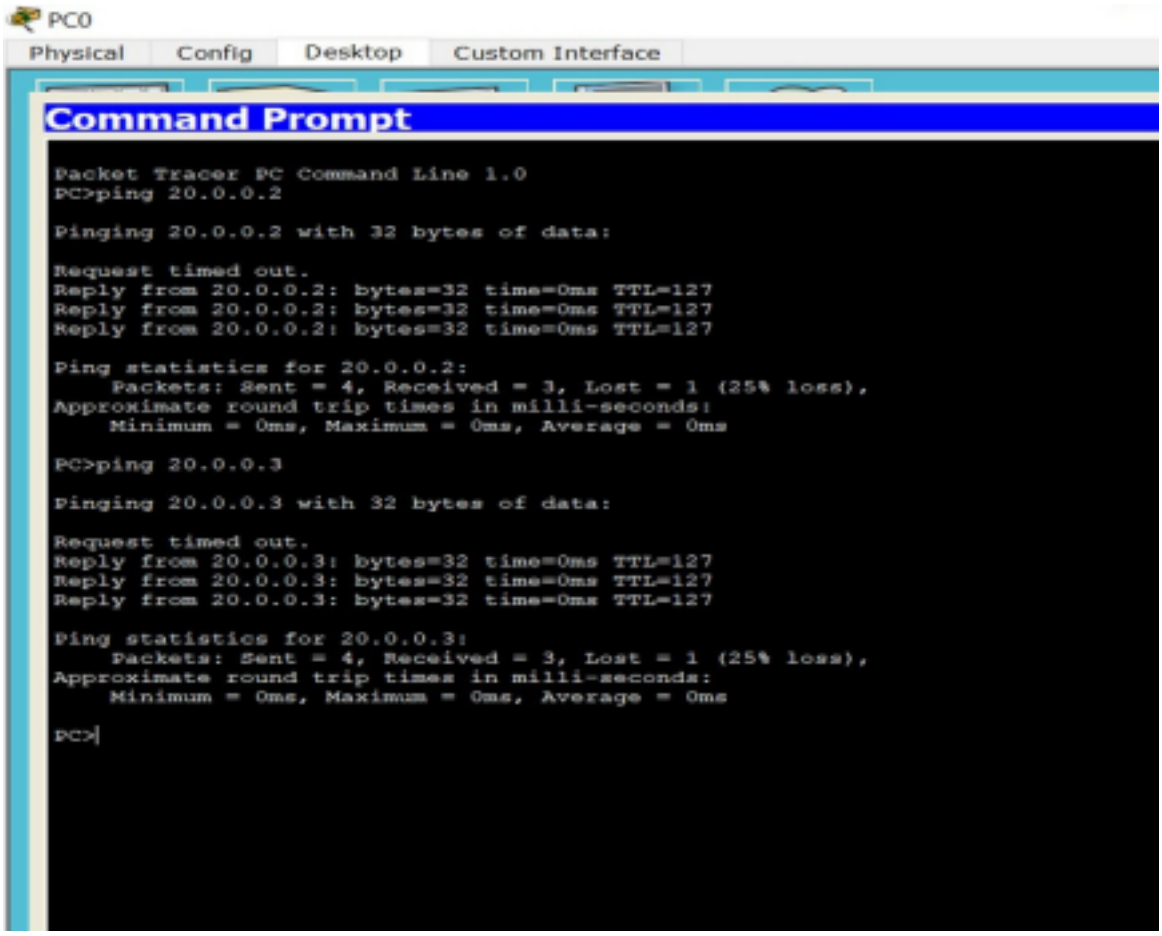
OUTPUT:

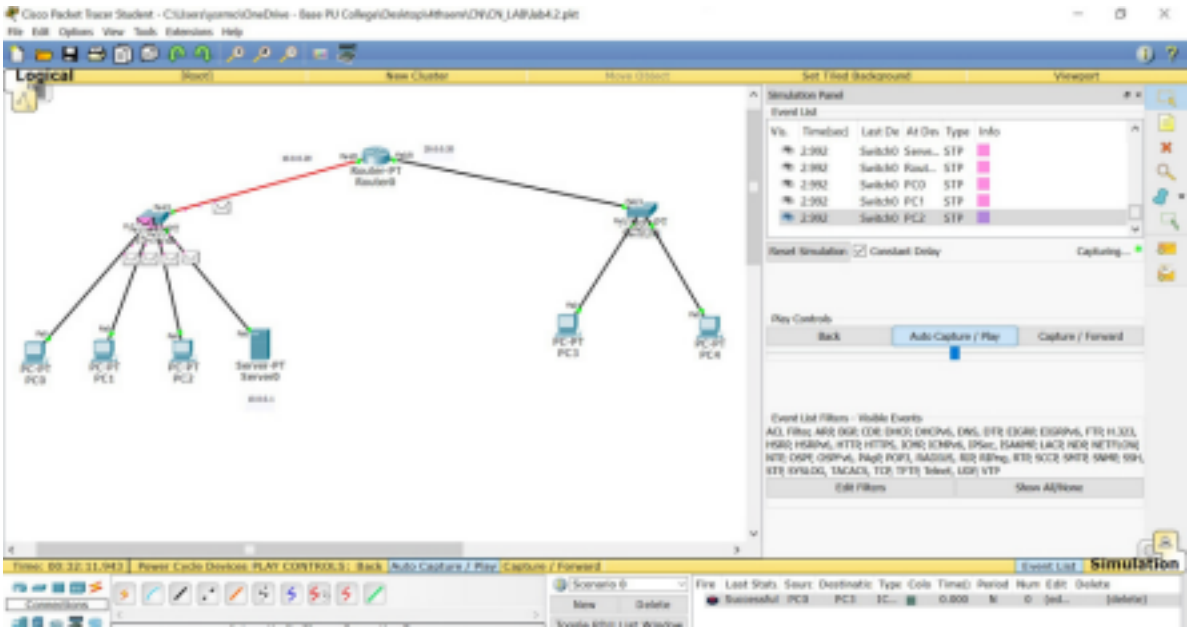
PROGRAM 4.1:




Logical
PC-PT
PC0
PC-PT
PC1
PC-PT
PC2
Server-PT
Server0
Simulation

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:

TOPOLOGY:

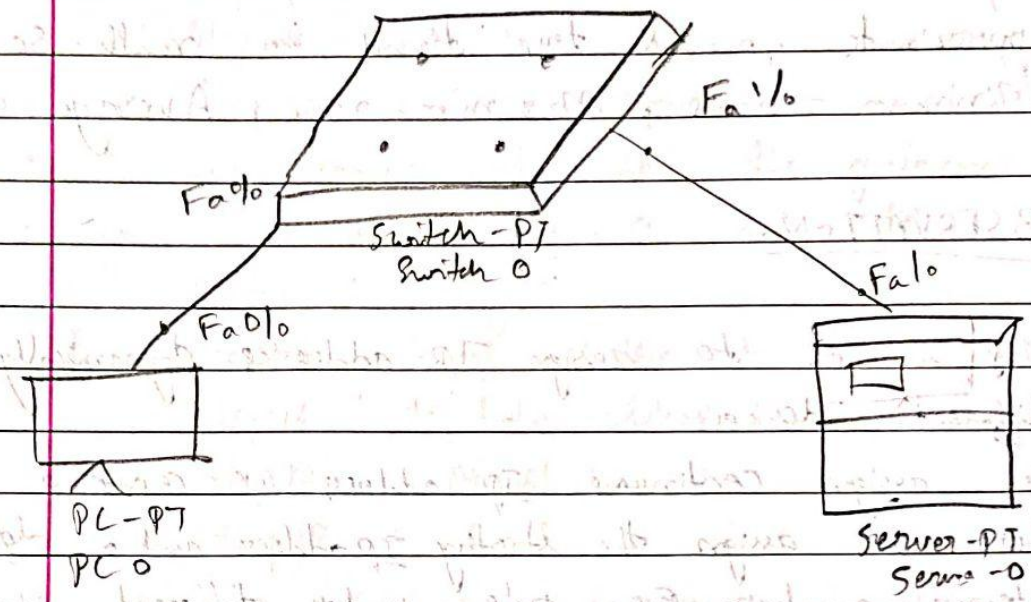
Date __/__/__
Page _____

Lab-5

Aim:

Configure Web server, DNS within a LAN.

Topology:



Procedure –

- Connect a switch, pc and a server to form a LAN.
- Set pc's IP address by clicking on it and go to config tab, there in fast Ethernet option set IP address as 10.0.0.1 and subnet mask.
- Set servers IP address as 10.0.0.2 and subnet mask respectively.
- Go to pc's Desktop and click on web browser in the URL tab type 10.0.0.2. you will get a default display

Date __/__/__
Page _____

- Next go to server → Services → DNS and switch on the services. Now add a Domain name and type the IP address as 10.0.0.2 press add and save it
- Again go back to pc → Desktop → Webbrowser and type the given domain name. Here we can see the CV which had been created earlier

Output:

Web browser

< > URL http://dhanush Go Stop

CV

Dhanush H.V

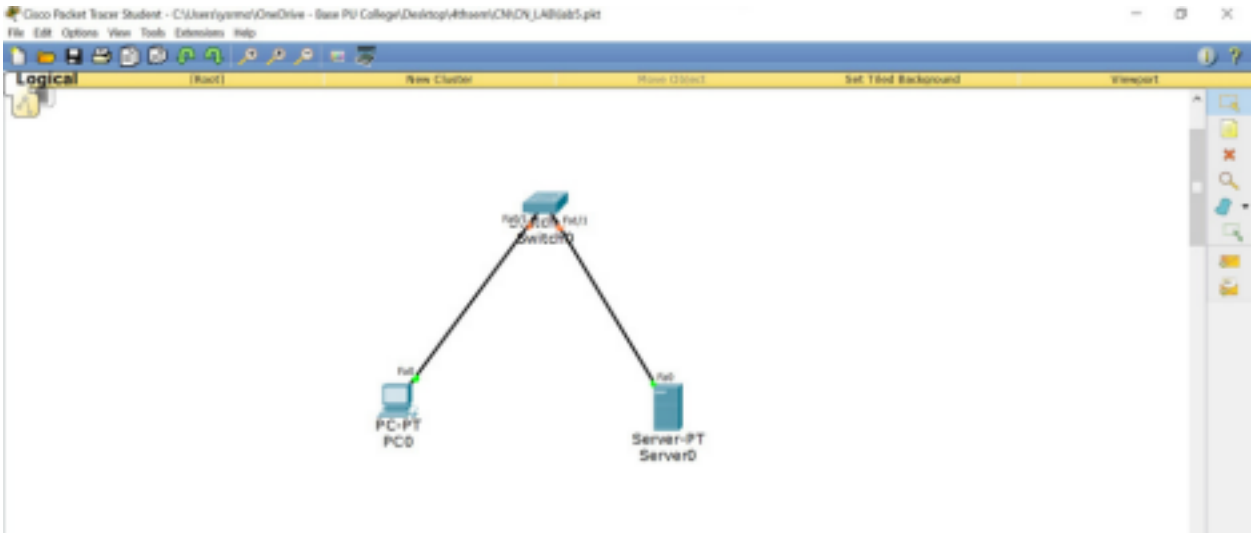
USN: 1BM21CS052

Languages: C/C++/Java

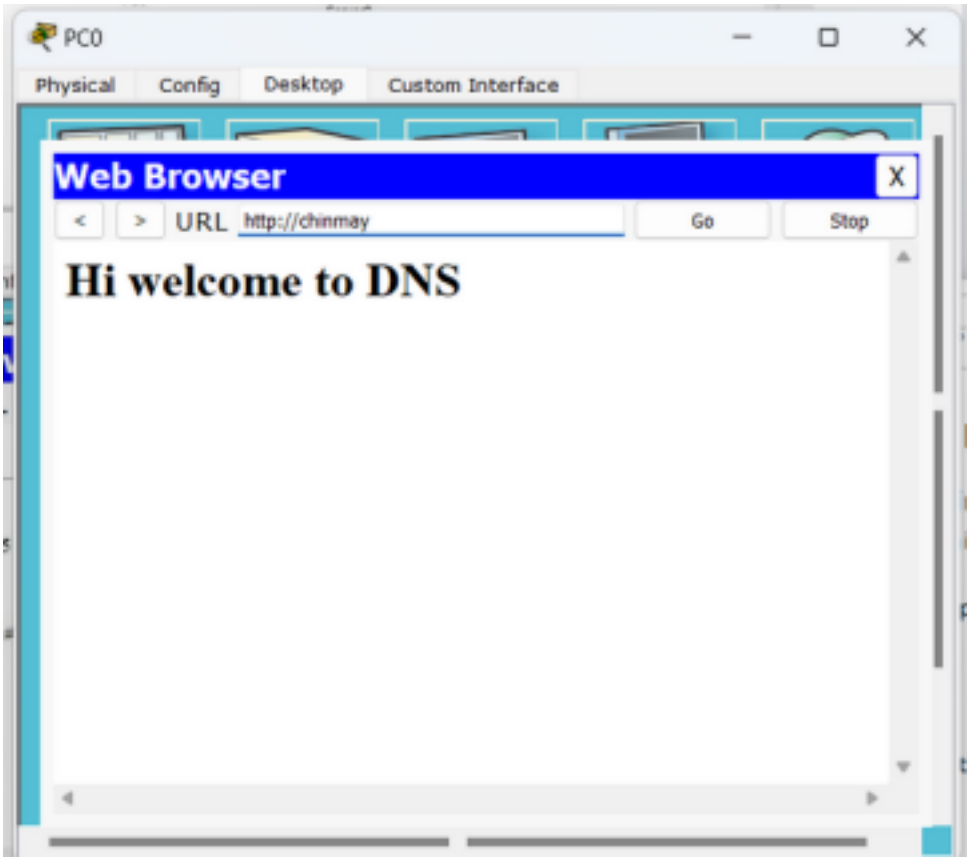
Image:

Observation:

- If you wanted to go to a certain website you would open webbrowser and type domain name of that website or else you can also type the IP address instead if you know that website IP address
- Since we can't remember IP addresses of all websites DNS server will search through its cache to find a


Logical
PC-PT
PC0
Server-PT
Server0

OUTPUT:


PC0
Physical
Config
Desktop
Custom Interface
Web Browser
X
URL
http://chinmay
Go
Stop
Hi welcome to DNS

WEEK 6

Configure RIP routing Protocol in Routers.

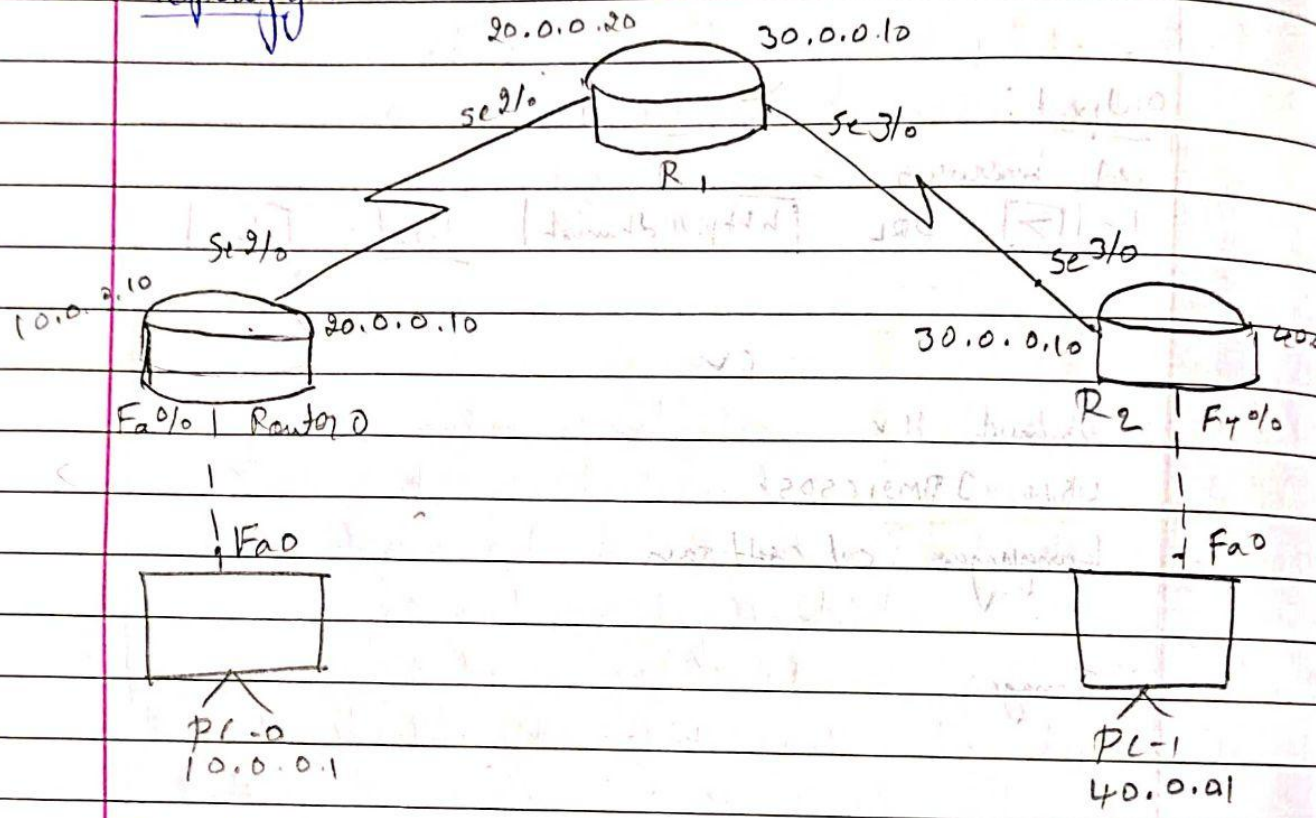
OBSERVATION:

Date __/__/__
Page

LAB-6

AIM:
Configure RIP routing protocol in Routers.

Topology:



Procedure

- Create a Network using 3 routers and 2 PC's. Connect routers using V serial DCE cable and pc to router using copper-crossover cable.
- Set the IP address and gateway no for both pc's as 10.0.0.1 - IP 10.0.0.10 - gateway - PC0
  40.0.0.1 - IP 40.0.0.10 - gateway - PC1 respectively
- Up to Router → CLI mode and execute the Commands

Date __/__/__
Page _____

Step 5 - IP address 10.0.0.10 255.0.0.0
Step 6 - No shut
Step 7 - Exit
Step 8 - interface se 2/0
Step 9 - Ip address 20.0.0.10 255.0.0.0
Step 10 - Encapsulation ppp //
Step 11 - clock rate 64000 //
Step 12 - No shut

- Here for Routers with Fast Ethernet execute only till Step 7 and type No shut.
- Only for Router to Router connection execute all steps, also execute the step 11 only for the router connection which has a clock syn bol at start.
Repeat these steps for all routers.
- Again go to Router 0 → CLI mode and type these steps
  Step 1 : config T
  Step 2 : router rip
  Step 3 : Network 10.0.0.0
  Step 4 : Network 20.0.0.0
  Step 5 : Exit
- Repeat these steps for all routers.
- At last now go to each router and type show Ip route. Here the Ip addresses associated with that router will be labelled as C and other Ip addresses are labelled as R.
- Lastly go to PC 0 and ping a message to PC 1 using ping destination IP address command.

Date __/__/__
Page

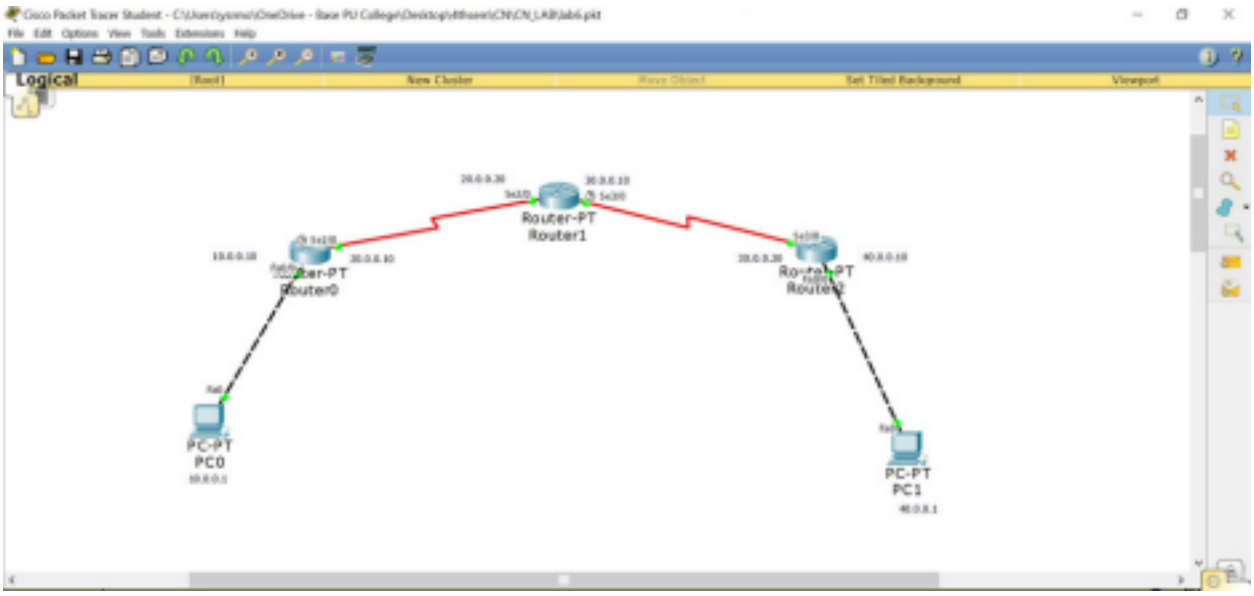
Request timed out.
Reply from 40.0.0.1 : bytes=32 times : 8ms TTL=125
Reply from 40.0.0.1 : bytes=32 times : 5ms TTL=125
Reply from 40.0.0.1 : bytes=32 times : 10ms TTL=125

ping statistics for 40.0.0.1:
Packets sent = 4, Recieved = 3, Lost = 1 (25% loss)
Approximate round trip times in milli seconds:
Minimum = 5ms, Maximum = 10ms, Average = 7ms.

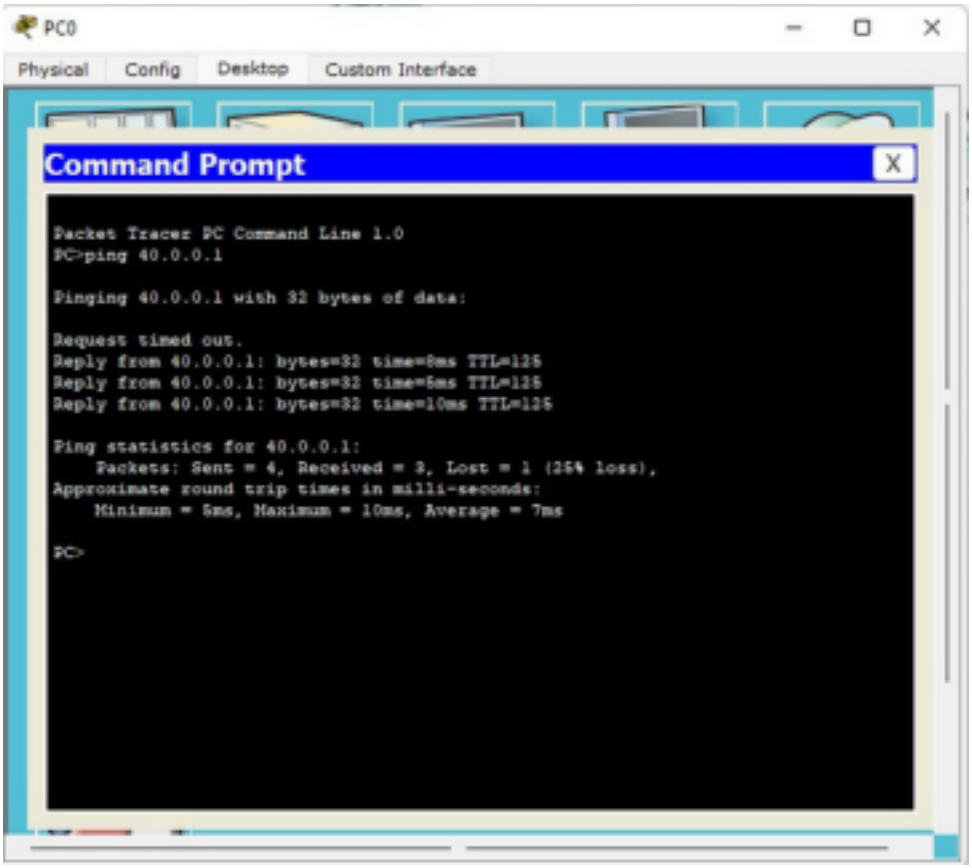
Observation:

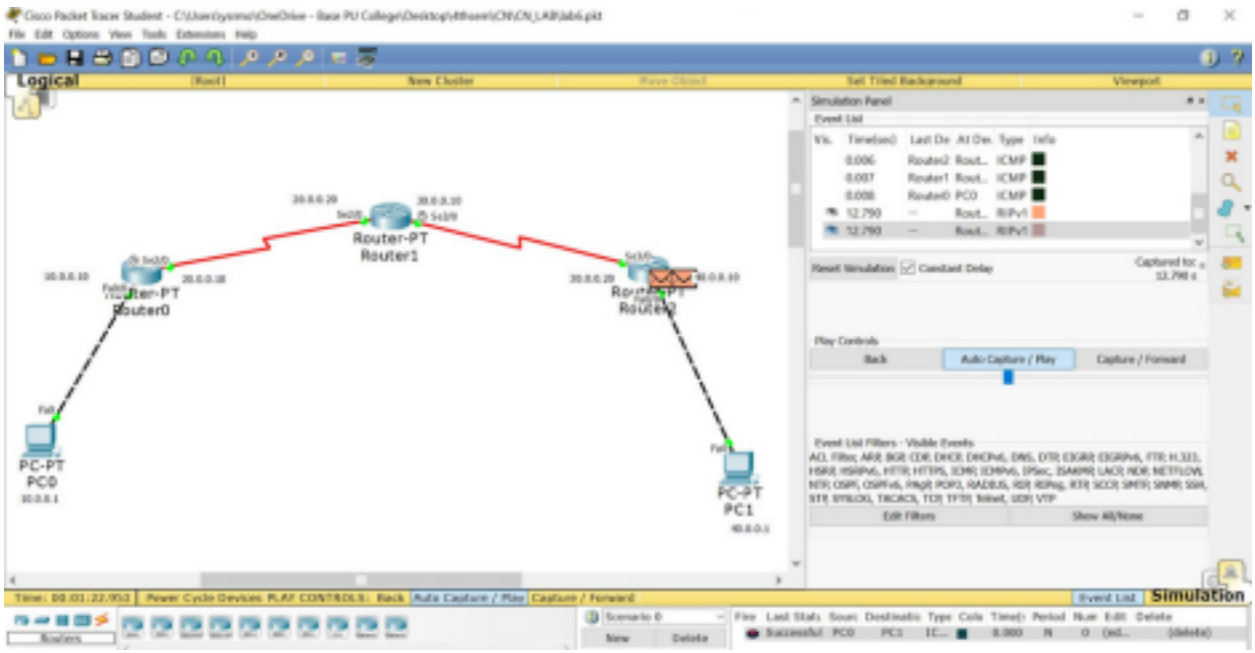
- Routing information protocol (rip) is a dynamic rou protocol that uses hop count as a routing metric t find the best path between source and destination. It a distance-vector routing protocol.
- Hop count is the no of routers coming in between sour and destination. The path with least hop count is selected.
- Updates of the networks are exchanged periodically.
- Updates of routing information are always broadcast
- Full routing tables are sent in update.
- Routers always trust routing information received from neighbour routers.

TOPOLOGY:



OUTPUT:




Logical
Router-PT
Router1
Router-PT
Router0
Router-PT
Router2
PC-PT
PC0
PC-PT
PC1
Simulation Panel
Event List
Play Controls
Back
Auto Capture / Play
Capture / Forward
Simulation

WEEK 7

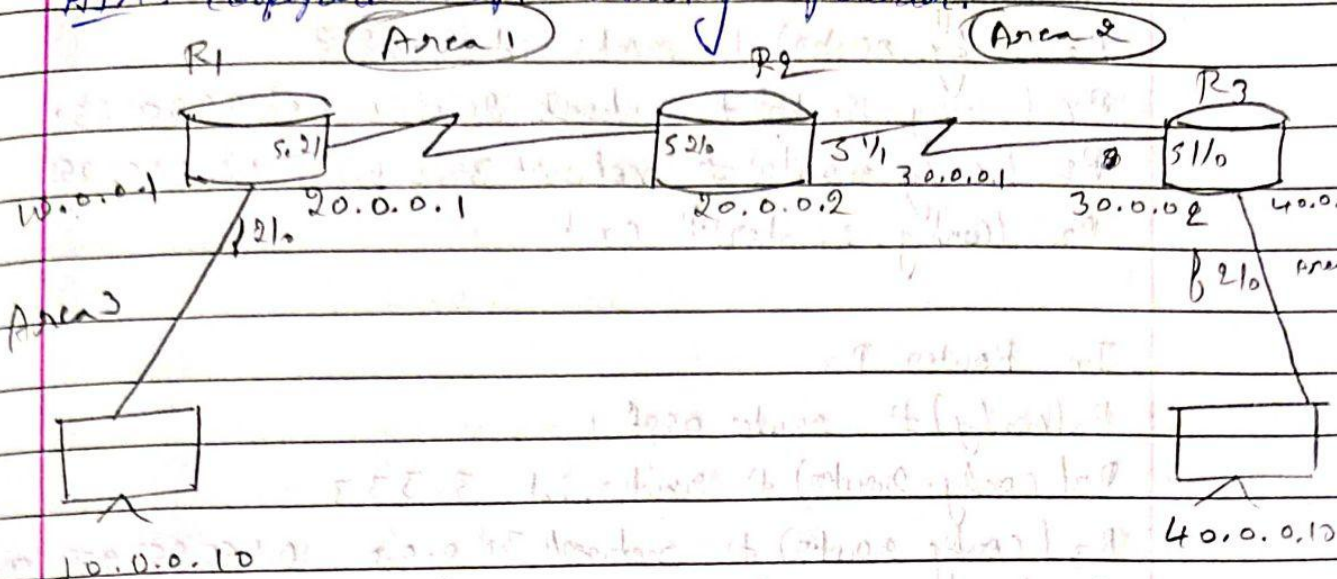
Configure OSPF routing

protocol. OBSERVATION:

Date 27/7/23
Page

LAB-8
OSPF

AIM: configure OSPF routing protocol.



Procedure:

→ Configure the pc's with IP address and gateway according to the topology.

→ Configure each of the router according to the IP address given in topology.

→ Encapsulation ppp and clockrate need to be set as done in RIP protocol experiment.

Step 3: Now enable ip routing by configuring ospf routing protocol in all routers.

In Router R1

R1 (config) # router ospf

R1 (config-router) # router-id 1.1.1.1

R1 (config-router) # network 10.0.0.00 0.255.255.255 area

R1 (config-router) # network 20.0.0.0 0.255.255.255 area

In Router R2

R2(config)# router ospf
R2(config-router)# router-id 2.2.2.2
R2(config-router)# network 20.0.0.0 0.255.255.255
R2(config-router)# network 30.0.0.0 0.255.255.255
R2(config-router)# exit.

In 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
R3(config-router)# network 40.0.0.0 0.255.255.255 area
R3(config-router)# exit.

Step4: Loopback in serial interface

In router R1

R1(config-if)# interface loopback 0
R1(config-if)# ip address 172.16.1.252 255.255.0.1
R1(config-if)# no shut

In router 2 in serial interface

R2(config-if)# interface loopback 0
R2(config-if)# ip address 172.16.1.253 255.255.0.1
R2(config-if)# no shut.

In router 3

R3(config-if)# interface loopback

Date __/__/__
Page _____

Step 5 : Virtual link.

In router R1

R1 (config) # router ospf 1

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

R1 (config-router) # exit.

In 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

O IA 10.0.0.0/8 [110/129] via 30.0.0.1 serial 3/0

O IA 20.0.0.0/8 [110/128] via 30.0.0.1 serial 3/0

30.0.0.0/8 is subnetted, 2 subnets, 2 masks

C 30.0.0.0/8 is directly connected, serial 3/0

C 30.0.0.1/32 is directly connected serial 3/0

C 40.0.0.0/8 is directly connected fastethernet 0/0

C 172.16.0.0/16 is directly connected loopback

Ping output

Pinging 40.0.0.10 with 32 bytes of data.

Request timed out.

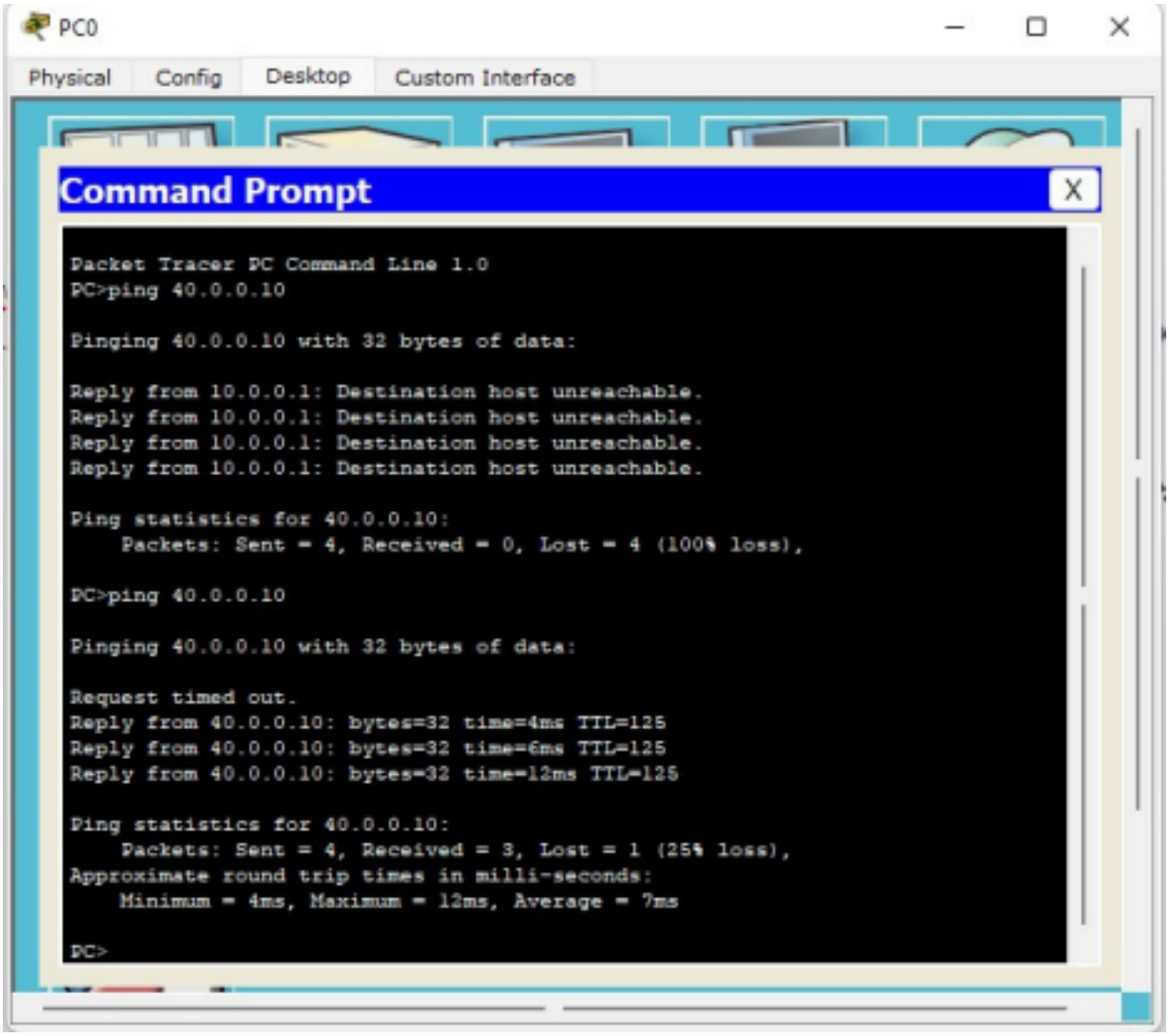
Reply from 40.0.0.10 bytes = 32 time = 2ms TTL=125

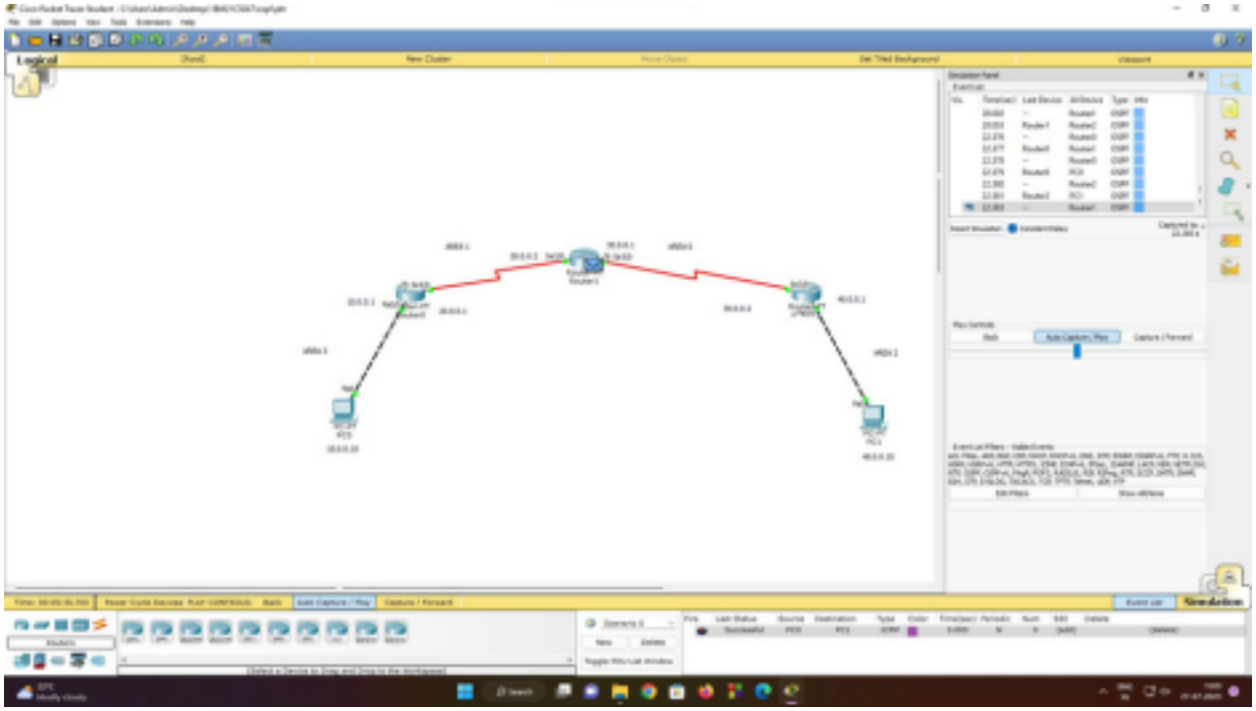
Reply from 40.0.0.10 bytes = 32 time = 9ms TTL=125

Reply from 40.0.0.10 bytes = 32 time = 10ms TTL=125

TOPOLOGY:

OUTPUT:





WEEK 8

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

OBSERVATION:

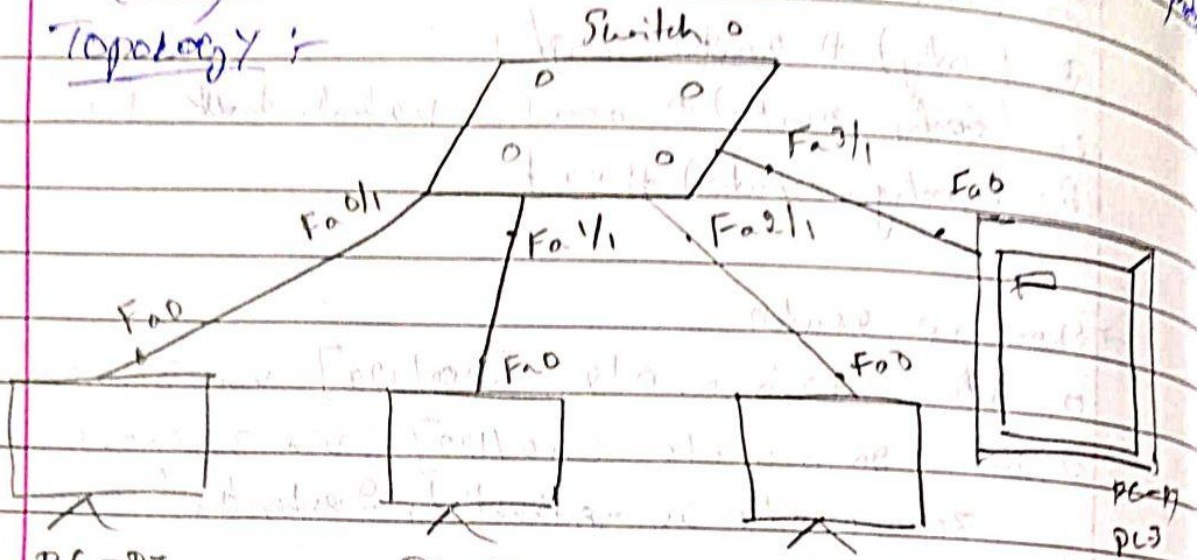
Date / /
Page

LAB-8

AIM:

To construct Single LAN and understand the Concept and operation of Address Resolution Protocol (ARP)

Topology :



Procedure :

- Create a topology of 3PC's and a server.
- Assign a IP address to all pc's and server
- Connect them through the switch
- Use the inspect tool to click on a pc to see ARP table.
- Command ins cmd for the same is arp -a
- Initially ARP table

Date __/__/__
Page _____

- Use the capture button in the simulation panel to go step by step so that the changes in ARP can be clearly noted.

PING OUTPUT

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=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 milliseconds.
Minimum=0 ms : Maximum=0 ms : Average=0ms

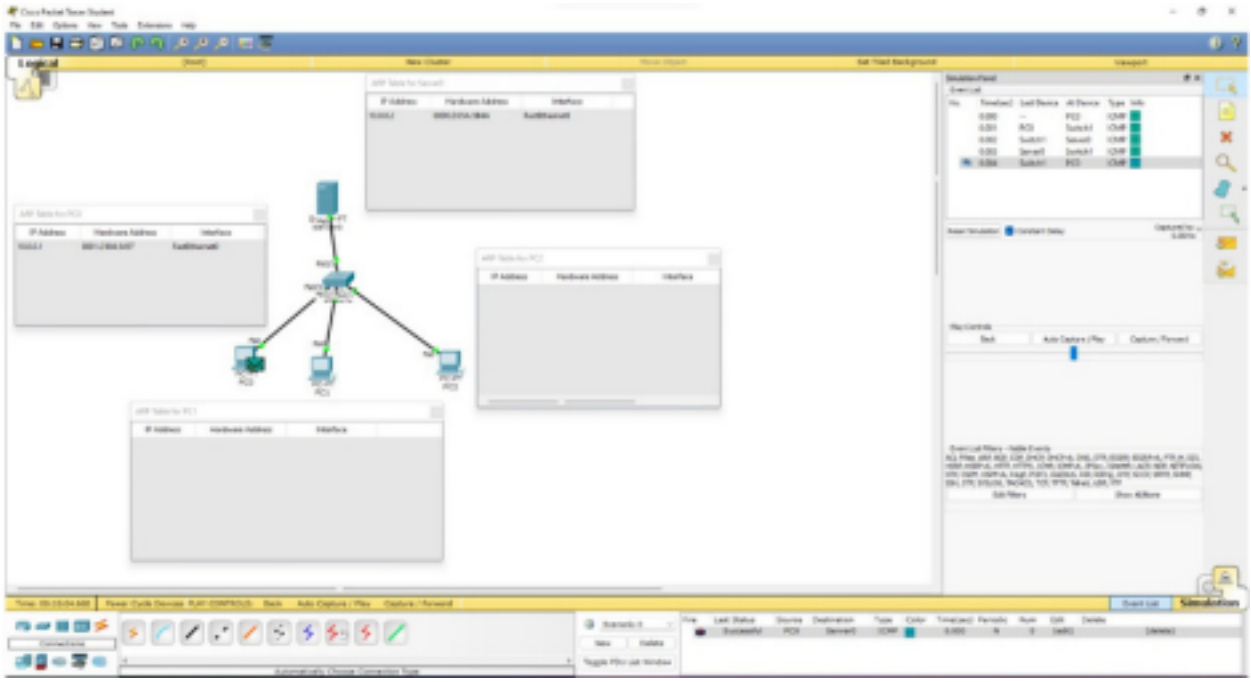
pc > arp -a

Internet address	physical Address	Type
10.0.0.4	0060.2f20.3201	dynamic.

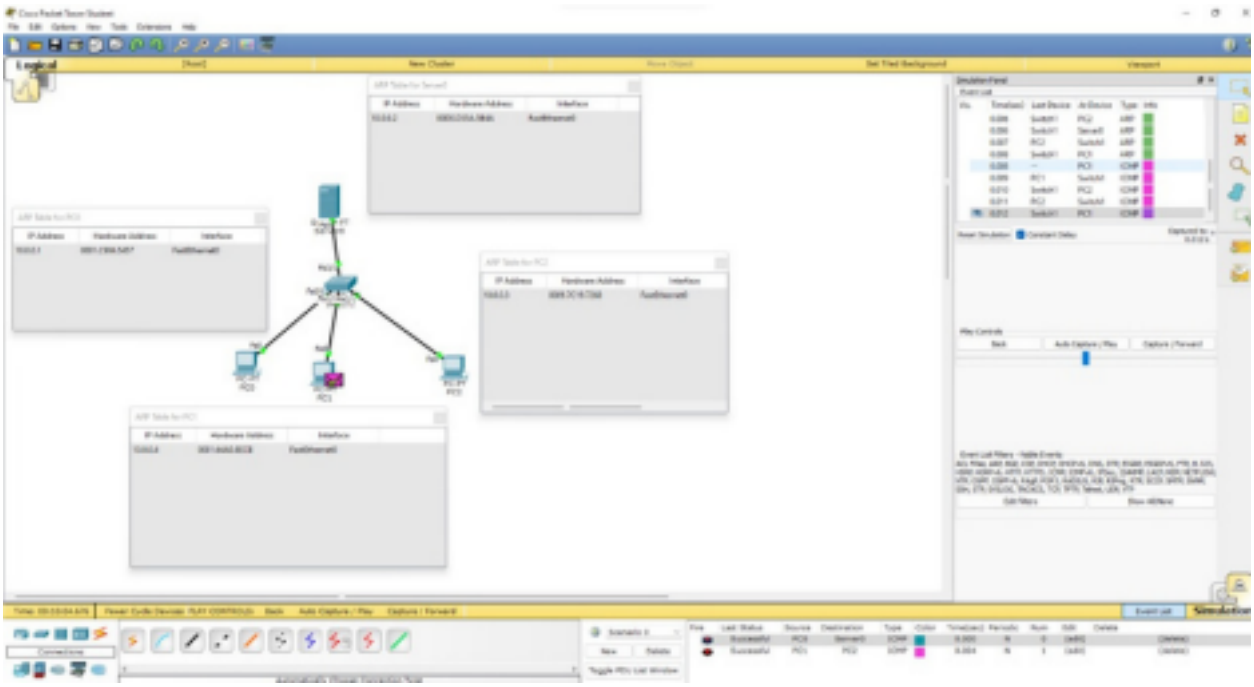
Observation

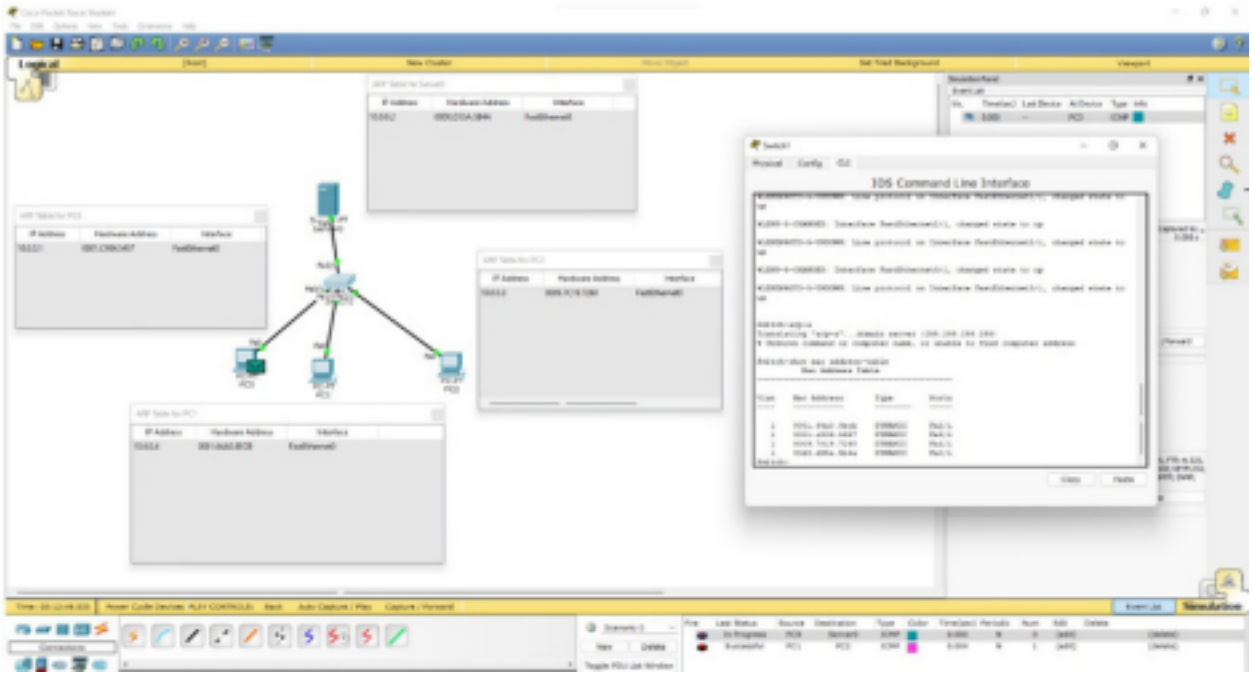
- When we ping pc and server the address of server is known to pc and vice versa.
- When we ping between other 2 pc's simultaneously the address of each other are known.
- Every time a host request a MAC address in order

TOPOLOGY:



OUTPUT:




IOS Command Line Interface

WEEK 9

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

OBSERVATION:

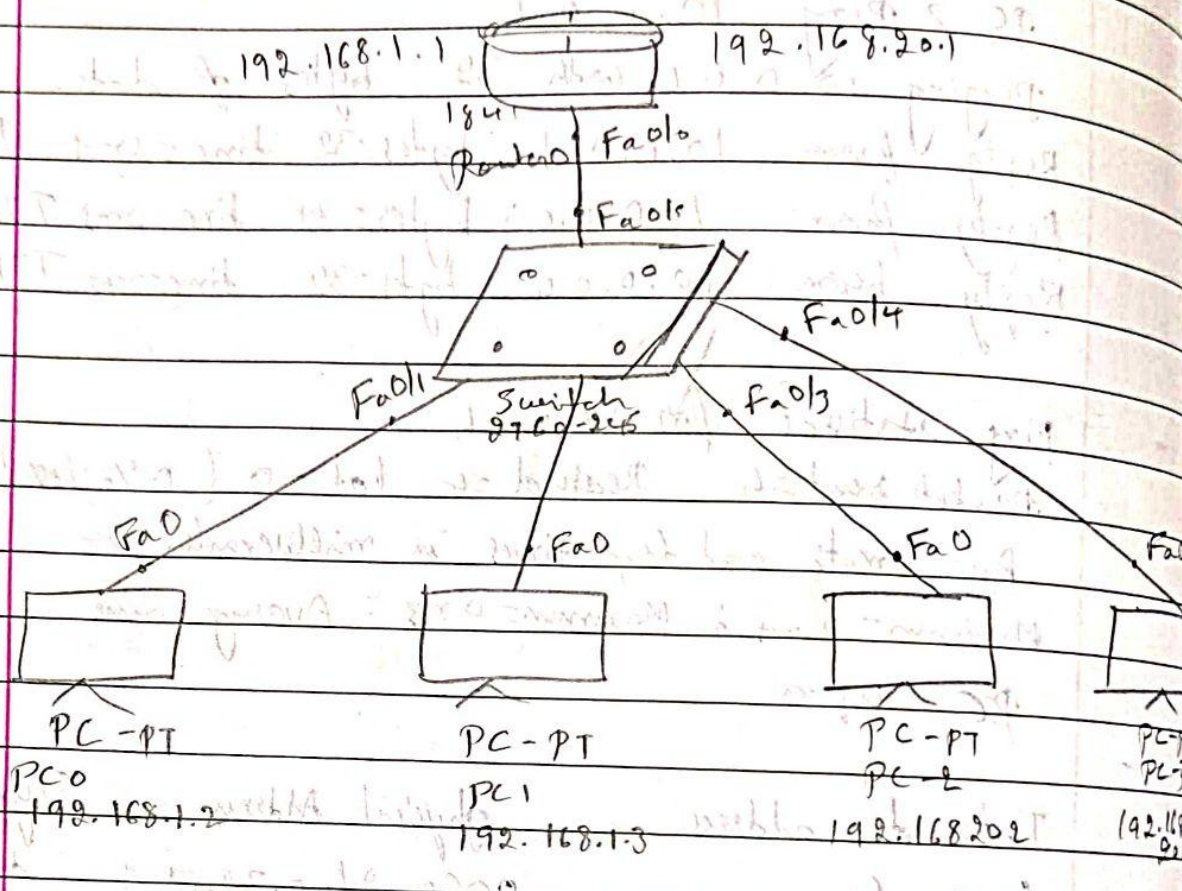
Date __/__/__
Page

LAB-9

AIM:

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

Topology:



Procedure:

- Create a topology as shown above choosing 1841 router and 2960-24PT Switch.
- Set up the IP address of the router and 4PC's respectively we use class C IP address also set

Date __/__/__
Page _____

- Go to router → config tab and delet VLAN database and enter the name VLAN & no. 2 create
- Go to router → CLI and type the following command.

Step 1 : config T
Step 2 : interface fa 0/0
Step 3 : IP address 192.168.1.1 255.255.255.0
Step 4 : No shut
Step 5 : Exit
Step 6 : Config T
Step 7 : interface fa 0/0.1
Step 8 : Encapsulation dot1q
Step 9 : ip address 192.168.20.7 255.255.255.0
Step 10 : No shut
Step 11 : Exit.

- Ping message from PC to another VLAN PC.

Ping - output.

Packet trace 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=2ms TTL=128
Reply from 192.168.20.3 bytes=32 time=5ms TTL=128
Reply from 192.168.20.3 bytes=32 time=6ms TTL=128
Ping statistics for 192.168.20.3
Packet sent=4, Received=3 lost=1 (25% loss)

Date __/__/__
Page

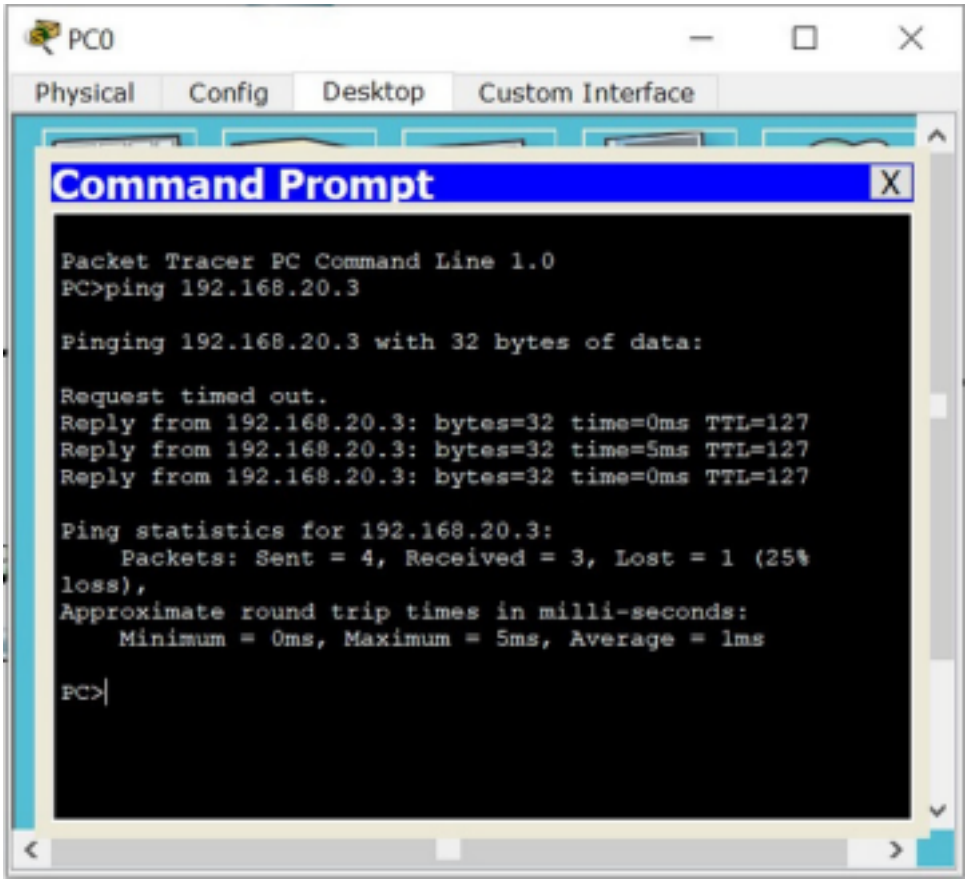
Observation :-

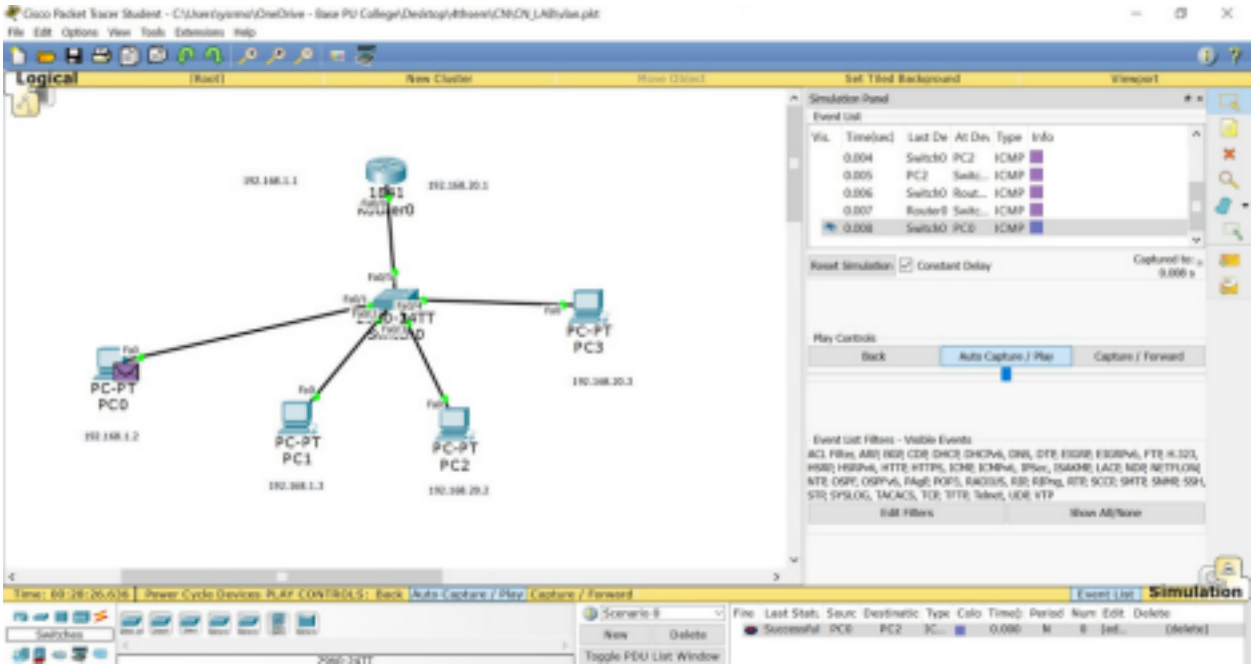
(i) VLAN → Virtual local area Network is any broadcast domain that is hosted and isolated in a computer network at the data link layer.

(ii) It is a virtualized connector that connects multiple devices and network nodes from different LANs to one logical network.

TOPOLOGY:

OUTPUT:





WEEK 10

Demonstrate the TTL/ Life of a Packet.

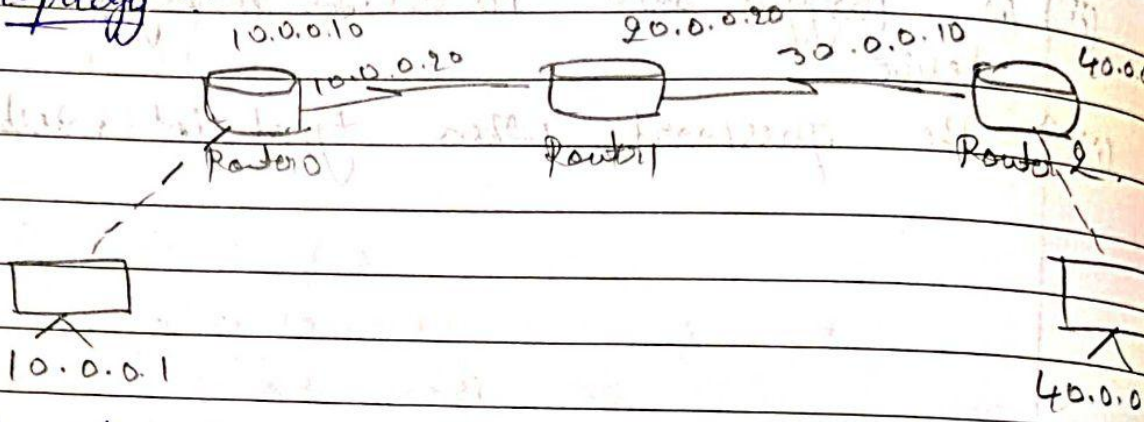
OBSERVATION:

Date / /
Page

LAB-12

AIM: Demonstrate the TTL / Life of a packet.

Topology :



Procedure :

(i) Creat a 2 pc's and 3 routers configuration in serial DTE b/w routers and copper cross over b/w router & PC.

(ii) Configure the IP address and gateway of PC and Configure the routers.

Router > enable
Router # config t
Router (config) # interface fastethernet 0/0
Router (config-if) # ip address 10.0.0.10 255.0.0.0
Router (config-if) # no shut
Router (config-if) # exit
Router (config) # ip route 30.0.0.0 255.0.0.0

Date __/__/__
Page _____

Router (config-if) # ip address 20.0.0.20 255.0.0.0
Router (config-if) # no shut
Router (config-if) # exit
Router (config) # interface serial 3/0
Router (config-if) # ip address 30.0.0.10 255.0.0.0
Router (config-if) # no shut
Router (config-if) # exit

Router (config) # ip route 10.0.0.0 255.0.0.0 20.0.0.10
Router (config) # ip route 40.0.0.0 255.0.0.0 30.0.0.20
Router (config) # exit
Router > enable (Router 2)

Router # config t
Router (config) # interface serial 2/0
Router (config-if) # ip address 20.0.0.20 255.0.0.0
Router (config-if) # no shut
Router (config-if) # exit
Router (config) # interface fastethernet 0/0
Router (config-if) # ip address 40.0.0.10 255.0.0.0
Router (config-if) # no shut
Router (config-if) # exit.
Router (config) # ip route 10.0.0.0 255.0.0.0 30.0.0.10
Router (config) # ip route 20.0.0.0 255.0.0.0 30.0.0.10

Date __/__/__
Page

Result :

PDU information at device : pc 0
outbound PDU details
TTL : 255
PDU information at Device : pc0
Inbound PDU details
TTL : 255
outbound pDU details
TTL : 255
PDU information at Device Router 1
Inbound PDU details.
TTL : 254
outbound PDU details
TTL : 253
PDU information at Device Router 2
Inbound PDU details
TTL : 253
outbound PDU details
TTL : 252
PDU information at device PC1
Inbound PDU details
TTL : 252

An example :- for Inbound details of Router 0

O/P

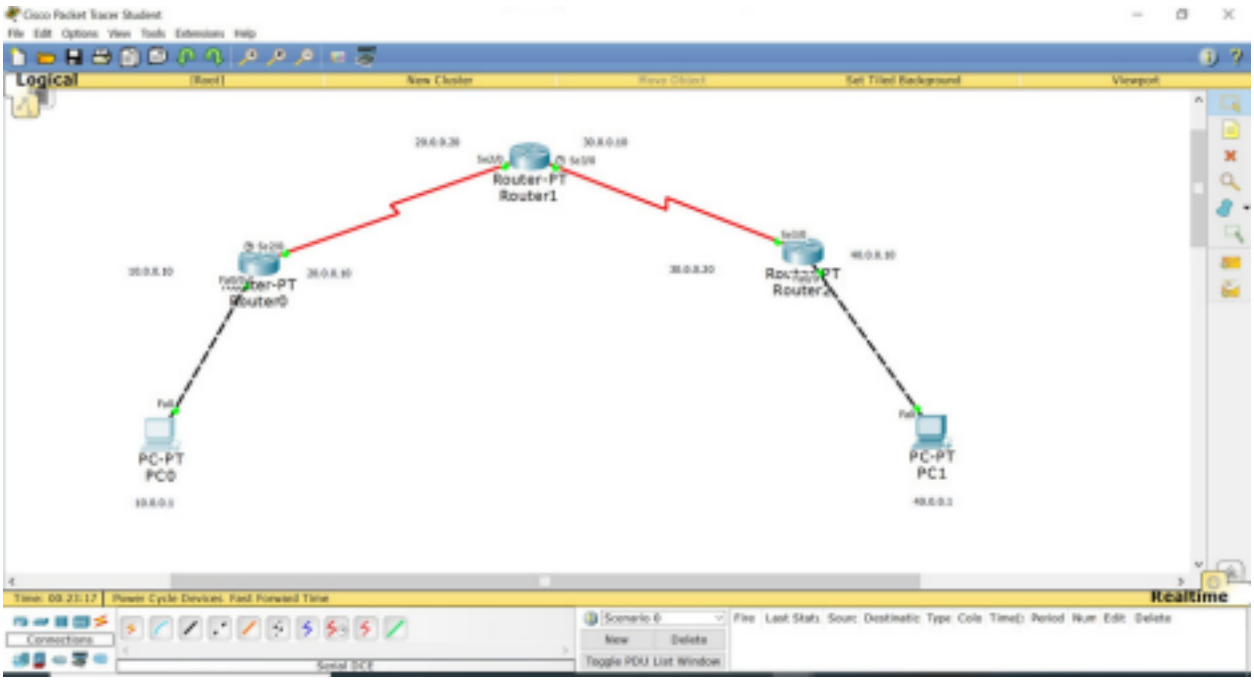
4	IHL	DSCP: 0x0	TL = 28
ID: 0xc		0x0	0x0

Date __/__/__
Page _____

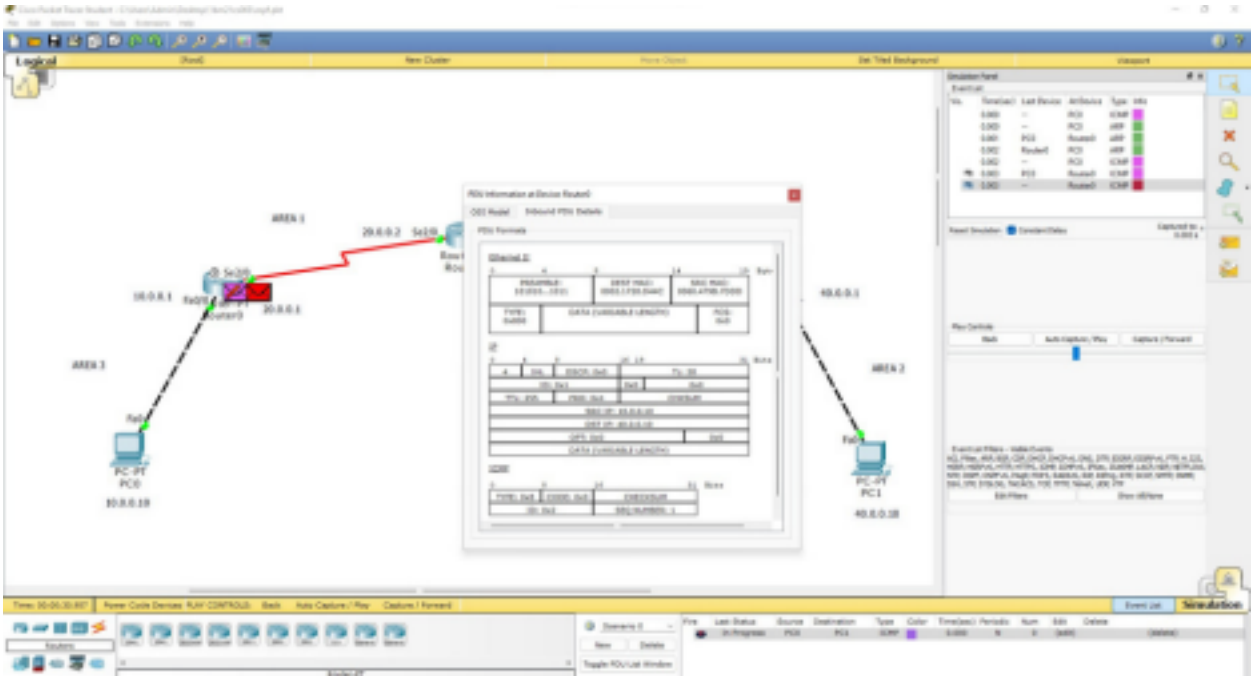
Observation

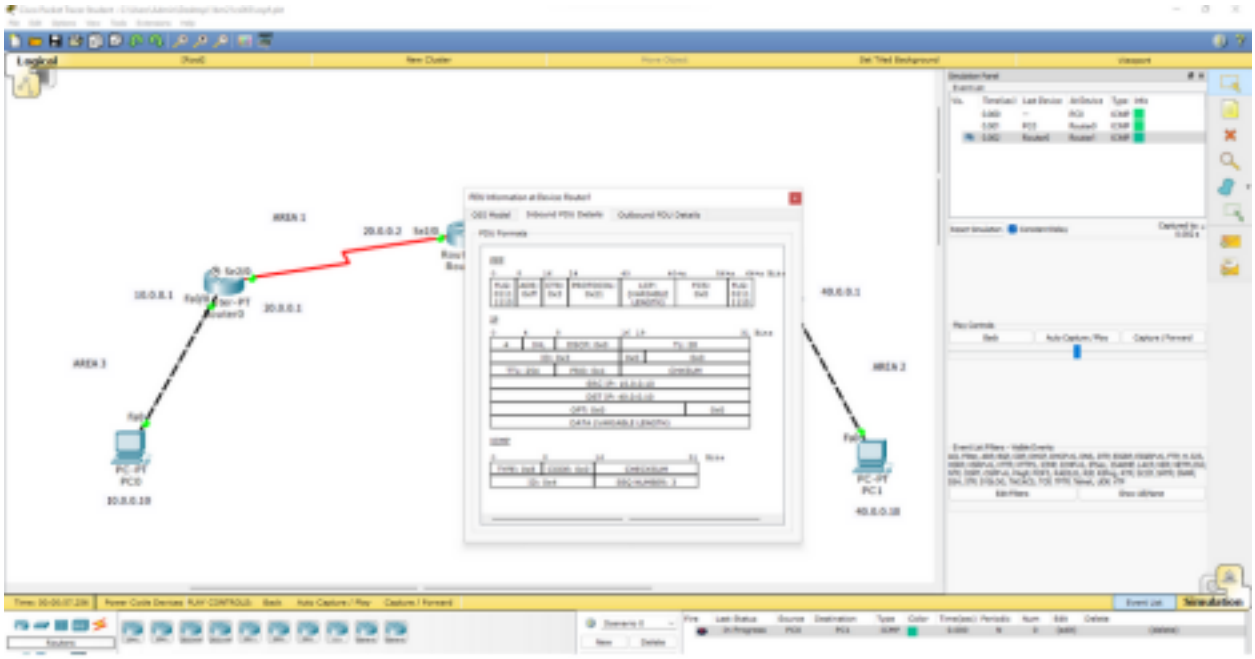
(1) The TTL is reduced by 1 in every router. Time to Live (TTL) is a mechanism which limits the lifeform or lifetime of data in a computer or network. It is a counter 255 is set as max TTL.

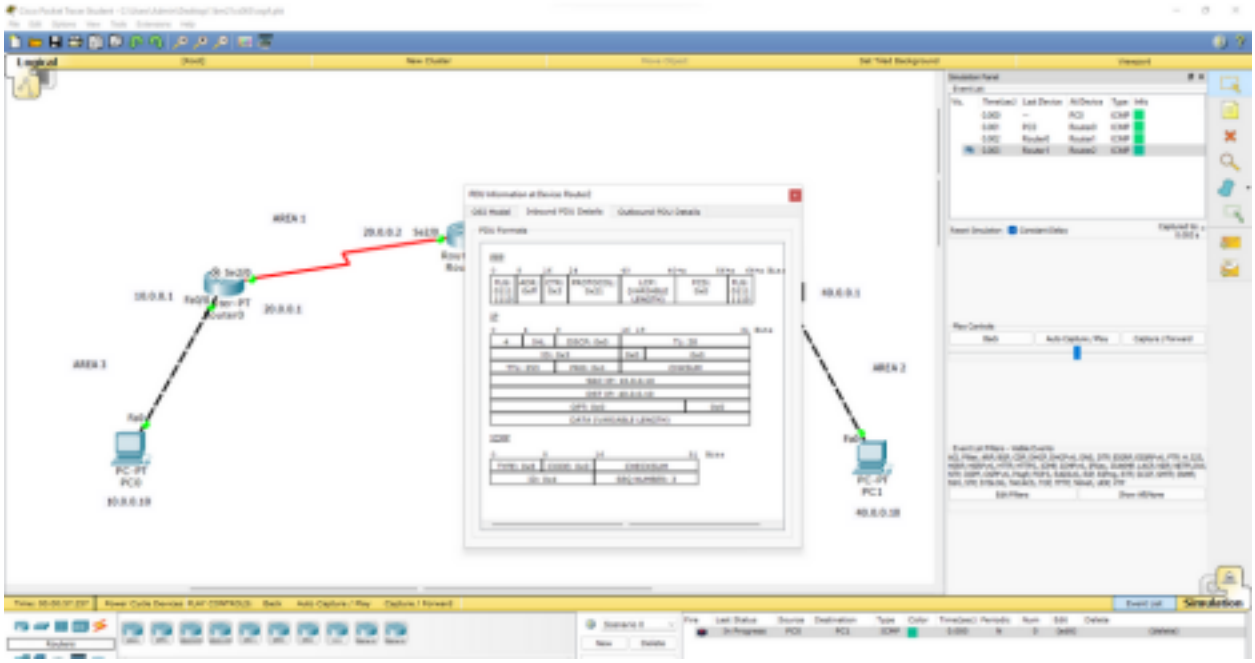
TOPOLOGY:

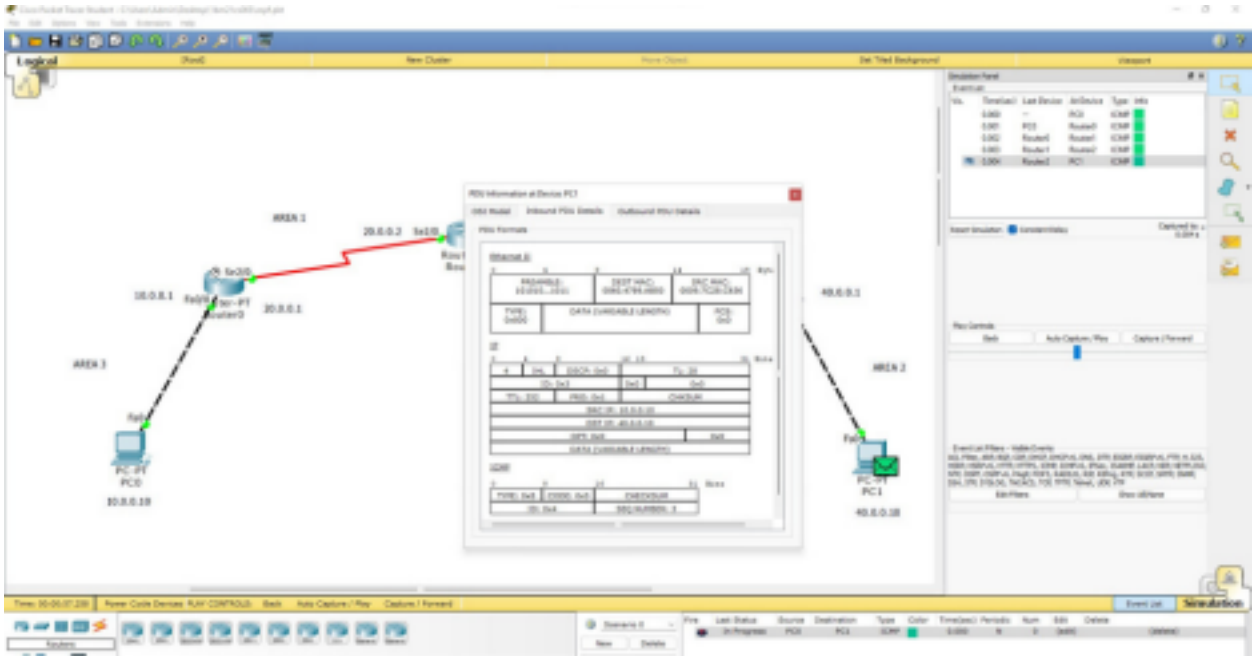


OUTPUT:




AREA 1
20.0.0.2
10.0.0.1
20.0.0.1
40.0.0.1
AREA 3
AREA 2
PC-PT
PC0
10.0.0.10
PC-PT
PC1
40.0.0.10


AREA 1
20.0.0.2
10.0.0.1
20.0.0.1
40.0.0.1
AREA 3
AREA 2
PC-PT
PC0
10.0.0.10
PC-PT
PC1
40.0.0.10


AREA 1
20.0.0.2
10.0.0.1
20.0.0.1
AREA 3
40.0.0.1
AREA 2
PC-PT
PC0
10.0.0.10
PC-PT
PC1
40.0.0.10

WEEK 11

To construct a WLAN and make the nodes communicate wirelessly

OBSERVATION:

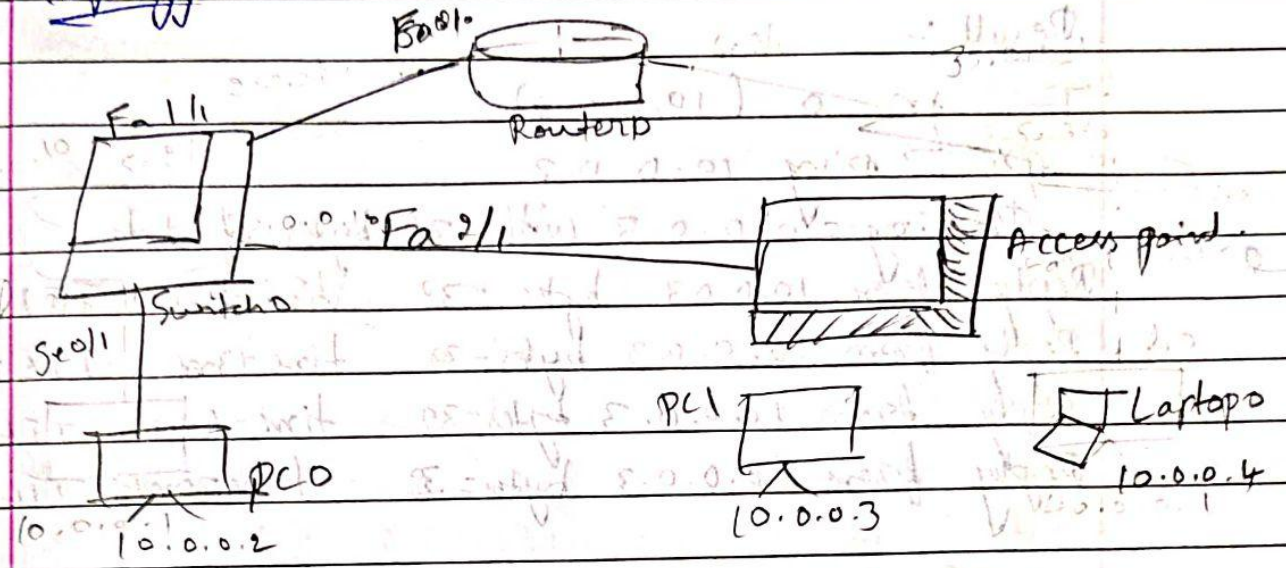
Date __/__/__
Page _____

LAB - 10

AIM:

To construct a WLAN and make the nodes communicate wirelessly.

Topology :-



procedure :-

(i) Construct above topology. In Access point PT connect that to router SRT the IP address of the PC connected with wire and configure router 1.

(ii) Configure access point1 → port1 → SSID Name-any-name (WLAN name). Select WEP and give 10 digit 1234567890 key.

(iii) To configure PC4 and laptop wirelessly, Switch off the device. Drags the existing PT-Host-NM-1 to the component listed in the LHS. Drag WMP300N wirelessly interface to the empty port and switch on the device.

Date __/__/__
Page

Router> enable
Router # config t
Router (config) # interface fastethernet 0/0
Router (config-if) # ip address 10.0.0.10 255.0.0.0
Router (config-if) # no shut

Result :-

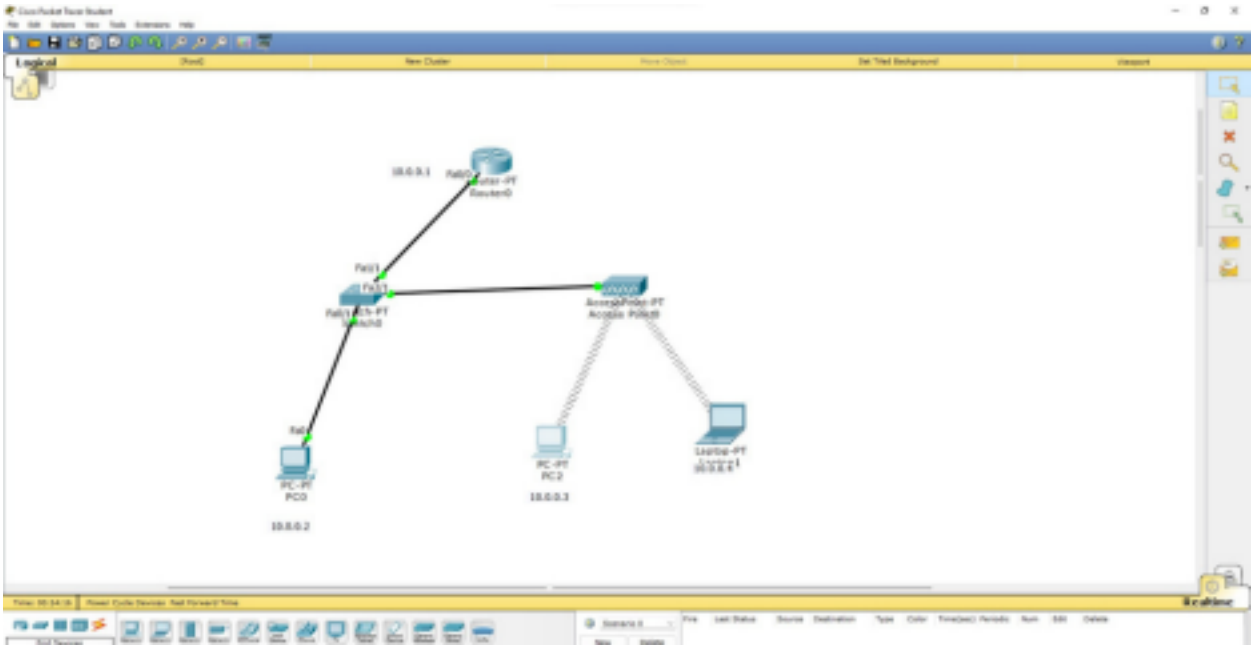
In pc 0 (10.0.0.2)
PC > ping 10.0.0.3
Pinging 10.0.0.3 with 32 bytes of data
Reply from 10.0.0.3 bytes = 32 time = 1ms TTP = 128
Reply from 10.0.0.3 bytes = 32 time = 13ms TTL = 128
Reply from 10.0.0.3 bytes = 32 time = 6ms TTL: 128
Reply from 10.0.0.3 bytes = 32 time = 0ms TTL: 128

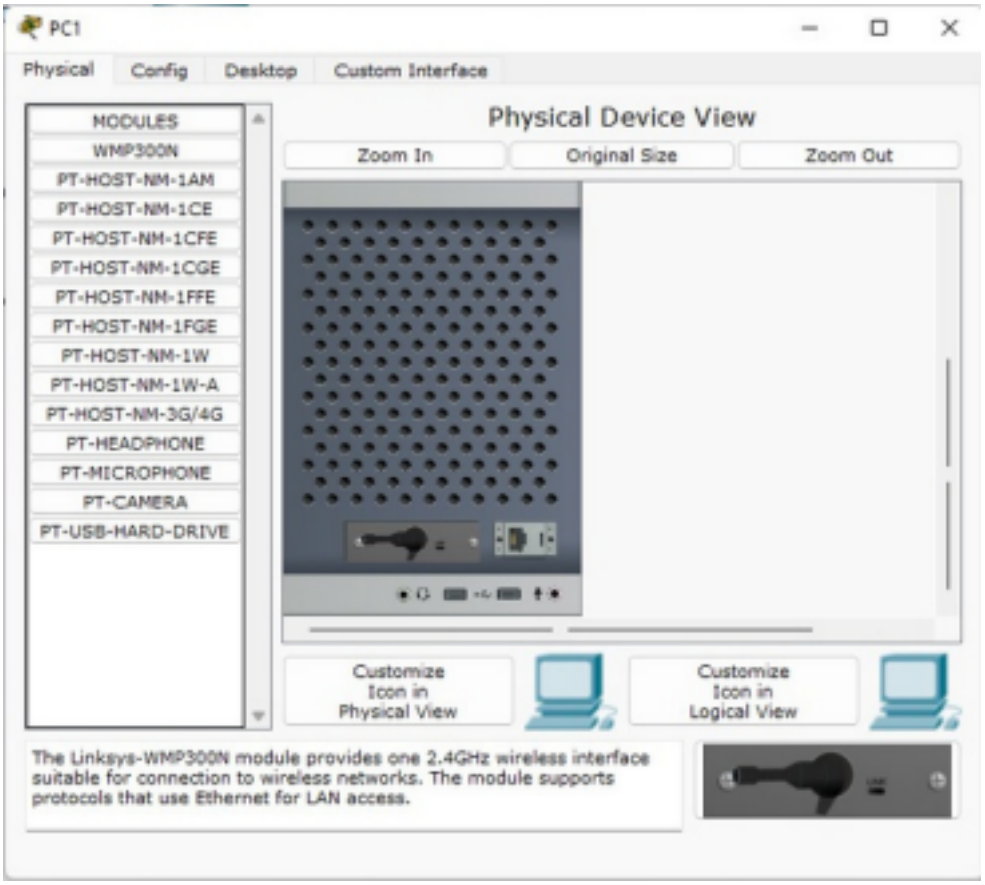
Ping statistics for 10.0.0.2
Packets sent = 4, Received = 4, lost = 0 (0% loss)
Approximate round trip times in milliseconds
Minimum = 6ms, Maximum = 21ms, Avg = 12ms

Observation

(i) wireless local area network WLAN is a group of interconnected computers or other devices that form a network based on a radio transmission rather than wire connections.

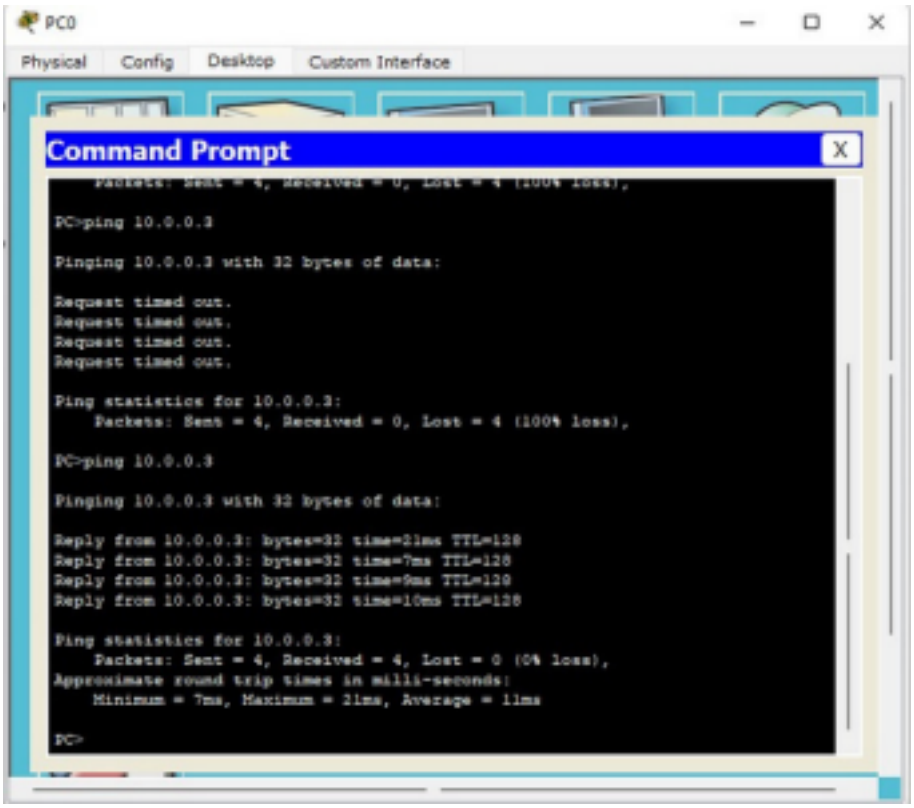
TOPOLOGY:




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
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:

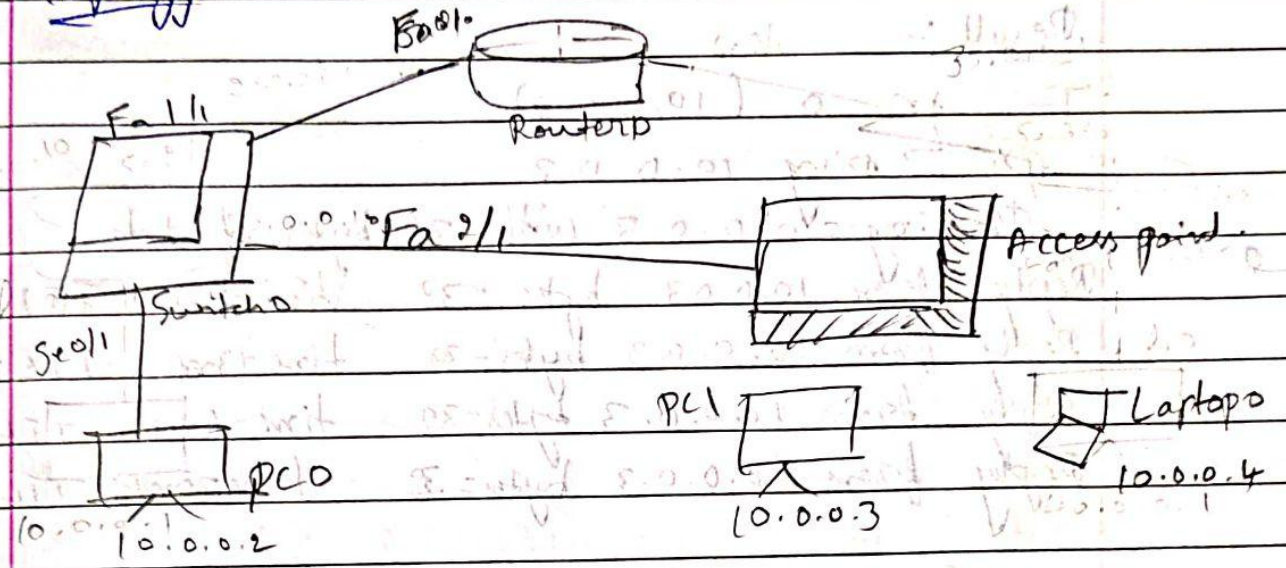
Date __/__/__
Page _____

LAB - 10

AIM:

To construct a WLAN and make the nodes communicate wirelessly.

Topology :-



procedure :-

(i) Construct above topology. In Access point PT connect that to router SRT the IP address of the PC connected with wire and configure router 1.

(ii) Configure access point1 → port1 → SSID Name-any-name (WLAN name). Select WEP and give 10 digit 1234567890 key.

(iii) To configure PC4 and laptop wirelessly, Switch off the device. Drags the existing PT-Host-NM-1 to the component listed in the LHS. Drag WMP300N wirelessly interface to the empty port and switch on the device.

Date __/__/__
Page

Router> enable
Router # config t
Router (config) # interface fastethernet 0/0
Router (config-if) # ip address 10.0.0.10 255.0.0.0
Router (config-if) # no shut

Result :-

In pc 0 (10.0.0.2)
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 = 1ms TTP = 128
Reply from 10.0.0.3 bytes = 32 time = 13ms TTL = 128
Reply from 10.0.0.3 bytes = 32 time = 6ms TTL: 128
Reply from 10.0.0.3 bytes = 32 time = 0ms TTL: 128

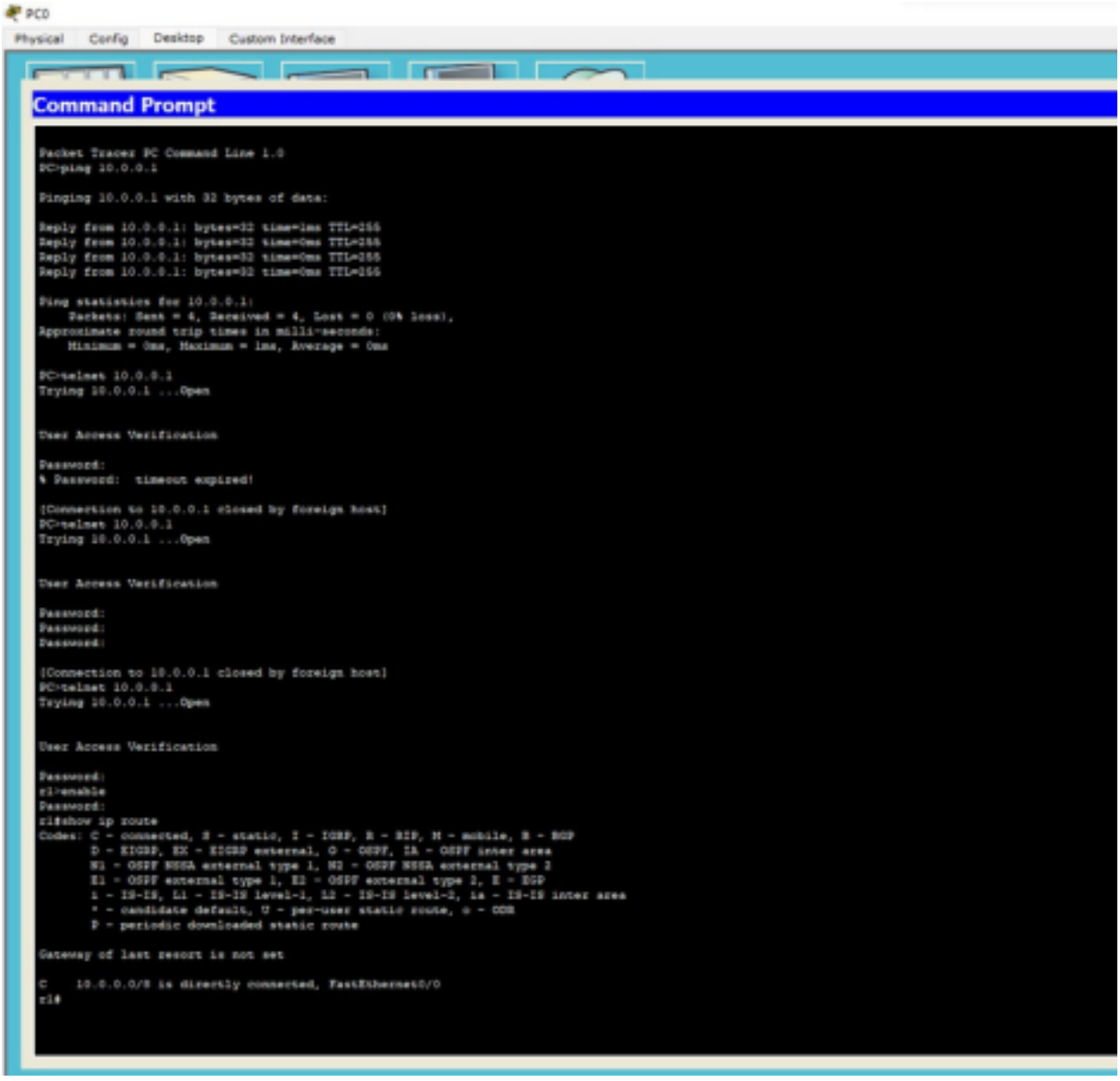
Ping statistics for 10.0.0.2
Packets sent = 4, Received = 4, lost = 0 (0% loss)
Approximate round trip times in milliseconds
Minimum = 6ms, Maximum = 21ms, Avg = 12ms

Observation

(i) wireless local area network WLAN is a group of interconnected computers or other devices that form a network based on a radio transmission rather than wire connections.

TOPOLOGY:

OUTPUT:



WEEK 13

Write a program for error detecting code using CRC

Date 17/08/23
Page

CRC Implementation

Write a program for error detecting code using CRC - CCITT

C-code :-

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

char data[30];
char check_value[30];
char poly[10];
int data_length, i, j;

Void XOR
{
  for(j=1; j<N; j++)
    checkvalue[j] = ((check value[j] == poly[j])?
                    '0' : '1');
}

Void receiver()
{
  printf("Enter the received data");
  Scanf("%s", data);
  printf("Data received: %s", data);
  crc();
```

Date __/__/__
Page _____

```
    printf("\n Error detected");
else
    printf("\n No error detected\n");
}
void crc()
{
    for(i=0; i<N; i++)
        check_value[i] = data[i];
    do {
        if(checkvalue[0] == '1')
            XOR();
        for(j=0; j<N-1; j++)
            check_value[j] = check_value[j+1];
        check_value[j] = data[j++];
    } while(i <= data_length + N + 1);
}

int main()
{
    printf("\n Enter data to be transmitted: ");
    scanf("%s", data);
    printf("\n Enter the divisor polynomial: ");
    scanf("%s", poly);
    data_length = strlen(data);
    for(i=data_length; i<data_length+N-1; i++)
        data[i] = '0';
    printf("\n Data padded with n-1 zeros: %s",
```

```
    printf("\n Final dataword to be sent: %s", data);
    receiver();
    return 0;
}
```

O/p :-

Enter data to be transmitted : 10101
Enter the divisor polynomial : 1011

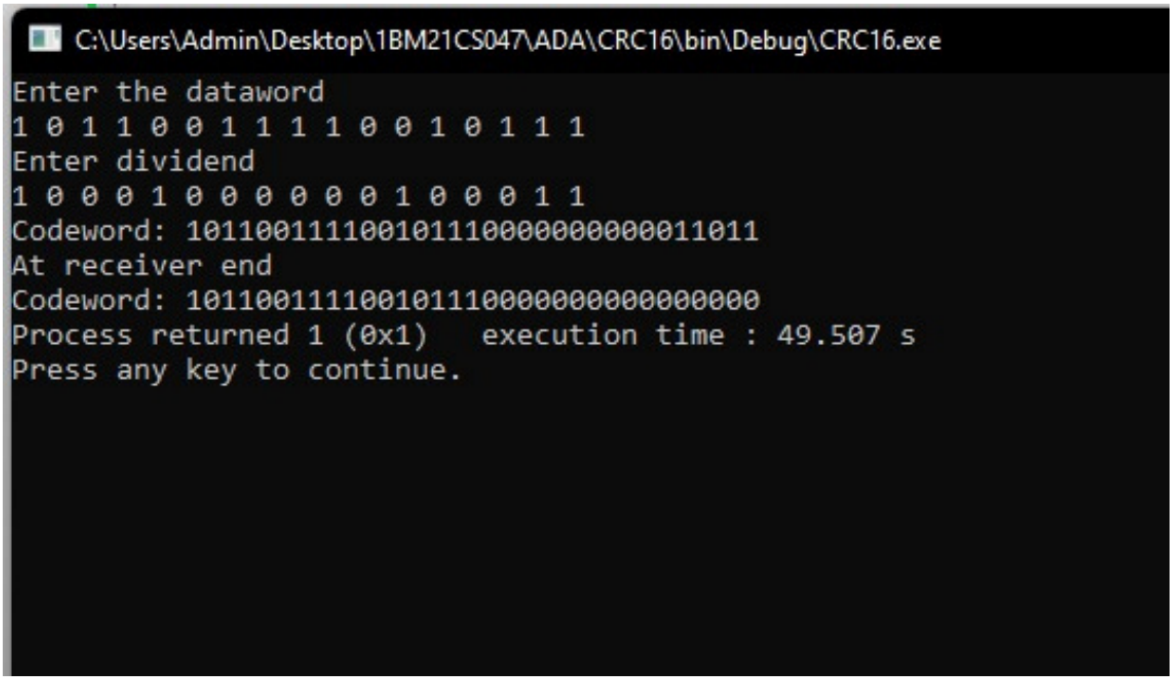
Data padded with n-1 zeros : 101010000
CRC value is : 001
Final codeword to be sent : 101010001

Enter the received data : 100010000
Error detected

Enter data to be transmitted : 10100
Enter the divisor polynomial : 1001

Data padded with n-1 zeros : 101000000
CRC value is : 001
Final codeword to be sent : 101000001

Enter the received data : 101000001
No error detected.


C:\Users\Admin\Desktop\1BM21CS047\ADA\CRC16\bin\Debug\CRC16.exe
Enter the dataword
1 0 1 1 0 0 1 1 1 1 0 0 1 0 1 1 1
Enter dividend
1 0 0 0 1 0 0 0 0 0 0 1 0 0 0 1 1
Codeword: 10110011110010111000000000011011
At receiver end
Codeword: 10110011110010111000000000000000
Process returned 1 (0x1)   execution time : 49.507 s
Press any key to continue.

WEEK 14

Write a program for congestion control using Leaky bucket algorithm

Date __/__/__
Page _____

Write a program for congestion control using Leaky Bucket algorithm.

```
#include <stdio.h>
int main()
{
int incoming, outgoing, buck_size, n, store = 0;
printf("Enter bucket size:");
scanf("%d", &buck_size);
printf("Enter outgoing size:");
scanf("%d", &outgoing);
printf("Enter no. of inputs:");
scanf("%d", &n);
while(n!=0)
{
printf("Enter the incoming bucket size:");
scanf("%d", &incoming);
if(incoming <= (buck_size - store))
{ store += incoming;
printf("Bucket buffer size %d out of %d\n",
store, buck_size);
}
else {
printf("Dropped %d no of packets\n",
```

Date / /
Page

Output :

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

NLP
21/9/2023

```
PS D:\VS Code> cd "d:\VS Code\OS\" ; if ($?) { gcc bucket.c -o bucket } ; if ($?) { .\bucket }
Enter Bucket size and outstream size
2000
100
Packet of 41 bytes accepted
Remaining bytes: 2000
If you want to stop input, press 0, otherwise, press 1
1
Packet of 467 bytes accepted
Remaining bytes: 1633
If you want to stop input, press 0, otherwise, press 1
1
Packet of 334 bytes accepted
Remaining bytes: 1399
If you want to stop input, press 0, otherwise, press 1
1
Packet of 500 bytes accepted
Remaining bytes: 999
If you want to stop input, press 0, otherwise, press 1
1
Packet of 169 bytes accepted
Remaining bytes: 930
If you want to stop input, press 0, otherwise, press 1
1
Packet of 724 bytes accepted
Remaining bytes: 306
If you want to stop input, press 0, otherwise, press 1
1
Packet of 478 bytes is discarded
Remaining bytes: 406
If you want to stop input, press 0, otherwise, press 1
1
Packet of 358 bytes accepted
Remaining bytes: 148
If you want to stop input, press 0, otherwise, press 1
1
Packet of 962 bytes is discarded
Remaining bytes: 248
If you want to stop input, press 0, otherwise, press 1
0
Remaining bytes: 348
Remaining bytes: 448
Remaining bytes: 548
Remaining bytes: 648
Remaining bytes: 748
```

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:

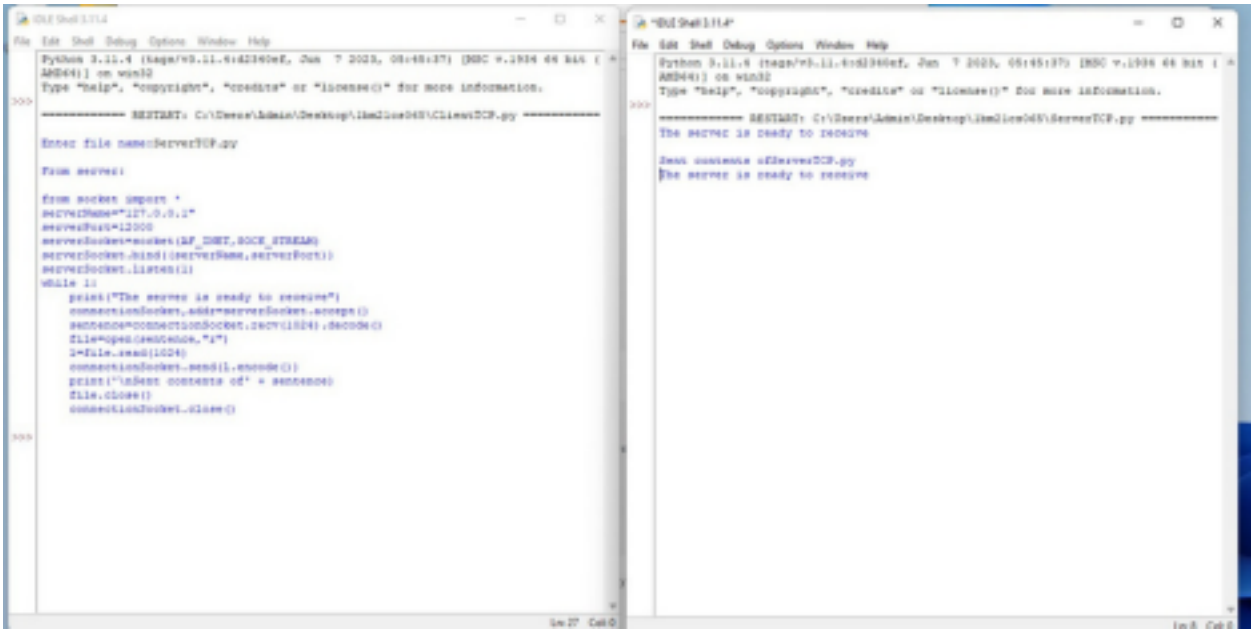
ClientTCP.py

```
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:

Date 25/8/23
Page

* 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.

Client Tcp.py

```
from Socket import *
ServerName = '127.0.0.1'
Serverport = 12000
ClientSocket = Socket (AF_INET, SOCK_STREAM)
ClientSocket.connect (ServerName, Serverport)
Sentence = input ("\nEnter file name:")

ClientSocket.send (Sentence.encode())
filecontents = clientSocket.recv(1024).decode()
print ("\nFromServer:\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:
```

```
file=open(sentence,"r")
l=file.read(1024)
connectionSocket.send(l.encode())
print("In Sent contents of"+Sentence)
        file.close()
        (connectionSocket.close()
```

Output

Server is ready to recieve

In client

Enter file name : Server TCP.py

final server details will come

---

* 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.

Client UDP.py

```
from Socket import *
ServerName = "127.0.0.1"
Serverport = 12000
clientSocket = Socket(AF_INET, SOCK_DGRAM
```

WEEK 16

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:

ClientUDP.py

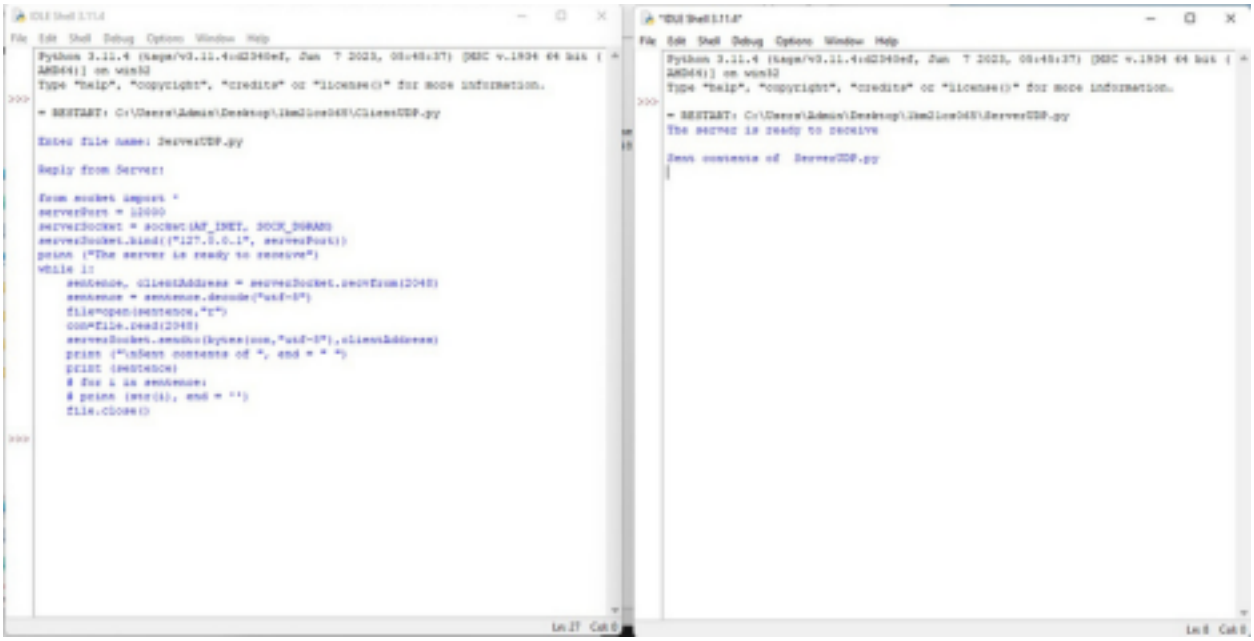
```
from socket import *
serverName = “127.0.0.1”
serverPort = 12000
clientSocket = socket(AF_INET, SOCK_DGRAM)
sentence = input(“\nEnter file name: “)
clientSocket.sendto(bytes(sentence,”utf-8”),(serverName,
serverPort)) filecontents,serverAddress =
clientSocket.recvfrom(2048) print (“\nReply from Server:\n”)
print (filecontents.decode(“utf-8”))
# for i in filecontents:
# print(str(i), end = “ ”)
clientSocket.close()
clientSocket.close()
```

ServerUDP.py

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

```
print (sentence)
# for i in sentence:
# print (str(i), end = " ")
file.close()
```

OUTPUT:



OBSERVATION:

```
file = open (sentence, "r")
d = file.read (1024)
connectionSocket.send (d.encode())
print ("\n Sent contents of' + Sentence)
        file.close()
        connectionSocket.close()
```

Output

Server is ready to recieve

In client

Enter file name : Server Tcp.py

found server details will come

---

* 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.

Client Udp.py

```
from Socket import *
ServerName = "127.0.0.1"
Serverport = 12000
```

Date __/__/__
Page _____

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

fileContents, ServerAddress = clientSocket.recvfrom(2048)
print("\n Reply from server:\n")
print(fileContents.decode("utf-8"))
# for i in fileContents:
# print(str(i), end="")
clientSocket.close()
clientSocket.close()

Server UDP.py

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

ServerSocket.sendto(bytes(con, "utf-8"), clientAddress)
print('\n Sent contents of', end='')
print(sentence)

Date
Page

output

The server is ready to recieve
Send content of ServerUDP.py
The server is ready to recieve.
Enter file name : ServerUDP.py
Reply from Server: Whole ServerUDP contents.

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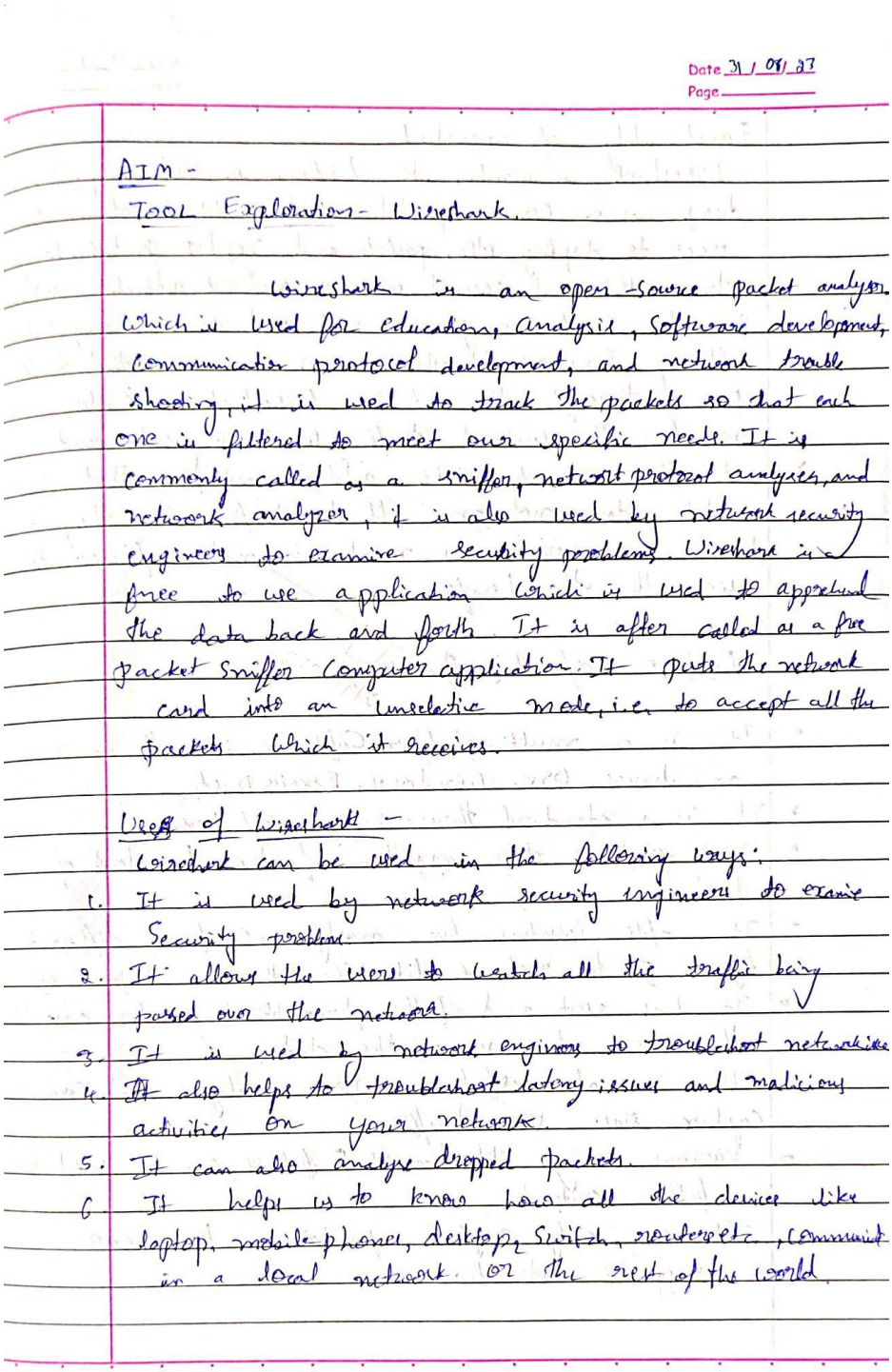
2/9/2023

WEEK 17

Tool Exploration -

Wireshark OBSERVATION:



Date 31/08/23
Page

AIM -
Tool Exploration - Wireshark.

Wireshark is an open-source packet analyser which is used for education, analysis, software development, communication protocol development, and network trouble shooting, it is used to track the packets so that each one is filtered to meet our specific needs. It is commonly called as a sniffer, network protocol analyser, and network analyzer, it is also used by network security engineers to examine security problems. Wireshark is a free to use application which is used to apprehend the data back and forth. It is often called as a free packet Sniffer Computer application. It puts the network card into an unselective mode, i.e. to accept all the packets which it receives.

Uses of Wireshark -
Wireshark can be used in the following ways:
1. It is used by network security engineers to examine Security problems.
2. It allows the users to watch all the traffic being passed over the network.
3. It is used by network engineers to troubleshoot networking issues.
4. It also helps to troubleshoot latency issues and malicious activities on your network.
5. It can also analyze dropped packets.
6. It helps us to know how all the devices like laptop, mobile phones, desktops, Switch, routers etc., communicate in a local network or the rest of the world.

Date __/__/__
Page

Functionality of wireshark

Wireshark is similar to tcpdump in networking. Tcp dump is a common packet analyzer which allows the user to display other packets and TCP/IP packets being transmitted and received over a network attached to the computer. It has a graphic end and some sorting and filtering functions. Wireshark users can see the traffic passing through the network. Wireshark can also monitor the unicast traffic which is not sent to the networks MAC address interface. But, the switch does not pass all the traffic to the port. Hence the promiscuous mode is not sufficient to see all the traffic.

Features of Wireshark

2/9/2023

- It is a multi-platform software, i.e., it can run on linux, OSX, windows, FreeBSD, etc.
- It is a standard three-pane packet browser.
- It performs deep inspection of the hundreds of protocols.
- It often involves live analysis i.e, from different types of the network like the Ethernet, loopback etc.
- It has sort and filter options which makes easy to the user to view the data.
- It is also useful in VOIP analysis and can capture raw USB traffic.
- Various settings, like timers & filters, can be used to filter output.
- It can only capture packet on the PCAP supported networks.