VISVESVARAYATECHNOLOGICALUNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB RECORD

Computer Network Lab (23CS5PCCON)

Submitted by

DEEPTHI B E (1BM23CS405)

in partial fulfillment for the award of the degree of

BACHELOROFENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

B.M.S. COLLEGE OF ENGINEERING

(Autonomous Institution under VTU)

BENGALURU-560019

Academic Year 2024-25 (odd)

B.M.S. College of Engineering

Bull Temple Road, Bangalore 560019

(Affiliated To Visvesvaraya Technological University, Belgaum)

Department of Computer Science and Engineering

CERTIFICATE

This is to certify that the Lab work entitled " Computer Network (23CS5PCCON)" carried out by **DEEPTHI B E (1BM23CS405),** who is a bonafide student of **B.M.S. College of Engineering.** It is in partial fulfilment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum. The Lab report has been approved as it satisfies the academic requirements of the above-mentioned subject and the work prescribed for the said degree.

Spoorthi D M Assistant Professor Department of CSE, BMSCE	Dr. Kavitha Sooda Professor & HOD Department of CSE, BMSCE

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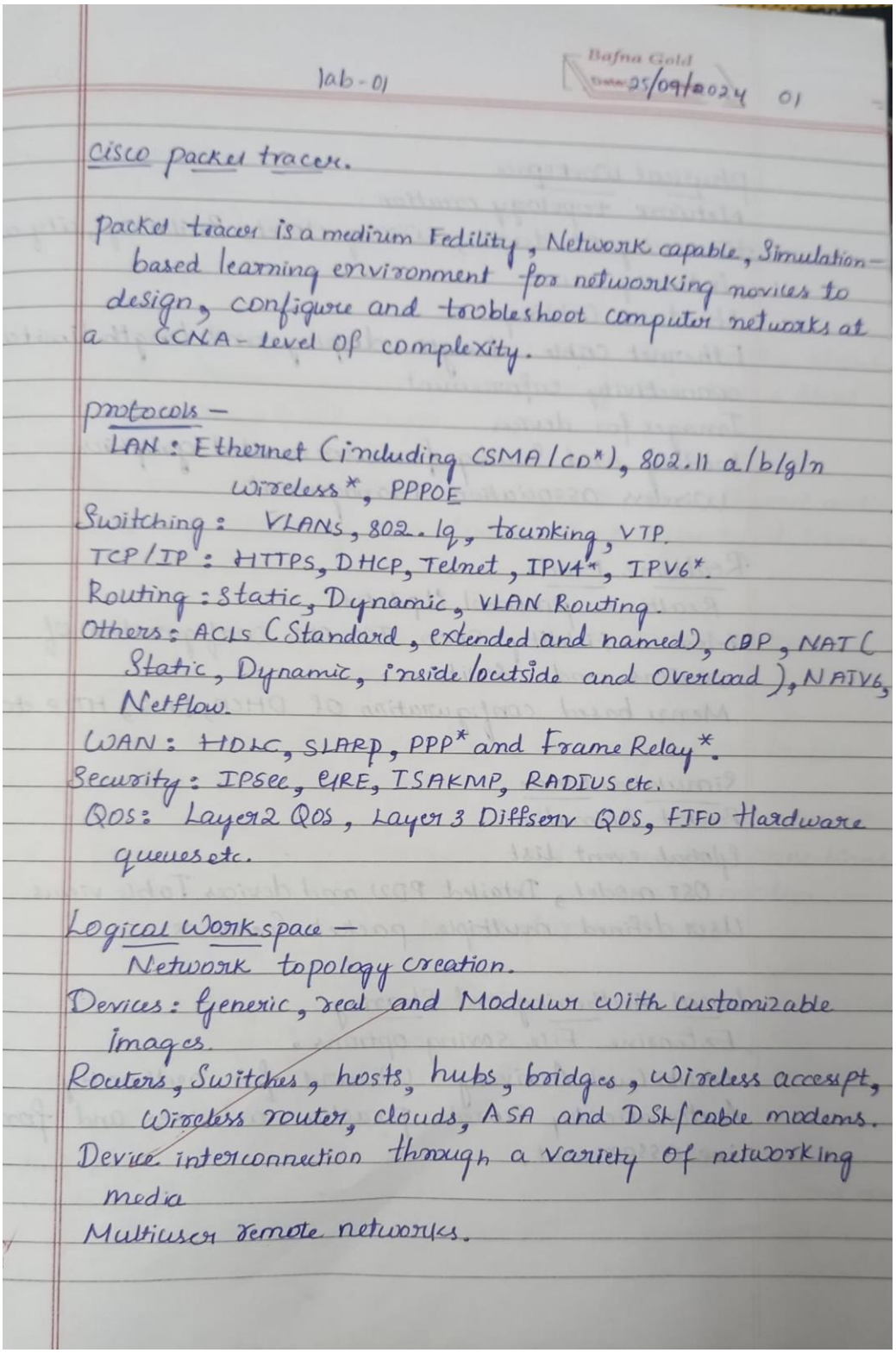
16	18-12-24	Using TCP/IP sockets, write a client-server program to make the client send the file name and the server to send back the contents of the requested file if present.	68-69
17	18-12-24	Using UDP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.	70-71

5|9|2024 Week-1 (Interface Overview,PC to Server & Experiment 1)

Observation Book:



lab-01

Bafna Gold
Date 25/09/2024 01

Cisco packet tracer.

Packet tracer is a medium Fedility, Network capable, Simulation-based learning environment for networking novices to design, configure and troubleshoot computer networks at a CCNA-level of complexity.

protocols –
LAN: Ethernet (including CSMA/CD*), 802.11 a/b/g/n wireless*, PPPOE
Switching: VLANs, 802.1q, trunking, VTP.
TCP/IP: HTTPS, DHCP, Telnet, IPV4*, IPV6*.
Routing: Static, Dynamic, VLAN Routing.
Others: ACLs (Standard, extended and named), CDP, NAT (Static, Dynamic, inside/outside and Overload), NATV6, Netflow.
WAN: HDLC, SLARP, PPP* and Frame Relay*.
Security: IPSec, GRE, ISAKMP, RADIUS etc.
QOS: Layer2 QOS, Layer 3 Diffserv QOS, FIFO Hardware queues etc.

Logical Workspace –
Network topology creation.
Devices: Generic, real and Modular with customizable images.
Routers, Switches, hosts, hubs, bridges, Wireless accesspt, Wireless router, clouds, ASA and DSL/cable modems.
Device interconnection through a variety of networking media
Multiuser remote networks.

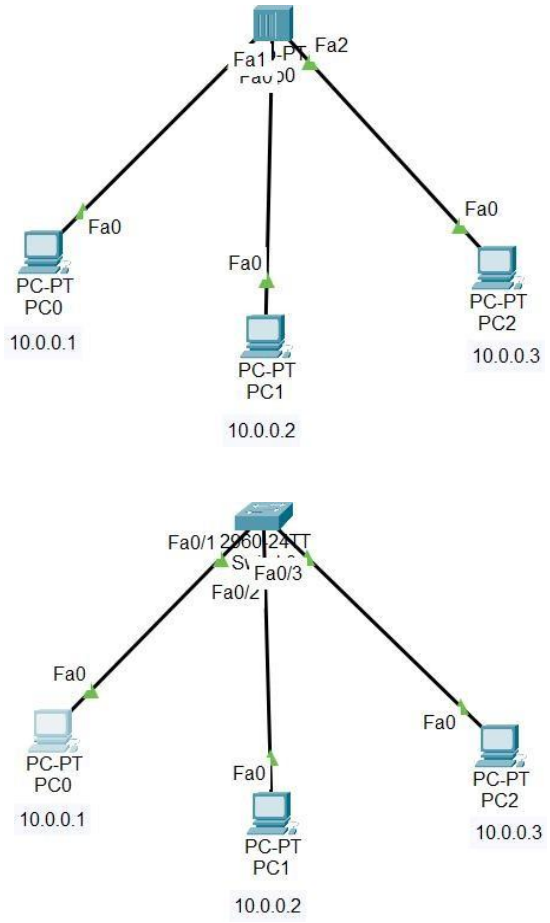
Physical Workspace
Network topology creation.
Hierarchy of device, Wiring closet, Building, city and intercity views.
Structure Cabling:
Ethernet cable. length display and length limitation connectivity enforcement.
Images for devices
loading and Scaling for user created graphics.
Wireless association Management.

Realtime Mode
Realtime protocol Updates.
Medium Fidelity Cisco IOS CLI configuration of routers and Switches.
Menu based configuration of DHCP, DNS, HTTP etc.

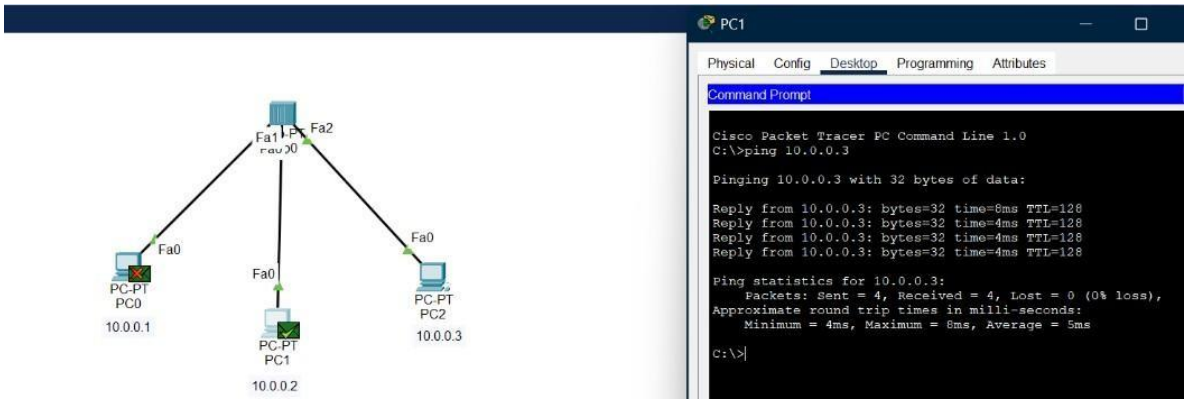
Simulation Mode
Packet Animation.
Global event list
OSI model, Detailed PDU and devices Table views.
User defined multiple packet Scenarios.

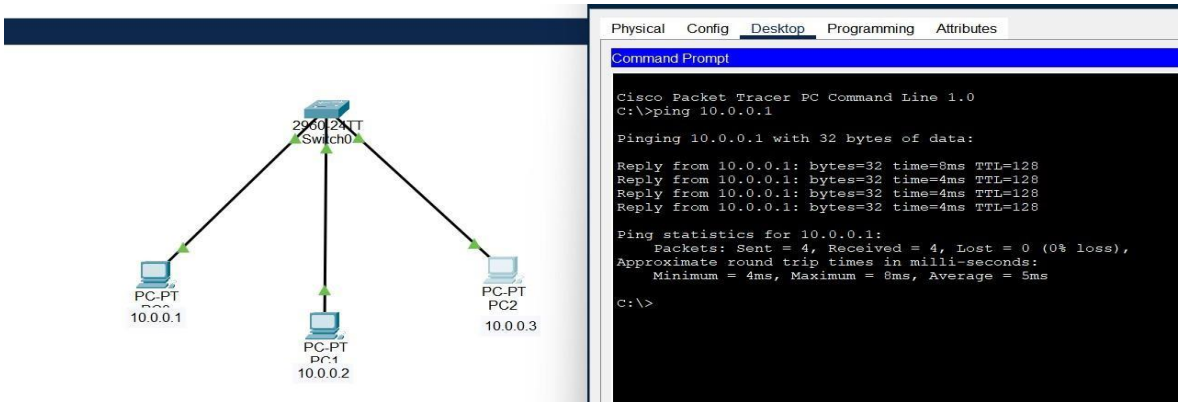
Local Authoring and Sharing
Extensive File saving options.
Multi Level Activity Wizard for authority
Automatically Scored practice activities and formative assessment.

Topology:


Fa2
Fa0
PC-PT
PC0
10.0.0.1
Fa0
PC-PT
PC1
10.0.0.2
Fa0
PC-PT
PC2
10.0.0.3
Fa0/3
Fa0
PC-PT
PC0
10.0.0.1
Fa0
PC-PT
PC1
10.0.0.2
Fa0
PC-PT
PC2
10.0.0.3

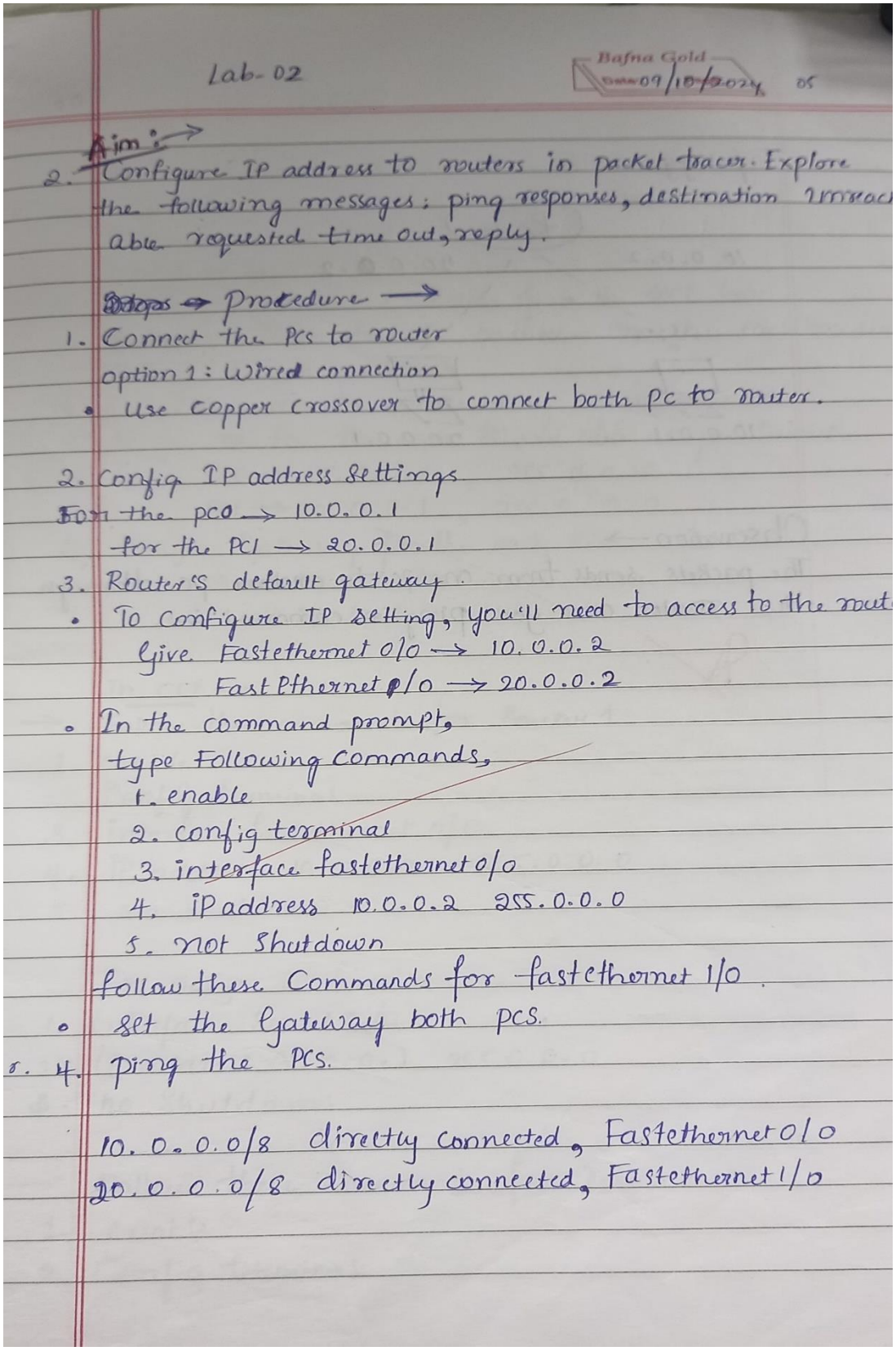
Output:


PC1
Physical
Config
Desktop
Programming
Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.3
Pinging 10.0.0.3 with 32 bytes of data:
Reply from 10.0.0.3: bytes=32 time=8ms TTL=128
Reply from 10.0.0.3: bytes=32 time=4ms TTL=128
Reply from 10.0.0.3: bytes=32 time=4ms TTL=128
Reply from 10.0.0.3: bytes=32 time=4ms 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 = 4ms, Maximum = 8ms, Average = 5ms
C:\>
Fa0
Fa2
Fa0
Fa0
PC-PT
PC0
10.0.0.1
PC-PT
PC1
10.0.0.2
PC-PT
PC2
10.0.0.3


Physical
Config
Desktop
Programming
Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.1
Pinging 10.0.0.1 with 32 bytes of data:
Reply from 10.0.0.1: bytes=32 time=8ms TTL=128
Reply from 10.0.0.1: bytes=32 time=4ms TTL=128
Reply from 10.0.0.1: bytes=32 time=4ms TTL=128
Reply from 10.0.0.1: bytes=32 time=4ms TTL=128
Ping statistics for 10.0.0.1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 4ms, Maximum = 8ms, Average = 5ms
C:\>
2960-24TT
Switch0
PC-PT
10.0.0.1
PC-PT
10.0.0.2
PC-PT
PC2
10.0.0.3

9|10|2024 Week-2(Experiment 2a)

Observation Book:



Lab-02

Bafna Gold 09/10/2024

Aim:→

2. Configure IP address to routers in packet tracer. Explore the following messages: ping responses, destination unreachable requested time out, reply.

Procedure →

1. Connect the PCs to router
   option 1: Wired connection
   - Use copper crossover to connect both pc to router.

2. Config IP address settings
   For the pc0 → 10.0.0.1
   for the PC1 → 20.0.0.1

3. Router's default gateway
   - To configure IP setting, you'll need to access to the rout
     Give Fastethernet 0/0 → 10.0.0.2
     FastEthernet 1/0 → 20.0.0.2
   - In the command prompt,
     type Following commands,
     1. enable
     2. config terminal
     3. interface fastethernet 0/0
     4. ip address 10.0.0.2 255.0.0.0
     5. not shutdown
     follow these Commands for fastethernet 1/0.
   - set the gateway both PCs.
4. ping the PCs.

10.0.0.0/8 directly connected, Fastethernet 0/0
20.0.0.0/8 directly connected, Fastethernet 1/0

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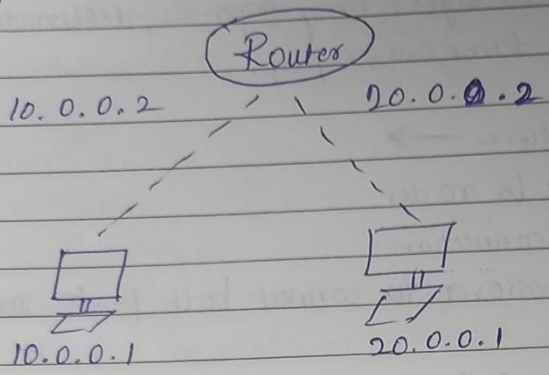
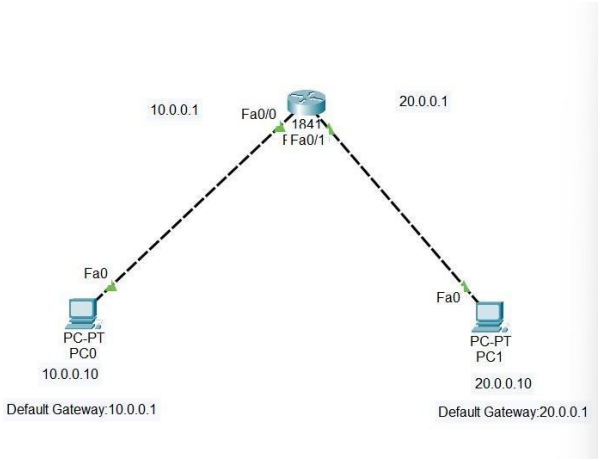
Topology →



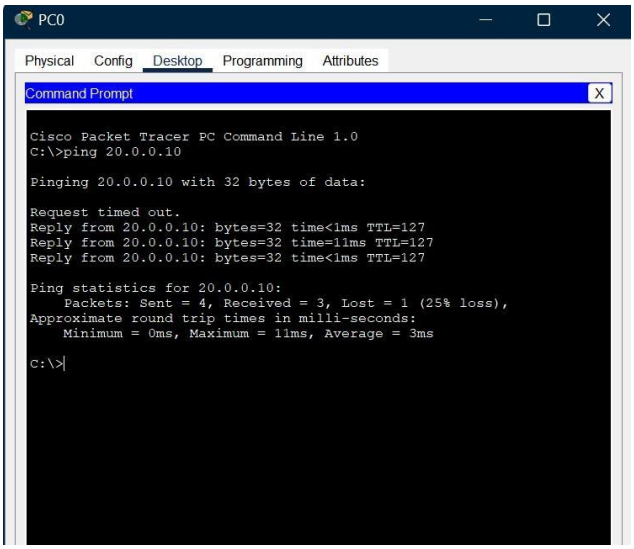
Observation →

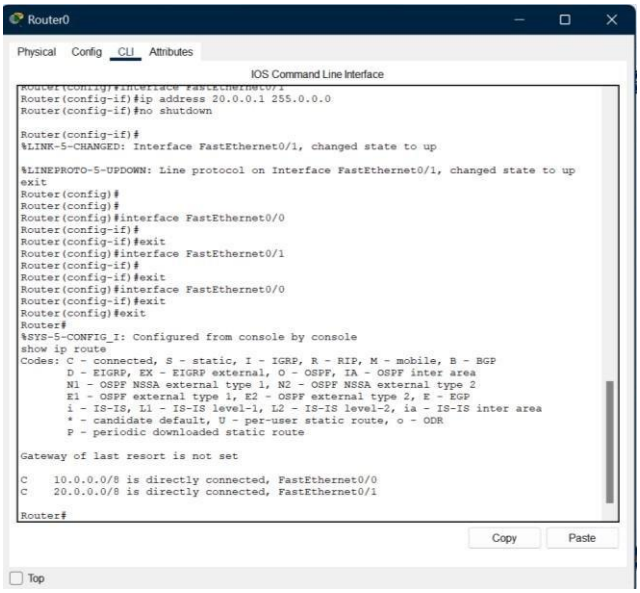
The packets sends from one pc to another pc through the router once you ping in command line.

Topology:

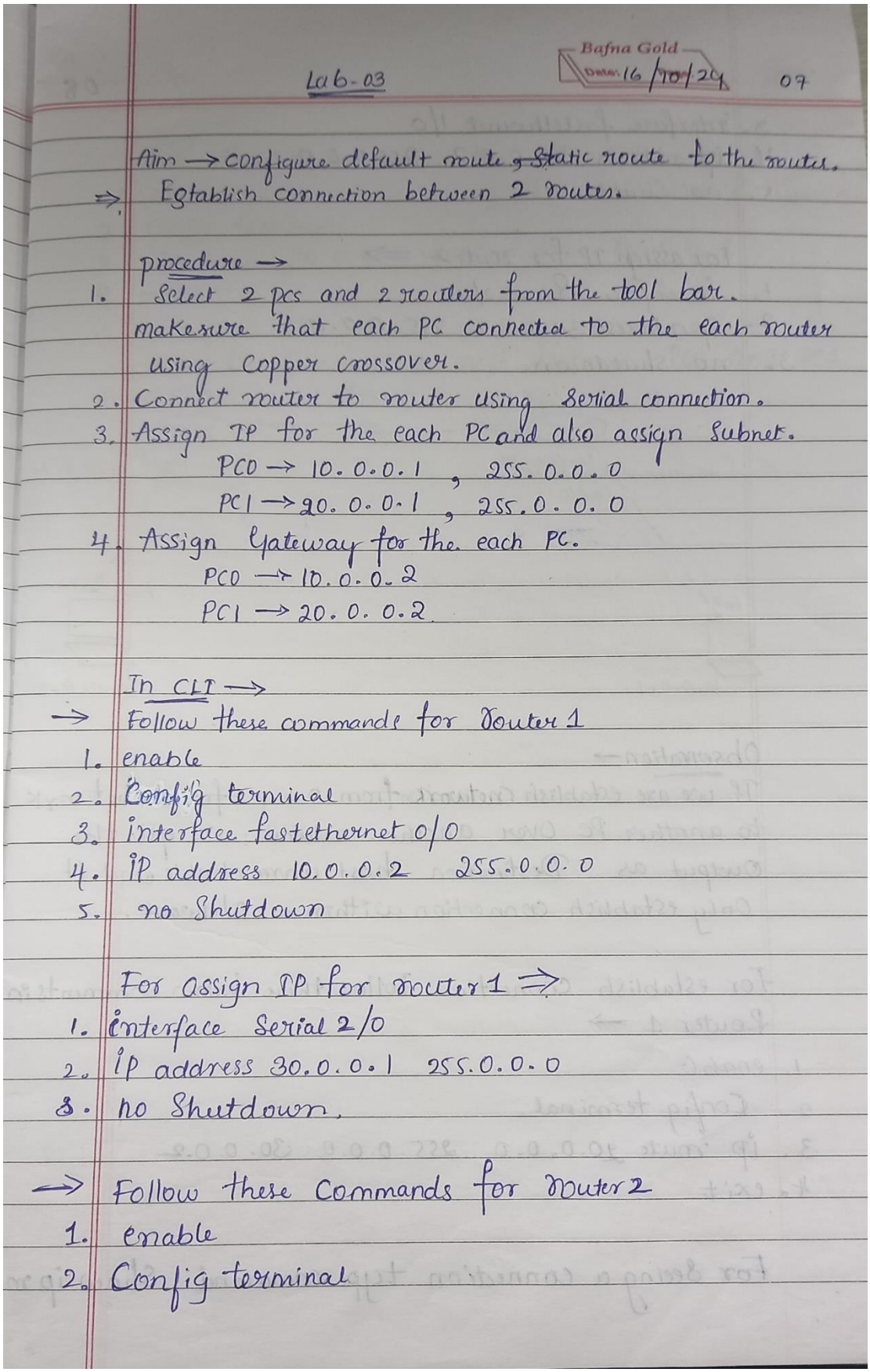


Output:





Observation Book:



Lab-03

Bafna Gold Date: 16/10/24 07

Aim → configure default route, Static route to the router.

⇒ Establish connection between 2 routers.

procedure →

1. Select 2 pcs and 2 routers from the tool bar. make sure that each PC connected to the each router using Copper crossover.
2. Connect router to router using Serial connection.
3. Assign IP for the each PC and also assign Subnet.
   PC0 → 10.0.0.1 , 255.0.0.0
   PC1 → 20.0.0.1 , 255.0.0.0
4. Assign Gateway for the each PC.
   PC0 → 10.0.0.2
   PC1 → 20.0.0.2

In CLI →

→ Follow these commands for Router 1

1. enable
2. Config terminal
3. interface fastethernet 0/0
4. IP address 10.0.0.2 255.0.0.0
5. no Shutdown

For assign IP for router 1 ⇒

1. interface Serial 2/0
2. ip address 30.0.0.1 255.0.0.0
3. no Shutdown.

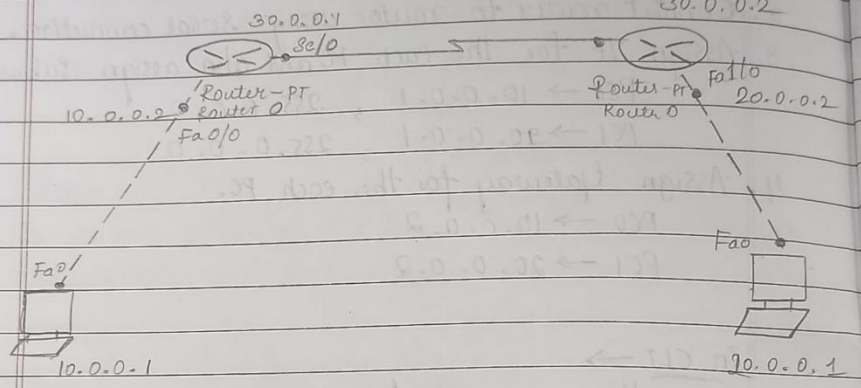
→ Follow these Commands for Router 2

1. enable
2. Config terminal

3. Interface fastethernet 1/0
4. ip address 20.0.0.2 255.0.0.0
5. no Shutdown

For assign IP for route 2 ⟹

1. Interface Serial 2/0
2. ip address 30.0.0.2 255.0.0.0
3. no shutdown.



Observation →
If we are establish connection from one pc from a network to another PC over another network. we get the output as Destination host unreachable and if only establish connection within a Network.

For establish connection Follow these below comments in Router 1 →

1. enable
2. Config terminal
3. ip route 20.0.0.0 255.0.0.0 30.0.0.2
4. exit

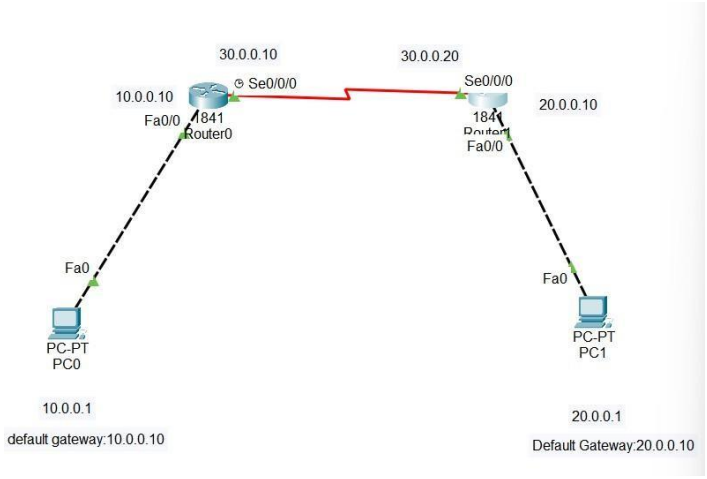
For Seeing a connection type command show ip route

For establish connection to router 2 →

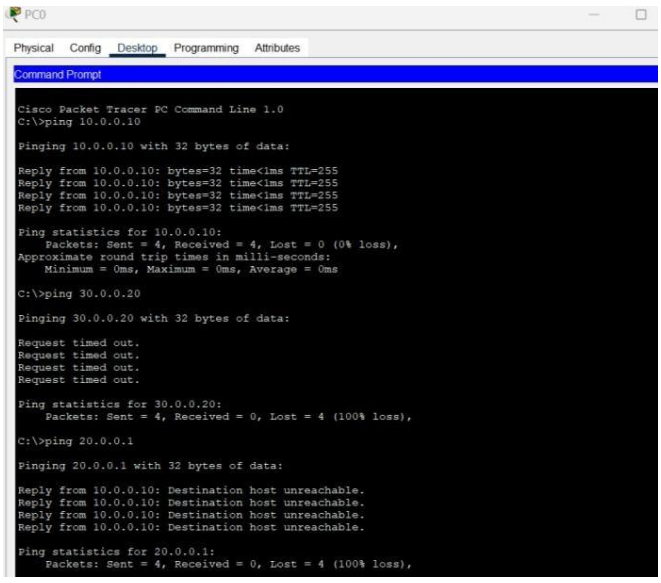
1. enable
2. Config terminal
3. ip route 20.0.0.0 255.0.0.0 30.0.0.1
4. exit.

Now the Connection will between PC0 and PC1 over a different network.

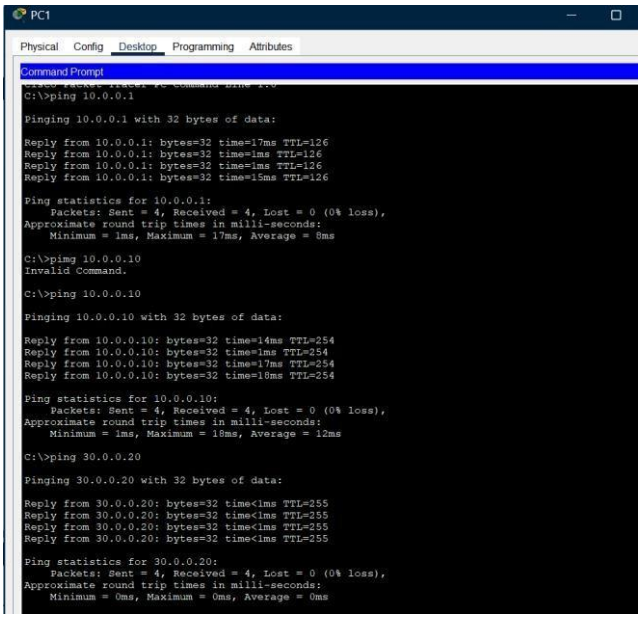
opology:



Output:(Before Static Routing)



(After Static Routing)



10 23/10/2024

Aim → Configure default route, Static route to the router.

procedure →

1. Select 2 pcs and 3 Routers from the tools (generic). Connect 3 routers each other using Serial DCE. connect one pc to router 0 and another PC to router 1 Using copper crossover wire.
2. Config IP address for the PCs
   PC0 = 10.0.0.10
   PC1 = 40.0.0.10
3. Set the Gateway for the Both PCs.
   PC0 = 10.0.0.1
   PC1 = 40.0.0.1

To establish connection between Pc0 and router 0
Follow these Commands in router0 CLI ⇒

1. enable
2. Config terminal
3. interface fastEthernet 0/0.
4. ip address 10.0.0.1 255.0.0.0.
5. no shutdown.

To establish Connection between router 0 and router 1
Follow these Commands ⇒
In router 0 CLI,

1. enable
2. config terminal.
3. interface Serial 2/0.
4. ip address 20.0.0.1 255.0.0.0.

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In router 1 CLI,

1. enable
2. config terminal
3. interface Serial 2/0
4. ip address 20.0.0.2 255.0.0.0

To establish connection between Pc0 and router 2 follow these Commands ⇒

2 In router 2 CLI,

1. enable
2. config terminal
3. interface fastethernet 0/0
4. ip address 40.0.0.1 255.0.0.0
5. no shutdown

To establish connection blw router 1 and router 2 Foll these commands ⇒

In router 2 CLI,

1. enable
2. config teminal
3. Interface Serial 3/0
4. Ip address 30.0.0.2 255.0.0.0

In router 1 CLI,

1. enable
2. Config terminal
3. Interface Serial 3/0
4. IP address 30.0.0.1 255.0.0.0

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To establish the connection between router 1 and PC0 ⇒

In router 1 CLI,

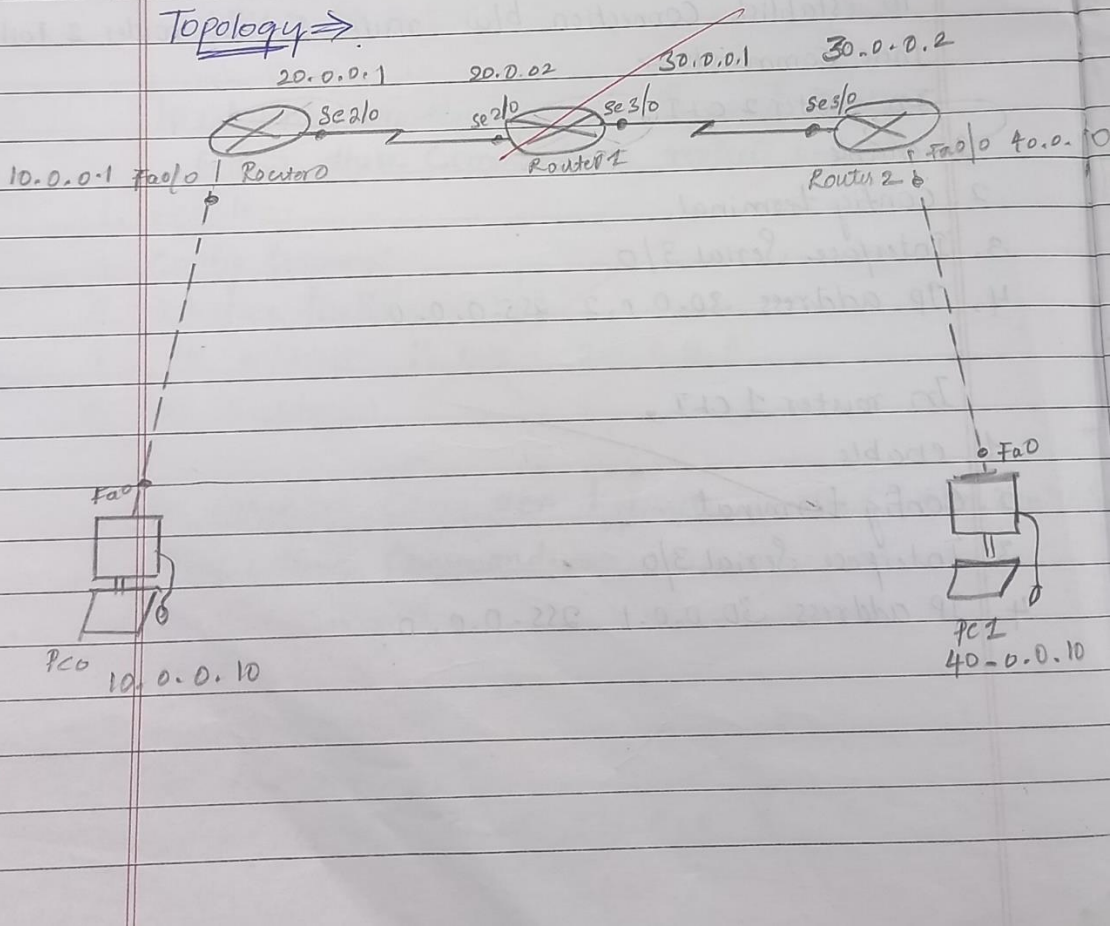
1. enable
2. config terminal
3. ip route 10.0.0.0 255.0.0.0 20.0.0.1
4. exit.

To establish the connection between router1 and PC1 ⇒

In router 1 CLI,

1. enable.
2. config terminal.
3. ip route 40.0.0.0 255.0.0.0 30.0.0.2
4. exit.

Topology ⇒



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Observation ⇒

All the Routers and Pcs are connected each other if we ping all the devices from PC0 and PC1. we can successfully able to view the packets which are send, recieve and lost.

If all the packets which are send is equal to recieve then the connection successfully established.

Connection established from router 0 ⇒

C 10.0.0.0/8 is directly connected, Fastethernet 0/0
C 20.0.0.0/8 is directly connected, Serial 2/0
S* 0.0.0.0/0 [1/0] via 20.0.0.2

Connection established from router 1 ⇒

S 10.0.0.0/8 [1/0] via 20.0.0.1
C 20.0.0.0/8 is directly connected Serial2/0
C 30.0.0.0/8 is directly connected Serial 3/0
S 40.0.0.0/8 [1/0] via 30.0.0.2

Connection established from router 2 ⇒

C 30.0.0.0/8 connected. Serial3/0
C 40.0.0.0/8 connected Fastethernet 0/0
S* 0.0.0.0/0 [1/0] via 30.0.0.1

To check the connection Follow these Commands,

1. enable
2. Show ip route.

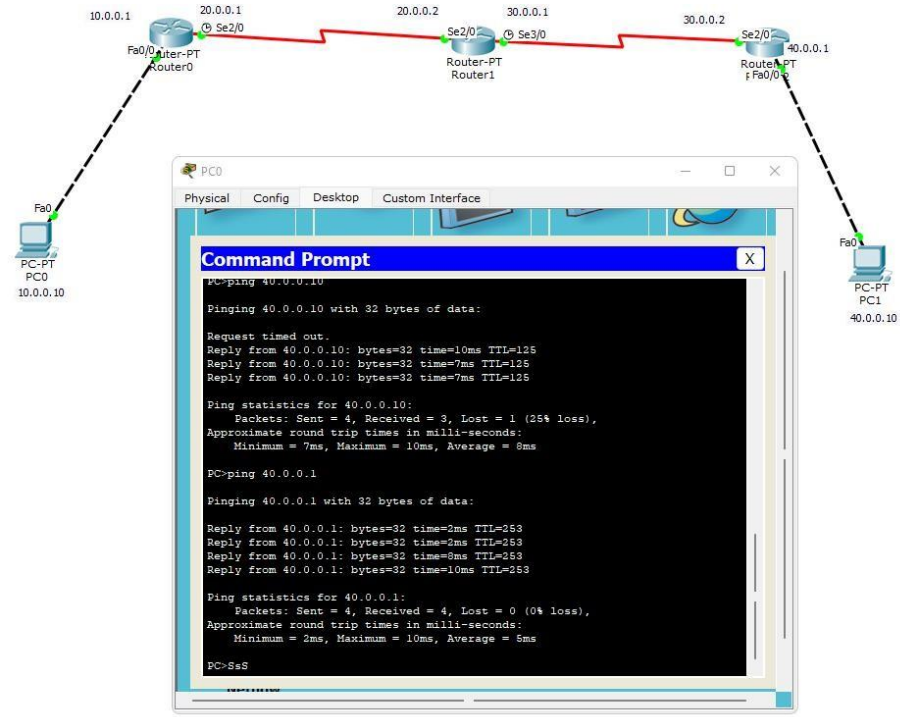
Output ⇒

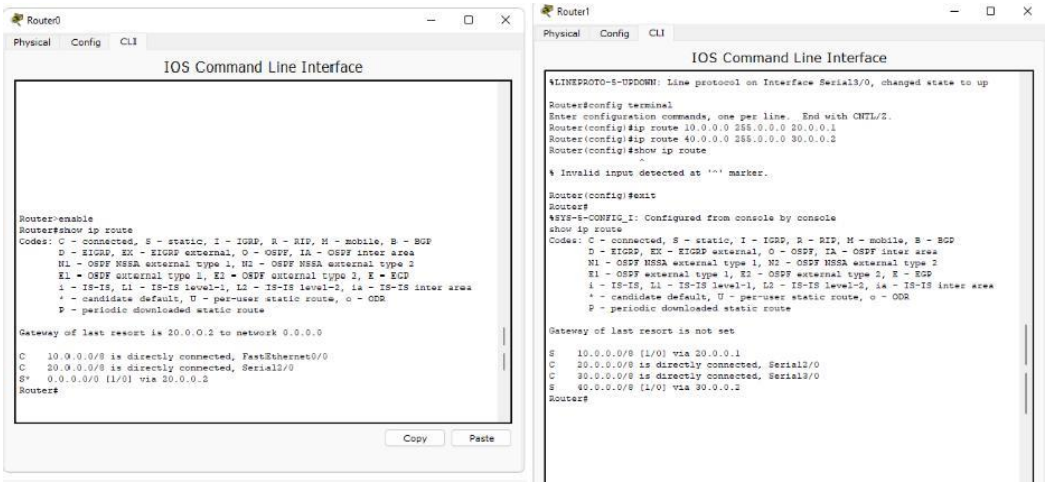
```
Pc > ping 10.0.0.1

 pinging 10.0.0.1 with 32 bytes of data :
Reply from 10.0.0.1 bytes=32 time = 4ms TTL = 128
Reply from 10.0.0.1 bytes=32 time = 4ms TTL = 128
Reply from 10.0.0.1 bytes=32 time = 4ms TTL = 128
Reply from 10.0.0.1 bytes=32 time = 4ms TTL = 128

Packets : Sent = 4 Recieved = 4 lost = 0 (0% loss)
```

ping 20.0.0.1
ping 20.0.0.2
ping 30.0.0.1
ping 30.0.0.2
ping 40.0.0.1
ping 40.0.0.10

Topology:

Output:





13|11|2024 Week-5(Experiment 4)

Observation Book:

14 15 lab-05

Bafna Gold Date: 13/11/2024

Aim → Configure DHCP within a LAN.

Procedure →

First Network

1. Select 2Pcs, 1 laptop and a server and a switch.
In a server, First set the IP address as 10.0.0.1 in IP configuration.

2. Then go to Services in Server. In Services select DHCP and follows as below for configure First network.
Pool name: switch 1
Default gateway : 10.0.0.1
DNS Server : 10.0.0.0
Start IP address : 10.0.0.3
Subnet mask : 255.0.0.0
Max no of user : 100
Then click on Add. and confirm that Service must be on

3. Then go to each and every pc and laptop which were connected to first network.
click on destop, go to IP configuration then give DHCP After that every PCs and laptops automatically assigned with the IP address.

2nd Network

1. Select 2 Pcs, 1 laptop for the Second Network connection.
In a Server, change the IP address from 10.0.0.1 to 10.0.0.2

2. Then go to Services in server. In Services select DHCP and follow as below for configure 2nd network.

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Poolname : switch2
Default gateway : 20.0.0.1
DNS server : 20.0.0.0
Start IP address : 20.0.0.3
Subnet mask : 255.0.0.0
max no. of user : 100
click on add button.

To Establish connection between the 1st and 2nd Network add router and connect with it
1st network connecting using Fiber wire.
2nd network connecting using straight wire.

Go to router, Open CLI follow these below commands
for 1st network,

1. enable
2. Config terminal
3. interface fastethernet fa 4/0
4. ip address 10.0.0.1 255.0.0.0
5. ip helper-address 10.0.0.2.
6. NO Shutdown
7. exit.

For 2nd Network,

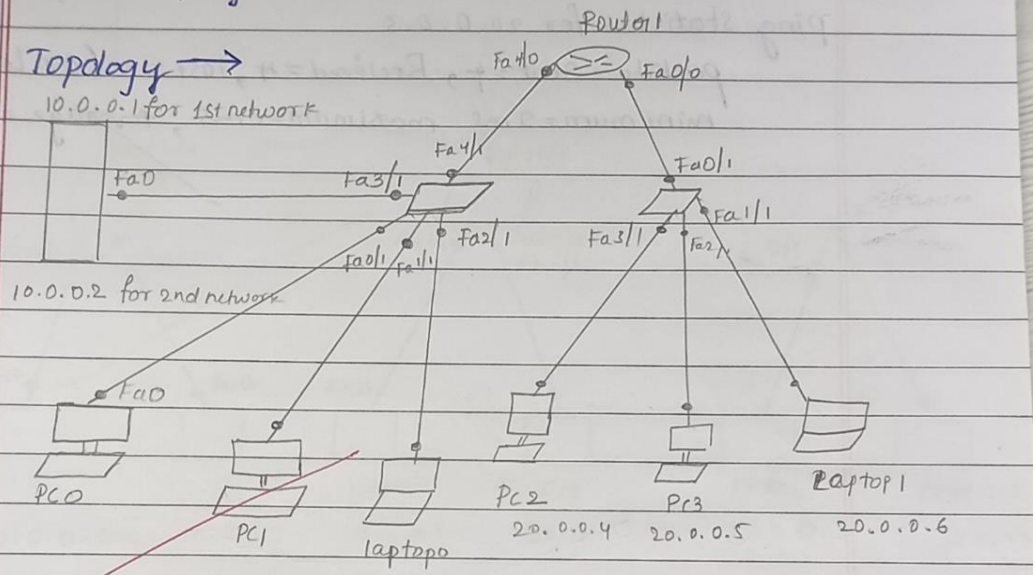
1. enable
2. Config terminal.
3. interface fastethernet Fa 0/0.
4. ip address 20.0.0.1 255.0.0.0
5. ip helper-address 20.0.0.2
6. NO Shutdown
7. exit.

go to every pcs and laptop which are connected to 2nd Network

click on Desktop, go to IP configuration then give DHCP After that every pcs and laptop automatically assigned with the IP address.

Once the connection established between the two networks, Start to ping between the networks

Topology →



Observation →

Each and every pcs and laptop sends packet to pcs and laptop present in 2nd networks and the packets get successfully sent each other.

So that the packet gonna sent from one network to another network through the Router connection.

O/P →

PC0 : [command prompt]

PC > ping 20.0.0.3

pinging 20.0.0.3 with 32 bytes of data:

Replying from 20.0.0.3 : bytes 32 time : 0ms TIL = 127

Replying from 20.0.0.3 : byte 32 time : 0ms TIL = 127

Replying from 20.0.0.3 : byte 32 time : 0ms TIL = 127

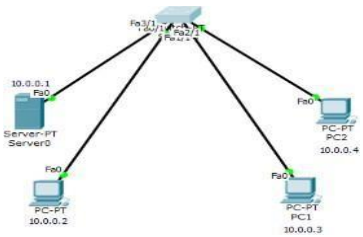
Replying from 20.0.0.3 : byte 32 time : 0ms TIL = 127

ping statistics for 20.0.0.3

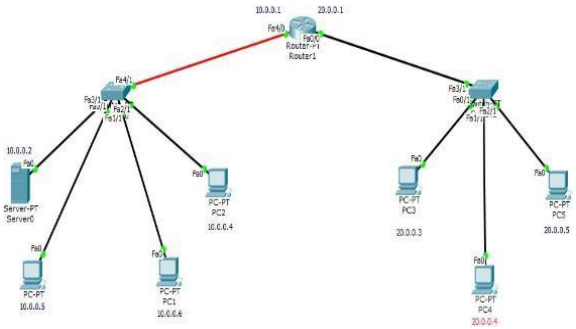
packets : sent = 4, Recieved = 4, lost = 0 (0% loss),

minimum = 2ms maximum = 0ms, Average = 0ms.

Topology:



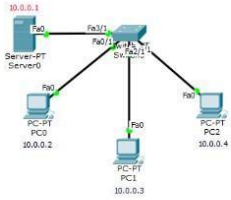
(within Lan)

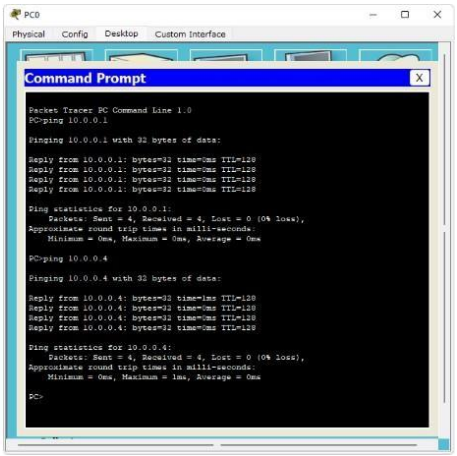


(outside Lan)

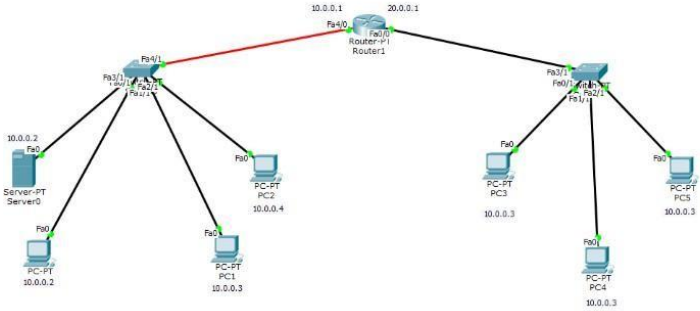
Output:

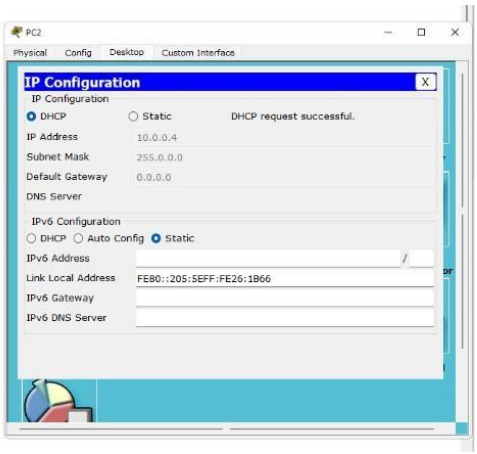
(within Lan)

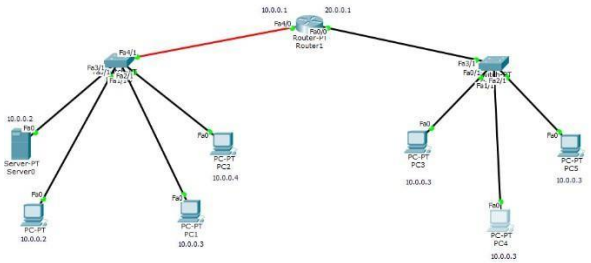


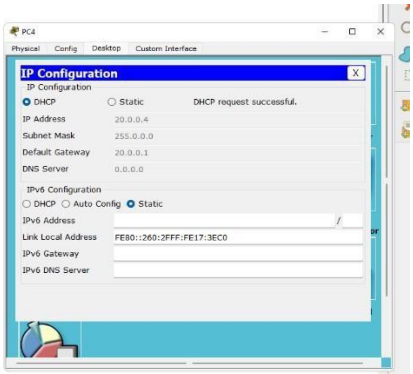


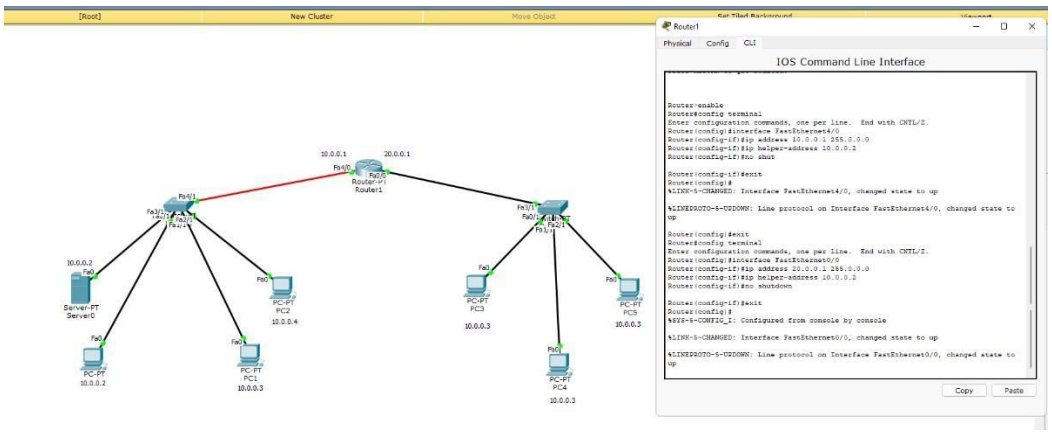
(outside Lan)


10.0.0.1
20.0.0.1
Fa4/0
Fa0/0
Router-PT
Router1
Fa4/1
Fa3/1
Fa2/1
Fa0/1
Fa2/1
10.0.0.2
Fa0
Server-PT
Server0
Fa0
PC-PT
PC2
10.0.0.4
Fa0
PC-PT
10.0.0.2
Fa0
PC-PT
PC1
10.0.0.3
Fa0
PC-PT
PC3
10.0.0.3
Fa0
PC-PT
PC5
10.0.0.3
Fa0
PC-PT
PC4
10.0.0.3


PC2
Physical
Config
Desktop
Custom Interface
IP Configuration
X
IP Configuration
DHCP
Static
DHCP request successful.
IP Address
10.0.0.4
Subnet Mask
255.0.0.0
Default Gateway
0.0.0.0
DNS Server
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
Link Local Address
FE80::205:5EFF:FE26:1B66
IPv6 Gateway
IPv6 DNS Server


10.0.0.1
20.0.0.1
Router1
Server-PT
Server0
10.0.0.2
PC2
10.0.0.4
PC1
10.0.0.3
PC-PT
10.0.0.2
PC3
10.0.0.3
PC4
10.0.0.3
PC5
10.0.0.3


PC4
Physical
Config
Desktop
Custom Interface
IP Configuration
IP Configuration
DHCP
Static
DHCP request successful.
IP Address
20.0.0.4
Subnet Mask
255.0.0.0
Default Gateway
20.0.0.1
DNS Server
0.0.0.0
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
Link Local Address
FE80::260:2FFF:FE17:3EC0
IPv6 Gateway
IPv6 DNS Server


[Root]
New Cluster
Router1
Physical
Config
CLI
IOS Command Line Interface
Router>enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet4/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#ip helper-address 10.0.0.2
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#
%LINK-5-CHANGED: Interface FastEthernet4/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet4/0, changed state to up
Router(config)#exit
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#ip helper-address 10.0.0.2
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
%SYS-5-CONFIG_I: Configured from console by console
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
Copy
Paste

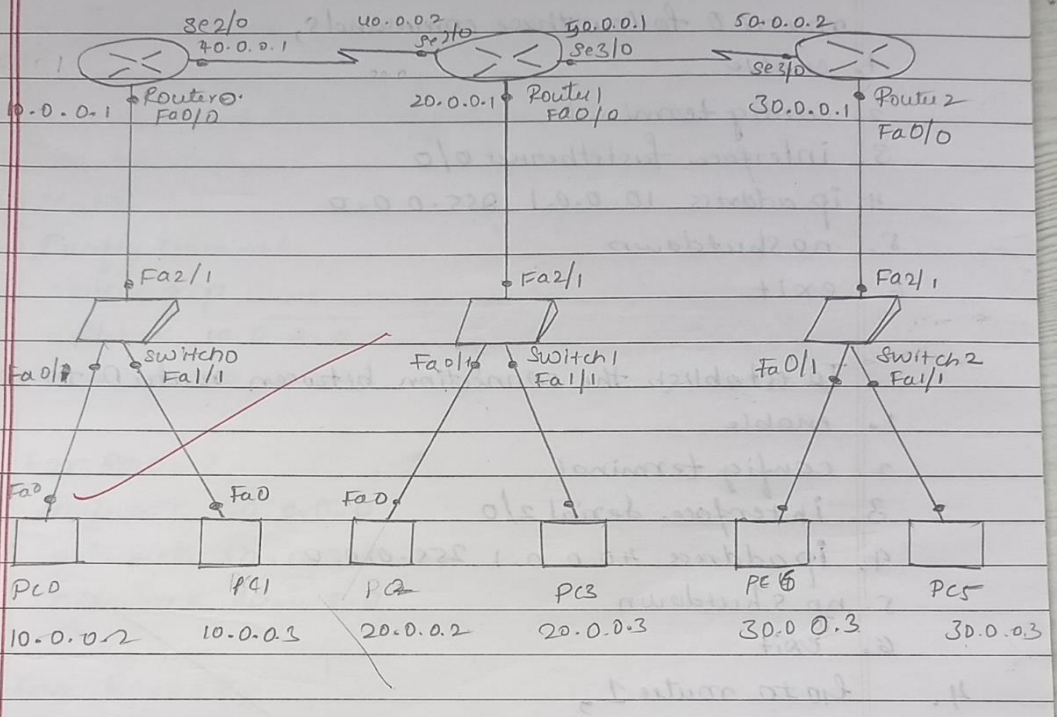
20|11|2024 Experiment 5-Configure RIP routing Protocol in Router

Observation Book:

19. lab-06

Aim → configure routing information protocol in Router.

Topology →



procedure →

1. connect 2 pcs to the Switch and Switch to router like that totally we have two use 6 pcs each 2 pcs connected to 1 Switch and that Switch connected to the router. each Router connected to another Router.

2. Assign Ipaddresses for each pcs.

PC0 - 10.0.0.2

PC1 - 10.0.0.3

PC2 - 20.0.0.2

PC3 - 20.0.0.3
PC4 - 30.0.0.2
PC5 - 30.0.0.3

3. Go to router0,
To establish the connection between switch 0 and router 0 follow these commands,

1. enable
2. config terminal
3. interface fastethernet 0/0
4. ip address 10.0.0.1 255.0.0.0
5. no shutdown
6. exit

To establish the connection between router0 to router 1,

1. enable
2. config terminal
3. interface Serial 2/0
4. ipaddress 40.0.0.1 255.0.0.0
5. no shutdown
6. exit.

4. Go to router 1,
For Router 1 to Router 0,
interface Serial 2/0
ipaddress 40.0.0.2 255.0.0.0

For Router 1 to Router 2,
interface Serial 3/0
ipaddress 50.0.0.1 255.0.0.0

For Router 1 to Switch 1
interface fastethernet 0/0
ipaddress 20.0.0.1 255.0.0.0

Bafna Gold
Date: Page:

5. Go to Router 2, for Router 2 to Router 1
   interface Serial 3/0
   ipaddress 50.0.0.2 255.0.0.0.

   For Router 2 to Switch 2
   interface Fastethyr 0/0
   ipaddress 30.0.0.1 255.0.0.0.

To Send packet successfully over network,
For Router 0,

1. enable
2. Config terminal
3. router rip
4. network 10.0.0.0
5. network 40.0.0.0

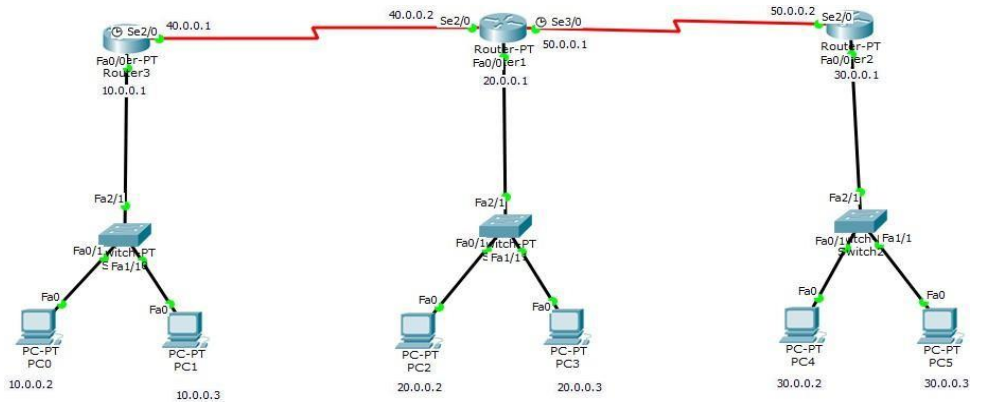
For Router 1,
network 40.0.0.0
network 50.0.0.0
network 20.0.0.0

For Router 2,
network 50.0.0.0
network 30.0.0.0

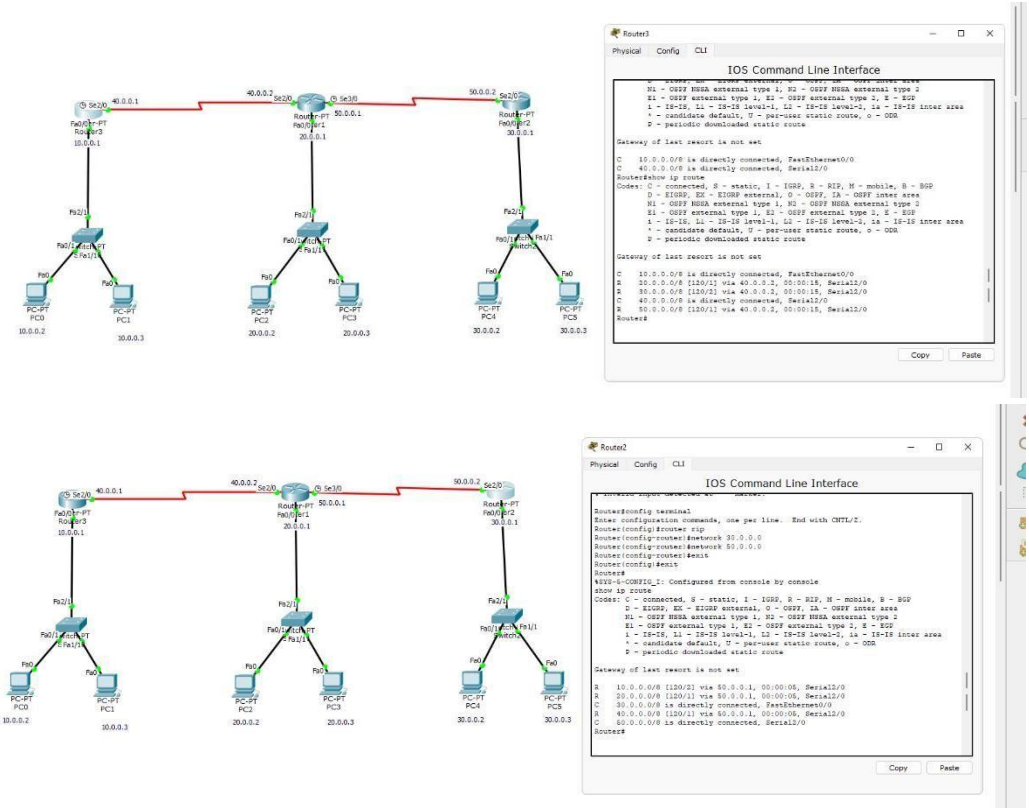
To see the connection in CLI, type show ip route.

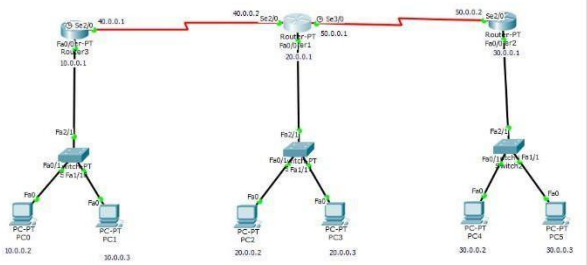
Observation ⟹ connection established successfully over a network and packets are sent from one pc to another pc over a network successfully.

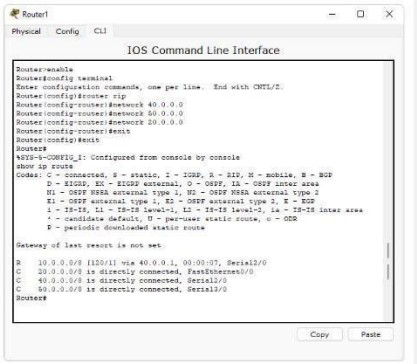
Topology:

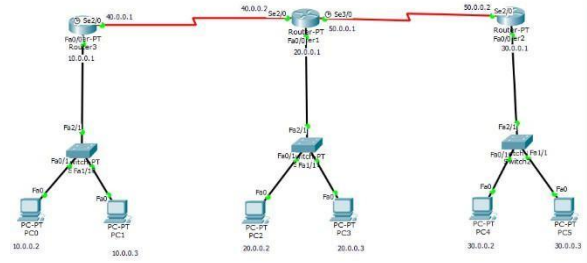


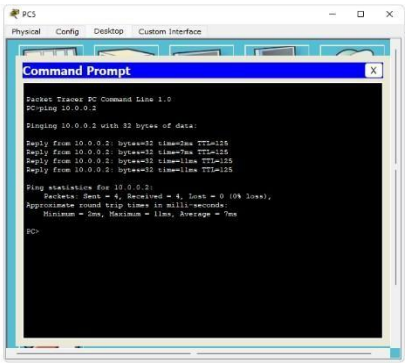
Output:




40.0.0.1
40.0.0.2
50.0.0.1
50.0.0.2
10.0.0.1
20.0.0.1
30.0.0.1
10.0.0.2
10.0.0.3
20.0.0.2
20.0.0.3
30.0.0.2
30.0.0.3

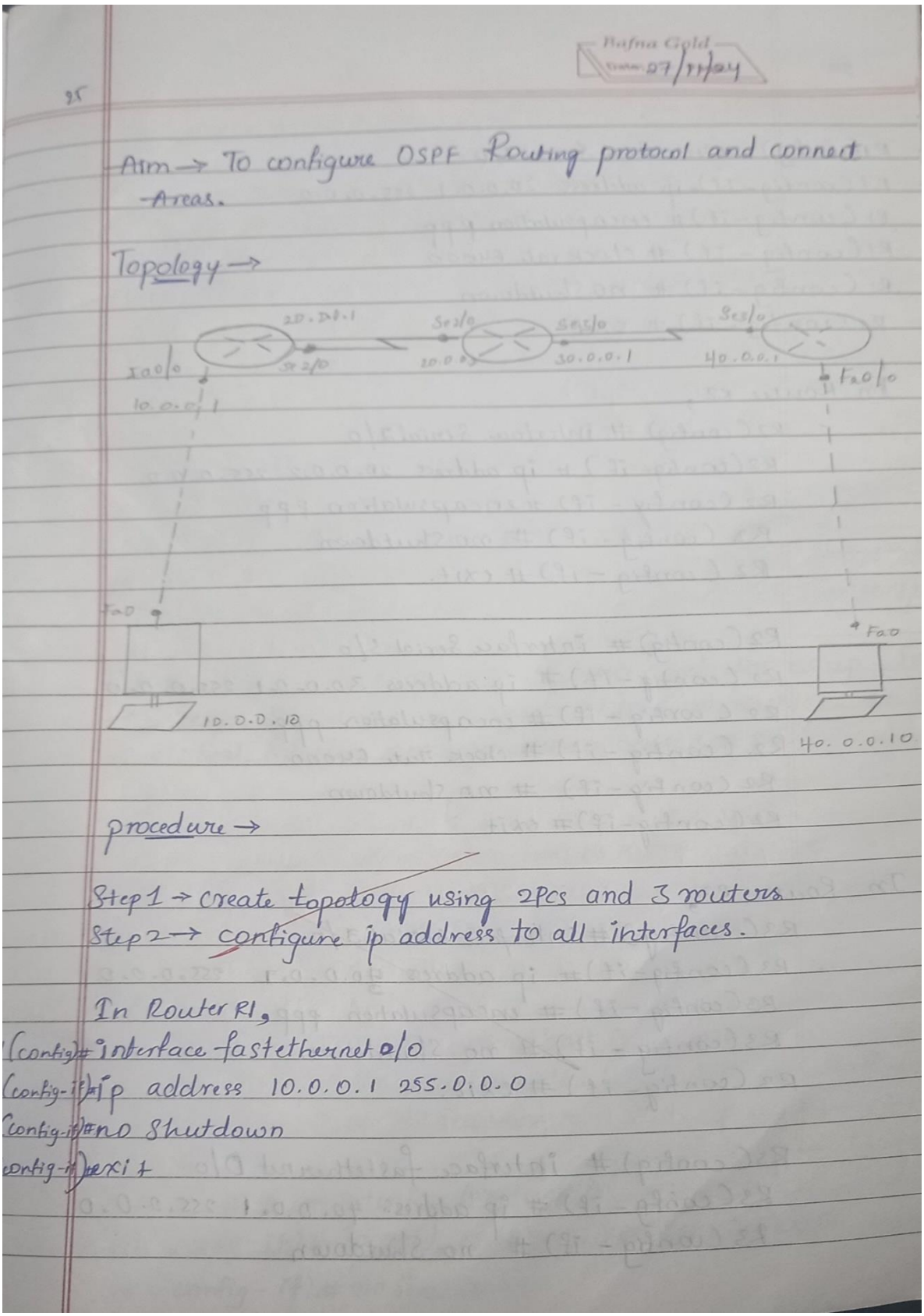

Router1
Physical
Config
CLI
IOS Command Line Interface
Router>enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 40.0.0.0
Router(config-router)#network 50.0.0.0
Router(config-router)#network 20.0.0.0
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
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 result is not set
R 10.0.0.0/8 [120/1] via 40.0.0.1, 00:00:07, Serial2/0
C 20.0.0.0/8 is directly connected, FastEthernet0/0
C 40.0.0.0/8 is directly connected, Serial2/0
C 50.0.0.0/8 is directly connected, Serial3/0
Router#
Copy
Paste


40.0.0.1
40.0.0.2
50.0.0.1
50.0.0.2
10.0.0.1
20.0.0.1
30.0.0.1
10.0.0.2
10.0.0.3
20.0.0.2
20.0.0.3
30.0.0.2
30.0.0.3


PC5
Physical
Config
Desktop
Custom Interface
Command Prompt
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.2
Pinging 10.0.0.2 with 32 bytes of data:
Reply from 10.0.0.2: bytes=32 time=2ms TTL=125
Reply from 10.0.0.2: bytes=32 time=7ms TTL=125
Reply from 10.0.0.2: bytes=32 time=11ms TTL=125
Reply from 10.0.0.2: bytes=32 time=11ms TTL=125
Ping statistics for 10.0.0.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 2ms, Maximum = 11ms, Average = 7ms
PC>

27|11|2024 Experiment 6- Configure OSPF routing protocol

Observation Book:



R1(config) # interface Serial 2/0
R1(config-if) # ip address 20.0.0.1 255.0.0.0
R1(config-if) # encapsulation ppp
R1(config-if) # clock rate 64000
R1(config-if) # no Shutdown
R1(config-if) # exit

In Router R2,

R2(config) # interface Serial 2/0
R2(config-if) # ip address 20.0.0.2 255.0.0.0
R2(config-if) # encapsulation ppp
R2(config-if) # no shutdown
R2(config-if) # exit.

R2(config) # interface Serial 3/0
R2(config-if) # ip address 30.0.0.1 255.0.0.0
R2(config-if) # encapsulation ppp
R2(config-if) # clock rate 64000
R2(config-if) # no shutdown
R2(config-if) # exit.

In Router R3,

R3(config) # interface serial 3/0
R3(config-if) # ip address 30.0.0.2 255.0.0.0
R3(config-if) # encapsulation ppp.
R3(config-if) # no shutdown.
R3(config-if) # exit.

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

Bafna Gold
Date: Page:

R3(config-if)# exit.

Step4 —> Now check routing table of R1,
Router # Show ip route

Here R2 knows Area 0 Network 20.0.0.0. connected to R2 from R1, so R1 learn network through this network.
R3(config)# router ospf 1, Here 1 is process id, It can be 1-65535 It initializes ospf process.

Gateway of last resort is not set
C 10.0.0.0/8 is directly connected, Fastethernet 0/0
C 20.0.0.0/8 is directly connected, Serial 2/0
O IA 40.0.0.0/8 via 20.0.0.2 00:04:23 Serial 2/0
O IA 30.0.0.0/8 via 20.0.0.2 00:07:29 Serial 2/0

There must be Interface up & Keep ospf process up. So it better to configure loopback address to routers. It is a virtual interface never goes down once we configured.

R1,
R1(config-if)# interface loopback 0
R1(config-if)# ip add 172.16.1.252 255.255.0.0
R1(config-if)# no Shutdown

R2,
R2(config-if)# Interface loopback 0
R2(config-if)# ip add 172.16.1.253 255.255.0.0.
R2(config-if)# no Shutdown

R3(config-if)# interface loopback 0
R3(config-if)# ip add 172.16.1.254 255.255.0.0
R3(config-if)# no Shoutdown

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Steps → Now, check routing table of R3

R3 # Show ip route

Step 6 → create virtual link b/w R1, R2 by this we create a virtual link to connect area 3 to area 0

R1,
router ospf 1
area 1 virtual-link 2.2.2.2
exit

R2, area 1 virtual-link 1.1.1.1
exit

Step 7 → R2 and R3 get updates about area 3, Now checking routing table of 3

R3 # Show ip route

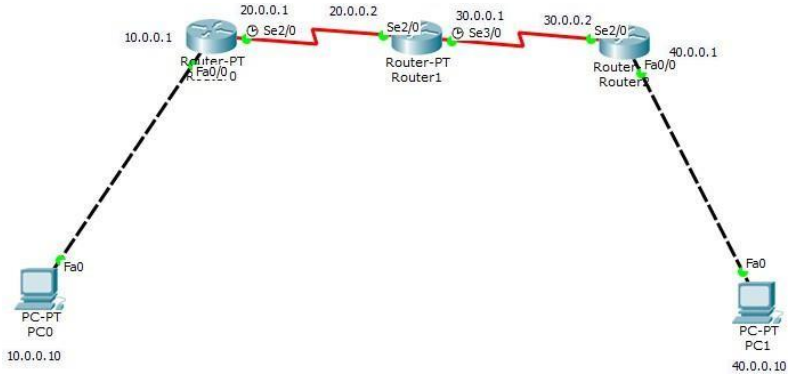
Output → O/p Ping from pc 40.0.0.10

PC > ping 40.0.0.10

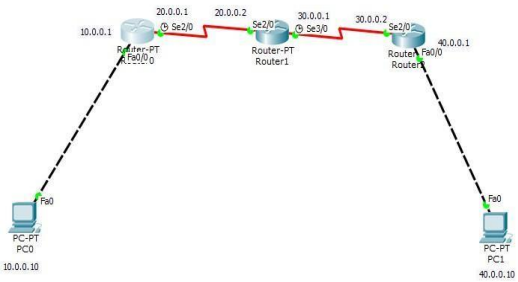
Pinging 10.0.0.10 with 32 bytes of data
Reply from 10.0.0.10: bytes = 32 time = 9ms TTL = 125
Reply from 10.0.0.10: bytes = 32 time = 9ms TTL = 125
Reply from 10.0.0.10: bytes = 32 time = 9ms TTL = 125
Reply from 10.0.0.10: bytes = 32 time = 9ms TTL = 125

Ping Statistics for 10.0.0.10:
Packets: Sent = 4 Recieved = 4 lost = 0 (0% loss),
Approximate round trip times in Mili-Seconds:
Minimum = 7ms, Maximum = 9ms, Average = 8ms.

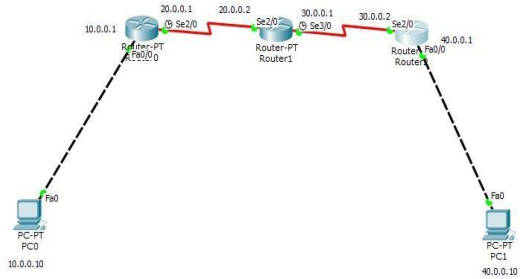
Topology:

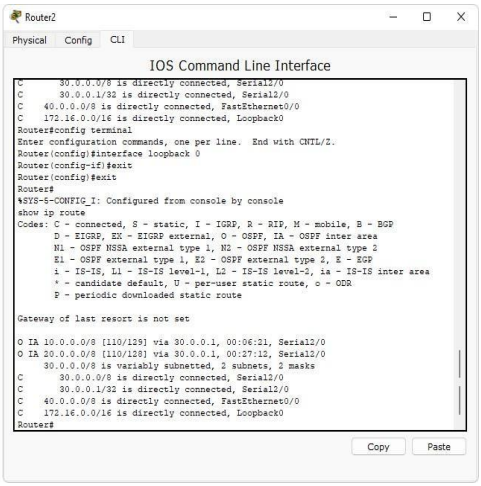

20.0.0.1
Se2/0
20.0.0.2
Se2/0
30.0.0.1
Se3/0
30.0.0.2
Se2/0
10.0.0.1
Router-PT
Router1
Fa0/0
40.0.0.1
Fa0
PC-PT
PC0
10.0.0.10
Fa0
PC-PT
PC1
40.0.0.10

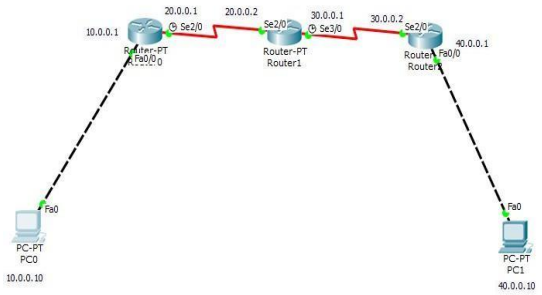
Output:

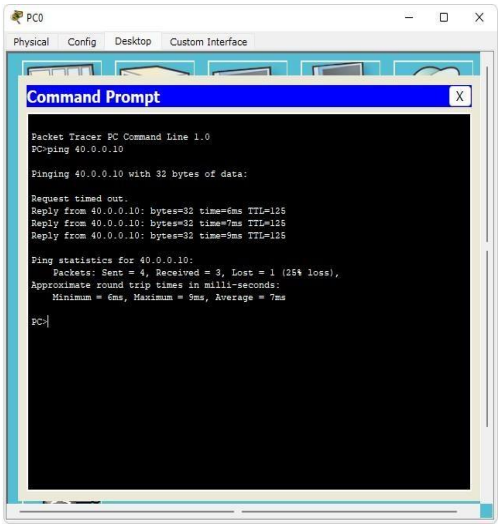

20.0.0.1
20.0.0.2
30.0.0.1
30.0.0.2
10.0.0.1
Se2/0
Se3/0
Fa0/0
40.0.0.1
Router-PT
Router1
Router2
PC-PT
PC0
PC1
Fa0
10.0.0.10
40.0.0.10

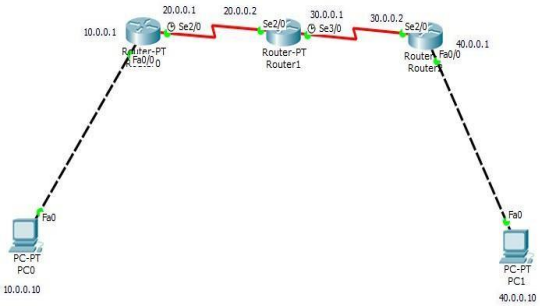

Router0
Physical
Config
CLI
IOS Command Line Interface
Router>enable
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
Gateway of last resort is not set
C 10.0.0.0/8 is directly connected, FastEthernet0/0
20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C 20.0.0.0/8 is directly connected, Serial2/0
C 20.0.0.2/32 is directly connected, Serial2/0
O 30.0.0.0/8 [110/128] via 20.0.0.2, 00:05:09, Serial2/0
O IA 40.0.0.0/8 [110/129] via 20.0.0.2, 00:05:09, Serial2/0
C 172.16.0.0/16 is directly connected, Loopback0
Router#
Copy
Paste

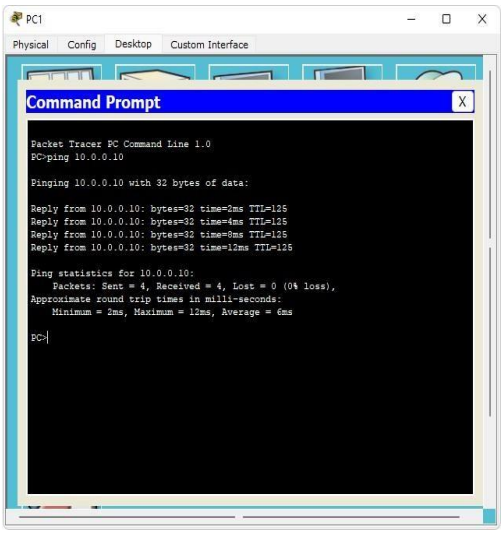

20.0.0.1
20.0.0.2
30.0.0.1
30.0.0.2
10.0.0.1
Se2/0
Se3/0
Fa0/0
40.0.0.1
Router-PT
Router1
Router2
PC-PT
PC0
PC1
Fa0
10.0.0.10
40.0.0.10


Router2
Physical
Config
CLI
IOS Command Line Interface
C 30.0.0.0/8 is directly connected, Serial2/0
C 30.0.0.1/32 is directly connected, Serial2/0
C 40.0.0.0/8 is directly connected, FastEthernet0/0
C 172.16.0.0/16 is directly connected, Loopback0
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface loopback 0
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
Gateway of last resort is not set
O IA 10.0.0.0/8 [110/129] via 30.0.0.1, 00:06:21, Serial2/0
O IA 20.0.0.0/8 [110/128] via 30.0.0.1, 00:27:12, Serial2/0
30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C 30.0.0.0/8 is directly connected, Serial2/0
C 30.0.0.1/32 is directly connected, Serial2/0
C 40.0.0.0/8 is directly connected, FastEthernet0/0
C 172.16.0.0/16 is directly connected, Loopback0
Router#
Copy
Paste


20.0.0.1
20.0.0.2
30.0.0.1
30.0.0.2
10.0.0.1
Se2/0
Se2/0
Se3/0
Se2/0
Fa0/0
40.0.0.1
Router-PT
Router1
Fa0
Fa0
PC-PT
PC0
10.0.0.10
PC-PT
PC1
40.0.0.10


PC0
Physical
Config
Desktop
Custom Interface
Command Prompt
X
Packet Tracer PC Command Line 1.0
PC>ping 40.0.0.10
Pinging 40.0.0.10 with 32 bytes of data:
Request timed out.
Reply from 40.0.0.10: bytes=32 time=6ms TTL=125
Reply from 40.0.0.10: bytes=32 time=7ms TTL=125
Reply from 40.0.0.10: bytes=32 time=9ms TTL=125
Ping statistics for 40.0.0.10:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 6ms, Maximum = 9ms, Average = 7ms
PC>


20.0.0.1
20.0.0.2
30.0.0.1
30.0.0.2
10.0.0.1
Se2/0
Se2/0
Se3/0
Se2/0
Fa0/0
40.0.0.1
Router-PT
Router1
Fa0
Fa0
PC-PT
PC0
10.0.0.10
PC-PT
PC1
40.0.0.10


PC1
Physical
Config
Desktop
Custom Interface
Command Prompt
X
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.10
Pinging 10.0.0.10 with 32 bytes of data:
Reply from 10.0.0.10: bytes=32 time=2ms TTL=125
Reply from 10.0.0.10: bytes=32 time=4ms TTL=125
Reply from 10.0.0.10: bytes=32 time=0ms TTL=125
Reply from 10.0.0.10: bytes=32 time=12ms TTL=125
Ping statistics for 10.0.0.10:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 2ms, Maximum = 12ms, Average = 6ms
PC>

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Bafna Gold
Date: Page:

Out layer
layer 7
layer 6
layer 5
layer 4
layer 3
layer 2: Ethernet II Header
00D0.FFBE.C1CB >> 00E0.A3AE.09E6
layer 1: Port(s): FastEthernet 2/1

Inbound PDU details

Ethernet II

0	4	8	14	19
Preamble		Dest mac	SRC MAC:	
101010...1011		00E0.A3E.09E6	00D0.FFBE.C1CB	
Type:		Data (variable length)		FCS:
0x800				0x0

IP

0	4	8	16	19	31
4	IHL	DSCP: 0x0		TL: 28	
ID: 0x27		0x0		0x0	
TTL: 255		PRO: 0x1		CHKSUM	

SRC IP: 10.0.0.2
DST IP: 30.0.0.2
OPT: 0x0 0x0
DATA (variable length)

22

Aim → Demonstrate PTL/life of a packet

Steps →

1. Select a packet.
2. Transfer it from one pc to another over a network i.e PC0 to PC6
3. While transferring packets pause the packets (click on Autocapture play)
4. Then click on packet then you can able to view inbound and outbound pdu.

PDU information at device : Switch 5

OSI model
At device : Switch 5
Source : PC0
Destination : PC6

In layers
layer 7
layer 6
Layer 5
layer 4
Layer 3
Layer 2: Ethernet II Header
0DD0, FFBE.C1CB >> 00E0.A3AE.09E6
layer 1 : Port FastEthernet 0/1

O/P →

In PC0

PC >> ping 30.0.0.2

Pinging 30.0.0.2 with 32 bytes of data:

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

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

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

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

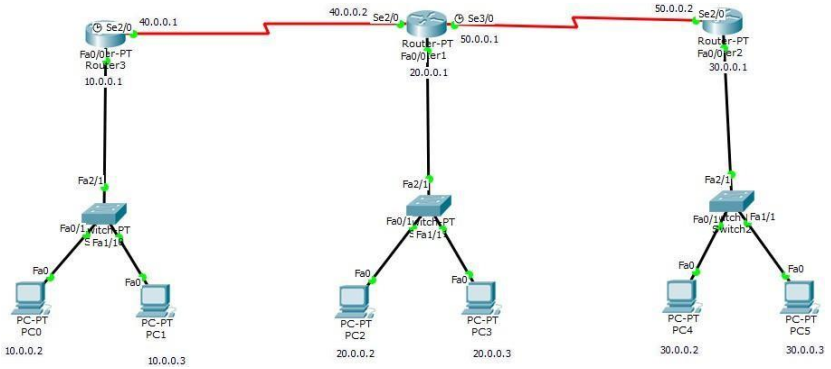
ping statistics for 30.0.0.2

Packets : Sent = 4 Recieved = 4 lost = 0 (0% loss)

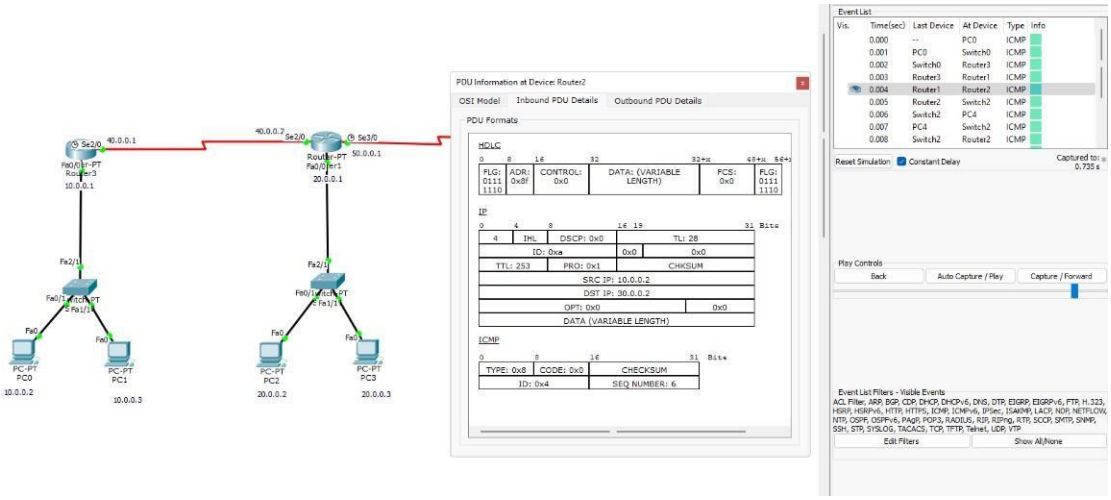
Approximate round trip times in milliseconds:

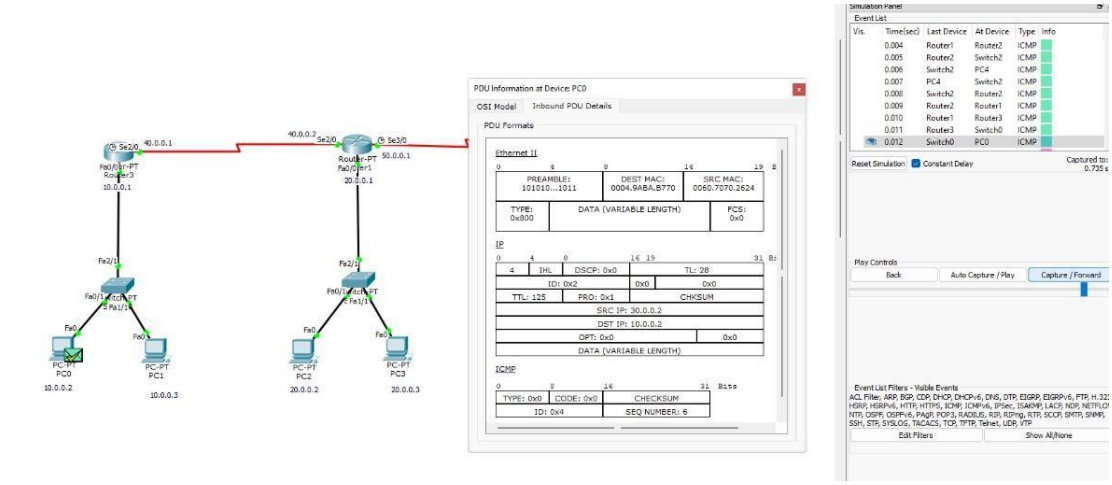
minimum = 2ms, maximum = 9ms, Average = 5ms

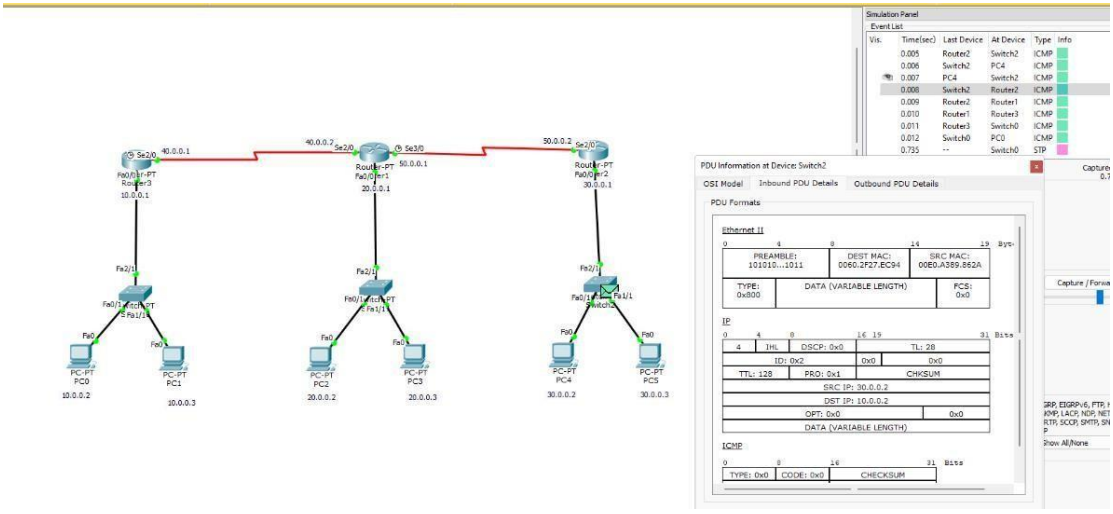
Topology:



Output:

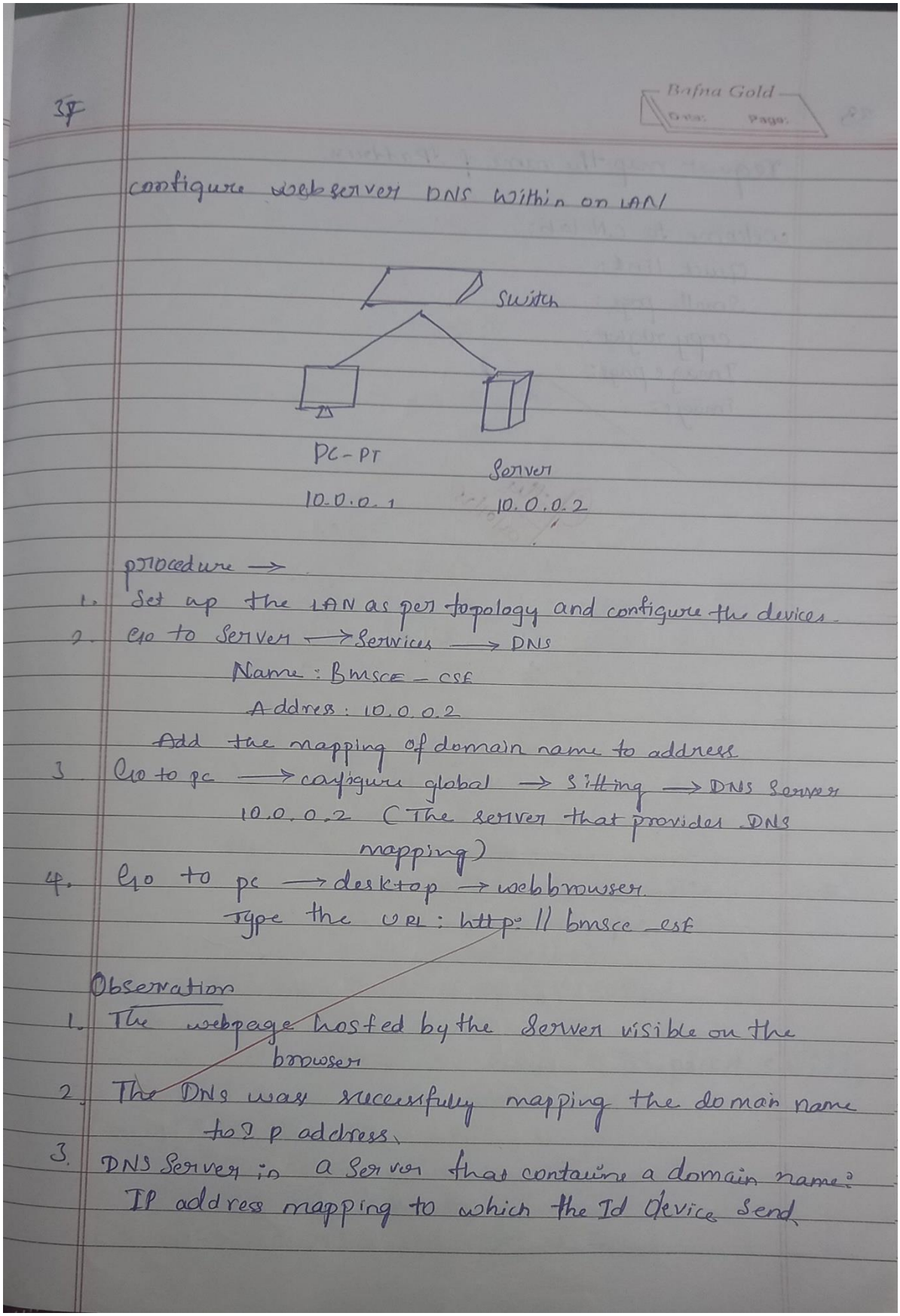



PDU Information at Device: PC0
OSI Model
Inbound PDU Details
PDU Formats
Ethernet II
PREAMBLE: 101010...1011
DEST MAC: 0004.9ABA.B770
SRC MAC: 0060.7070.2624
TYPE: 0x800
DATA (VARIABLE LENGTH)
FCS: 0x0
IP
DSCP: 0x0
TL: 28
ID: 0x2
TTL: 125
PRO: 0x1
CHKSUM
SRC IP: 30.0.0.2
DST IP: 10.0.0.2
OPT: 0x0
DATA (VARIABLE LENGTH)
ICMP
TYPE: 0x0
CODE: 0x0
CHECKSUM
ID: 0x4
SEQ NUMBER: 6
Simulation Panel
Event List
Reset Simulation
Constant Delay
Play Controls
Back
Auto Capture / Play
Capture / Forward
Edit Filters
Show All/None


PDU Information at Device: Switch2
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
Ethernet II
PREAMBLE: 101010...1011
DEST MAC: 0060.2F27.EC94
SRC MAC: 00E0.A389.862A
TYPE: 0x800
DATA (VARIABLE LENGTH)
FCS: 0x0
IP
DSCP: 0x0
TL: 28
ID: 0x2
TTL: 128
PRO: 0x1
CHKSUM
SRC IP: 30.0.0.2
DST IP: 10.0.0.2
OPT: 0x0
DATA (VARIABLE LENGTH)
ICMP
TYPE: 0x0
CODE: 0x0
CHECKSUM
Simulation Panel
Event List

18|12|2024 Experiment 8- Configure Web Server, DNS within a LAN

Observation Book:



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configure webserver DNS within an LAN

procedure →

1. Set up the LAN as per topology and configure the devices.
2. Go to Server → Services → DNS
   Name : Bmsce - CSE
   Address : 10.0.0.2
   Add the mapping of domain name to address
3. Go to pc → configure global → Sitting → DNS Server
   10.0.0.2 (The server that provides DNS mapping)
4. Go to pc → desktop → web browser
   Type the URL : http:// bmsce - cse

Observation

1. The webpage hosted by the Server visible on the browser
2. The DNS was successfully mapping the domain name to IP address.
3. DNS Server is a Server that contains a domain name : IP address mapping to which the Id device send.

Request map the name of IP address.

welcome to CN lab:

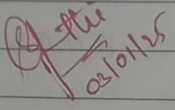
Quick link:

Small page:

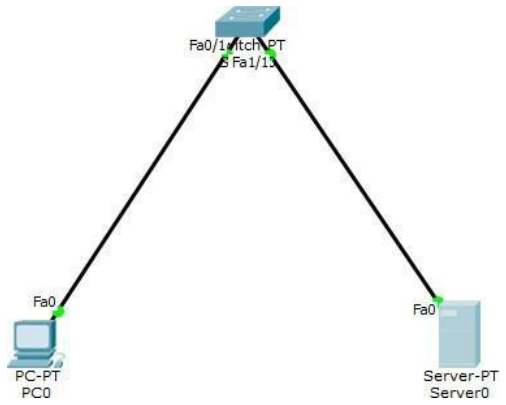
copy right:

Image page:

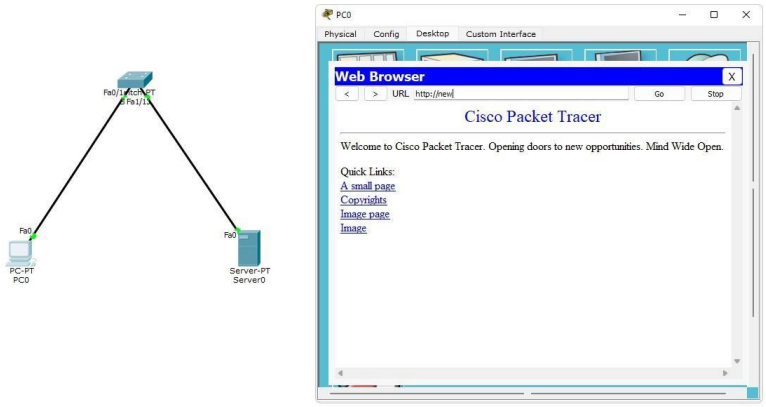
image:

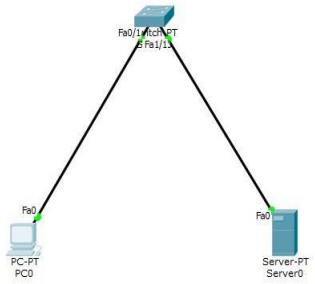


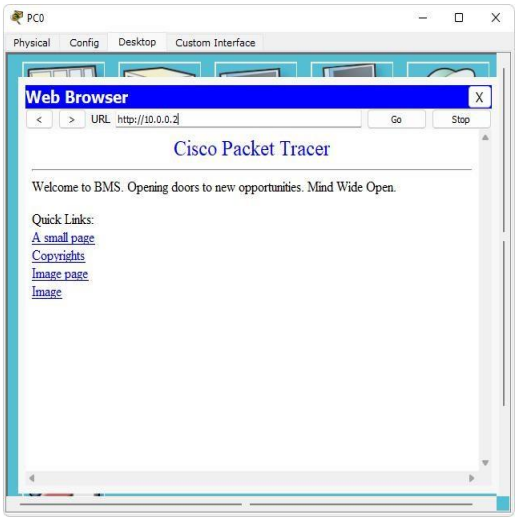
Topology:

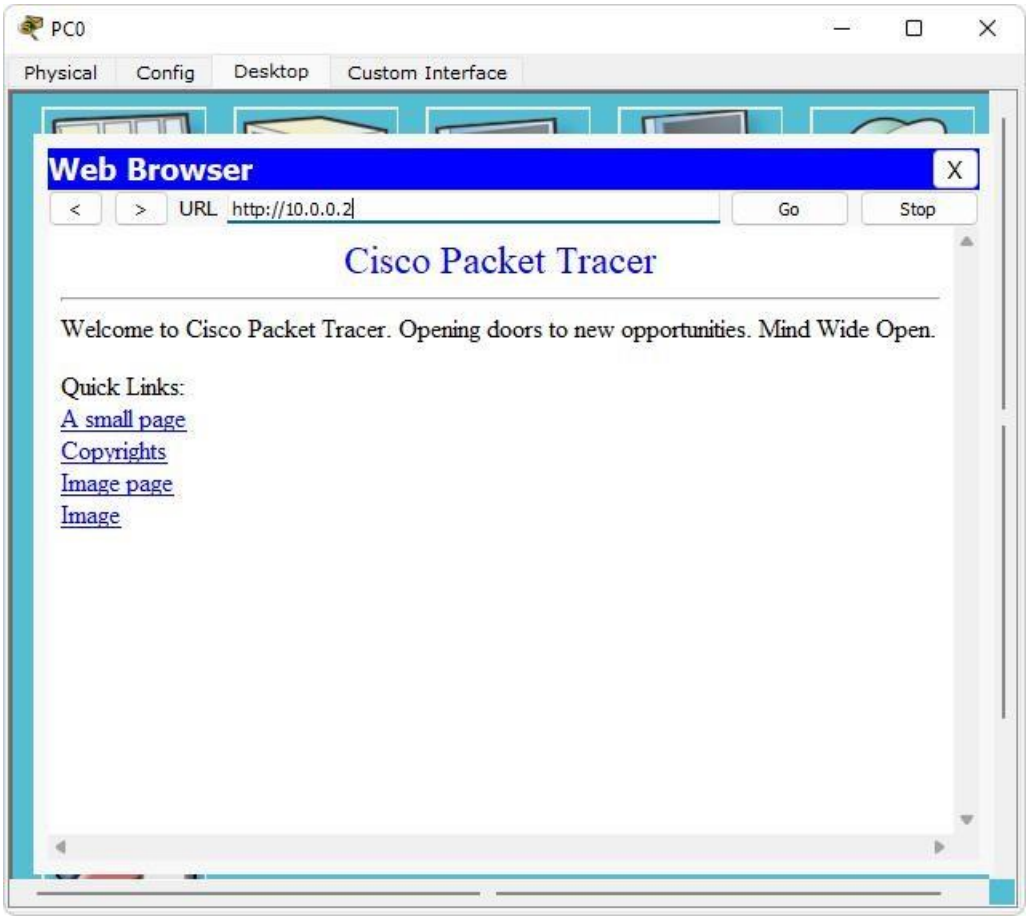


Output:



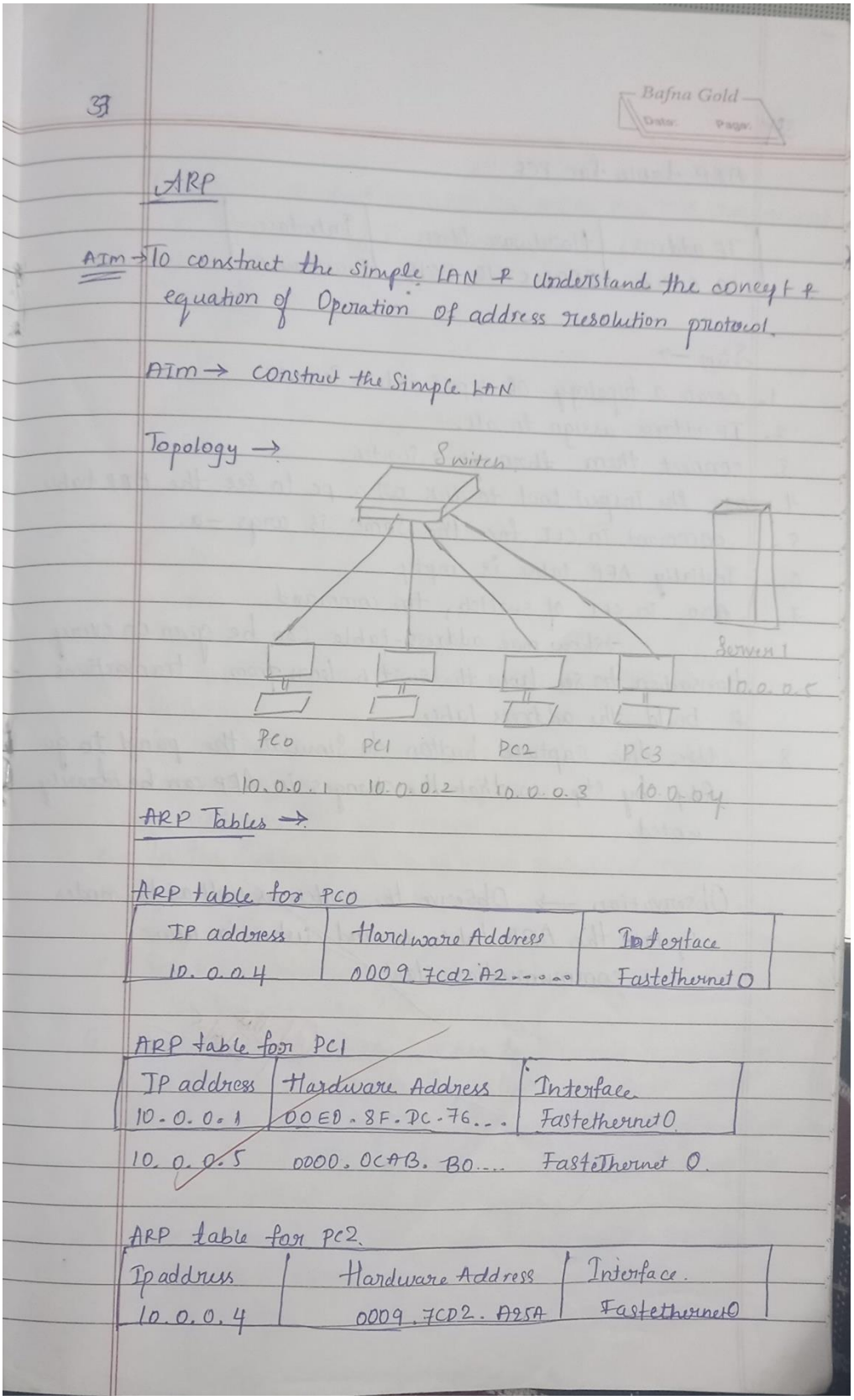

Fa0
Fa0
PC-PT
PC0
Server-PT
Server0


PC0
Physical
Config
Desktop
Custom Interface
Web Browser
X
URL
http://10.0.0.2
Go
Stop
Cisco Packet Tracer
Welcome to BMS. Opening doors to new opportunities. Mind Wide Open.
Quick Links:
A small page
Copyrights
Image page
Image


PC0
Physical
Config
Desktop
Custom Interface
Web Browser
X
URL
http://10.0.0.2
Go
Stop
Cisco Packet Tracer
Welcome to Cisco Packet Tracer. Opening doors to new opportunities. Mind Wide Open.
Quick Links:
A small page
Copyrights
Image page
Image

18|12|2024 Experiment 9- To construct simple LAN and understand the concept and operation of Address Resolution Protocol (ARP)

Observation Book:



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Date: Page:

ARP

Aim → To construct the simple LAN & understand the concept & equation of Operation of address resolution protocol.

Aim → construct the simple LAN

Topology →

ARP Tables →

ARP table for PC0

IP address	Hardware Address	Interface
10.0.0.4	0009.7cd2.A2...	FastEthernet0

ARP table for PC1

IP address	Hardware Address	Interface
10.0.0.1	00ED.8F.DC.76...	FastEthernet0
10.0.0.5	0000.0CAB.B0...	FastEthernet 0.

ARP table for PC2.

Ip address	Hardware Address	Interface.
10.0.0.4	0009.7CD2.A25A	FastEthernet0

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Request map the name of IP address.

welcome to CN lab:

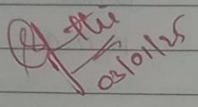
Quick link:

Small page:

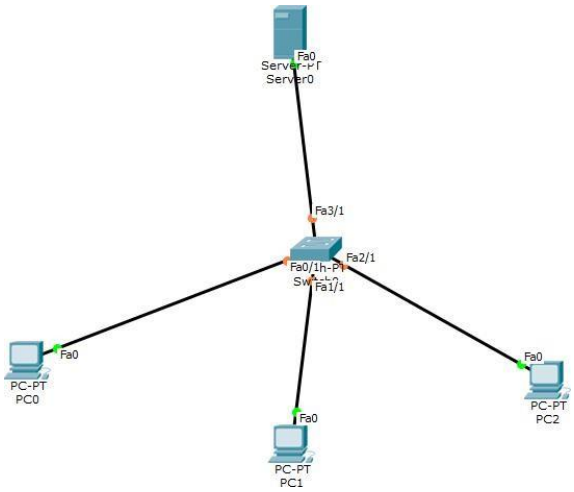
copy right:

Image page:

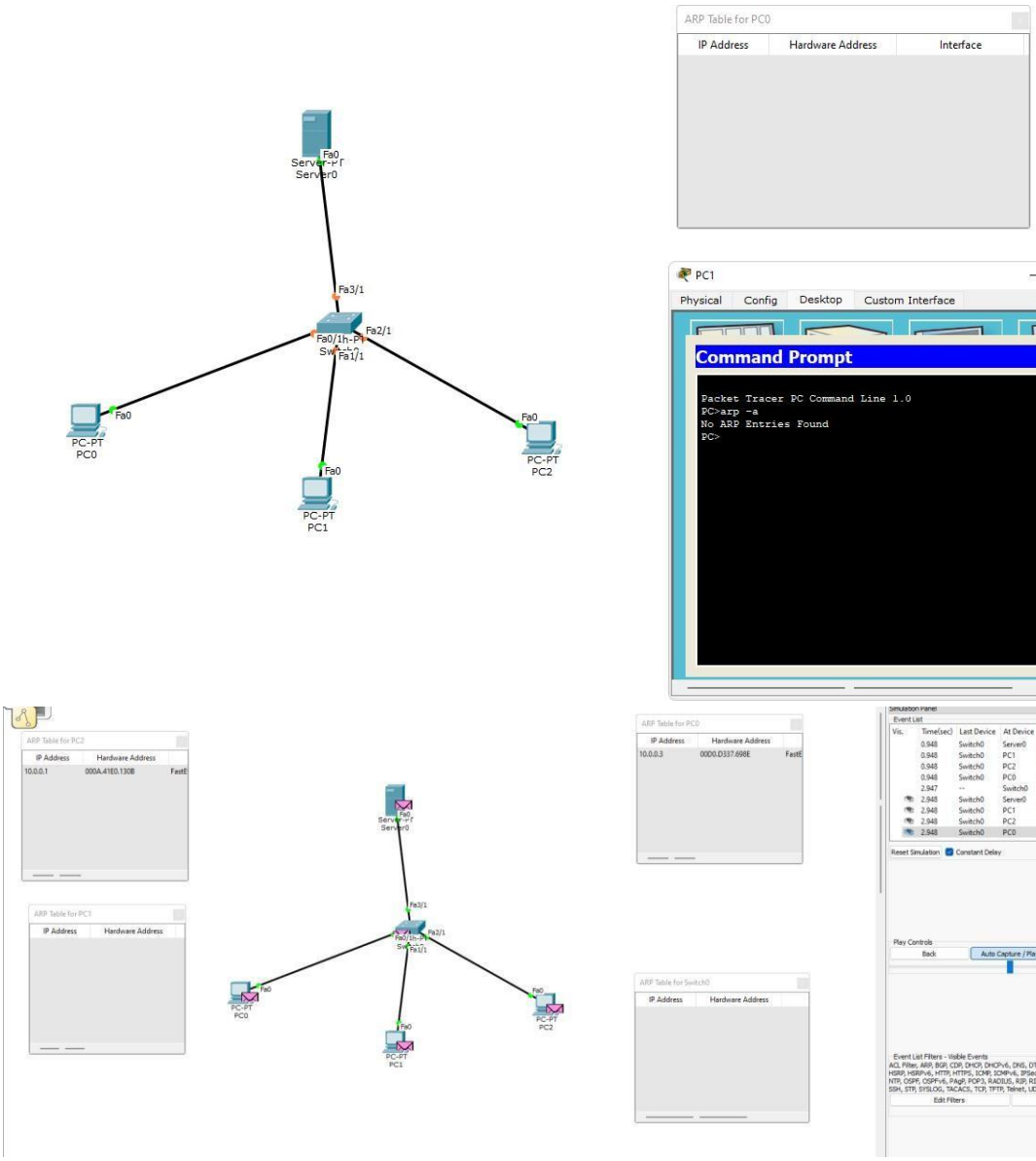
image:



Topology:

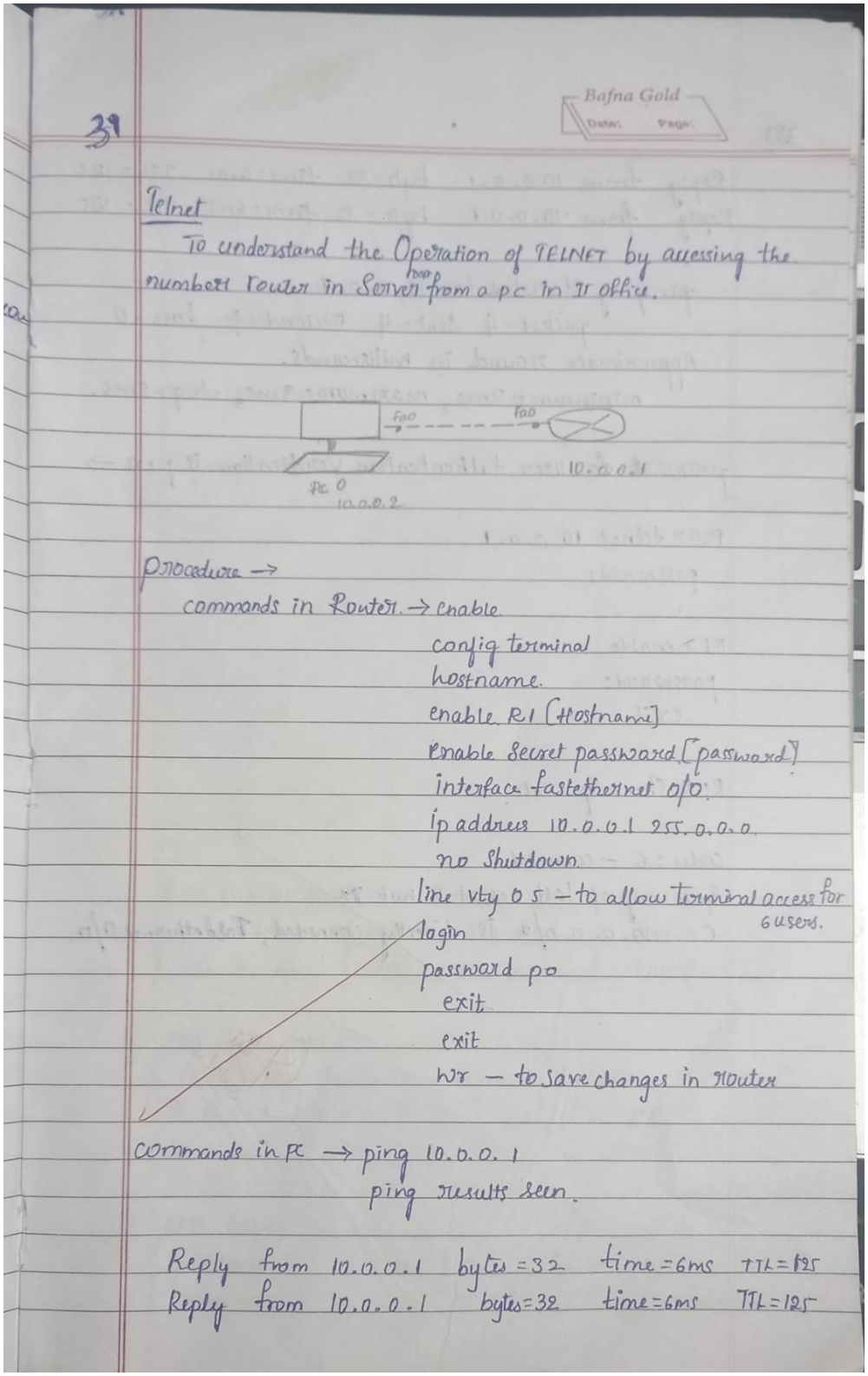

Fa0
Server0
Fa3/1
Fa2/1
Fa1/1
Fa0
PC-PT
PC0
Fa0
PC-PT
PC2
Fa0
PC-PT
PC1

Output:


ARP Table for PC0
IP Address
Hardware Address
Interface
Server0
Fa0
Fa3/1
Fa2/1
Fa1/1
Fa0/1h-PT
PC-PT
PC0
PC1
PC2
PC1
Physical
Config
Desktop
Custom Interface
Command Prompt
Packet Tracer PC Command Line 1.0
PC>arp -a
No ARP Entries Found
PC>

18|12|2024 Experiment 10- To understand the operation of TELNET by accessing the router in server room from a PC in IT office.

Observation Book:



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Telnet

To understand the Operation of TELNET by accessing the number router in Server room from a pc in IT office.

Fa0 Fa0 10.0.0.1

PC 0
10.0.0.2

Procedure →

commands in Router. → enable
config terminal
hostname.
enable R1 [Hostname]
enable secret password [password]
interface fastethernet 0/0.
ip address 10.0.0.1 255.0.0.0.
no shutdown.
line vty 0 5 – to allow terminal access for 6 users.
login
password pa
exit
exit
wr – to save changes in router

commands in PC → ping 10.0.0.1
ping results seen.

Reply from 10.0.0.1 bytes=32 time=6ms TTL=125
Reply from 10.0.0.1 bytes=32 time=6ms TTL=125

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Reply from 10.0.0.1 byte=32 time=6ms TTL=125
Reply from 10.0.0.1 byte=32 time=6ms TTL=125

pinging Statistics for 10.0.0.1
packet=4 Sent=4 Recieved=4 loss=0
Approximate round in miliseconds.
minimum=2ms, maximum=9ms, Avg=5ms.

password for user Authentication Verification is pc0 →

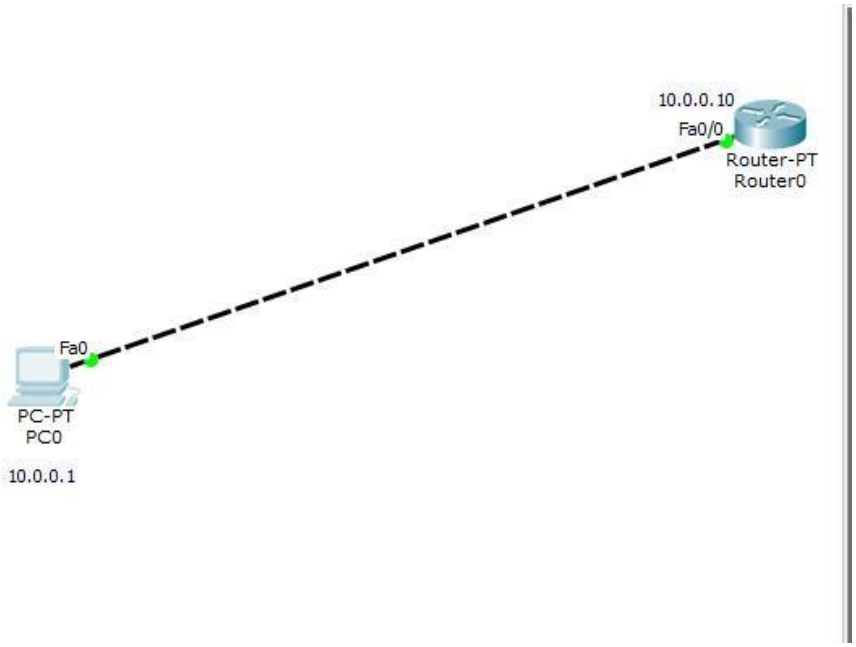
PC0> telnet 10.0.0.1
password:

R1> enable
password:
exit

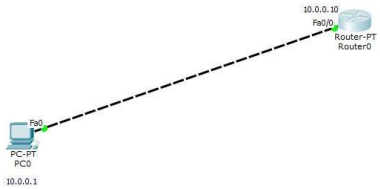
R1# Show ip route

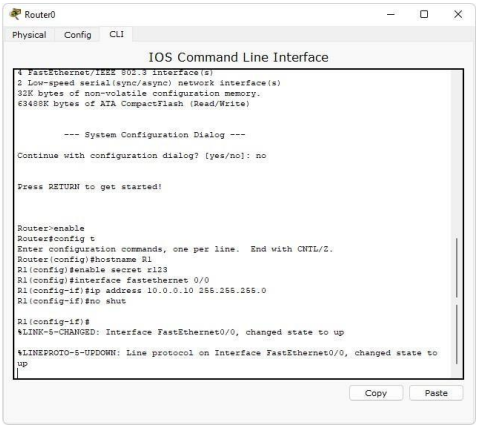
Codes: C - connected
Gate way of last resort is not set.
C 10.0.0.0/0 is directly connected, FastEthernet 0/0.

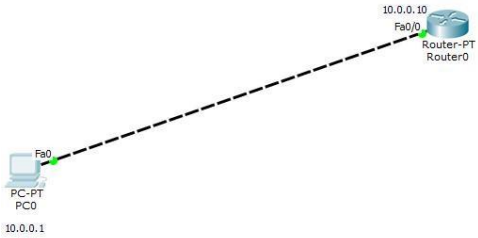
Topology:

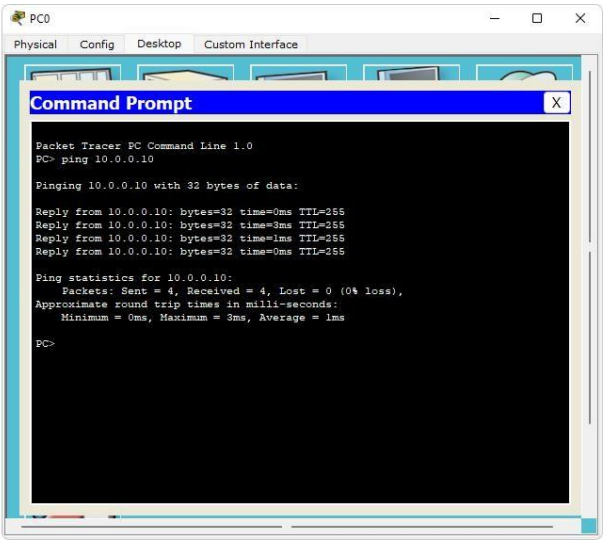


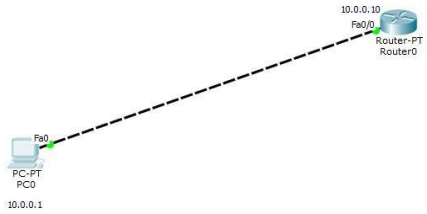
Output:

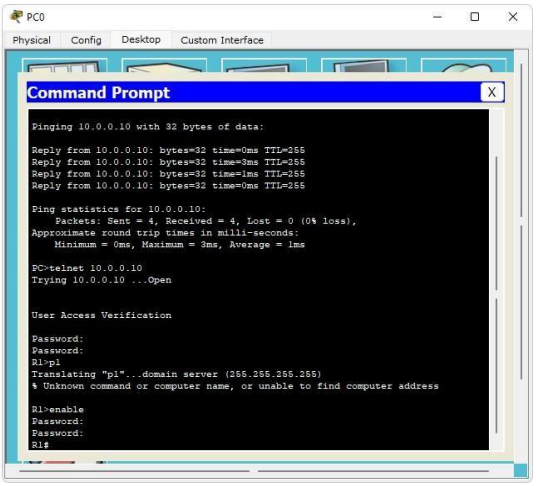





10.0.0.10
Fa0/0
Router-PT
Router0
Fa0
PC-PT
PC0
10.0.0.1


PC0
Physical
Config
Desktop
Custom Interface
Command Prompt
X
Packet Tracer PC Command Line 1.0
PC> ping 10.0.0.10
Pinging 10.0.0.10 with 32 bytes of data:
Reply from 10.0.0.10: bytes=32 time=0ms TTL=255
Reply from 10.0.0.10: bytes=32 time=3ms TTL=255
Reply from 10.0.0.10: bytes=32 time=1ms TTL=255
Reply from 10.0.0.10: bytes=32 time=0ms TTL=255
Ping statistics for 10.0.0.10:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 3ms, Average = 1ms
PC>


10.0.0.10
Fa0/0
Router-PT
Router0
Fa0
PC-PT
PC0
10.0.0.1


PC0
Physical
Config
Desktop
Custom Interface
Command Prompt
X
Pinging 10.0.0.10 with 32 bytes of data:
Reply from 10.0.0.10: bytes=32 time=0ms TTL=255
Reply from 10.0.0.10: bytes=32 time=0ms TTL=255
Reply from 10.0.0.10: bytes=32 time=1ms TTL=255
Reply from 10.0.0.10: bytes=32 time=0ms TTL=255
Ping statistics for 10.0.0.10:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 3ms, Average = 1ms
PC>telnet 10.0.0.10
Trying 10.0.0.10 ...Open
User Access Verification
Password:
Password:
R1>p1
Translating "p1"...domain server (255.255.255.255)
% Unknown command or computer name, or unable to find computer address
R1>enable
Password:
Password:
R1#

EXPERIMENT-11 To construct a VLAN and make the PC's communicate among a VLAN

Observation:

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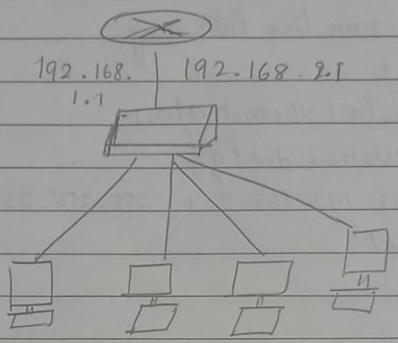
Date: Page:

Aim → To construct a VLAN and make the PC's communicat -ive among a VLAN

Topology →



Steps →

1. To create a new VLAN, we use a class C type addresses.
2. Create a topology as seen below.
   Choose the 1841 router.
3. In the Switch go to config tab and select VLAN database
4. Give any VLAN number say 2 here include any name. Say add.
5. Select the interface is fastethernet 4/1 [near Switch from router] and make it trunk.
6. VLAN trunking allows Switches to forwards frames from diff VLAN's Over a Single link called trunk.
7. This is done by adding an additional header information called tag to the ethernet frame. The process of Adding this small header is called VLAN tagging.
8. Looks into the interfaces of the Switches with the 2 NEW VLAN Systems.

36.

This makes the Switch understand NEWVLAN
Next the router is to understand the NEWVLAN

9. Config tab of router Select VLAN Database order the number and name of the VLAN created.

Go to CLI, run the following

```
config t
interface fastethernet 0/0.1
encapsulation dot1q 2
ipaddress 192.168.2.1 255.255.255.0
no shut
exit
```

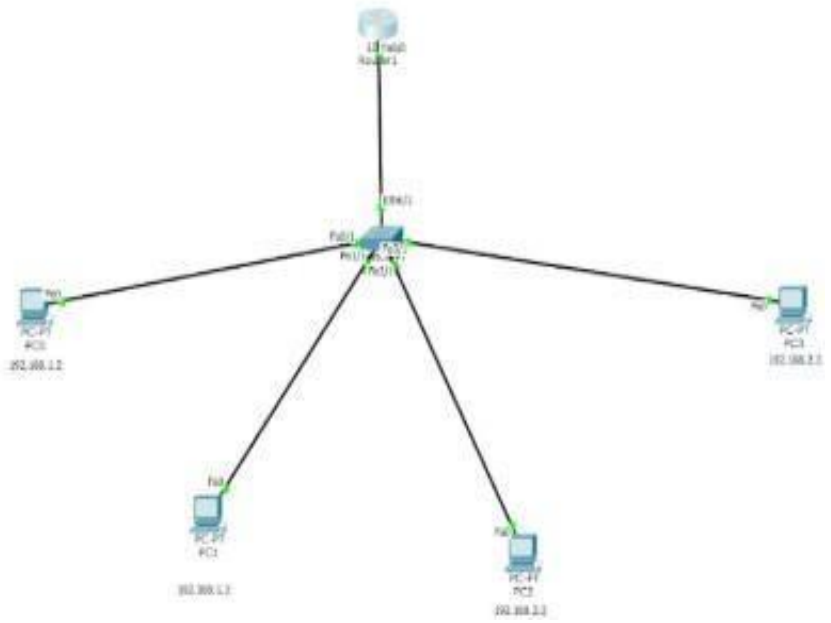
Observation →

1. VLAN are used to logically Segment a network devices in the same VLAN to communicate directly while isolating traffic from Others VLAN's

2. Switches must be configured to create VLAN's assign VLAN IDS & allocate ports to Spefic VLAN's

03/01/25

Screenshot of the topology:

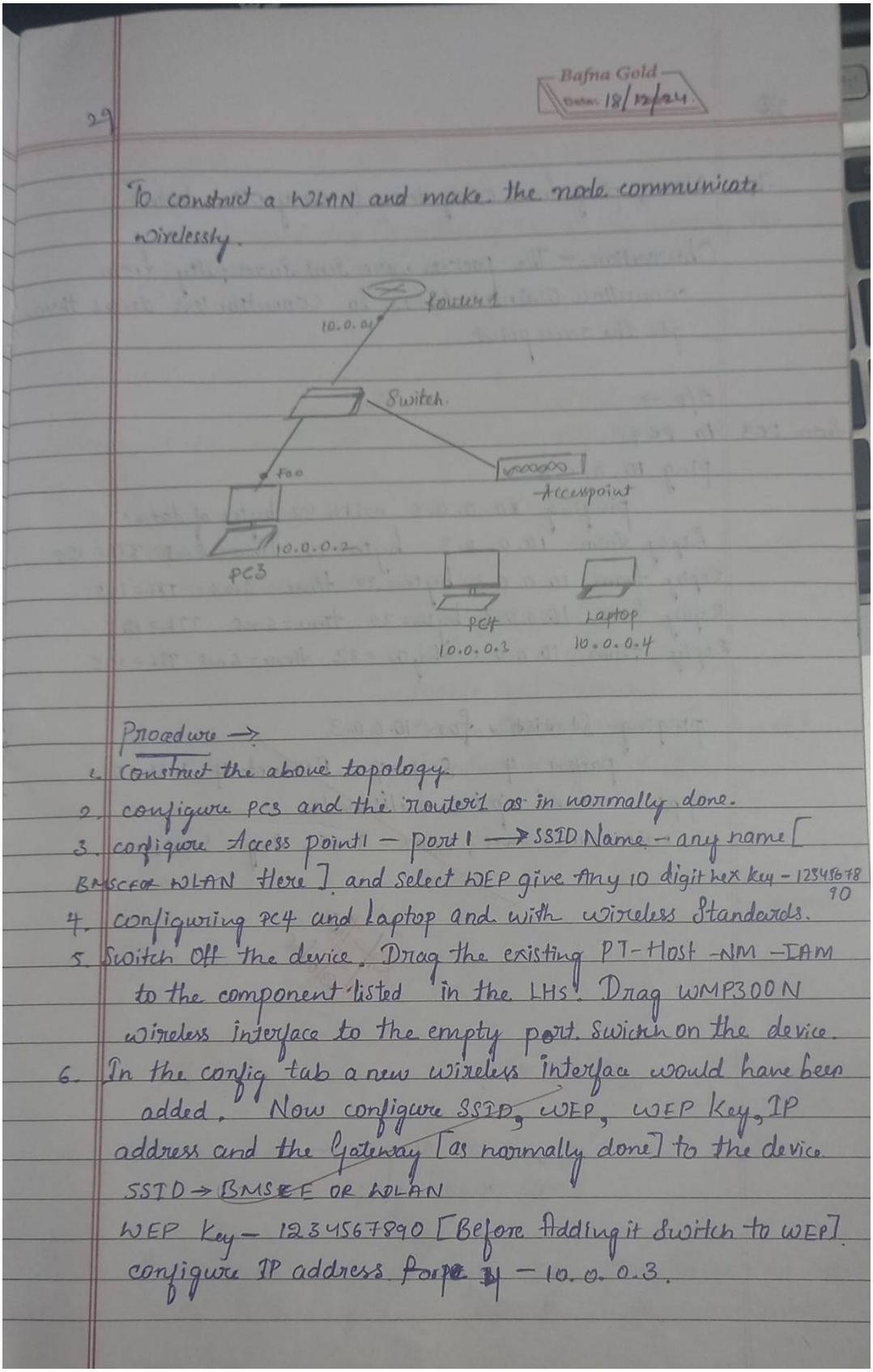


Screenshot of the output:


```
PC>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Reply from 192.168.1.3: bytes=32 time=0ms TTL=128
Reply from 192.168.1.3: bytes=32 time=0ms TTL=128
Reply from 192.168.1.3: bytes=32 time=3ms TTL=128
Reply from 192.168.1.3: bytes=32 time=0ms TTL=128

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 3ms, Average = 0ms
```

18|12|2024 Experiment 12- To construct a WLAN and make the nodes communicate wirelessly

Observation Book:



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Bafna Gold
Date: 18/12/24

To construct a WLAN and make the node communicate wirelessly.

Procedure →

1. Construct the above topology.
2. configure PC3 and the router1 as in normally done.
3. configure Access point1 – port 1 → SSID Name – any name [BMSCE or WLAN Here] and select WEP give Any 10 digit hex key – 1234567890
4. configuring PC4 and Laptop and with wireless Standards.
5. Switch Off the device. Drag the existing PT-Host -NM -1AM to the component listed in the LHS. Drag WMP300N wireless interface to the empty port. Switch on the device.
6. In the config tab a new wireless interface would have been added. Now configure SSID, WEP, WEP Key, IP address and the Gateway [as normally done] to the device.

SSID → BMSCE OR WLAN

WEP Key – 1234567890 [Before adding it Switch to WEP]

configure IP address for PC4 – 10.0.0.3.

7. Now, ping from every device to every other device.

Observation – The packets were sent successfully from connection oriented devices to connectionless devices through the access point

O/P →

from PC3 to PC4

ping 10.0.0.3

pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3 bytes=32 time=6ms TTL=125

Reply from 10.0.0.3 bytes=32 time=6ms TTL=125

Reply from 10.0.0.3 bytes=32 time=6ms TTL=125

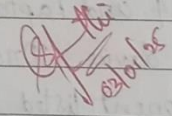
Reply from 10.0.0.3 bytes=32 time=6ms TTL=125

pinging statistics for 10.0.0.3

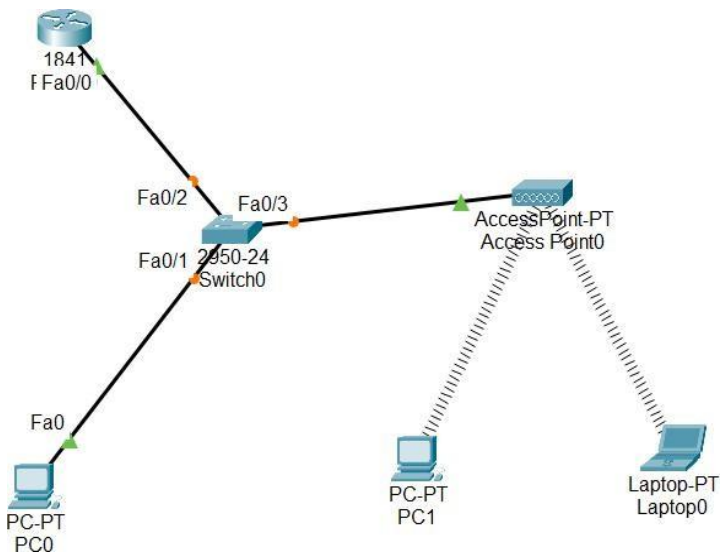
packet = 4 Sent = 4 Recieved = 4 loss = 0

Appx round trip in milliseconds

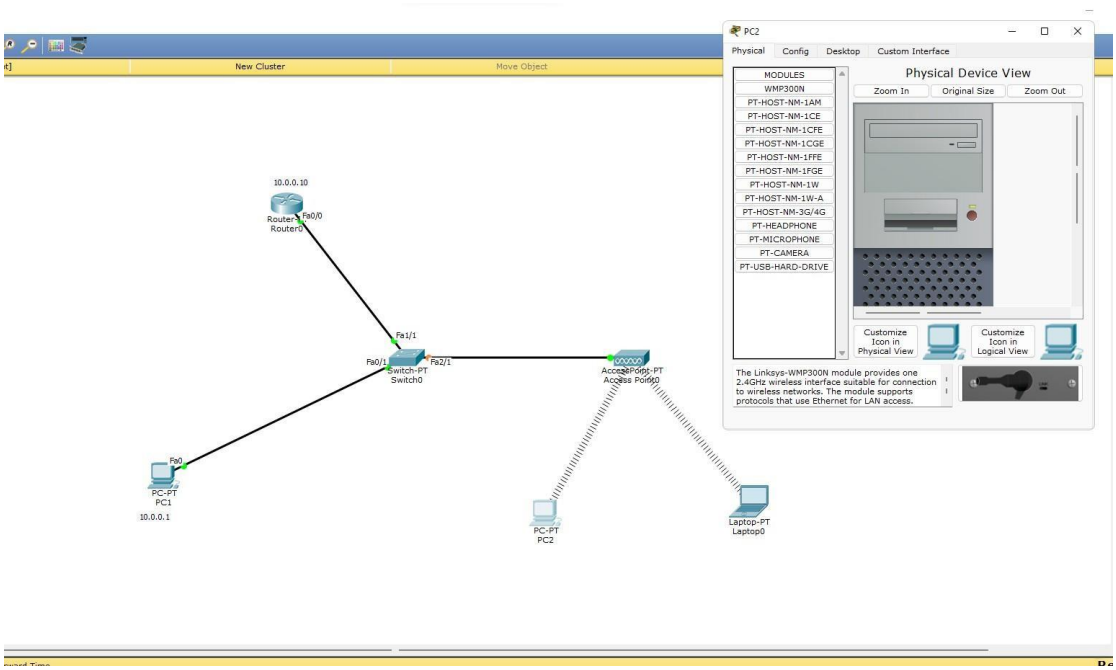
minimum = 2ms, max = 9ms, Avg = 5ms.

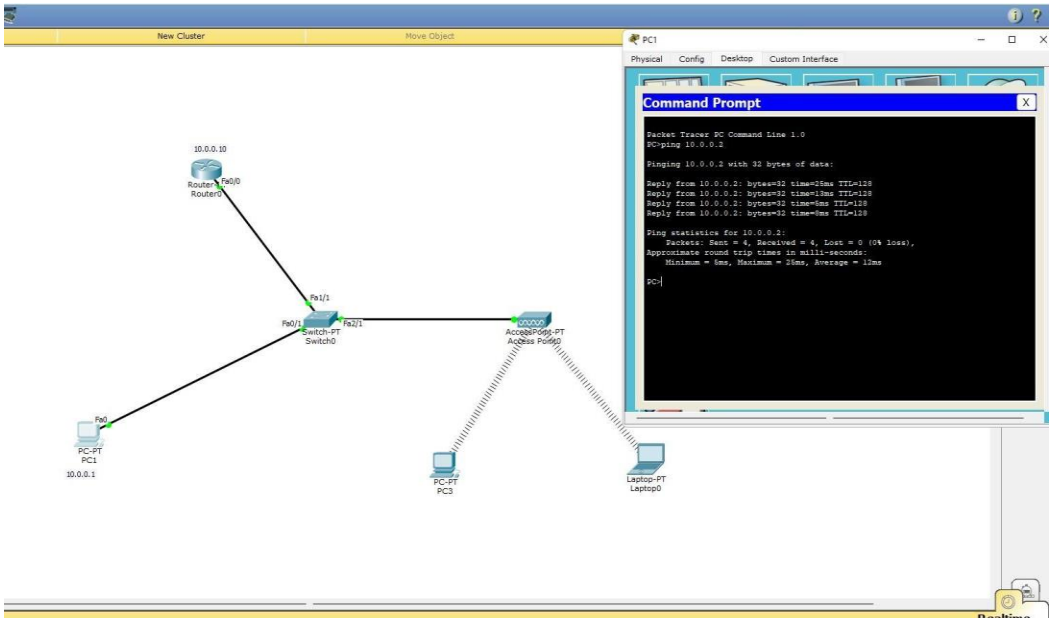


opology:



Output:



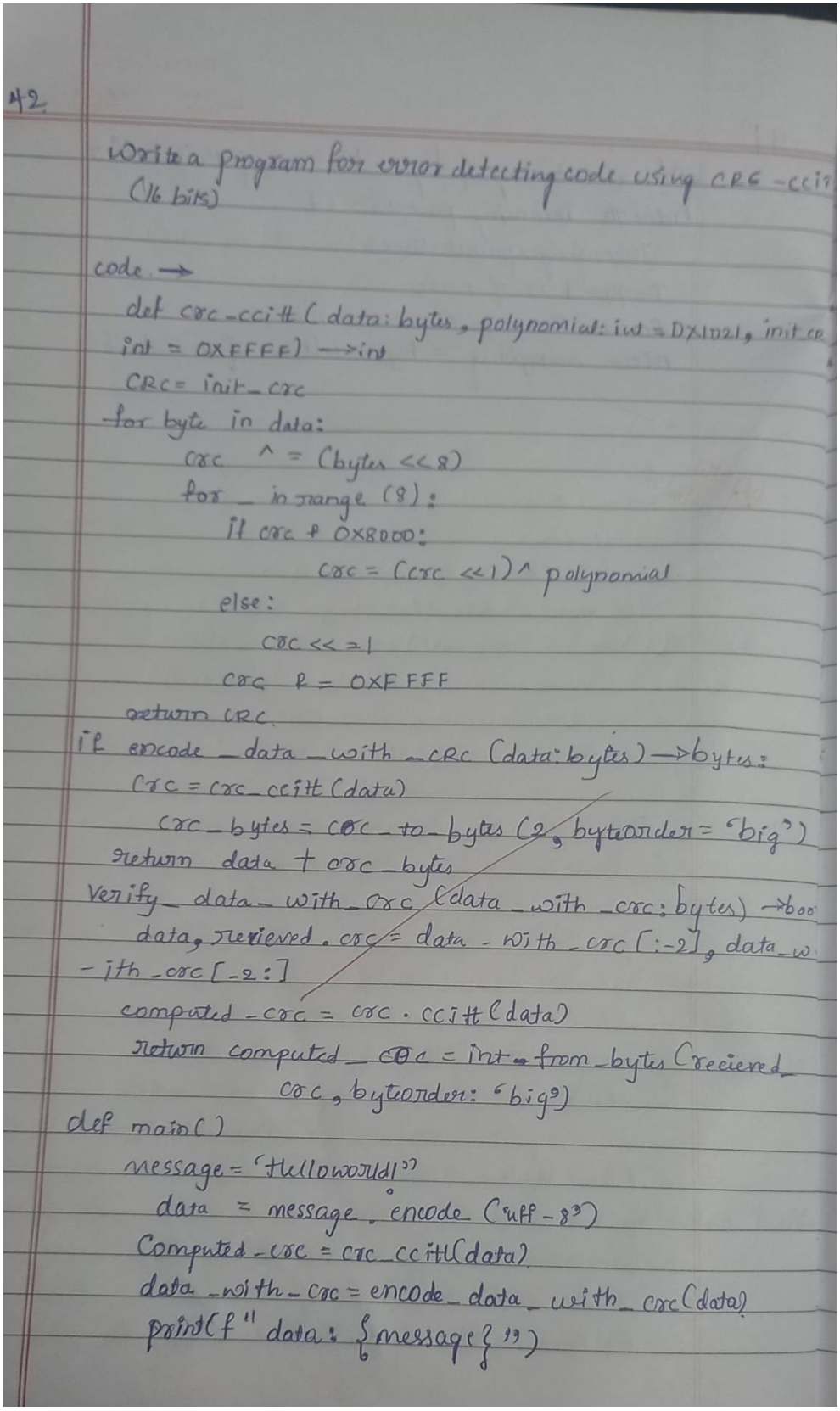

New Cluster
Move Object
10.0.0.10
Router-PT
Router0
Fa0/0
Fa1/1
Fa0/1
Fa2/1
Switch-PT
Switch0
Access Point0
Fa0
PC-PT
PC1
10.0.0.1
PC-PT
PC3
Laptop-PT
Laptop0
PC1
Physical
Config
Desktop
Custom Interface
Command Prompt
X
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.2
Pinging 10.0.0.2 with 32 bytes of data:
Reply from 10.0.0.2: bytes=32 time=25ms TTL=128
Reply from 10.0.0.2: bytes=32 time=13ms TTL=128
Reply from 10.0.0.2: bytes=32 time=8ms TTL=128
Reply from 10.0.0.2: bytes=32 time=8ms TTL=128
Ping statistics for 10.0.0.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 8ms, Maximum = 25ms, Average = 13ms
PC>

PART-B

Program 14

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

Code :



```
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Write a program for error detecting code using CRC-CCIT
(16 bits)

code →
def crc_ccitt(data: bytes, polynomial: iw = 0x1021, init_cr
int = 0xFFFF) →int
CRC= init_crc
for byte in data:
    crc ^= (bytes <<8)
    for _ in range (8):
        if crc & 0x8000:
            crc = (crc <<1)^ polynomial
        else:
            crc <<=1
        crc &= 0xFFFF
return CRC
if encode_data_with_CRC (data:bytes) →bytes:
crc = crc_ccitt(data)
    crc_bytes = crc_to_bytes (2, byteorder = 'big')
return data + crc_bytes
Verify_data_with_crc (data_with_crc: bytes) →boo
    data, recieved_crc = data_with_crc[:-2], data_w
-ith_crc[-2:]
    computed_crc = crc.ccitt(data)
    return computed_crc = int.from_bytes (recieved_
            crc, byteorder: 'big')
def main()
    message = 'Helloworld!'
    data = message.encode ('utf-8')
    Computed_crc = crc_ccitt(data)
    data_with_crc = encode_data_with_crc(data)
    print(f" data: {message}")
```

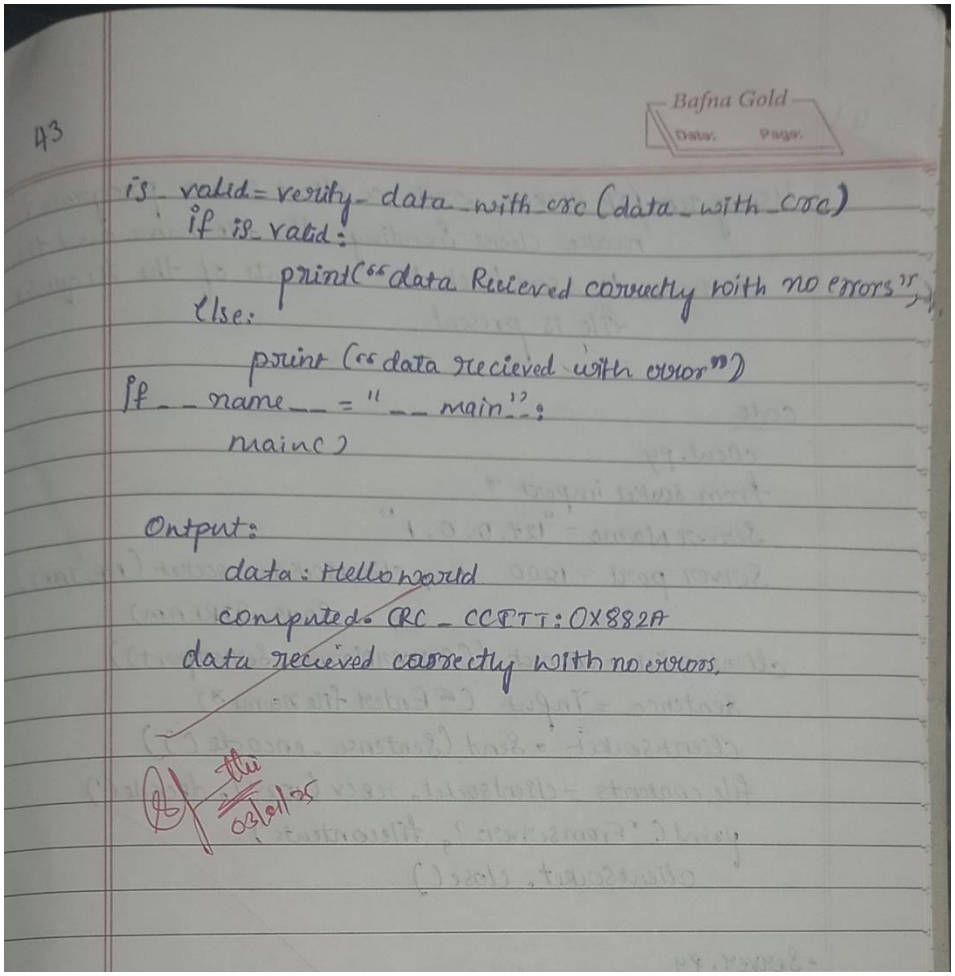

```
is_valid = verify_data_with_crc(data_with_crc)
if is_valid:
    print("Data Received correctly with no errors")
else:
    print("Data received with error")
if __name__ == "__main__":
    main()
```

Output:

```
data: Helloworld
computed CRC_CCITT: 0X882A
data received correctly with no errors.
```

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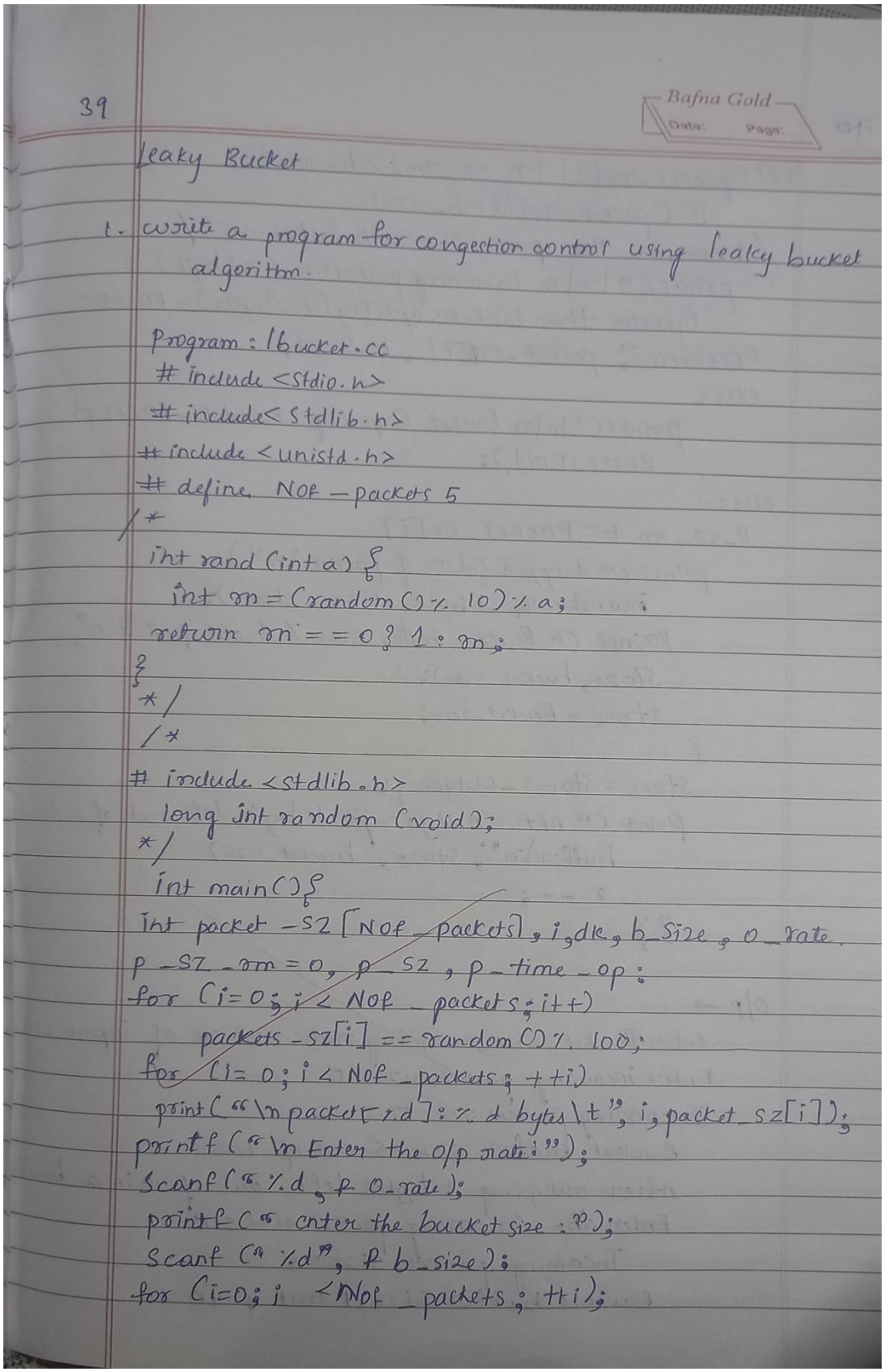
```
Output

Enter data: 1100110
Enter generator polynomial: 1101
CRC: 100
Transmitted Data: 1100110100
Enter received data: 1100110100
No Error

=== Code Execution Successful ===
```

Program 15

Write a program for congestion control using Leaky bucket algorithm.

Code:



```
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Leaky Bucket

1. write a program for congestion control using leaky bucket
   algorithm.

Program : lbucket.cc
# include <stdio.h>
# include< stdlib.h>
# include <unistd.h>
# define NOf_packets 5
/*
int rand (int a) {
  int rn = (random () % 10) % a;
  return rn == 0 ? 1 : rn;
}
*/
/*
# include <stdlib.h>
  long int random (void);
*/
  int main(){
int packet_sz [NOf_packets], i, dle, b_size, o_rate,
p_sz_rm = 0, p_sz, p_time_op ;
for (i=0; i < NOf_packets; i++)
     packets_sz[i] == random () % 100;
for (i= 0; i < NOf_packets; ++i)
  print ("\n packet [%d]: %d bytes \t", i, packet_sz[i]);
printf ("\n Enter the o/p rate:");
Scanf ("%d, & o_rate);
printf (" enter the bucket size :");
Scanf ("%d", & b_size);
for (i=0; i <Nof_packets; ++i);
```
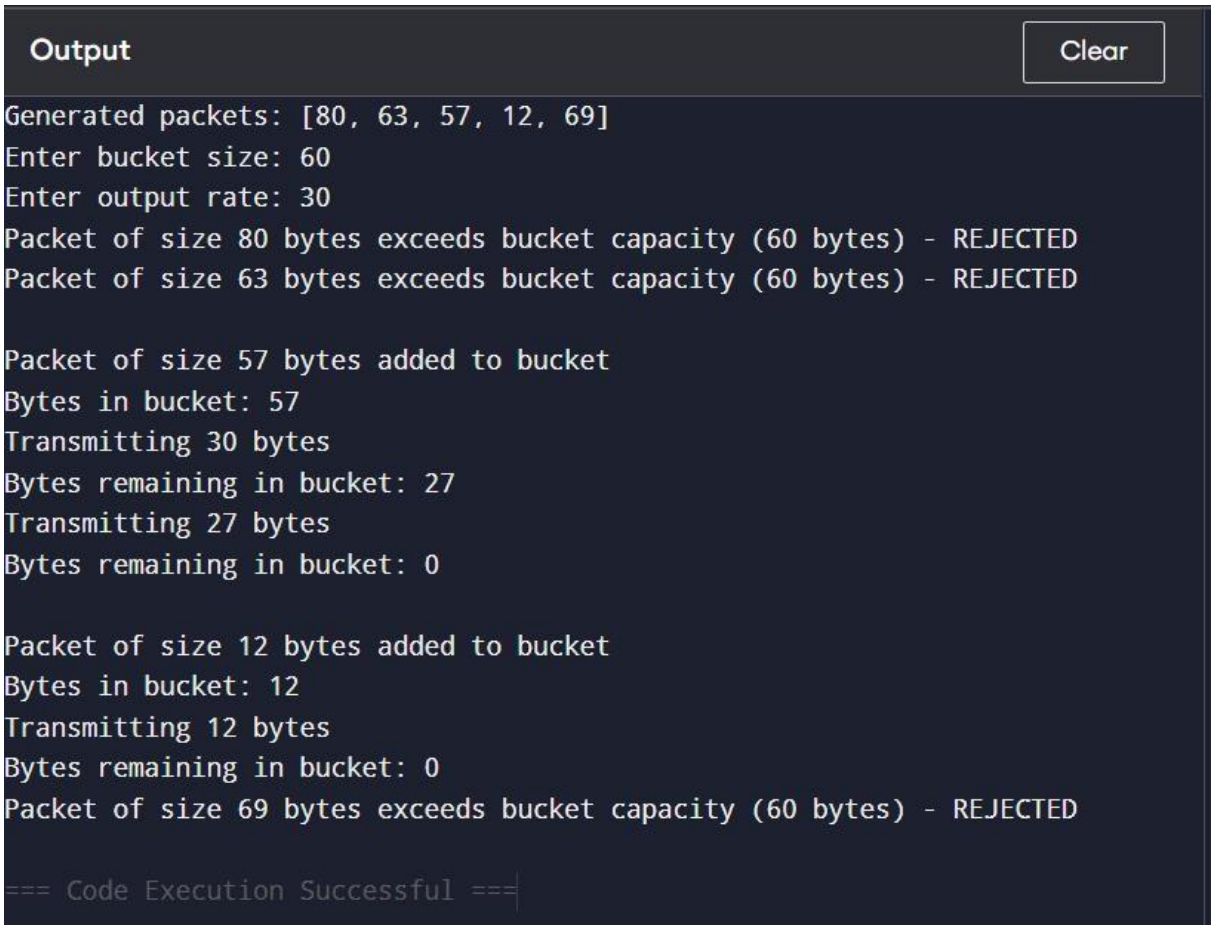

```
{if(packet_sz[i]+p_sz_rm)>b_size)
    if (packet_sz[i]>b_size)
/* compare the packet size with buket size */
  printf("\n\n Incoming packet size (%d byte) is
    Greater than bucket capacity (%d bytes) - PAKET
  REJECTED", packet_sz[i], b_size);
  else:
      printf("\n\n Bucket Capacity exceeded - PACKETS
        REJECTED!!.");
  else:
   P_sz_rm += PACKET_sz[i];
     printf("dropped %d no of packets\n")
        inconstantly - (bucket size - store));
     printf("Bucket buffer size %d out of %d\n",
     Store, bucket_size);
     store = bucket_size;
   }
    Store = Store - Outgoing;
    Print("After outgoing %d bytes left out of %d in
        buffer\n", Store, bucket_size)
        n--;
  }}
```

o/p →

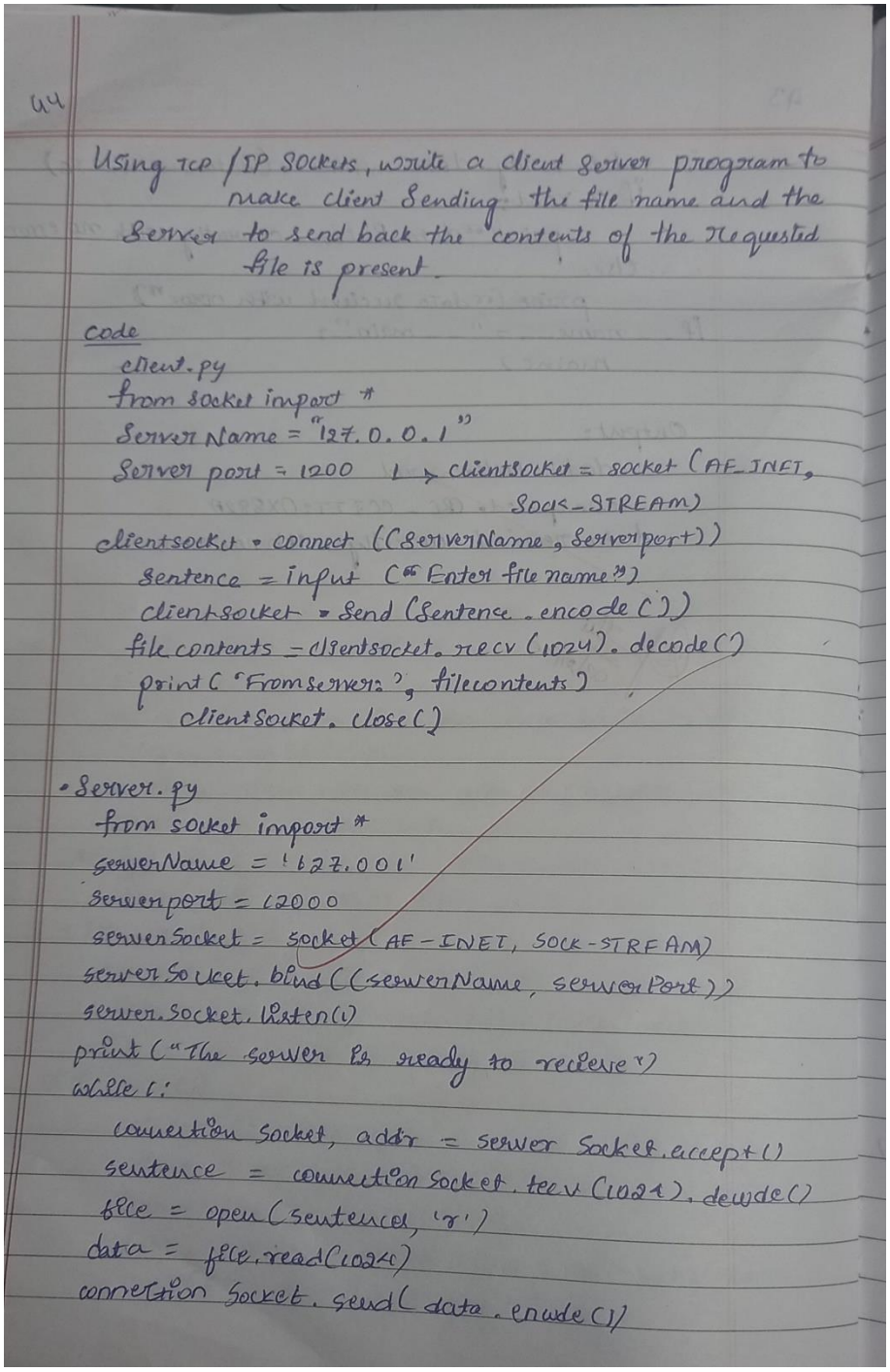
```
enter Bucket_size, outgoing rate and no of inputs: 10
Enter incoming packet_size: 5
Incoming packet size: 5
  Bucket buffer size 5 out of 10
  After outgoing 2 bytes left out of 10 in a buff
  Enter the incoming packet size: 15
    Incoming packet size: 5
  Bucket buffer size 1 out of 10
```


Output
Clear
Generated packets: [80, 63, 57, 12, 69]
Enter bucket size: 60
Enter output rate: 30
Packet of size 80 bytes exceeds bucket capacity (60 bytes) - REJECTED
Packet of size 63 bytes exceeds bucket capacity (60 bytes) - REJECTED
Packet of size 57 bytes added to bucket
Bytes in bucket: 57
Transmitting 30 bytes
Bytes remaining in bucket: 27
Transmitting 27 bytes
Bytes remaining in bucket: 0
Packet of size 12 bytes added to bucket
Bytes in bucket: 12
Transmitting 12 bytes
Bytes remaining in bucket: 0
Packet of size 69 bytes exceeds bucket capacity (60 bytes) - REJECTED
=== Code Execution Successful ===

Program 16

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

Code and Output:



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 is present.

Code

client.py

```
from socket import *
ServerName = "127.0.0.1"
Serverport = 1200 → clientSocket = socket(AF_INET, SOCK_STREAM)
clientsocket.connect((ServerName, Serverport))
sentence = input("Enter file name")
clientsocket.send(sentence.encode())
filecontents = clientsocket.recv(1024).decode()
print("From server:", filecontents)
clientSocket.close()
```

- Server.py

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

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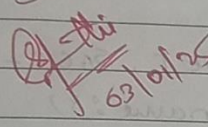
file.close()
connection socket.close()

Output :

Server.py - The server redy to recieve

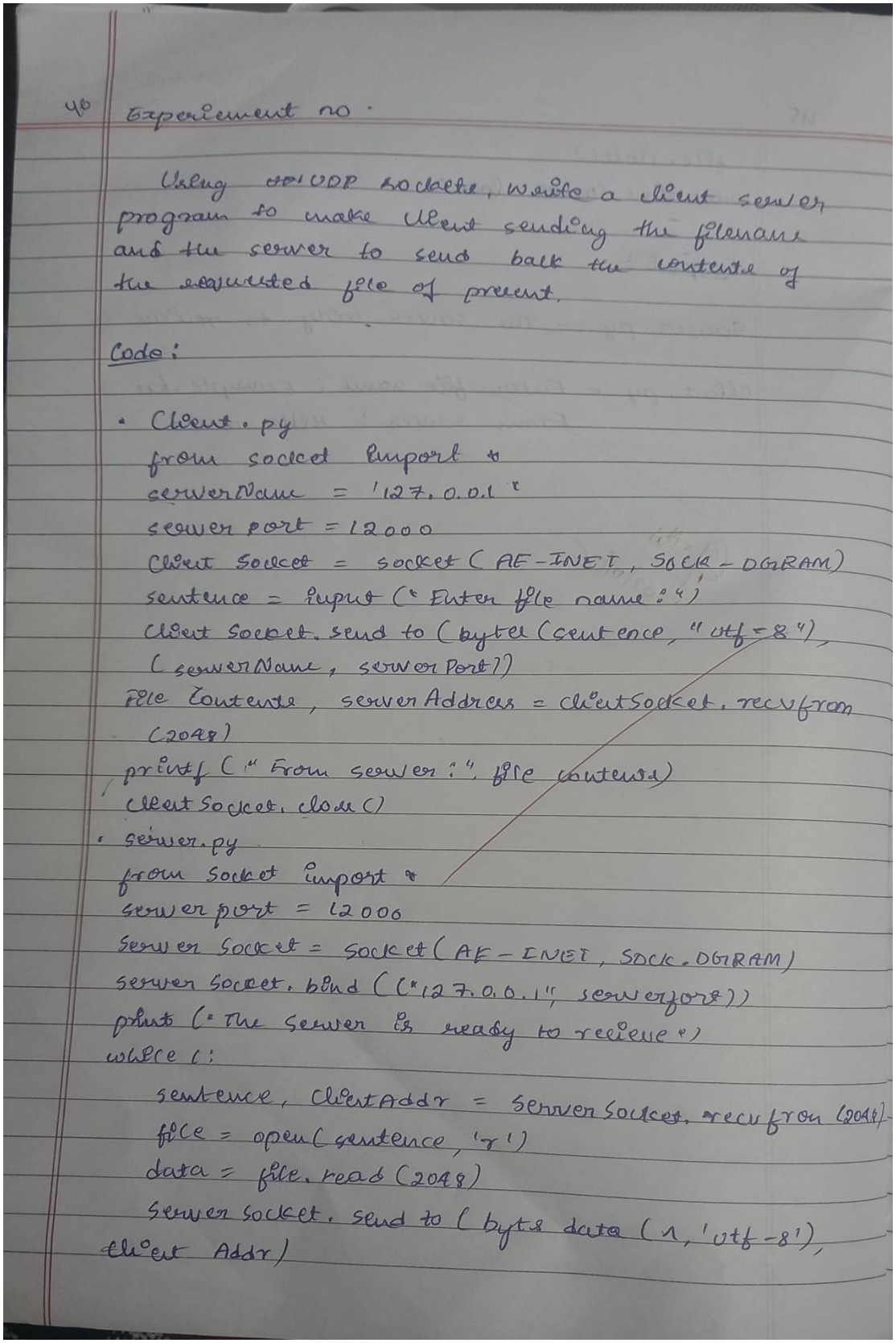
Client.py = Enter file name : Example.txt
From server : Hello, world!



Program 17

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

Code:



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

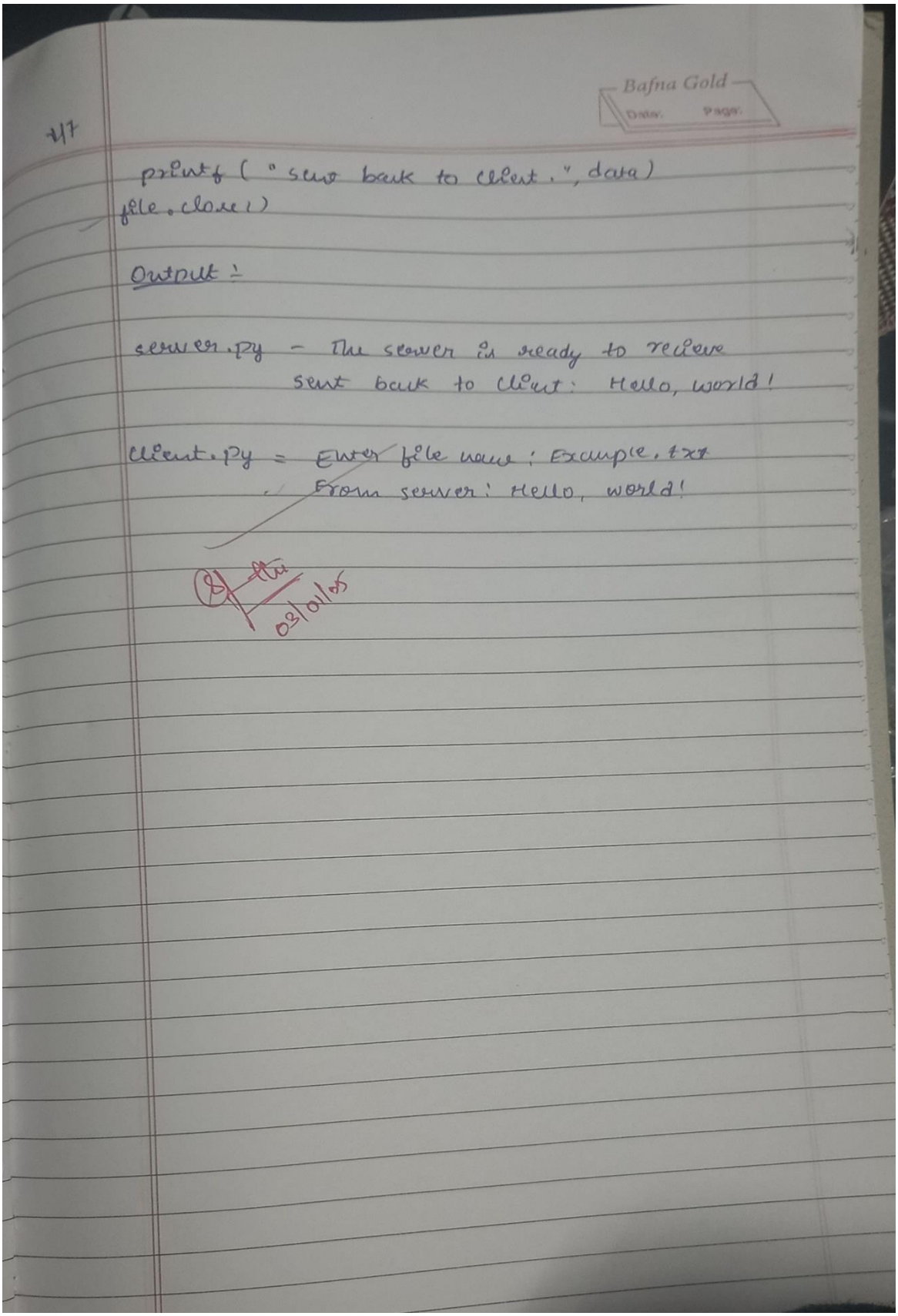
Code:

- Client.py

```
from socket import *
serverName = '127.0.0.1'
serverport = 12000
ClientSocket = socket(AF_INET, SOCK_DGRAM)
sentence = input("Enter file name:")
ClientSocket.sendto(bytes(sentence,"utf-8"),
(serverName, serverPort))
File Contents, serverAddress = clientSocket.recvfrom
(2048)
print("From Server:", file contents)
ClientSocket.close()
```

- server.py

```
from Socket import *
serverport = 12000
Server Socket = Socket(AF_INET, SOCK_DGRAM)
serverSocket.bind(("127.0.0.1", serverport))
print("The Server is ready to recieve")
while 1:
    sentence, clientAddr = serverSocket.recvfrom(2048)
    file = open(sentence, 'r')
    data = file.read(2048)
    Server Socket.sendto(bytes data(1,'utf-8'),
clientAddr)
```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print("sent back to client.", data)
file.close()
Output :
server.py - The server is ready to recieve
sent back to client: Hello, world!
client.py = Enter file name : Example.txt
From server: Hello, world!
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