VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

COMPUTER NETWORKS LAB

Submitted by

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in partial fulfillment for the award of the degree of
BACHELOR OF ENGINEERING
in
COMPUTER SCIENCE AND ENGINEERING

B.M.S. COLLEGE OF ENGINEERING
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Temple Road, Bangalore 560019
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Department of Computer Science and Engineering

CERTIFICATE

This is to certify that the Lab work entitled "COMPUTER NETWORKS LAB" carried out by **NIDHI M N (1BM21CS266),** 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 year 2023. The Lab report has been approved as it satisfies the academic requirements in respect of a **COMPUTER NETWORKS - (22CS4PCCON)** work prescribed for the said degree.

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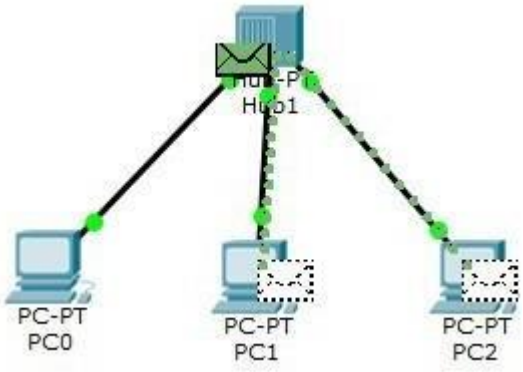
Cycle - 1

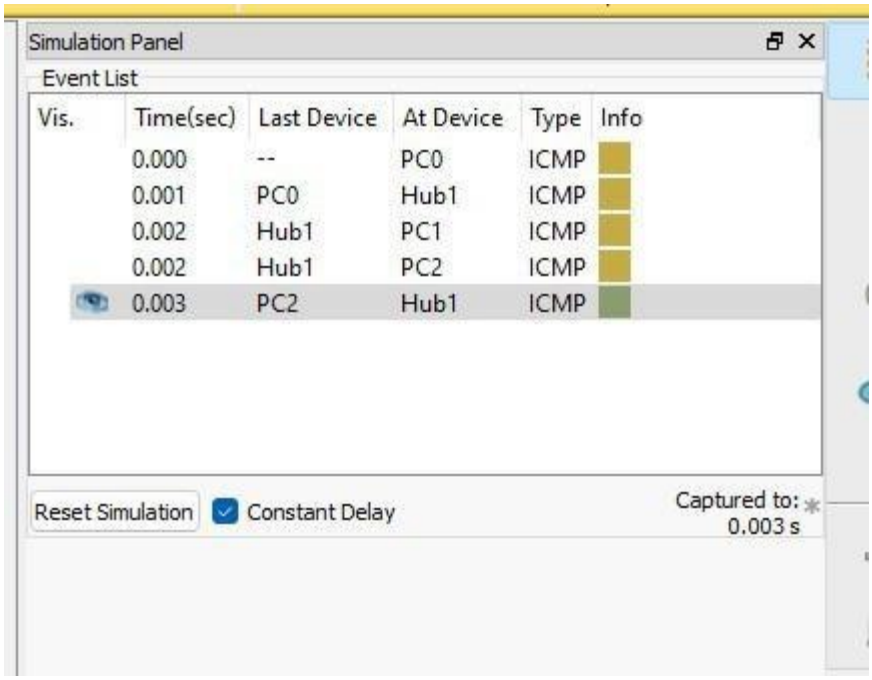
Experiment 1

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

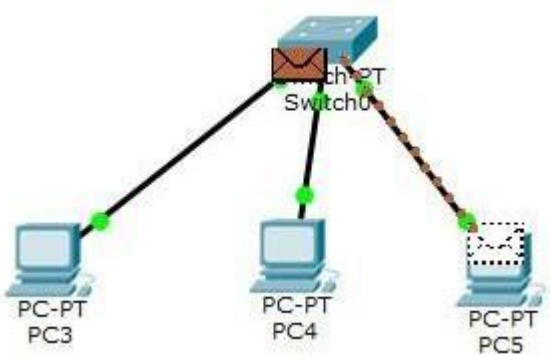
Topology:

Topology with Hub as connecting Device:

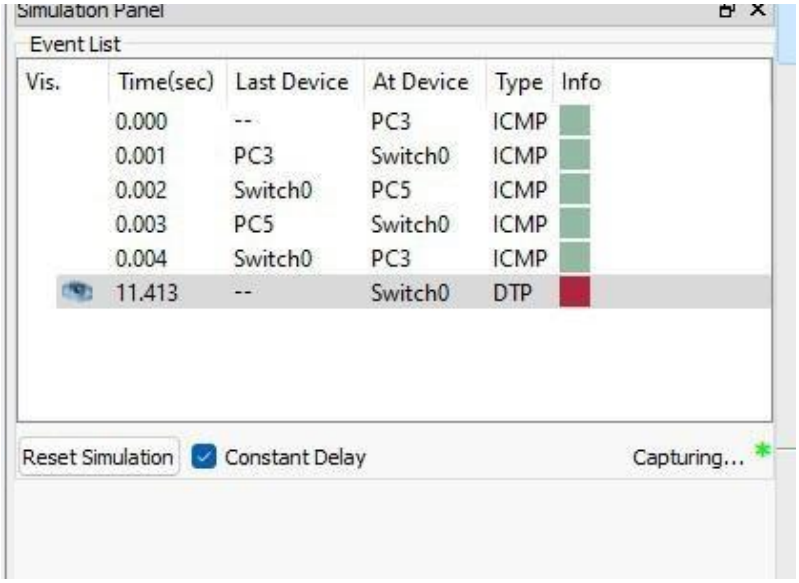




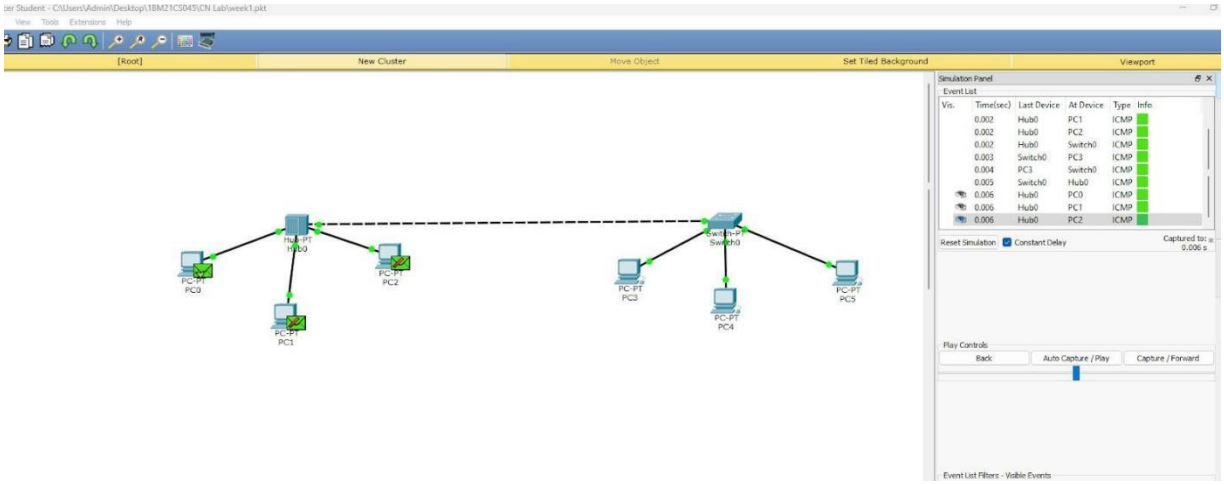
Topology with Switch as connecting Device:



Simulation Panel:



Topology with Switch and Hub together



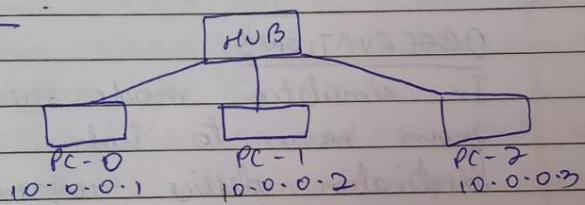
Experiment - 1

Create a topology and simulate sending PDV from source device and demonstrate ping message.

Aim : To make and understand topology using hub, switch and hybrid topology.

Network with Hub :-

Topology :



Procedure :

i) Select end users hence PC & generic hub
ii) Send a simple PDV message from PC-0 to PC-2 in simulation mode.
iii) In real time mode click on PC0
iv) Ping another PC. Ex: Ping 10.0.0.3.

Result :

i) The simple PDV is sent from PC0 to hub

ii) Wait for PC and switch connections to be established.
iii) Set IP address of all end devices by clicking on end user → config → assign IP address
iv) In realtime mode ping PC0 from PC0.

Result:

Ping 10.0.0.3
Reply from 10.0.0.3 bytes = 32 time = 0ms TTL = 128
Reply from 10.0.0.3 bytes = 32 time = 0ms TTL = 128
Reply from 10.0.0.3 bytes = 32 time = 0ms TTL = 128
ping statistics for 10.0.0.3
Packets: sent = 4 received = 4 lost = 0
Minimum = 0ms, Maximum = 0ms, average = 0ms

Observation:

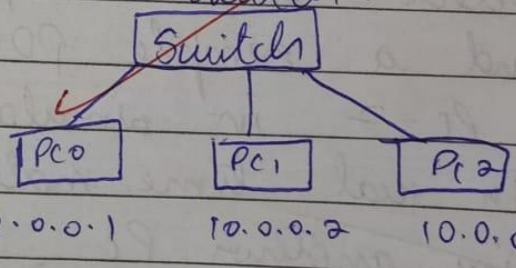
The simple PDU is sent from PC0 to switch, switch sends this data only to destination and receives the data.

ii) Hub sends PDU to all ports except destination port.
iii) PC2 sends an acknowledgement to hub.
iv) PC0 receives this and transferred.

Ping 10.0.0.3
Pinging 10.0.0.3 with 32 bytes of data
Ping statistics from 10.0.0.3
Packets : sent = 4, received = 4, lost = 0

OBSERVATIONS:
In simulation mode message was sent from source to hub. Only the destination device responds and receives the message whereas all others get rejected

Topology with Switch:
Topology :



Procedure:
i) Add a generic switch and connect 3 PC's to it using copper wire.

Reply from 10.0.0.6 byte = 32 time = 0ms TTL = 128
Ping statistics for 10.0.0.6
Packets sent = 4, received = 4, loss = 0

Observations:

Sending message from PC0 to PC5.
PC1 is the source mode which sends the message to other PC's.
HUB 1 sends this message to other PC's connected with it i.e to PC1 & PC0.
HUB 2 sends it to all end devices. PC5 accepts the message and acknowledges where as all other PC's reject it.

Sept

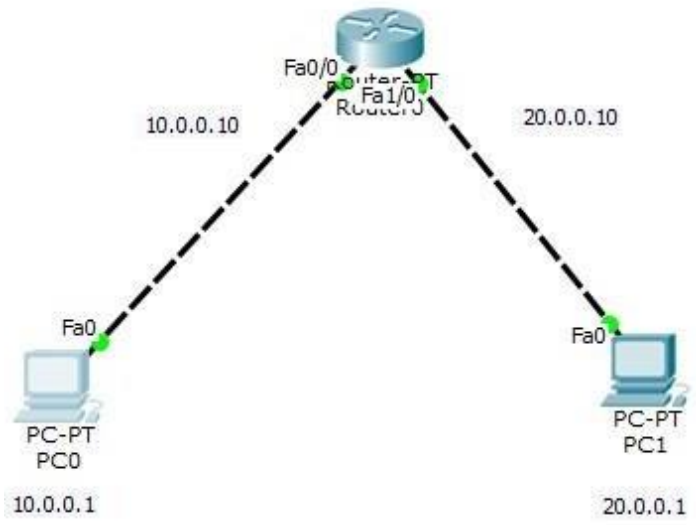
Experiment 2

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

2A:

Topology:

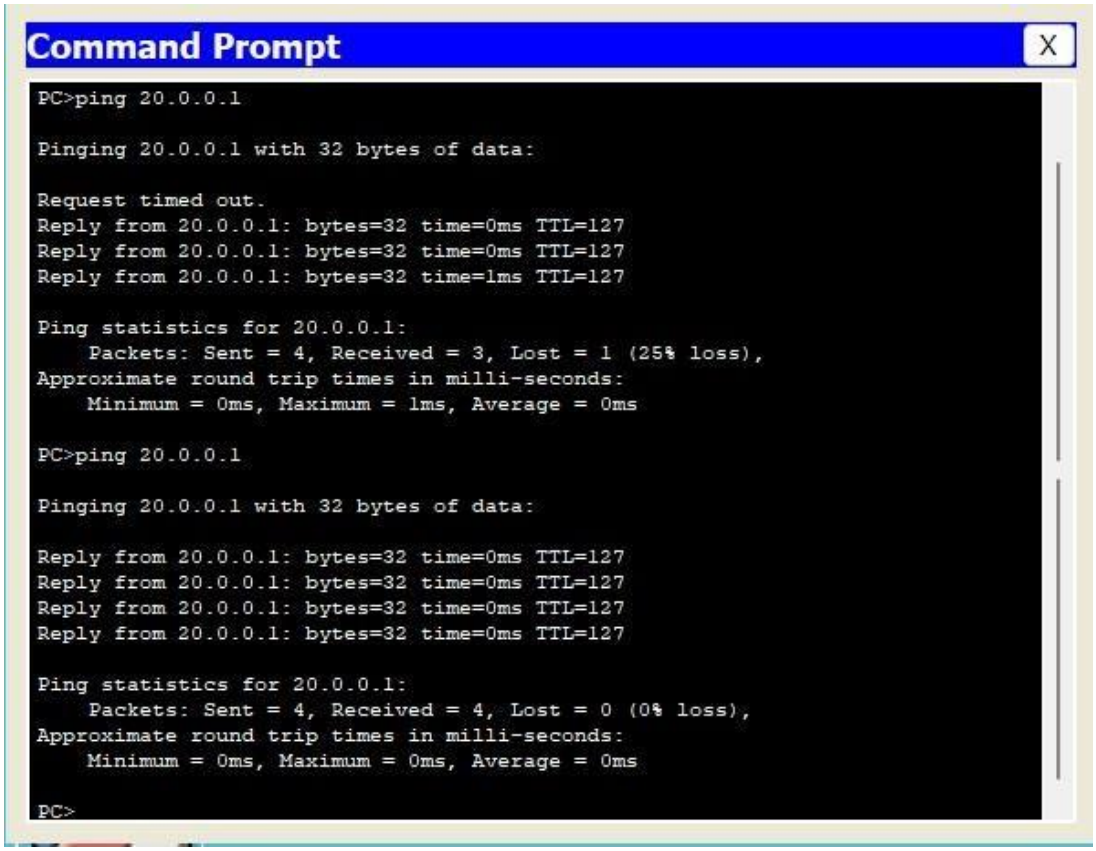
Topology with 1 router and 2 PCs:



Configuration of Router:

```
Continue with configuration dialog? [yes/no]: n


Press RETURN to get started!



Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface fastethernet0/0
Router(config-if)#ip address 10.0.0.10 255.0.0.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
exit
Router(config)#interface fastethernet1/0
Router(config-if)#ip address 20.0.0.10 255.0.0.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up
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

C    10.0.0.0/8 is directly connected, FastEthernet0/0
C    20.0.0.0/8 is directly connected, FastEthernet1/0
Router#
```

Ping Output:

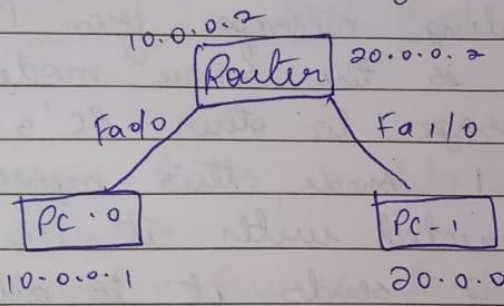

Command Prompt
X
PC>ping 20.0.0.1
Pinging 20.0.0.1 with 32 bytes of data:
Request timed out.
Reply from 20.0.0.1: bytes=32 time=0ms TTL=127
Reply from 20.0.0.1: bytes=32 time=0ms TTL=127
Reply from 20.0.0.1: bytes=32 time=1ms TTL=127
Ping statistics for 20.0.0.1:
Packets: Sent = 4, Received = 3, Lost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

Experiment - 2

Configure IP address to routers in packet tracer. Ping responses, destination, request timed out reply.

AIM: To understand different ping messages and when they are caused.

Topology:



Procedure:

i) Use a generic router and connect two end devices to it.

ii) Set the IP address of 2 PC's as 10.0.0.1 and 20.0.0.1

iii) In the router, go to command line interface and enter 'no' for continue.

iv) Type enable.

v) Type 'configure terminal'

router (config) # interface Fa0/0

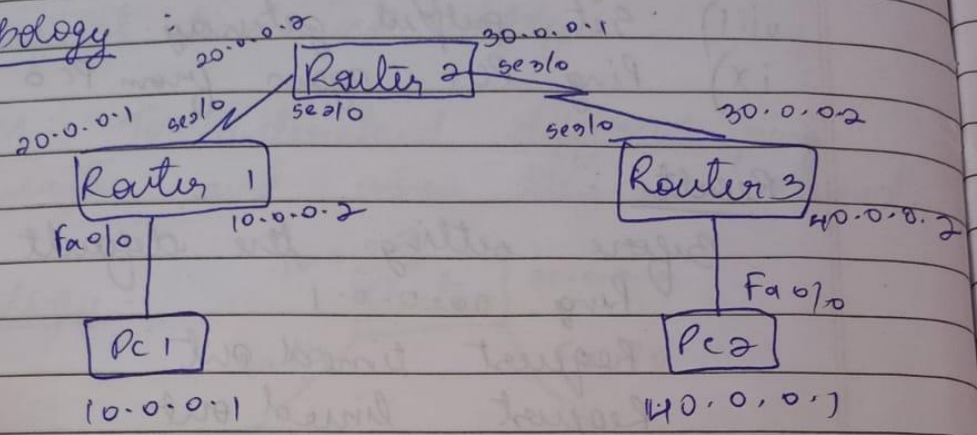
router (config-if) # ip address 10.0.0.2 255.0.0

router (config-if) # no shutdown.

router (config-if) # no exit.

3 routers together and end devices:

Topology:



Procedure:

i) Take 3 generic router & 2 end devices. The end devices are connected to R1

ii) Go to command line interface of R1 and config the IP address of fast ethernet

iii) Similarly for R-R connection use serial port of se 2/0 as 20.0.0.1

iv) Repeat step 3 & 4 for router 2 & 3

Following are the required IP addresses.

R1 → Fa 0/0 → 10.0.0.2

Se 2/0 → 20.0.0.1

R2 → Se 2/0 → 20.0.0.2

Se 3/0 → 30.0.0.1

R3 → se 3/0 → 30.0.0.2

Fa 0/0 → 40.0.0.2

vi) Repeat steps for Fa1/0 interface
vii) Ping PC1 from PC0.
viii) Set output gateway.
ix) Ping PC1 again from PC0.

Result :

Before setting the default gateway

Ping 20.0.0.1

Request timed out
Request timed out
Request timed out
Request timed out.

Ping statistics for 10.0.0.2
Packets sent = 4, received = 0, loss = 4.

After setting default gateway.

Ping 20.0.0.1

Ping statistics for 10.0.0.2
Packets : sent = 4, received = 0, loss = 0

Page No.
Date / /

Result :

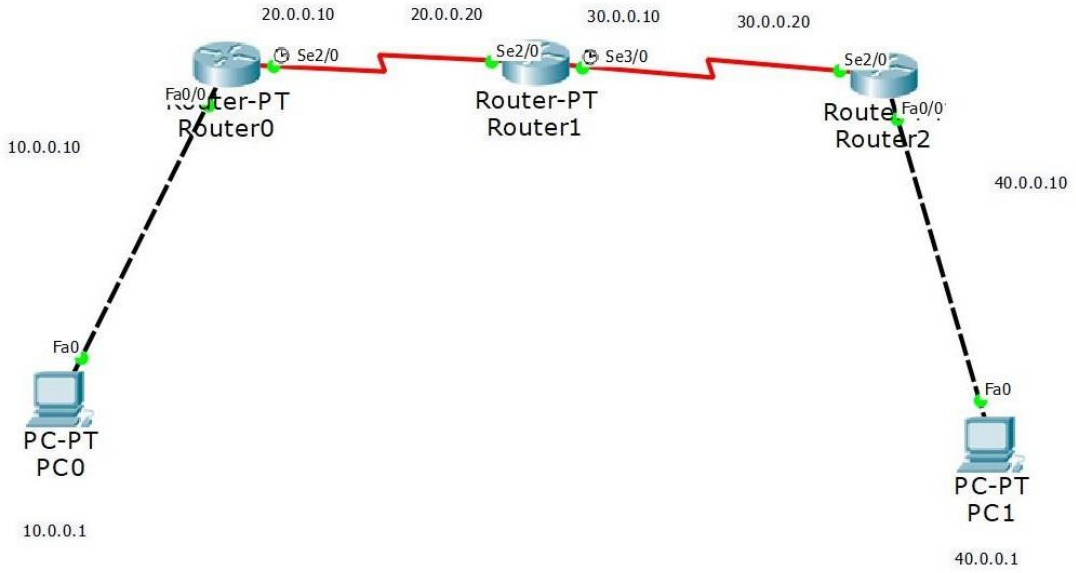
a) ping 20.0.0.2
Request Timed out
Request Timed out
Request Timed out
Request Timed out.
Packets sent = 4, received = 0, loss = 4

b) ping 20.0.0.1
Reply from 20.0.0.1 time = 0ms TTL = 128
Reply from 20.0.0.1 time = 0ms TTL = 128
Reply from 20.0.0.1 time = 0ms TTL = 128
Reply from 20.0.0.1 time = 0ms TTL = 128.

c) ping 30.0.0.1
Reply from 20.0.0.2 : Destination unreachable
Reply from 20.0.0.2 : Destination unreachable
Reply from 20.0.0.2 : Destination unreachable
Reply from 20.0.0.2 : Destination unreachable
Ping statistics from 30.0.0.1
Packets : sent = 4, received = 0, lost = 4.

2B:

Topology:



Configuration of Routers:

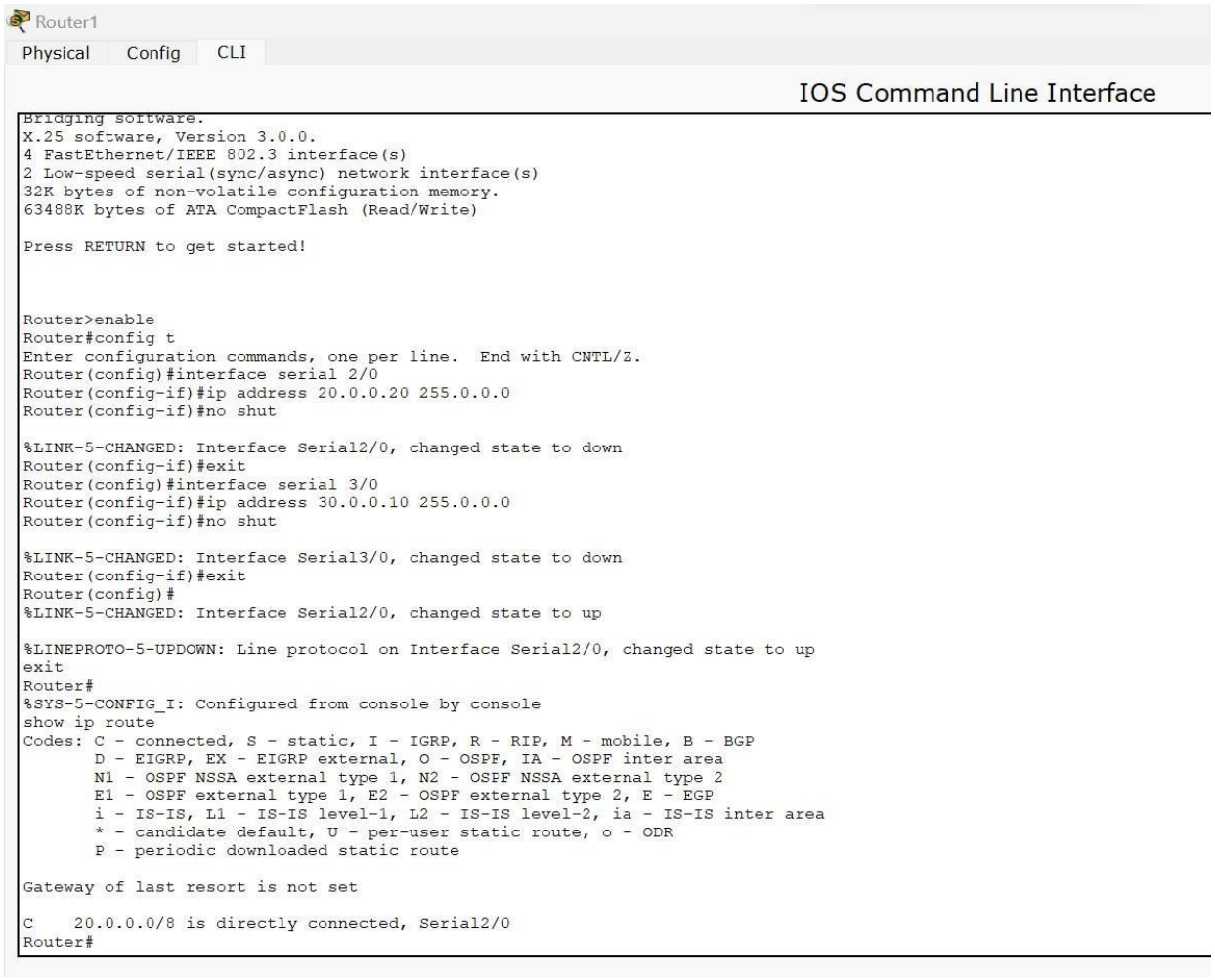
Router0

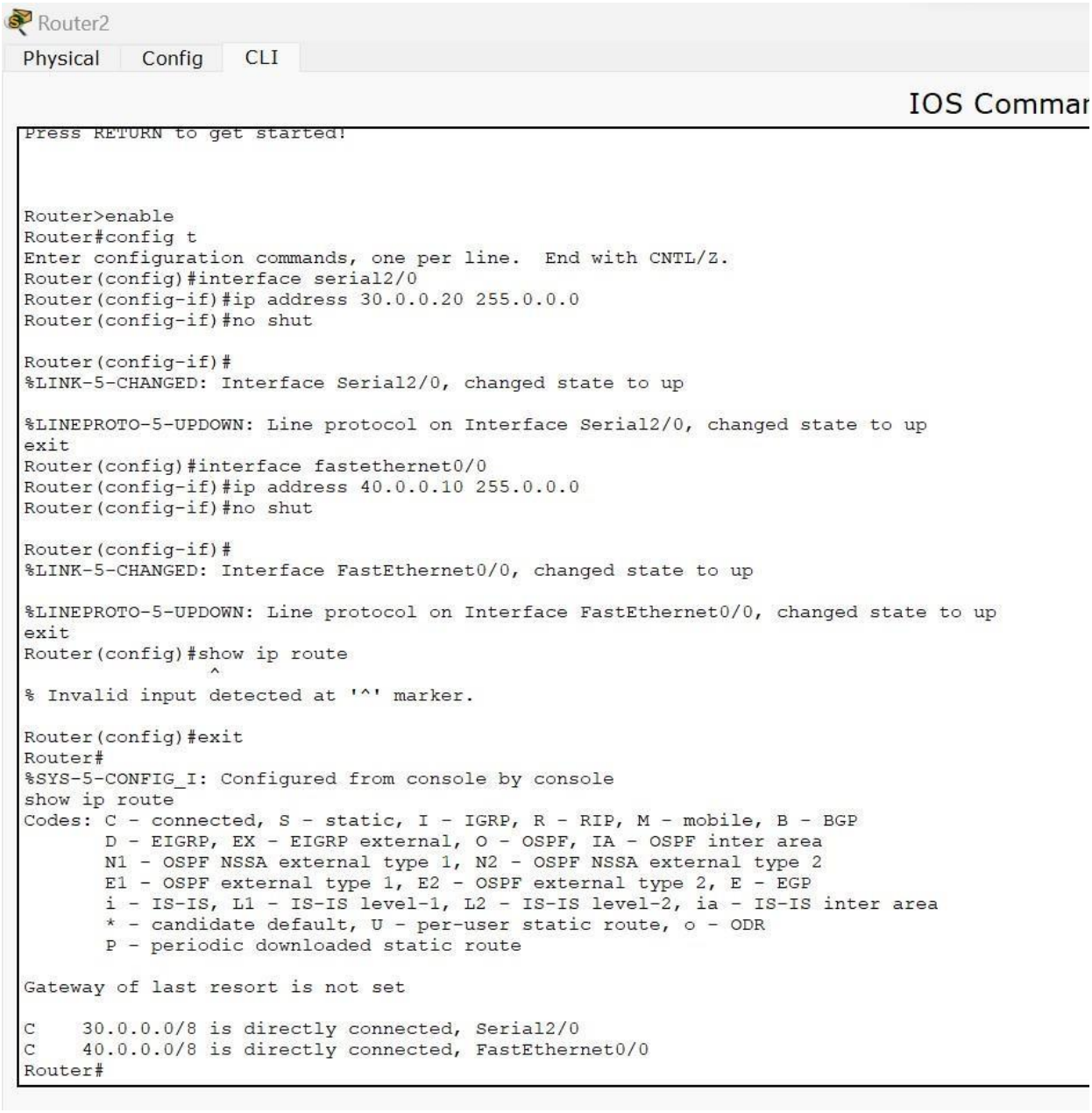
Physical | Config | CLI

IOS Command Line Interface

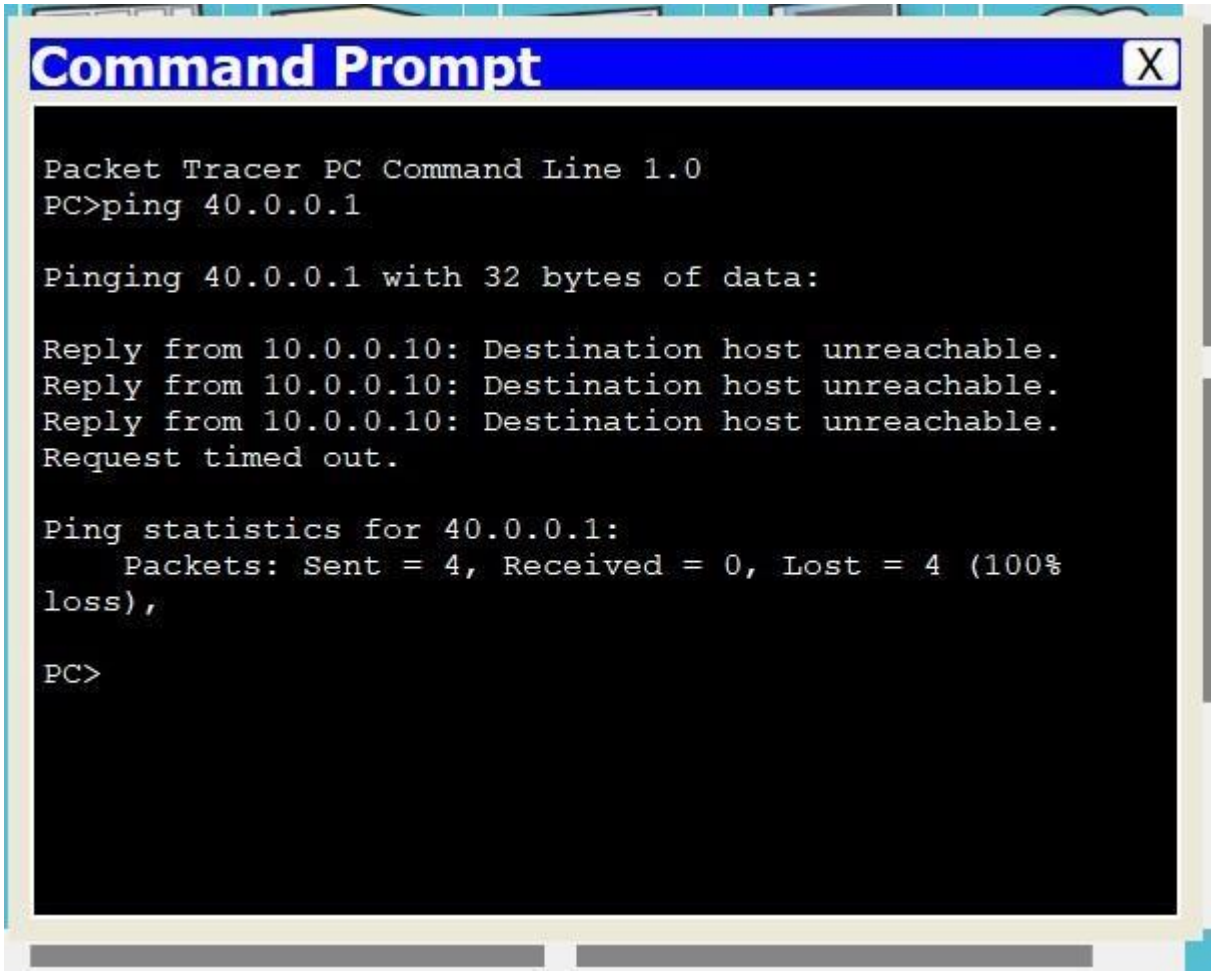
```
.
Processor board ID PT0123 (0123)
PT2005 processor: part number 0, mask 01
Bridging software.
X.25 software, Version 3.0.0.
4 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)

Press RETURN to get started!



Router>n
Translating "n"...domain server (255.255.255.255)
% Unknown command or computer name, or unable to find computer address

Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface fastethernet0/0
Router(config-if)#ip address 10.0.0.10 255.0.0.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
exit
Router(config)#exit
Router#
```

```
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface serial2/0
Router(config-if)#ip address 20.0.0.10 255.0.0.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

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

C    10.0.0.0/8 is directly connected, FastEthernet0/0
C    20.0.0.0/8 is directly connected, Serial2/0
Router#
```


Router1
Physical
Config
CLI
IOS Command Line Interface
Bridging software.
X.25 software, Version 3.0.0.
4 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)
Press RETURN to get started!
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface serial 2/0
Router(config-if)#ip address 20.0.0.20 255.0.0.0
Router(config-if)#no shut
%LINK-5-CHANGED: Interface Serial2/0, changed state to down
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
%LINK-5-CHANGED: Interface Serial3/0, changed state to down
Router(config-if)#exit
Router(config)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
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
C 20.0.0.0/8 is directly connected, Serial2/0
Router#


Router2
Physical
Config
CLI
IOS Commar
Press RETURN to get started!
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface serial2/0
Router(config-if)#ip address 30.0.0.20 255.0.0.0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
exit
Router(config)#interface fastethernet0/0
Router(config-if)#ip address 40.0.0.10 255.0.0.0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
exit
Router(config)#show ip route
^
% Invalid input detected at '^' marker.
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
C 30.0.0.0/8 is directly connected, Serial2/0
C 40.0.0.0/8 is directly connected, FastEthernet0/0
Router#

Ping output before static routing:



Router 0 :

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip route 40.0.0.0 255.0.0.0 20.0.0.20
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

C    10.0.0.0/8 is directly connected, FastEthernet0/0
C    20.0.0.0/8 is directly connected, Serial2/0
S    30.0.0.0/8 [1/0] via 20.0.0.20
S    40.0.0.0/8 [1/0] via 20.0.0.20
Router#
```

Router 1:

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
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#
%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

S    10.0.0.0/8 [1/0] via 20.0.0.10
C    20.0.0.0/8 is directly connected, Serial2/0
C    30.0.0.0/8 is directly connected, Serial3/0
S    40.0.0.0/8 [1/0] via 30.0.0.20
Router#
```

Router 2:

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
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
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

S    10.0.0.0/8 [1/0] via 30.0.0.10
S    20.0.0.0/8 [1/0] via 30.0.0.10
C    30.0.0.0/8 is directly connected, Serial2/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0
Router#
```

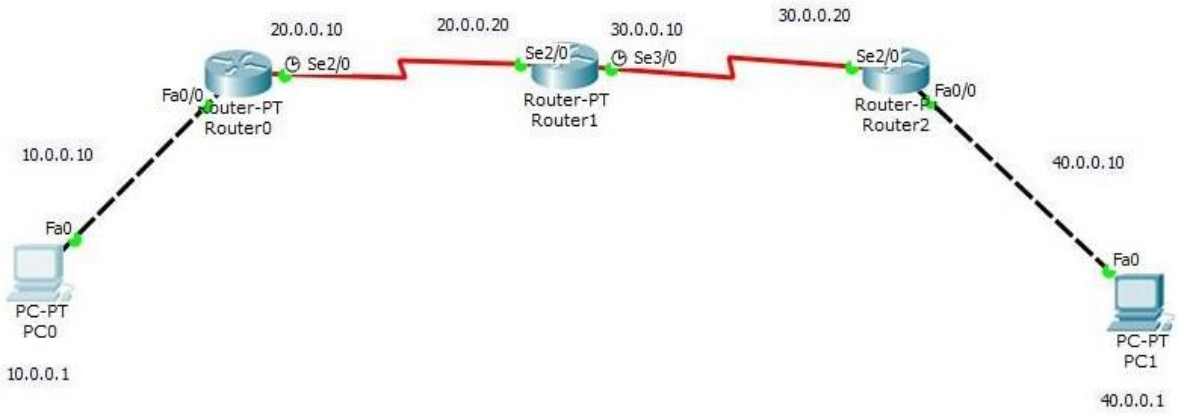
Ping output after static routing:

```
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=2ms 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 = 2ms, Average = 2ms

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=35ms TTL=125
Reply from 40.0.0.1: bytes=32 time=4ms TTL=125
Reply from 40.0.0.1: bytes=32 time=27ms TTL=125
Reply from 40.0.0.1: bytes=32 time=13ms 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 = 4ms, Maximum = 35ms, Average = 19ms

PC>
```

Experiment 3

Aim: Configure default route, static route to the Router

Topology:



Configurations:

Roter 0 :

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
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)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
exit
Router(config)#interface serial 2/0
Router(config-if)#ip address 20.0.0.10 255.0.0.0
Router(config-if)#no shut

%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router(config-if)#exit
Router(config)#exit
```

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip route 0.0.0.0 0.0.0.0 20.0.0.20
Router(config)#
```

```
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 20.0.0.20 to network 0.0.0.0

C    10.0.0.0/8 is directly connected, FastEthernet0/0
C    20.0.0.0/8 is directly connected, Serial2/0
S*   0.0.0.0/0 [1/0] via 20.0.0.20
Router#
```

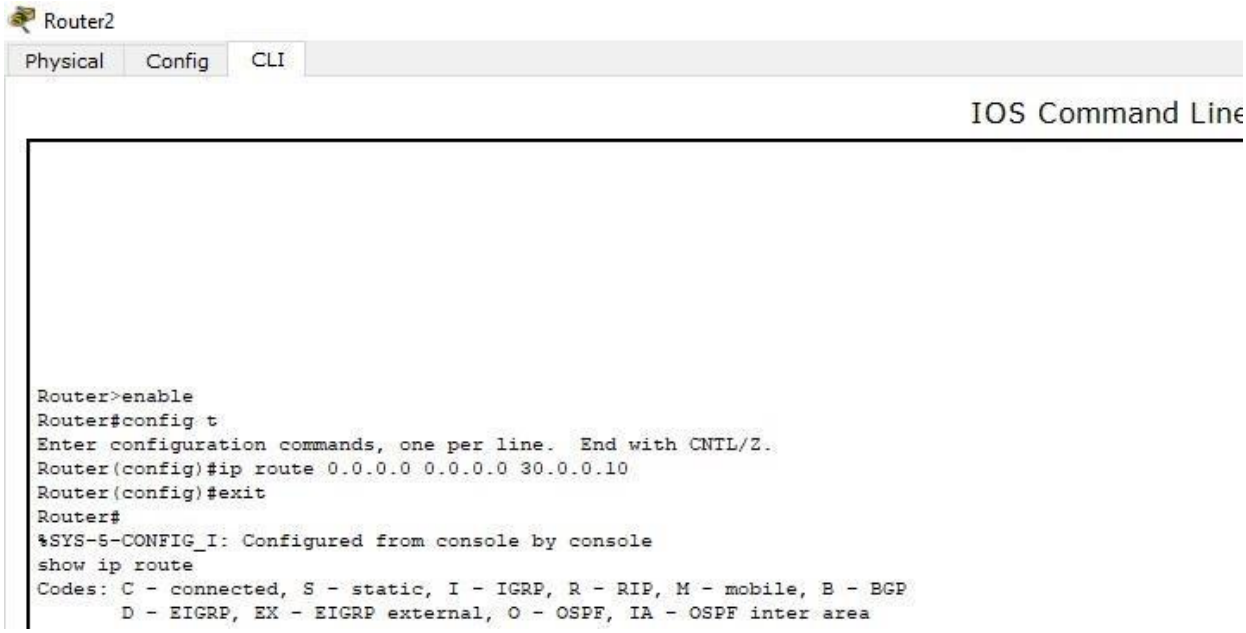
Roter 1 :

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
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)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up
exit
Router(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
interface serail 3/0
                 ^
% Invalid input detected at '^' marker.

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

%LINK-5-CHANGED: Interface Serial3/0, changed state to down
Router(config-if)#exit
Router(config)#exit
```

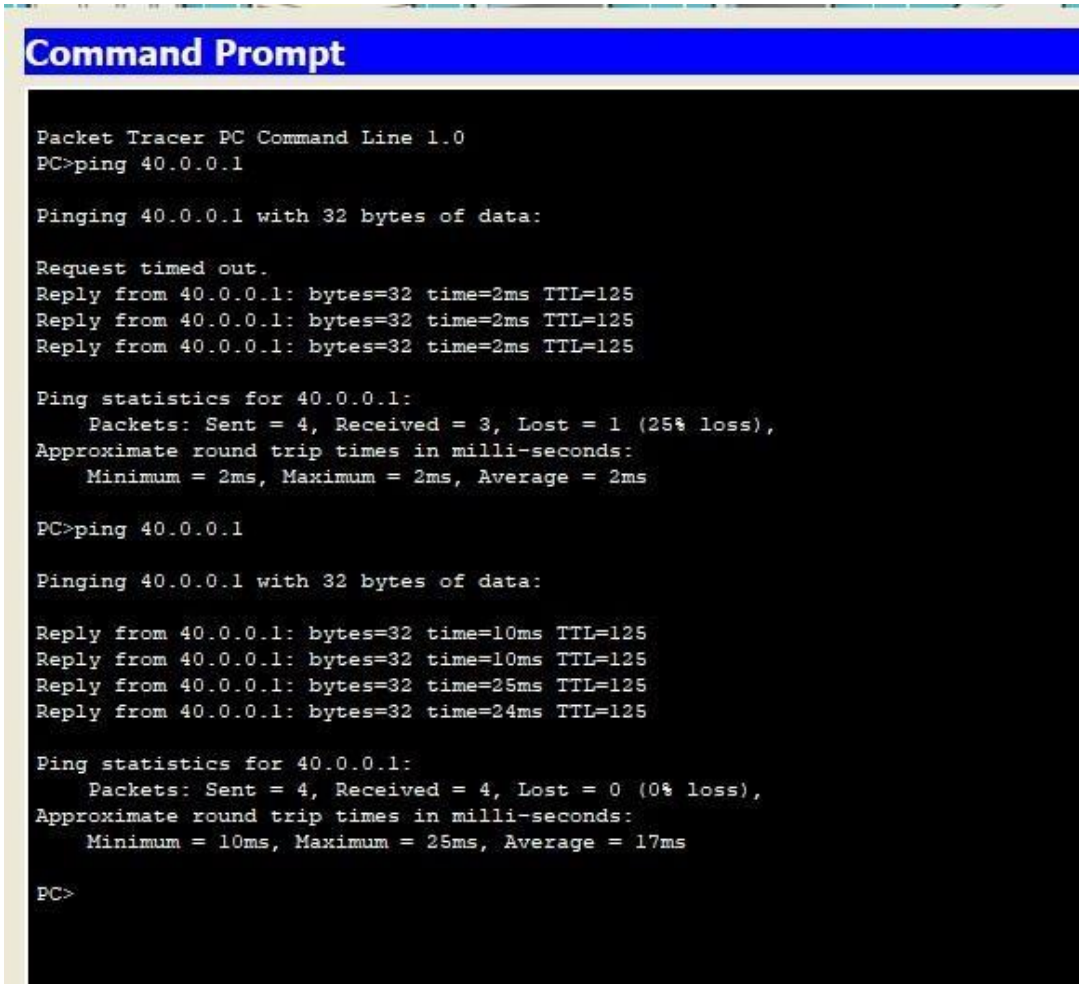
```
Router(config)#ip route 40.0.0.0 255.0.0.0 30.0.0.20
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       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

S    10.0.0.0/8 [1/0] via 20.0.0.10
C    20.0.0.0/8 is directly connected, Serial2/0
C    30.0.0.0/8 is directly connected, Serial3/0
S    40.0.0.0/8 [1/0] via 30.0.0.20
Router#
```

Roter 2 :

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface serail 2/0
                            ^
% Invalid input detected at '^' marker.

Router(config)#interface serial 2/0
Router(config-if)#ip address 30.0.0.20 255.0.0.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up
exi
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
t
Router(config)#exit
```


Router2
Physical
Config
CLI
IOS Command Line
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 0.0.0.0 0.0.0.0 30.0.0.10
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

Ping Output:


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=2ms 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 = 2ms, Average = 2ms
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=10ms TTL=125
Reply from 40.0.0.1: bytes=32 time=10ms TTL=125
Reply from 40.0.0.1: bytes=32 time=25ms TTL=125
Reply from 40.0.0.1: bytes=32 time=24ms 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 = 10ms, Maximum = 25ms, Average = 17ms
PC>

Lab-3

Static Routing

Same Topology -

Procedure:

Adding static Routers:

1) To router 1 for networks 20.0.0.0 & 40.0.0.0

Router (config) #ip route 40.0.0.0 255.0.0.0 30.0.0.1

Router (config) #ip route 20.0.0.0 255.0.0.0 30.0.0.1

2) To router 3 for networks 10.0.0.0 & 20.0.0.0

Router (config) #ip route 10.0.0.0 255.0.0.0 30.0.0.2

Router (config) #ip route 20.0.0.0 255.0.0.0 40.0.0.2

3) To route 2 for networks 10.0.0.0 & 30.0.0.0

Router (config) #ip route 30.0.0.0 2550.0.0 40.0.0.2

Router (config) #ip route 10.0.0.0 255.0.0.0 40.0.0.1

Page No.
Date / /

Observation:

Router-1

Show ip route

C 10.0.0.0/8 is directly connected

S 20.0.0.0/8 [1/0] via 30.0.0.1

C 30.0.0.0/8 is directly connected

S 40.0.0.0/8 [1/0] via 30.0.0.1

Router-2

show ip route

S 10.0.0.0/8 [1/0] via 40.0.0.1

C 20.0.0.0/8 directly connect

S 30.0.0.0/8 [1/0] via 40.0.0.1

C 40.0.0.0/8 directly connect.

Router-3

Show ip route

S 10.0.0.0/8 [1/0] via 30.0.0.2

S 20.0.0.0/8 [1/0] via 40.0.0.2

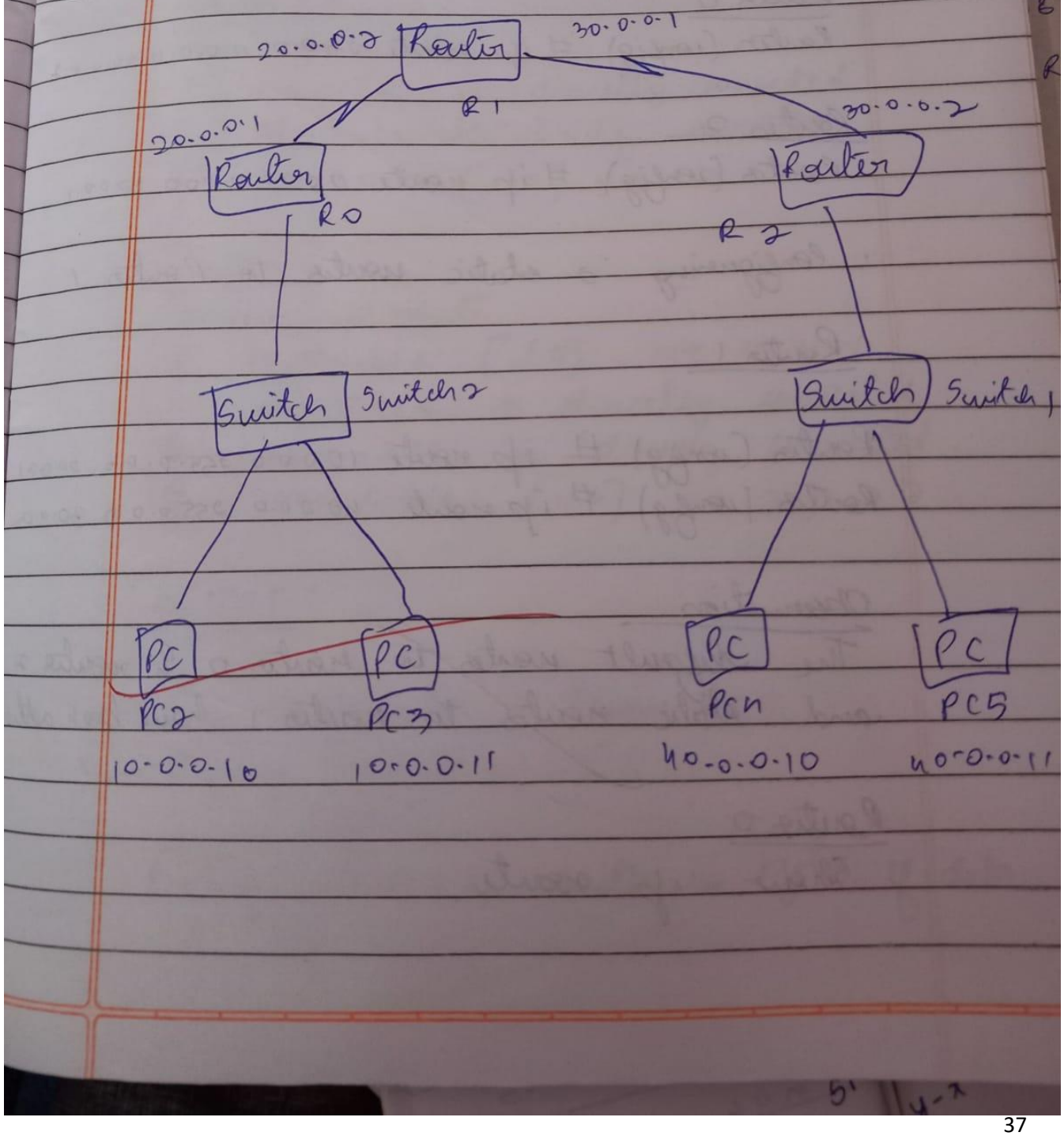
C 30.0.0.0/8 directly connected

C 40.0.0.0/8 directly connected.

Page No.
Date / /

Default Routing

Topology



OUTPUT

The ping requests to all networks are successful

From PC0

→ ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data

Reply from 20.0.0.1 : bytes = 32 time = 10ms TTL = 125
Reply from 20.0.0.1 : bytes = 32 time = 2ms TTL = 125
Reply from 20.0.0.1 : bytes = 32 time = 2ms TTL = 125
Ping statistics for 20.0.0.1 :
Packets : Sent = 4, Received = 4, lost = 0 [0% loss]

→ ping 40.0.0.2

Pinging 40.0.0.2 with 32 bytes of data

Reply from 40.0.0.2 : bytes = 32 time = 7ms TTL = 253
Reply from 40.0.0.2 : bytes = 32 time = 7ms TTL = 253
Reply from 40.0.0.2 : bytes = 32 time = 6ms TTL = 253
Ping statistics
Packets : Sent = 4, Received = 4, lost = 0 (0% loss)

C 10.0.0.0/8 is directly connected
C 20.0.0.0/8 is directly connected.
S* 0.0.0.0/0 [1/0] via 20.0.0.2

Router - 2

Show ip route
C 30.0.0.0/8 is directly connected
C 40.0.0.0/8 is directly connected
S* 0.0.0.0/0 [1/0] via 30.0.0.1

Router - 1

Show ip route
S 10.0.0.0/8 [1/0] via 20.0.0.1.
C 20.0.0.0/8 is directly connected.
C 30.0.0.0/8 is directly connected.
S 40.0.0.0/8 [1/0] via 30.0.0.2.

OUTPUT:

Ping ~~requests~~ : From PC5
→ ping 10.0.0.11

Pinging 10.0.0.11 with 32 bytes of data.

Procedure

- Configuring default route to Router 0 & Router 2

Router 0

Router (config) # ip route 0.0.0.0 0.0.0.0 30.0.0.2

Router 2

Router (config) # ip route 0.0.0.0 0.0.0.0 30.0.0.1

- Configuring 2 static routes to Router 1

Router 1

Router (config) # ip route 10.0.0.0 255.0.0.0 20.0.0.1
Router (config) # ip route 40.0.0.0 255.0.0.0 30.0.0.2

Observation

The default routes to router 0 & router 2 and static routes to router 1 have been added

Router 0

Show ip route

Reply from 10.0.0.11 : bytes = 32 time = 10ms TTL = 125
Reply from 10.0.0.11 : bytes : 32 time = 8ms TTL = 125
Reply from 10.0.0.11 : bytes : 32 time = 6ms TTL = 125
Reply from 10.0.0.11 : bytes : 32 time = 6ms TTL = 125

ping statistics for 10.0.0.11 :
Packets : Sent = 4, Received = 4, Lost = 0 (0% loss)

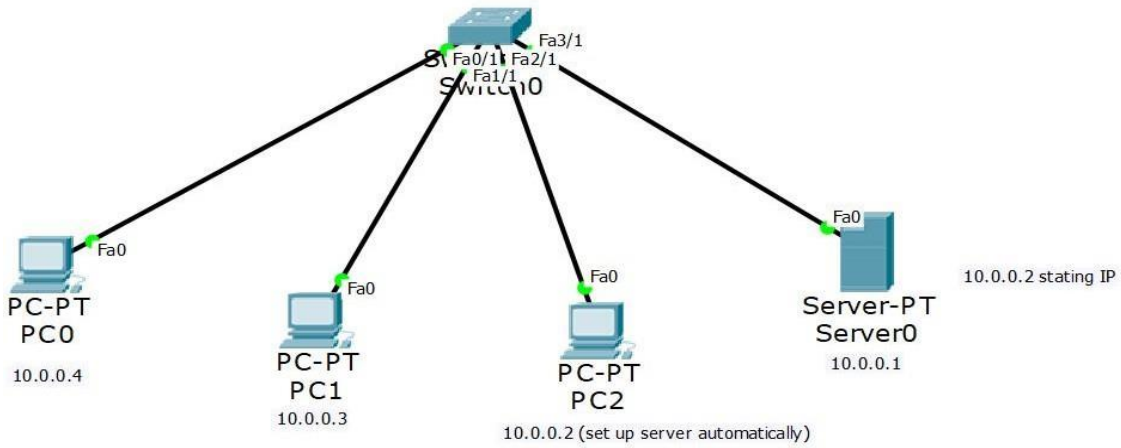
Sent

Experiment 4

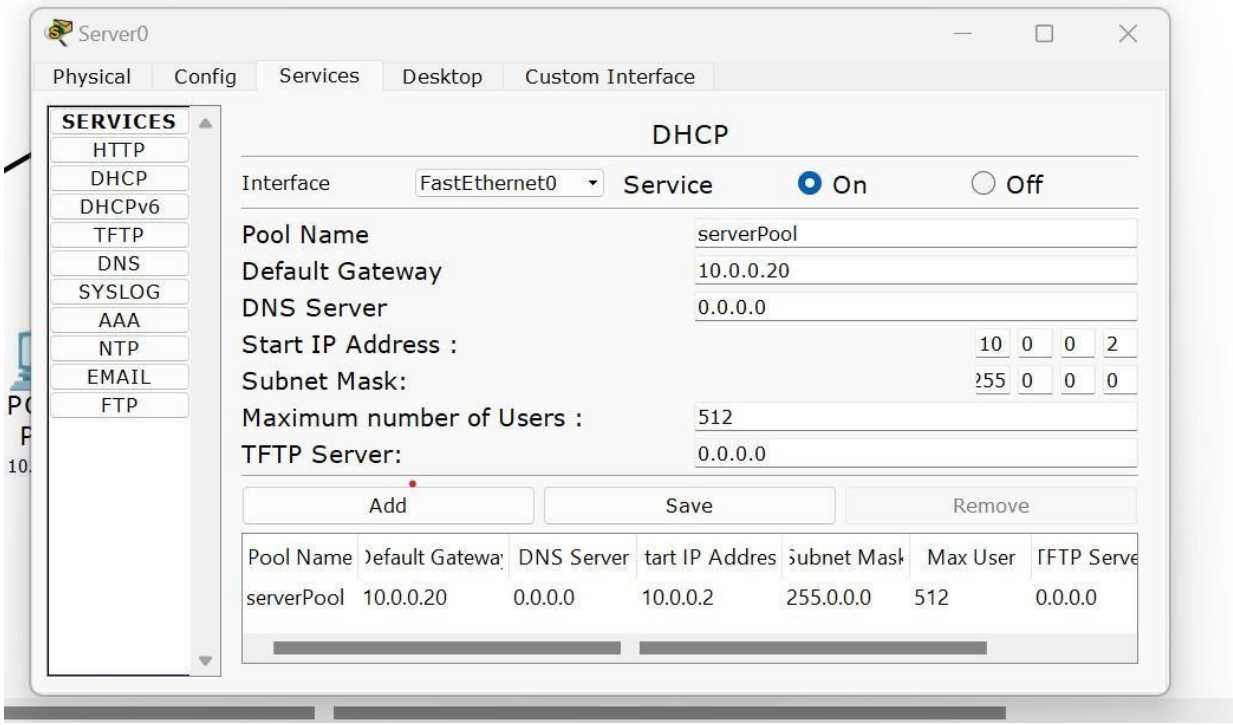
Aim: Configure DHCP within a LAN and outside LAN.

4A: Within a LAN.

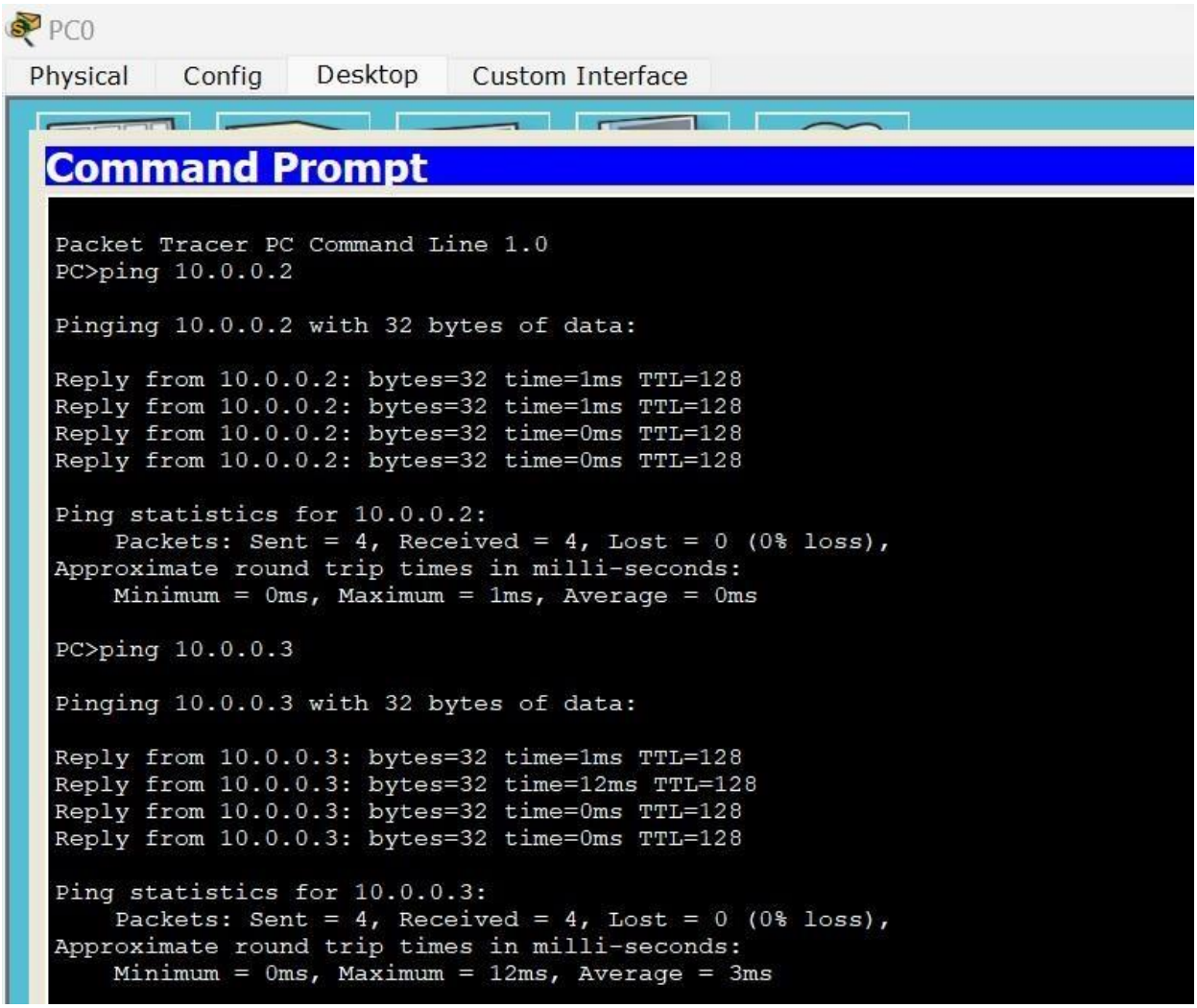
Topology:



Server 0 :



Ping Output :

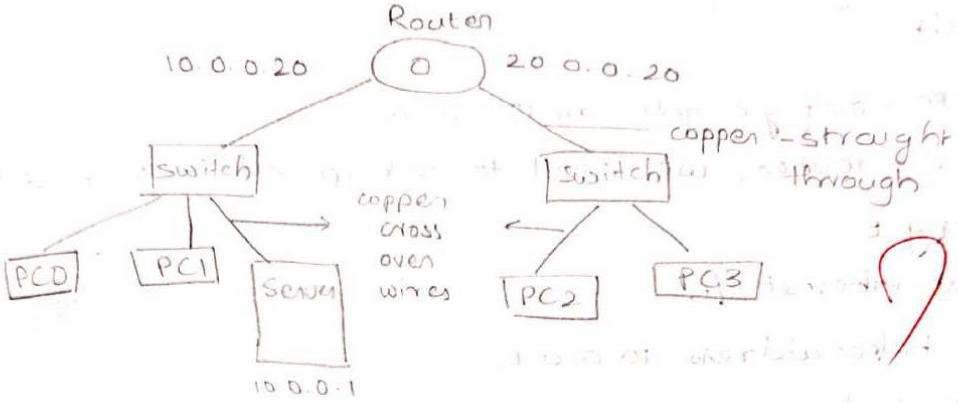

PC0
Physical
Config
Desktop
Custom Interface
Command Prompt
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.2
Pinging 10.0.0.2 with 32 bytes of data:
Reply from 10.0.0.2: bytes=32 time=1ms TTL=128
Reply from 10.0.0.2: bytes=32 time=1ms TTL=128
Reply from 10.0.0.2: bytes=32 time=0ms TTL=128
Reply from 10.0.0.2: 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 milli-seconds:
Minimum = 0ms, Maximum = 1ms, Average = 0ms
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 TTL=128
Reply from 10.0.0.3: bytes=32 time=12ms TTL=128
Reply from 10.0.0.3: bytes=32 time=0ms TTL=128
Reply from 10.0.0.3: bytes=32 time=0ms 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 = 0ms, Maximum = 12ms, Average = 3ms

Observation :

Experiment - ~~6~~ 4

Aim: Connection of server LAN within and outside the network using ~~star~~ switches and routers

Topology:



Procedure

Select two or more PC and a server connecting to switch and another network with only end devices and switch

Devices and switch

Connect both switches to router

Set IP address of server ~~to~~ as ~~router~~ 10.0.0.1

go to services select DHCP save the current IP address

Now, check the IP addresses of other devices in the network in the IP configuration in desktop.

following commands are given in CLI of router

>enable

config t

interface fastethernet 4/0

Ip address 10.0.0.10 255.0.0.0
no shut
exit
interface fastethernet 0/0
Ip address 20.0.0.20 255.0.0.0
no shut
exit

- server <config< gateway 10.0.0.20
- Now in routes, we need to set ip address of server

config t
fast ethernet 0/0
ip helper-address 10.0.0.1
no shut
exit

- Now go to server < services< DHCP< add new IP address 20.0.0.2
- To check connection, IP configuration in PC outside the network click DHCP and IP gateway will be visible

ing output

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=12

Reply from 20.0.0.2: bytes = 32 time = 0 ms TTL=127

Reply from 20.0.0.2: bytes = 32 time = 0 ms TTL=127

Ping statics for 20.0.0.2

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

Approximate round trip times in millie-seconds

minimum = 0 ms, Maximum = 0 ms, Average = 0 ms.

servation:

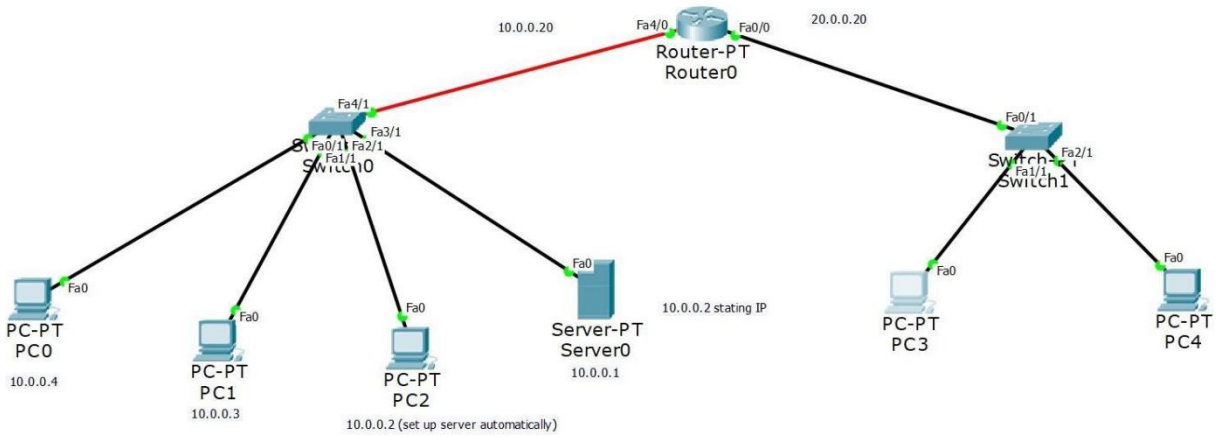
DHCP is used to assign IP addresses dynamically to different devices.

To assign continuous IP address we create a server pool where we assign the starting IP address and a default gateway number for PC's under different switches we create a different server pool again and start.

This takes care of delivering the packets to correct destination IP address and also sends back the Ack to the initial device.

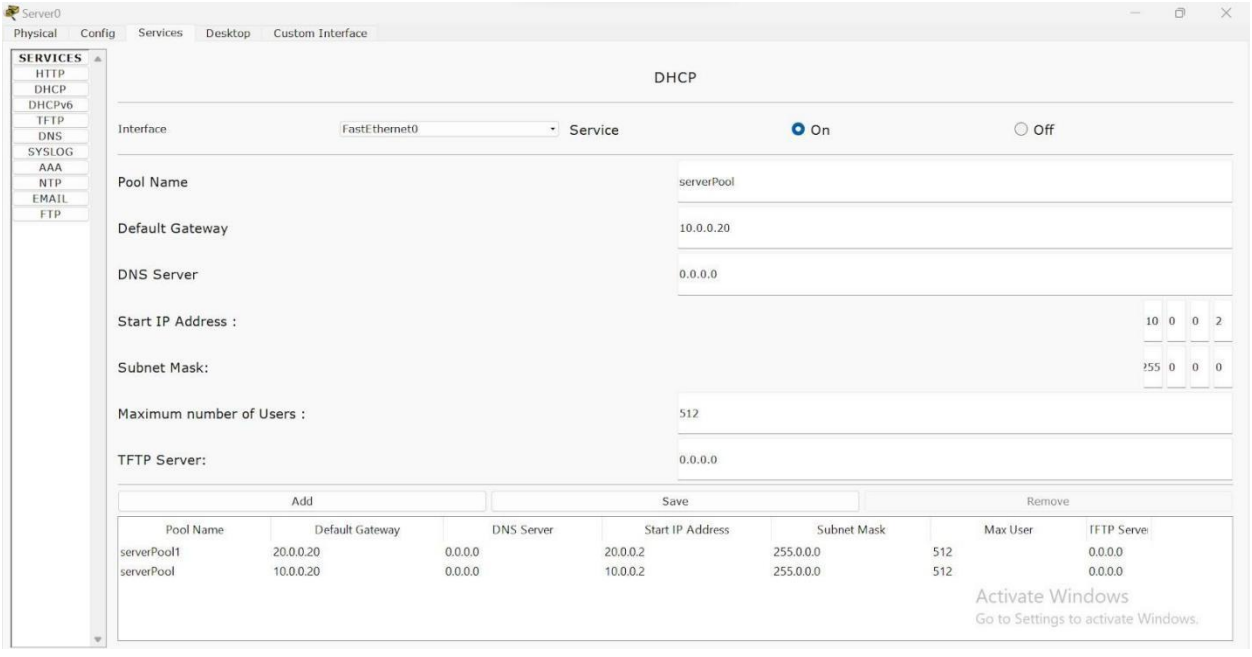
4B: Outside a LAN.

Topology:

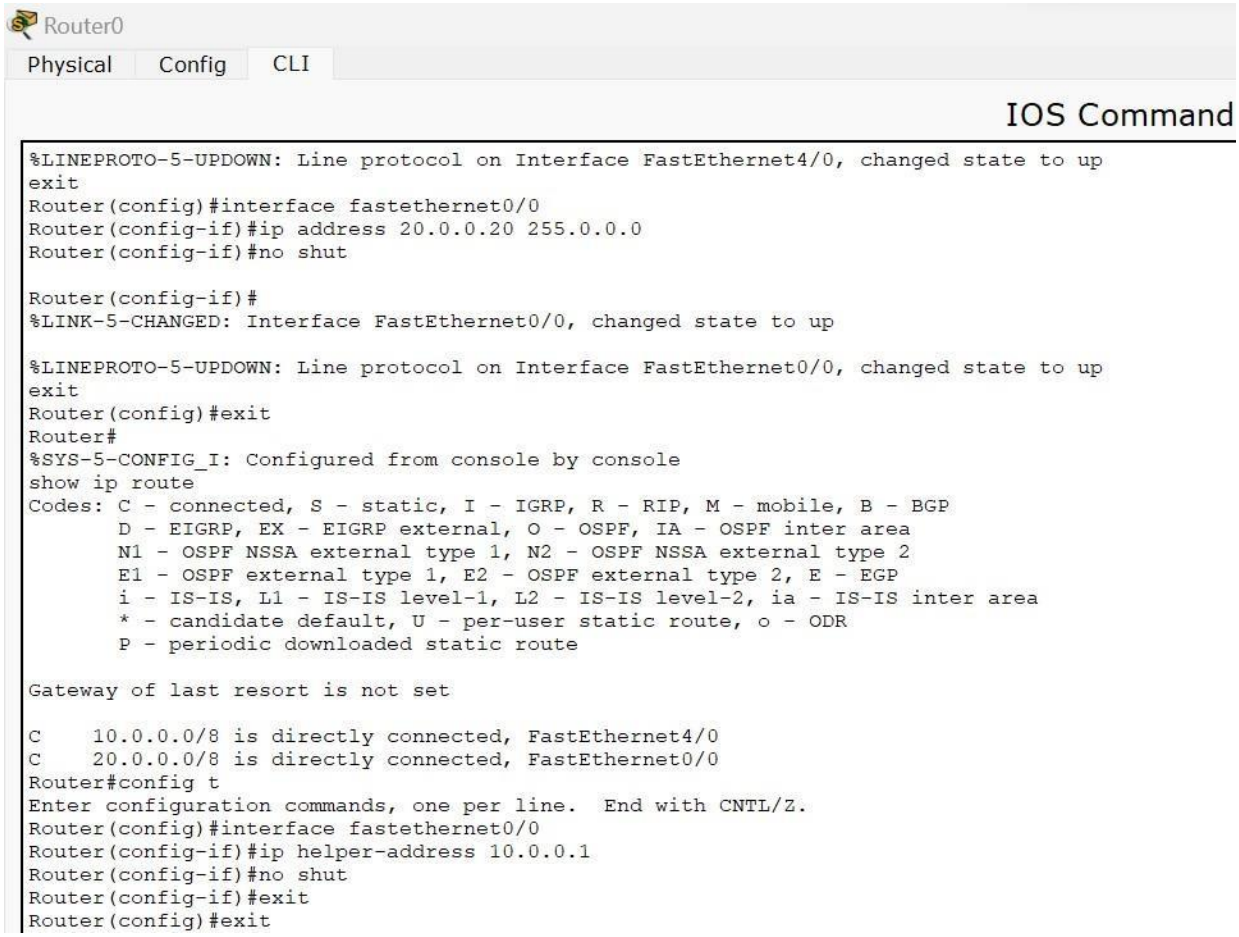


Configurations :

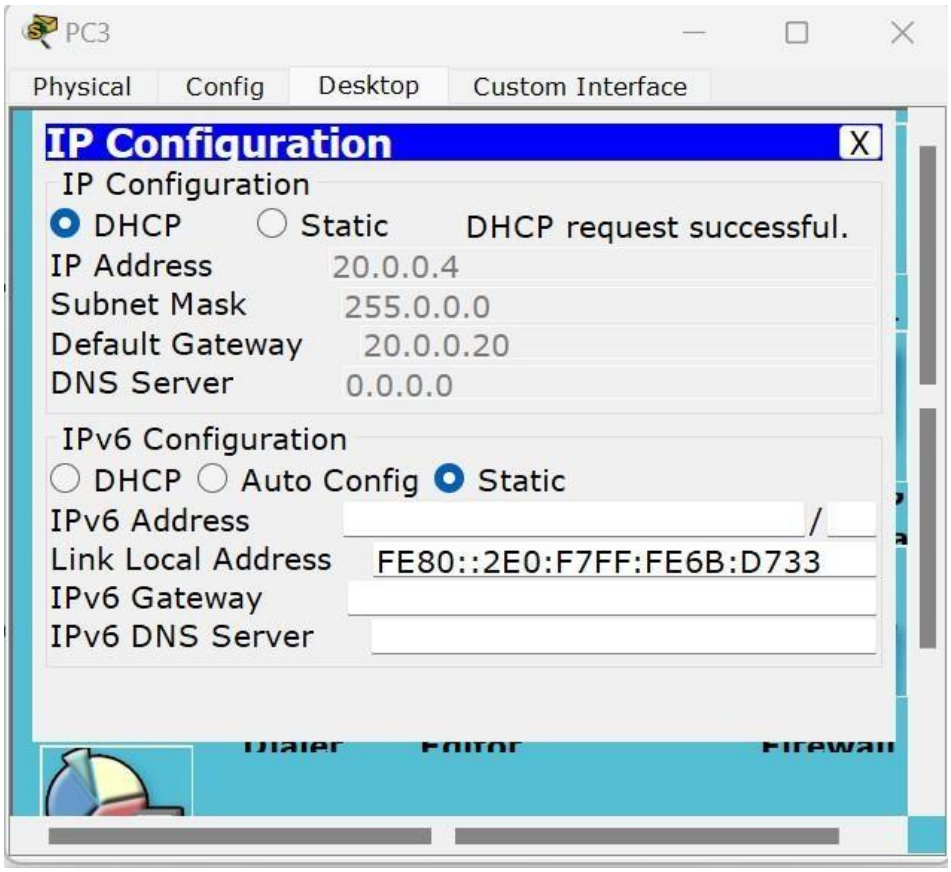
Server 0 :



Router 0 :


Router0
Physical
Config
CLI
IOS Command
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet4/0, changed state to up
exit
Router(config)#interface fastethernet0/0
Router(config-if)#ip address 20.0.0.20 255.0.0.0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
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
C 10.0.0.0/8 is directly connected, FastEthernet4/0
C 20.0.0.0/8 is directly connected, FastEthernet0/0
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastethernet0/0
Router(config-if)#ip helper-address 10.0.0.1
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#exit

Automation IP is assigned in the PCs by Server 0 via DHCP:



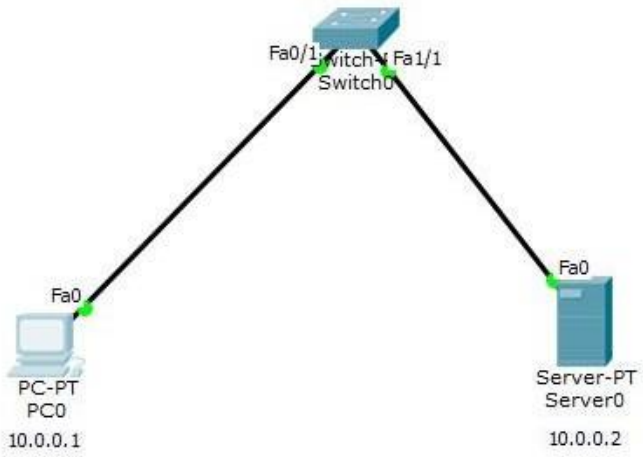
Ping Output :

```
PC>ping 20.0.0.2

Pinging 20.0.0.2 with 32 bytes of data:

Reply from 20.0.0.2: bytes=32 time=1ms 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
Reply from 20.0.0.2: bytes=32 time=0ms TTL=127

Ping statistics for 20.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

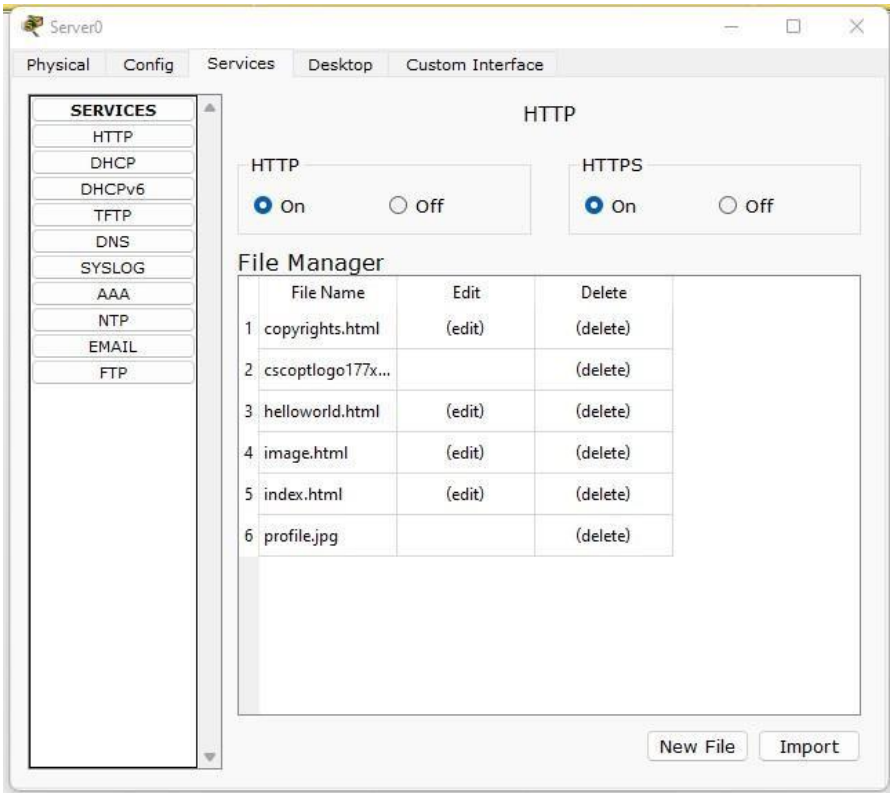
Experiment 5

Aim : Configure Web Server, DNS

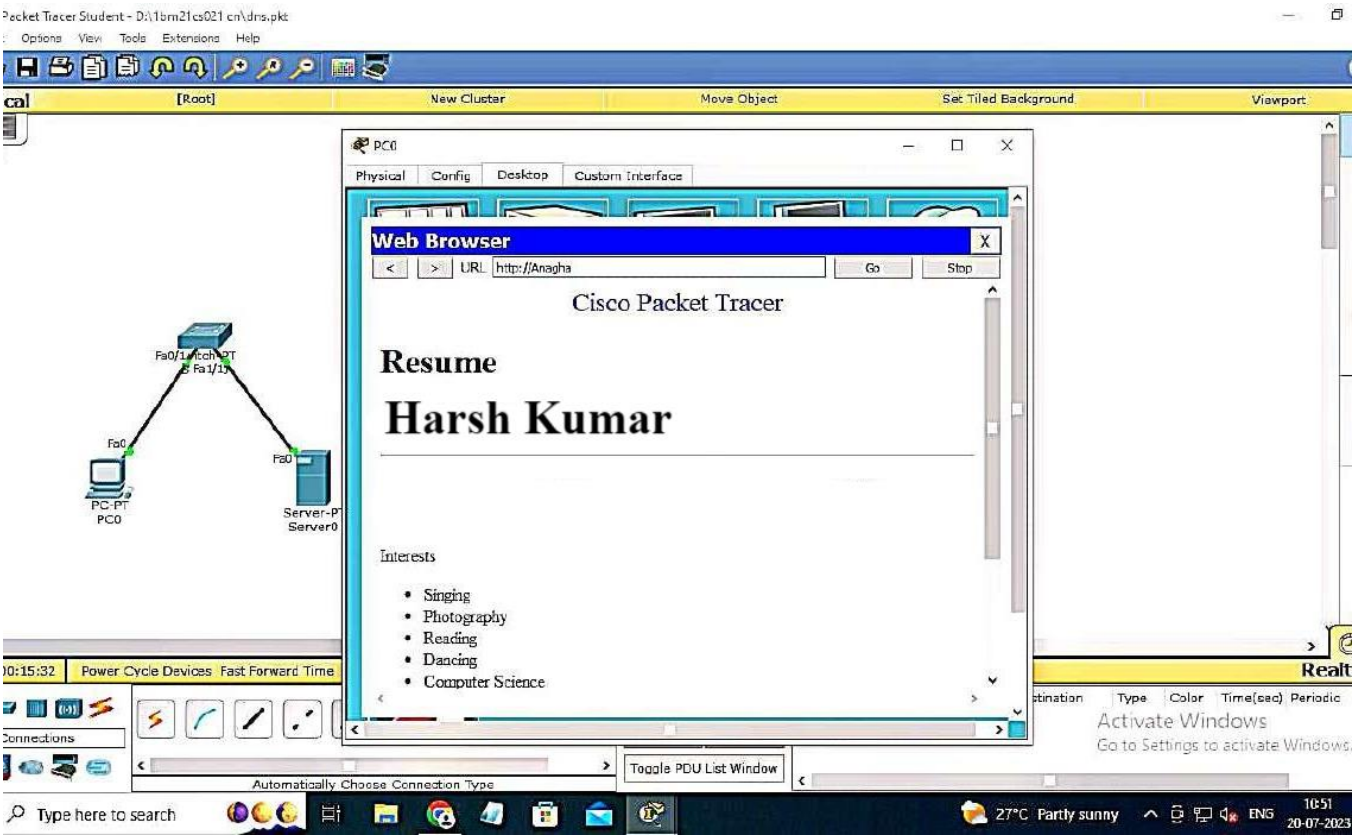
LAN. Topology:



Server 0 :



Website:

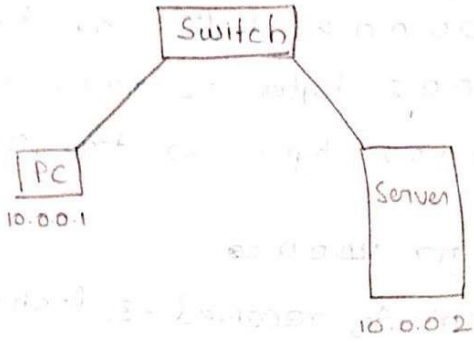

Packet Tracer Student - D:\1bm21cs021 cn\dns.pkt
Options View Tools Extensions Help
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
PC0
Physical
Config
Desktop
Custom Interface
Web Browser
URL http://Anagha
Go
Stop
Cisco Packet Tracer
Resume
Harsh Kumar
Interests
Singing
Photography
Reading
Dancing
Computer Science
Fa0
Fa0
PC-PT
PC0
Server-P
Server0
Power Cycle Devices Fast Forward Time
Toggle PDU List Window
Automatically Choose Connection Type
Activate Windows
Go to Settings to activate Windows.
Type here to search
27°C Partly sunny
ENG
10:51
20-07-2023

Observation :

Experiment 4 to 5

Aim: To understand the working of DNS

Topology:



Procedure

1. Connect a switch, PC and a server to form a LAN
2. Set IP address of PC as 10.0.0.1 and IP address server as 10.0.0.2
3. Go to PC > web browser and give server IP address as A default page is generated.
4. Go to server > services > http > index make any change and save.
5. repeat step 3. Changes will be seen.
6. Go to Server > services > DNS and turn it on. Give a na and save.
7. Go to PC > web browser, type the given name as url. the same page will be generated.
8. Repeat step 4. Generate your cv. in index.
9. repeat step 7. Your generated cv is shown as output.

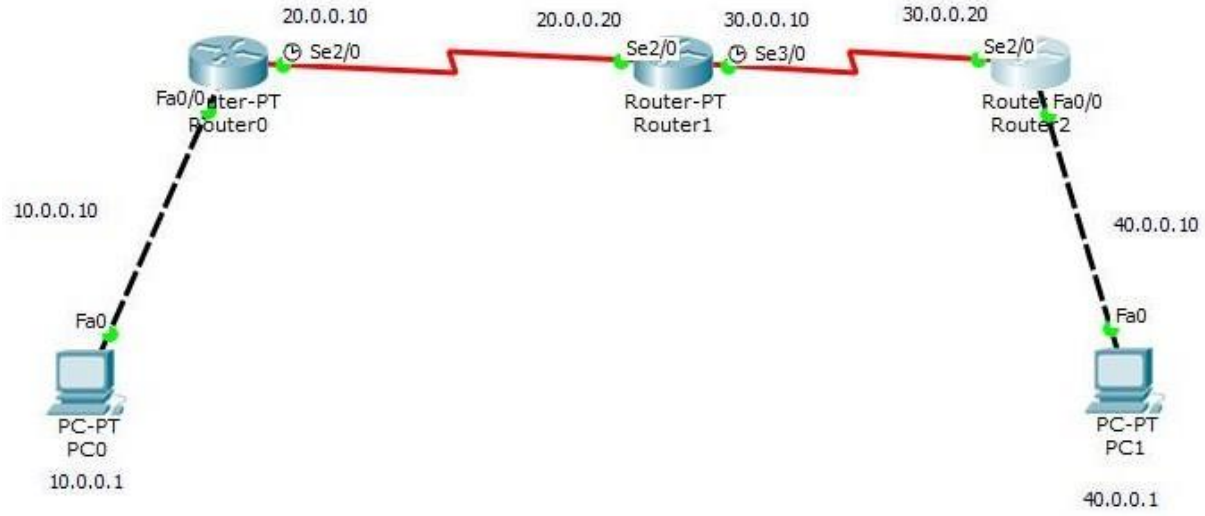
Observation:

* DNS - domain naming system, it uses a mapping table. from IP addresses to domain names.
* So, in the beginning before giving a name, we used IP address as URL for website then we gave a domain name and used the name as a URL instead.

Experiment 6

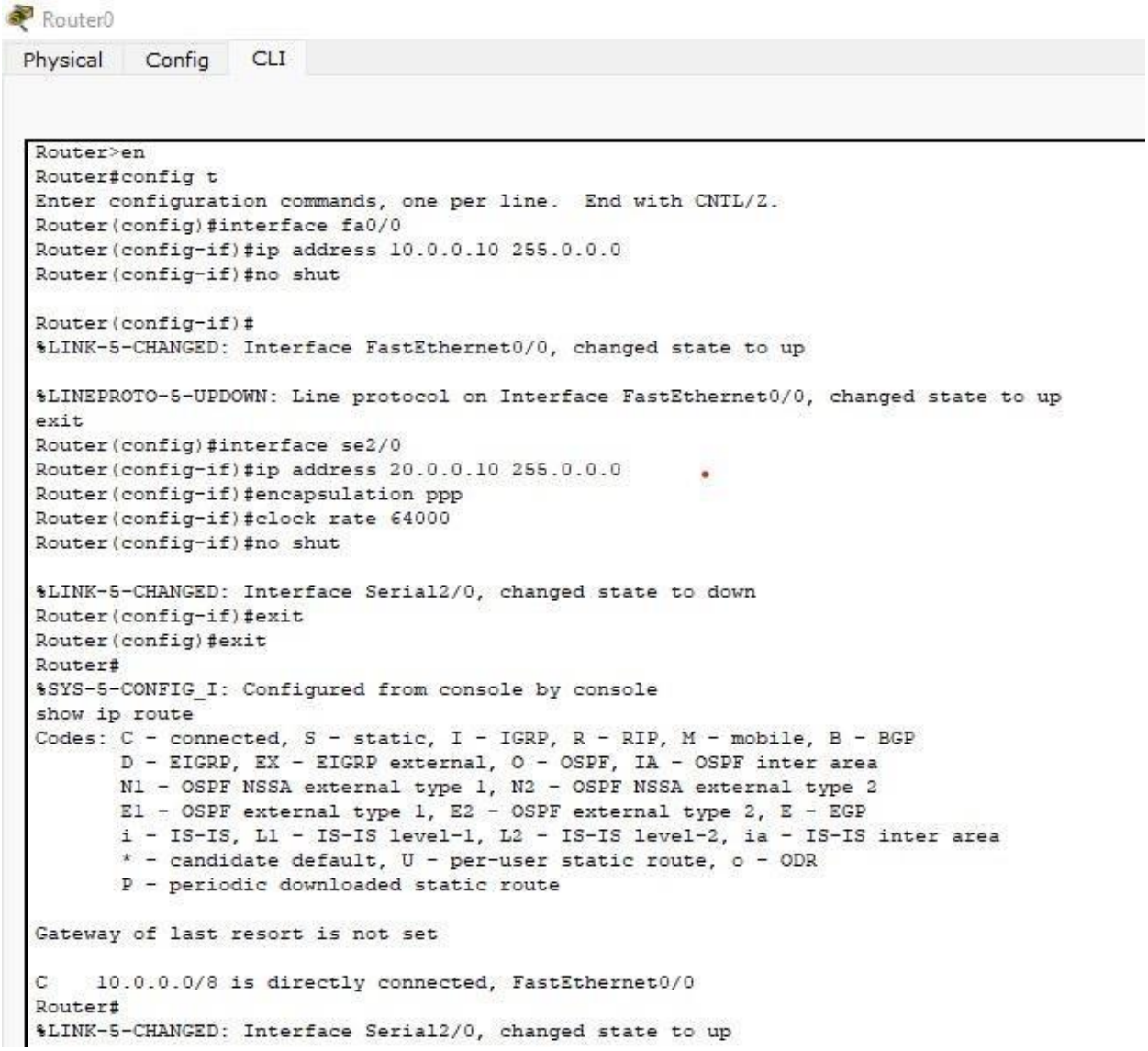
Aim: Configure RIP routing Protocol in Routers.

Topology:



Configuration:

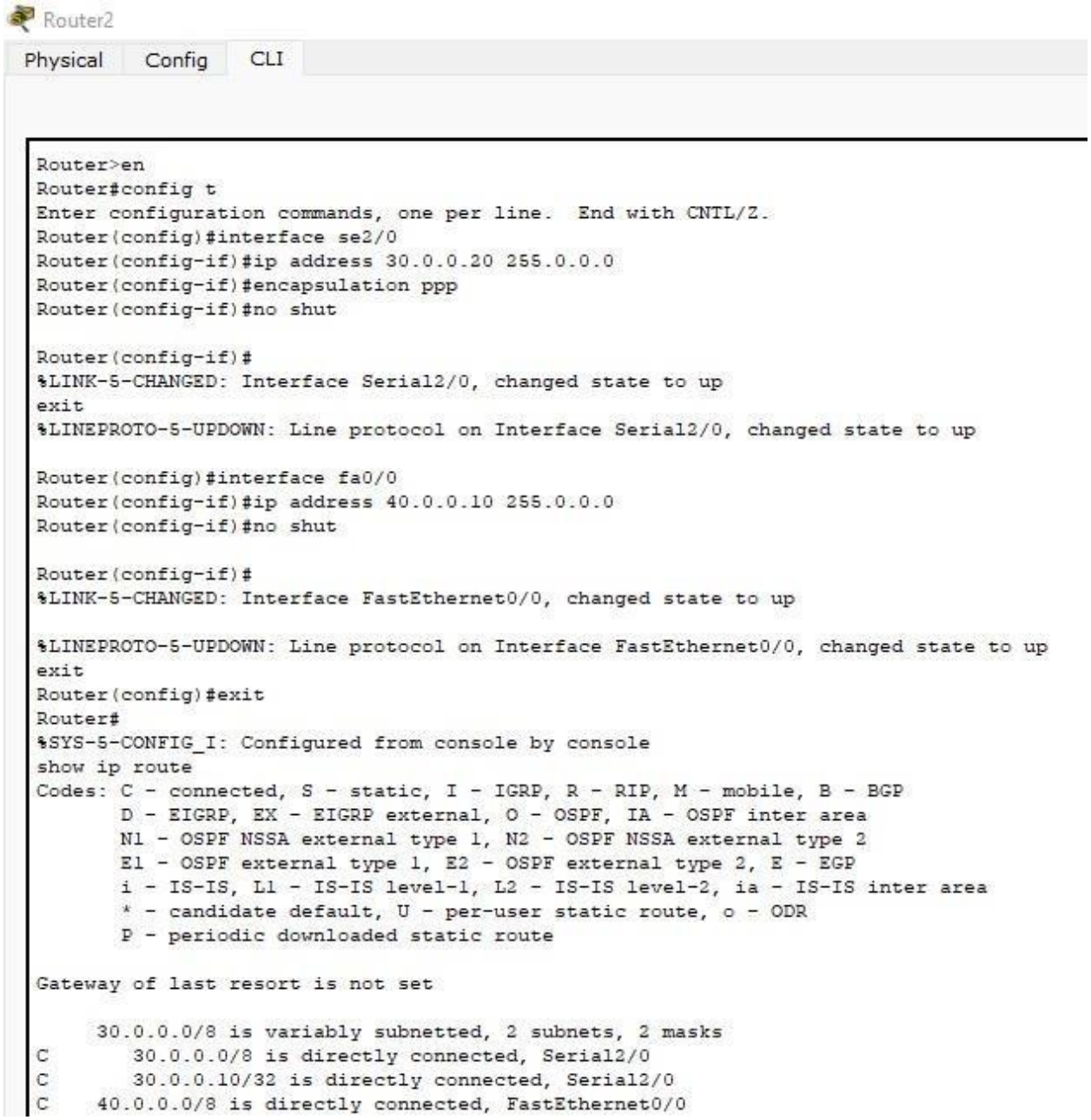
Router 0 :



Router 1 :


Router1
Physical
Config
CLI
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface se2/0
Router(config-if)#ip address 20.0.0.20 255.0.0.0
Router(config-if)#encapsulation ppp
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
exit
Router(config)#interface se3/0
Router(config-if)#ip address 30.0.0.10 255.0.0.0
Router(config-if)#encapsulation ppp
Router(config-if)#clock rate 64000
Router(config-if)#no shut
%LINK-5-CHANGED: Interface Serial3/0, changed state to down
Router(config-if)#exit
Router(config)#show ip route
% Invalid input detected at '^' marker.
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
20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C 20.0.0.0/8 is directly connected, Serial2/0
C 20.0.0.10/32 is directly connected, Serial2/0
Router#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

Router 2 :


Router2
Physical
Config
CLI
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface se2/0
Router(config-if)#ip address 30.0.0.20 255.0.0.0
Router(config-if)#encapsulation ppp
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up
exit
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
Router(config)#interface fa0/0
Router(config-if)#ip address 40.0.0.10 255.0.0.0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
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
30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C 30.0.0.0/8 is directly connected, Serial2/0
C 30.0.0.10/32 is directly connected, Serial2/0
C 40.0.0.0/8 is directly connected, FastEthernet0/0

RIP routing:

Router 0:

```
Router#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 10.0.0.0
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 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       20.0.0.20/32 is directly connected, Serial2/0
R    30.0.0.0/8 [120/1] via 20.0.0.20, 00:00:18, Serial2/0
R    40.0.0.0/8 [120/2] via 20.0.0.20, 00:00:18, Serial2/0
Router#
```

Router 1:

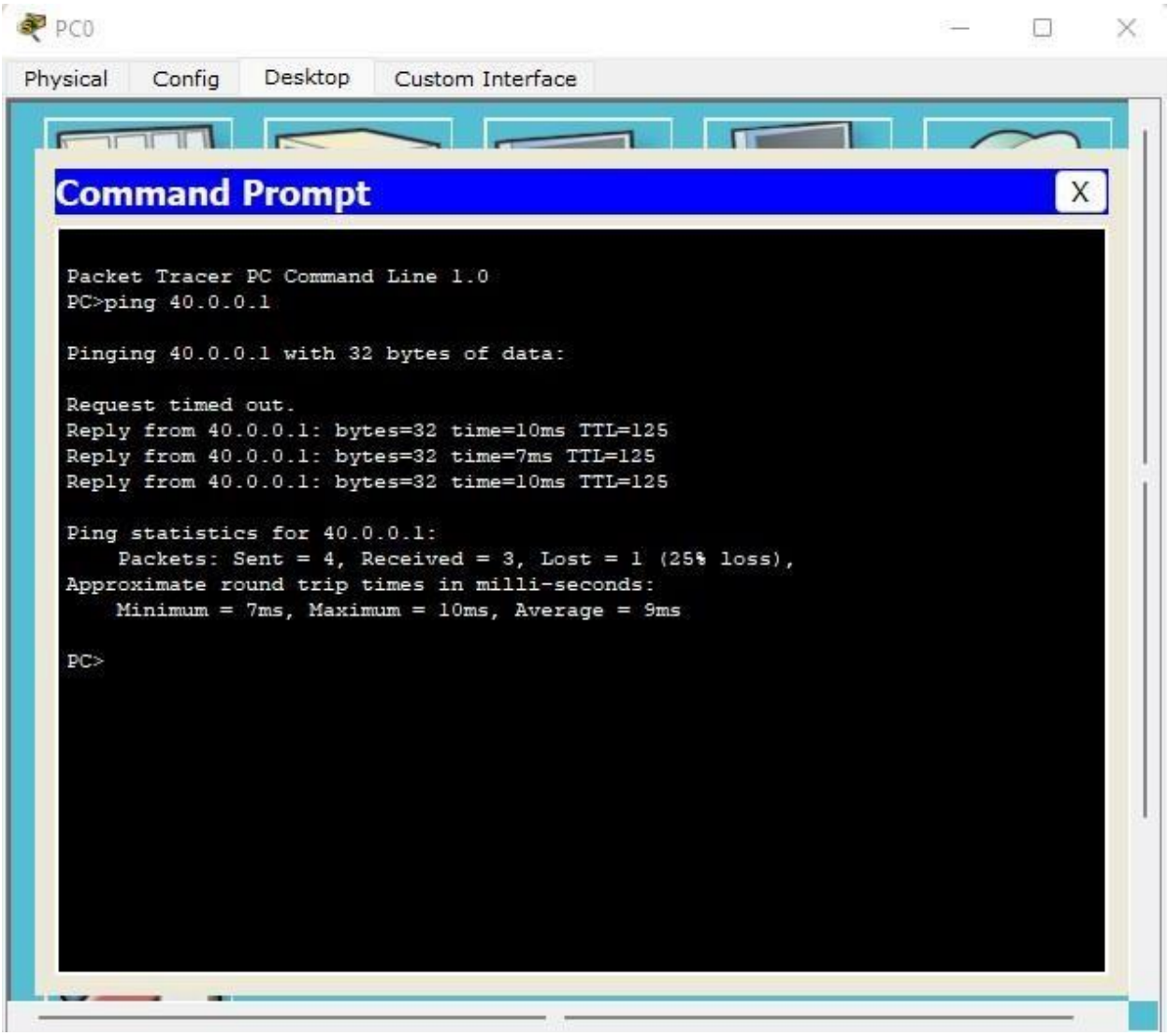
```
Router#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 20.0.0.0
Router(config-router)#network 30.0.0.0
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 resort is not set

R    10.0.0.0/8 [120/1] via 20.0.0.10, 00:00:20, Serial2/0
     20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       20.0.0.0/8 is directly connected, Serial2/0
C       20.0.0.10/32 is directly connected, Serial2/0
     30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       30.0.0.0/8 is directly connected, Serial3/0
C       30.0.0.20/32 is directly connected, Serial3/0
R    40.0.0.0/8 [120/1] via 30.0.0.20, 00:00:19, Serial3/0
Router#
```

Router 2:

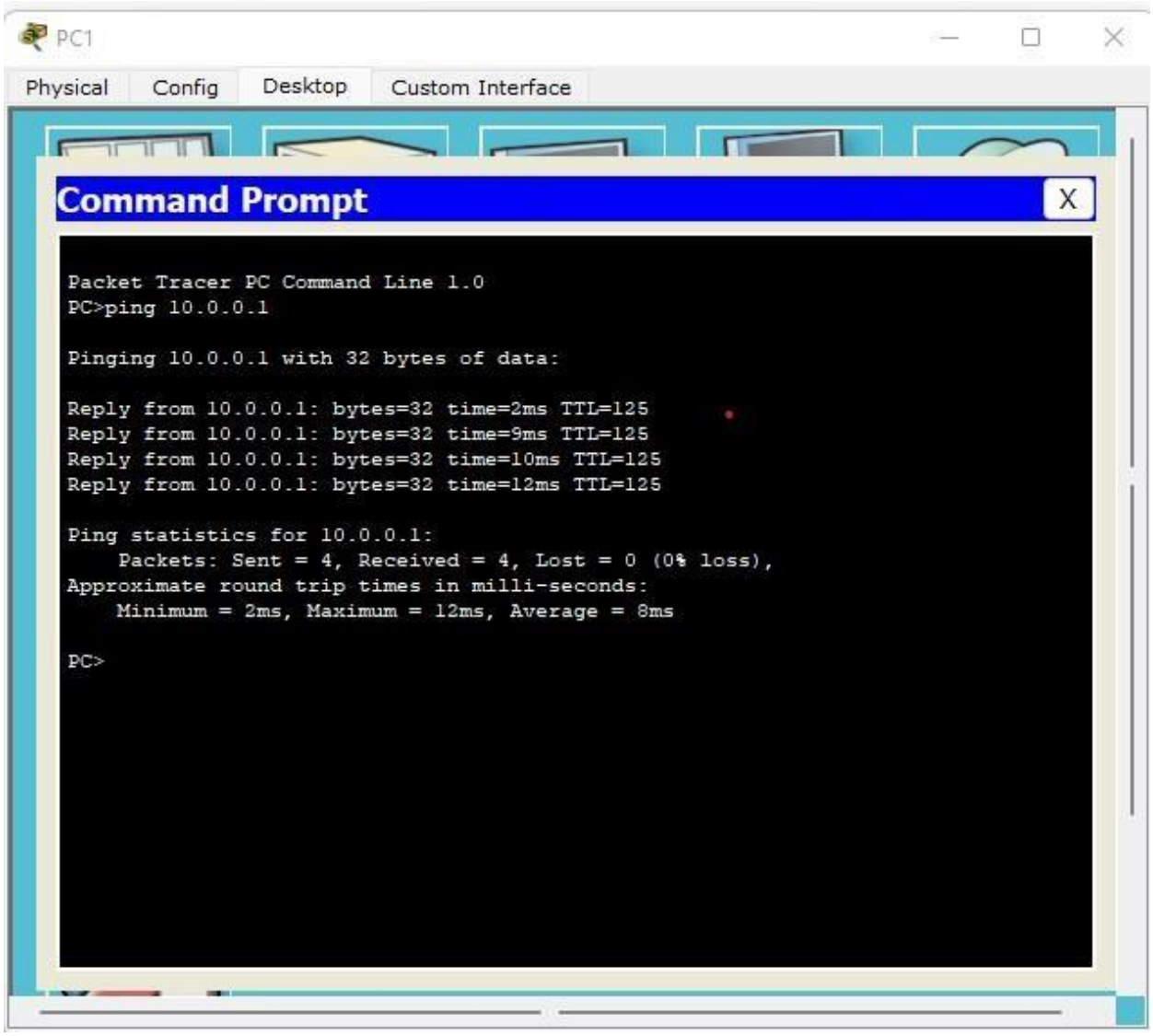
```
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#network 30.0.0.0
                ^
% Invalid input detected at '^' marker.

Router(config)#router rip
Router(config-router)#network 30.0.0.0
Router(config-router)#network 40.0.0.0
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 resort is not set

R    10.0.0.0/8 [120/2] via 30.0.0.10, 00:00:14, Serial2/0
R    20.0.0.0/8 [120/1] via 30.0.0.10, 00:00:14, 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       30.0.0.10/32 is directly connected, Serial2/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0
Router#
```

Ping Outputs:

P0:



P1:

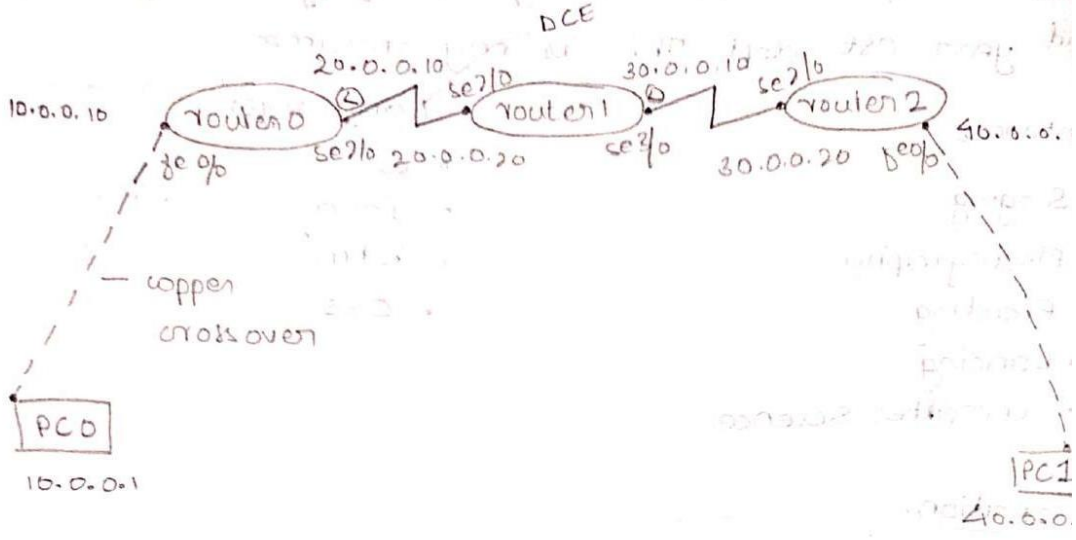

PC1
Physical
Config
Desktop
Custom Interface
Command Prompt
X
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.1
Pinging 10.0.0.1 with 32 bytes of data:
Reply from 10.0.0.1: bytes=32 time=2ms TTL=125
Reply from 10.0.0.1: bytes=32 time=9ms TTL=125
Reply from 10.0.0.1: bytes=32 time=10ms TTL=125
Reply from 10.0.0.1: bytes=32 time=12ms 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 = 12ms, Average = 8ms
PC>

Observation :

Experiment 6

Aim : To understand working of RIP.

Topology :



Procedure

1. Connect 3 routers using DCE and connect two PC (end devices) using copper cross over.
2. Set IPs and gateways for PCs.
3. Configure IPs for routers. For fastethernet port—
   for router → 0

```
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
```

. For router to router configuration follow same steps till ip address

uter(config-if)# encapsulation PPP ← this step for every router router configuration

router(config-if)# clock rate 64000 ← This step for every interface with clock on it (router 0 se 2/0 router se 3/

router(config-if)# no shut

router(config-if)# exit.

For RIP →

router 0:

(router)# config t

router(config)# router RIP

router(config-router)# network 10.0.0.0

router(config-router)# network 20.0.0.0

router(config-router)# exit

repeat the same steps for all routers.

.. Ping PC1. from PC0.

utput:

PC> ping 40.0.0.1

pinging 40.0.0.1 with 32 bytes of data:

Request timed out

Reply from 40.0.0.0.1 : bytes=32 time=9ms TTL=12

Reply from 40.0.0.01 : bytes 32 time = 15 ms TTL = 12

Reply from 40.0.0.1 : bytes 32 time = 9 ms TTL = 1

Ping statics for 40.0.0.1

Packets : sent = 4 ; received = 3, loss = 1 (25% loss)

Approximate round trip times in millie-seconds

minimum = 9 ms, Maximum = 15 ms, Average = 11 m

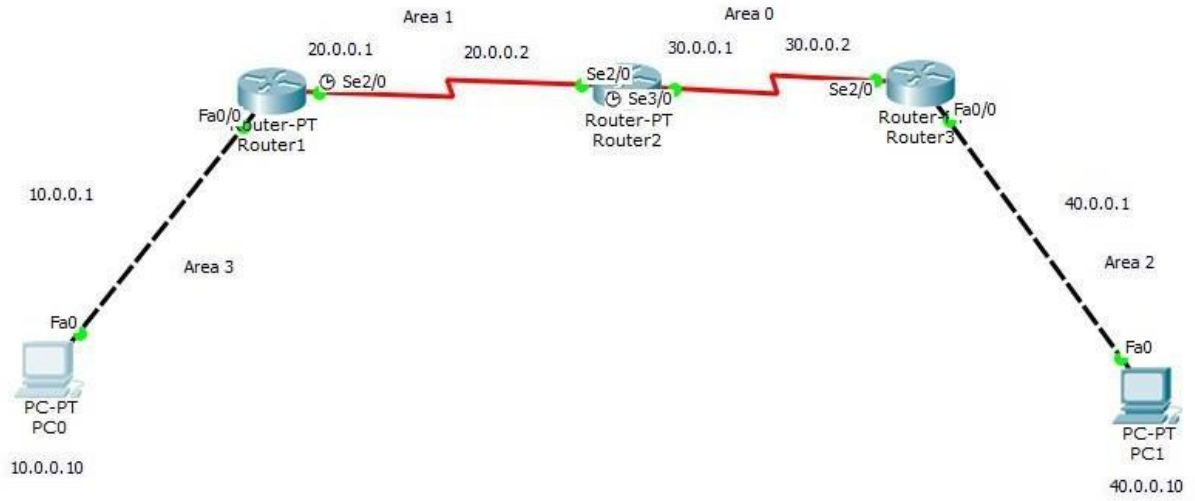
Observation:

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

Experiment 7

Aim : Configure OSPF routing protocol.

Topology:

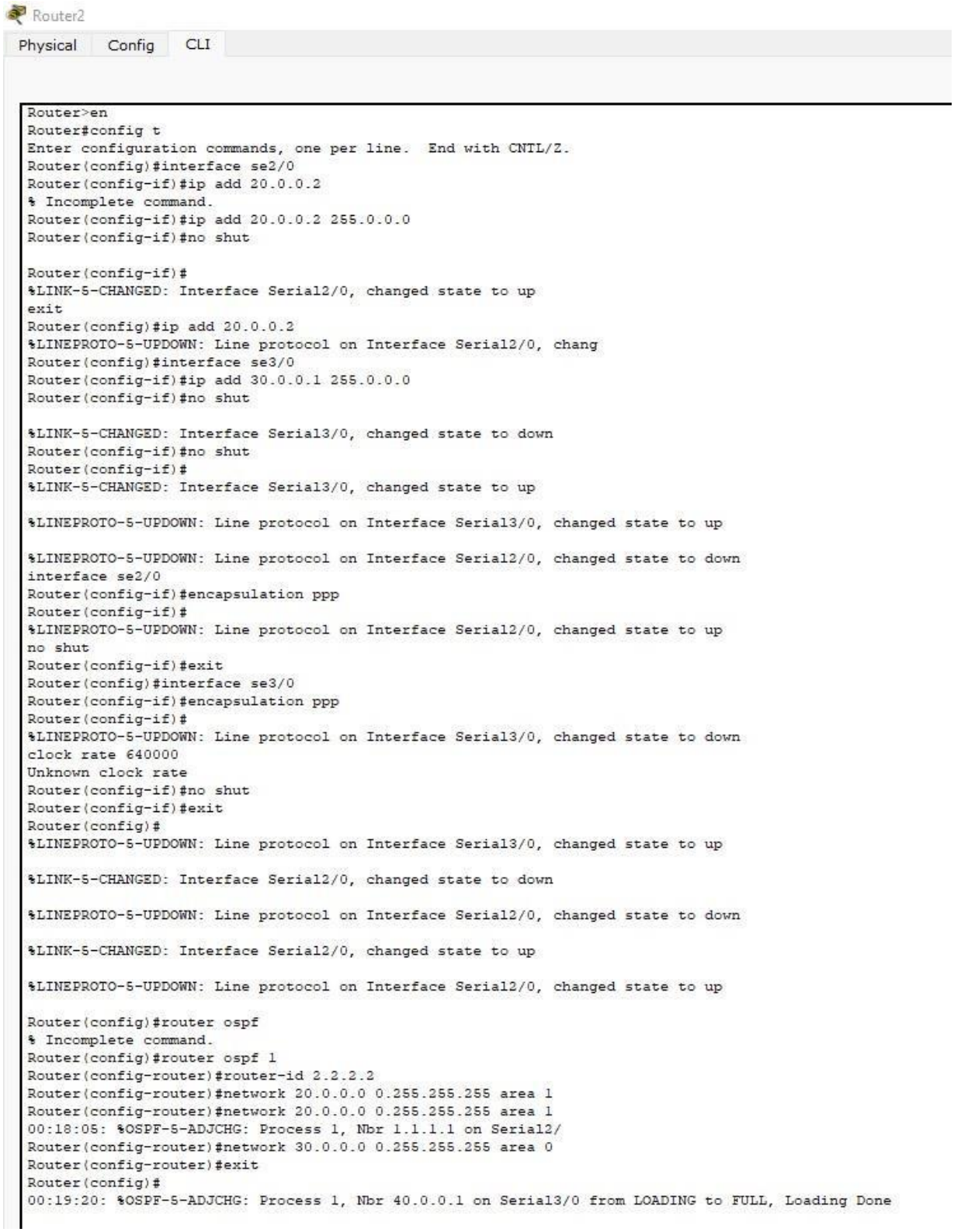


Configurations:

Router 1 :

```
Router(config)#interface se2/0
Router(config-if)#interface loopback 0

Router(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up

Router(config-if)#ip address 172.16.1.252 255.255.0.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#router ospf 1
Router(config-router)#area 1 virtual-link 2.2.2.2
Router(config-router)#exit
Router(config)#
00:24:20: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on OSPF_VL0 from LOADING to FULL, Loading Done
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

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, 00:00:54, Serial2/0
O IA 40.0.0.0/8 [110/129] via 20.0.0.2, 00:00:54, Serial2/0
C    172.16.0.0/16 is directly connected, Loopback0
Router#
```

Router 2 :


Router2
Physical
Config
CLI
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface se2/0
Router(config-if)#ip add 20.0.0.2
% Incomplete command.
Router(config-if)#ip add 20.0.0.2 255.0.0.0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up
exit
Router(config)#ip add 20.0.0.2
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, chang
Router(config)#interface se3/0
Router(config-if)#ip add 30.0.0.1 255.0.0.0
Router(config-if)#no shut
%LINK-5-CHANGED: Interface Serial3/0, changed state to down
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to down
interface se2/0
Router(config-if)#encapsulation ppp
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
no shut
Router(config-if)#exit
Router(config)#interface se3/0
Router(config-if)#encapsulation ppp
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to down
clock rate 640000
Unknown clock rate
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
%LINK-5-CHANGED: Interface Serial2/0, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to down
%LINK-5-CHANGED: Interface Serial2/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
Router(config)#router ospf
% Incomplete command.
Router(config)#router ospf 1
Router(config-router)#router-id 2.2.2.2
Router(config-router)#network 20.0.0.0 0.255.255.255 area 1
Router(config-router)#network 20.0.0.0 0.255.255.255 area 1
00:18:05: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial2/
Router(config-router)#network 30.0.0.0 0.255.255.255 area 0
Router(config-router)#exit
Router(config)#
00:19:20: %OSPF-5-ADJCHG: Process 1, Nbr 40.0.0.1 on Serial3/0 from LOADING to FULL, Loading Done


Router2
Physical
Config
CLI
IOS Command Line Interface
Router(config)#interface se3/0
Router(config-if)#interface loopback 0
Router(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
ip add 172.16.1.253 255.255.0.0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to down
00:23:22: %OSPF-5-ADJCHG: Process 1, Nbr 40.0.0.1 on Serial3/0 from FULL to DOWN, Neighbor Down: Interface down or detached
%LINK-5-CHANGED: Interface Serial3/0, changed state to up
Router(config-if)#exi
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
t
00:23:33: %OSPF-4-ERRRCV: Received invalid packet: mismatch area ID, from backbone area must be virtual-link but not found from 20.0.0.2, Serial2/0
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
00:23:41: %OSPF-5-ADJCHG: Process 1, Nbr 40.0.0.1 on Serial3/0 from LOADING to FULL, Loading Done
Router#
00:23:43: %OSPF-4-ERRRCV: Received invalid packet: mismatch area ID, from backbone area must be virtual-link but not found from 20.0.0.2, Serial2/0
config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#
00:23:53: %OSPF-4-ERRRCV: Received invalid packet: mismatch area ID, from backbone area must be virtual-link but not found from 20.0.0.2, Serial2/0
Router(config-router)#area 1 virtual-link
00:24:03: %OSPF-4-ERRRCV: Received invalid packet: mismatch area ID, from backbone area must be virtual-link but not found from 20.0.0.2, Serial2/0
1.1.1.1
Router(config-router)#
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#c
00:24:18: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on OSPF_VL0 from LOADING to FULL, Loading Done
% Ambiguous command: "c"
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
Gateway of last resort is not set
20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C 20.0.0.0/8 is directly connected, Serial2/0
C 20.0.0.1/32 is directly connected, Serial2/0
30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks

```
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#area 1 virtual-link 1.1.1.1
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 resort is not set

O IA 10.0.0.0/8 [110/65] via 20.0.0.1, 00:00:34, Serial2/0
     20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       20.0.0.0/8 is directly connected, Serial2/0
C       20.0.0.1/32 is directly connected, Serial2/0
     30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       30.0.0.0/8 is directly connected, Serial3/0
C       30.0.0.2/32 is directly connected, Serial3/0
O IA 40.0.0.0/8 [110/65] via 30.0.0.2, 00:01:24, Serial3/0
C    172.16.0.0/16 is directly connected, Loopback0
Router#
```

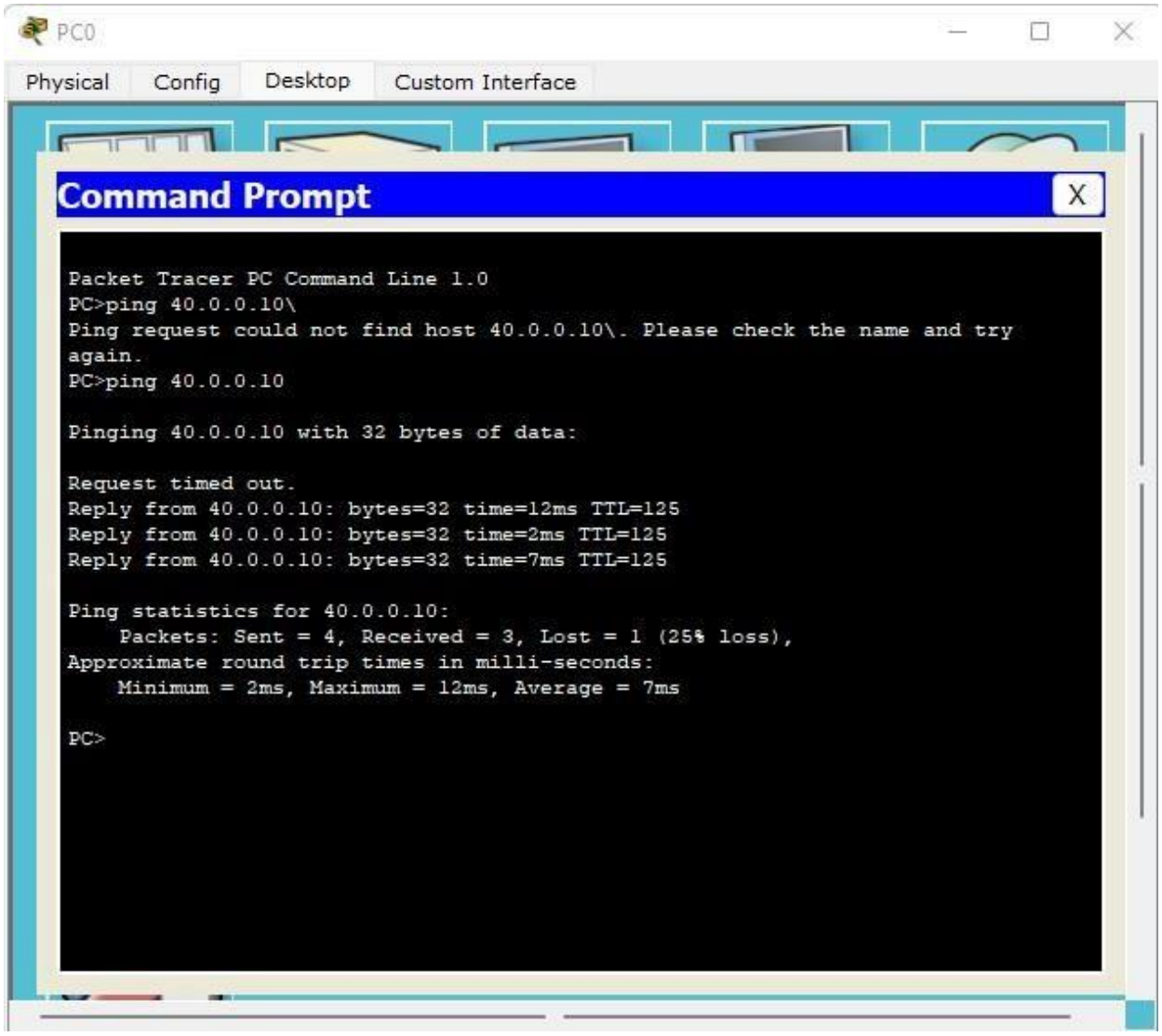
Router 3 :


Router3
Physical
Config
CLI
IOS Commar
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fa0/0
Router(config-if)#ip add 40.0.0.1 255.0.0.0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
exit
Router(config)#interface se2/0
Router(config-if)#ip add 30.0.0.2 255.0.0.0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up
exit
Router(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to down
Router(config)#interface se2/0
Router(config-if)#encapsulation ppp
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
no shut
Router(config-if)#exit
Router(config)#router ospf 1
Router(config-router)#network 30.0.0.0 0.255.255.255 area 0
Router(config-router)#
00:18:56: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial2/0 from LOADING to FULL, Loading Done
Router(config-router)#network 40.0.0.0 0.255.255.255 area 2
Router(config-router)#exit
Router(config)#interface se2/0
Router(config-if)#interface loopback 0
Router(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
ip add 172.16.1.254 255.255.0.0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to down
00:22:58: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial2/0 from FULL to DOWN, Neighbor Down: Interface down or detached
%LINK-5-CHANGED: Interface Serial2/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
00:23:18: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial2/0 from LOADING to FULL, Loading Done
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

```
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, 00:05:53, Serial2/0
O IA 20.0.0.0/8 [110/128] via 30.0.0.1, 00:06:30, 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#
```

Ping Output:

P0:

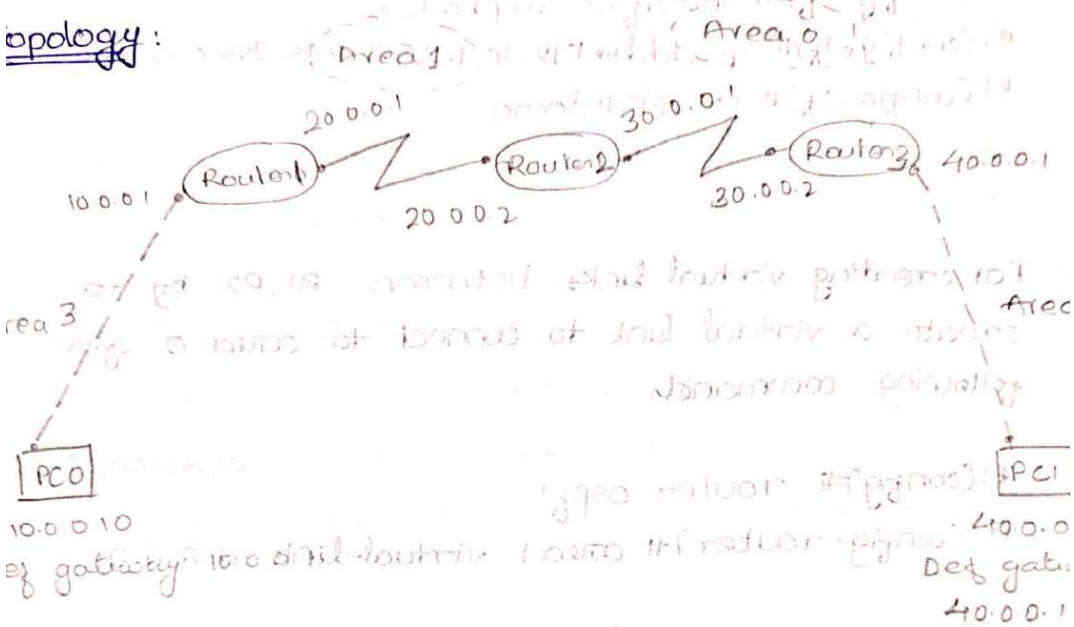


Observation :

Experiment-7

Aim : To understand working of OSPF (Open shortest path first)

Topology :



Procedure :

Configure the routers and PCs with IPs and gateways as per the topology.

Configure each of routers according to IP's shown in topology.

Encapsulation ppp and clock rate need to be set as done in RIP experiment.

Give the following commands

Router (config)# router ospf 1

Router (config-router)# router-id 1.1.1.1

Router (config-router)# network 10.0.0.0 0.255.255.255

Router (config-router)# network 20.0.0.0 0.255.255.255

5. Repeat same steps for all routers.

6. For loop backs give following commands

R2 serial 3/0
R3 serial 2/0

```
R1(config)# interface serial 2/0
R1(config-if)# interface loopback 0
R1(config-if)# ip address 172.16.1.252 255.255.0.0
R1(config-if)# no shutdown
```

R2	253	remaining + same
R3	254	

7. For creating virtual links between R1, R2 ~~by~~ to create a virtual link to connect to area 0 give following commands.

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

R2 area 1

```
R1(config-router)# exit
```

8. Show IP route. 30 and 40 are directly connected Make sure all networks are listed.

put

:> ping 40.0.0.10

inging 40.0.0.10 with 32 bytes of data:

eply from 40.0.0.10 : bytes = 32 time= 2ms TTL=125
ply from 40.0.0.10 : bytes=32 time=3ms TTL=125
ply from 40.0.0.10 : bytes = 32 time = 22ms TTL=125
ply from 40.0.0.10 : bytes = 32 time= 2ms TTL=125

ng statics for 40.0.0.10 :
Packets Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in millie-seconds
Minimum = 2ms, Maximum = 22ms, Average = 7ms

route =>

10.0.0.0/8 is directly connected, fastethernet 0/0
20.0.0.0/8 is variably subnetted, 2 subnets, 2
20.0.0.0/8 is directly connected, serial 2/0
20.0.0.2/32 is directly connected, serial 2/0
30.0.0.0/8 [110/128] via 20.0.0.2, 00:03:23, seri
IA 40.0.0.0/8 [110/129] via 20.0.0.2, 00:03:23, serial
127.16.0.0/16 is directly connected, Loopback 0

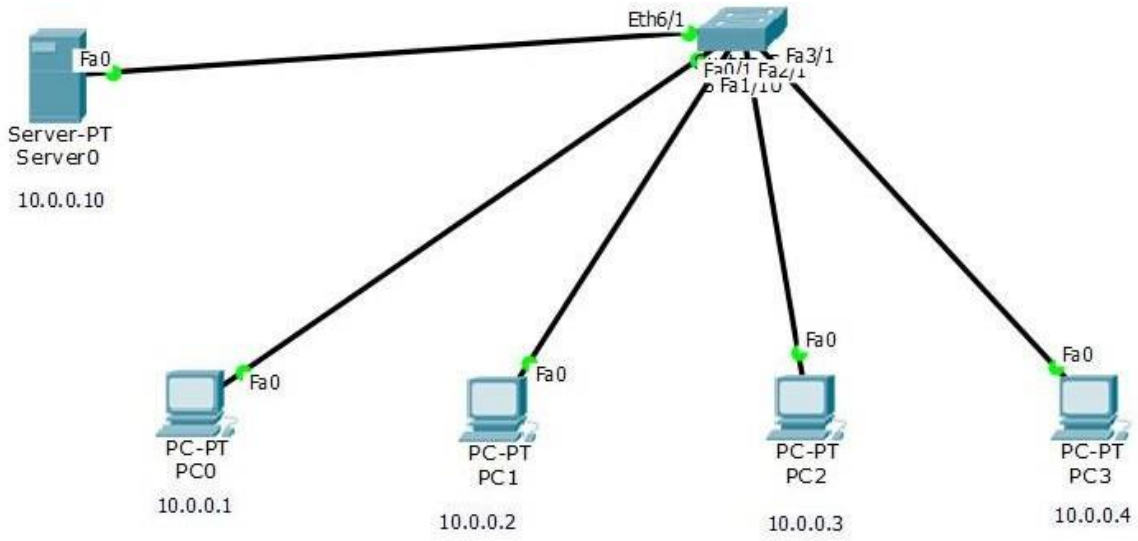
Observation:

- OSPS (open shortest path first) is a link state routing protocol that is used to find the best path between the source and the destination router using its own shortest path first
- To keep routers active we have to configure the routers using loopback
- OSPF we virtual link to connect to the backbone through a non back bone area

Experiment 8

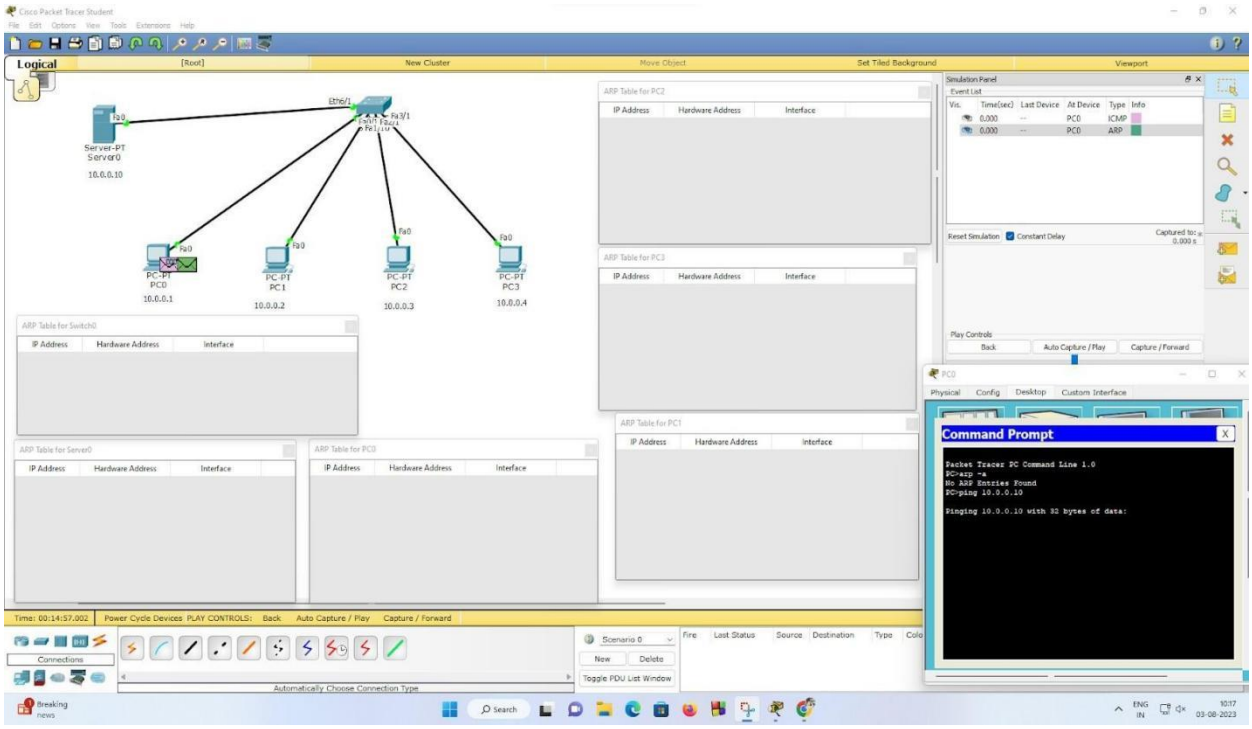
Aim : To construct simple LAN and understand the concept and operation of Address Resolution Protocol (ARP)

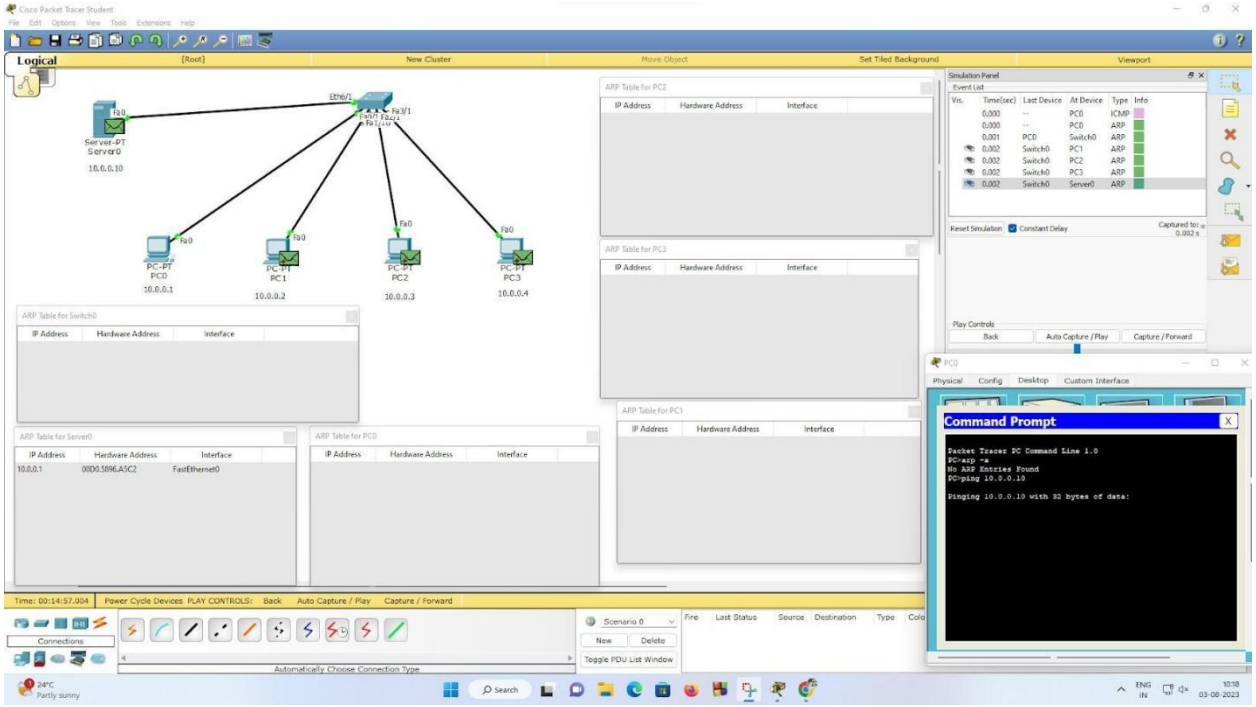
Topology:

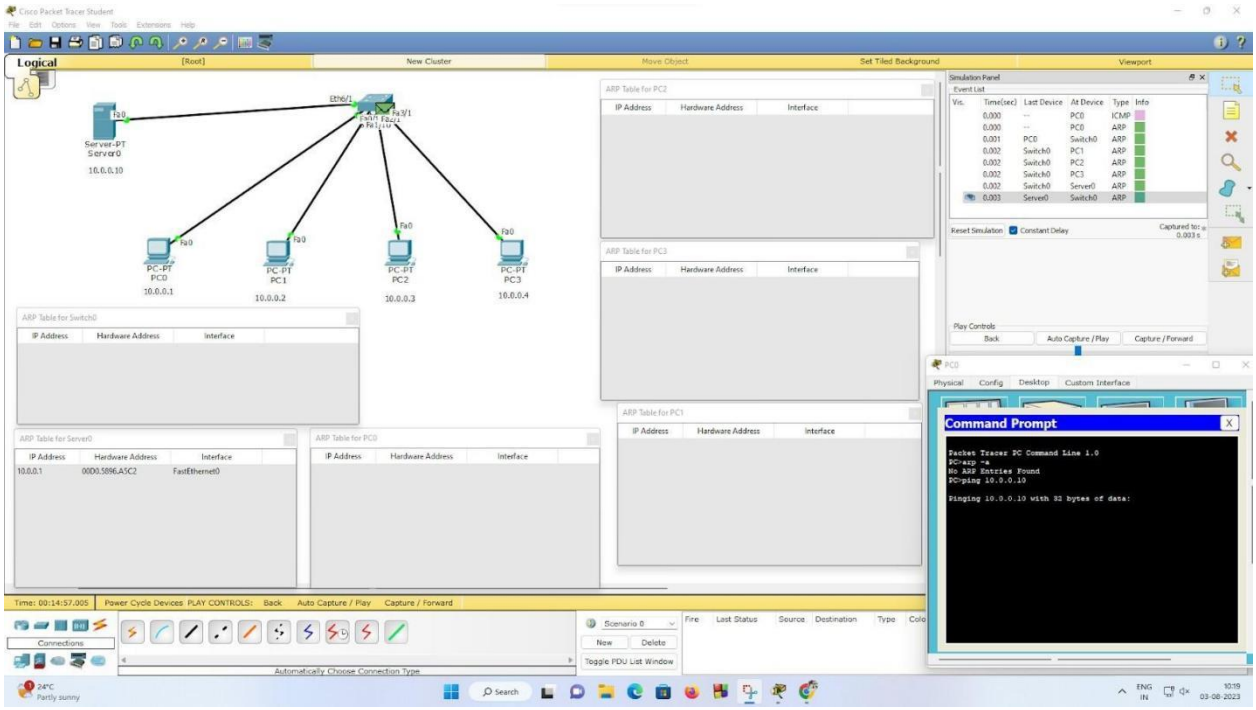


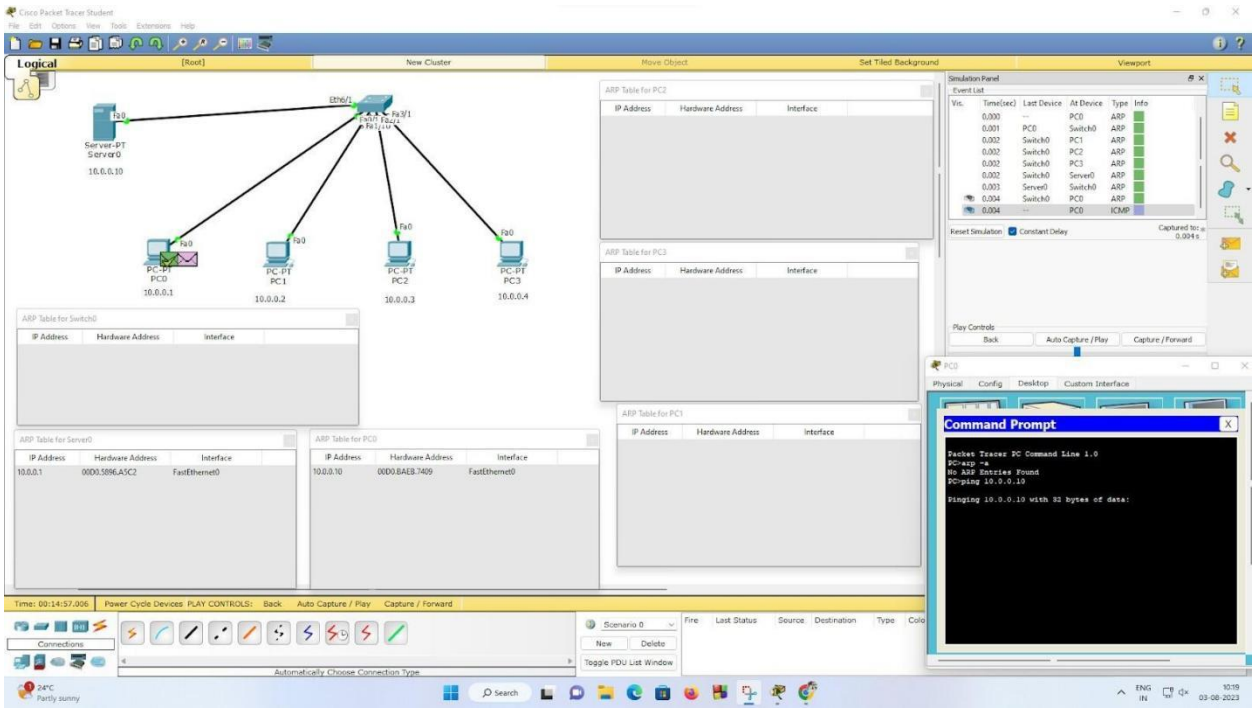
ARP Tables while pinging :

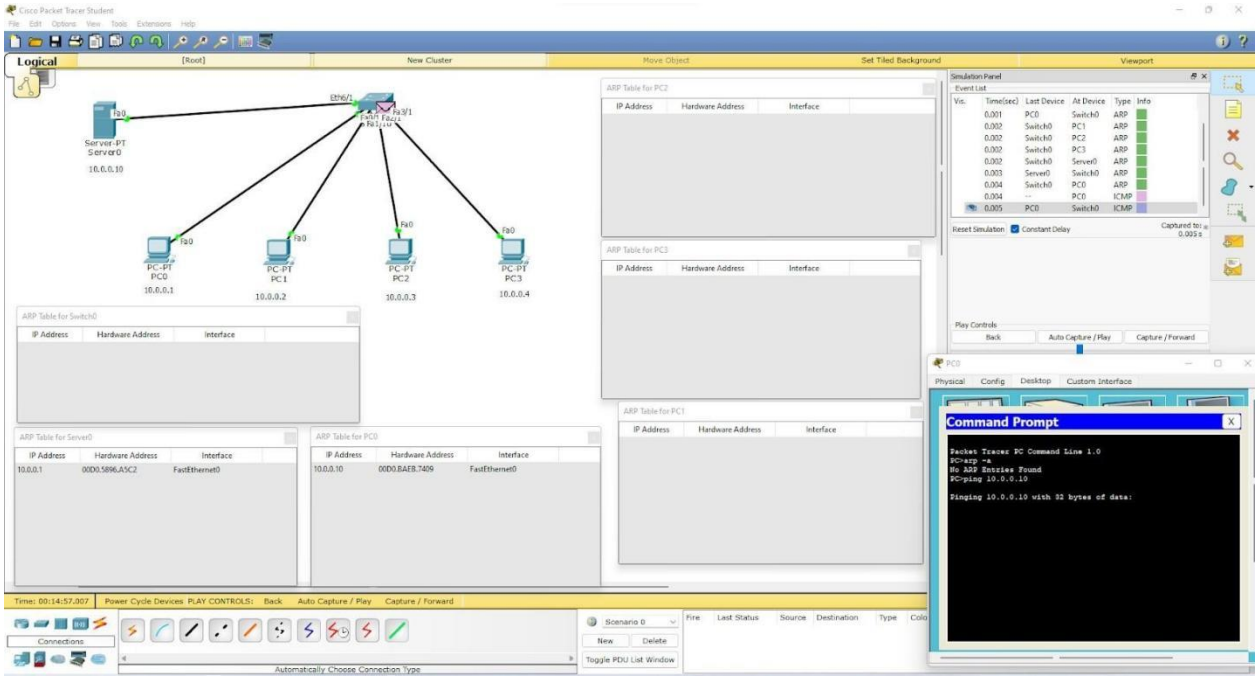
Ping from PC0 to Server0:

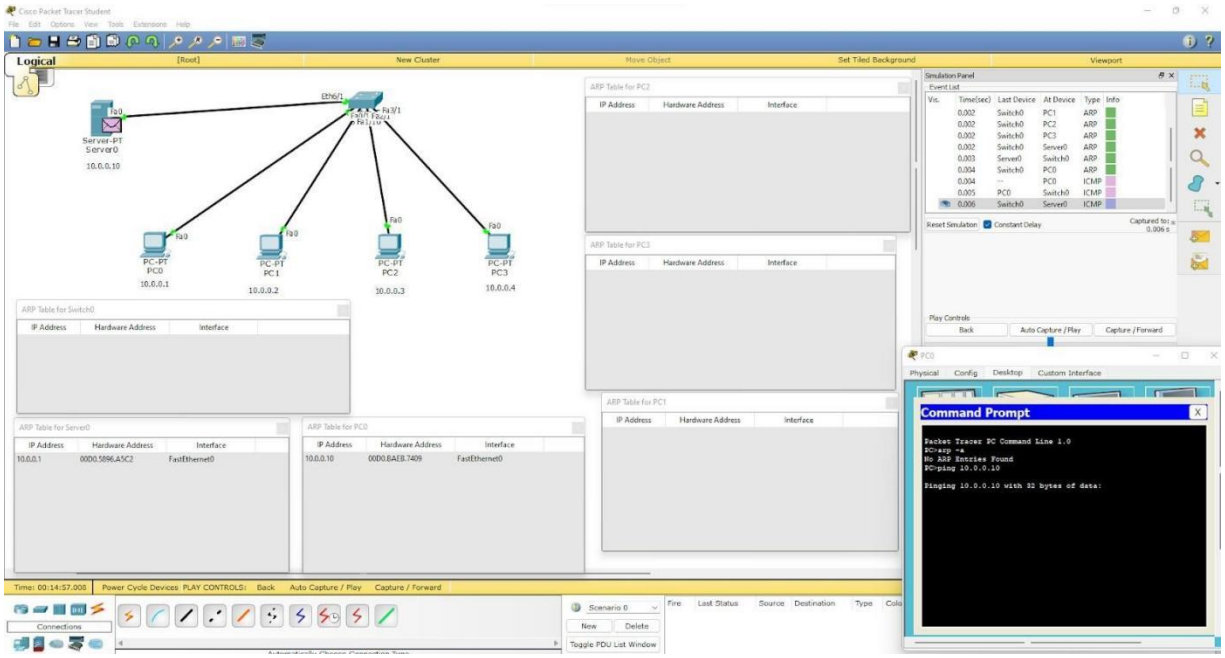


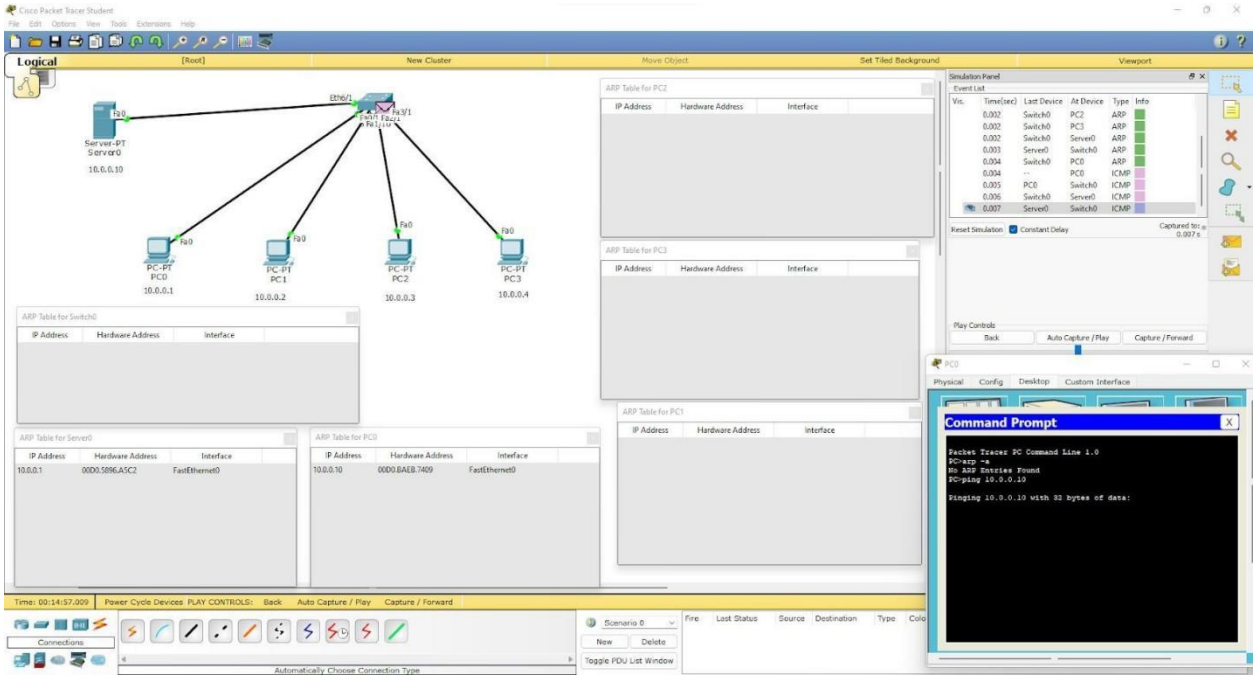


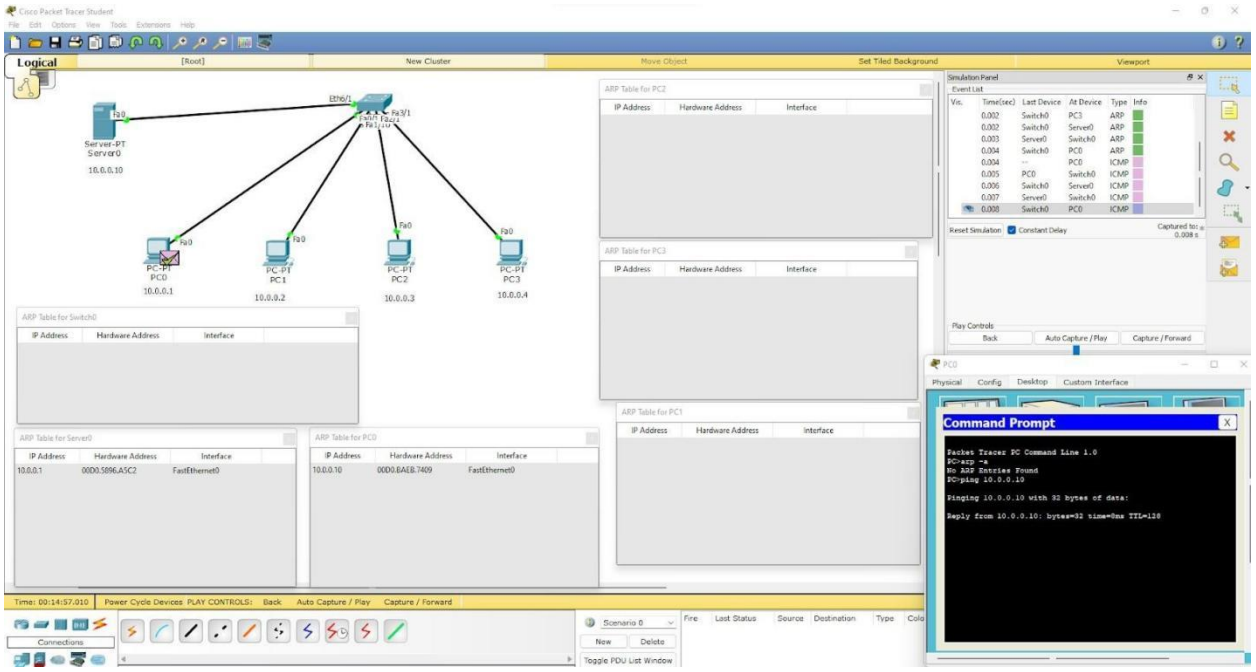

Logical
Server-PT Server0
10.0.0.10
PC-PT PC0
10.0.0.1
PC-PT PC1
10.0.0.2
PC-PT PC2
10.0.0.3
PC-PT PC3
10.0.0.4
Command Prompt
Packet Tracer PC Command Line 1.0
PC>arp -a
No ARP Entries Found
PC>ping 10.0.0.10
Pinging 10.0.0.10 with 32 bytes of data:

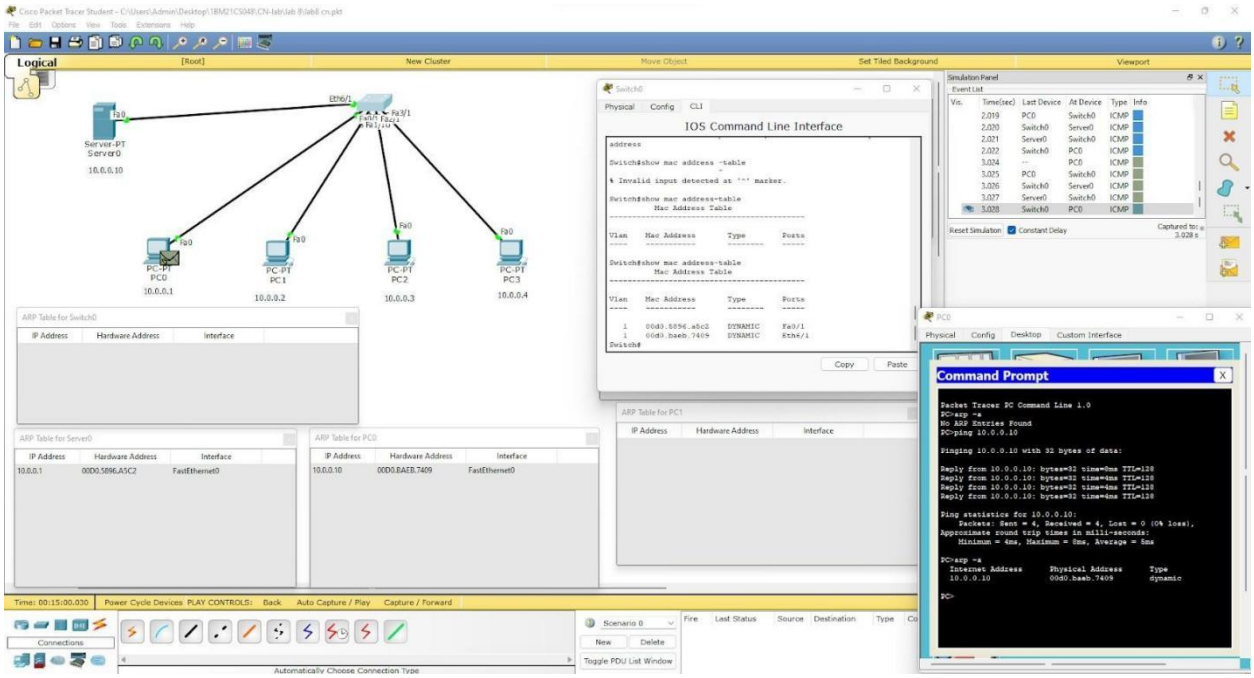

Logical
Server-PT Server0
10.0.0.10
PC-PT PC0
10.0.0.1
PC-PT PC1
10.0.0.2
PC-PT PC2
10.0.0.3
PC-PT PC3
10.0.0.4
Command Prompt
Packet Tracer PC Command Line 1.0
PC>arp -a
No ARP Entries Found
PC>ping 10.0.0.10
Pinging 10.0.0.10 with 32 bytes of data:


Logical
Server-PT Server0
10.0.0.10
PC-PT PC0
10.0.0.1
PC-PT PC1
10.0.0.2
PC-PT PC2
10.0.0.3
PC-PT PC3
10.0.0.4
Command Prompt
Packet Tracer PC Command Line 1.0
PC>arp -a
No ARP Entries Found
PC>ping 10.0.0.10
Pinging 10.0.0.10 with 32 bytes of data:

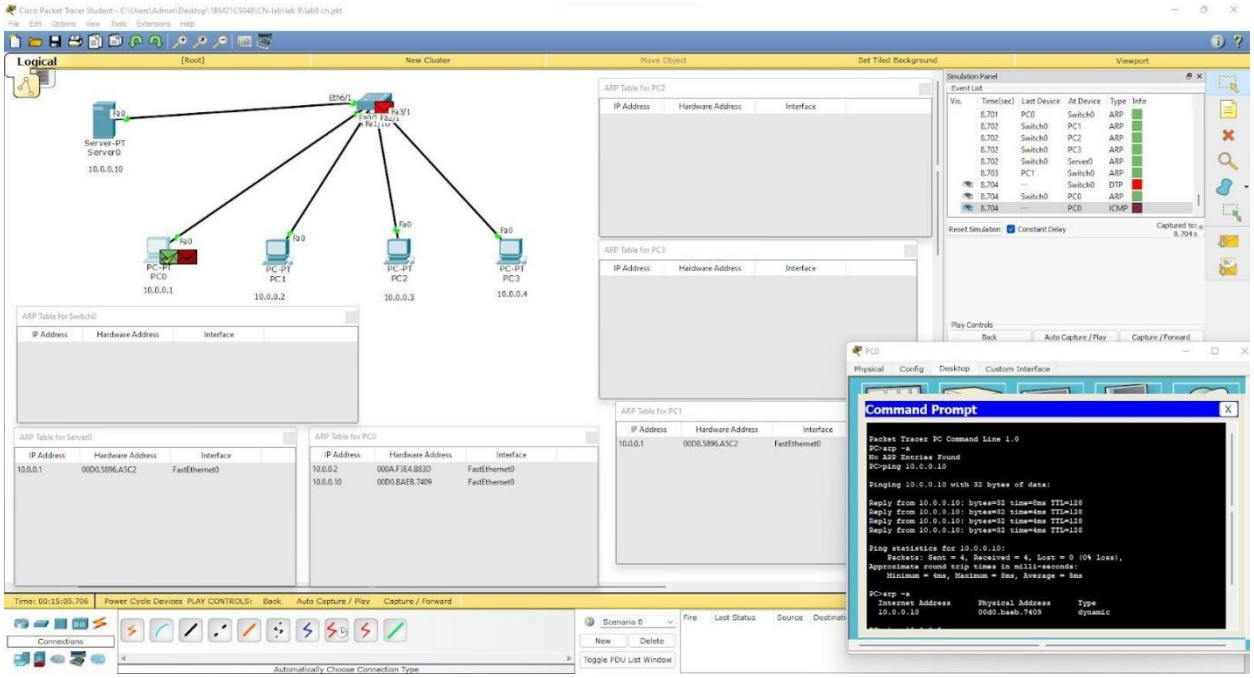

Logical
Server-PT Server0
10.0.0.10
PC-PT PC0
10.0.0.1
PC-PT PC1
10.0.0.2
PC-PT PC2
10.0.0.3
PC-PT PC3
10.0.0.4
Command Prompt
Packet Tracer PC Command Line 1.0
PC>arp -a
No ARP Entries Found
PC>ping 10.0.0.10
Pinging 10.0.0.10 with 32 bytes of data:

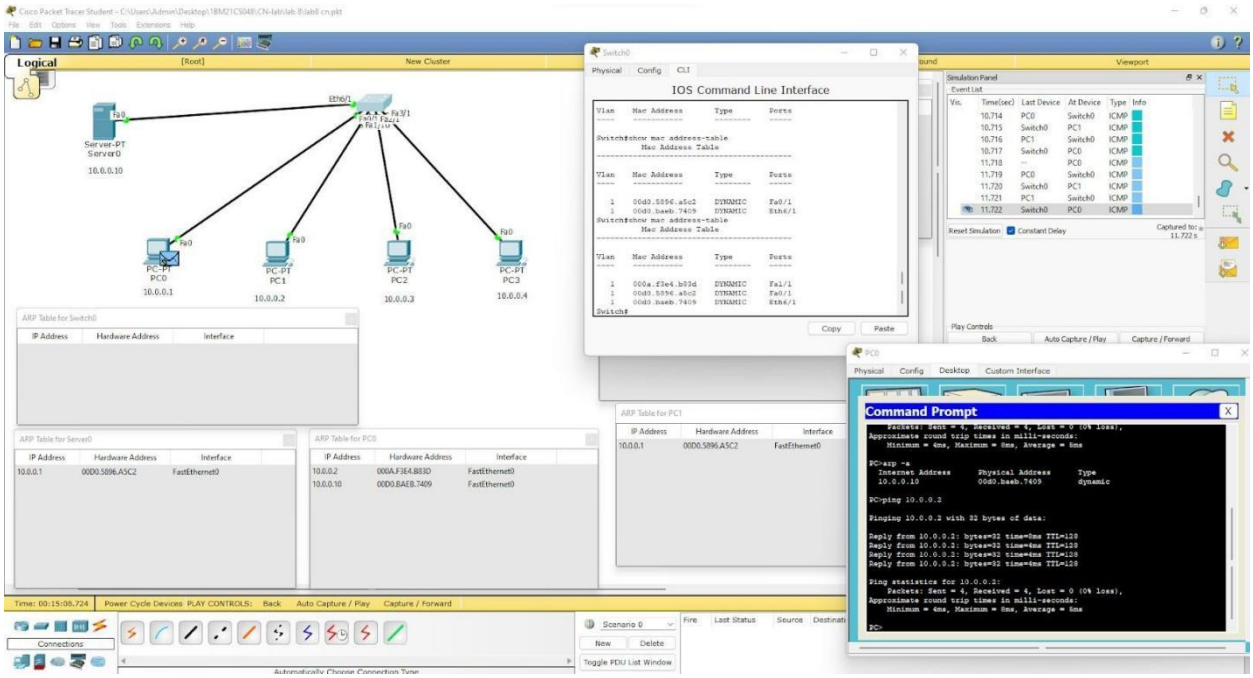

Logical
Server-PT Server0
10.0.0.10
PC-PT PC0
10.0.0.1
PC-PT PC1
10.0.0.2
PC-PT PC2
10.0.0.3
PC-PT PC3
10.0.0.4
Command Prompt
Packet Tracer PC Command Line 1.0
PC>arp -a
No ARP Entries Found
PC>ping 10.0.0.10
Pinging 10.0.0.10 with 32 bytes of data:


Logical
Server-PT Server0
10.0.0.10
PC-PT PC0
10.0.0.1
PC-PT PC1
10.0.0.2
PC-PT PC2
10.0.0.3
PC-PT PC3
10.0.0.4
Command Prompt
Packet Tracer PC Command Line 1.0
PC>arp -a
No ARP Entries Found
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=128

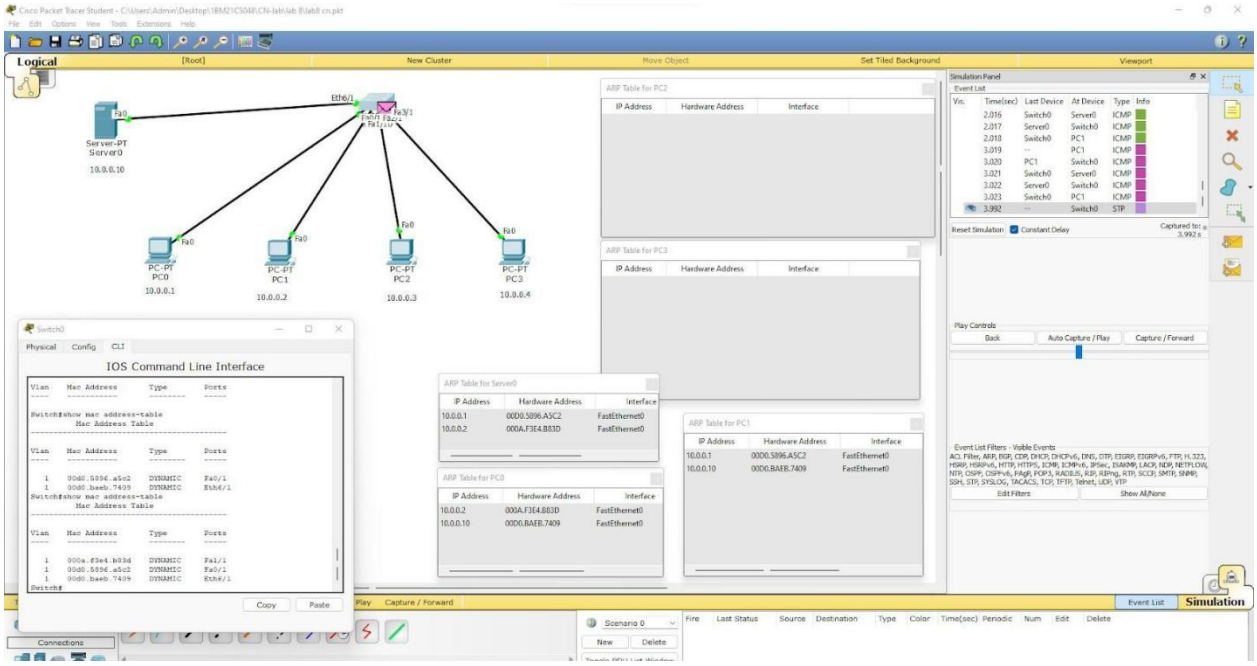


Ping from PC0 to PC1:





Final ARP Tables after pinging:

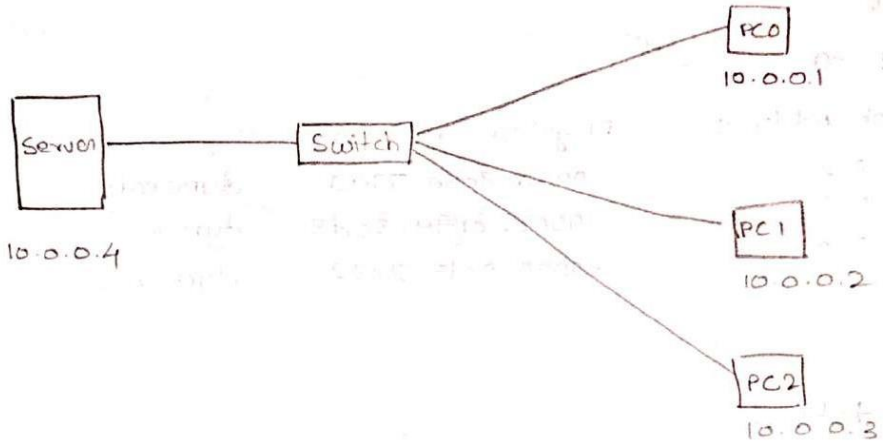


Observation:

Lab 8

Aim: To understand the working of ARP

Topology:



Procedure:

- Connect a server, switch and PCs to form a simple LAN.
- set IP addresses of all the PCs and ~~services~~ servers
- Go to inspect and click on ARP table, which will be empty at the beginning.
- In simulation mode, ping the PCs using capture. Make sure that switch gets to know about every IP address by pinging ~~them~~ the devices.
- ~~As we~~ After pinging is completed, we can see that ARP tables are getting updated
- Go to command prompt of PC and give — arp -a

- It'll show the arp table of following PC
- Go to switch > CLI > show mac address-table to get all the addresses.

Output

arp table of PC0 —

PC > arp -a

Internet Address	Physical address	Type
10.0.0.2	0060.3e5e.7740	dynamic
10.0.0.3	000c.cf94.36d8	dynamic
10.0.0.4	0090.0c15.2c32	dynamic

mac address table —

switch > show mac address-table

Mac address Table

VLAN	Mac Address	Type	Ports
1	000c.cf94.36d8	DYNAMIC	Fa2/1
1	0060.3e5e.7740	DYNAMIC	Fa1/1
1	0090.0c15.2c32	DYNAMIC	Fa3/1
1	00d0.584b.99b6	DYNAMIC	Fa0/1

- It'll show the arp table of following PC
- Go to swith > CLI > show mac address-table to get all the addresses.

Output

arp table of PC0 —

PC > arp -a

Internet Address	Physical address	Type
10.0.0.2	0060.3e5e.7740	dynamic
10.0.0.3	000c.cf94.36d8	dynamic
10.0.0.4	0090.0c15.2c32	dynamic

mac address table —

switch > show mac address-table

Mac address Table

VLAN	Mac Address	Type	Ports
1	000c.cf94.36d8	DYNAMIC	Fa2/1
1	0060.3e5e.7740	DYNAMIC	Fa1/1
1	0090.0c15.2c32	DYNAMIC	Fa3/1
1	00d0.584b.99b6	DYNAMIC	Fa0/1

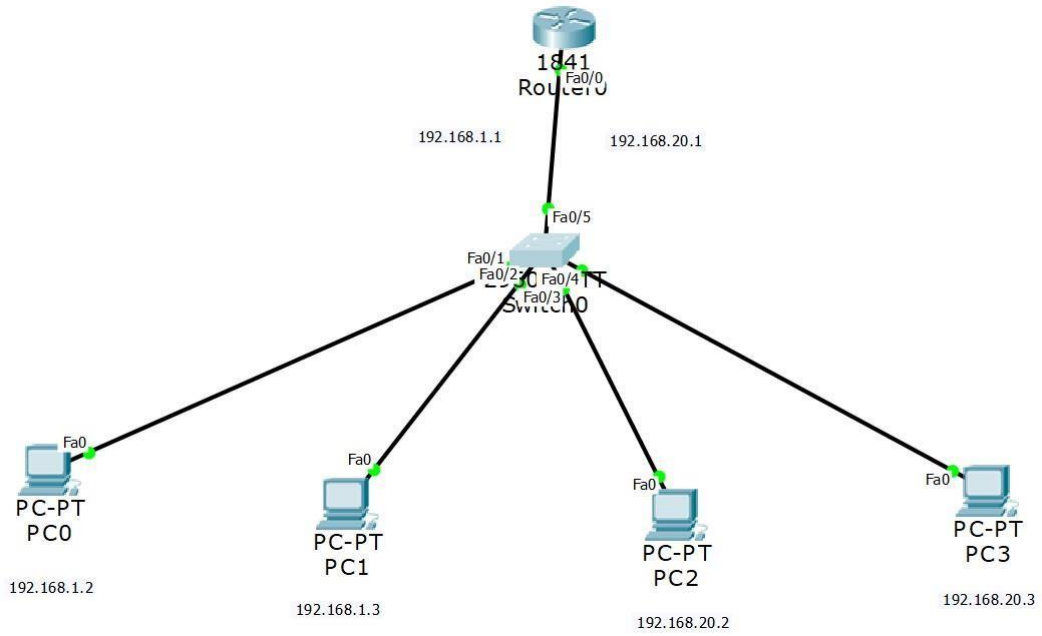
Observation

- ARP (address resolution protocol) is a protocol that connects dynamically changing IP address to a fixed mac address in a LAN.
- As we go on pinging the devices, we observe that ARP table gets updated dynamically.
- when we do show mac address-table, we can observe all device's mac address as we have pinged the devices to get to know about each other

Experiment 9

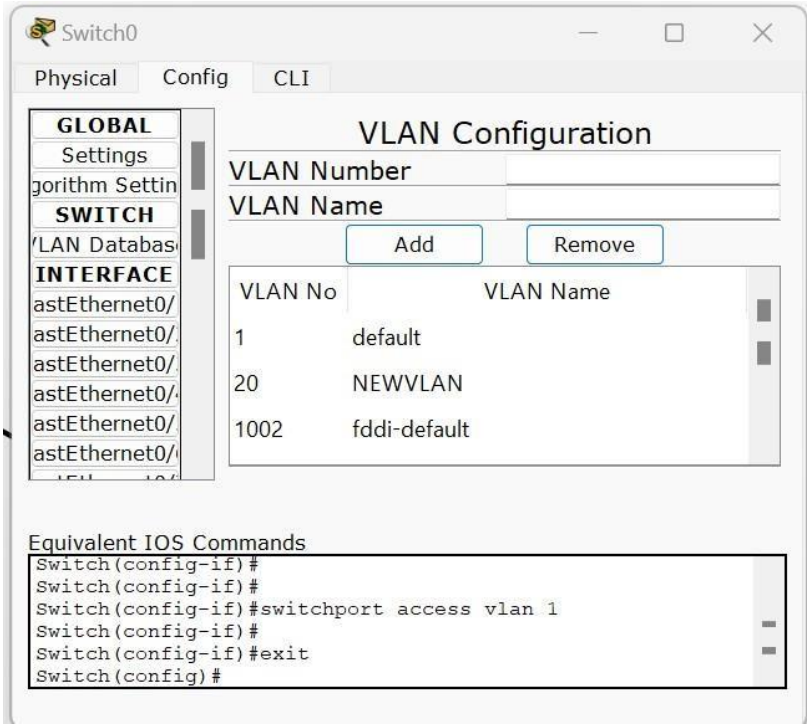
Aim : To construct a VLAN and make the PC's communicate among a VLAN

Topology:

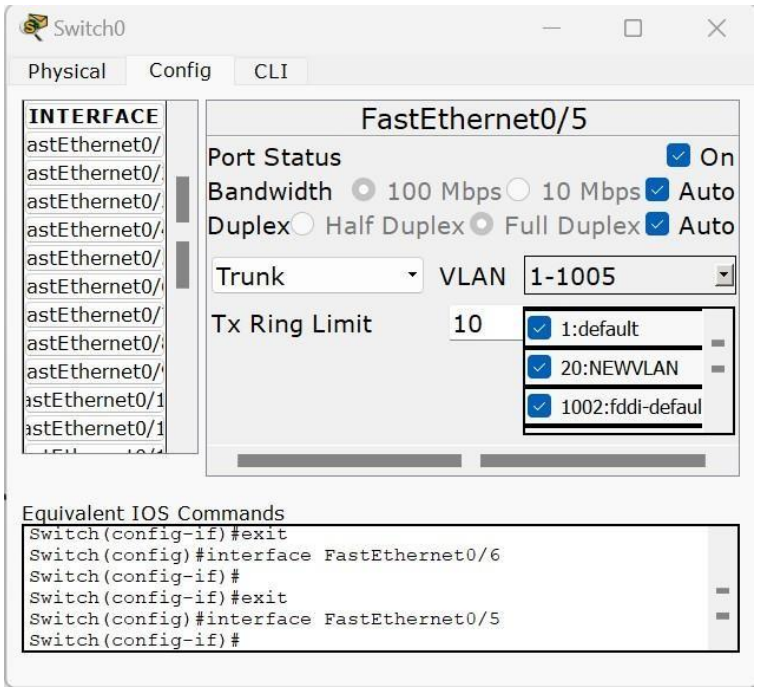


Configurations:

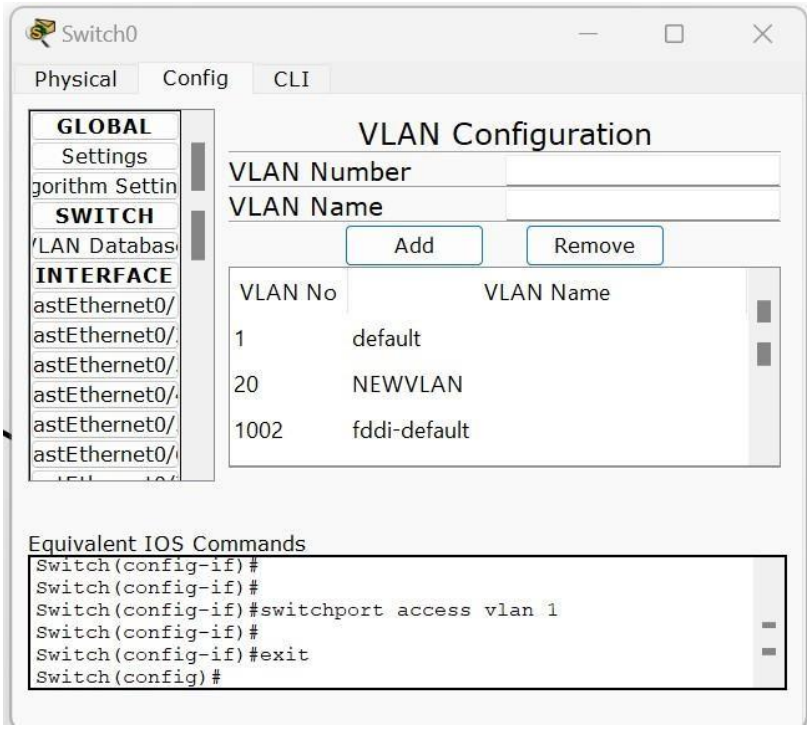
Switch VLAN Database:



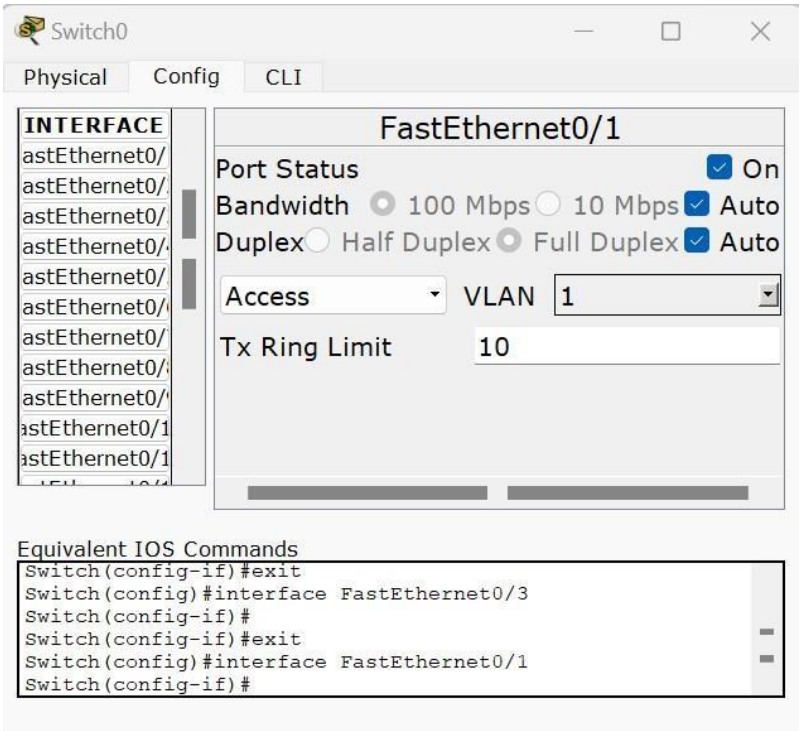
Switch FastEthernet0/5



Switch FastEthernet0/3 and FastEthernet0/4

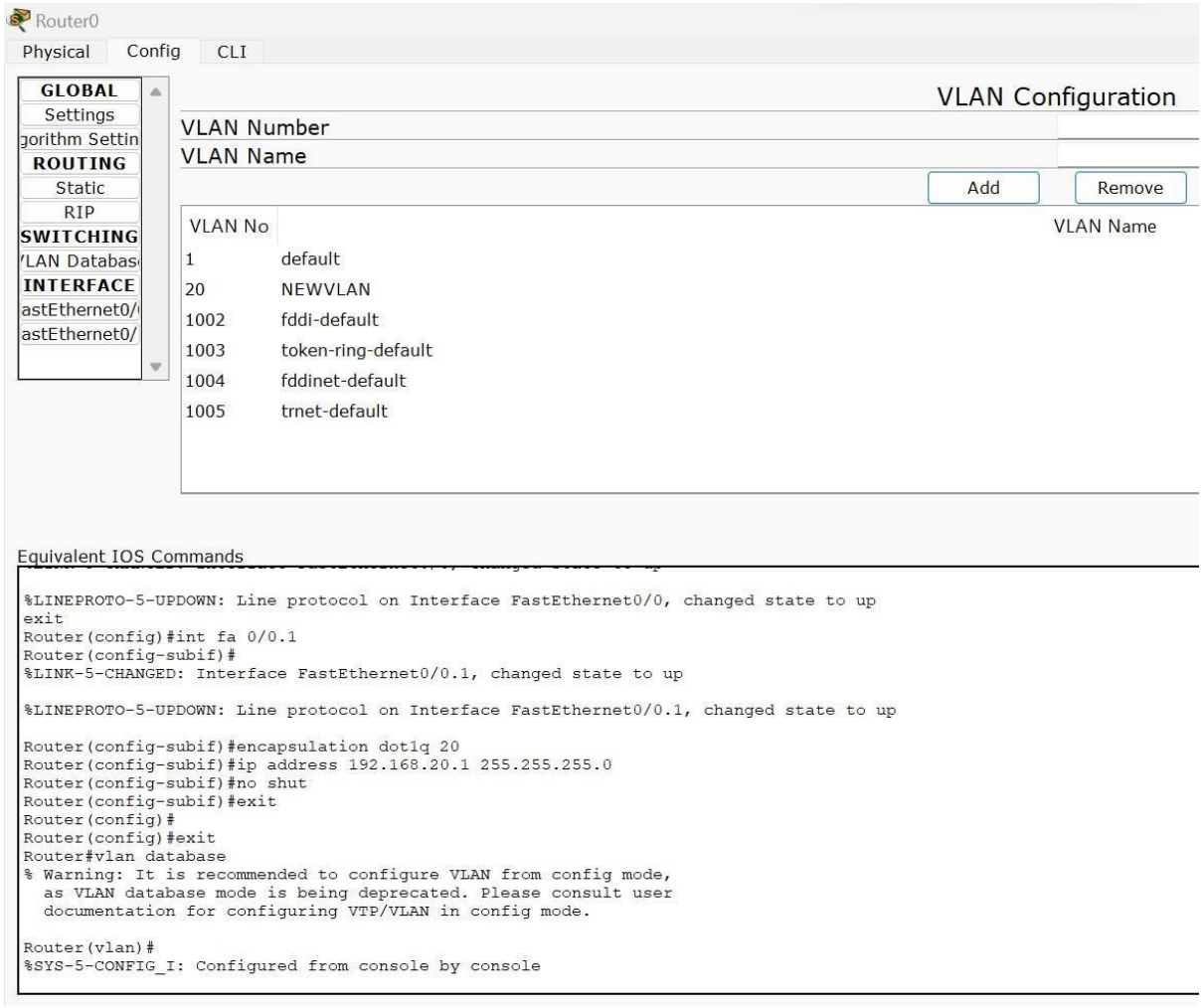


Switch FastEthernet0/1 and FastEthernet0/2



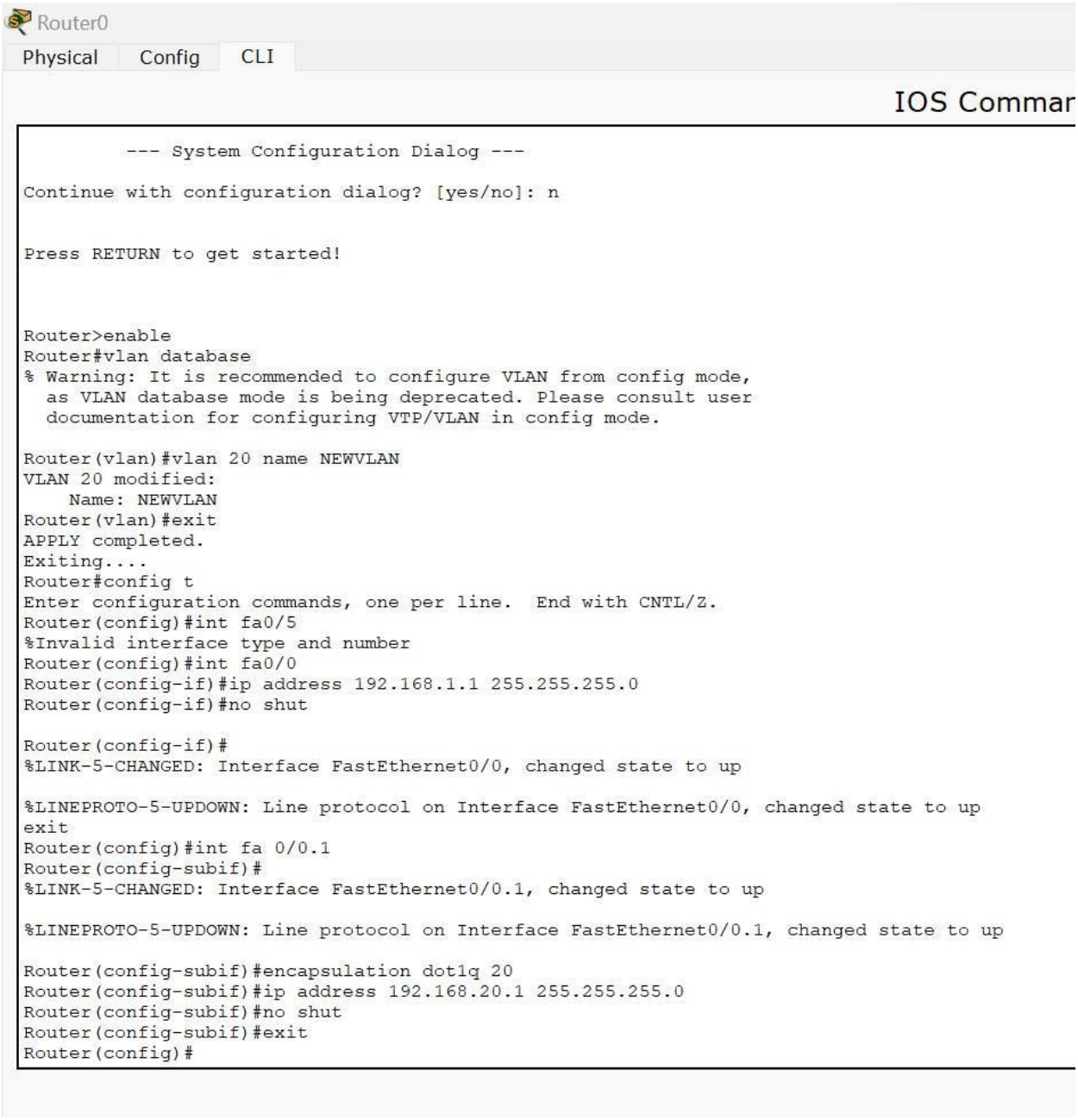
Router 0 :

VLAN DataBase:



Router 0 :

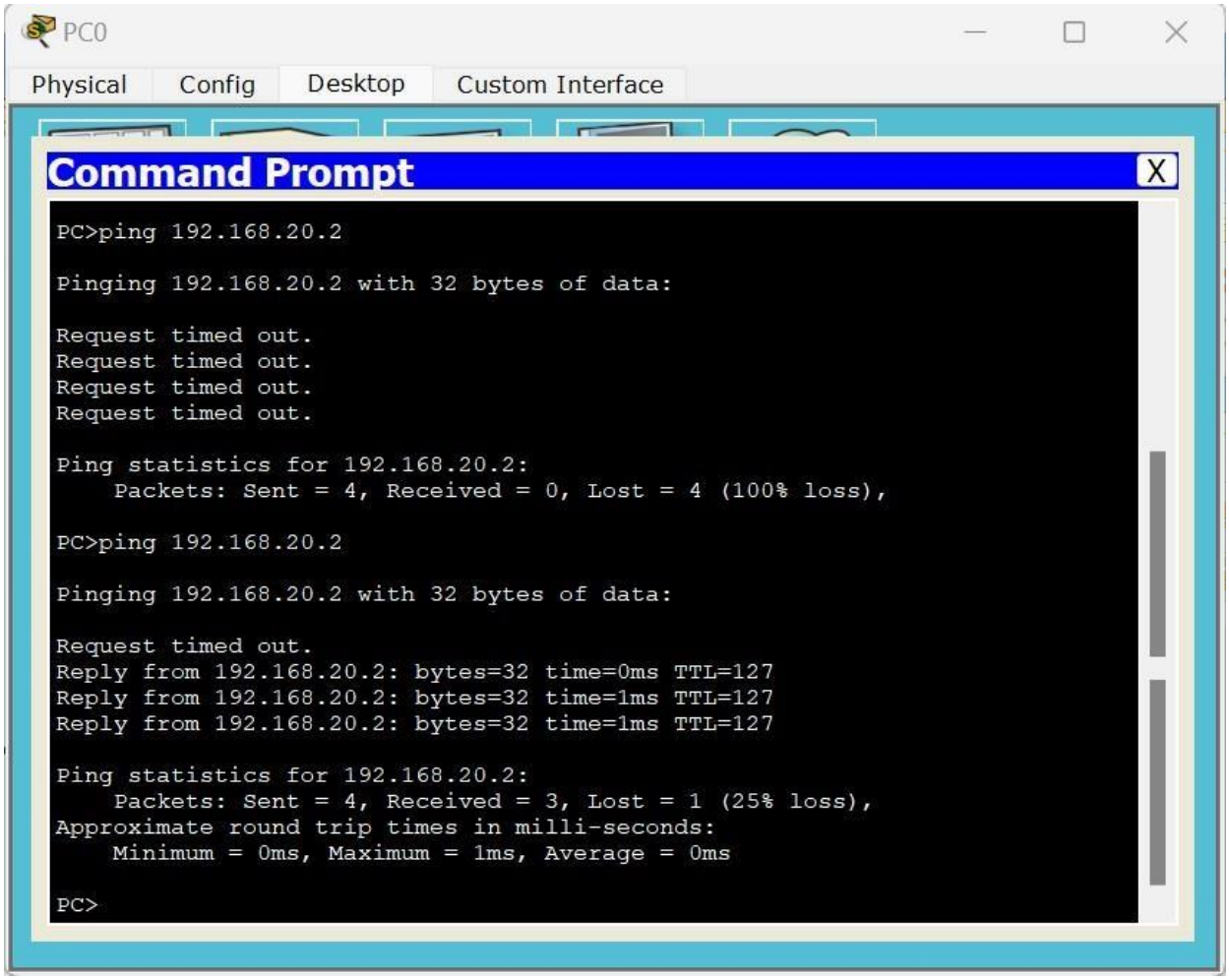
CLI:



Ping Outputs:

P0:

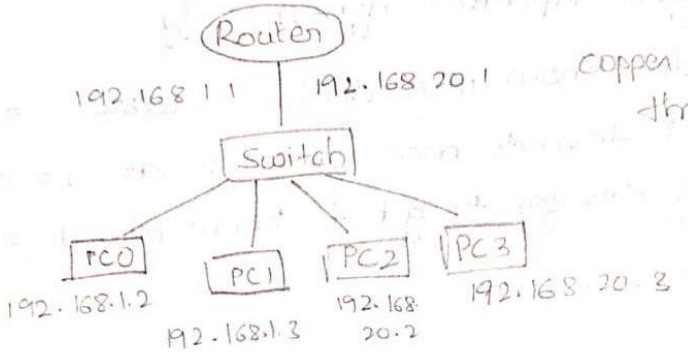
Before and after VLAN configuration was successful.



Observation:

Aim :- to contruct a VLAN and make the PC's communicate among a VLAN

Topology:



Procedure:

1) Set up the topology as shown above, use 1891 router
2) Add an extra router port to the switch as its needed
3) Use copper straight through wire. Set the IP address & gateway
4) In switch → config → VLAN Database, give any VLAN numbers, here 20, and VLAN name, here → VLAN
5) select add select the interface (here - fe 4/1) (nearest to the switch from router)

6) Look into fe 2/1 and 3/1 and change VLAN1 to 20: VLAN

7) In router, select VLAN Database, enter the number and name of the VLAN created

In CLI of router

Router (vlan) # exit

Apply completed

Exiting

Router # config t

Router (config) # interface fastethernet 0/0

Router (config-if) # ip address 192.168.1.1 255.255.255.0

Router (config-if) # no shut

Router (config)# interface fastethernet 0/0.1

Router (config subif) # encapsulation dot1q 20

Router (config -subif) # ip address 192.168.20.1 255.255.255.0

Router (config-subif) # no shut

Router (config-subif) # exit

Result

(in PC0)

PC> ping 192.168.20.3

pinging 192.168.20.3 with 32 bytes of data

Reply from 192.168.20.3: bytes=32 time=1ms TTL=128
Reply from 192.168.20.3: bytes=32 time=1ms TTL=128
Reply from 192.168.20.3: bytes=32 time=0ms TTL=128
Reply from 192.168.20.3: bytes=32 time=0ms TTL=128

Ping statics for 192.168.20.3
Packet: sent=4, Received=4, Lost=0

Approximate round trip time in milliseconds
Minimum = 0 ms, Maximum = 1 ms, Average=0ms

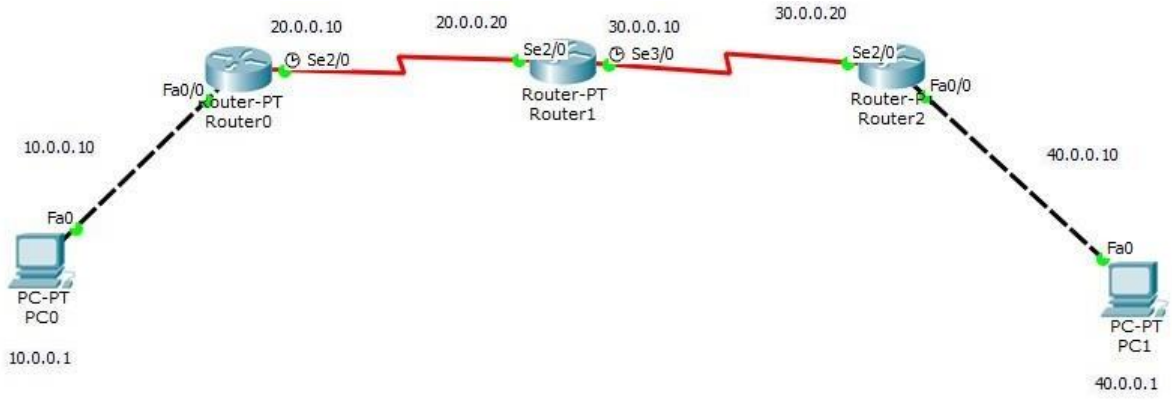
Observation

* VLAN - Virtual local area network is any broadcast domain that is partitioned and isolated in a completed network at the data link layer
* It is a virtualised connection that converts multiple devices and network nodes from different LANs into one local/

Experiment 10

Aim : Demonstrate the TTL/ Life of a Packet

Topology :

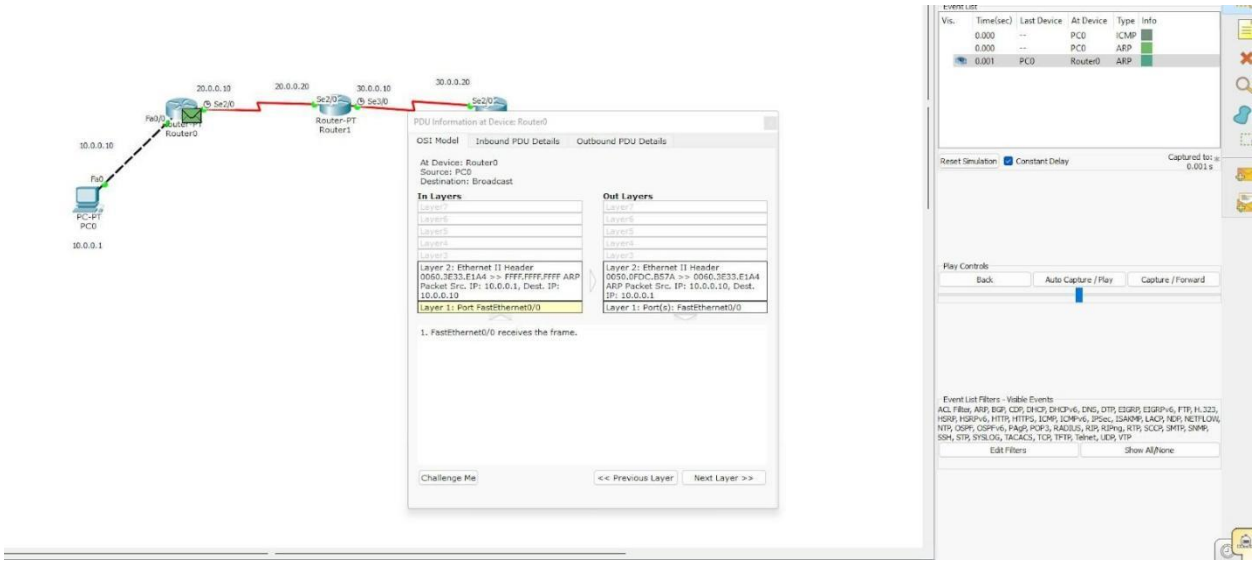


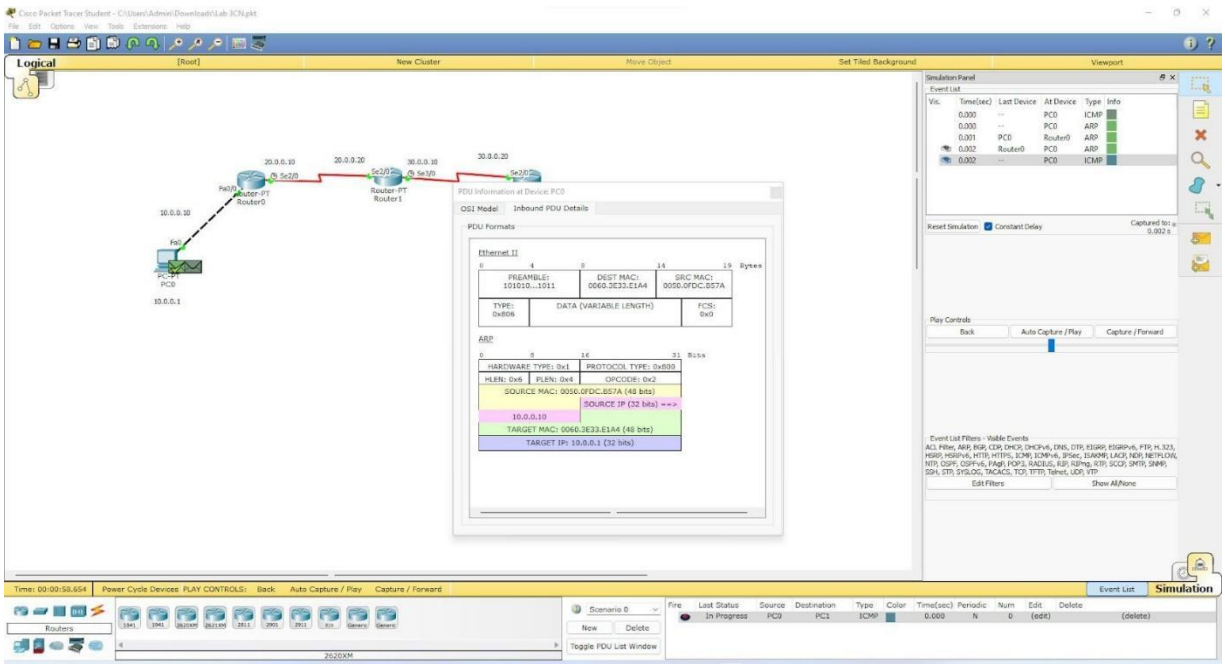
Configurations :

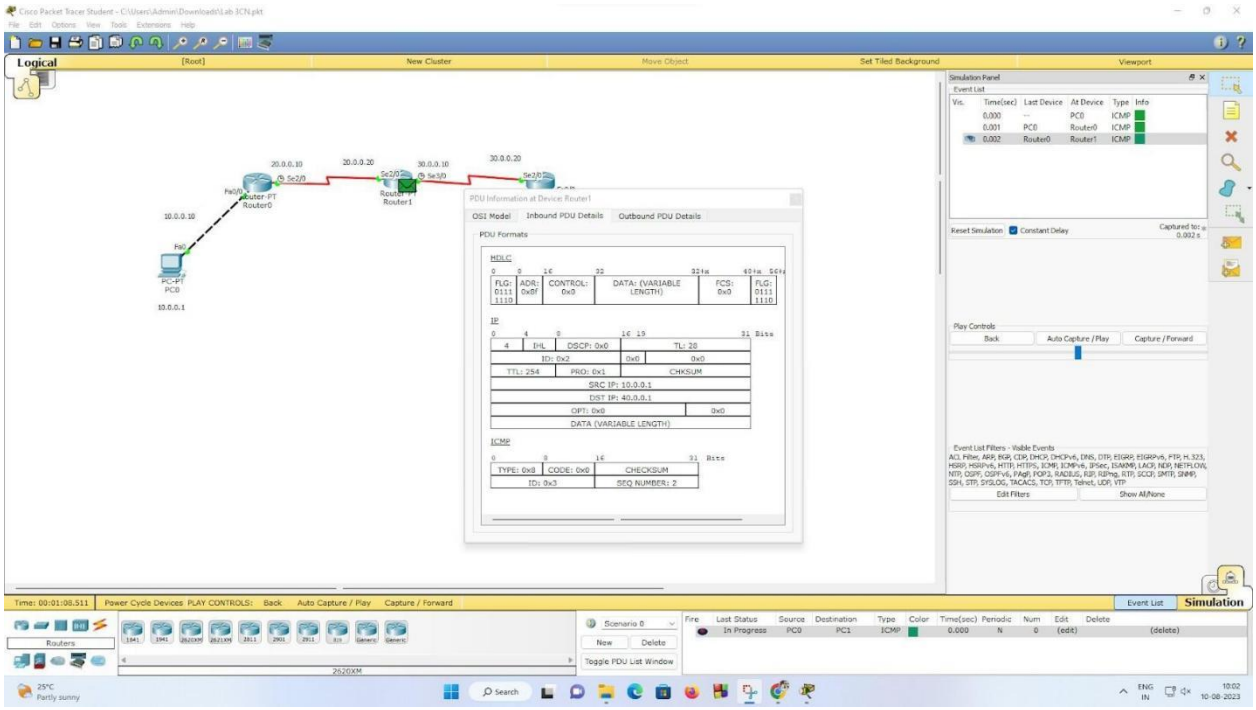
Configure the devices as per static / default / dynamic routing.
Above is done using static routing.

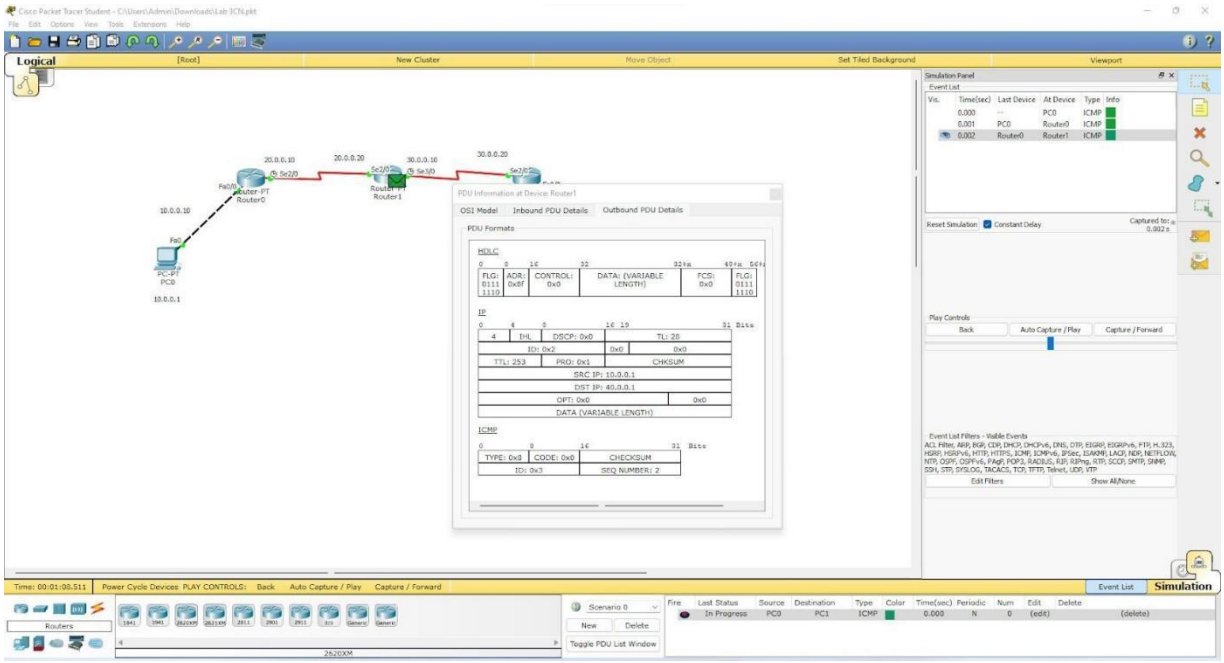
Output and PDU Details:

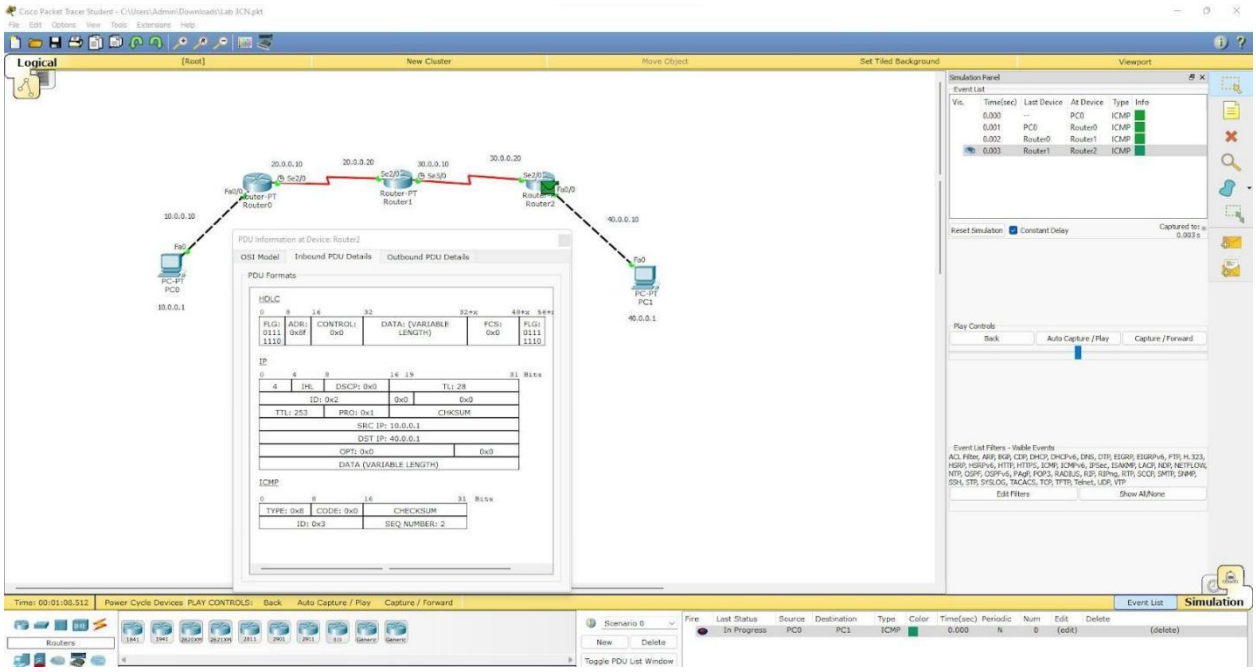
Simple PDU sent from PC0 to PC1 in simulation mode.

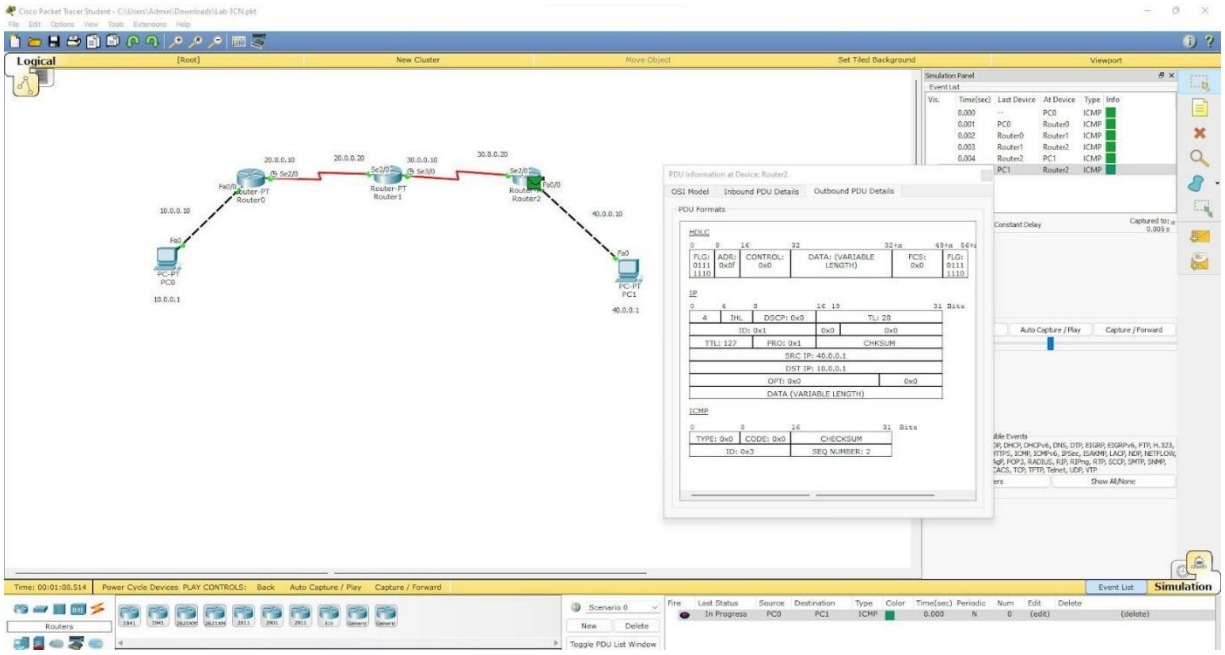


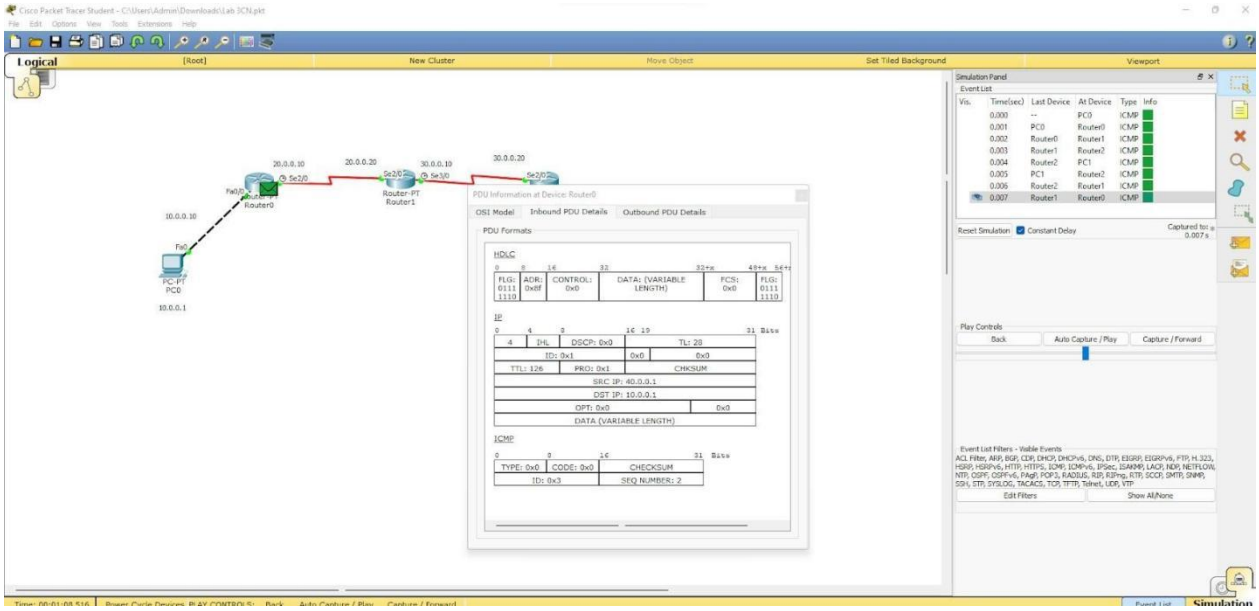


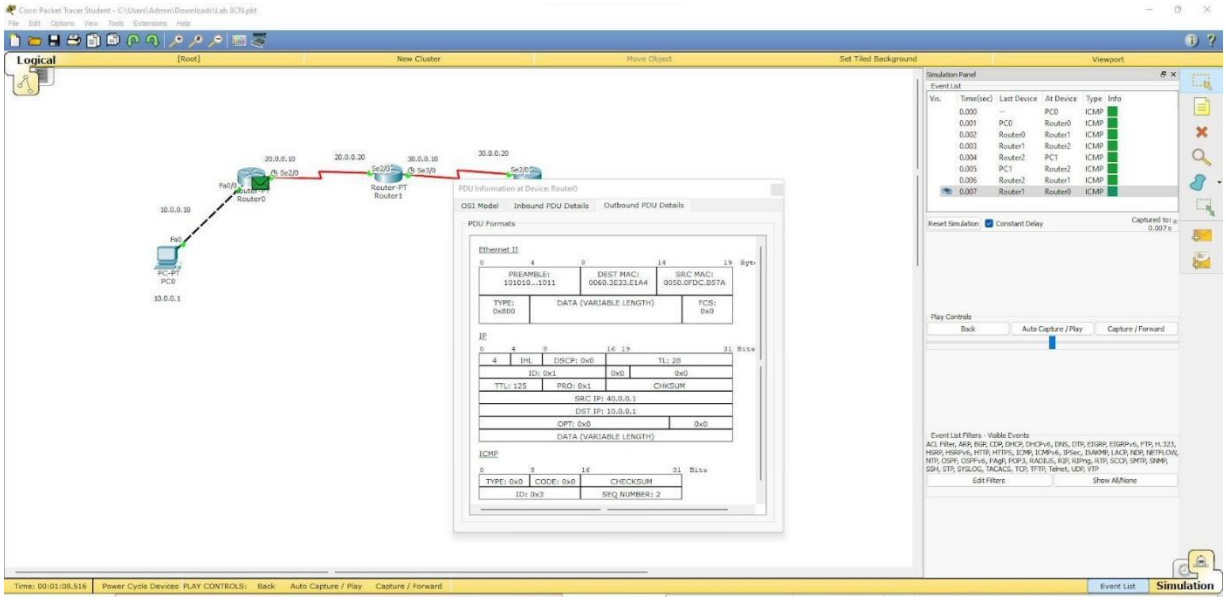

Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Router-PT
Router0
Router1
PC-PT
PC0
10.0.0.10
20.0.0.10
20.0.0.20
30.0.0.10
30.0.0.20
10.0.0.1
PDU Information at Device Router1
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
HDLC
IP
ICMP
Simulation Panel
Event List
Reset Simulation
Constant Delay
Play Controls
Back
Auto Capture / Play
Capture / Forward
Event List Filters - Visible Events
Edit Filters
Show All/None
Time: 00:01:08.511
Power Cycle Devices
PLAY CONTROLS:
Back
Auto Capture / Play
Capture / Forward
Event List
Simulation
Routers
2620XM
Scenario 0
New
Delete
Toggle PDU List Window
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
Periodic
Num
Edit
Delete
In Progress
PC0
PC1
ICMP
(edit)
(delete)

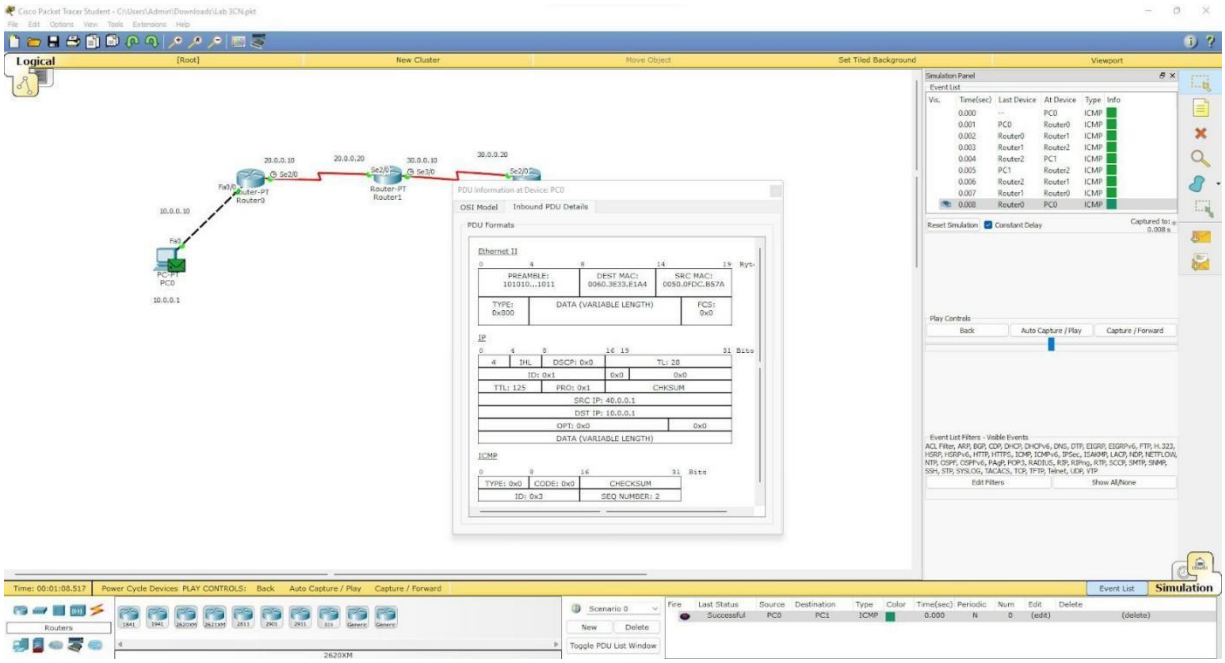

Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Router-PT
Router0
Router1
PC-PT
PC0
10.0.0.10
20.0.0.10
20.0.0.20
30.0.0.10
30.0.0.20
10.0.0.1
PDU Information at Device Router1
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
HDLC
IP
ICMP
Simulation Panel
Event List
Reset Simulation
Constant Delay
Play Controls
Back
Auto Capture / Play
Capture / Forward
Event List Filters - Visible Events
Edit Filters
Show All/None
Time: 00:01:08.511
Power Cycle Devices
PLAY CONTROLS:
Back
Auto Capture / Play
Capture / Forward
Event List
Simulation
Routers
2620XM
Scenario 0
New
Delete
Toggle PDU List Window
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
Periodic
Num
Edit
Delete
In Progress
PC0
PC1
ICMP
(edit)
(delete)


Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Router-PT Router0
Router-PT Router1
Router-PT Router2
PC-PT PC0
PC-PT PC1
10.0.0.10
20.0.0.10
20.0.0.20
30.0.0.10
30.0.0.20
40.0.0.10
10.0.0.1
40.0.0.1
PDU Information at Device: Router2
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
HDLC
IP
ICMP
Simulation Panel
Event List
Play Controls
Simulation


Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Router-PT Router0
Router-PT Router1
Router-PT Router2
PC-PT PC0
PC-PT PC1
10.0.0.10
20.0.0.10
20.0.0.20
30.0.0.10
30.0.0.20
40.0.0.10
10.0.0.1
40.0.0.1
PDU Information at Device: Router2
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
HDLC
IP
ICMP
Simulation Panel
Event List
Simulation


Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Router0
Router-PT
Router1
PC-PT
PC0
10.0.0.1
20.0.0.10
20.0.0.20
30.0.0.10
30.0.0.20
PDU Information at Device: Router0
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
HDLC
IP
ICMP
Simulation Panel
Event List
Play Controls
Back
Auto Capture / Play
Capture / Forward
Edit Filters
Show All/None
Simulation

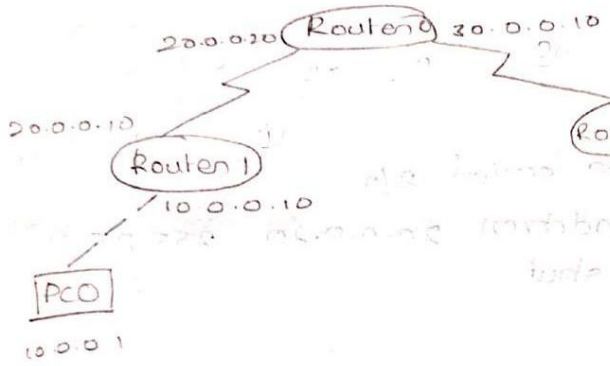

Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Router0
Router-PT
Router1
PC-PT
PC0
10.0.0.1
20.0.0.10
20.0.0.20
30.0.0.10
30.0.0.20
PDU Information at Device: Router0
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
Ethernet II
IP
ICMP
Simulation Panel
Event List
Play Controls
Back
Auto Capture / Play
Capture / Forward
Edit Filters
Show All/None
Simulation


Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Router-PT
Router0
Router-PT
Router1
PC-PT
PC0
10.0.0.10
10.0.0.1
20.0.0.10
20.0.0.20
30.0.0.10
30.0.0.20
PDU Information at Device: PC0
OSI Model
Inbound PDU Details
PDU Formats
Ethernet II
IP
ICMP
Simulation Panel
Event List
Reset Simulation
Constant Delay
Play Controls
Back
Auto Capture / Play
Capture / Forward
Edit Filters
Show All/None
Time: 00:01:08.517
Power Cycle Devices
PLAY CONTROLS:
Routers
2620XM
Scenario 0
New
Delete
Toggle PDU List Window
Event List
Simulation

Observation :

Aim - To demonstrate TTL/ life of a packet

Topology :



Procedure

1. Create a 2 PC and 3 router configuration, as shown in the topology
2. Use serial DTE between routers and copp cross over between router and PC.
3. Configure the IP address and gateway of P and configure all the routers

for router 0

>enable

Router# config t

Router# interfa Router(config)# interface gastethernet 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 20.0.0.20
Router (config)# ip route 40.0.0.0 255.0.0.0 20.0.0.
Router (config)# exit

For router 1

> enable
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)# 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 routes 10.0.0.0 255.0.0.0 20.0.0.1
router (config)# ip route 40.0.0.0 255.0.0.0 30.0.0.2
router (config)# exit

Similar commands for router 2.

4) Select simulation mode. select simple PDU and select source & destination PCs.

5) Click on capture button to send PDU, and acknowledgement from PC to router and router to PC.

6) Click on PDU during every transfer to see the inbound and outbound PDU details Observe the difference in TTL.

Result

at PC0

Outbound PDU details: TTL=255

At router0

Inbound PDU details : TTL = 255

Outbound PDU details : TTL = 254

at router1

Inbound PDU details : TTL = 254

Outbound PDU details : TTL = 253

at router2

Inbound PDU details : TTL = 253

Outbound PDU details : TTL = 252

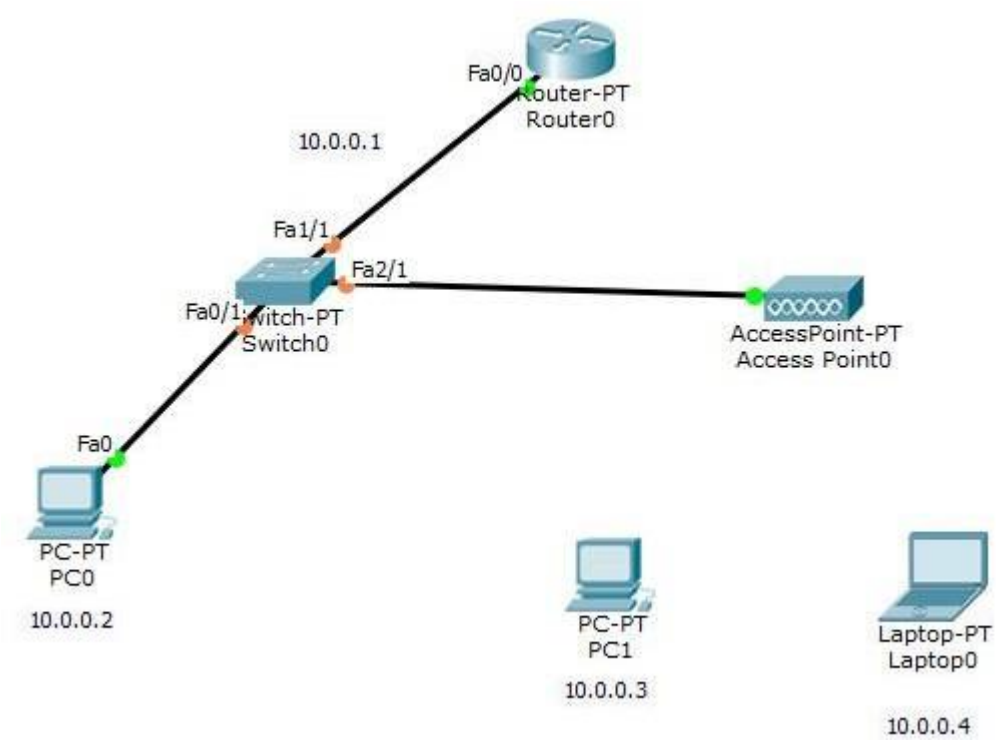
Observation

- The TTL is reduced by 1 in every routers
- TTL is a mechanism which limits the number of hops between source and destination
- When TTL becomes 0 it means it can't do another hop.

Experiment 11

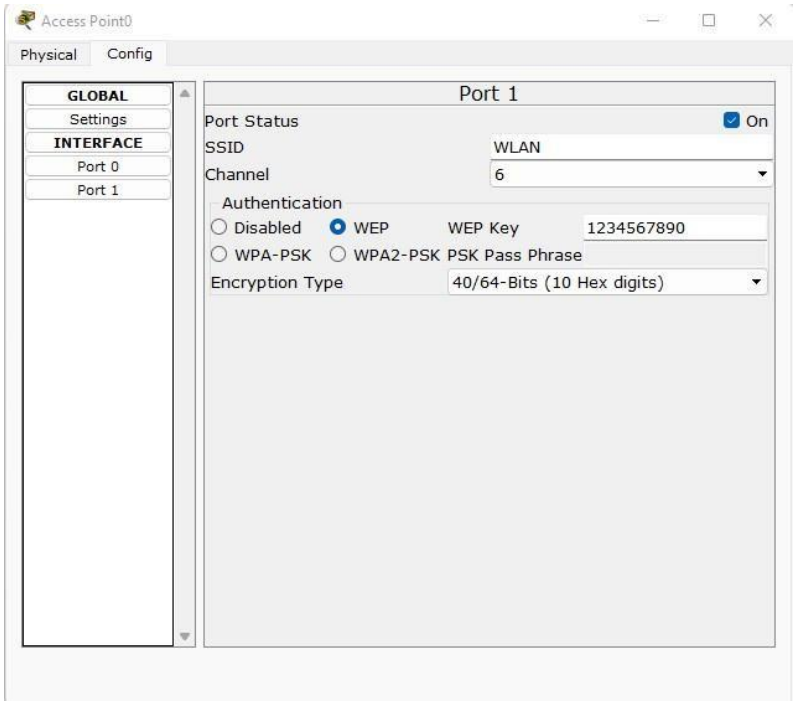
Aim : To construct a WLAN and make the nodes communicate wirelessly

Topology:

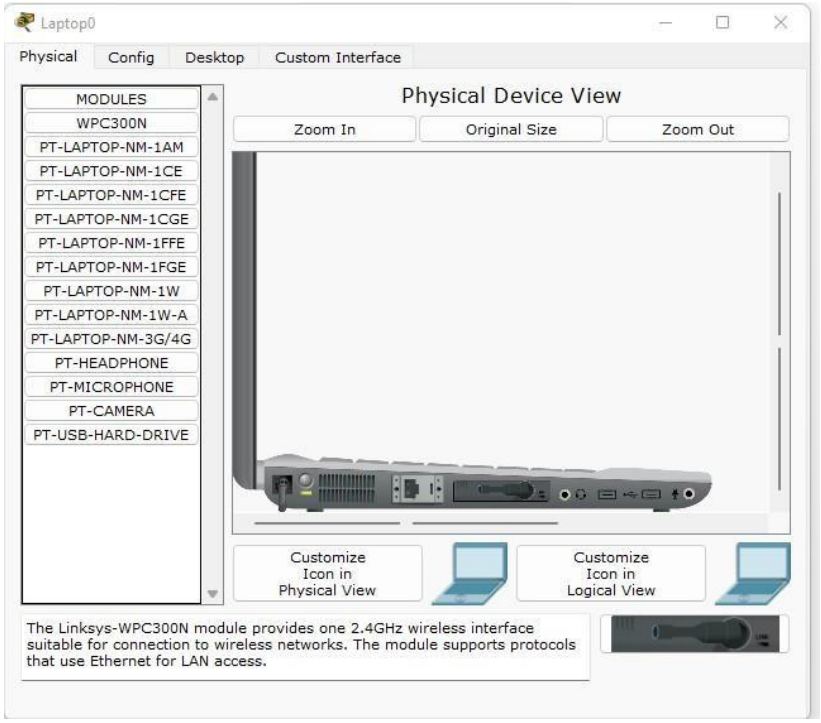


Configurations:

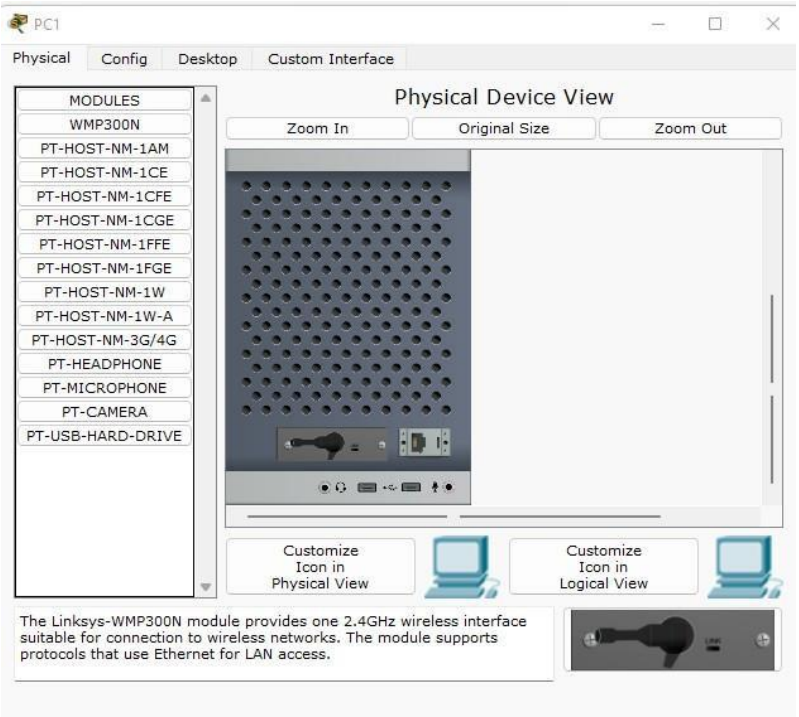
Access Point0:



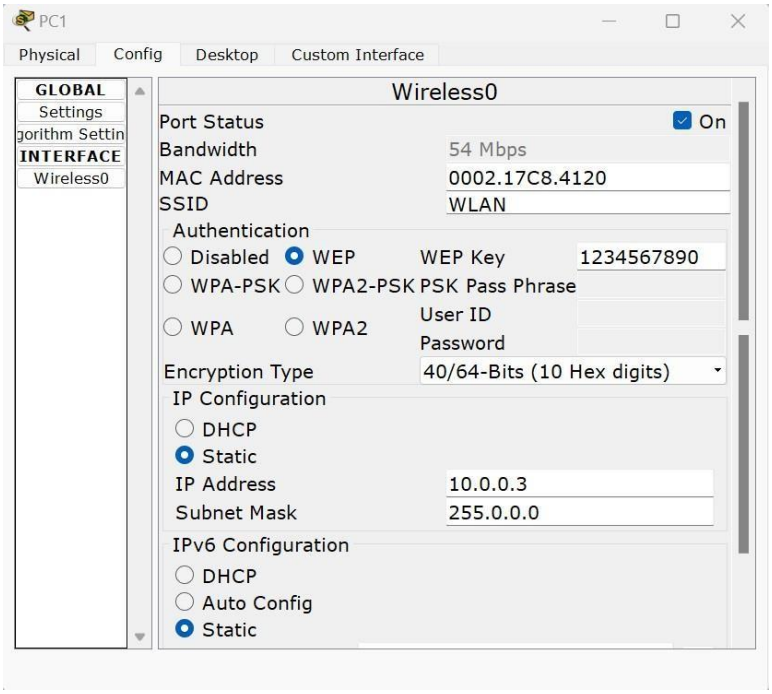
Laptop0 Physical port change:



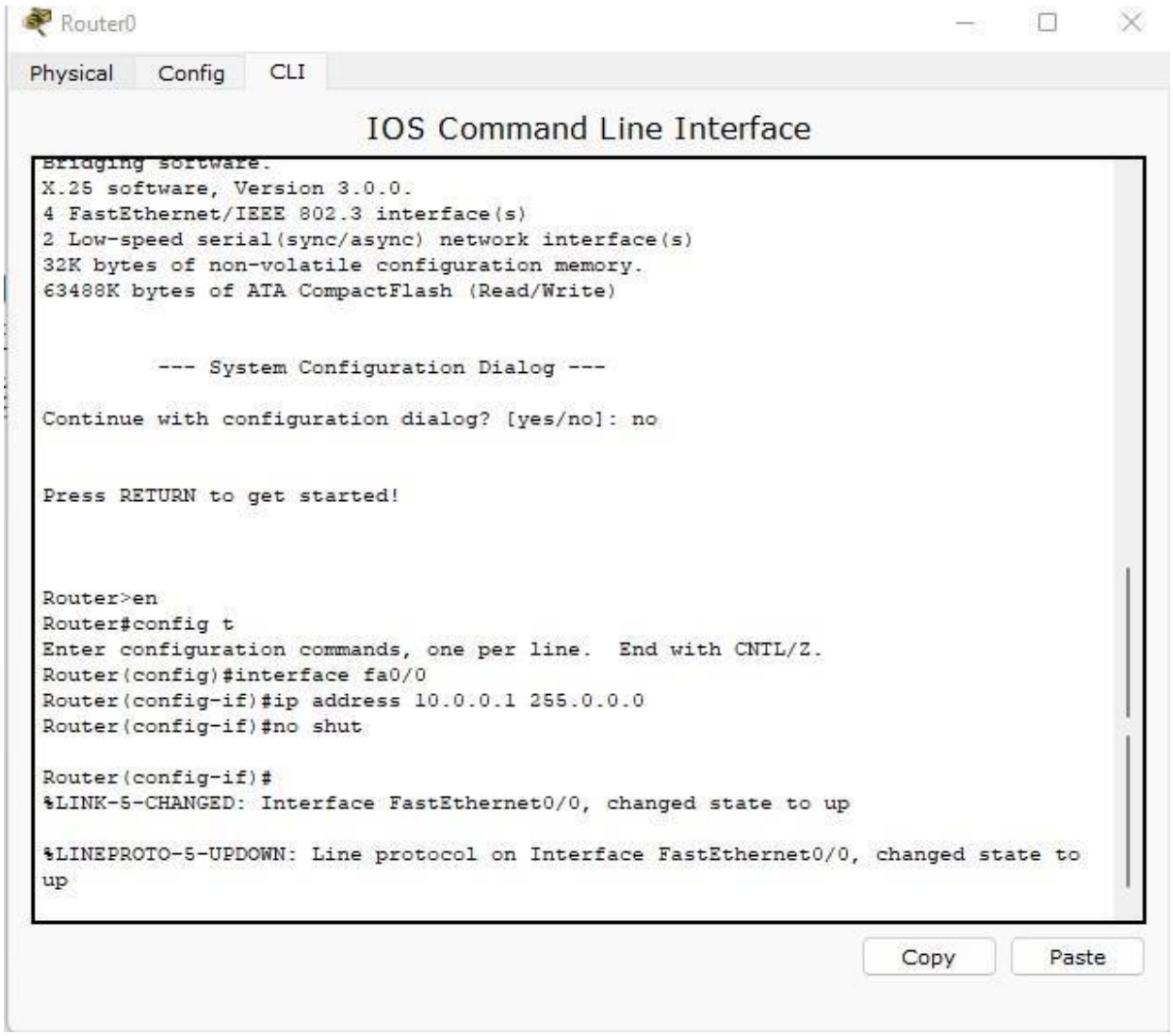
PC0 Physical port change:



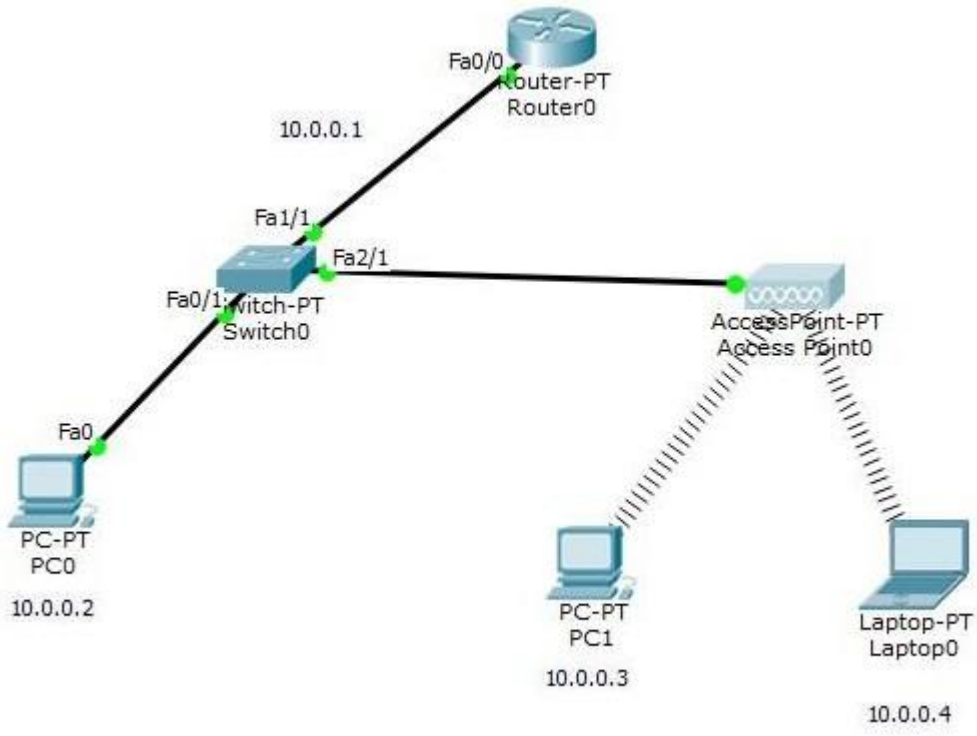
PC0 and Laptop0 Wireless configuration:



Router 0 CLI:

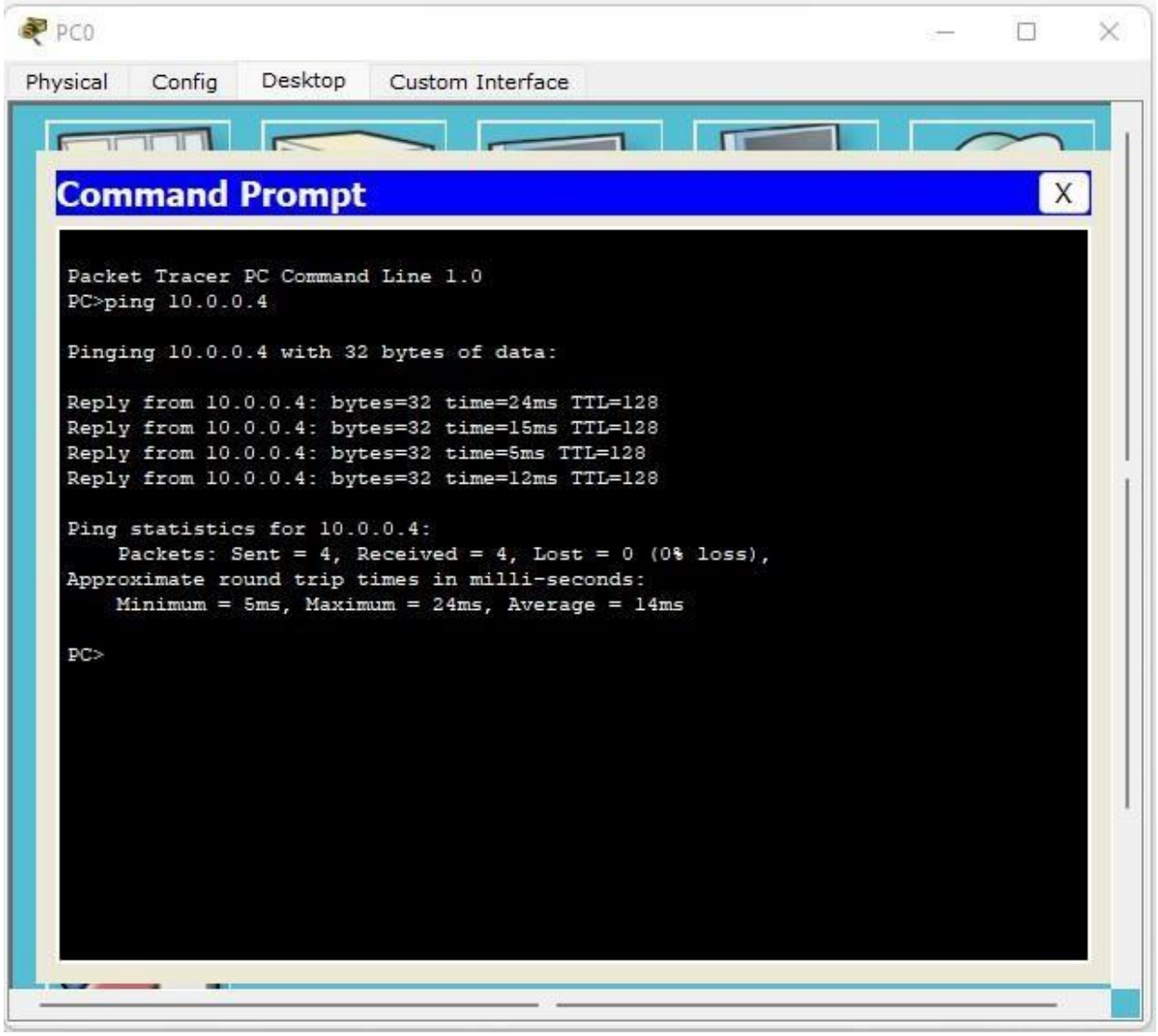

Router0
Physical
Config
CLI
IOS Command Line Interface
Bridging software.
X.25 software, Version 3.0.0.
4 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)
--- System Configuration Dialog ---
Continue with configuration dialog? [yes/no]: no
Press RETURN to get started!
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fa0/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
Copy
Paste

Final Topology:

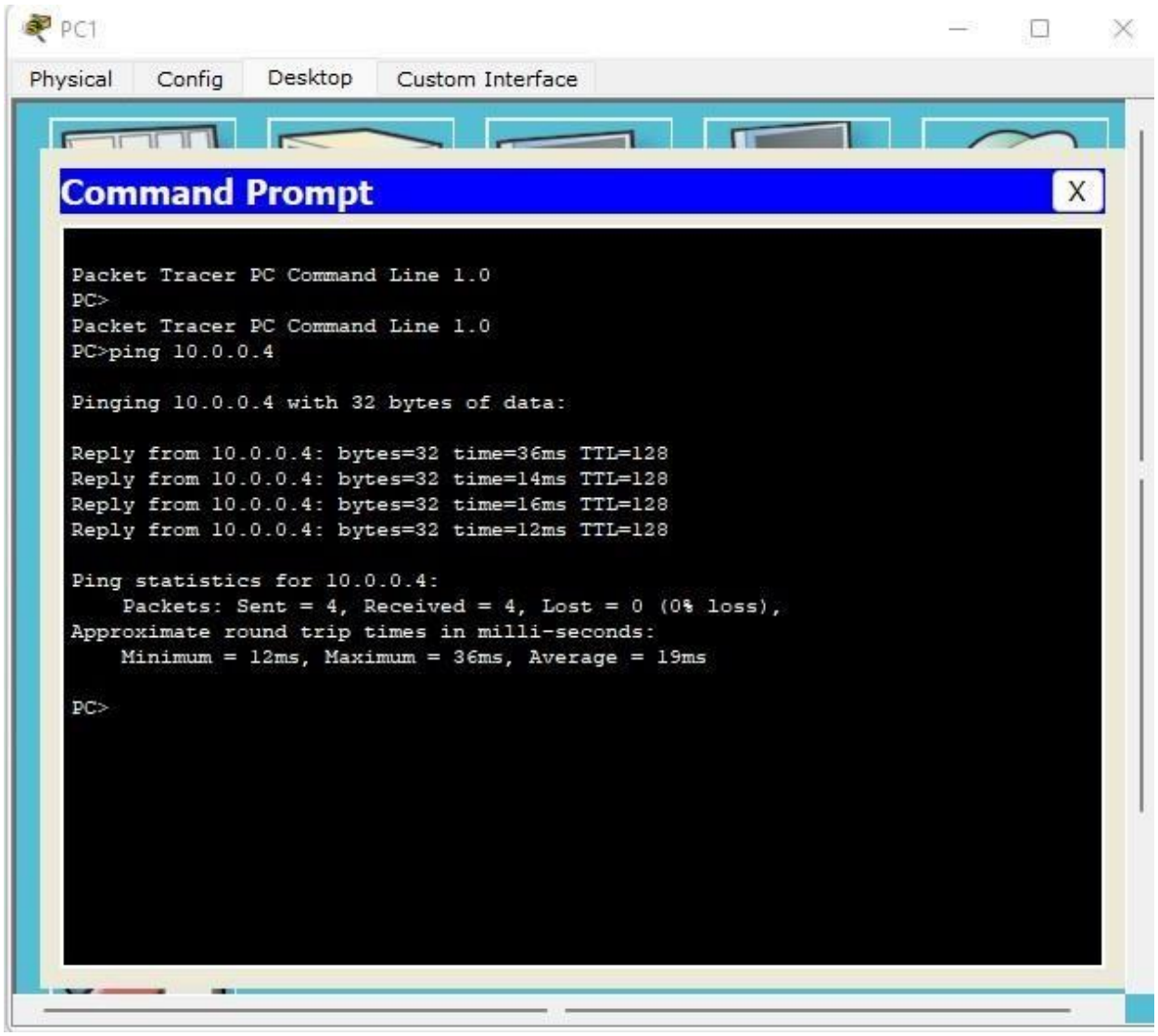


Ping Output :

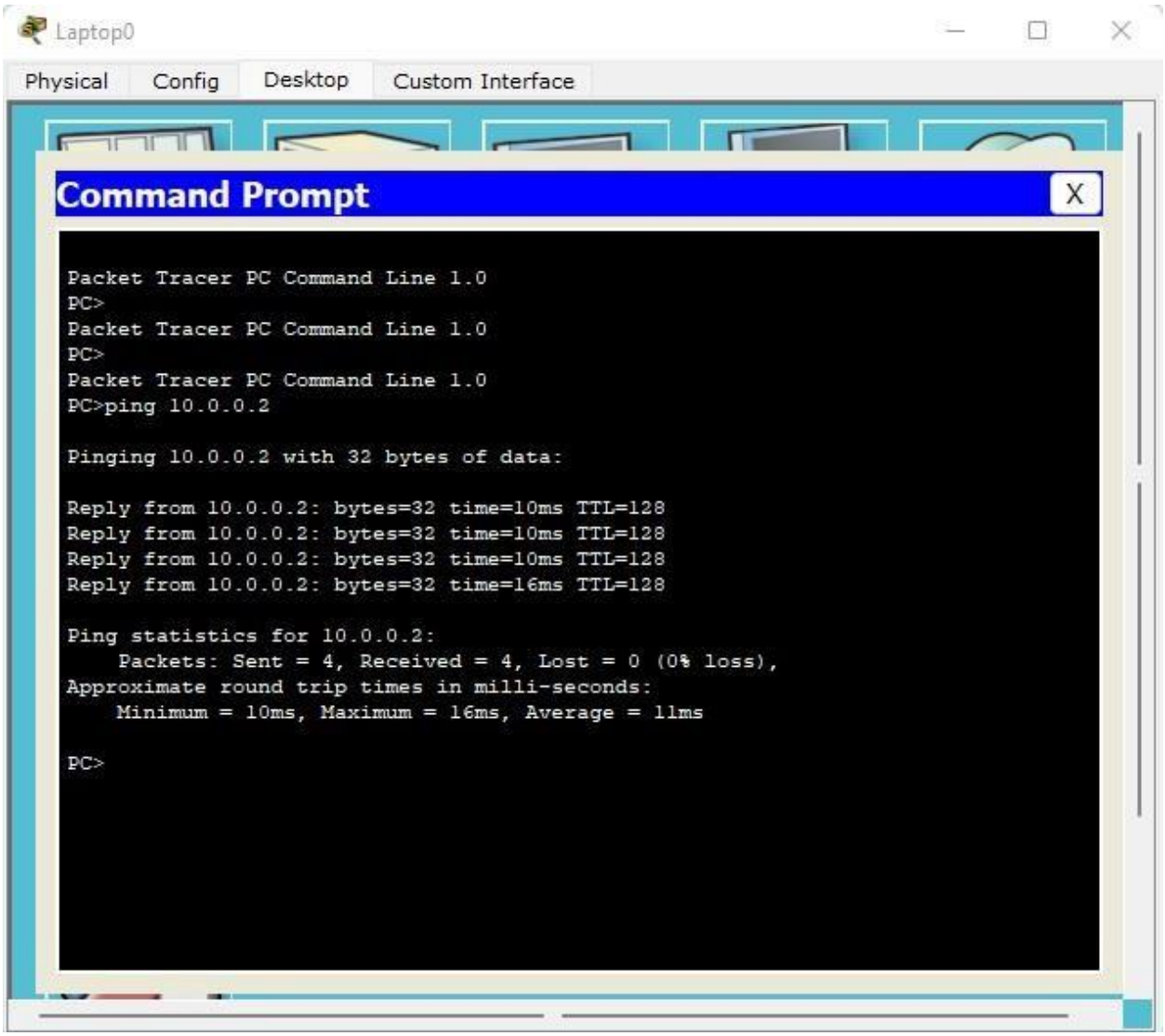
PC0 to Laptop0 :



PC1 to Laptop0 :



Laptop0 to PC0:

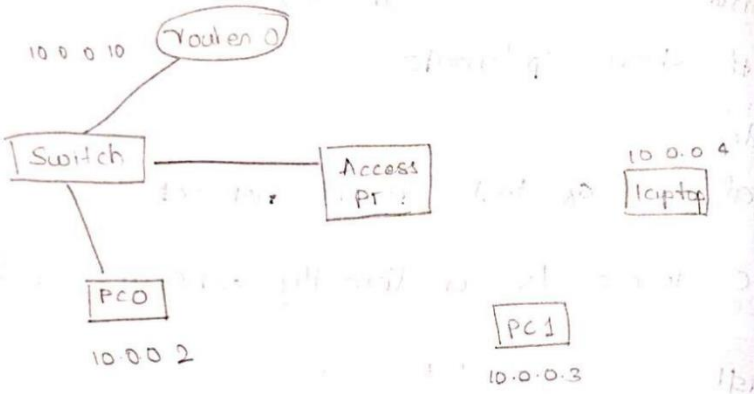


Observation :

Lab 9

Aim : To connect a WLAN and make the nodes communicate wirelessly

Topology :



Procedure

1) Construct the above topology.
2) Set the IP of PC connected with wire and configure router 0
3) Configure access point 1 → port 1 → SSID name → WLAN

Select WEP and give 10 digit key (here 1234567890)

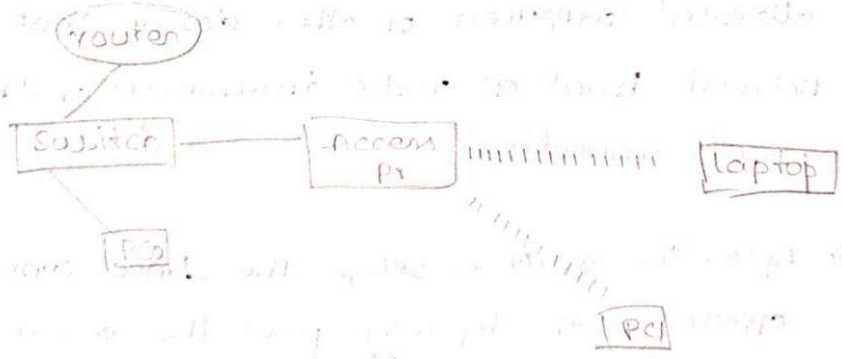
4) To configure PC 0 and laptop wirelessly,
Switch off the device
Drag the existing PT-HOST-NM-1AM to the components list in the LHS.
Drag WMP300N wireless interface to the empty port and switch on the device.

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

6) router > enable
config t
interface fastethernet 0/0
ip address 10.0.0.0 255.0.0.0
no shut

Result

Topology:



At PC 0

PC > ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes = 32 time = 21 ms TTL

Reply from 10.0.0.3: bytes = 32 time = 13 ms TTL =

Reply from 10.0.0.3: bytes = 32 time = 6 ms TTL = 12

Reply from 10.0.0.3: bytes = 32 time = 0 ms TTL = 12

Ping statics for 10.0.0.3

Packets sent = 4, Received = 4, Lost = 0

Approximate roundtrip time in millisecond

minimum = 6 ms, Maximum = 21 ms, Avera

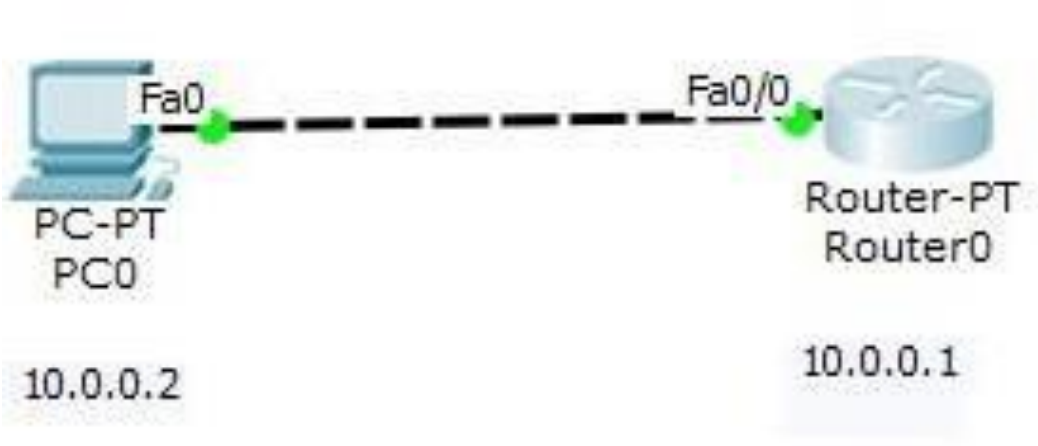
Observation:

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

Experiment 12

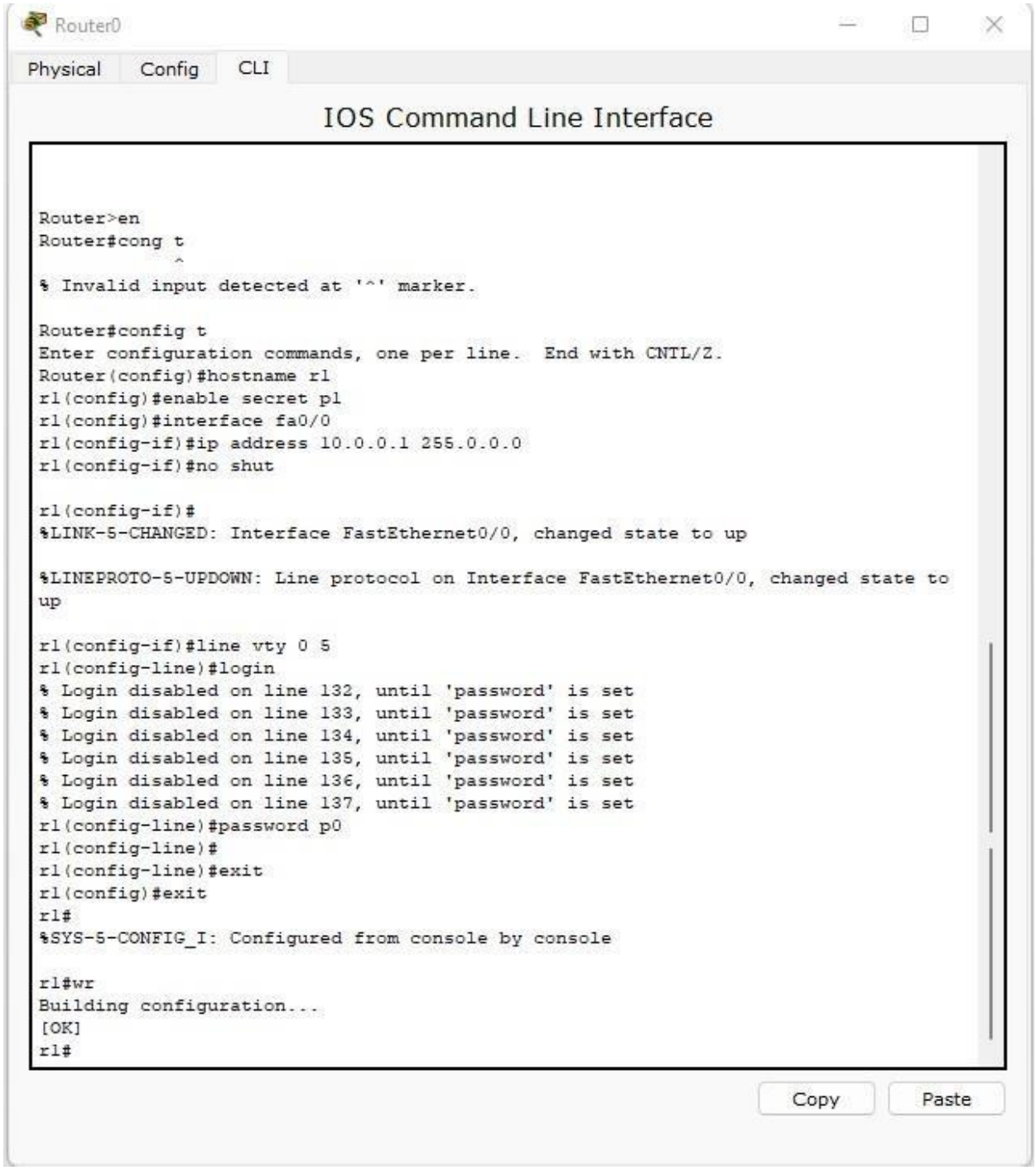
Aim : To understand the operation of TELNET by accessing the router in server room from a PC in IT office.

Topology:



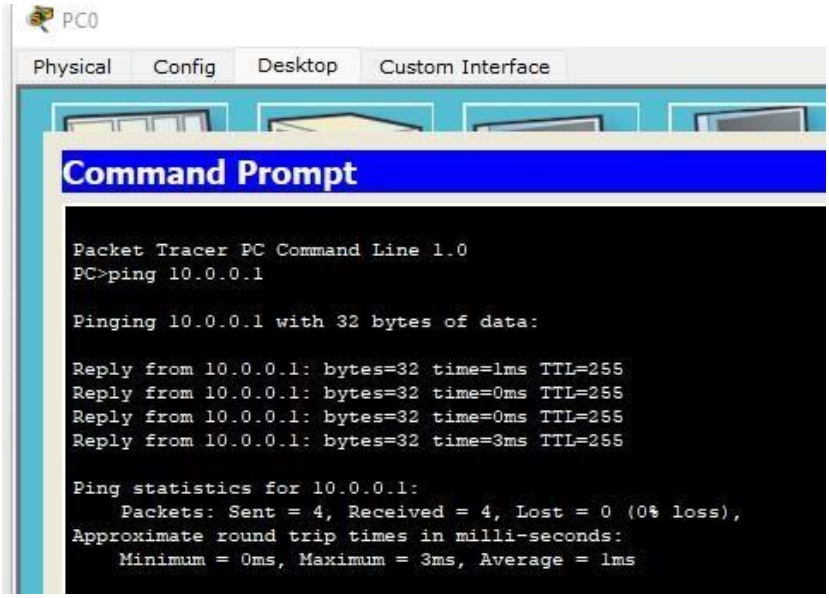
Configuration:

Router 0 CLI:

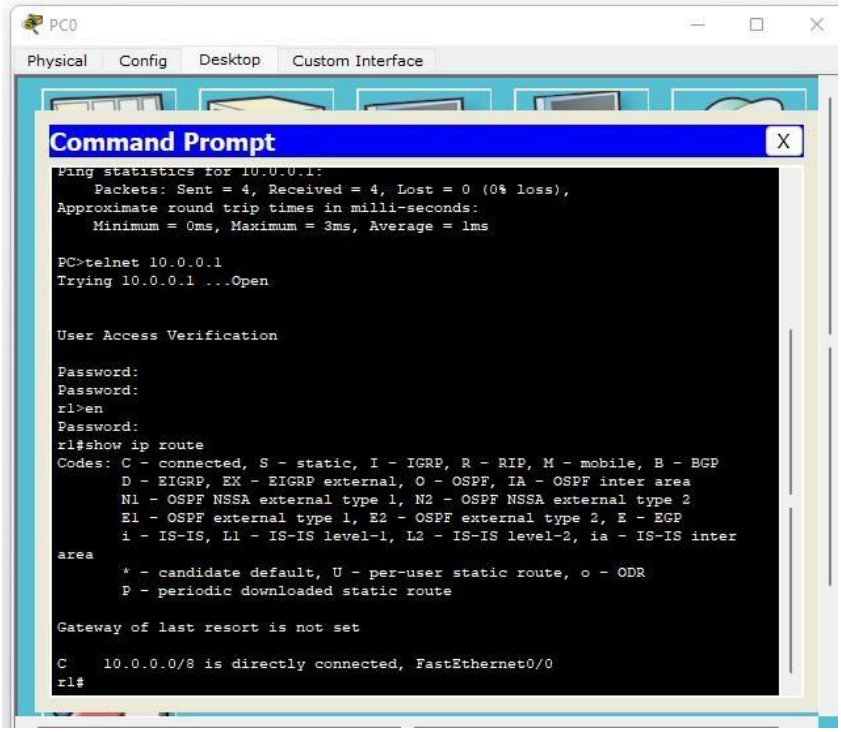


Ping Output:

PC0 to Router:



Accessing the router in server room from a PC in IT office:



Observation :

Lab 9

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

Topology :

Procedure -

1) Connect the devices as shown in topology abo

2) Configure IP address and set IP and gate for PC.

3) Router CLI

```
> enable
router # config t
router (config) # hostname r1
r1 (config) # enable secret p1
r1 (config) # interface fastethernet 0/0
r1 (config-if) # ip address 10.0.0.1 255.0.0.0
r1 (config-if) # no shut
r1 (config-if) # line vty 0 5
r1 (config-line) # login
```

r1(config-line)# password p0

r1(config-line)# exit

r1# wr

Building configuration...

Result

In PC0

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 = 21 ms TTL=

Reply from 10.0.0.1 : bytes=32 time = 13 ms TTL = 255

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

Reply from 10.0.0.1 : bytes= 32 time = 0 ms TTL=

Ping statics from 10.0.0.1 :

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

Approximate roundtrip time in milliseconds:

Minimum= 6ms Maximum = 21 ms Averg

```
PC> telnet 10.0.0.1
Trying 10.0.0.1 ... open
User access verification
Password:                    (Type P0)
r1 >enable
Password:                    (Type P1)
r1 # show ip route
code:
gateway of last resort not set

C  10.0.0.0/8 is directly connected, fastethernet

r1#
```

observation

1) Telnet - used by terminal emulation programs that allow you to log into a remote host

2) we logged into 10.0.0.1 IP devices through 10.0.0.2 IP device

3) The password typed is not visible.

Cycle - 2

Experiment 13

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

CRC code:

```
#include<stdio.h>
#include<string.h>
#define N strlen(divisor)
char data[28];
char rem[28];
char divisor[10];
int dlength,i,j;

void XOR(){
for(j=1; j<N; j++)
rem[j]=((rem[j]==divisor[j]?'0':'1');
}

void receiver(){
printf("Enter the received data");
scanf("%s",data);
printf("\n\n");
printf("Data received : %s",data);
crc();
for(i=0;(i<N-1)&&(rem[i]!='1');i++);
if(i<N-1)
printf("\n Error detected\n\n");
else
printf("\n No error detected\n\n");
```

```
void crc(){
  for (i=0; i<N; i++)
     rem[i] = data[i];
  do {
    if (rem[0] == '1')
      XOR();

    for (j=0; j<N-1; j++)
       rem[j] = rem[j+1]
    rem[j] = data[i++];
  }
while (i<= dlength + 16);
}

int main()
{
  int c=0;
  printf("\n Enter data to be transmitted :");
   scanf("%s", data);
   printf("\n Enter the Divisor :");
   scanf("%s", divisor);
   dlength = strlen(data);
   for (i= dlength; i< dlength +16; i++)
        data[i] = '0';
    printf("\n");
```

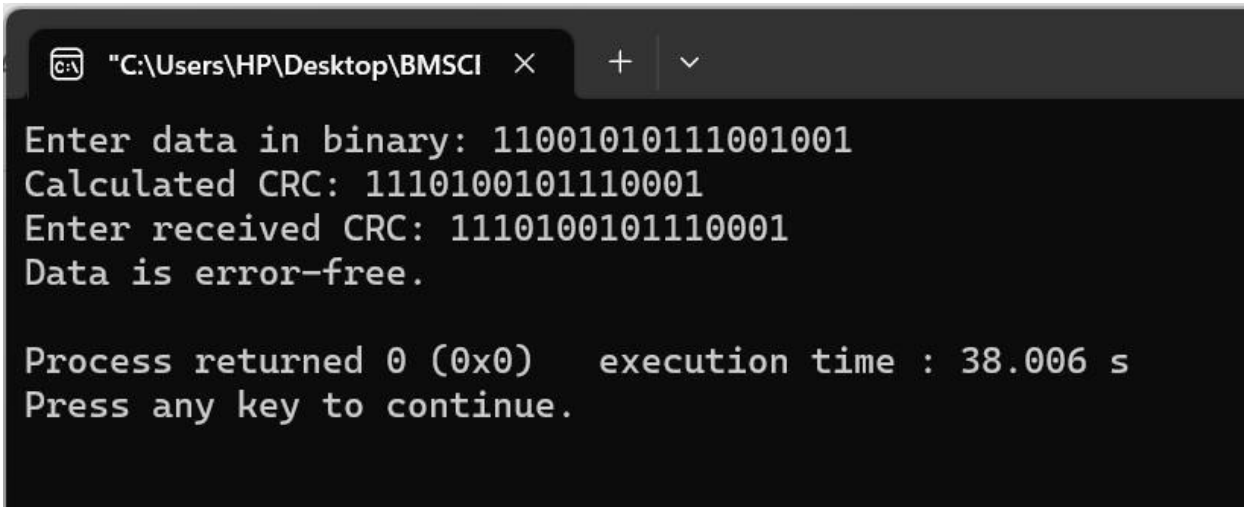
```
printf("\n Data padded with n-1 zeros : %d",
  data);
printf("\n");
 crc();
printf("\n CRC or Check value is : %s", rem);
 printf("\n rem strlen is : %d", strlen(rem));
    {
     printf("\n %s ", data);
      data[i] = rem[c++];
    }
    printf("\n");
   printf("\n final data to be sent : %s",
     data);
 printf("\n\n");
 receiver();
  return 0;
}
```

Program:

```
#include <stdio.h>
#include <string.h>

// CRC-CCITT polynomial: x^16 + x^12 + x^5 + 1 (0x1021)
//#define CRC_POLY 0x1021

// Function to perform bitwise XOR on binary strings
void binaryXOR(char *result, const char *a, const char *b) {
    for (int i = 0; i < 16; i++) {
        result[i] = (a[i] == b[i]) ? '0' : '1';
    }
    result[16] = '\0';
}

// Function to calculate CRC-CCITT checksum
void calculateCRC(const char *data, int length, char *checksum) {
    char crc[17];
    for (int i = 0; i < 16; i++) {
        crc[i] = '0';
    }
    crc[16] = '\0';

    for (int i = 0; i < length; i++) {
        for (int j = 0; j < 8; j++) {
            char msb = crc[0];
            for (int k = 0; k < 16; k++) {
                crc[k] = crc[k + 1];
            }
            crc[15] = '0';

            if (msb == '1') {
                char temp[17];
                binaryXOR(temp, crc, "10001000000100001"); // CRC_POLY in binary
                strcpy(crc, temp);
            }
        }
        crc[15] = (data[i] == '1') ? '1' : '0';
    }
```

```
    strcpy(checksum, crc);
}

void main() {
    char data[100]; // Replace with your actual data
    printf("Enter data in binary: ");
    scanf("%s", data);

    int dataLength = strlen(data);
    char checksum[17];
    calculateCRC(data, dataLength, checksum);

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

    // Simulating error by changing a bit
    // data[2] ^= 0x01; // Uncomment this line to introduce an error

    // Verify the received data char
    receivedChecksum[17];
    printf("Enter received CRC: ");
    scanf("%s", receivedChecksum);

    if (strcmp(receivedChecksum, checksum) == 0)
        printf("Data is error-free.\n");

    else
        printf("Data contains errors.\n");
}
```

Output :


"C:\Users\HP\Desktop\BMSCI
Enter data in binary: 1100101011100 1001
Calculated CRC: 1110100101110001
Enter received CRC: 1110100101110001
Data is error-free.
Process returned 0 (0x0) execution time : 38.006 s
Press any key to continue.

Experiment 14

Aim : Write a program for congestion control using Leaky bucket algorithm.

Code :

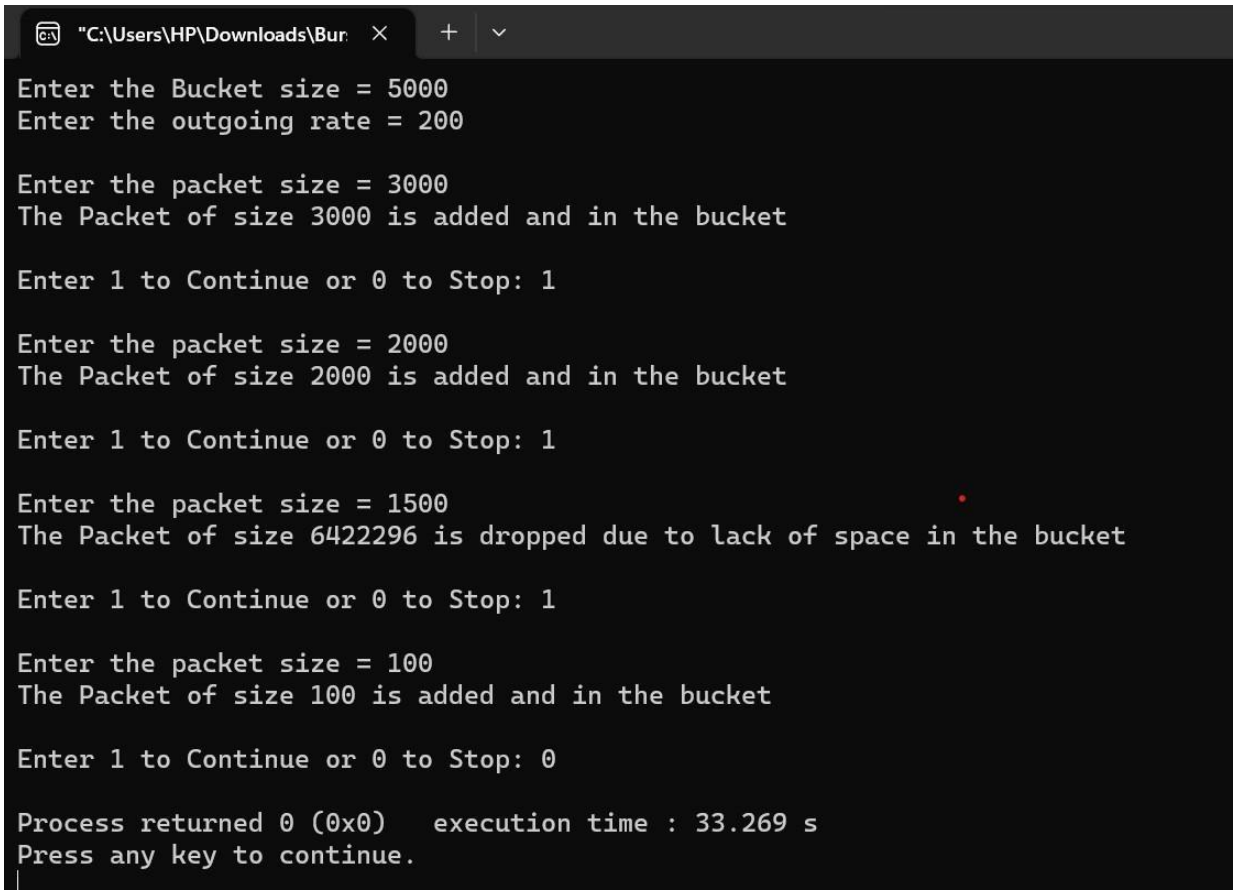
```
#include<stdio.h>
#include<conio.h>
void main(){
    int bucket_size;
    int dr;
    printf("Enter bucket size and data rate\n");
    scanf("%d", &bucket_size);
    scanf("%d", &dr);
    int emp = bucket_size;
    while(1)
    {
      int ch;
      int ps;
      printf("Enter the packet size :\n");
      scanf("%d", &ps);
      printf("remaining empty size %d \n", emp);
    if(ps <= bucket_size)
    {
       if(ps <= emp)
        {
          printf(" packet of size %d transmitted
           : \n", ps);
        }
```

```
        printf("packet dropped:\n");
        }
    }
else
{
    printf("packet dropped\n");
    }
printf("Do you want to continue transmitting
data? In 1 or 0?:");
scanf("%d", &ch);
    if(ch==0)
      {
        break;
      }
    emp = emp - ps + dr;
    }
}
```

Program:

```
#include<stdio.h>

void main()
{
   int psize,bsize,outgoing,emptyspace,choice;
   printf("Enter the Bucket size = ");
   scanf("%d",&bsize);
   emptyspace=bsize;
   printf("Enter the outgoing rate = ");
   scanf("%d",&outgoing);
   while(1)
   {
      printf("\nEnter the packet size = ");
      scanf("%d",&psize);

      if(psize<bsize&&psize<=emptyspace)
      {
         emptyspace=emptyspace-psize;
         printf("The Packet of size %d is added and in the bucket \n",psize);
         emptyspace+=outgoing;
      }

      else
      {
         printf("The Packet of size %d is dropped due to lack of space in the bucket\n");
      }

      printf("\nEnter 1 to Continue or 0 to Stop: ");
      scanf("%d",&choice);
      if(choice==0)
         break;

   }
}
```

Output :


"C:\Users\HP\Downloads\Bur
Enter the Bucket size = 5000
Enter the outgoing rate = 200
Enter the packet size = 3000
The Packet of size 3000 is added and in the bucket
Enter 1 to Continue or 0 to Stop: 1
Enter the packet size = 2000
The Packet of size 2000 is added and in the bucket
Enter 1 to Continue or 0 to Stop: 1
Enter the packet size = 1500
The Packet of size 6422296 is dropped due to lack of space in the bucket
Enter 1 to Continue or 0 to Stop: 1
Enter the packet size = 100
The Packet of size 100 is added and in the bucket
Enter 1 to Continue or 0 to Stop: 0
Process returned 0 (0x0) execution time : 33.269 s
Press any key to continue.

Experiment 15

Aim : 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.

Aim: 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 program :

clientTCP.py

```
from socket import *
serverName = '127.0.0.1'
serverport = 12000
clientSocket = socket (AF_INET, SOCK_STREAM)
clientSocket.connect ((serverName, serverPort))
sentence = input ("\n Enter file name :")

clientSocket.send (sentence.encode())
filecontents = clientSocket.recv(1024).decode()
print ("\n From Server : \n")
print (file contents)
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")
 connection Socket, addr = serverSocket.accept()
 sentence = connectionSocket.recv (1024).decode
 file = open (sentence, "r")
  l = file.read (1024)

  connectionSocket.send (l.encode())
  print ("In Sent Contents of " + sentence)
  file.close ()

  connectionSocket.close()
```

Output

Server side:

The server is ready to receive

Client side:

Enter file name: ServerTCP.py

From server:

from Socket import *

⋮

(ServerTCP.py is printed)

server side:

The server is ready to receive

sent contents of ServerTCP.py

The server is ready to receive.

Program:

ServerTCP.py: from

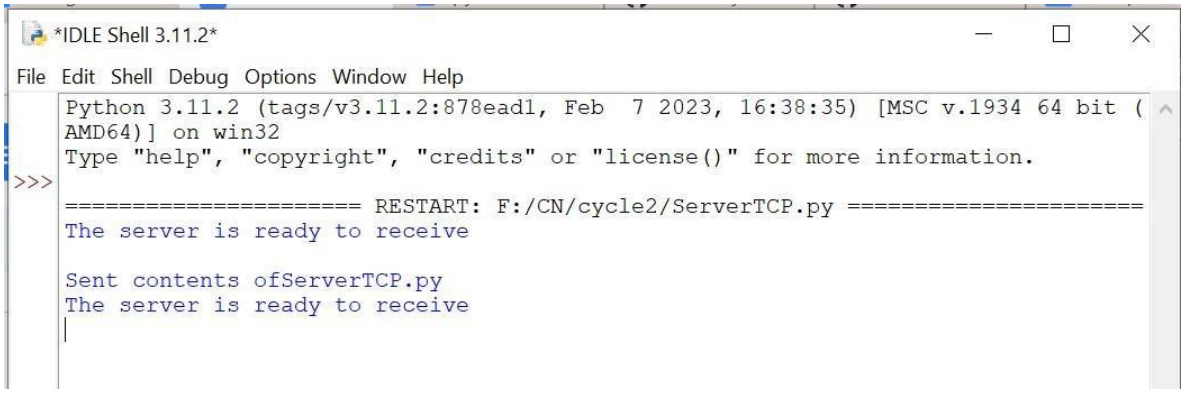
```
socket import *
serverName="127.0.0.1"
serverPort=12000
serverSocket=socket(AF_INET,SOCK_STREAM)
serverSocket.bind((serverName,serverPort))
serverSocket.listen(1)
while 1:
   print("The serve is ready to receive")
   connectionSocket,addr = serverSocket.accept()
   sentence=connectionSocket.recv(1024).decode()

   file=open(sentence,"r")
   l=file.read(1024)

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

ClientTCP.py: from

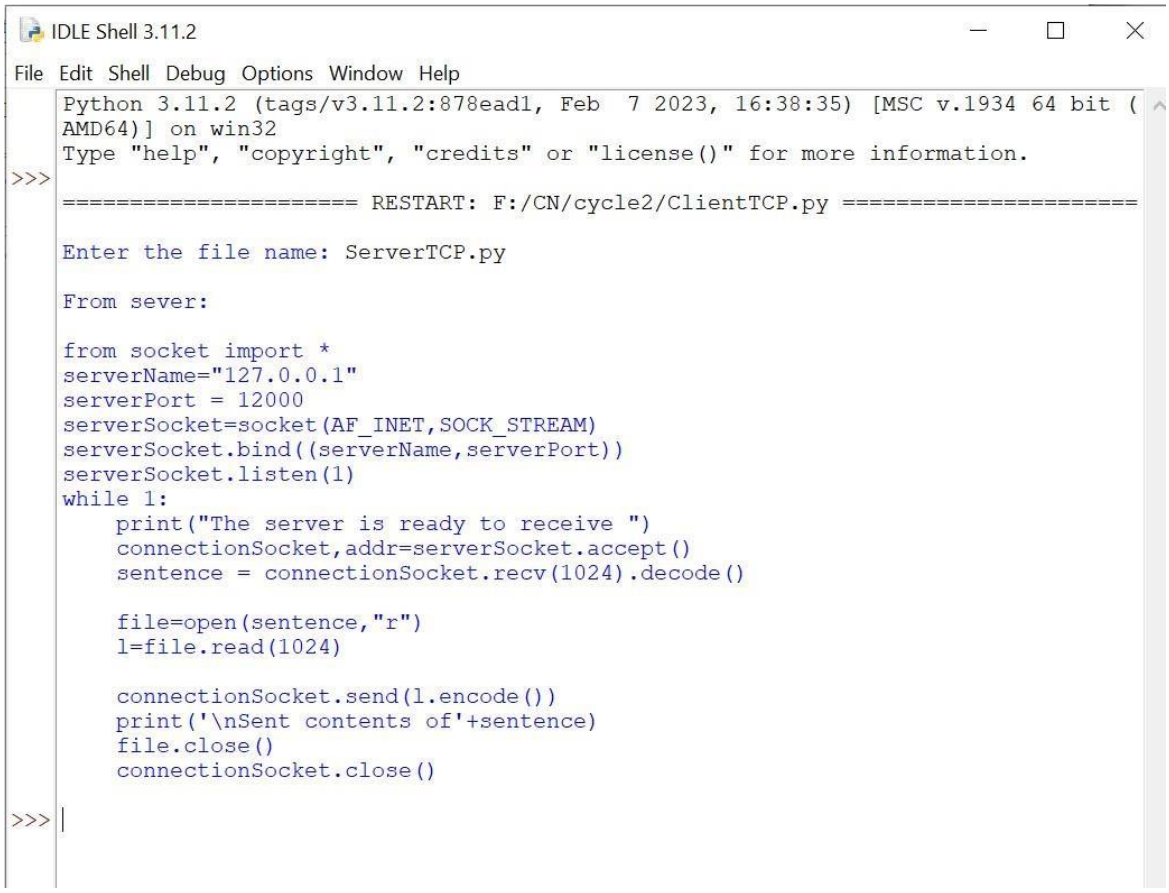
```
socket import *
serverName='127.0.0.1'
serverPort=12000
clientSocket=socket(AF_INET,SOCK_STREAM)
clientSocket.connect((serverName,serverPort))
sentence=input("\nEnter file name: ")

clientSocket.send(sentence.encode())
filecontents=clientSocket.recv(1024).decode()
print('\nFrom Server:\n')
print(filecontents)
clientSocket.close()
```

Output :

Server instance:



Client instance:



Experiment 16

Aim : 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.

Aim : 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.

Solution

Client side program:

ClientUDP.py

```
from socket import*
serverName = "127.0.0.1"
serverPort = 12000
clientSocket = socket (AF_INET, SOCK_DGRAM)
sentence = input ("\n Enter file name:")
clientSocket.sendto (bytes (sentence, "utf-8"),
 (serverName, serverPort)

fileContents, serverAddress = clientSocket.recvfrom (20
print ("\n Reply from server : \n")
print (Filecontents.decode ("UTF-8"))
```

```
for i in filecontentents:
    print (str(i), end=' ')

clientSocket.close()
clientSocket.close()
```

server side program:

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 ("In Sent contents of", end = 1)
print (sentence)
for i in sentence:
    print (str(i), end = '')
file.close()
```

Output:

Server side

The server is ready to receive

Client side:

Enter the file name: serverUDP.py

Reply from server:

from socket import*

(serverUDP.py program)

Server side:

sent contents of serverUDP.py

The server is ready to receive

Program:

ServerUDP.py:

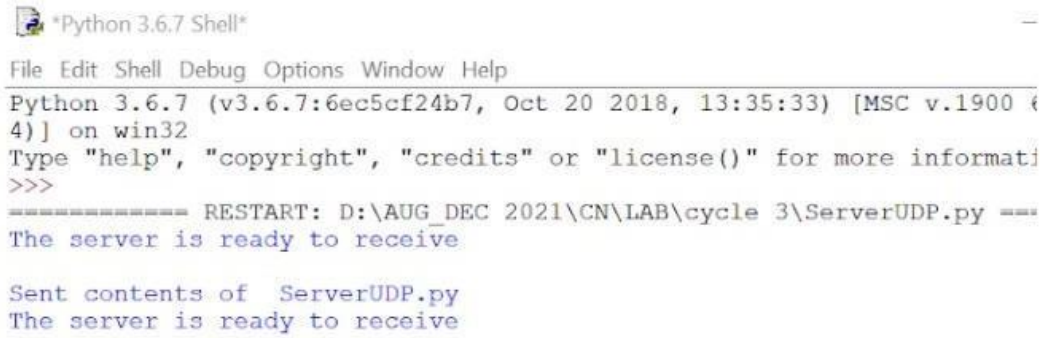
```
from socket import *
serverPort=12000
serverSocket=socket(AF_INET,SOCK_DGRAM)
serverSocket.bind(("127.0.0.1",serverPort))
print("The server is ready to receive")
while 1:
    sentence,clientAddress=serverSocket.recvfrom(2048)
    sentence=sentence.decode("utf-8")
    file=open(sentence,"r")
    con=file.read(2048)

    serverSocket.sendto(bytes(con,"utf-8"),clientAddress)

    print('\nSent contents of',end='')
    print(sentence)
    file.close()
```

ClientUDP.py:

```
from
socket import *
serverPort=12000
serverName="127.0.0.1"
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"))
clientSocket.close()
clientSocket.close()
```

Output :

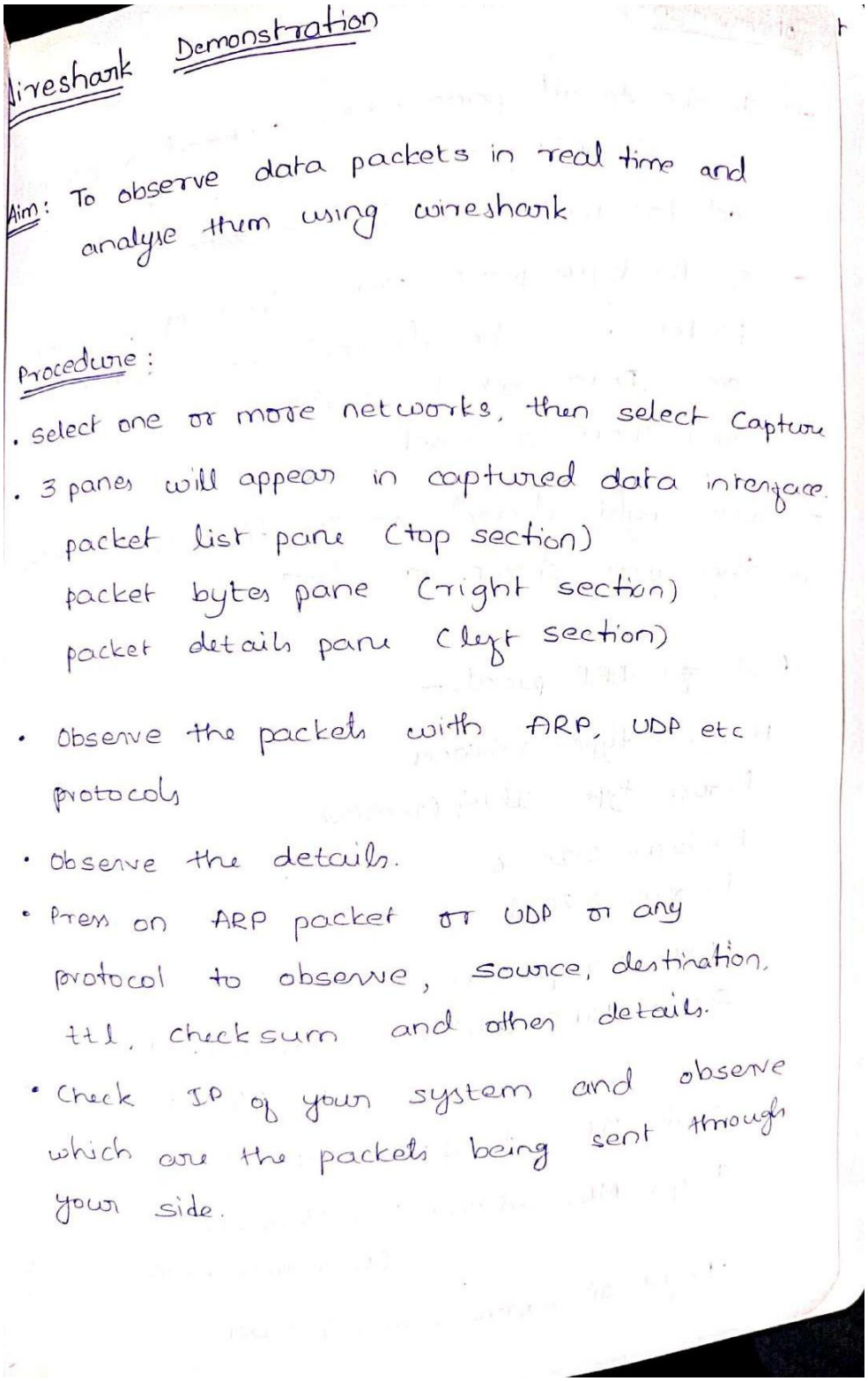
Server instance :



Client instance :

Experiment 17

Aim : Tool Exploration -Wireshark.



Wireshark Demonstration

Aim: To observe data packets in real time and analyse them using wireshark

Procedure:

- select one or more networks, then select Capture
- 3 panes will appear in captured data interface.
  - packet list pane (top section)
  - packet bytes pane (right section)
  - packet details pane (left section)
- Observe the packets with ARP, UDP etc protocols
- Observe the details.
- Press on ARP packet or UDP or any protocol to observe, source, destination, ttl, checksum and other details.
- Check IP of your system and observe which are the packets being sent through your side.

→ In the details pane ... packe
protocols and protocols fields of the selected packed could be seen.

→ In the bytes pane, raw data of selected packet in a hexadecimal view could be seen. Data which couldn't be printed were shown as a dot.

→ when right clicked on the hexadecimal bit data they were shown as bits.

Result for ARP packets –

Hardware type: Ethernet

Protocol type: IPv4 (0x0800)

Hardware size: 6

Protocol size: 4

opcode: request (1)

Sender MAC address: ExtremeN_7d:bf:69 (00:04:96:7b:bf:

Sender IP address: 10.124.0.9

Target MAC address: 00:00:00_00:00:00 (00:00:00:00:00:00)

No., time, source, destination, protocol, length info about a packet can be seen and analysed.