

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
(Autonomous Institution under VTU)

BENGALURU-560019 JUN-2023 to SEP-2023

**B. M. S. College of Engineering,
Bull Temple Road, Bangalore 560019**

(Affiliated To Visvesvaraya Technological University, Belgaum)
Department of Computer Science and Engineering



CERTIFICATE

This is to certify that the Lab work entitled “COMPUTER NETWORKS LAB” carried out by **Zayd Ahmed (1BM21CS254)**, 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:

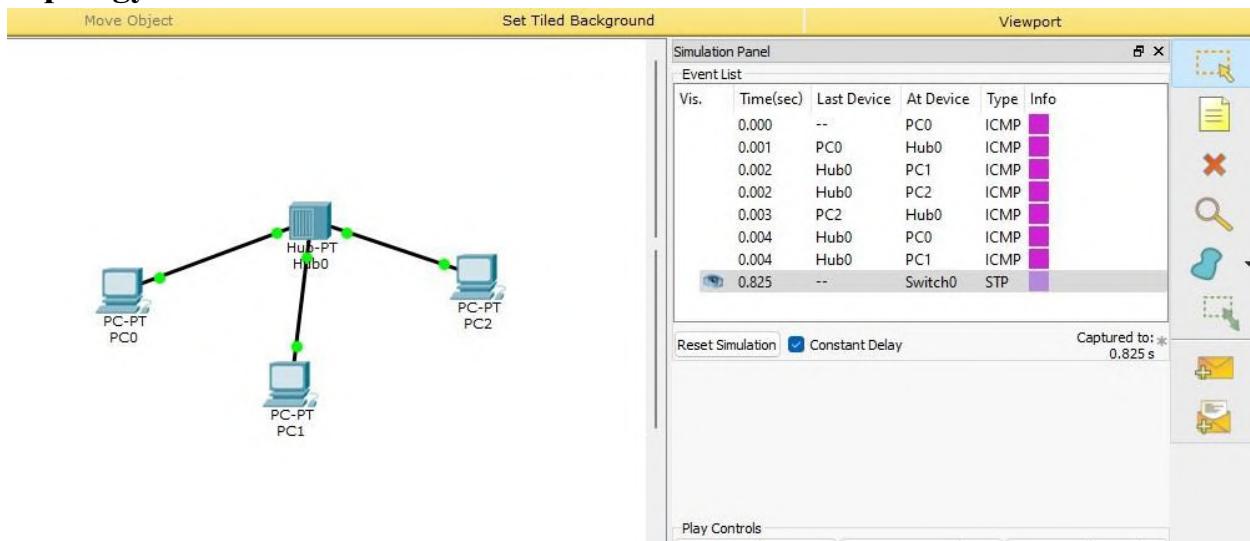


Fig 1: Topology with hub as connecting device

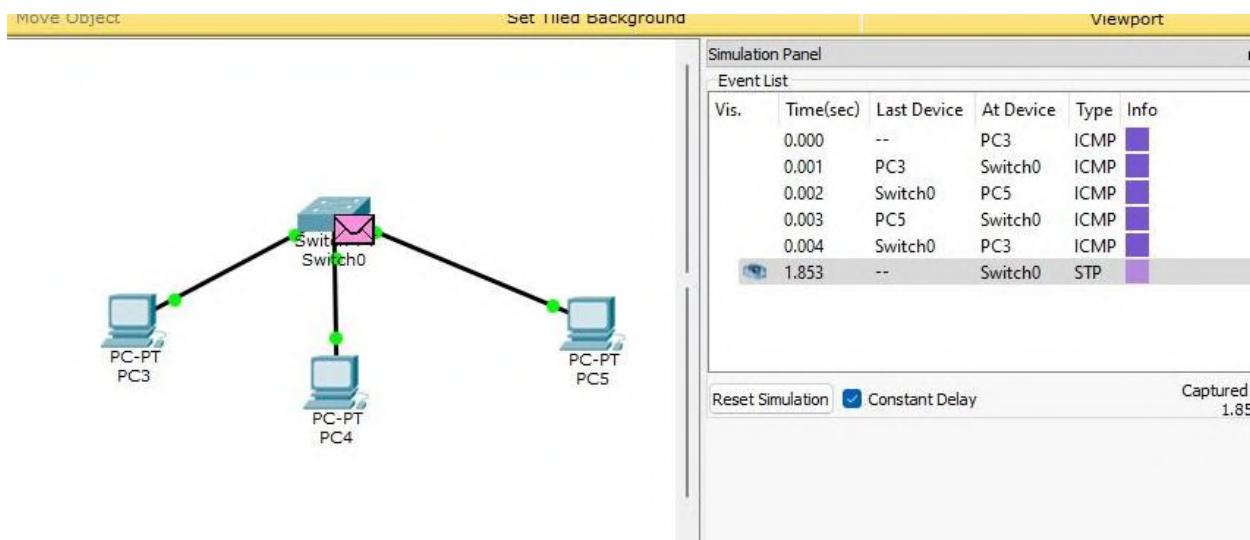
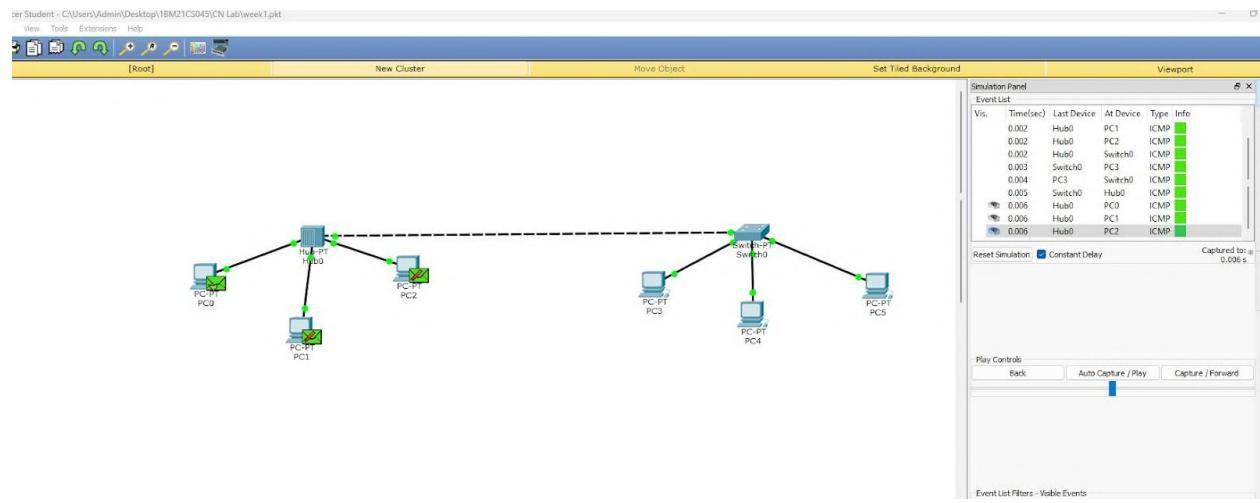


Fig 2: Topology with switch as connecting device

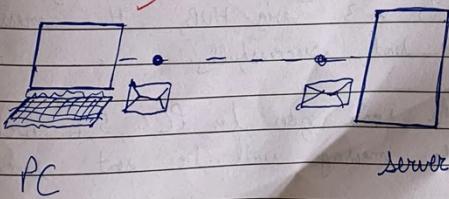


Observation:

Date / /
Page / /

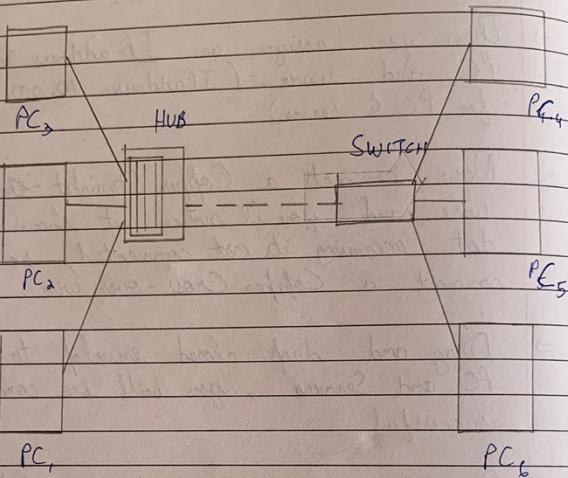
Simple connection between a PC & server

- You basically drag and drop PC & server from the end devices & options.
- Then you assign an IP address to both PC and server. (IP addresses 10.0.0.1 & 10.0.0.2 for PC & server)
- Now connect a Copper Straight-through wire and you'll notice it shows a red dot meaning it's not connected, so you connect a Copper Cross-over wire.
- Drag and drop closed envelop to the PC and Server, you will see connection successful.
- Go to command prompt and type Ping 10.0.0.2 and you will notice it displays Packet sent = 4, received = 4, lost = 0 (0% loss)
- But if you type a random Ping IP address, it will display Request timed out and Lost = 4



Date _____
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create a topology using Hub & switch to transmit a simple PDU packets



→ Connect PCs 1, 2, 3 to the hub and PCs 4, 5, 6 to switch and assign those PCs an IP address.

- ⇒ If we try to send message b/w PC1 or 2 or 3 via HUB, the message will be sent successfully.
- ⇒ The same goes for PC4, 5, 6 with switch, the message will be sent successfully.

Date 1/1

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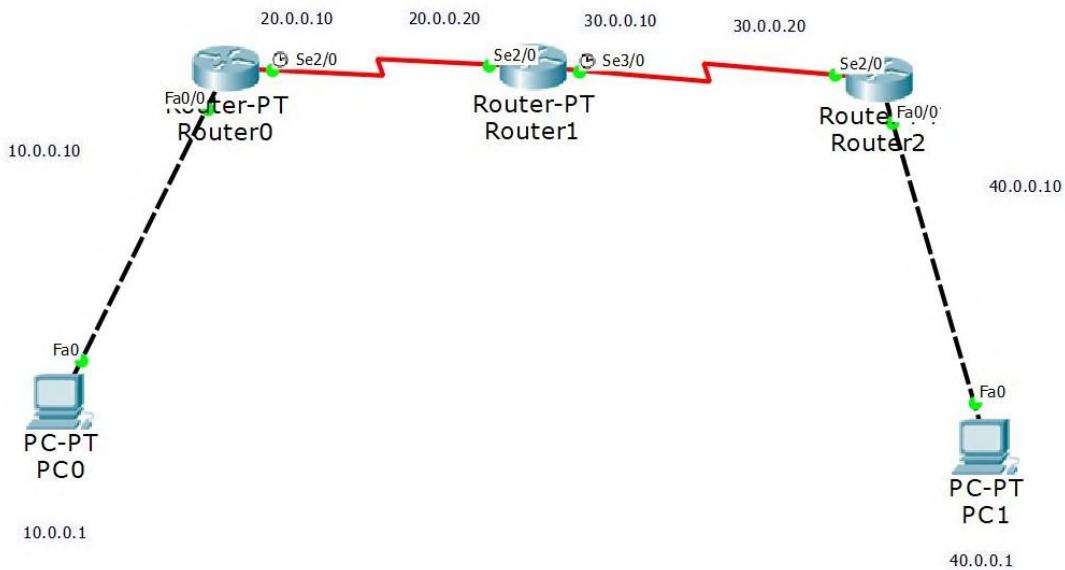
- But if you send a message between PC's 1, 2, 3 & 4, 5, 6 without the HUB or switches being linked, it will show failed.
- But if you connect the HUB and switch together with a wire and try again, it will be sent successfully.

✓ 1/6/2

Experiment 2

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

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:

Command Prompt

X

```
Packet Tracer PC Command Line 1.0
PC>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Reply from 10.0.0.10: Destination host unreachable.
Reply from 10.0.0.10: Destination host unreachable.
Reply from 10.0.0.10: Destination host unreachable.
Request timed out.

Ping statistics for 40.0.0.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
PC>
```

Router 0 :

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

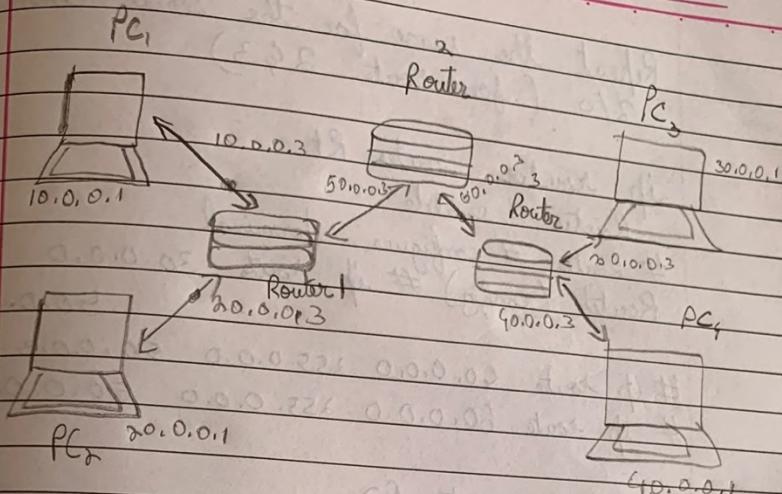
Pinging 40.0.0.1 with 32 bytes of data:

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>
```

Observation :

setting up devices

Drag four PC's and configure their IP address and connect the routers to the PC's.

now configure the gateway IP addresses of PC0 & PC1.

Then go to the router and then CLI,
 Router (config) # interface fast Ethernet 0/0
 Router (config-if) # ip address 10.0.0.3
 255.0.0.0

Router (config-if) # no shutdown & then #exit
 we do the same for other PC's.

Now repeat the steps for other route for the 2 PC's. Now do it for serial connection

Router (config) # interface 2/0
 Router (config-if) # ip address 50.0.0.1
 255.0.0.0

Router (config-if) # no shutdown

Router (config-if) # exit

Repeat the same for the serial connection
3/0 (for router 2 & 3)

ip route router R1

Router > enable

Router # configure terminal

Router (config) # ip route 30.0.0.0 255.0.0.0
50.0.0.3

ip route 40.0.0.0 255.0.0.0 50.0.0.3

ip route 60.0.0.0 255.0.0.0 50.0.0.3

ip route router R2

Router (config) # ip route

10.0.0.0 255.0.0.0 60.0.0.3

ip route 20.0.0.0 255.0.0.0 60.0.0.3

ip route 50.0.0.0 255.0.0.0 60.0.0.3

ip route router R3

Router (config) # ip route 10.0.0.0 255.0.0.0
50.0.0.1

ip route 20.0.0.0 255.0.0.0 50.0.0.1

ip route 30.0.0.0 255.0.0.0 60.0.0.1

ip route 40.0.0.0 255.0.0.0 60.0.0.1

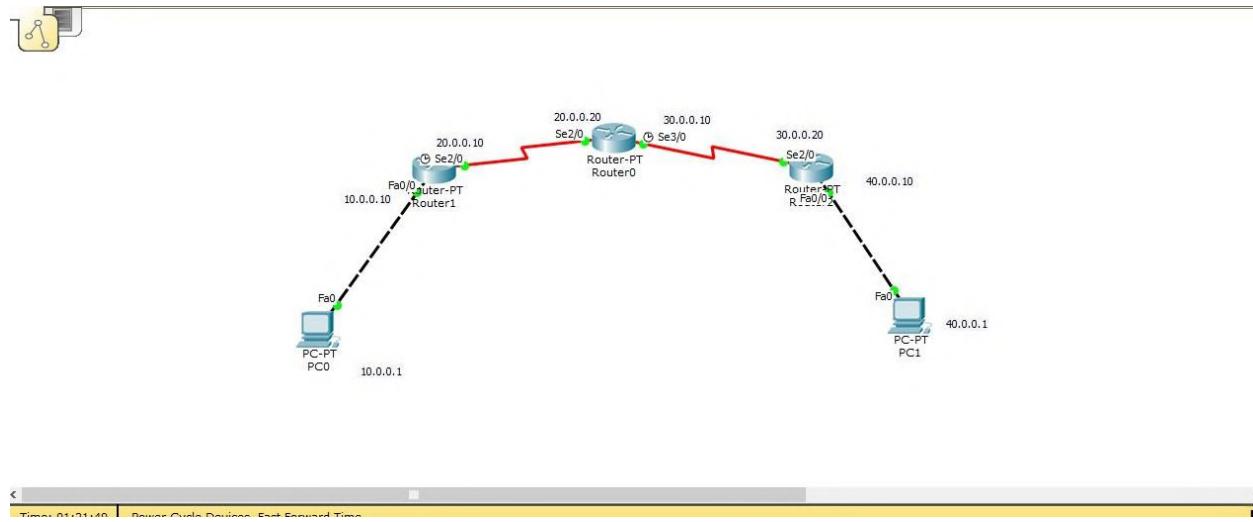
Observation

When the routers are not introduced with other two IP addresses and we ping them, we get a message saying host unreachable. Once when we introduce routers with other two IP addresses and we ping now we get message sent successfully with orig. locs.

Experiment 3

Aim: Configure default route, static route to the Router

Topology :



Configurations:

Roter 0 :

Router0

Physical Config CLI

IOS Command Line Interface

```
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 Serial3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, 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
C    30.0.0.0/8 is directly connected, Serial3/0
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
%Invalid next hop address (it's this router)
Router(config)#ip route 40.0.0.0 255.0.0.0 30.0.0.20
```

Copy Paste

Router0

Physical Config CLI

IOS Command Line Interface

```
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
ip route
^
% Invalid input detected at '^' marker.

Router#ip route
^
% Invalid input detected at '^' marker.

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

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
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 30.0.0.20
Router(config)#exit
Router#
```

Copy Paste

Roter 1 :

Router1

Physical Config CLI

IOS Command Line Interface

```
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)#
%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
```

Copy Paste

Router1

Physical Config CLI

IOS Command Line Interface

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

Copy Paste

Roter 2 :

Router2

Physical Config CLI

IOS Command Line Interface

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 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
exit
Router(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
interface fastethernet 0/0
Router(config-if)#ip address 40.0.0.10 255.0.0.0
Router(config-if)#no shut

Router(config-if)#
%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
```

Copy Paste

Router2

Physical Config CLI

IOS Command Line Interface

```
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

C    30.0.0.0/8 is directly connected, Serial2/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0
Router#
```

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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:

Reply from 10.0.0.10: Destination host unreachable.

Ping statistics for 40.0.0.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
PC>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Request timed out.
Reply from 40.0.0.1: bytes=32 time=7ms TTL=125
Reply from 40.0.0.1: bytes=32 time=2ms TTL=125
Reply from 40.0.0.1: bytes=32 time=25ms 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 = 25ms, Average = 11ms

PC>ping 40.0.0.1
```

Command Prompt

```
PC>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Request timed out.
Reply from 40.0.0.1: bytes=32 time=7ms TTL=125
Reply from 40.0.0.1: bytes=32 time=2ms TTL=125
Reply from 40.0.0.1: bytes=32 time=25ms 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 = 25ms, Average = 11ms

PC>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

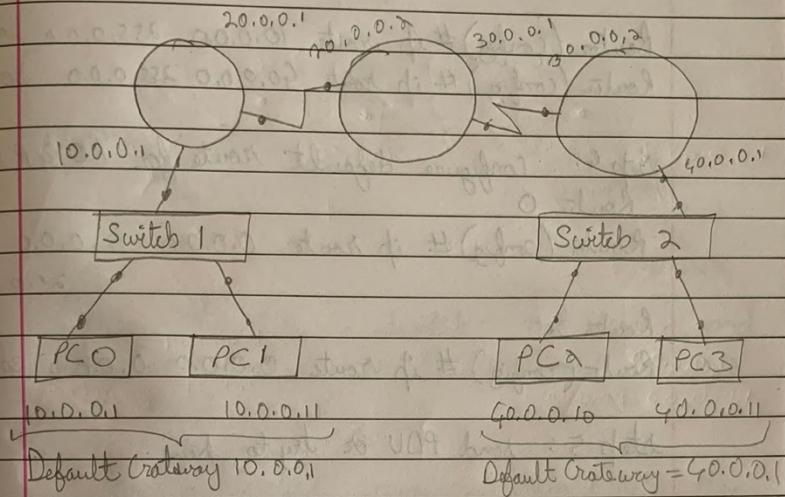
Reply from 40.0.0.1: bytes=32 time=12ms TTL=125
Reply from 40.0.0.1: bytes=32 time=9ms TTL=125
Reply from 40.0.0.1: bytes=32 time=22ms TTL=125
Reply from 40.0.0.1: bytes=32 time=19ms TTL=125

Ping statistics for 40.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 9ms, Maximum = 22ms, Average = 15ms

PC>
```

Observation:

Configuring Default Route : Exp #4



Step 1: configure IP addresses of PC 0, PC1, PC 2 and PC 3, configure Default gateway for all the PC's.

Step 2: configure Routers

Router 0

```

Router(config) # interface fast-ethernet 0/0
Router(config-if) # ip address 10.0.0.1 255.0.0.0
Router(config-if) # no shutdown
Router(config-if) # exit
Router(config) # interface serial 2/0
Router(config-if) # ip address 20.0.0.1 255.0.0.0
Router(config-if) # no shutdown
Router(config-if) # exit
  
```

Repeat the steps for other routers

Date / /

Page

Step 3: configure static route of 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 30.0.0.1

Step 4: configure default route for R0 & R2

Router 0

Router (config) # ip route 0.0.0.0 0.0.0.0

20.0.0.1

Router 2

Router (config) # ip route 0.0.0.0 0.0.0.0 30.0.0.1

Step 5: send PDU or try to ping.

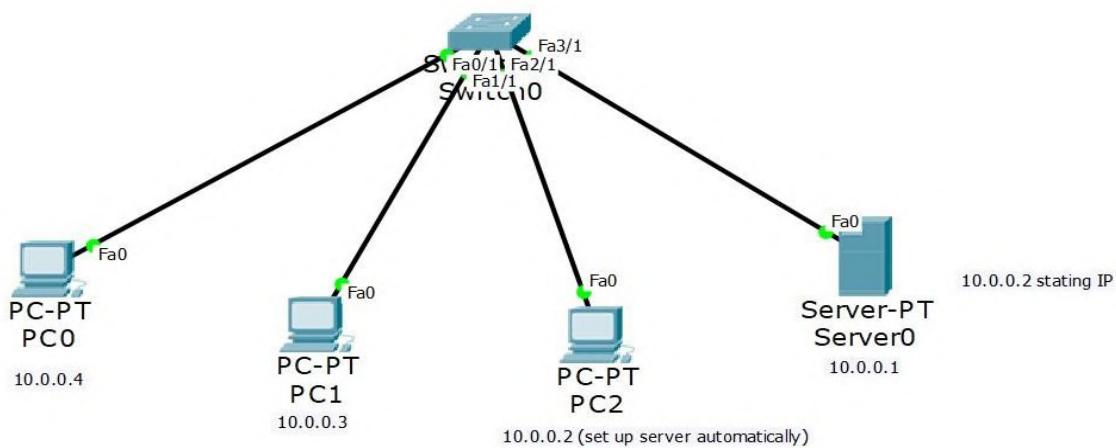


Experiment 4

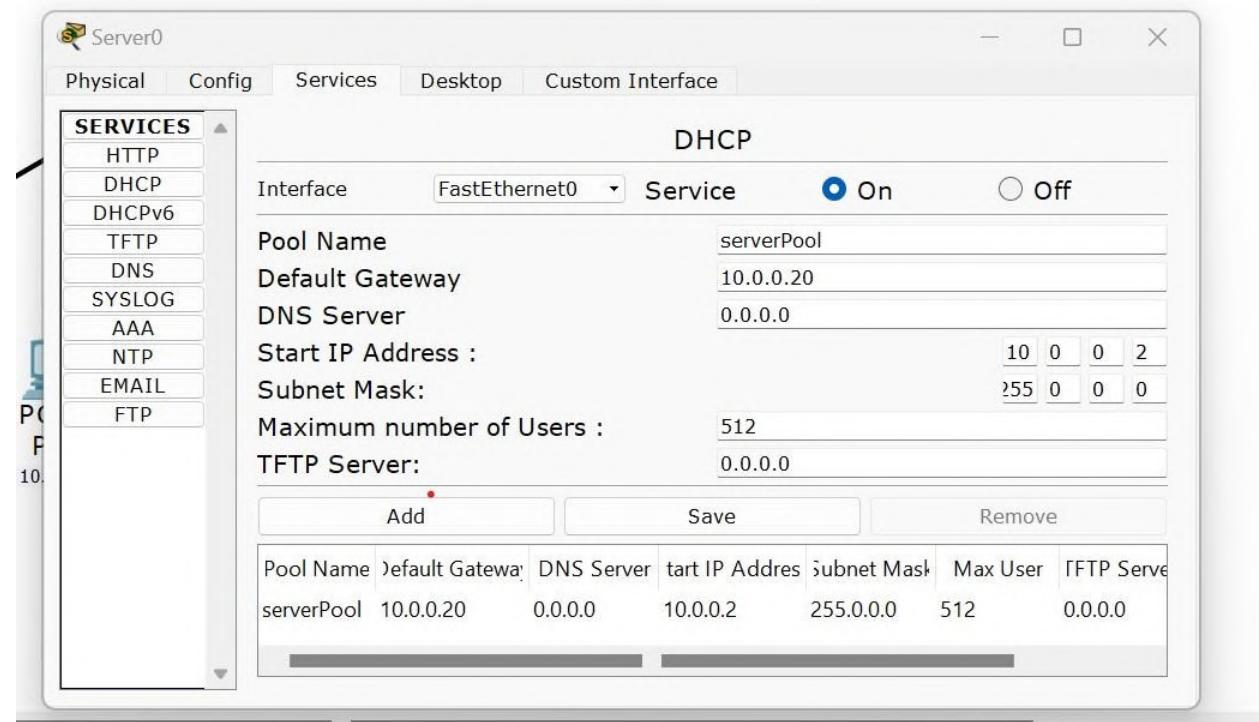
Aim: Configure DHCP within a LAN and outside LAN.

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 :

- ① Enable ~~switch~~ ~~switch 029 401 -8~~
- ② configt ~~switch 029 401 -8~~
- ③ interface fast ethernet 0/0.
- ④ IP address 10.0.0.10 255.0.0.0
- ⑤ No shut
- ⑥ Exit ~~fast eth 0/0 up enig <9>~~
- ⑦ Interface serial 0/0.0 ~~enig~~
- ⑧ IP address 20.0.0.10 255.0.0.0
- ⑨ No shut ~~no limit - too many~~
- ⑩ Exit ~~serial 0/0 up no~~
- ⑪ ~~exit serial 0/0 up no~~

ii. Repeat these commands for other two routers.

5. for router 183, set ip routes of its adjacent routers statically at lower hierarchy
- ① configt ~~switch 029 401 -8~~
 - ② ip route 10.0.0.0 to 255.0.0.0 20.0.0.10
 - ③ ip route 40.0.0.0 255.0.0.0 30.0.0.20
 - ④ exit
 - ⑤ exit ~~not set at switch 1 through 4~~
 - ⑥ show ip route ~~(to view route table)~~

6. We set default ip routes ~~(to view~~ + ~~route~~ table. To both router 10 & router 2, which tells if can access any in address with any subnet mask address).

7. Set default ip routes by following 7 commands.

- ① config t
- ② ip route 0.0.0.0
- ③ ip route 0.0.0.0

8- Go to pco command prompt & give ping to send message

Ping output

pc> ping 40.0.0.1

pinging 40.0.0.1 with 32 bytes of data

Request timed out.

Reply from 40.0.0.1: bytes = 32 time = 2ms TTL = 128

Reply from 40.0.0.1: bytes = 32 time = 2ms TTL = 128

Reply from 40.0.0.1: bytes = 32 time = 2ms TTL = 128

Ping statistics for 40.0.0.1

3 packets sent, 3 received = 100% loss (25.00)

Approximate round trip time in milliseconds:

Minimum = 2ms, Maximum = 9ms, Average = 7ms

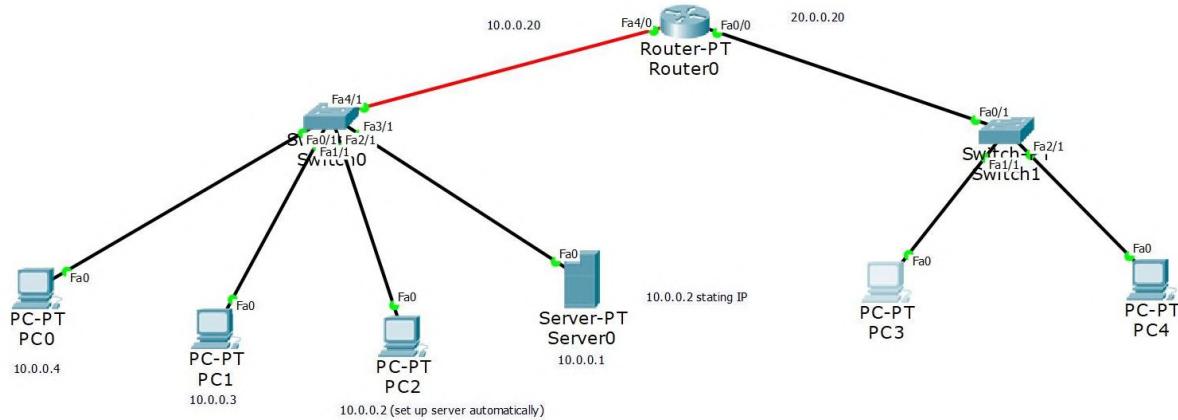
Observation

Action

A default is given to router which takes action when no other route is available for an IP address destination. If packet is received, default first checks IP destination address, if it is not available it checks if routable. If packet is forwarded to next hop towards destination process repeat until packet is delivered to host.

4B: Outside a LAN.

Topology :



Configurations :

Router 0 :

```
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

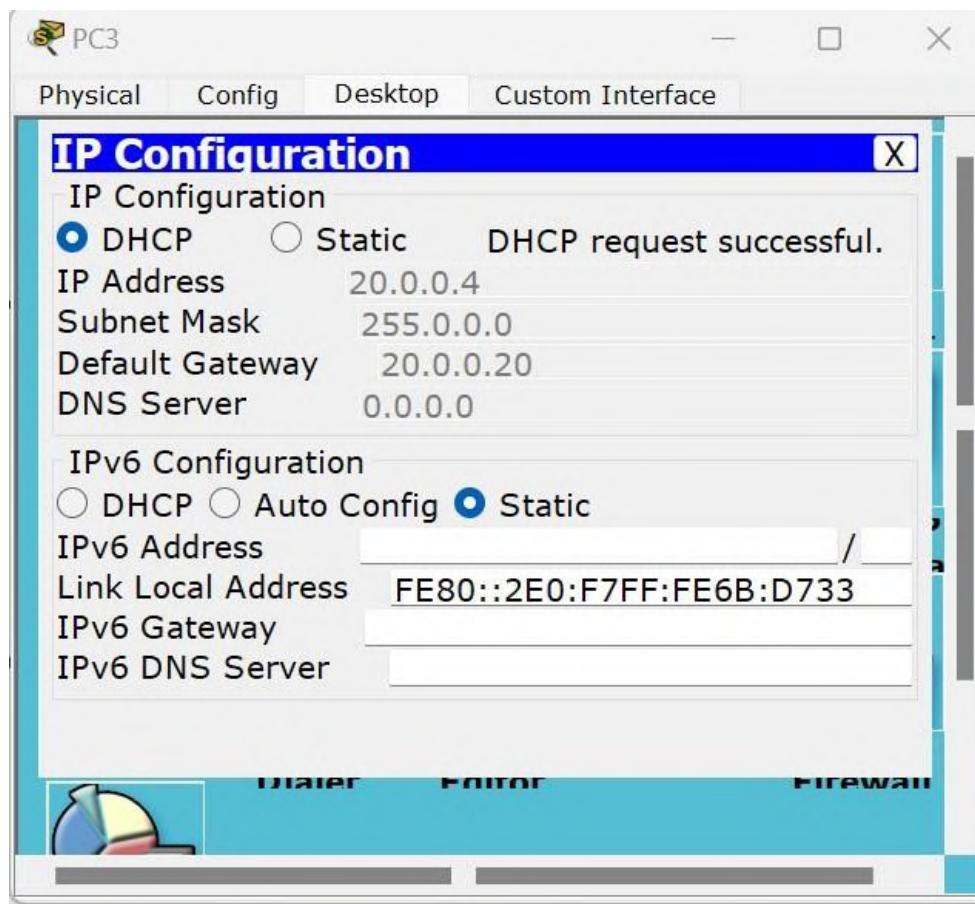
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%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#
```

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
```

Observation :

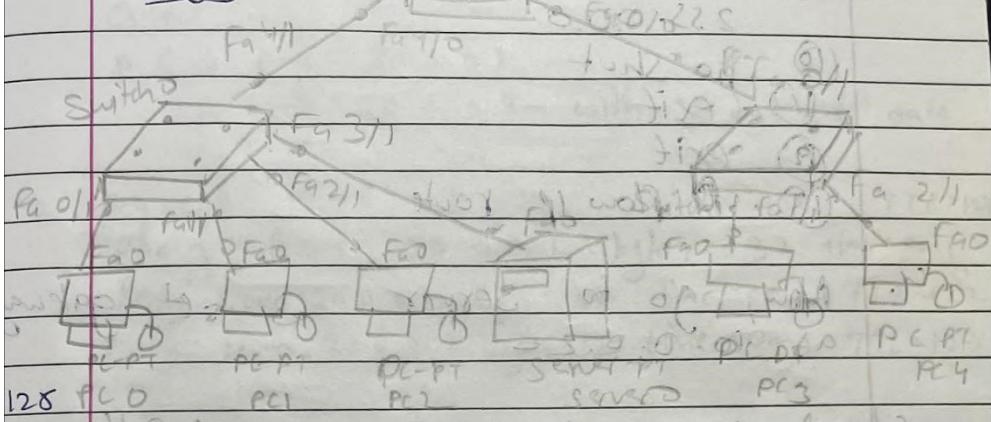
Experiment :- 6

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Aim

Configure DHCP within a LAN and outside LAN.

Topology



Procedure

1. Add a router, a switch & 2 pc's to previous program. Connect the router to both switches.
2. Set the server IP address of server and with help of server set the first PC's IP address through DHCP.
3. Now set router IP address with following commands
 - (1) No
 - (2) enable
 - (3) config
 - (4) interface Fastethernet 4/0

- (5) ip address 10.0.0.20 255.0.0.0
- (6) no shut
- (7) exit
- (8) interface fast ethernet 0/0
- (9) ip address 20.0.0.20 255.0.0.0
- (10) no shut
- (11) exit
- (12) exit
- (13) flow ip route

4. Now, go to Server & set gateway
as 10.0.0.20

5) Again go to router CLI & follow
commands

- (1) config
- (2) interface fast ethernet 0/0
- (3) ip helper address 20.0.0.20
- (4) no shut
- (5) exit

6) Now, go to Server settings & add an
IP pool named as Server pool 1
Start IP address as 20.0.0.4 &
Default gateway as 20.0.0.20.

7) Now set other two PCs IP address
by going to their Desktop → IP configuration
& Select DHCP which will automatically
generate its IP address.

Q1 Now the network is complete & ready to serial packets from pc to other by typing ping address in command prompt

Output:

pc> ping 20.0.0.2

pinging 20.0.0.2 with 32 bytes of data

Request timed out

TTL=127

Reply from 20.0.0.2: bytes = 32 time = 0ms,

Reply from 20.0.0.2: bytes = 32 time = 0ms TTL=122

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

Ping Statistics for 20.0.0.2:

Packets Sent = 4, Received = 3 Lost = 1
(25% loss)

Approximate round trip times in milliseconds.

Minimum = 0ms, Maximum = 0ms, Average

1.0.0.0.1 (122.168.91.239 +2 =0ms)

Observation

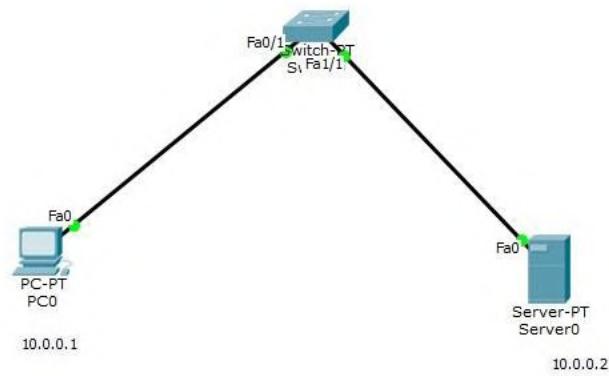
DHCP is used to assign IP addresses dynamically to different devices. To assign continuous IP addresses we create a server pool where we assign the starting IP address and default gateway number. For PC's under different switches we create a different server pool again and start

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

Experiment 5

Aim : Configure Web Server, DNS within a LAN.

Topology :



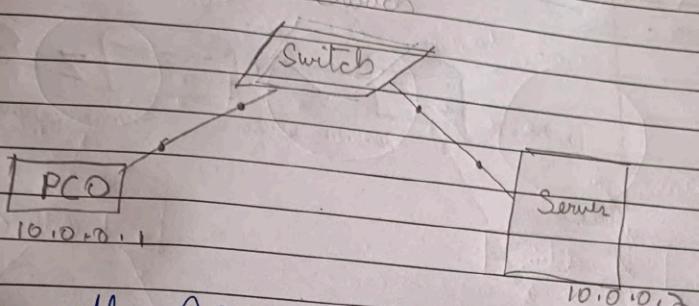
Observation:

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DNS



Place the PC, switch and server and assigns 10.0.0.1 to PC0 and 10.0.0.2 to the server.

Then go to the server, then DNS, then add your name and address of the server.

Then go to PC0's desktop Web browser and type 10.0.0.2.

Then you can edit your index.html from the servers index.html's edit options and then save it.

8
24/12/23

Experiment 6

Aim: Configure RIP routing Protocol in Routers.

Topology :



Configuration:

Ping Outputs:

P0:

IOS Command Line Interface

```
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 serial2/0
Router(config-if)#ip address 20.0.0.10 255.0.0.0
Router(config-if)#encapsulation ppp
Router(config-if)#clock rate 64000
Router(config-if)#no shut

%LINK-5-CHANGED: Interface Serial2/0, 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

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#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
      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, 00:00:06, Serial2/0
R    40.0.0.0/8 [120/2] via 20.0.0.20, 00:00:06, Serial2/0
R*   0.0.0.0/0 [120/1] via 20.0.0.20, 00:00:06, Serial2/0
Router#
```

Router1

Physical Config CLI

IOS Command Line Interface

```
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface serial2/0
Router(config-if)#ip address 20.0.0.20
* Incomplete command.
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
exit
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
exit
^
* Invalid input detected at '^' marker.

Router(config-if)#interface serial3/0
Router(config-if)#ip address 30.0.0.10
* Incomplete command.
Router(config-if)#ip address 30.0.0.10 255.0.0.0
Router(config-if)#encapsulate ppp
^
* Invalid input detected at '^' marker.

Router(config-if)#encapsulation ppp
Router(config-if)#clock rate 64000
Router(config-if)#no shut
```

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Router1

Physical Config CLI

IOS Command Line Interface

```
Router(config-if)#encapsulate ppp
^
* Invalid input detected at '^' marker.

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)#
*LINK-5-CHANGED: Interface Serial3/0, changed state to up

*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

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

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 - local unreachables, o - originator timer over
```

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Router1

Physical Config CLI

IOS Command Line Interface

```
* 0.0.0.0/32 is subnetted, 1 subnets
C*   0.0.0.0 is directly connected, Serial3/0
R   10.0.0.0/8 [120/1] via 20.0.0.10, 00:00:21, 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
C     30.0.0.0/8 is directly connected, Serial3/0
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

* 0.0.0.0/32 is subnetted, 1 subnets
C*   0.0.0.0 is directly connected, Serial3/0
R   10.0.0.0/8 [120/1] via 20.0.0.10, 00:00:01, 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, 00:00:10, Serial3/0
Router#
```

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Router2

Physical Config CLI

IOS Command Line Interface

```
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 30.0.0.0 255.0.0.0
Bad mask /8 for address 30.0.0.0
Router(config-if)#no shut

Router(config-if)#
*LINK-5-CHANGED: Interface Serial2/0, changed state to up
exit
Router(config)#interface serial2/0
Router(config-if)#encapsulation ppp
Router(config-if)#exit
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to no
shut
Router(config-if)#exit
Router(config)#interface fastethernet0/0
Router(config-if)#ip address 40.0.0.10
* Incomplete command.
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
```

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Router2

Physical Config CLI

IOS Command Line Interface

```
*LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to
up
exit
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)#show ip route
^
* Invalid input detected at '^' marker.

Router(config)#exit
Router#
*SYS-5-CONFIG_I: Configured from console by console

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

      30.0.0.0/32 is subnetted, 1 subnets
C        30.0.0.10 is directly connected, Serial2/0

```

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Router2

Physical Config CLI

IOS Command Line Interface

```
30.0.0.0/32 is subnetted, 1 subnets
C      30.0.0.10 is directly connected, Serial2/0
C      40.0.0.0/8 is directly connected, FastEthernet0/0
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface serial2/0
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)#exit
Router(config)#exit
Router#
*SYS-5-CONFIG_I: Configured from console by console

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 30.0.0.10 to network 0.0.0.0

R    10.0.0.0/8 [120/2] via 30.0.0.10, 00:00:20, Serial2/0
R    20.0.0.0/8 [120/1] via 30.0.0.10, 00:00:20, 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

```

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P1:

PC1

Physical Config Desktop Custom Interface

Command Prompt

```
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data:

Reply from 10.0.0.1: bytes=32 time=2ms TTL=125
Reply from 10.0.0.1: bytes=32 time=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

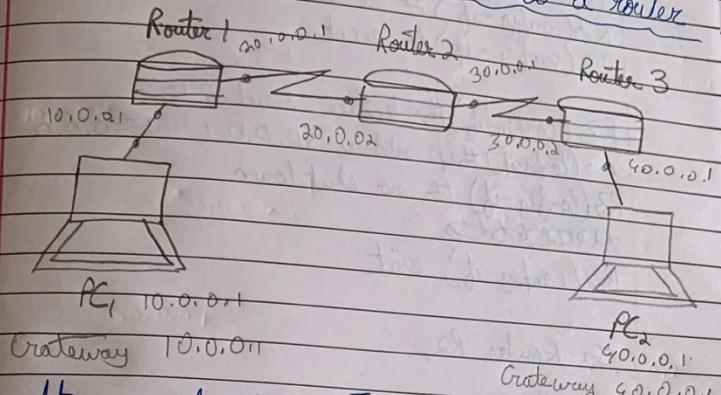
Ping statistics for 10.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 12ms, Average = 8ms

PC>
```

Observation :

Exp 5

Configuring RIP protocol to a router



after configuring IP addresses for all the devices,

In Router R₁:

```
R1(config)# interface serial 1/0  
R1(config-if)# ip address 20.0.0.1 255.0.0.0  
R1(config-if)# no shutdown  
R1(config-if)# exit
```

```
R1(config-if)# interface serial 1/0  
R1(config-if)# ip address 20.0.0.1 255.0.0.0  
R1(config-if)# encapsulation ppp  
R1(config-if)# clock rate 64000  
R1(config-if)# no shutdown  
R1(config-if)# exit
```

```
R2(config)# interface serial 1/1  
R2(config)# ip address 30.0.0.1 255.0.0.0  
R2(config)# encapsulation ppp
```

R2(config-if)# clock rate 64000
R2(config-if)# no shutdown
R2(config-if)# exit

R3(config-if)# interface serial 2/0
R3(config-if)# ip address 40.0.0.1 255.0.0.0
R3(config-if)# no shutdown
~~ip address~~
R3(config-if) exit

In Router R2,

R2(config)# router rip
R2(config)# network 20.0.0.0
R2(config-router) network 30.0.0.0
R2(config-router) exit

In Router R1

RIP to all routers
Router(config)# router ip
Router(config)# network 10.0.0.0
R1(config-route) network 20.0.0.0
Router(config)# exit

In Router R3,

~~R3(config)~~ R3(config) router rip
Router(config)# router ip
Router(config)# network 30.0.0.0
Router(config)# network 40.0.0.0
R3(config)# exit

Experiment 7

Aim : Configure OSPF routing protocol.

Topology :



Configurations:

Router1

Physical Config CLI

IOS Command Line Interface

```
Router>enable
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

Router(config-if)#exit
^
* Invalid input detected at '^' marker.

Router(config-if)#exit
Router(config)#interface serial2/0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#encapsulation ppp
Router(config-if)#clock rate 64000
Router(config-if)#no shut

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

Copy Paste

Router1

Physical Config CLI

IOS Command Line Interface

```
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
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
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 area 3
Router(config-router)#network 20.0.0.0 0.255.255.255 area 1
Router(config-router)#exit
Router(config)#
00:15:22: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial2/0 from LOADING to
FULL, Loading Done

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
^
* Invalid input detected at '^' marker.
```

Copy Paste

Router1

Physical Config CLI

IOS Command Line Interface

```
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 addressss 172.16.1.252.255.255.0.0
^
* Invalid input detected at '^' marker.

Router(config-if)#ip address 172.16.1.252.255.255.0.0
^
* Invalid input detected at '^' marker.

Router(config-if)#exit
Router(config)#interface se2/0
Router(config-if)#interface loopback 0
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 1.1.1.1
^
* Invalid input detected at '^' marker.

Router(config-router)#area 1 virtual-link 1.1.1.1
Router(config-router)#area 1 virtual-link 2.2.2.2
```

Copy Paste

Physical Config CLI

IOS Command Line Interface

```
Router(config) Router#exit
Router(config)#router ospf 1
Router(config-router)#area 1 virtual-link 2.2.2.2
Router(config-router)#exit
Router(config)#
00:26:54: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on OSPF_VL1 from LOADING to FULL,
Loading Done

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      20.0.0.2/32 is directly connected, Serial2/0
O      30.0.0.0/8 [110/128] via 20.0.0.2, 00:03:03, Serial2/0
O  IA 40.0.0.0/8 [110/129] via 20.0.0.2, 00:03:03, Serial2/0
C      172.16.0.0/16 is directly connected, Loopback0

Router#
```

Copy Paste

Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface se2/0
Router(config-if)#ip address 30.0.0.2 255.0.0.0
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

Router(config-if)#exit
Router(config)#interface fa0/0
Router(config-if)#ip address 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

Router(config-if)#exit
Router(config)#router ospf 1
^
% Invalid input detected at '^' marker.

Router(config-router)#network 40.0.0.0 0.255.255.255 area 2
Router(config-router)#exit
Router(config)#interface 2/0
^
% Invalid input detected at '^' marker.

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 172.16.1.254 255.255.0.0
^
% Invalid input detected at '^' marker.

Router(config-if)#exit
Router(config)#interface se2/0
Router(config-if)#interface loopback 0
Router(config-if)#ip address 172.16.1.254 255.255.0.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP

Router3

Physical Config CLI

IOS Command Line Interface

```
% Invalid input detected at '^' marker.

Router(config-if)#exit
Router(config)#interface se2/0
Router(config-if)#interface loopback 0
Router(config-if)#ip address 172.16.1.254 255.255.0.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

O IA 10.0.0.0/8 [110/129] via 30.0.0.1, 00:07:28, Serial2/0
O IA 20.0.0.0/8 [110/128] via 30.0.0.1, 00:16:23, Serial2/0
  30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C    30.0.0.0/8 is directly connected, Serial2/0
C    30.0.0.1/32 is directly connected, Serial2/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0
C  172.16.0.0/16 is directly connected, Loopback0
Router#
```

Copy Paste

Router2

Physical Config CLI

IOS Command Line Interface

```
Router>config
Configuring from terminal, memory, or network [terminal]? t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface se2/0
Router(config-if)#ip address 20.0.0.2 255.0.0.0
Router(config-if)#encapsulation ppp
Router(config-if)#no shut

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

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

Router(config)#interface se3/0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
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)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up
```

Copy Paste

Router2

Physical Config CLI

IOS Command Line Interface

F - 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
C     30.0.0.0/8 is directly connected, Serial3/0
C     30.0.0.2/32 is directly connected, Serial3/0
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
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 0
00:15:15: %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)#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 30.0.0.0 0.255.255.255 area 0
Router(config-router)#exit
Router(config)#
00:17:53: %OSPF-5-ADJCHG: Process 1, Nbr 3.3.3.3 on Serial3/0 from LOADING to
FULL, Loading Done

Router(config)#interface 3/0
^
```

Copy Paste

Router2

Physical Config CLI

IOS Command Line Interface

```
00:25:47: %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
Router(config-router)#area
00:25:57: %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 virtual-link 1.1.1
00:26:07: %OSPF-4-ERRRCV: Received invalid packet: mismatch area ID, from backbone
area must be virtual-link but not found from 20.0.0.2, Serial2/1
Router(config-router)#area
00:26:17: %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 virtual-
00:26:27: %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
link 1.1.1
Router(config-router)#
00:26:47: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on OSPF_VL0 from LOADING to FULL,
Loading Done

Router(config-router)#exit
Router(config)#router ospf 1
Router(config-router)#area 1 virtual-link 1.1.1.1
Router(config-router)#exit
Router(config)#
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
```

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Router2

Physical Config CLI

IOS Command Line Interface

```
Loading Done

Router(config-router)#exit
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

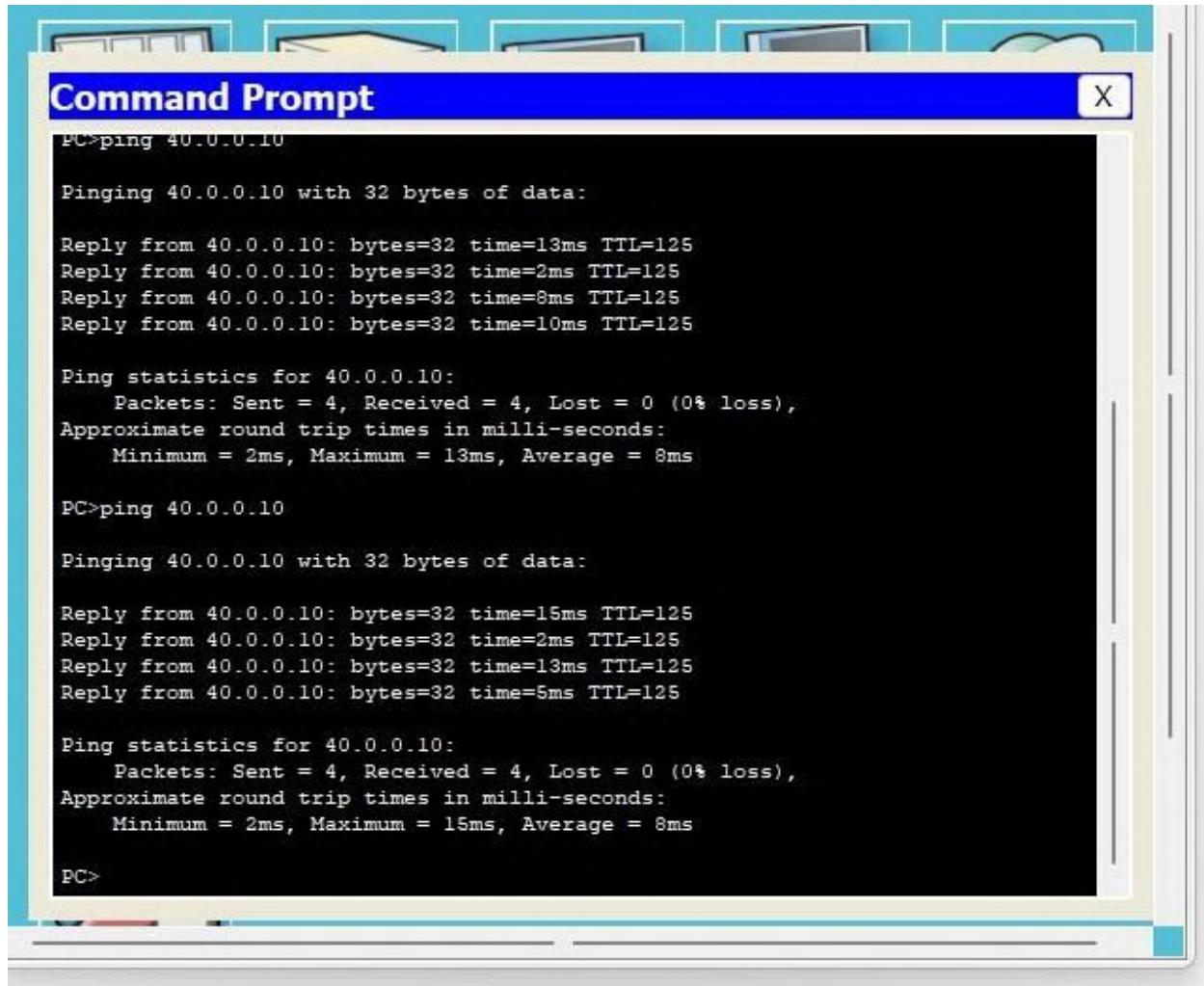
O IA 10.0.0.0/8 [110/65] via 20.0.0.1, 00:05:35, Serial2/0
  20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C     20.0.0.0/8 is directly connected, Serial2/0
C     20.0.0.1/32 is directly connected, Serial2/0
C     30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C     30.0.0.0/8 is directly 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, 00:14:06, Serial3/0
C     172.16.0.0/16 is directly connected, Loopback0

Router#
```

Copy Paste

Ping Output:

P0:



The image shows a Windows Command Prompt window titled "Command Prompt". The window contains two sets of ping command outputs. The first set is for IP address 40.0.0.10, and the second set is for IP address 40.0.0.10. Both sets show four successful replies from the target host. The statistics for each ping show 0% loss and round trip times between 2ms and 15ms.

```
PC>ping 40.0.0.10

Pinging 40.0.0.10 with 32 bytes of data:

Reply from 40.0.0.10: bytes=32 time=13ms TTL=125
Reply from 40.0.0.10: bytes=32 time=2ms TTL=125
Reply from 40.0.0.10: bytes=32 time=8ms TTL=125
Reply from 40.0.0.10: bytes=32 time=10ms TTL=125

Ping statistics for 40.0.0.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 13ms, Average = 8ms

PC>ping 40.0.0.10

Pinging 40.0.0.10 with 32 bytes of data:

Reply from 40.0.0.10: bytes=32 time=15ms TTL=125
Reply from 40.0.0.10: bytes=32 time=2ms TTL=125
Reply from 40.0.0.10: bytes=32 time=13ms TTL=125
Reply from 40.0.0.10: bytes=32 time=5ms TTL=125

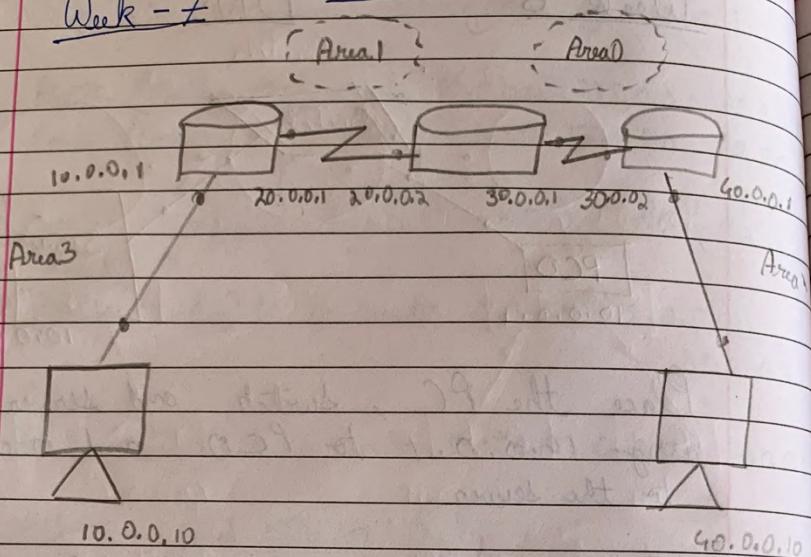
Ping statistics for 40.0.0.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 15ms, Average = 8ms

PC>
```

Observation :

Week - 7

OSPF



In Router R1,

```
R1(config)# interface fastethernet 2/0  
R1(config-if)# ip address 10.0.0.1 255.0.0.0  
R1(config-if)# no shutdown  
R1(config-if)# exit  
R1(config)# interface serial 1/0  
R1(config-if)# ip address 20.0.0.1 255.0.0.0  
R1(config-if)# encapsulation ppp  
R1(config-if)# clock rate 64000  
R1(config-if)# no shutdown  
R1(config-if)# exit
```

In Router R2

```
R2(config)# interface serial 1/0  
R2(config-if)# ip address 20.0.0.2 255.0.0.0  
R2(config-if)# encapsulation ppp  
R2(config-if)# no shutdown  
R2(config-if)# exit
```

Date ___/___
Page ___

```
R2(config)# interface serial 1/1
R2(config-if)# ip address 30.0.0.1 255.0.0.0
R2(config-if)# encapsulation ppp
R2(config-if)# clock rate 64000
R2(config-if)# no shutdown
R2(config-if)# exit
```

In Router R3,

```
R3(config)# interface serial 1/0
R3(config-if)# ip address 30.0.0.2 255.0.0.0
R3(config-if)# encapsulation ppp
R3(config-if)# no shutdown
R3(config-if)# exit
R3(config)# interface fastethernet 2/0
R3(config-if)# ip address 40.0.0.1 255.0.0.0
R3(config-if)# no shutdown
R3(config-if)# exit
```

Now we just enable IP routing by
configuring OSPF routing protocol

In all the Routers,

```
R(config)# router ospf 1
R(config-router)# router-id 1.1.1.1
R(config-router)# network 10.0.0.0 0.255.255.255 area 3
R(config-router)# network 20.0.0.0 0.255.255.255 area 1
R(config-router)# exit
```

do this for all routers

Observation

- OSPF stands for open shortest path first, a link-state protocol and as the name suggests, it is used to find the best and the optimal path way between the starting point and the destination target router using its own shortest path first algorithm
- OSPF marks on part no 89
- OSPF generates a topological map of the network from available routers; each network-to-network connection is designed as an area (area 0, 1, 0, 0 2)
- After the virtual links are made between areas, which is connected to the backbone area, we can ping messages successfully.

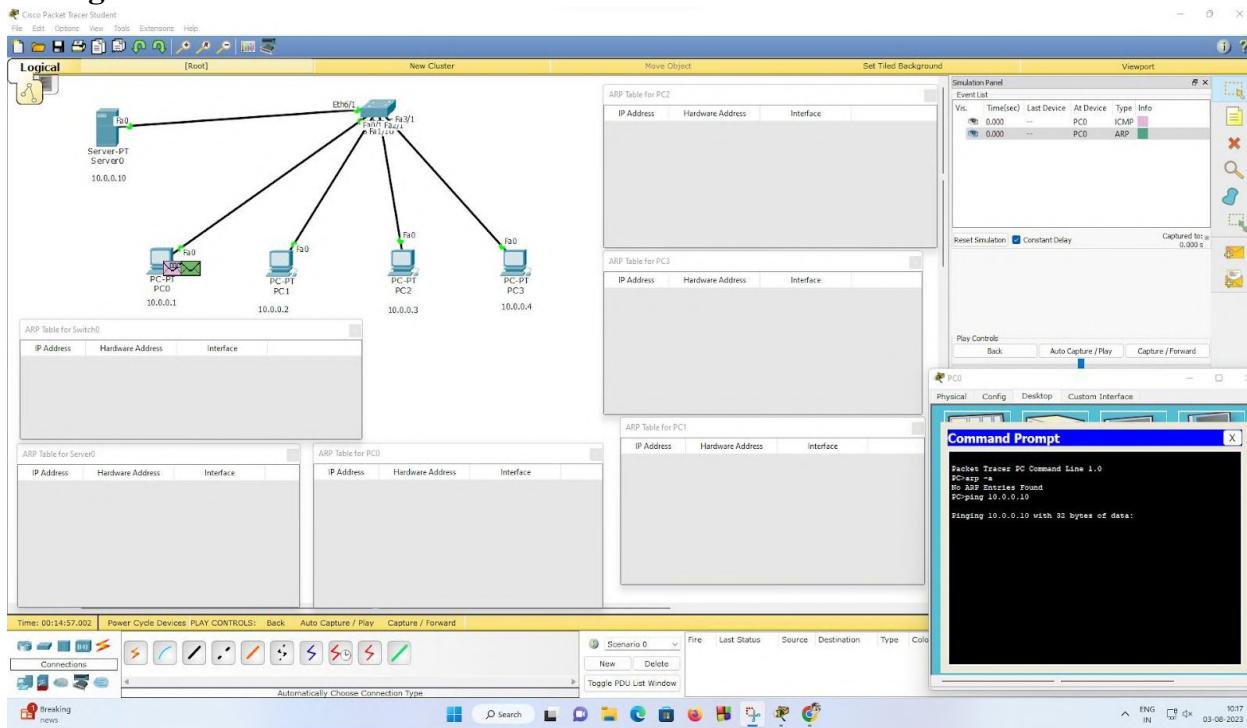
Experiment 8

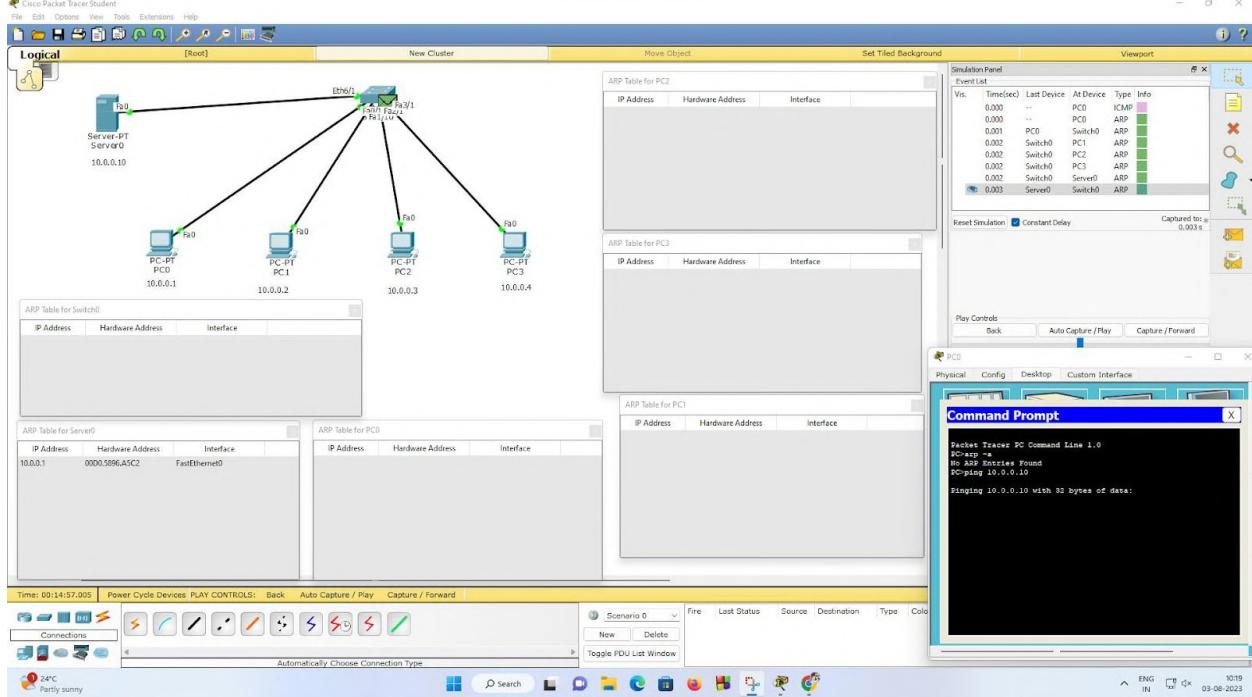
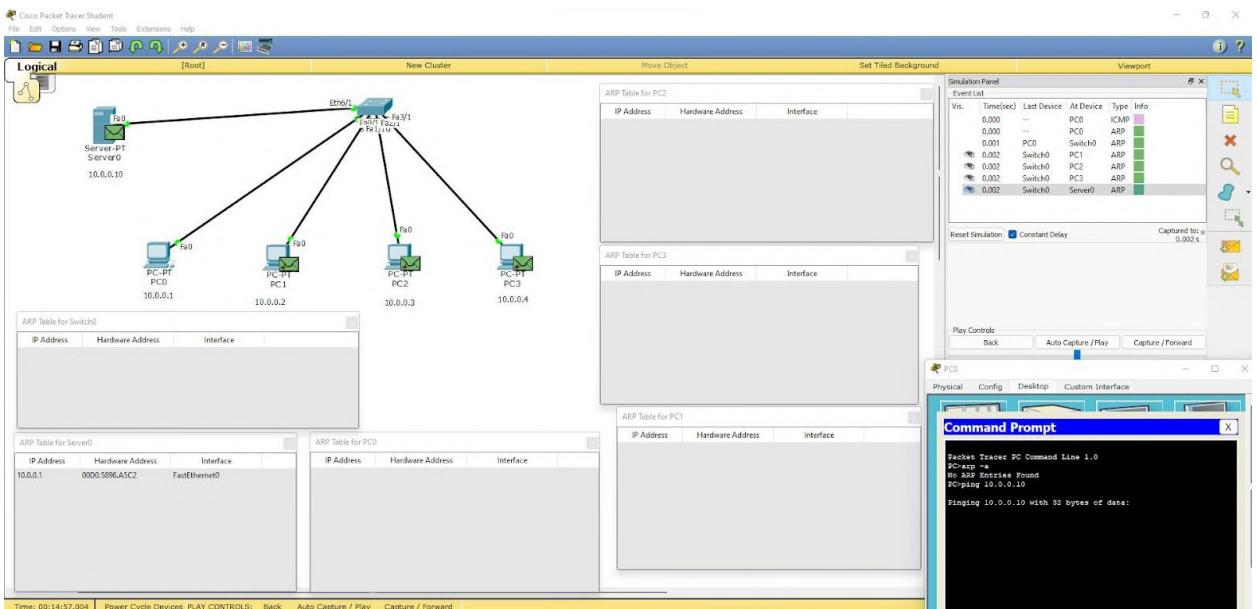
Aim : To construct simple LAN and understand the concept and operation of Address Resolution Protocol (ARP)

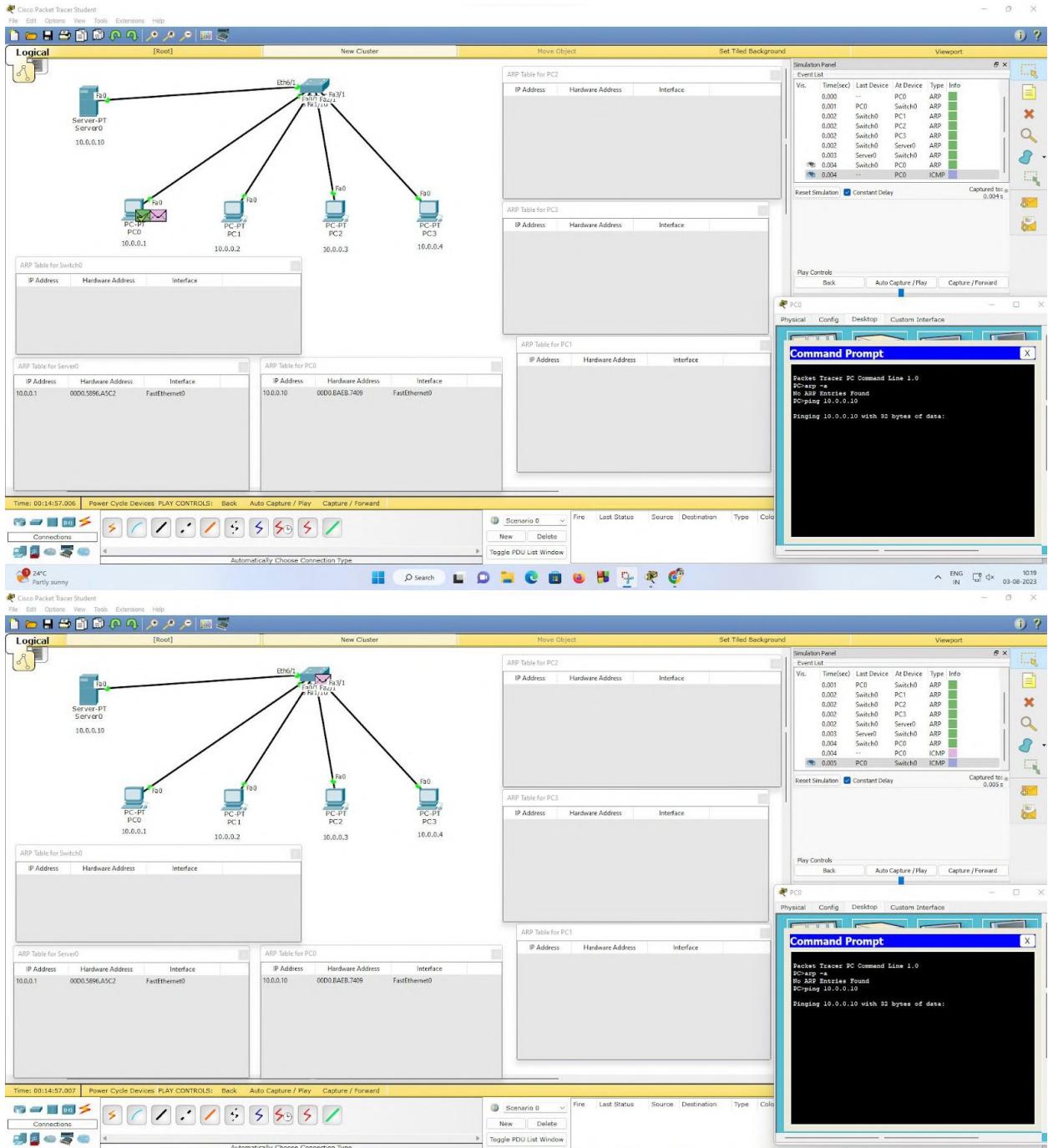
Topology :

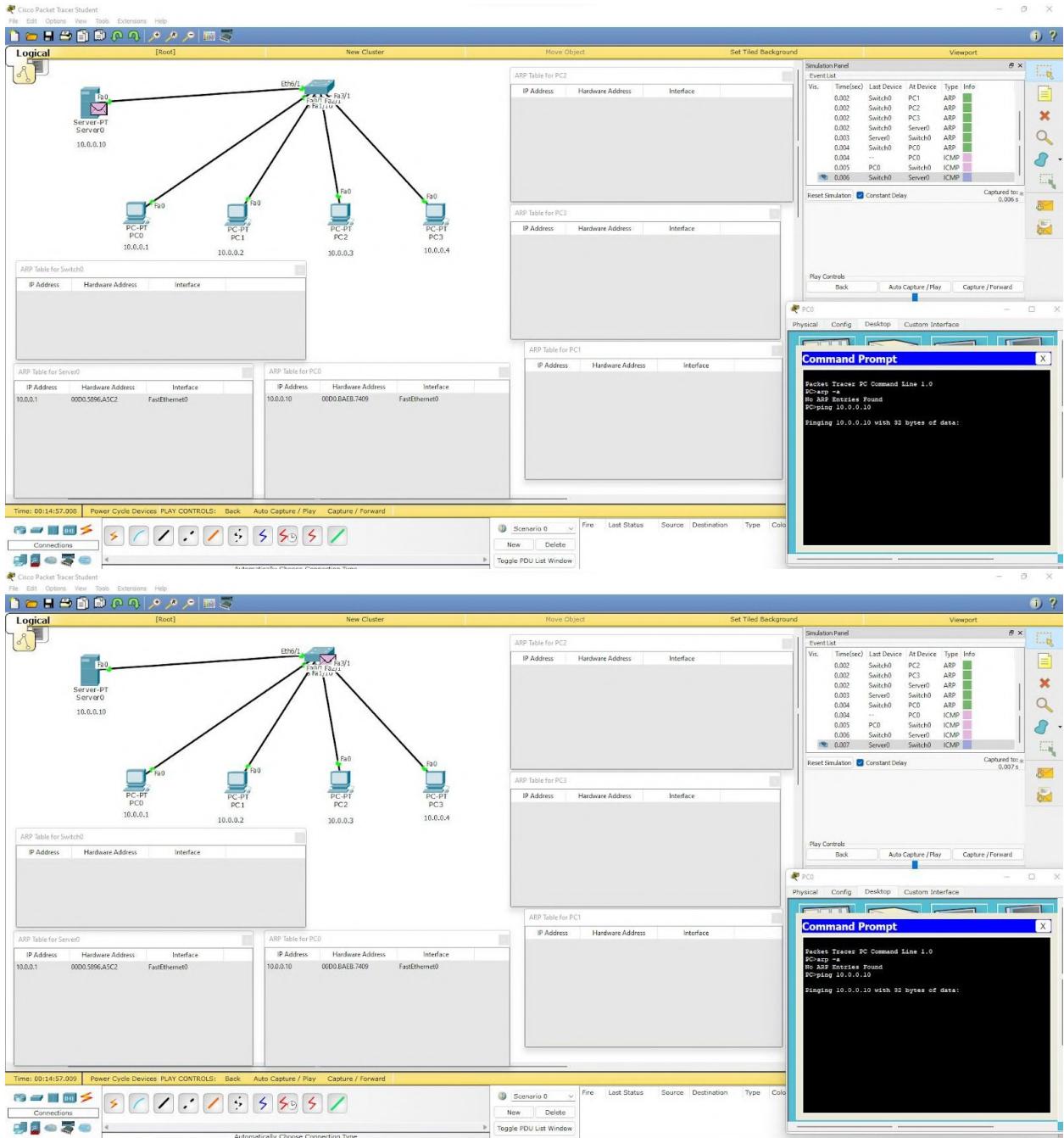
ARP Tables while pinging :

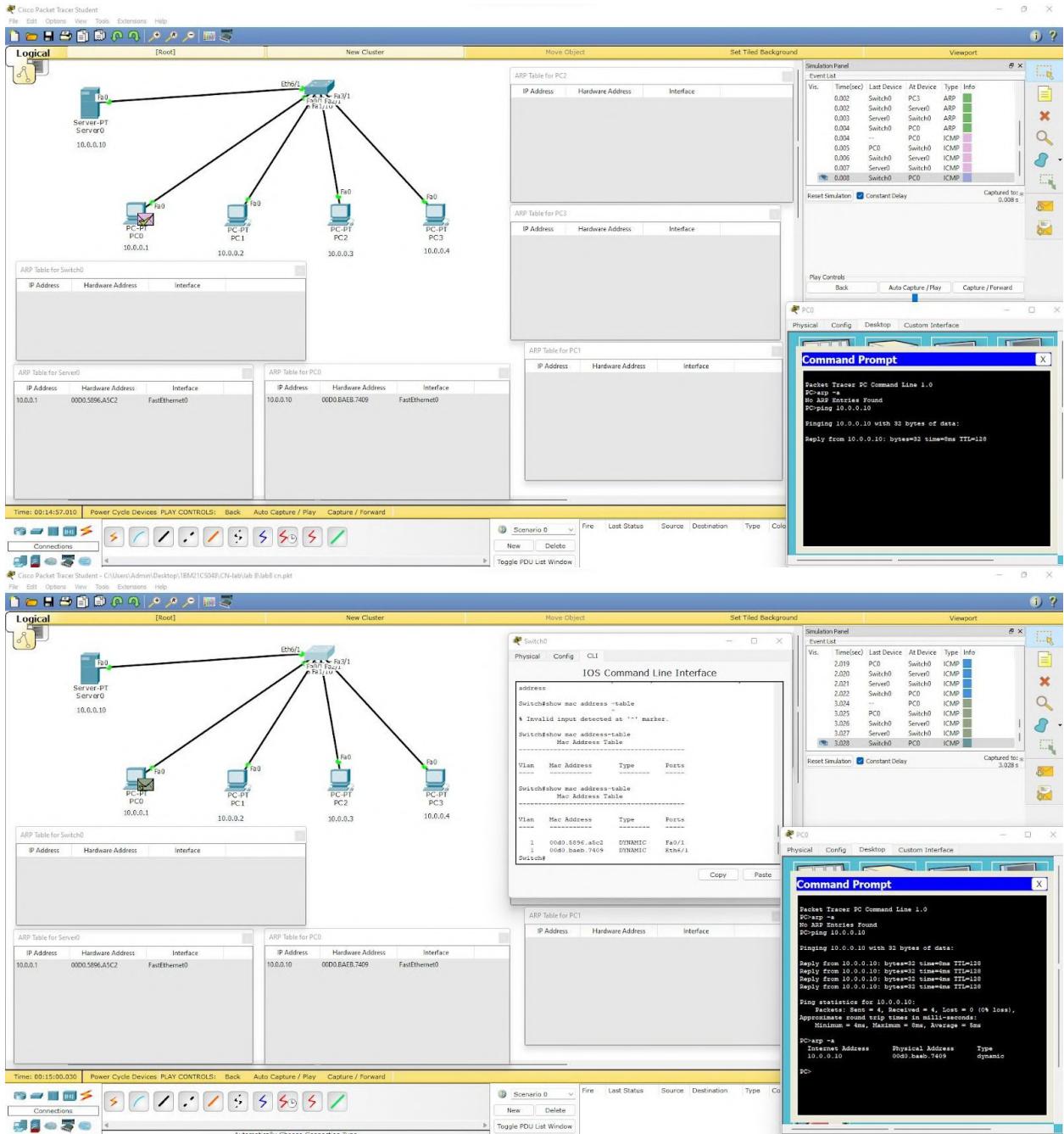
Ping from PC0 to Server0:











Ping from PC0 to PC1:

Logical

ARP Table for PC2

IP Address	Hardware Address	Interface
10.0.0.10	0000.5896.A5C2	Fa0/1
10.0.0.1	000A.F3E4.B83D	Fa0/1
10.0.0.2	000D.BAEB.7409	Fa0/1
10.0.0.3	0000.5896.A5C2	Fa0/1
10.0.0.4	0000.5896.A5C2	Fa0/1

ARP Table for PC3

IP Address	Hardware Address	Interface
10.0.0.10	0000.5896.A5C2	Fa0/1
10.0.0.1	000A.F3E4.B83D	Fa0/1
10.0.0.2	000D.BAEB.7409	Fa0/1
10.0.0.3	0000.5896.A5C2	Fa0/1
10.0.0.4	0000.5896.A5C2	Fa0/1

ARP Table for PC1

IP Address	Hardware Address	Interface
10.0.0.10	0000.5896.A5C2	Fa0/1
10.0.0.1	000A.F3E4.B83D	Fa0/1
10.0.0.2	000D.BAEB.7409	Fa0/1
10.0.0.3	0000.5896.A5C2	Fa0/1
10.0.0.4	0000.5896.A5C2	Fa0/1

ARP Table for Server0

IP Address	Hardware Address	Interface
10.0.0.1	0000.5896.A5C2	Fa0/1

ARP Table for Switch0

IP Address	Hardware Address	Interface
10.0.0.10	0000.5896.A5C2	Fa0/1
10.0.0.1	000A.F3E4.B83D	Fa0/1
10.0.0.2	000D.BAEB.7409	Fa0/1
10.0.0.3	0000.5896.A5C2	Fa0/1
10.0.0.4	0000.5896.A5C2	Fa0/1

Simulation Panel

Virt.	Time(sec)	Last Device	At Device	Type	Info
8.701		PC0	Switch0	ARP	
8.702		Switch0	PC1	ARP	
8.703		Switch0	PC2	ARP	
8.704		Switch0	PC3	ARP	
8.705		Server0	Switch0	ARP	
8.706		PC1	Switch0	ARP	
8.707		--	Switch0	DTP	Red
8.708		Switch0	PC0	ARP	
8.709		PC0	ICMP		Black

Play Controls: Back, Auto Capture / Play, Capture / Forward

Physical Config Desktop Custom Interface

Command Prompt

```

Packet Tracer DC Command Line 1.0
PC>arp -a
No ARP Entries Found
PC>ping 10.0.0.10
Ping statistics for 10.0.0.10:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 4ms, Maximum = 4ms, Average = 4ms
PC>arp -a
Internet Address      Physical Address      Type
10.0.0.10          0000.5896.A5C2      dynamic

```

Logical

ARP Table for PC2

IP Address	Hardware Address	Interface
10.0.0.10	0000.5896.A5C2	Fa0/1
10.0.0.1	000A.F3E4.B83D	Fa0/1
10.0.0.2	000D.BAEB.7409	Fa0/1
10.0.0.3	0000.5896.A5C2	Fa0/1
10.0.0.4	0000.5896.A5C2	Fa0/1

ARP Table for PC3

IP Address	Hardware Address	Interface
10.0.0.10	0000.5896.A5C2	Fa0/1
10.0.0.1	000A.F3E4.B83D	Fa0/1
10.0.0.2	000D.BAEB.7409	Fa0/1
10.0.0.3	0000.5896.A5C2	Fa0/1
10.0.0.4	0000.5896.A5C2	Fa0/1

ARP Table for PC1

IP Address	Hardware Address	Interface
10.0.0.10	0000.5896.A5C2	Fa0/1
10.0.0.1	000A.F3E4.B83D	Fa0/1
10.0.0.2	000D.BAEB.7409	Fa0/1
10.0.0.3	0000.5896.A5C2	Fa0/1
10.0.0.4	0000.5896.A5C2	Fa0/1

ARP Table for Server0

IP Address	Hardware Address	Interface
10.0.0.1	0000.5896.A5C2	Fa0/1

ARP Table for Switch0

IP Address	Hardware Address	Interface
10.0.0.10	0000.5896.A5C2	Fa0/1
10.0.0.1	000A.F3E4.B83D	Fa0/1
10.0.0.2	000D.BAEB.7409	Fa0/1
10.0.0.3	0000.5896.A5C2	Fa0/1
10.0.0.4	0000.5896.A5C2	Fa0/1

Simulation Panel

Virt.	Time(sec)	Last Device	At Device	Type	Info
10.714		PC0	Switch0	ICMP	
10.715		Switch0	PC1	ICMP	
10.716		PC1	Switch0	ICMP	
10.717		Switch0	PC0	ICMP	
11.718		--	PC0	ICMP	Blue
11.719		PC0	Switch0	ICMP	Blue
11.720		Switch0	PC1	ICMP	Blue
11.721		PC1	Switch0	ICMP	Blue
11.722		Switch0	PC0	ICMP	Blue

Play Controls: Back, Auto Capture / Play, Capture / Forward

Physical Config Desktop Custom Interface

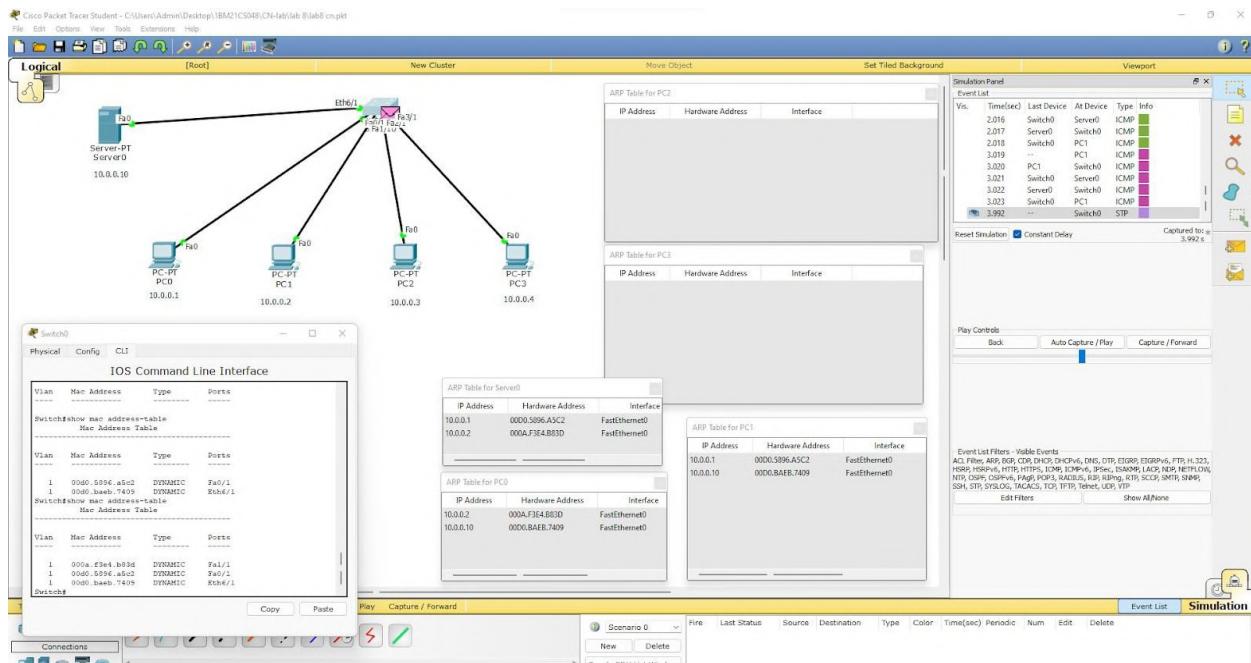
Command Prompt

```

Packet Tracer DC Command Line 1.0
PC>arp -a
No ARP Entries Found
PC>ping 10.0.0.10
Ping statistics for 10.0.0.10:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 4ms, Maximum = 4ms, Average = 4ms
PC>arp -a
Internet Address      Physical Address      Type
10.0.0.10          0000.5896.A5C2      dynamic
PC>ping 10.0.0.2
Ping statistics for 10.0.0.2 with 32 bytes of data:
Reply from 10.0.0.2: bytes=32 time=4ms 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 = 4ms, Maximum = 4ms, Average = 4ms
PC>

```

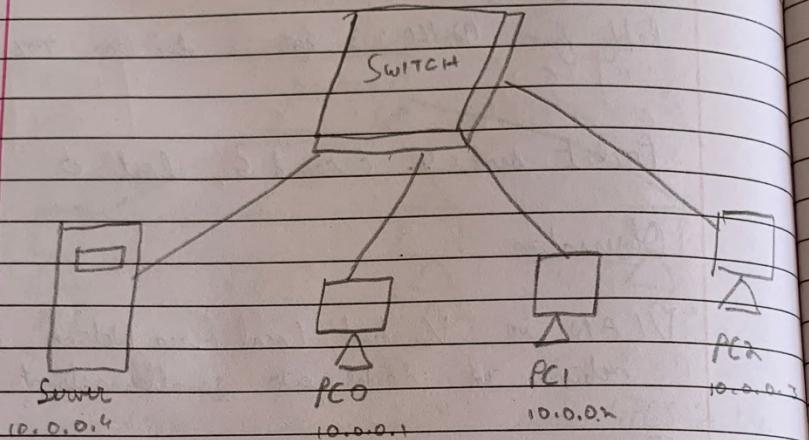
Final ARP Tables after pinging:



Observation:

Date / /
Page /

Experiment 8: LAN construction and operation of ARP



Procedure

Place generic switch, 3 PC's and ~~server~~ Server.

Connect the PC's and hub to the switch as shown.

Then go to CMD prompt of any pc and type; ipconfig

Create CMD prompt and ping all connected devices using IP address one by one. Go to simulation mode in each case and enable.

Using Inspect open ARP table of each device.

The CLI of switch type show mac address table

Results

PC > arp -a

Internet Address	Physical Address	Type
10.0.0.2	0001.C770.60	Dynmc
10.0.0.3	0001.7074.2200	Dynmc
10.0.0.4	0001.C7aa.6999	Dynmc

SWITCH > show mac address Table

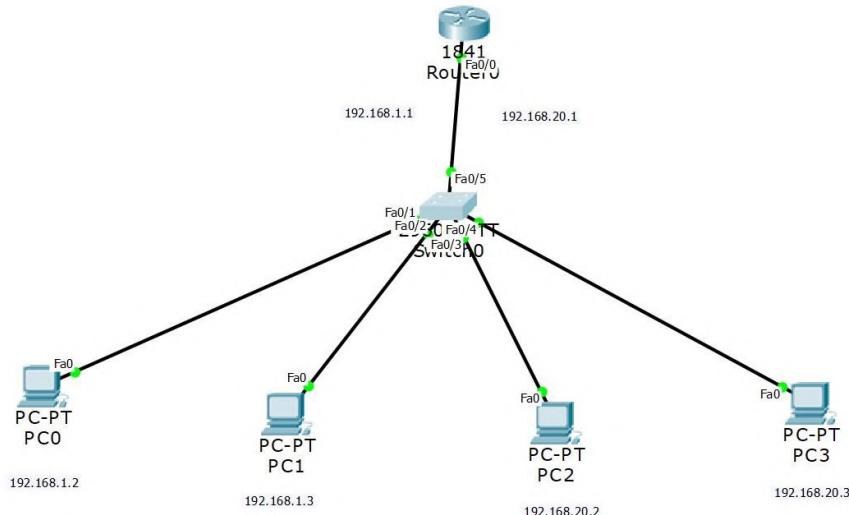
VLAN	Mac Address	Type	Port
1	0001.C778.601	Dynmc	Fa 1/1
1	0001.C7aa.6999	Dynmc	Fa 3/1
1	0060.7054.2200	Dynmc	Fa 2/1
1	00d0.1e1a.1482	Dynmc	Fa 0/1

ARP uses IP address to find out Physical Address / Mac address / link layer address

Experiment 9

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

Topology :



Configurations:

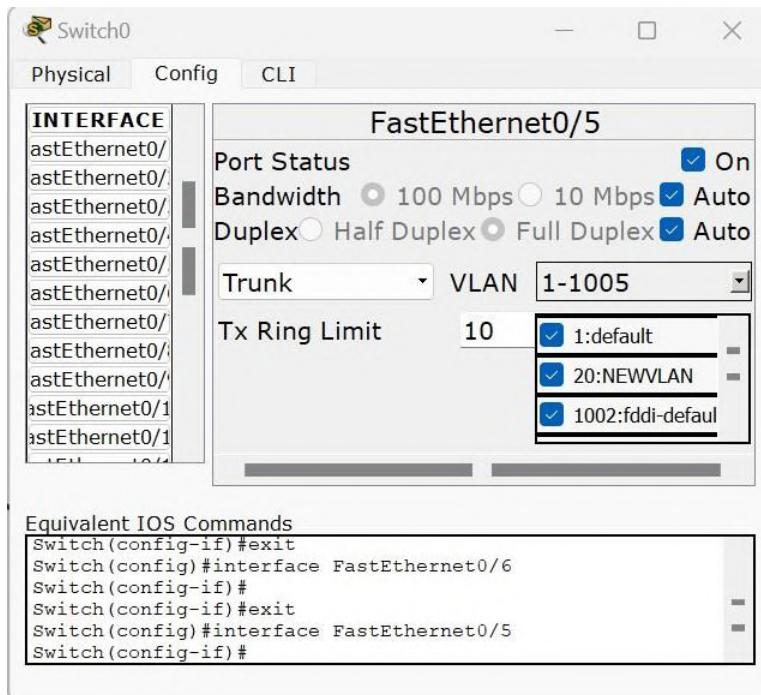
Switch VLAN Database:

VLAN No	VLAN Name
1	default
20	NEWVLAN
1002	fddi-default

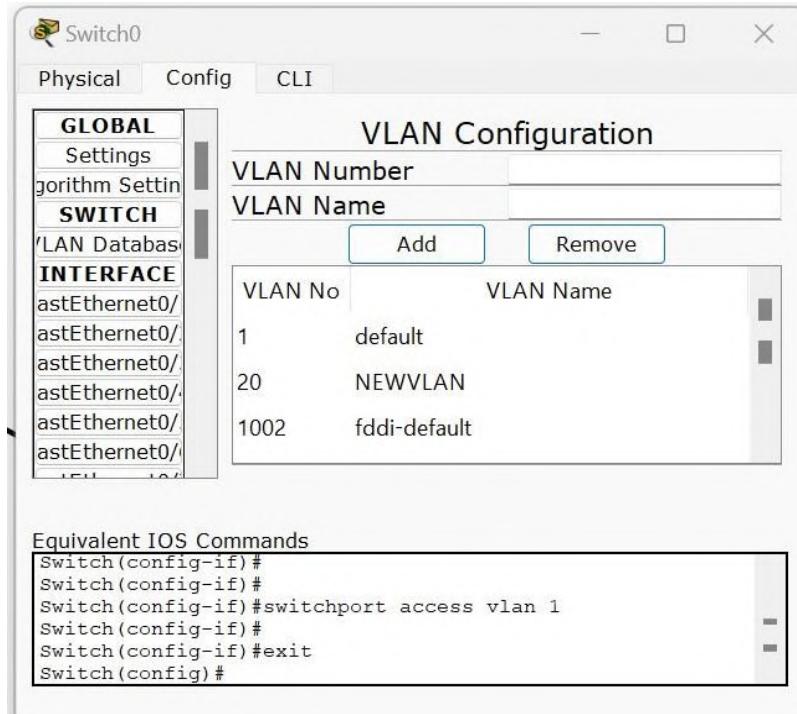
Equivalent IOS Commands

```
Switch(config-if)#  
Switch(config-if)#  
Switch(config-if)#switchport access vlan 1  
Switch(config-if)#  
Switch(config-if)#exit  
Switch(config)#
```

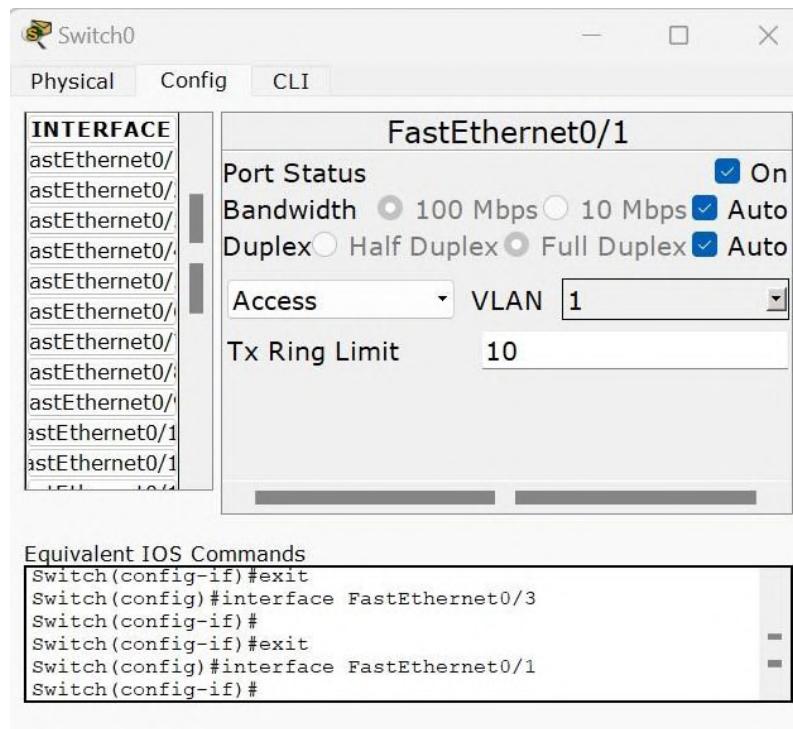
Switch FastEthernet0/5



Switch FastEthernet0/3 and FastEthernet0/4



Switch FastEthernet0/1 and FastEthernet0/2



Router 0 :

VLAN DataBase:

Router0	
Physical	Config
GLOBAL	CLI
Settings	
Algorithm Setting	
ROUTING	
Static	
RIP	
SWITCHING	
VLAN Database	
INTERFACE	
FastEthernet0/0	
FastEthernet0/1	
VLAN Number	VLAN Configuration
VLAN Name	
	Add Remove
VLAN No	VLAN Name
1 default	
20 NEWVLAN	
1002 fddi-default	
1003 token-ring-default	
1004 fddinet-default	
1005 trnet-default	
Equivalent IOS Commands	
<pre>%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up exit Router(config)#int fa 0/0.1 Router(config-subif)# %LINK-5-CHANGED: Interface FastEthernet0/0.1, changed state to up %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.1, changed state to up 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 Router(config)# Router(config)#exit Router#vlan database % Warning: It is recommended to configure VLAN from config mode, as VLAN database mode is being deprecated. Please consult user documentation for configuring VTP/VLAN in config mode. Router(vlan)# %SYS-5-CONFIG_I: Configured from console by console</pre>	

Router 0 : CLI:



Router0

Physical	Config	CLI
----------	--------	-----

IOS Commar

```

--- System Configuration Dialog ---

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

Press RETURN to get started!

Router>enable
Router#vlan database
% Warning: It is recommended to configure VLAN from config mode,
as VLAN database mode is being deprecated. Please consult user
documentation for configuring VTP/VLAN in config mode.

Router(vlan)#vlan 20 name NEWVLAN
VLAN 20 modified:
  Name: NEWVLAN
Router(vlan)#exit
APPLY completed.
Exiting....
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/5
%Invalid interface type and number
Router(config)#int fa0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
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)#int fa 0/0.1
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.1, changed state to up

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
Router(config)#

```

Ping Outputs:

P0:

Before and after VLAN configuration was successful.

The screenshot shows a software application window titled "PCo" with a toolbar at the top containing "Physical", "Config", "Desktop", and "Custom Interface" buttons. A sub-menu window titled "Command Prompt" is open, displaying the following terminal session:

```
PC>ping 192.168.20.2
Pinging 192.168.20.2 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

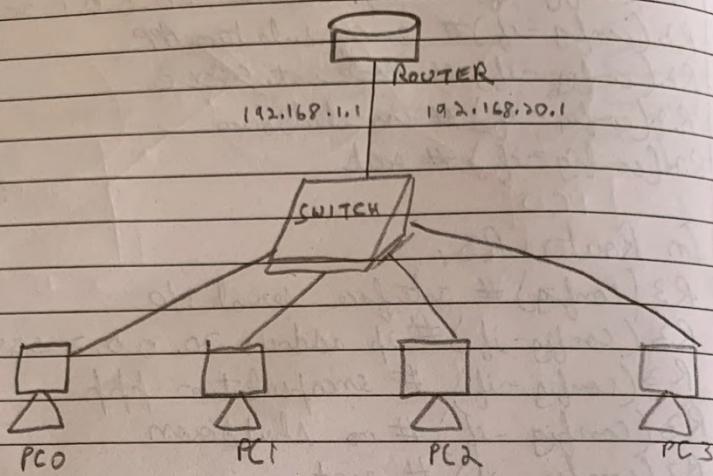
Ping statistics for 192.168.20.2:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
PC>ping 192.168.20.2
Pinging 192.168.20.2 with 32 bytes of data:
Request timed out.
Reply from 192.168.20.2: bytes=32 time=0ms TTL=127
Reply from 192.168.20.2: bytes=32 time=1ms TTL=127
Reply from 192.168.20.2: bytes=32 time=1ms TTL=127

Ping statistics for 192.168.20.2:
  Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
  Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
PC>
```

Observation:

OPSCA Week 8

VLAN



Place the router, switch and 4 PCs in the workspace and connect them.

In switch, go to config and select fastethernet and move it. This allow switch to forward from diff VLANs over single link.

Go to config of router and select VLAN and enter . and name of VLAN

Router (config) # interface fastethernet 0/0

Router (config-subif) #

encapsulation dot1q 2

IP address 192.168.2.1 255.255.255.0

No

Exit

Date / /

Page _____

Result

In CLI of 192.168.1.2

~~ping~~ ping 192.168.2.3

ping from 192.168.2.3 byte = 32 time = 118ms
TTL = 128

Reply from 192.168.2.3 byte = 32 time = 1000ms TTL = 128

Packet send = 4. Received 4, lost = 0

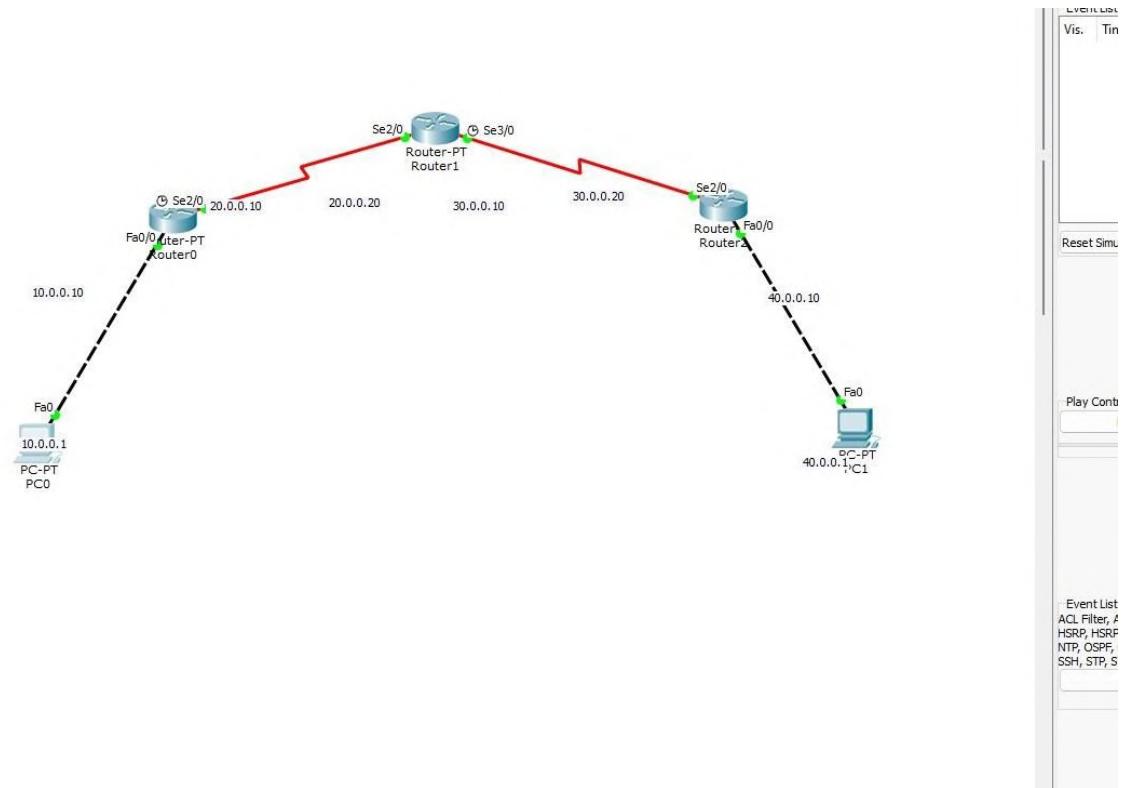
Observations

VLAN is Virtual Local Area Network, a network is divided into smaller networks.

Improve security

Experiment 10

Aim : Demonstrate the TTL/ Life of a Packet Topology :



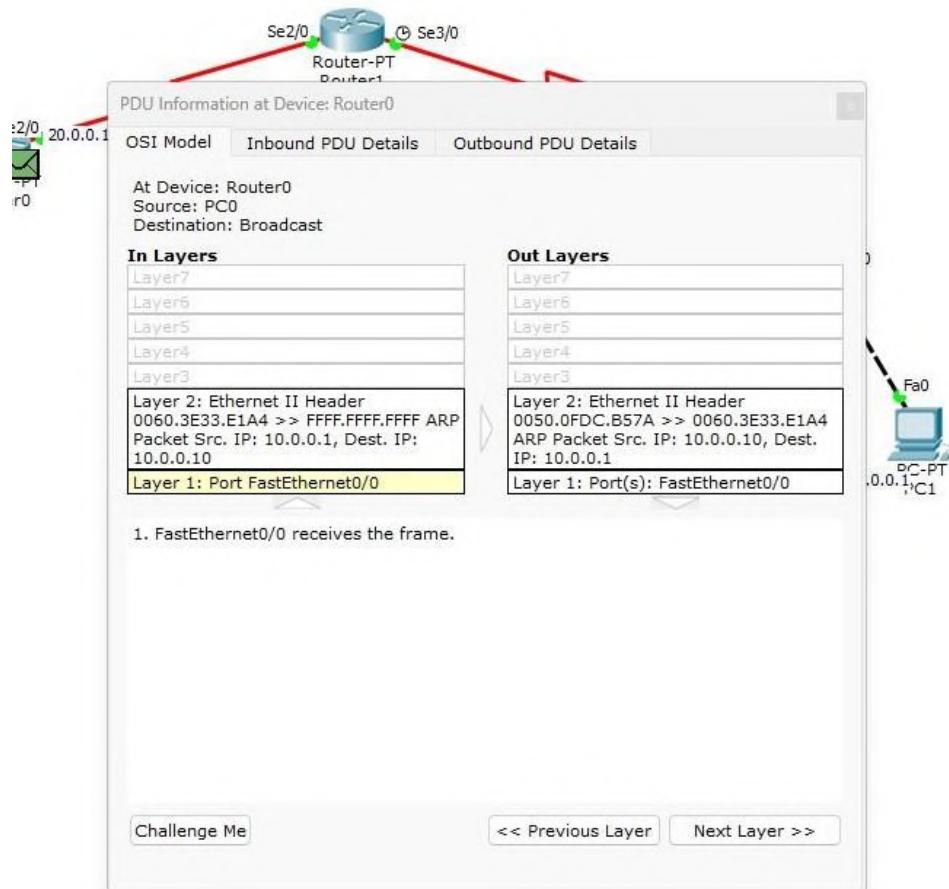
Configurations :

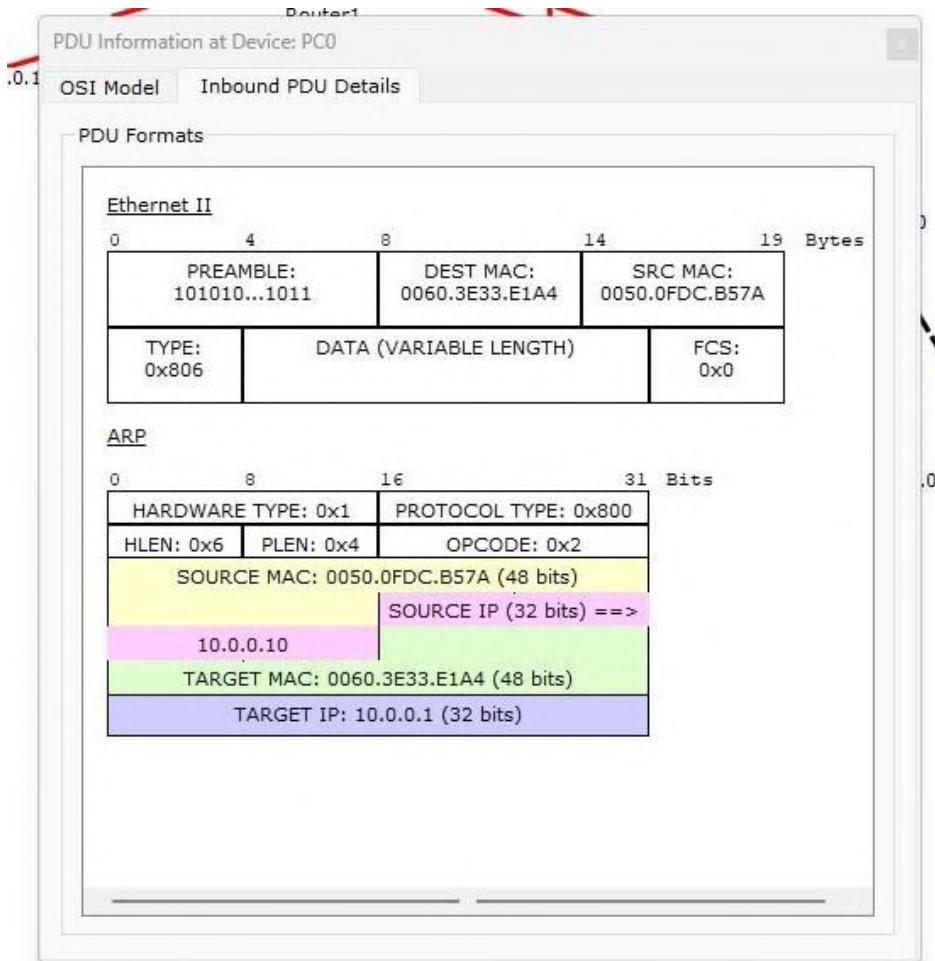
Configure the devices as per static / default / dynamic routing.

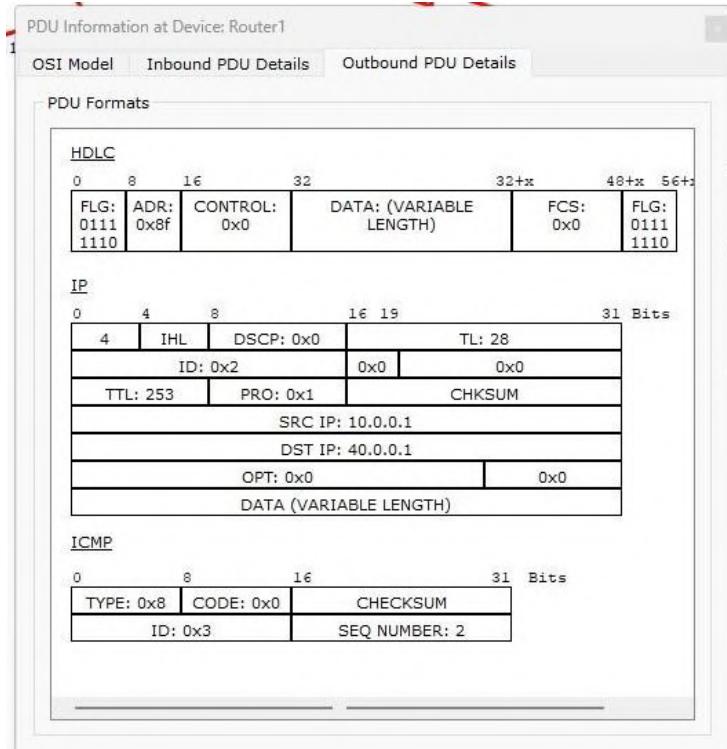
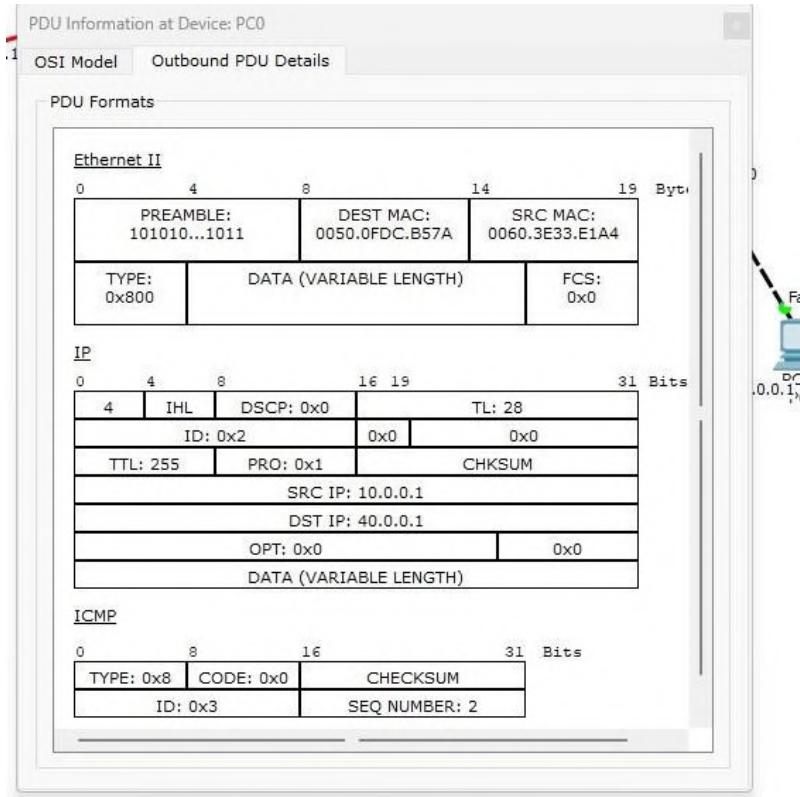
Above is done using static routing.

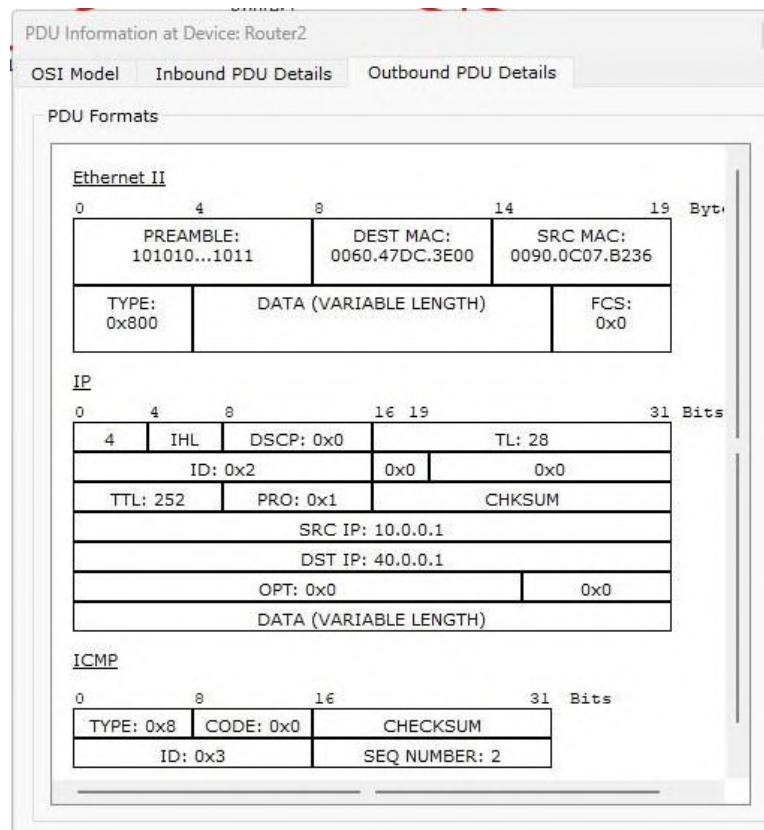
Output and PDU Details:

Simple PDU sent from PC0 to PC1 in simulation mode.



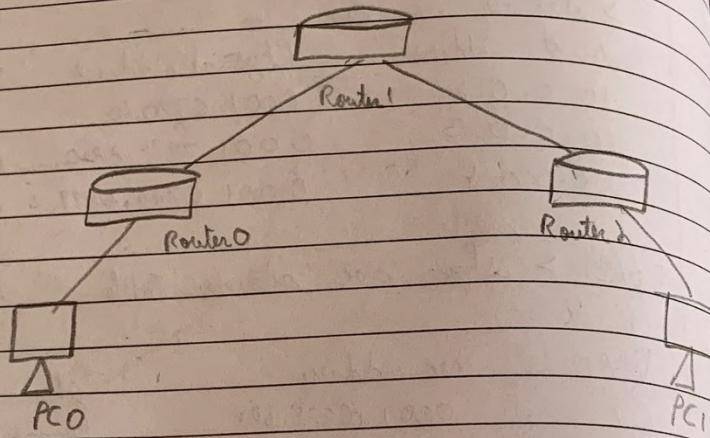






Observation :

Exp 10: Demonstrate TTL



Connect three routers and 2 PC's according to Topology.

Configure the router as static, go to simulation mode and run a sample PDU from PC 0 to PC 1. And use Capture.

Result	0	4	8	16	32
	4			TL: 2F	
				0x0 0x0	
TTL: 252		Px0:0x1		CHECKSUM	

SRC IP : 10.0.0.1
 DST IP : 40.0.0.1

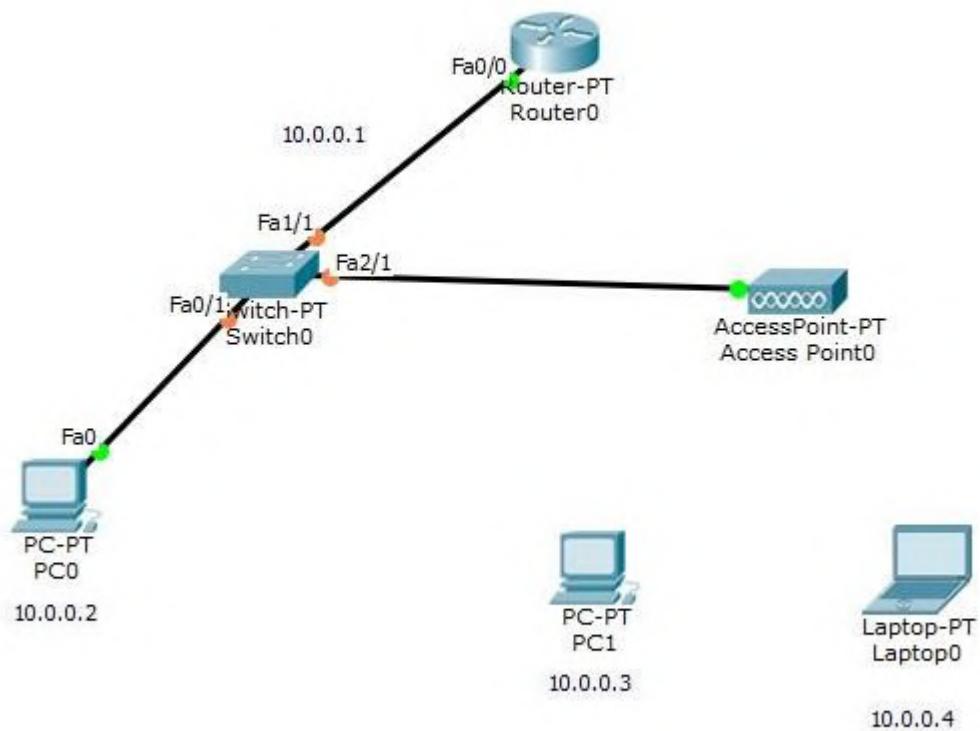
0 PT: 0x0	0x0
-----------	-----

DATA

Experiment 11

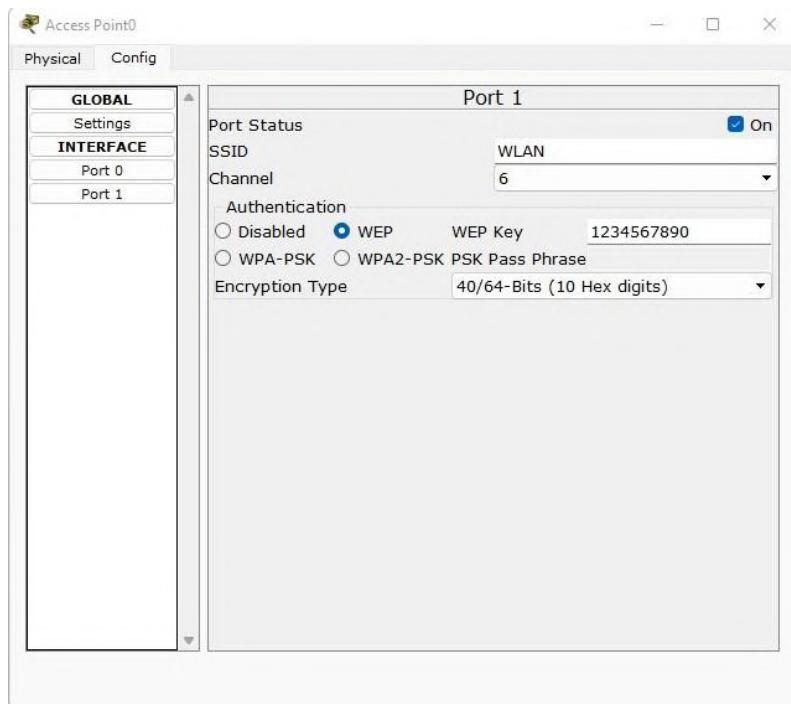
Aim : To construct a WLAN and make the nodes communicate wirelessly

Topology :

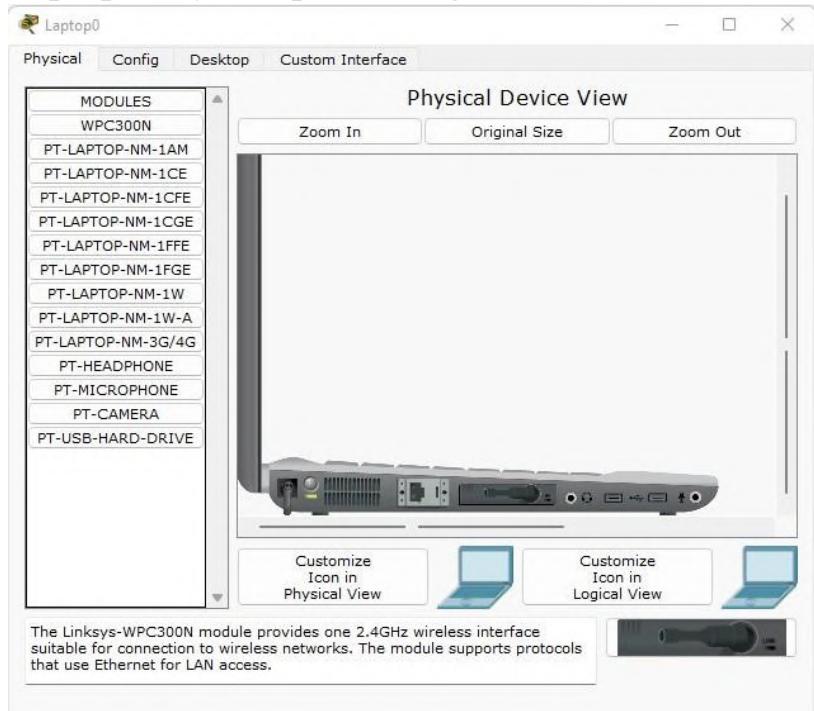


Configurations:

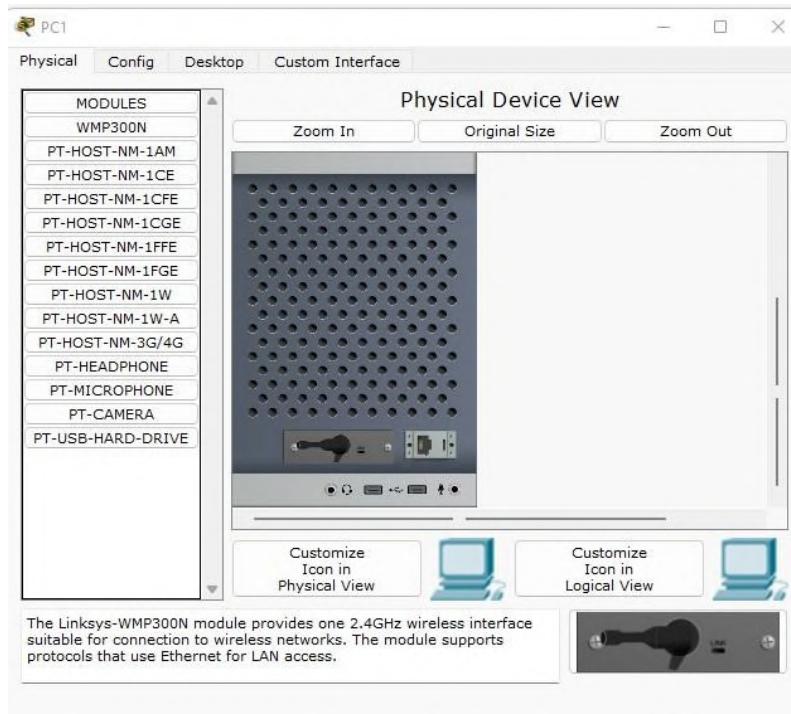
Access Point0:



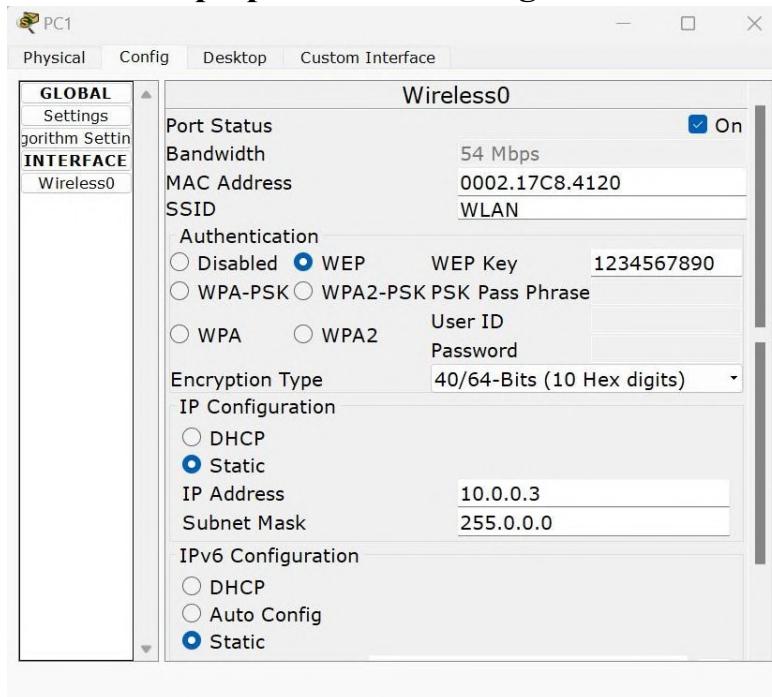
Laptop0 Physical port change:



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)
```

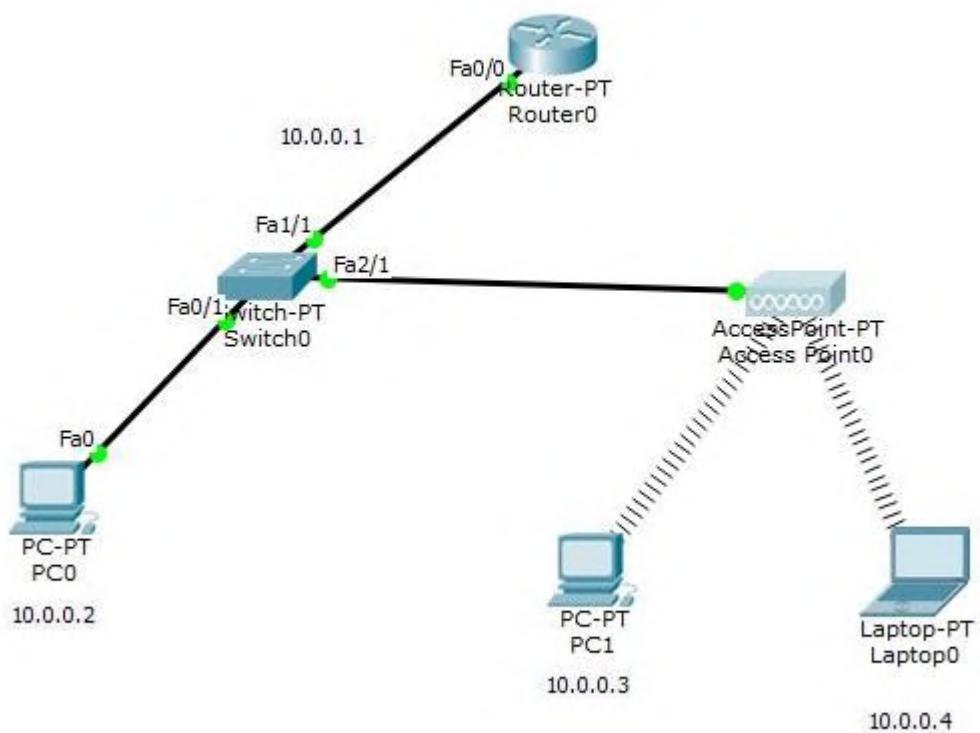
```
--- System Configuration Dialog ---
```

```
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
```

Final Topology:



Ping Output :

PC0 to Laptop0 :

PC0

Physical Config Desktop Custom Interface

Command Prompt

```
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.4

Pinging 10.0.0.4 with 32 bytes of data:

Reply from 10.0.0.4: bytes=32 time=24ms TTL=128
Reply from 10.0.0.4: bytes=32 time=15ms TTL=128
Reply from 10.0.0.4: bytes=32 time=5ms TTL=128
Reply from 10.0.0.4: bytes=32 time=12ms TTL=128

Ping statistics for 10.0.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 5ms, Maximum = 24ms, Average = 14ms

PC>
```

PC1 to Laptop0 :

The screenshot shows a window titled "Command Prompt" within a "PC1" interface in Packet Tracer. The window displays the following command-line session:

```
Packet Tracer PC Command Line 1.0
PC>
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.4

Pinging 10.0.0.4 with 32 bytes of data:

Reply from 10.0.0.4: bytes=32 time=36ms TTL=128
Reply from 10.0.0.4: bytes=32 time=14ms TTL=128
Reply from 10.0.0.4: bytes=32 time=16ms TTL=128
Reply from 10.0.0.4: bytes=32 time=12ms TTL=128

Ping statistics for 10.0.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 12ms, Maximum = 36ms, Average = 19ms

PC>
```

Laptop0 to PC0:

Laptop0

Physical Config Desktop Custom Interface

Command Prompt

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

Pinging 10.0.0.2 with 32 bytes of data:

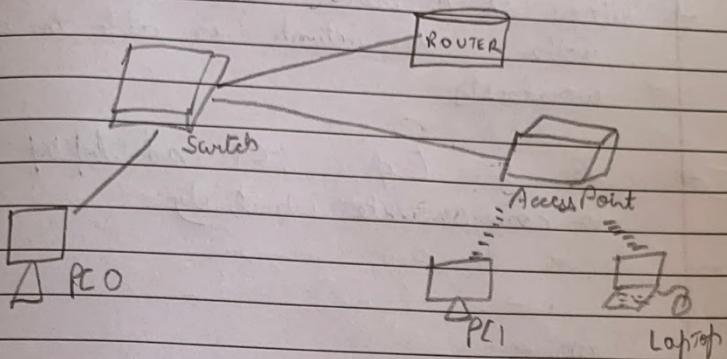
Reply from 10.0.0.2: bytes=32 time=10ms TTL=128
Reply from 10.0.0.2: bytes=32 time=10ms TTL=128
Reply from 10.0.0.2: bytes=32 time=10ms TTL=128
Reply from 10.0.0.2: bytes=32 time=16ms TTL=128

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 10ms, Maximum = 16ms, Average = 11ms

PC>
```

Observation :

Exp II: Construct WLAN



Procedure

Place the router, switch, access point
as shown

Config the Router to IP 192.0.0.1
and set IP ad create any to PC0

Switch off PC1 and Laptop and replace Eth0 port with wireless, then turn them on and select WEP to config them wirelessly.

Configure according to appropriate
IP ad gateway.

Result

PC> ping 192.0.0.4

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

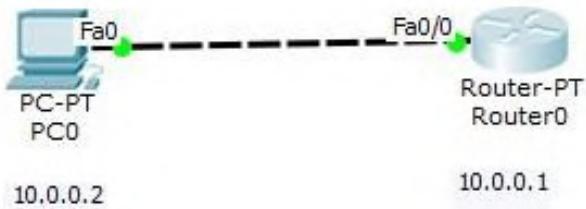
Observation

- WLAN is a local network where devices within the network are able to communicate wirelessly.
- In given Exp., PCI and laptop are able to communicate wirelessly.

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:

Router0

Physical Config CLI

IOS Command Line Interface

```
Router>en
Router#cong t
^
* Invalid input detected at '^' marker.

Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname rl
rl(config)#enable secret pl
rl(config)#interface fa0/0
rl(config-if)#ip address 10.0.0.1 255.0.0.0
rl(config-if)#no shut

rl(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

rl(config-if)#line vty 0 5
rl(config-line)#login
* Login disabled on line 132, until 'password' is set
* Login disabled on line 133, until 'password' is set
* Login disabled on line 134, until 'password' is set
* Login disabled on line 135, until 'password' is set
* Login disabled on line 136, until 'password' is set
* Login disabled on line 137, until 'password' is set
rl(config-line)#password p0
rl(config-line)#
rl(config-line)#exit
rl(config)#exit
rl#
*SYS-5-CONFIG_I: Configured from console by console

rl#wr
Building configuration...
[OK]
rl#
```

Copy Paste

Ping Output:

PC0 to Router:

PC0

Physical Config Desktop Custom Interface

Command Prompt

```
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data:

Reply from 10.0.0.1: bytes=32 time=1ms TTL=255
Reply from 10.0.0.1: bytes=32 time=0ms TTL=255
Reply from 10.0.0.1: bytes=32 time=0ms TTL=255
Reply from 10.0.0.1: bytes=32 time=3ms TTL=255

Ping statistics for 10.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 3ms, Average = 1ms
```

PC0

Physical Config Desktop Custom Interface

Command Prompt

```
Ping statistics for 10.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 3ms, Average = 1ms

PC>telnet 10.0.0.1
Trying 10.0.0.1 ...Open

User Access Verification

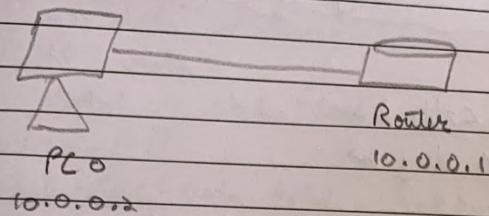
Password:
Password:
rl>en
Password:
rl#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - B
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS i
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
rl#
```

Observation :

Experiment 12: TELNET



Place PC and router and connect them
 Configure the Router.
 Then Ping the Router from the PC

Result

PC > # Telnet 10.0.0.1

Trying 10.0.0.1 -- open

User Access Verification

Password: PO

r> enable

password: PI

m #

Observation

Using TELNET, we are able to run commands in
 PC or would be run in routerCLI. If we
 type show IP route in PC - CLI, we will see
 routes in response in the command.

Cycle - 2

Experiment 13

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

Date / /
Page / /

AIM: program for error detecting code
using CRC CCITT (16 bits)

```
#include <iostream.h>
```

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

```
binary XOR ( 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';  
}
```

```
calculate CRC (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 j=0; j<length; j++) {
```

```
            for (int k=0; k<8; k++) {
```

```
                char msb = crc[0];
```

```
                for (int l=0; l<16; l++) {
```

```
                    crc[l] = crc[l+1];
```

```
                    crc[15] = '0';
```

```
                    if (msb == '1') {
```

```
                        char temp[17];
```

```
                        binary XOR (temp, crc, "100000000100001");
```

```
CRC_POLY is binary strcpy (crc, temp);
```

```
}
```

```
}
```

```
        crc[15] = (data[i] == '1') ? '1' : '0';
```

```
}
```

```
strcpy (checksum, crc);
```

```
}
```

```
de
Date ___/___
Page ___
```

```
void main() {
    char data[100];
    if ("Enter data in binary : ")
        sf ("%s", data);
    int data1 = strbin(data),
        checksum[17];
    calculateCRC(data, data1, checksum);
    if ("calculated CRC: "r, checksum);
    receivedChecksum[17];
    if ("Enter received CRC: ")
        sf ("%s", receivedChecksum);
    if (stricmp(receivedChecksum, checksum) == 0)
        pf ("Data is error free \n");
    else
        pf ("Data has errors \n");
}
```

O/P

Enter data in Binary: 11001010111001001
Calculated CRC: 1110100101110001
enter received CRC: 1110100101110001
Data is error free.

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("%os",
receivedChecksum);

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

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

```

Output :

```

C:\ "C:\Users\HP\Desktop\BMSCI" X + ▾
Enter data in binary: 11001010111001001
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.

Date _____
Page _____

AIM: Program for congestion control using
Leaky Bucket Algorithm

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

```
Void main () {
```

```
int psize, bsize, outgoing, emptyspace, choice;
```

```
if (" enter the bucket size = ")
```

```
sf ("%d", &bsize);
```

```
if (" enter outgoing rate = ")
```

```
sf ("%d", &outgoing);
```

```
while (1) {
```

```
if (" enter packet size = ")
```

```
sf ("%d", &psize);
```

```
If (psize < bsize && psize <= emptyspace) {
```

```
emptyspace = emptyspace - psize;
```

```
pf ("The packet of size %d is added and in the  
bucket (%d, psize);
```

```
empty space += outgoing;
```

```
}
```

```
else {
```

```
if (" packet of size %d is dropped due to lack of space  
in the bucket (%d);") {
```

```
if ("1 to continue or 0 to stop");
```

```
sf ("%d", &ch);
```

```
If (ch == 0)
```

```
break;
```

```
}
```

```
}
```

QFPenter bucket size = ~~5000~~ 15enter ~~size~~ bucket capacity : 10

new packet size : 2>

new packet cannot be added to bucket
bucket capacity after op: 5

enter packet size : 0

bucket capacity : 5

bucket capacity after output : 0

new packet size : 0

bucket capacity after output : 5

// program ends

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 :

```
ESC "C:\Users\HP\Downloads\Bur" X + ▾  
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.

Date / /
Page / /

AIM: Using TCP/IP socket, write client server program to make client sending file name and the server to send back the contents of the requested file if present

Server TCP.py:

```
from socket import *  
serverName = "127.0.0.1"  
serverPort = 12000  
serverSocket = socket(AF_INET, SOCK_STREAM)  
serverSocket.bind((serverName, serverPort))  
serverSocket.listen()  
while True:  
    print("Server is ready to receive")  
    connectionSocket, addr = serverSocket.accept()  
    sentence = connectionSocket.recv(1024).decode()  
    file = open(sentence, "r")  
    l = file.read(1024)  
    connectionSocket.send(l.encode())  
    print('I m Sent content of + sentence')  
    file.close()  
    connectionSocket.close()
```

Client TCP.py:

```
from socket import *  
serverName = '127.0.0.1'  
serverPort = 12000  
clientSocket = socket(AF_INET, SOCK_STREAM)  
clientSocket.connect((serverName, serverPort))  
sentence = input("I m Enter file Name: ")  
clientSocket.send(sentence.encode())  
filecontents = clientSocket.recv(1024).decode()  
print("I m From Server: " + filecontents)  
clientSocket.close()
```

Date / /

Page _____

O/P

server Instance

The server is ready to receive
Sent contents of Server TCP.py
The server is ready to receive

Client Instance

enter the filename: Server TCP.py
from server:

connectionSocket.close()

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:

The screenshot shows a Python IDLE Shell window titled "IDLE Shell 3.11.2". The shell displays the following text:

```
Python 3.11.2 (tags/v3.11.2:878ead1, Feb 7 2023, 16:38:35) [MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>> ===== RESTART: F:/CN/cycle2/ServerTCP.py =====
The server is ready to receive
Sent contents of ServerTCP.py
The server is ready to receive
```

Client instance:

The screenshot shows a Python IDLE Shell window titled "IDLE Shell 3.11.2". The shell displays the following text:

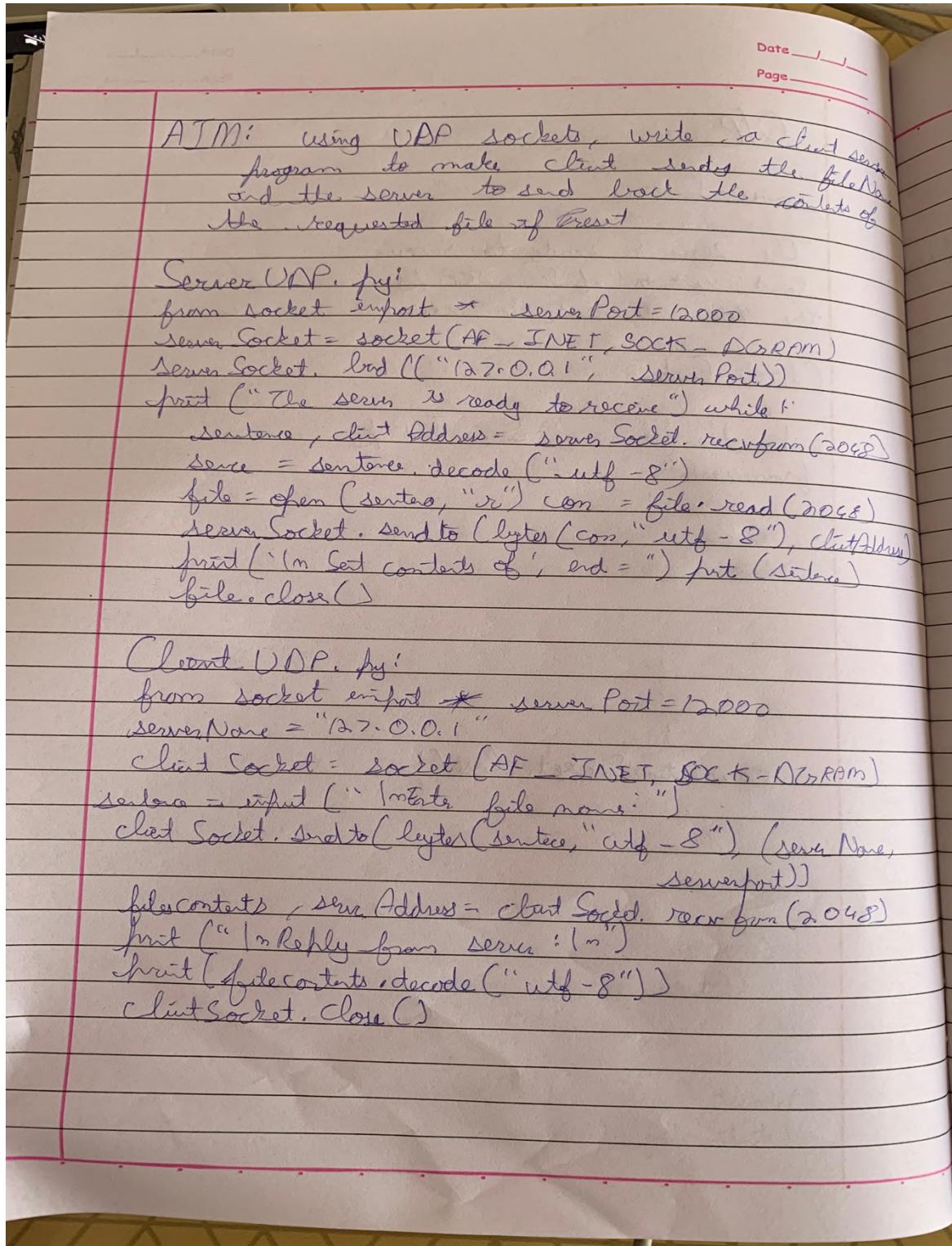
```
Python 3.11.2 (tags/v3.11.2:878ead1, Feb 7 2023, 16:38:35) [MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>> ===== RESTART: F:/CN/cycle2/ClientTCP.py =====
Enter the file name: ServerTCP.py
From sever:
from socket import *
serverName="127.0.0.1"
serverPort = 12000
serverSocket=socket(AF_INET, SOCK_STREAM)
serverSocket.bind((serverName,serverPort))
serverSocket.listen(1)
while 1:
    print("The server is ready to receive ")
    connectionSocket,addr=serverSocket.accept()
    sentence = connectionSocket.recv(1024).decode()

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

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

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.



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O/P

Server Instance:

The server is ready to receive
Sent contents of Server UDP.py
The server is ready to receive

Client Instance:

After the filename: SERVER UDP.py
from socket import *

file.close()

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 :

```
Python 3.6.7 Shell*
File Edit Shell Debug Options Window Help
Python 3.6.7 (v3.6.7:6ec5cf24b7, Oct 20 2018, 13:35:33) [MSC v.1900 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information
>>>
===== RESTART: D:\AUG_DEC 2021\CN\LAB\cycle 3\ServerUDP.py ====
The server is ready to receive

Sent contents of ServerUDP.py
The server is ready to receive
```

Client instance :

```
Python 3.6.7 Shell*
File Edit Shell Debug Options Window Help
Python 3.6.7 (v3.6.7:6ec5cf24b7, Oct 20 2018, 13:35:33) [MSC v.1900 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: D:\AUG_DEC 2021\CN\LAB\cycle 3\ClientUDP.py =====

Enter file name: ServerUDP.py

Reply from Server:

from socket import *
serverPort = 12000
serverSocket = socket(AF_INET, SOCK_DGRAM)
serverSocket.bind(("127.0.0.1", serverPort))

while 1:
    print ("The server is ready to receive")
    sentence, clientAddress = serverSocket.recvfrom(2048)
    sentence = sentence.decode("utf-8")
    file=open(sentence,"r")
    l=file.read(2048)

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

    print ('\nSent contents of ', end = ' ')
    print (sentence)
    # for i in sentence:
    #     print (str(i), end = '')
    file.close()

>>>
```

Experiment 17

Aim : Tool Exploration -Wireshark.

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AIM: Tool Exploration - Wireshark

Wireshark is a free open-source packet analyzer. It is used for network troubleshooting, analysis, software and communication protocol development and education.

Wireshark is mainly used to capture packets of data moving through a network. It allows user to set network interface control (NIC's) into promiscuous mode to observe most traffic.

When capturing packets, Wireshark color codes packets based on protocols. It means each packet can be colored differently based on protocol. This makes the GUI more user friendly and easy to understand. To begin capturing, you must select the type of connection. Options are mostly Ethernet, loopback traffic, LAN connection, wireless WiFi. Upon double clicking one of the options, we begin to capture packets exactly through that medium.

Fields captured: packet number, source, destination, protocol, length, and type. A filter option allows user to capture specific packets based on protocol, source IP, destination IP, etc.

These filters further improve the user experience and make the application beginner friendly. We can also receive information such as checksum, source Port, destination Port, payload, port number, headers information. Upon capturing we can move the capture to step. Capturing we can use either ~~Del~~ Cut+Z or ~~ctrl~~ C button.

Captures data (Eduardo Zorzan)
3 main buttons Packet list, Packet details, packet Bytes

Packet list contains all packets captured. It includes packet no, time, source IP, dest IP, protocol, length in bytes, additional info on the packet.

Packet

detail view on selected selection of packet list and it shows more information of the packets. Some of the information is source port and dest port number, checksum and time to live.

Packet bytes displays the raw data of the selected packet in hexa decimal view. This dump contains 16 hexa decimal bytes and 16 ASCII bytes along with the data offset.

(From right)

clicking, we can display the information in bits.