

# VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.



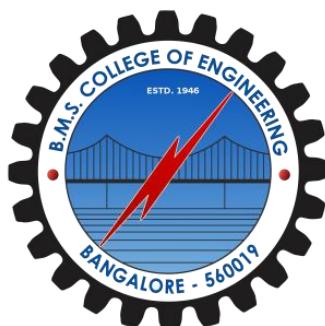
## LAB REPORT on

### Computer Networks (22CS4PCCON)

*Submitted by:*

**Samarth M Shetty (1BM21CS184)**

*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)

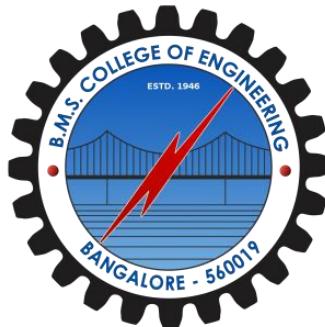
**BENGALURU-560019**

**June 2023 - August 2023**

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

(Affiliated To Visvesvaraya Technological University, Belgaum)

**Department of Computer Science and Engineering**



**CERTIFICATE**

This is to certify that the Lab work entitled “**Computer Networks**” carried out by **Samarth M Shetty (1BM21CS184)**, 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 2022-23. The Lab report has been approved as it satisfies the academic requirements in respect of **Computer Networks - (22CS4PCCON)** work prescribed for the said degree.

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# 1. Course Outcomes

**CO1:** Apply the fundamental concepts of communication in networking.

**CO2:** Analyze the various protocols, techniques in TCP/IP network architecture.

**CO3:** Develop programs that demonstrate the functionalities of physical, Data Link, Network, Transport or Application layer.

## 2. Experiments

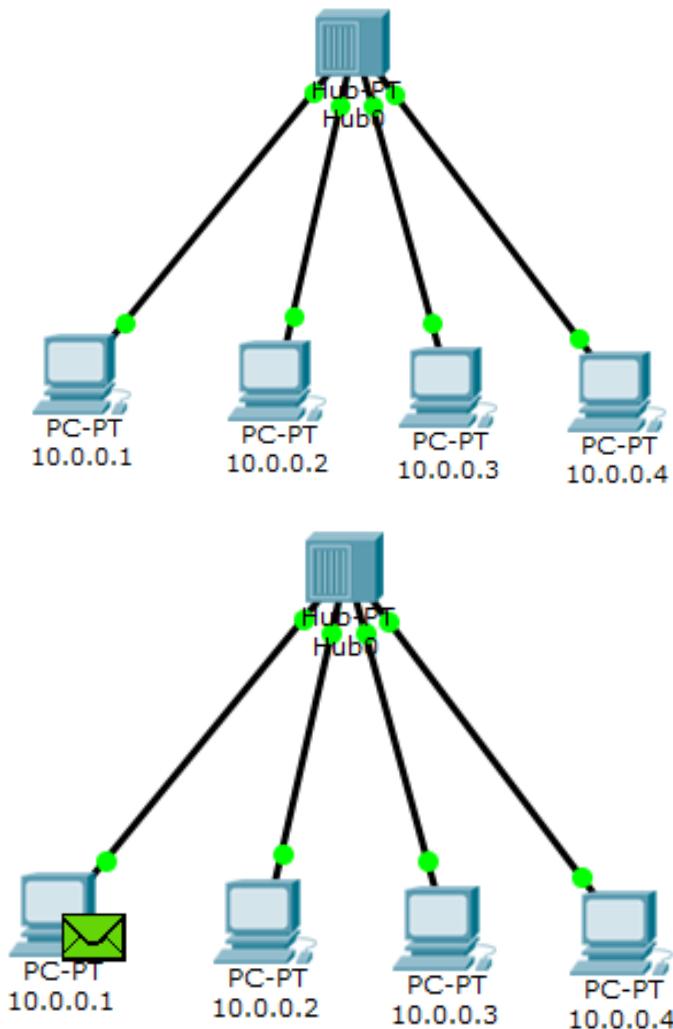
### 2.1 Experiment - 1:

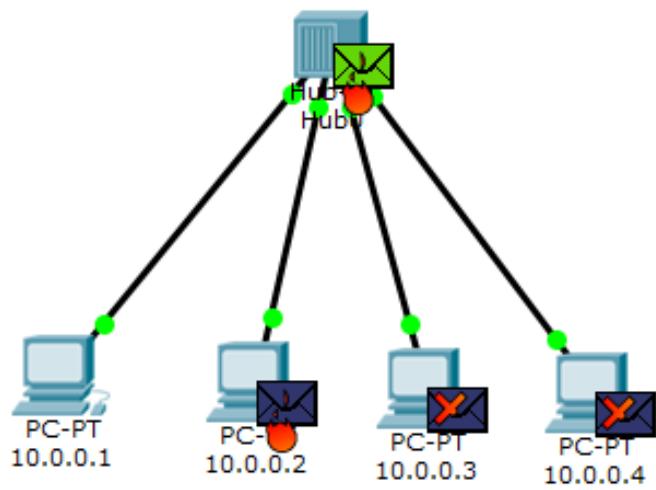
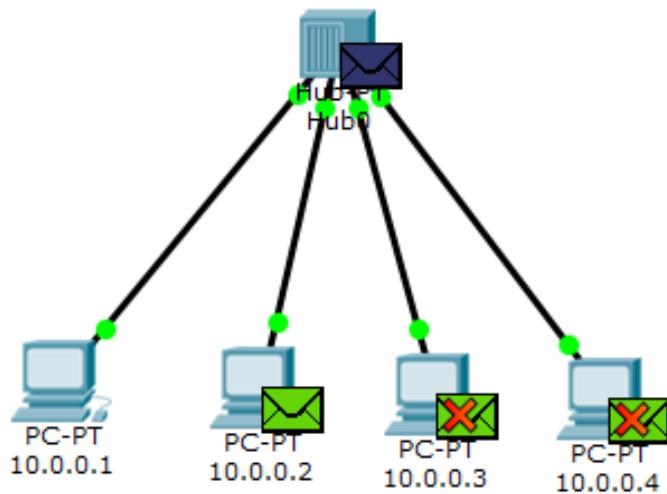
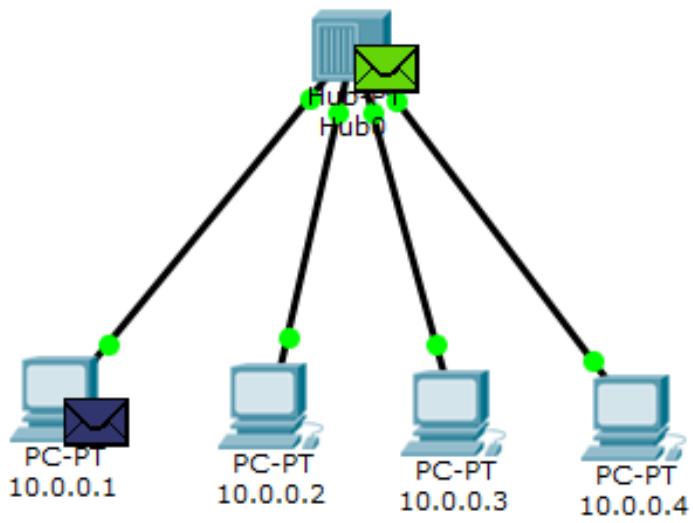
#### 2.1.1 Question:

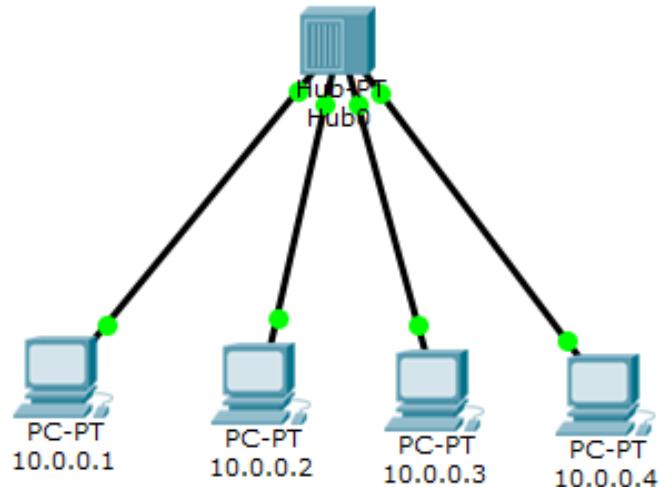
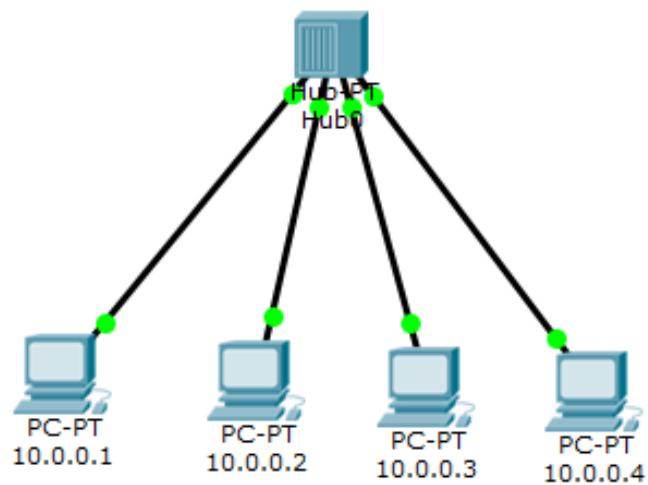
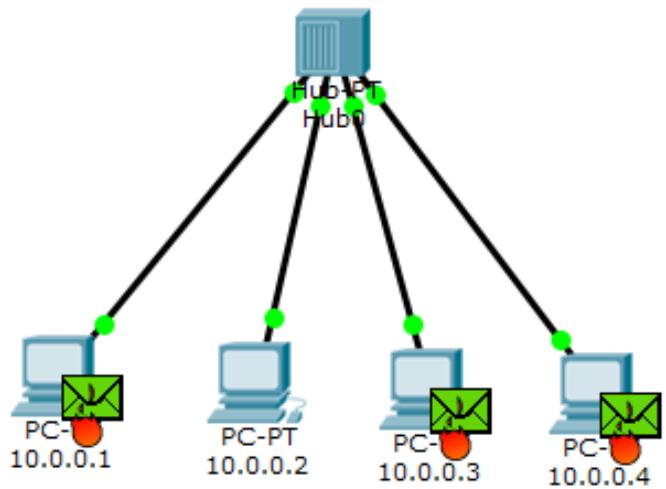
Create a topology and simulate sending a simple PDU from source to destination using hub and switch as connecting devices and demonstrate ping message.

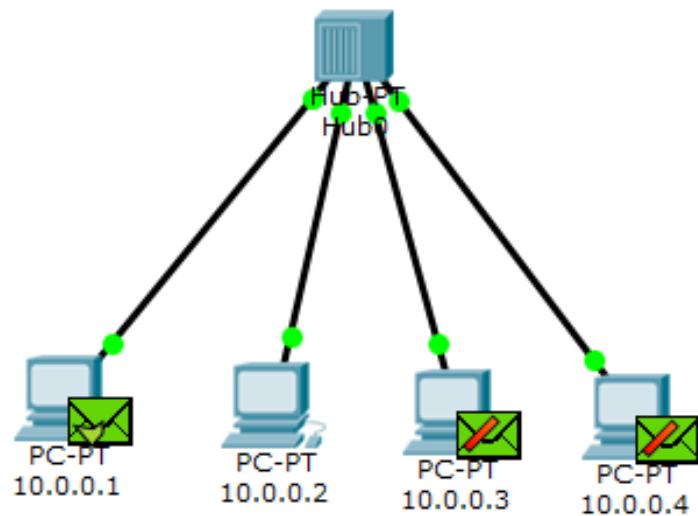
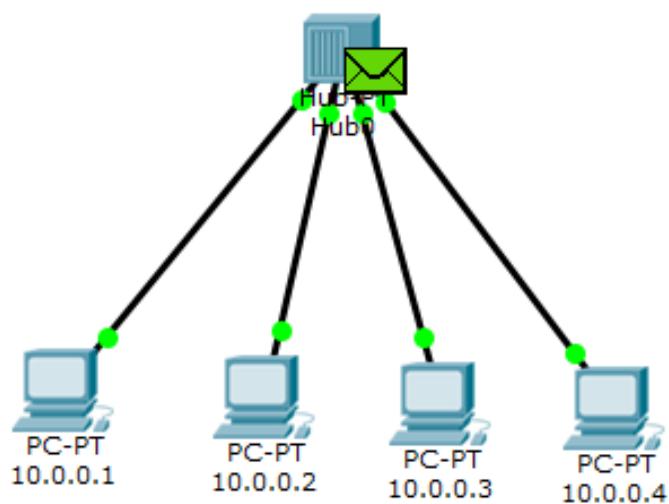
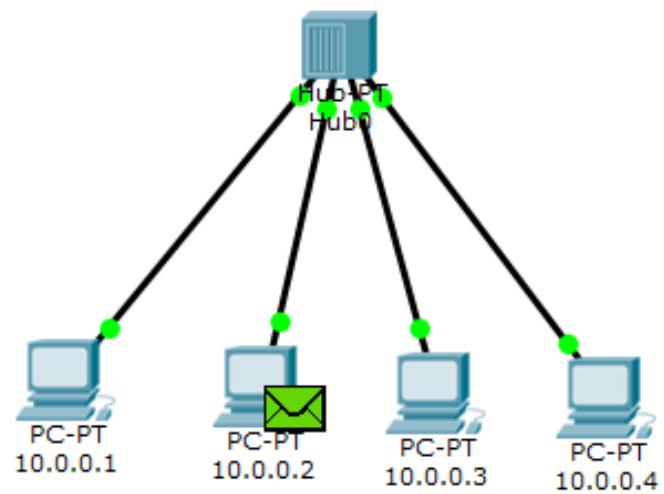
#### 2.1.2 Screenshots (Topology, Configurations & Output):

##### Topology - 1:









10.0.0.1

Physical Config Desktop Custom Interface

## Command Prompt

```
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.0

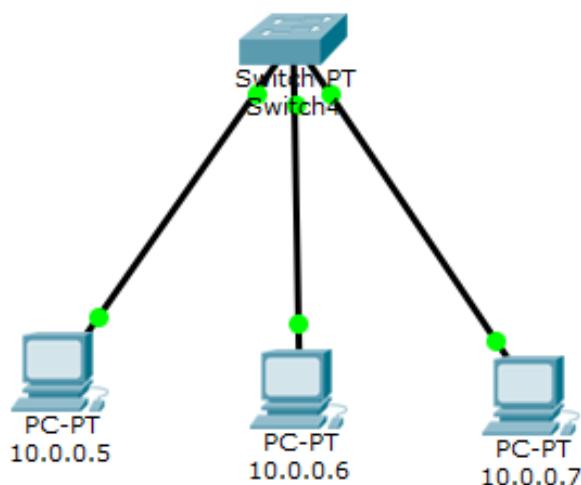
Pinging 10.0.0.0 with 32 bytes of data:

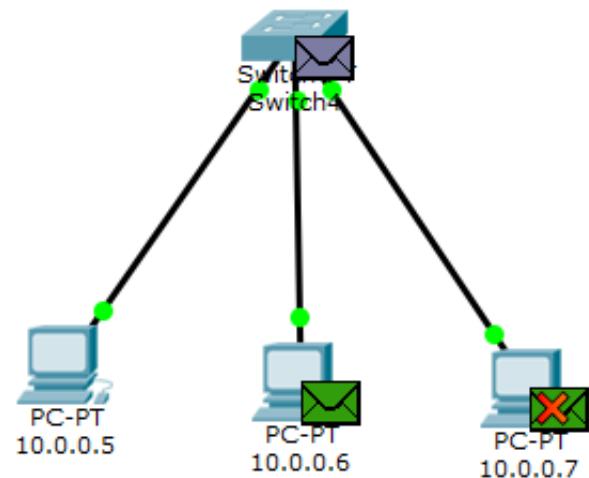
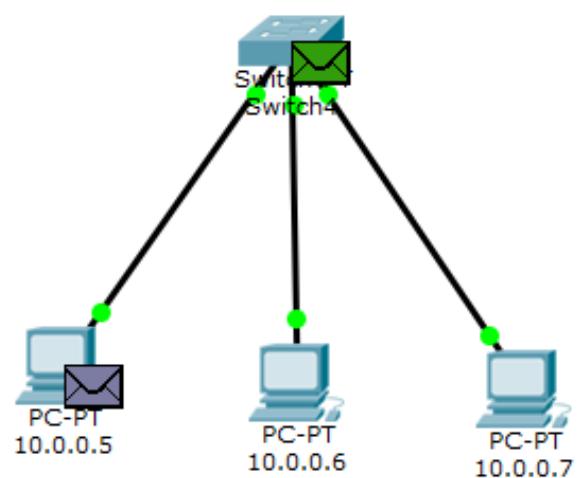
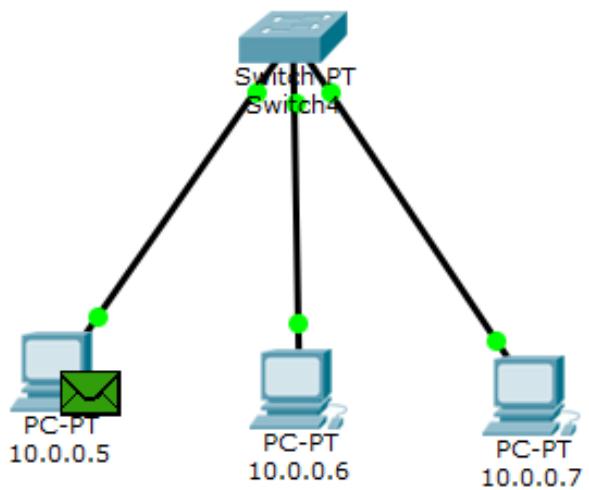
Reply from 10.0.0.4: bytes=32 time=0ms TTL=128

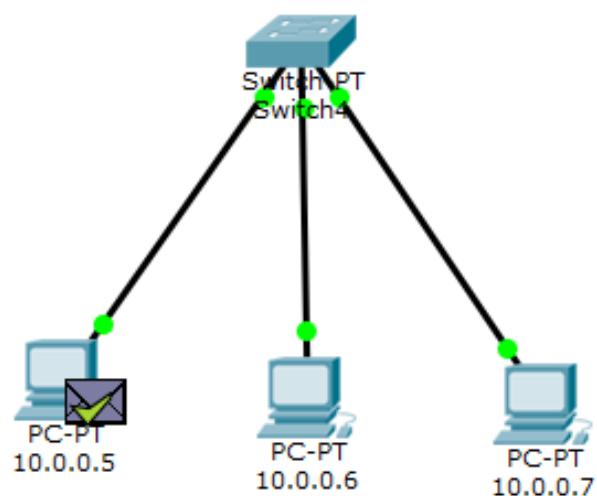
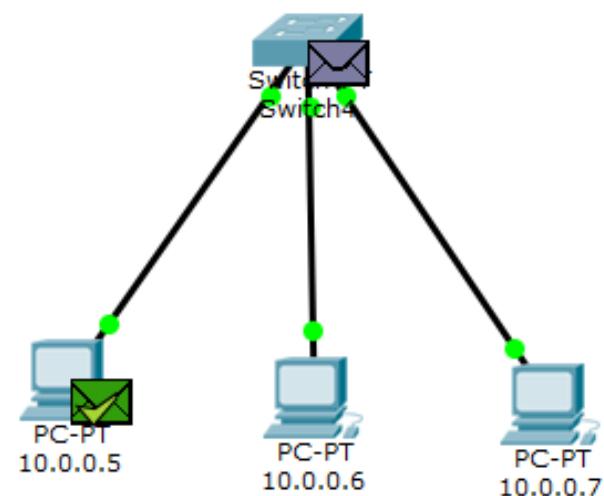
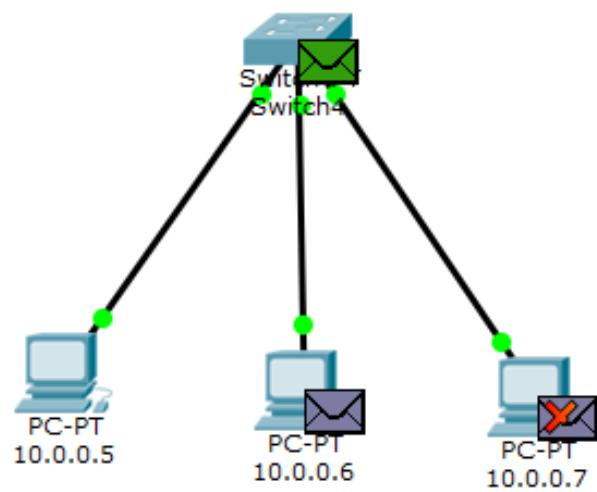
Ping statistics for 10.0.0.0:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

PC>
```

### Topology - 2:

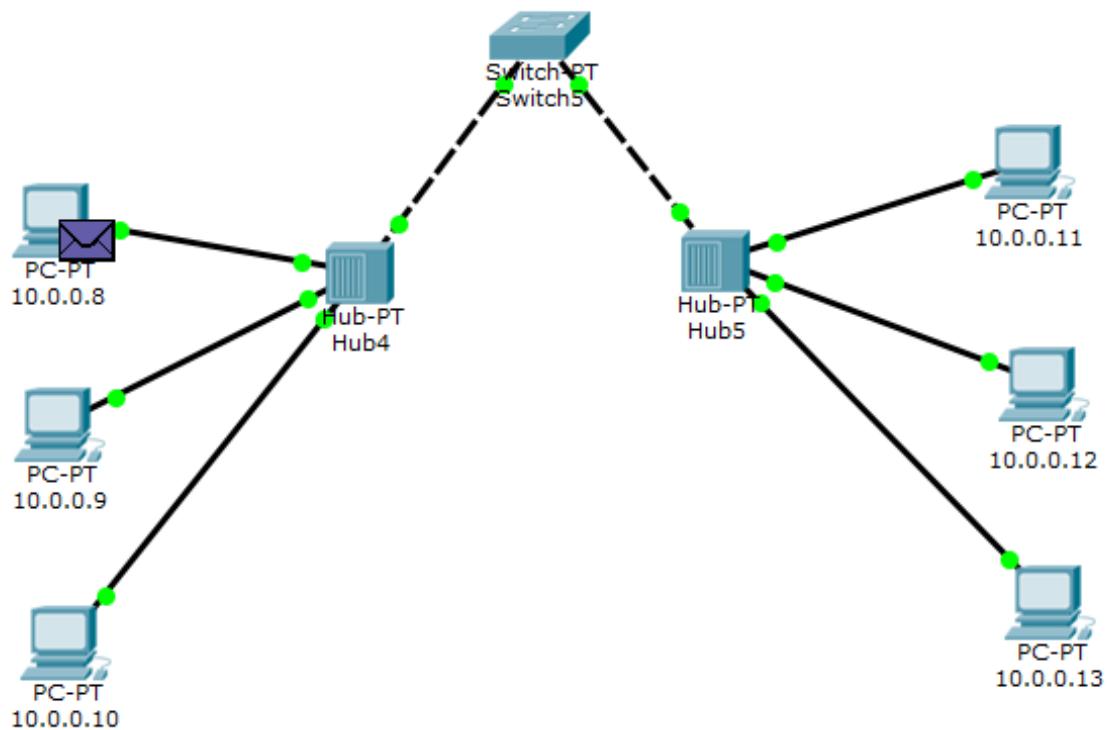
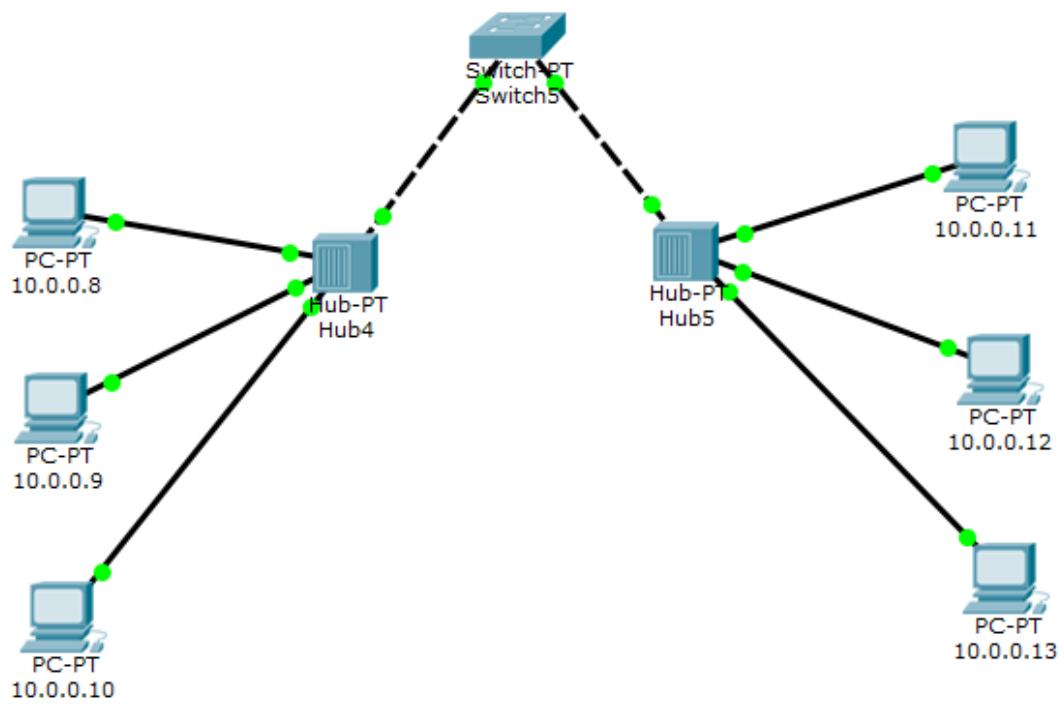


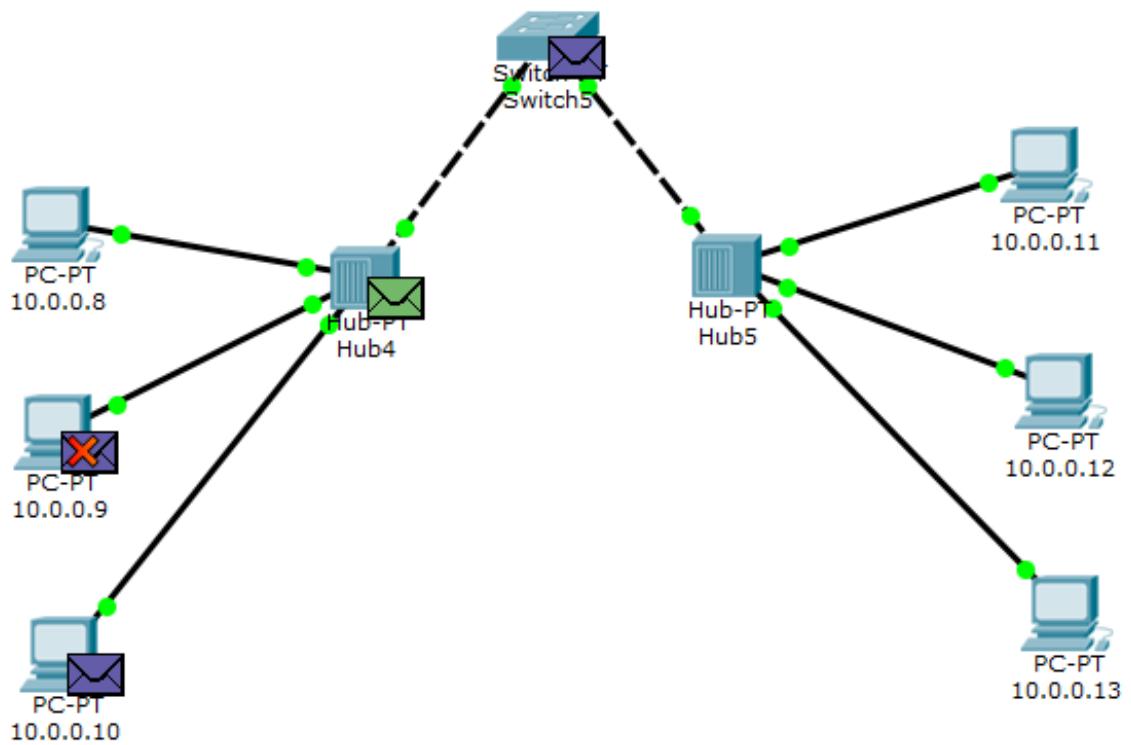
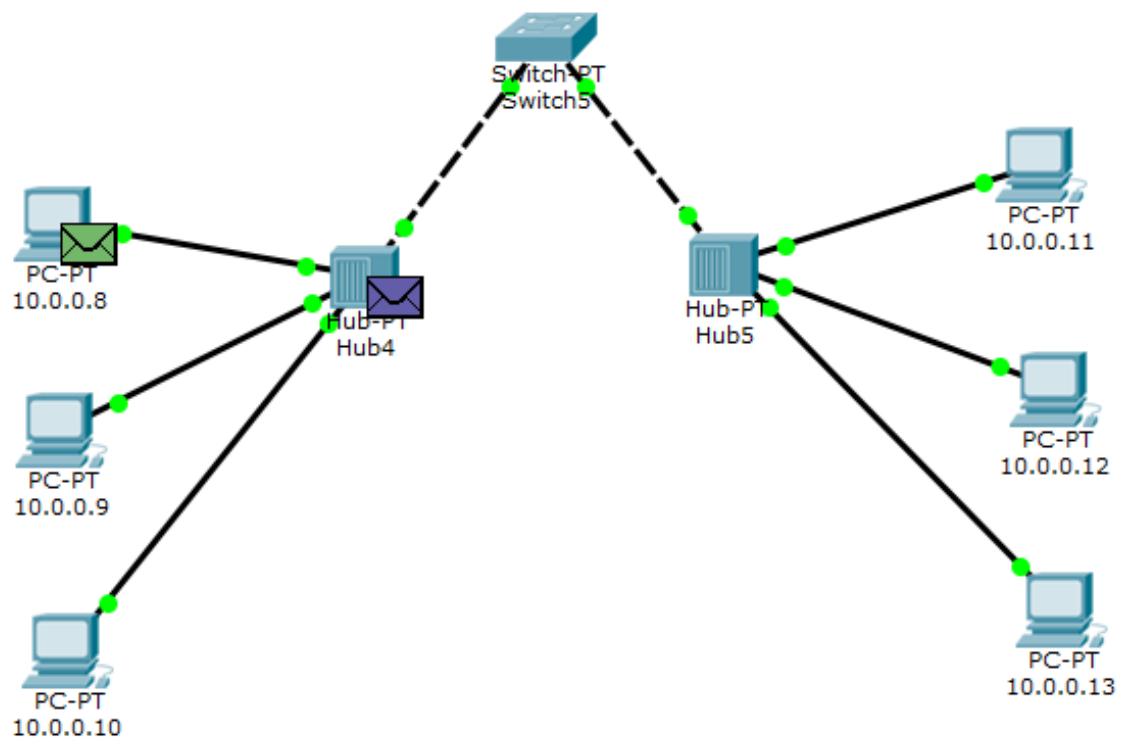


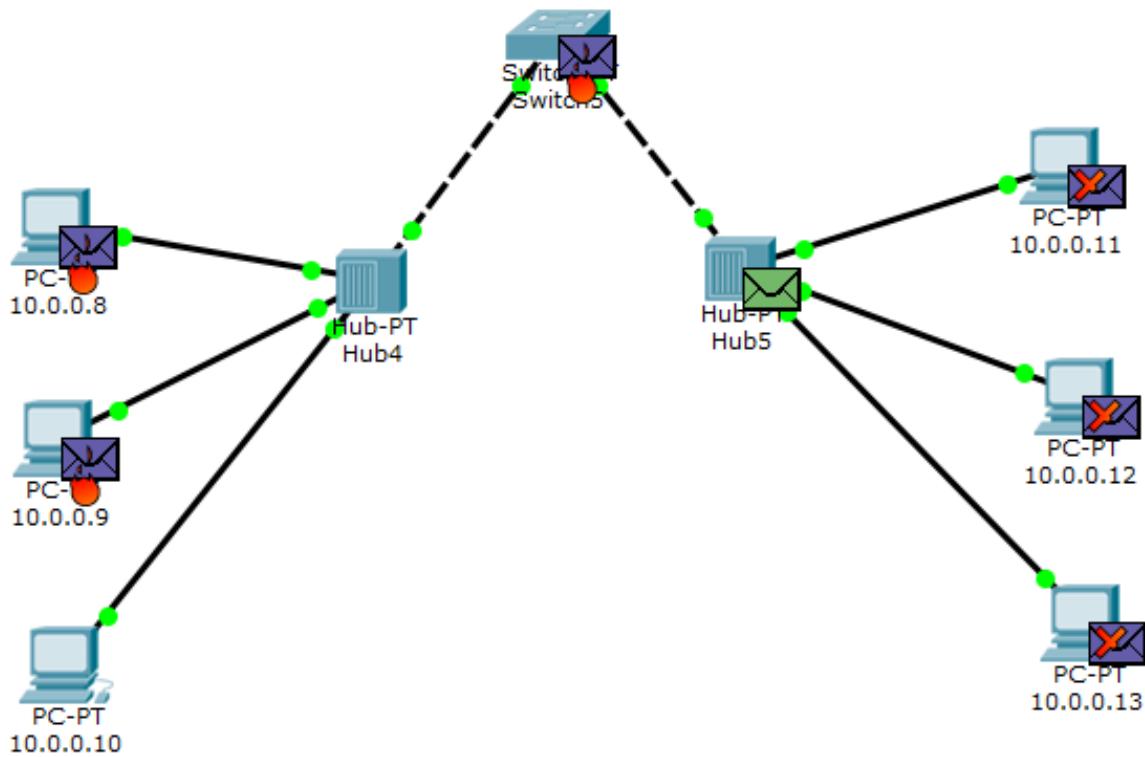
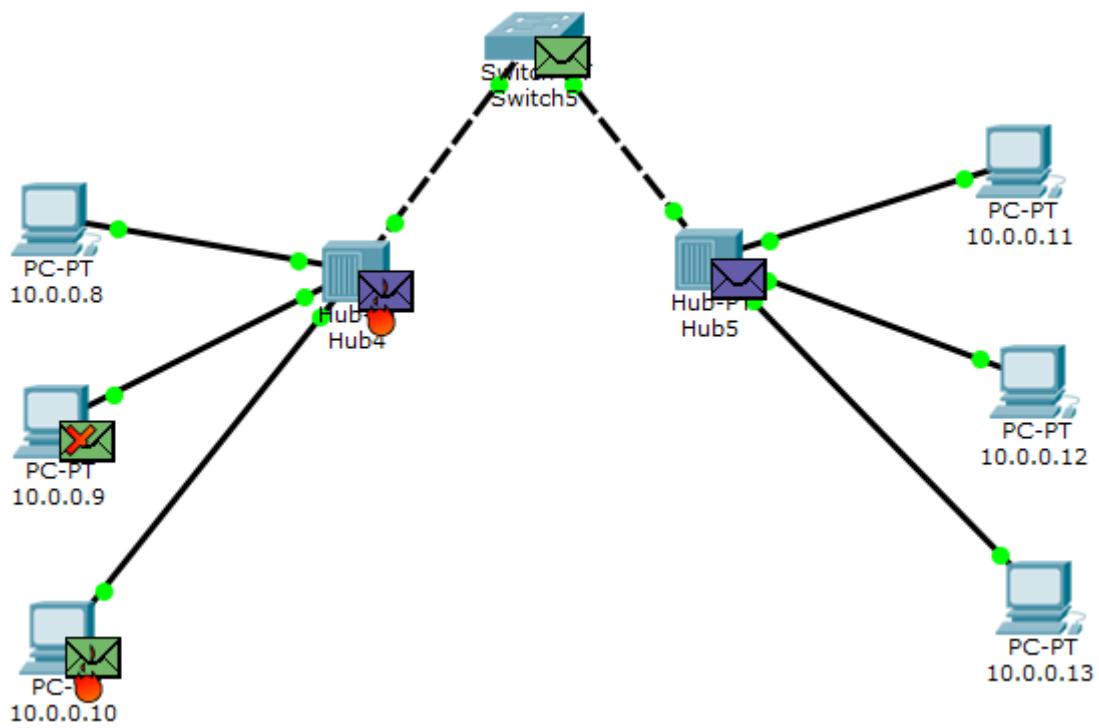


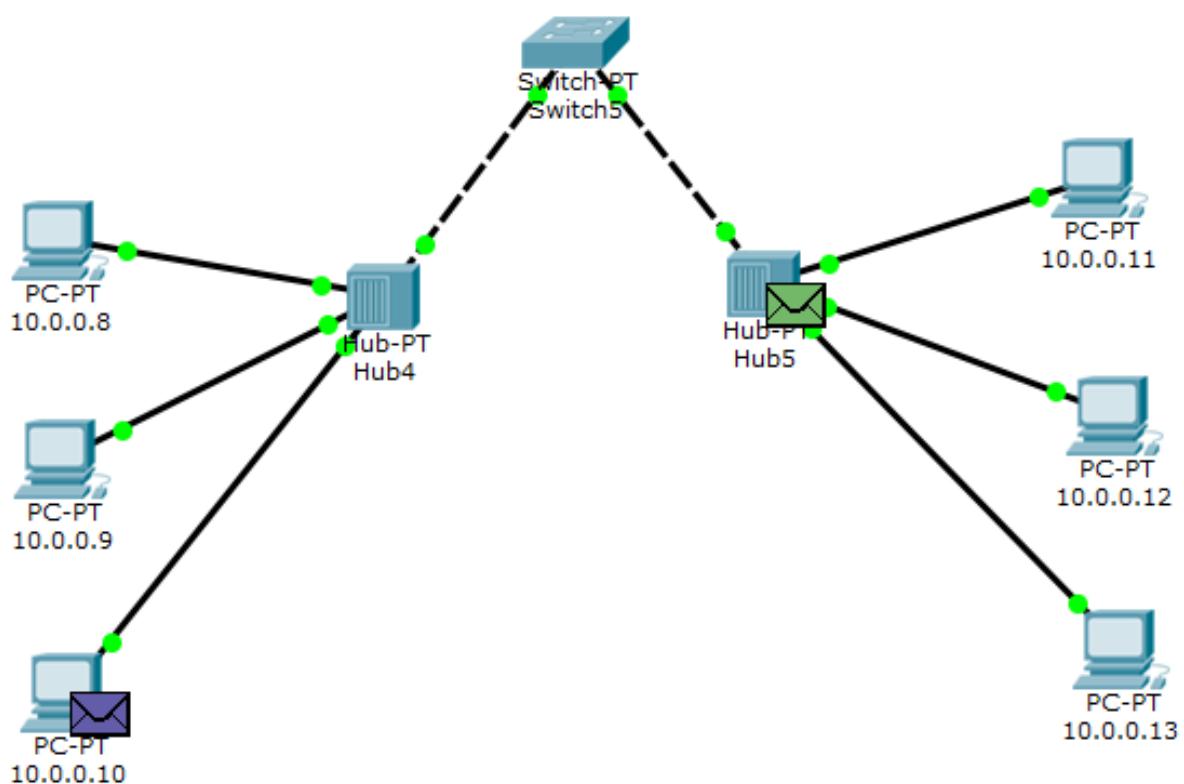
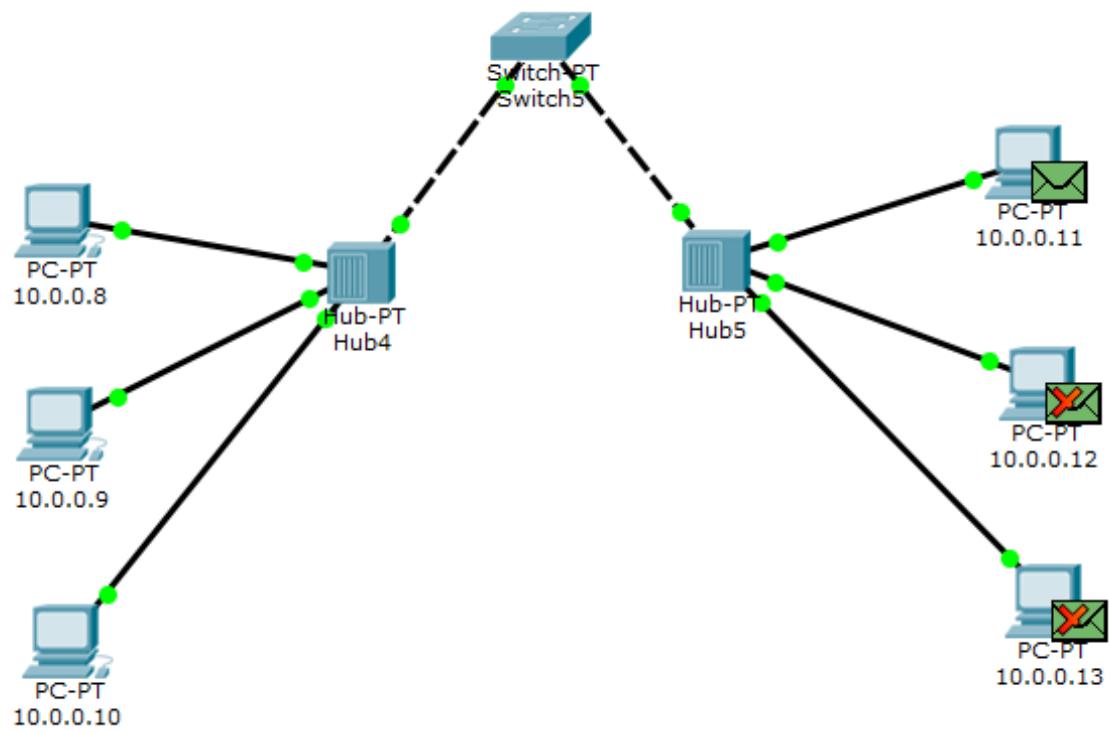
Packet Tracer PC Command Line 1.0  
PC>ping 10.0.0.6  
  
Pinging 10.0.0.6 with 32 bytes of data:  
  
Reply from 10.0.0.6: bytes=32 time=0ms TTL=128  
  
Ping statistics for 10.0.0.6:  
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
Minimum = 0ms, Maximum = 0ms, Average = 0ms  
  
PC>

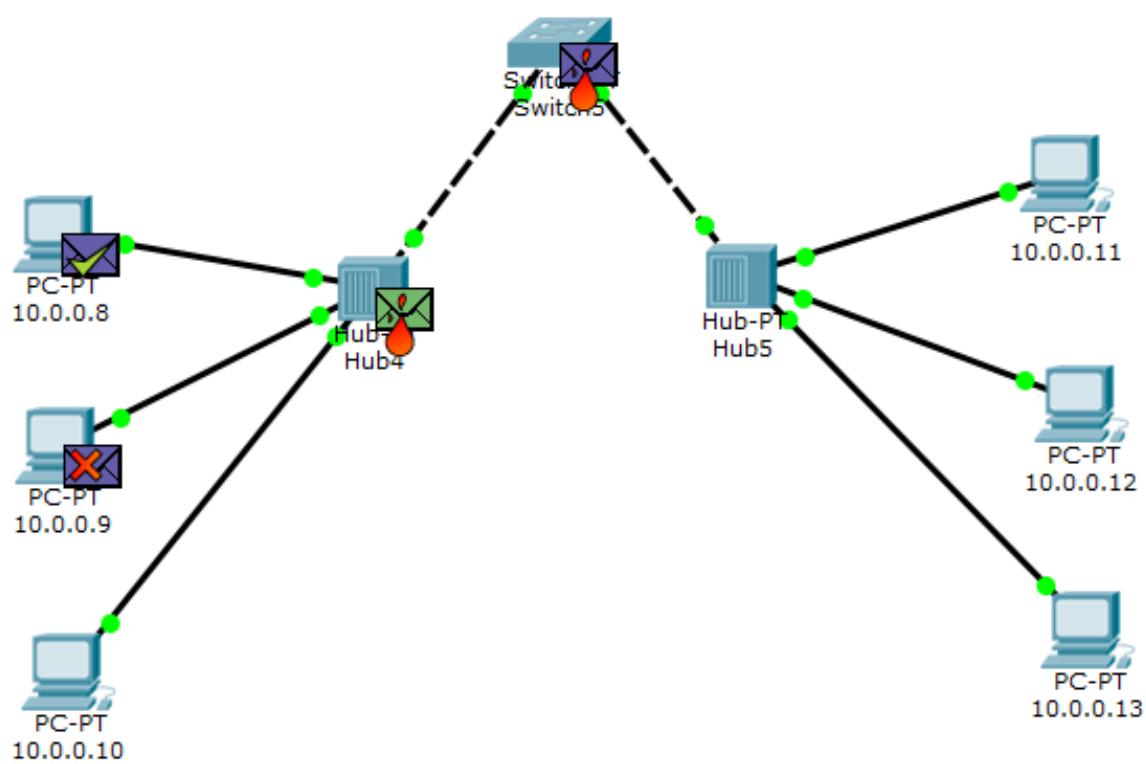
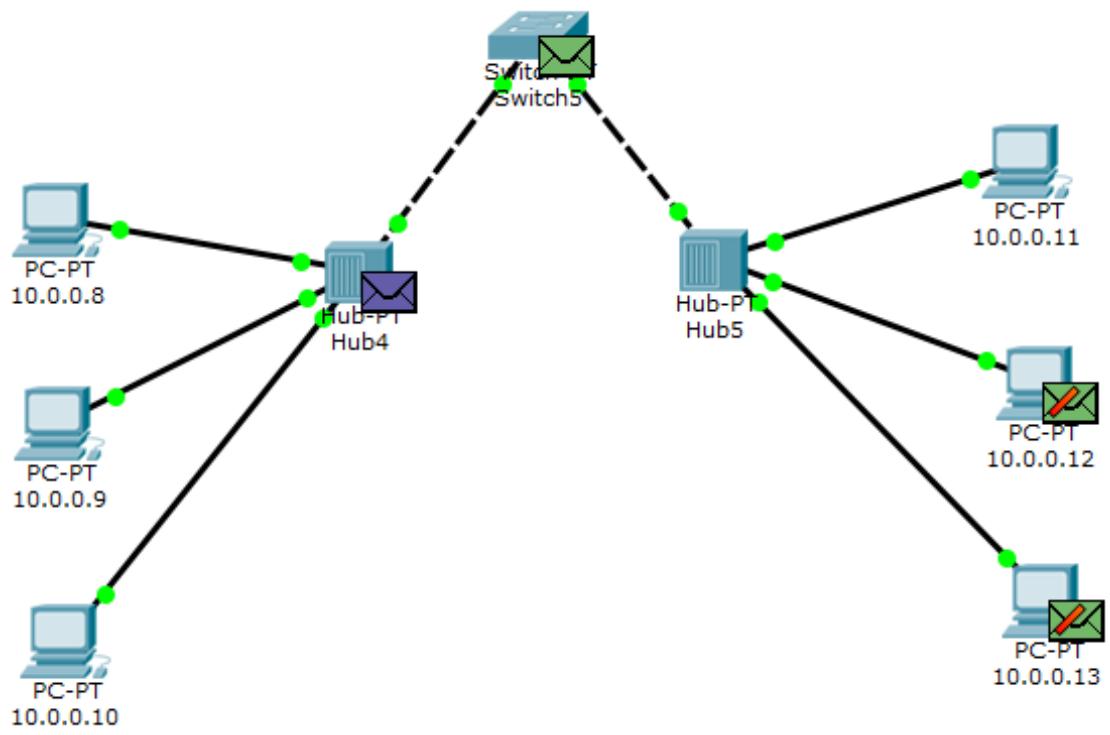
### Topology - 3:

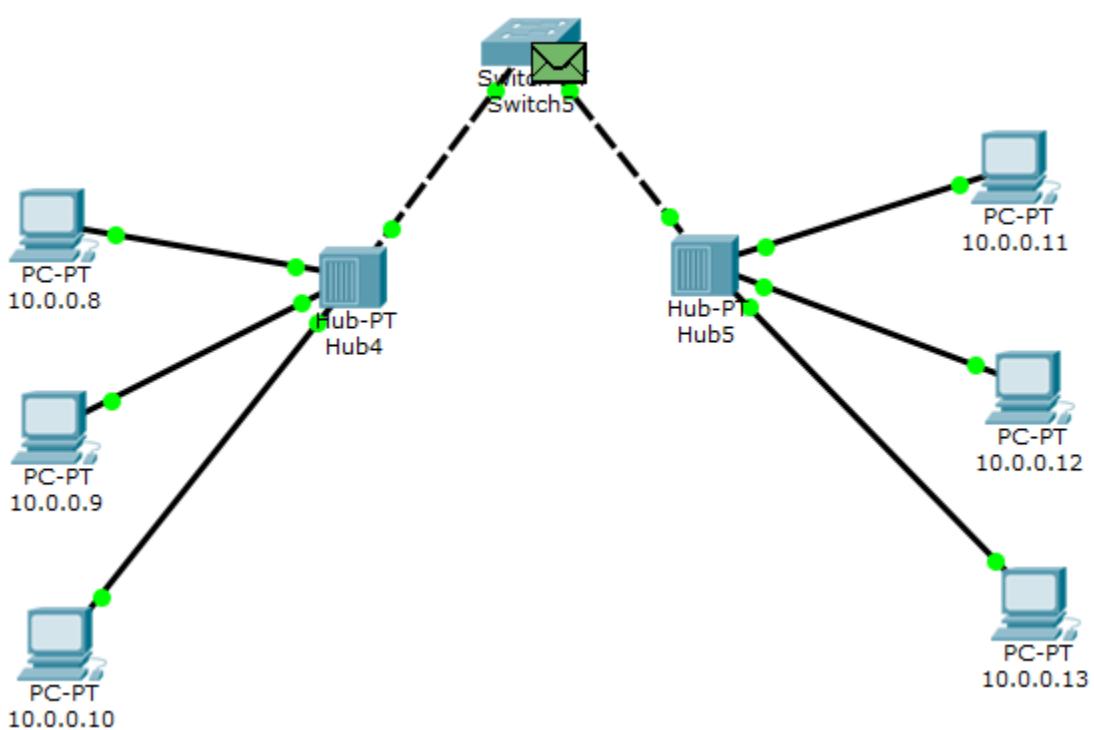
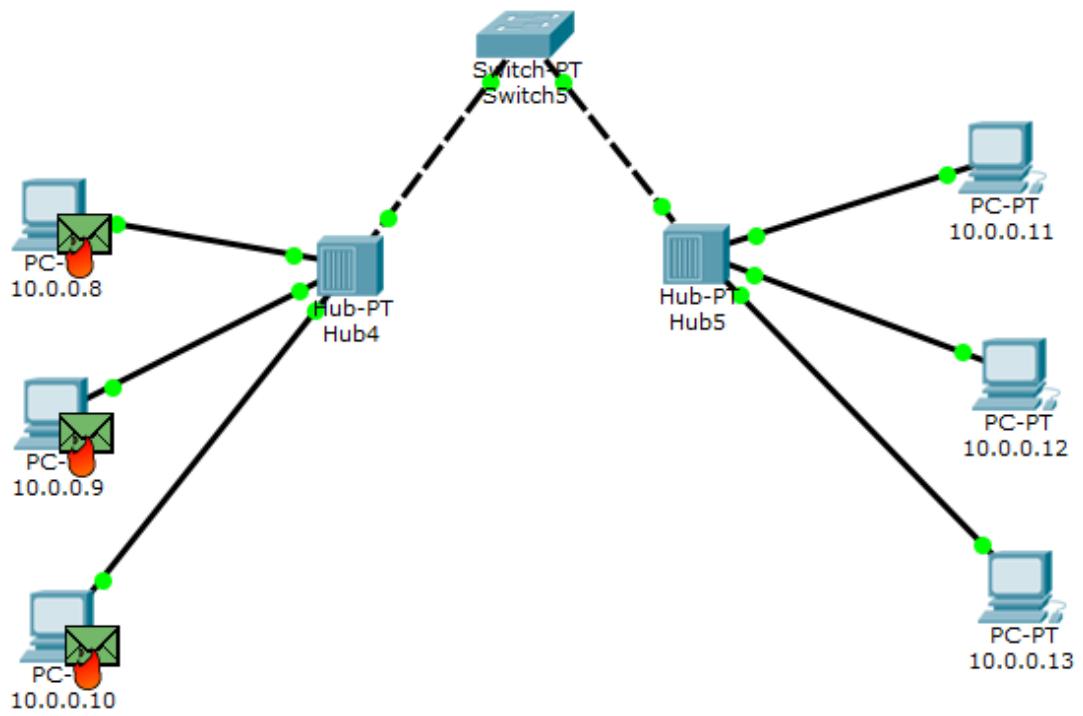


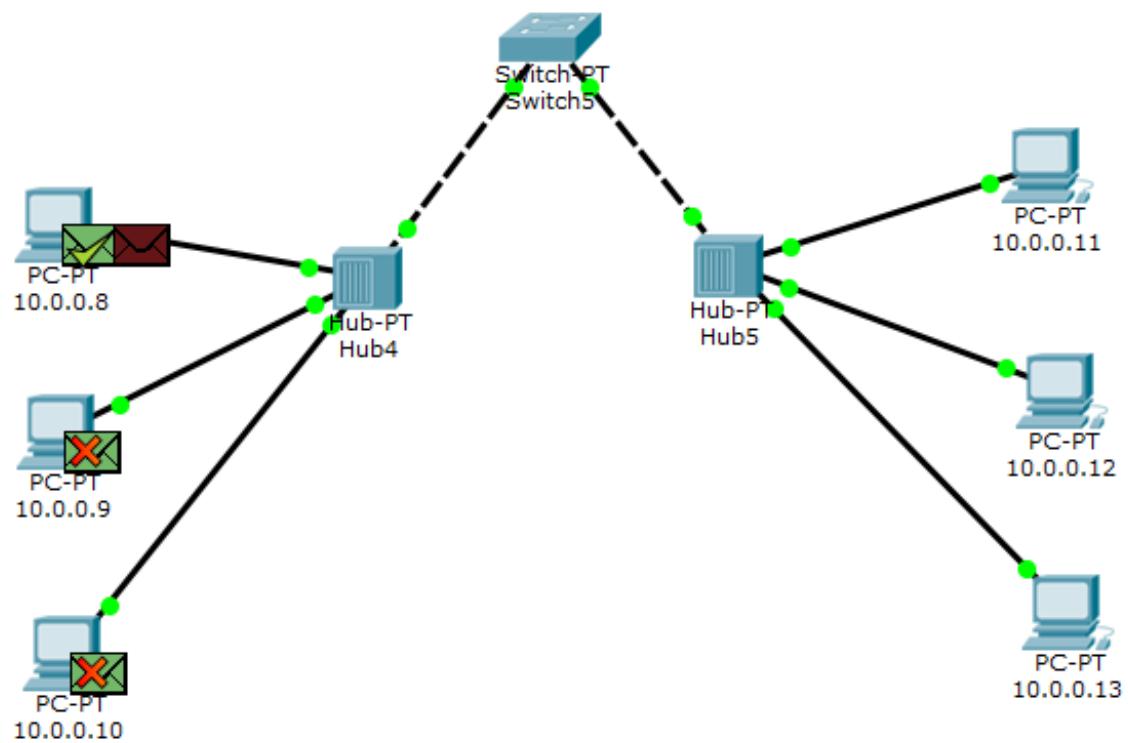
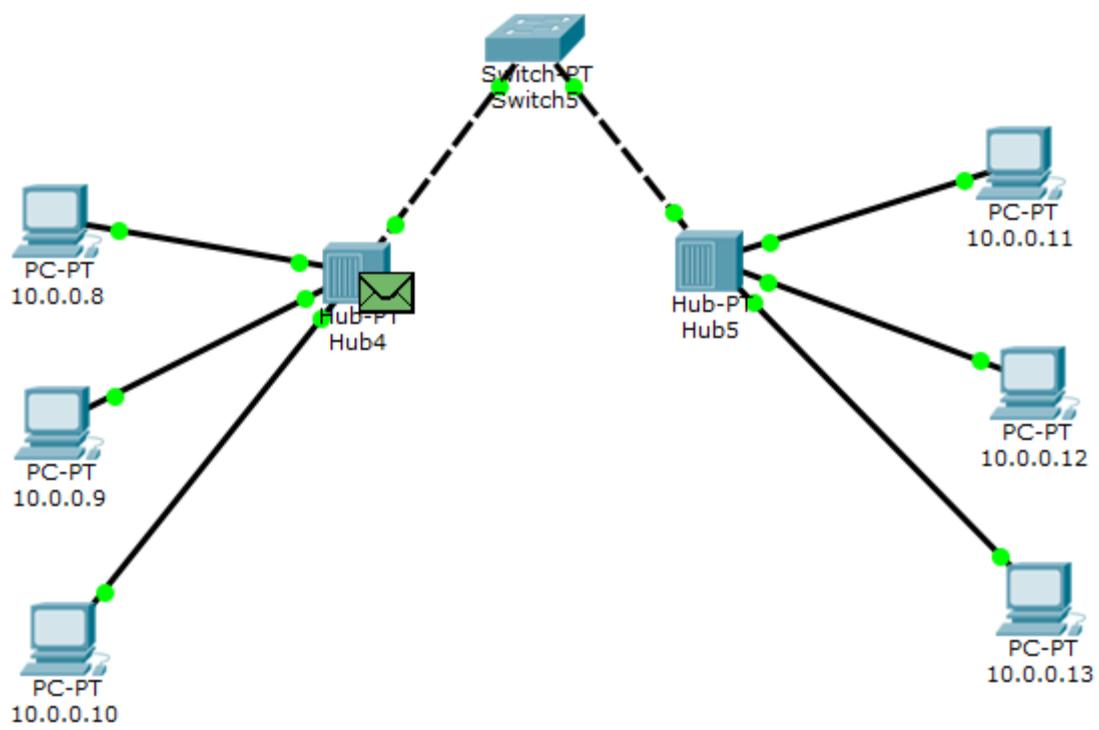












10.0.0.8

Physical Config Desktop Custom Interface

## Command Prompt X

```
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.13

Pinging 10.0.0.13 with 32 bytes of data:

Reply from 10.0.0.13: bytes=32 time=1ms TTL=128
Reply from 10.0.0.13: bytes=32 time=0ms TTL=128
Reply from 10.0.0.13: bytes=32 time=0ms TTL=128
Reply from 10.0.0.13: bytes=32 time=0ms TTL=128

Ping statistics for 10.0.0.13:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 10.0.0.10

Pinging 10.0.0.10 with 32 bytes of data:

Reply from 10.0.0.10: bytes=32 time=0ms TTL=128

Ping statistics for 10.0.0.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

PC>
```

### 2.1.3 Observation Book Pictures:

CLASSMATE  
Date \_\_\_\_\_  
Page \_\_\_\_\_

Object:

Add a generic hub & connect 3 PCs to it using copper straight-through wire.

Add a generic switch and connect 3 PCs to it using copper straight-through wire.

Wait for switch - PC connection to be established

Connect the hub & switch using a Copper cross-over wire.

Set IP address for all PC's (1-6) such that they are in the same network, 10.0.0.1, 10.0.0.2, ..., 10.0.0.6

Send a simple PDV from PC1 to PC6, wait until simulation is completed.

In real time mode ping PC6 from PC1 the is done in Desktop > Command prompt.

Result:

1. Simple PDV is sent from PC1 to hub.
2. The hub sends copy of PDV to PC2, PC3 and switch.
3. The switch forwards the message to PC4, PC5 & PC6.
4. PC6 receives the message and sends an acknowledgement to the switch.
5. The switch forwards the acknowledgement to the hub.
6. Hub broadcasts it to PC1, PC2 (PC3).
7. PC1 receives the acknowledgement and transfer of message is completed.

PC1 ping 10.0.0.6.

pinging 10.0.0.6 with 32 bytes of data

Reply from 10.0.0.6: bytes=32 time=0ms TTL=128

Reply from 10.0.0.3: bytes = 32 time = 0ms TTL = 128

Reply from 10.0.0.3: bytes = 32 time = 0ms TTL = 128

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)

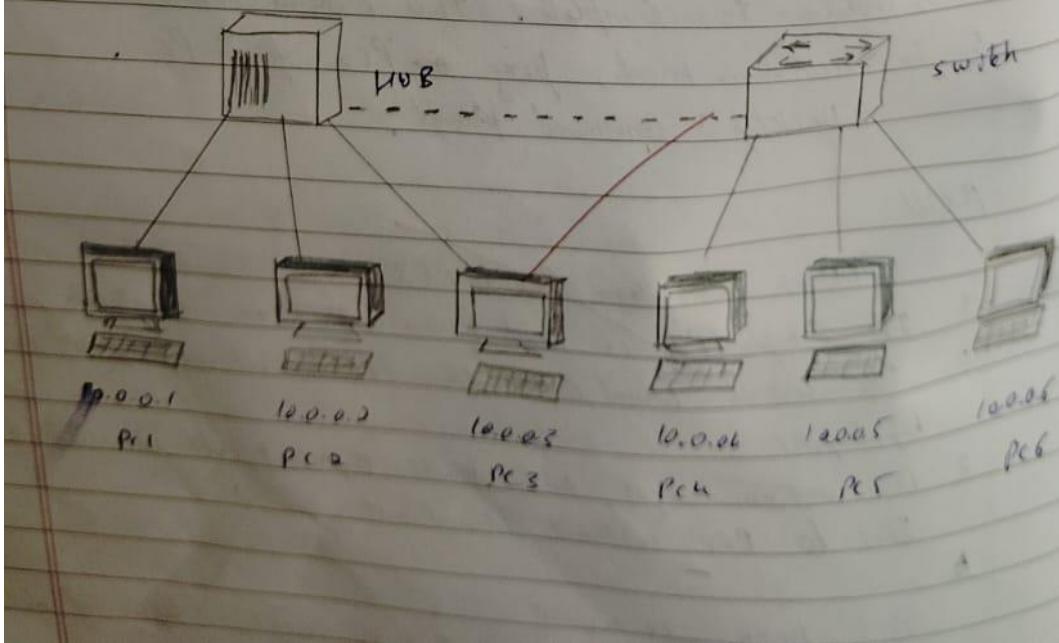
Approximate round trip time in ms/100-milliseconds:

Min: 0ms, Max: 0ms, Average = 0ms

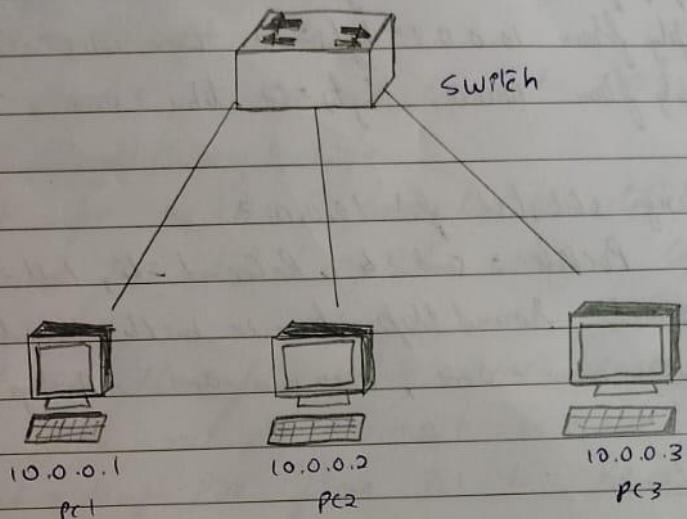
Observation:

Switch takes time for connection to be established.  
In the first transfer switch broadcast the packet to all end device. In following transfers the switch transfers the packet to destination end device based on mac address.

Topology:



Topology:



Procedure:

1. Add a Generic switch and connect 3 PCs to it using ~~connect~~ Copper-straight-through wire.
2. Wait for PC and switch connections to be established
3. Set up IP address for all end-devices.  
config > ~~FastEthernet~~ Interface > fastEthernet0 set IPv4 address  
at 10.0.0.1, 10.0.0.2 / 10.0.0.3
4. Send a simple PDU from PC1 to PC3 wait for transmission to complete. This is done in simulation mode
5. In real time mode, ping ~~PC3~~ from PC1.

Result:

~~PDU is sent from PC1 to PC3~~

1. The simple PDU is sent from PC1 to switch.
2. The switch broad casts the PDU to all output port except the input port.
3. PC3 acknowledges and sends a packet the switch transfers this to PC1 without broadcast.

PC1 ping 10.0.0.3

pinging 10.0.0.3 with 32 bytes of data

Result:

1. The simple PDU is sent from PC1 to hub
2. Hub sends the PDU to all ports except the input port. (Broadcasting)
3. The PDU is rejected by PC3
4. PC2 sends an acknowledgement to hub, which is again broadcasted.
5. PC1 receives this and the transfer is completed.

PC3 ping 10.0.0.3

pinging 10.0.0.3 with 32 bytes of data.

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 time in milliseconds

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

Observation

Hub doesn't store any data and all incoming packets are broadcasted to all ports except the input port.

The device should acknowledge the packet when received.

# Experiment -1

Date \_\_\_\_\_  
Page \_\_\_\_\_  
16/6/23

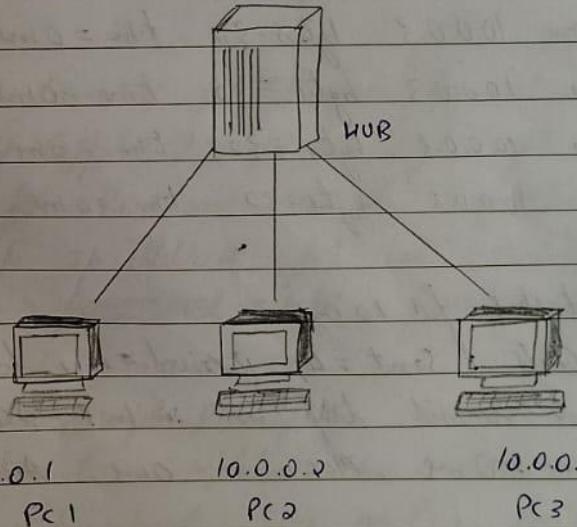
Create a topology and simulate sending a PDV from source to destination using hub and switch or connecting devices and demonstrate ping message.

Aim: To understand working of hub and switch.

Procedure:

1. Add a generic hub and connect

Topology:



Procedure:

1. Add a generic hub and 3 PCs to it using copper straight-through wire from fast ethernet interface of PC to hub.
2. Set the static ip address of all PCs under config>interface
3. Send a simple PDV message from one PC to another ~~and~~ PC to wait for simulation to complete. This is done in simulation mode.
4. In dual-time mode, click on a PC and under desktop open command prompt and ping one of the end device on the network  
e.g. 10.0.0.3.

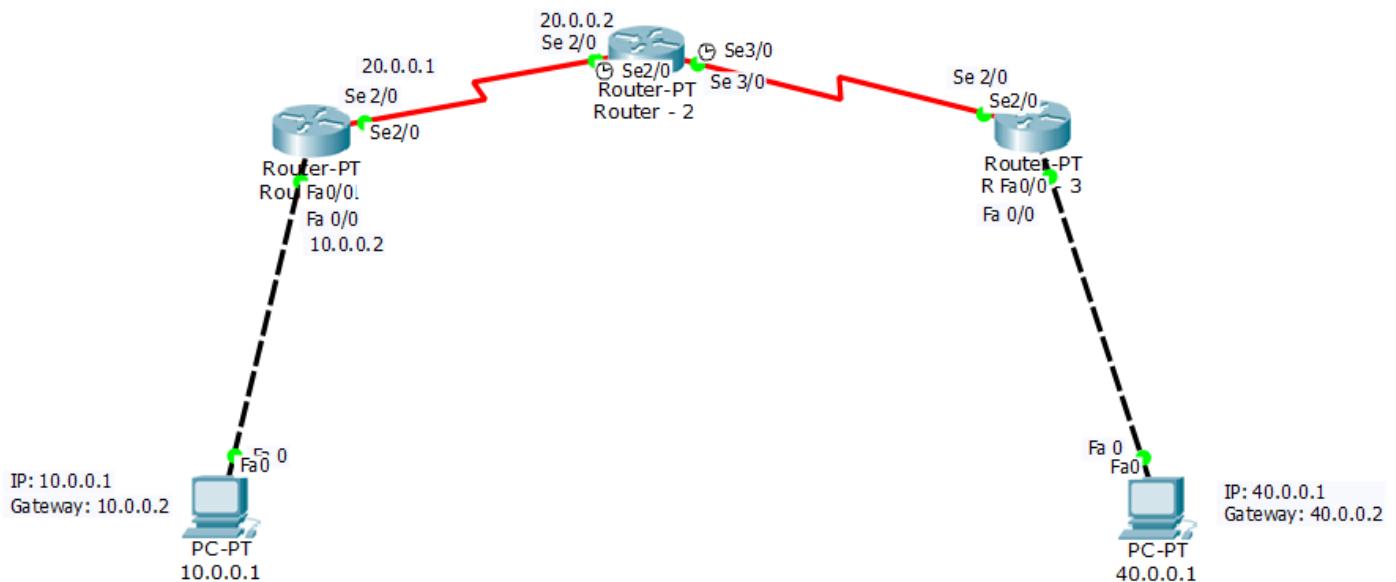
## 2.2 Experiment - 2:

### 2.2.1 Question:

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

### 2.2.2 Screenshots (Topology, Configurations & Output):

#### Topology:



#### Configuring Router - 1:

```
Router - 1
Physical Config CLI
IOS Command Line Interface
System Configuration Dialog
Continue with configuration dialog? [yes/no]: n
Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Fa0/0
Router(config-if)#ip address 10.0.0.2 255.0.0.0
Router(config-if)#no shutdown

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)#interface Se2/0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#no shutdown

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

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```

Router - 1

Physical Config CLI

### IOS Command Line Interface

```
%LINK-3-CHANGED: interface Serial2/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router con0 is now available

Press RETURN to get started.
```

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Router - 1

Physical Config CLI

### IOS Command Line Interface

```
Router>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

C    10.0.0.0/8 is directly connected, FastEthernet0/0
C    20.0.0.0/8 is directly connected, Serial2/0
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 40.0.0.0 255.0.0.0 20.0.0.2
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
```

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 Router - 1

Physical Config CLI

### IOS Command Line Interface

```
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      40.0.0.0/8 [1/0] via 20.0.0.2
Router#
```

Router con0 is now available

Press RETURN to get started.

## Configuring Router - 2:

 Router - 2

Physical Config CLI

### IOS Command Line Interface

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

Press RETURN to get started!

Router>enable
Router#configure terminal
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)#no shutdown

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

Router(config-if)#exit
Router(config)#interface
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed st
Router(config)#interface Se3/0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#no shutdown

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

Router(config-if)#exit
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
```

Router>show ip route

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP  
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area  
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2  
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP  
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area  
\* - candidate default, U - per-user static route, o - ODR  
P - periodic downloaded static route

Gateway of last resort is not set

C 20.0.0.0/8 is directly connected, Serial2/0  
C 30.0.0.0/8 is directly connected, Serial3/0

Router>enable

Router#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#ip route 40.0.0.0 255.0.0.0 30.0.0.2

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

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 30.0.0.2

Router#enable

Router#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#ip route 10.0.0.0 255.0.0.0 20.0.0.1

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

S 10.0.0.0/8 [1/0] via 20.0.0.1  
C 20.0.0.0/8 is directly connected, Serial2/0  
C 30.0.0.0/8 is directly connected, Serial3/0  
S 40.0.0.0/8 [1/0] via 30.0.0.2

Router#

Router - 2

Physical Config CLI

### IOS Command Line Interface

```

Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 10.0.0.0 255.0.0.0 20.0.0.1
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

S    10.0.0.0/8 [1/0] via 20.0.0.1
C    20.0.0.0/8 is directly connected, Serial2/0
C    30.0.0.0/8 is directly connected, Serial3/0
S    40.0.0.0/8 [1/0] via 30.0.0.2
Router#
%LINK-5-CHANGED: Interface Serial3/0, changed state to down

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

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

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

```

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### Configuring Router - 3:

Router - 3

Physical Config CLI

### IOS Command Line Interface

```

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Fa0/0
Router(config-if)#ip address 40.0.0.2 255.0.0.0
Router(config-if)#no shutdown

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)#interface Se2/0
Router(config-if)#ip address 30.0.0.2 255.0.0.0
Router(config-if)#no shutdown

%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

```

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Router - 3

Physical Config CLI

### IOS Command Line Interface

```
Router>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

C    30.0.0.0/8 is directly connected, Serial2/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 40.0.0.0 255.0.0.0 40.0.0.2
*Invalid next hop address (it's this router)
Router(config)#ip route 40.0.0.0 255.0.0.0 40.0.0.1
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
```

Router - 3

Physical Config CLI

### IOS Command Line Interface

```
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

C    30.0.0.0/8 is directly connected, Serial2/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0
Router#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 40.0.0.0 255.0.0.0 20.0.0.2
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
```

Router - 3

Physical Config CLI

### IOS Command Line Interface

```

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#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#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 40.0.0.0 255.0.0.0 10.0.0.2
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

```

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Router - 3

Physical Config CLI

### IOS Command Line Interface

```

Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

C 30.0.0.0/8 is directly connected, Serial2/0
C 40.0.0.0/8 is directly connected, FastEthernet0/0
Router#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 40.0.0.0 255.0.0.0 10.0.0.2
%LINK-5-CHANGED: Interface Serial2/0, changed state to down

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

%LINEPROTO-5-UPDOWN: Line protocol on Inter
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
show ip config
^

```

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Router - 3

Physical Config CLI

### IOS Command Line Interface

```
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to down
*LINK-5-CHANGED: Interface Serial2/0, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Inter
Router(config)#exit
Router#
*SYS-5-CONFIG_I: Configured from console by console
show ip config
^
* 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

C    30.0.0.0/8 is directly connected, Serial2/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0
Router#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 10.0.0.0 255.0.0.0 30.0.0.1
```

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Router - 3

Physical Config CLI

### IOS Command Line Interface

```
* 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#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 10.0.0.0 255.0.0.0 30.0.0.1
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 30.0.0.1
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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### Initial Ping (Failure):

10.0.0.1

Physical Config Desktop Custom Interface

**Command Prompt**

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

Pinging 40.0.0.1 with 32 bytes of data:

Reply from 10.0.0.2: Destination host unreachable.
Reply from 10.0.0.2: Destination host unreachable.
Request timed out.
Reply from 10.0.0.2: 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:

Reply from 10.0.0.2: Destination host unreachable.

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

PC>ping 30.0.0.2

Pinging 30.0.0.2 with 32 bytes of data:
```

10.0.0.1

Physical Config Desktop Custom Interface

**Command Prompt**

```
PC>ping 30.0.0.2

Pinging 30.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: Destination host unreachable.

Ping statistics for 30.0.0.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

PC>ping 30.0.0.1

Pinging 30.0.0.1 with 32 bytes of data:

Reply from 10.0.0.2: Destination host unreachable.
Reply from 10.0.0.2: Destination host unreachable.
Request timed out.
Reply from 10.0.0.2: Destination host unreachable.

Ping statistics for 30.0.0.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

PC>ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data:
Reply from 20.0.0.1: bytes=32 time=0ms TTL=255
```

```
PC>ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data:

Reply from 20.0.0.1: bytes=32 time=0ms TTL=255

Ping statistics for 20.0.0.1:
    Packets: Sent = 4, Received = 4 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

PC>ping 20.0.0.2

Pinging 20.0.0.2 with 32 bytes of data:

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

Ping statistics for 20.0.0.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

PC>ping 40.0.0.2

Pinging 40.0.0.2 with 32 bytes of data:
```

```
PC>ping 40.0.0.2

Pinging 40.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: Destination host unreachable.

Ping statistics for 40.0.0.2:
    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.
Request timed out.
Request timed out.
Request timed out.

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:
    Reply from 40.0.0.1: bytes=32 time=1ms TTL=125
```

### Ping After Adding Static Routes:

```
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=11ms TTL=125
Reply from 40.0.0.1: bytes=32 time=8ms TTL=125
Reply from 40.0.0.1: bytes=32 time=7ms TTL=125
Reply from 40.0.0.1: bytes=32 time=6ms 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 = 6ms, Maximum = 11ms, Average = 8ms

PC>ping 40.0.0.2
Pinging 40.0.0.2 with 32 bytes of data:

Reply from 40.0.0.2: bytes=32 time=9ms TTL=253
Reply from 40.0.0.2: bytes=32 time=7ms TTL=253
Reply from 40.0.0.2: bytes=32 time=10ms TTL=253
Reply from 40.0.0.2: bytes=32 time=2ms TTL=253

Ping statistics for 40.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 10ms, Average = 7ms

PC>ping 30.0.0.1
```

```
PC>ping 30.0.0.1
Pinging 30.0.0.1 with 32 bytes of data:

Reply from 10.0.0.2: Destination host unreachable.

Ping statistics for 30.0.0.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

PC>ping 30.0.0.2
Pinging 30.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: Destination host unreachable.
Reply from 10.0.0.2: Destination host unreachable.
Reply from 10.0.0.2: Destination host unreachable.
Request timed out.

Ping statistics for 30.0.0.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

PC>ping 20.0.0.1
Pinging 20.0.0.1 with 32 bytes of data:
```

10.0.0.1

Physical Config Desktop Custom Interface

## Command Prompt X

```
PC>ping 20.0.0.1
Pinging 20.0.0.1 with 32 bytes of data:
Reply from 20.0.0.1: bytes=32 time=0ms TTL=255

Ping statistics for 20.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

PC>ping 20.0.0.2
Pinging 20.0.0.2 with 32 bytes of data:
Reply from 20.0.0.2: bytes=32 time=5ms TTL=254
Reply from 20.0.0.2: bytes=32 time=7ms TTL=254
Reply from 20.0.0.2: bytes=32 time=4ms TTL=254
Reply from 20.0.0.2: bytes=32 time=6ms TTL=254

Ping statistics for 20.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 7ms, Average = 5ms
```

### 2.2.3 Observation Book Pictures:

Date \_\_\_\_\_  
Page \_\_\_\_\_

Experiment - 2. 33 / 6 / 23

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

Aim: To understand different ping (error) messages and when they occurred.

Topology :

```

graph TD
    Router[Router] --- Fa0_0[Fa0/0]
    Router --- Fa1_1[Fa1/1]
    Fa0_0 --- PC0[PC0]
    Fa1_1 --- PC1[PC1]
    PC0[PC0] --- IP0[10.0.0.10]
    PC1[PC1] --- IP1[20.0.0.10]
  
```

Protocol:

1. Add 2 PCs & connect them to a general Router.
2. Configure the PCs by setting their IP address to 10.0.0.1 and 20.0.0.1 respectively.
3. Go to command line interface in the Router and enter 'no' for 'Continue with Configuration dialog.'
4. Type 'enable'.
5. Type 'configure terminal'.

```

Router# config
Router(Config)# interface Fa0/0
Router(Config-if)# ip address 10.0.0.2 255.0.0.0
Router(Config-if)# no shutdown
Router(Config-if)# exit
  
```

6. Repeat step 5 for Fa1/1 interface with IP address 20.0.0.2.
7. Ping PC1 from PC0.
8. Set default gateway for PC0 as 10.0.0.1 and 20.0.0.2.

Ping Program from PCO.

Result:

Before setting the default gateway.

C> ping 20.0.0.10.

Pinging 20.0.0.10 with 32 bytes of data.

Reply from 20.0.0.10: bytes=32 time=0ms TTL=128

Reply from 20.0.0.10: bytes=32 time=0ms TTL=128

Request timed out

Request timed out

Request timed out

Request timed out

Ping statistics for 20.0.0.2:

Packets: sent=6, received=0, lost=6 (100% loss).

~~ping~~ ping

After setting the default gateway

PC> ping 20.0.0.10.

Pinging 20.0.0.10 with 32 bytes of data.

Reply from 20.0.0.10: bytes=32 time=0ms TTL=128

Ping statistics for 20.0.0.2

Packets: sent=6, received=6, lost=0 (0% loss)

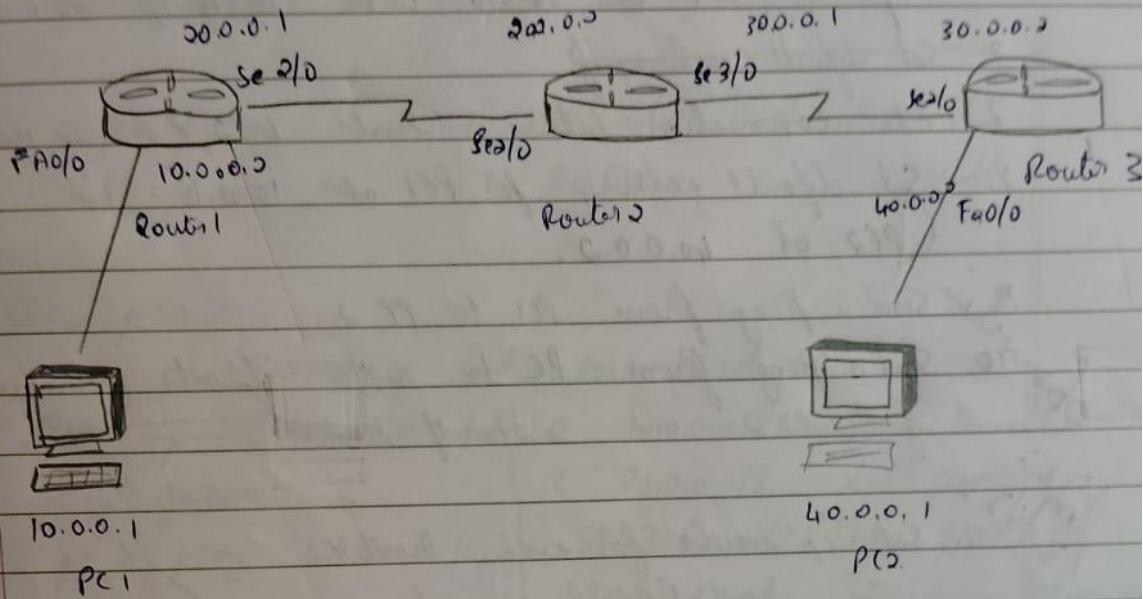
Approximate round trip time in milliseconds

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

observed.

?

## Topology:



## Procedure:

- 1) Take 3 generic routers and two devices. The end device is connected to routers 1 and 3. The router 2 is connected to router 3 & 1 using a serial connection acting as an intermediate.
2. Set the IP address of end devices. The both end devices is considered to be a separate network.
3. Go to CLI of routers and config the IP address of both their port Fa0/0.

Type 'enable'

Router# Configure terminal

Router(config)# intif Fa0/0

Router(config-if)# ipaddress 10.0.0.0 255.0.0.0

Router(config-if)# no shutdown

Router(config-if)# exit

4. Similarly configure next port with IP 20.0.0.1

5. Repeat step 3&4 for router 3 with ip 40.0.0.1  
ip 30.0.0.20 for serial port.
6. Repeat step 4 for router 2 for serial port S2/0 with  
ip 20.0.0.2 and S2/0 with ~~S2/0~~ ip 30.0.0.1
7. Set default gateway of
7. The connection between routers 1, 2, & 3 is now
8. Set default gateway for PC1 as 10.0.0.2 and  
PC2 as 40.0.0.2.
9. Send a ping from PC1 to PC2.
10. Send a ping from PC to S2/0, S2/0 of router 1, S2/0  
of router 2 and S2/0 of router 3.
11. Set ip routes for each router,  
In router 1's configure mode,  
router (config) # <sup>ip route</sup> 40.0.0.0 255.0.0.0 20.0.0.2  
router (config) # exit
12. Repeat step 11 for all routers,  
In router 2 for network 40.0.0.0, 10.0.0.0.  
" router 3 for network 10.0.0.0, & 20.0.0.0
13. Show ip route for Router1: Router3 show ip route.
14. Ping PC2 from PC1 and all other interfaces in the  
network.

Result:

PC> ping 20.0.0.2

Pinging 20.0.0.2 with 32 bytes of data:

Request timed out  
Request timed out  
Request timed out  
Request timed out

On pinging PC or any other interface

pc > ping 40.0.0.10.

Pinging 40.0.0.10 with 32 bytes of data

" " " "

Reply from 10.0.0.2 Destination host unreachable

Reply from 10.0.0.2 Destination host unreachable

" " " "

Show ip route, " " " "

Gateway of last resort is not set.

~~After if router is set,~~ ( 10.0.0.0/18 is directly connected, for  
~~220.200.0.0/16~~,  
 pc > ping 40.0.0.10 )  
 S 30.0.0.0/18 (1/0) via 20.0.0.1  
 S 40.0.0.0/18 (1/0) via 20.0.0.1

pinging 40.0.0.10 with 32 bytes of data

Reply from 40.0.0.10 : bytes = 32 time < 1ms TTL = 255

Reply from 40.0.0.10 : bytes = 32 time < 1ms TTL = 255

Reply from 40.0.0.10 : bytes = 32 time < 1ms TTL = 255

Reply from 40.0.0.10 : bytes = 32 time < 1ms TTL = 255

Ping statistics for 40.0.0.1:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss)

Approximate round trip times in milli-seconds:

Minimum = 0 ms, Maximum = 16 ms, Average = 4 ms

Observation:

Static ip routes can be set on a router using CLI.

Req an ICMP request timed out message is returned by a different destination than the pinging device. If a router can't resolve the network or can't find the device that we pinged, destination host unreachable is generated. On successful connection reply will be received.

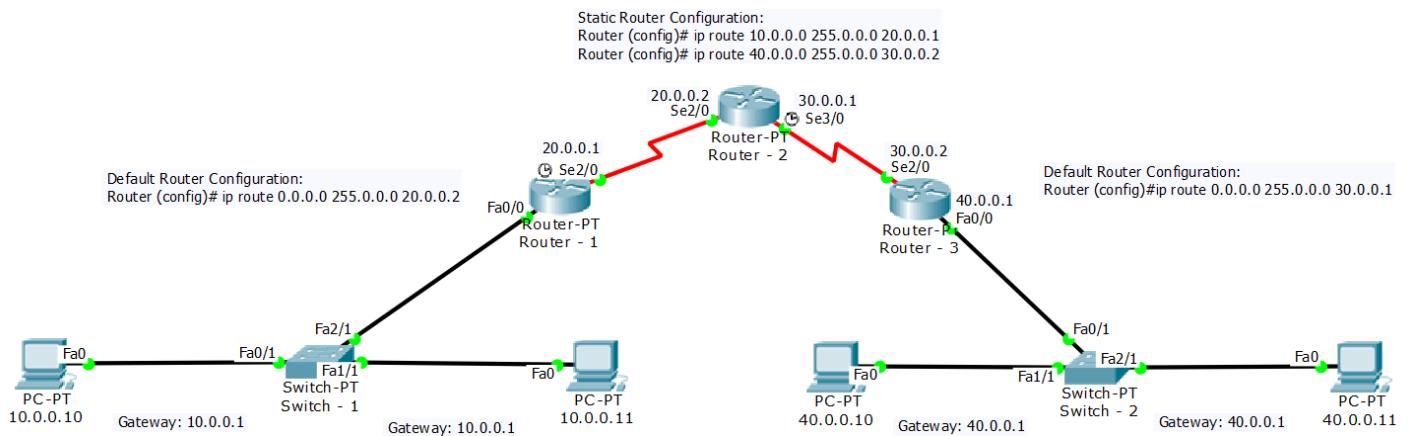
## 2.3 Experiment - 3:

### 2.3.1 Question:

Configure default route, static route to the Router.

### 2.3.2 Screenshots (Topology, Configurations & Output):

#### Topology:



#### Configuring Router - 1:

Router - 1

Physical Config CLI

IOS Command Line Interface

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

Press RETURN to get started!

Router>enable
Router#configure terminal
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 shutdown

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)#interface Se2/0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#no shutdown

%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
```

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Router - 1

Physical Config CLI

### IOS Command Line Interface

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

C    10.0.0.0/8 is directly connected, FastEthernet0/0
C    20.0.0.0/8 is directly connected, Serial2/0
Router#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 10.0.0.1 255.0.0.0 20.0.0.2
%Inconsistent address and mask
Router(config)#ip route 10.0.0.1 255.0.0.0 20.0.0.1
%Inconsistent address and mask
Router(config)#ip route 10.0.0.0 255.0.0.0 20.0.0.2
Router(config)#exit
Router#
```

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Router - 1

Physical Config CLI

### IOS Command Line Interface

```
%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

C    10.0.0.0/8 is directly connected, FastEthernet0/0
C    20.0.0.0/8 is directly connected, Serial2/0
Router#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 40.0.0.0 255.0.0.0 20.0.0.2
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
```

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Router - 1

Physical Config CLI

### IOS Command Line Interface

```

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    40.0.0.0/8 [1/0] via 20.0.0.2
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 0.0.0.0 0.0.0.0 20.0.0.2
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 20.0.0.2 to network 0.0.0.0

C    10.0.0.0/8 is directly connected, FastEthernet0/0
C    20.0.0.0/8 is directly connected, Serial2/0
S*   40.0.0.0/8 [1/0] via 20.0.0.2
S*   0.0.0.0/0 [1/0] via 20.0.0.2
Router#configure terminal

```

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Router - 1

Physical Config CLI

### IOS Command Line Interface

```

candidate default, o per user static route, o ODR
P - periodic downloaded static route

Gateway of last resort is 20.0.0.2 to network 0.0.0.0

C    10.0.0.0/8 is directly connected, FastEthernet0/0
C    20.0.0.0/8 is directly connected, Serial2/0
S*   40.0.0.0/8 [1/0] via 20.0.0.2
S*   0.0.0.0/0 [1/0] via 20.0.0.2
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#no ip route 40.0.0.0 255.0.0.0 20.0.0.2
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 20.0.0.2 to network 0.0.0.0

C    10.0.0.0/8 is directly connected, FastEthernet0/0
C    20.0.0.0/8 is directly connected, Serial2/0
S*   0.0.0.0/0 [1/0] via 20.0.0.2
Router#

```

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## Configuring Router - 2:

Router - 2

Physical Config CLI

### IOS Command Line Interface

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

Press RETURN to get started!

Router>enable
Router#configure terminal
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)#no shutdown

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

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

^
* Invalid input detected at '^' marker.

Router(config)#interface Se3/0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#no shutdown

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

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Router - 2

Physical Config CLI

### IOS Command Line Interface

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

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

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

Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      p - periodic downloaded static route

Gateway of last resort is not set

C    20.0.0.0/8 is directly connected, Serial2/0
C    30.0.0.0/8 is directly connected, Serial3/0
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 10.0.0.0 255.0.0.0 20.0.0.1
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

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**Router - 2**

Physical Config CLI

### IOS Command Line Interface

```
*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

S    10.0.0.0/8 [1/0] via 20.0.0.1
C    20.0.0.0/8 is directly connected, Serial2/0
C    30.0.0.0/8 is directly connected, Serial3/0
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 40.0.0.0 255.0.0.0 30.0.0.2
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
```

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**Router - 2**

Physical Config CLI

### IOS Command Line Interface

```
* - 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 20.0.0.1
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 30.0.0.2
Router#

Router con0 is now available

Press RETURN to get started.
```

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## Configuring Router - 3:

**Router - 3**

Physical Config CLI

### IOS Command Line Interface

```

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

Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Fa0/0
Router(config-if)#ip address 40.0.0.1 255.0.0.0
Router(config-if)#no shutdown

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)#interface Se2/0
Router(config-if)#ip address 30.0.0.2 255.0.0.0
Router(config-if)#no shutdown

%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

```

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**Router - 3**

Physical Config CLI

### IOS Command Line Interface

```

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

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

C    30.0.0.0/8 is directly connected, Serial2/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 40.0.0.0 255.0.0.0 30.0.0.1
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

```

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Router - 3

Physical Config CLI

### IOS Command Line Interface

```
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

C      30.0.0.0/8 is directly connected, Serial2/0
C      40.0.0.0/8 is directly connected, FastEthernet0/0
Router#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 10.0.0.0 255.0.0.0 30.0.0.1
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
```

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Router - 3

Physical Config CLI

### IOS Command Line Interface

```
Gateway of last resort is not set

S      10.0.0.0/8 [1/0] via 30.0.0.1
C      30.0.0.0/8 is directly connected, Serial2/0
C      40.0.0.0/8 is directly connected, FastEthernet0/0
Router#

Router con0 is now available

Press RETURN to get started.
```

Copy Paste

**Router - 3**

Physical Config CLI

### IOS Command Line Interface

```

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#no ip route 10.0.0.0 255.0.0.0 30.0.0.1
Router(config)#ip route 0.0.0.0 0.0.0.0 30.0.0.1
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 30.0.0.1 to network 0.0.0.0

C    30.0.0.0/8 is directly connected, Serial2/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0
S*   0.0.0.0/0 [1/0] via 30.0.0.1
Router#

```

Copy Paste

### Pinging from PC-PT(10.0.0.10) to PC-PT(40.0.0.10):

**10.0.0.10**

Physical Config Desktop Custom Interface

### Command Prompt

```

Packet Tracer PC Command Line 1.0
PC>ping 40.0.0.10

Pinging 40.0.0.10 with 32 bytes of data:

Request timed out.
Reply from 40.0.0.10: bytes=32 time=2ms TTL=125
Reply from 40.0.0.10: bytes=32 time=11ms TTL=125
Reply from 40.0.0.10: bytes=32 time=7ms TTL=125

Ping statistics for 40.0.0.10:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 11ms, Average = 6ms

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=9ms TTL=125
Reply from 40.0.0.10: bytes=32 time=2ms TTL=125
Reply from 40.0.0.10: bytes=32 time=3ms TTL=125
Reply from 40.0.0.10: bytes=32 time=17ms 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 = 17ms, Average = 7ms

```

### Pinging from PC-PT(10.0.0.10) to PC-PT(40.0.0.11):

The screenshot shows a Cisco Network Simulator window titled "10.0.0.10". The main menu bar includes "Physical", "Config", "Desktop", and "Custom Interface". Below the menu is a toolbar with icons for different interface types. A blue header bar displays "Command Prompt" and a close button ("X"). The main content area is a black terminal window showing the output of ping commands. The first ping command is to 40.0.0.11, resulting in one lost packet (25% loss). The second ping command is also to 40.0.0.11, resulting in no lost packets (0% loss).

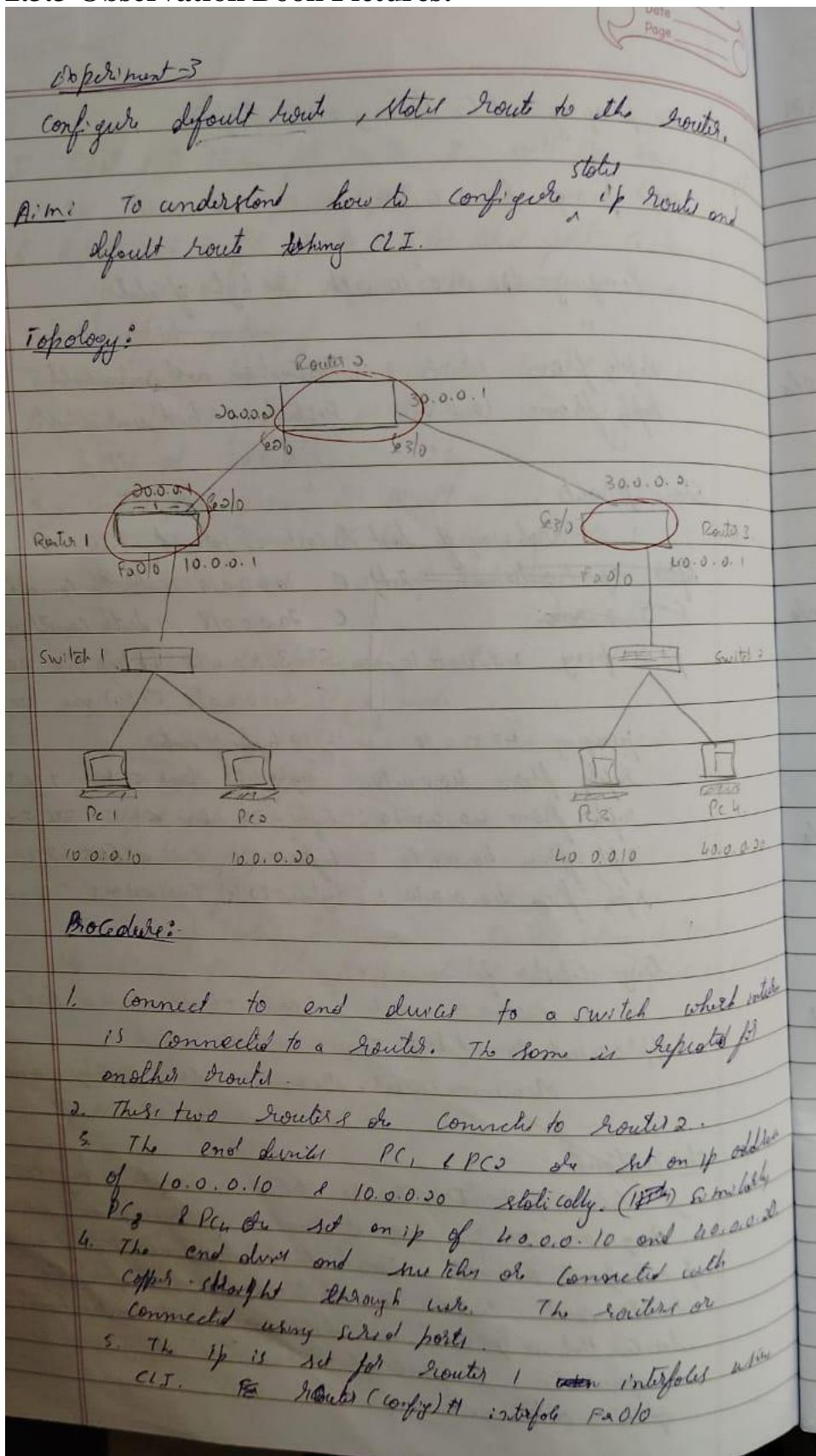
```
PC>ping 40.0.0.11
Pinging 40.0.0.11 with 32 bytes of data:
Request timed out.
Reply from 40.0.0.11: bytes=32 time=3ms TTL=125
Reply from 40.0.0.11: bytes=32 time=2ms TTL=125
Reply from 40.0.0.11: bytes=32 time=7ms TTL=125

Ping statistics for 40.0.0.11:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 7ms, Average = 4ms

PC>ping 40.0.0.11
Pinging 40.0.0.11 with 32 bytes of data:
Reply from 40.0.0.11: bytes=32 time=12ms TTL=125
Reply from 40.0.0.11: bytes=32 time=12ms TTL=125
Reply from 40.0.0.11: bytes=32 time=3ms TTL=125
Reply from 40.0.0.11: bytes=32 time=7ms TTL=125

Ping statistics for 40.0.0.11:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 12ms, Average = 8ms
```

### 2.3.3 Observation Book Pictures:



Router (config-if)# ip address 10.0.0.1 255.0.0.0  
 Router (config-if)# no shutdown  
 Router (config-if)# exit.

Step 5 is complete for serial 1, configuration of Router 1  
 with IP set at 10.0.0.1,

Router 2's ~~Serial port 5~~ Serial interface Serial with 20.0.0.2  
 S0/3/0 with IP address of 20.0.0.1

Router 3's Serial port S0/3/0 with 30.0.0.2

Router 3's Fast Ethernet port Fa0/0 with 40.0.0.1.

#### F. Show

7. Display the IP routes in Router 1.

Router> show ip route.

8. Default route is set for Router 1.

Router> enable.

Router# Configure terminal

Router(config)# ip route 0.0.0.0 0.0.0.0 20.0.0.2

Router(config)# exit.

9. Step 8 is repeated for Router 2 with

Router(config)# ip route 0.0.0.0 0.0.0.0 30.0.0.1

10. Display IP route of Router 1 after setting default route.

Router> show ip route.

11. IP route is set for Router 2 similarly.

Router(config)# ip route 40.0.0.0 255.0.0.0 30.0.0.1

Router(config)# ip route 10.0.0.0 255.0.0.0 20.0.0.1

12. Display IP route in Router 2 after setting IP route.  
 Router> show ip route.

Result:

if routes before default route is set in Router 1

Gateway of last resort not set

- C 10.0.0.0/18 is directly connected, Fast Ethernet Port
- C 20.0.0.0/18 is directly connected, serial 2/0

\*

After default gateway set.

- C 10.0.0.0/18 is directly connected, Fast Ethernet Port
  - C 20.0.0.0/18 is directly connected, serial 2/0
- S\* 0.0.0.0.10 [1107 via 3]

IP routes of Router 2

- C 20.0.0.0/18 is directly connected, Fast Ethernet Port
  - C 30.0.0.0/18 is directly connected, serial 2/0
- \*

After statically setting ip route,

- C 20.0.0.0/18 is directly connected, Fast Ethernet Port
  - C 30.0.0.0/18 is directly connected, serial 2/0
- S 40.0.0.0/18 [5/0] via 30.0.0.2
- S 10.0.0.0/18 [1/0] via 10.0.0.1.

Observations:

Static ip route can be ~~set~~ configured on a router using CLI  
In show ip route output C - denotes connected  
S - denotes static and S\* - denotes default gateway.  
End routers are configured with default gateway  
and routers connected to two or more networks are configured  
statically.

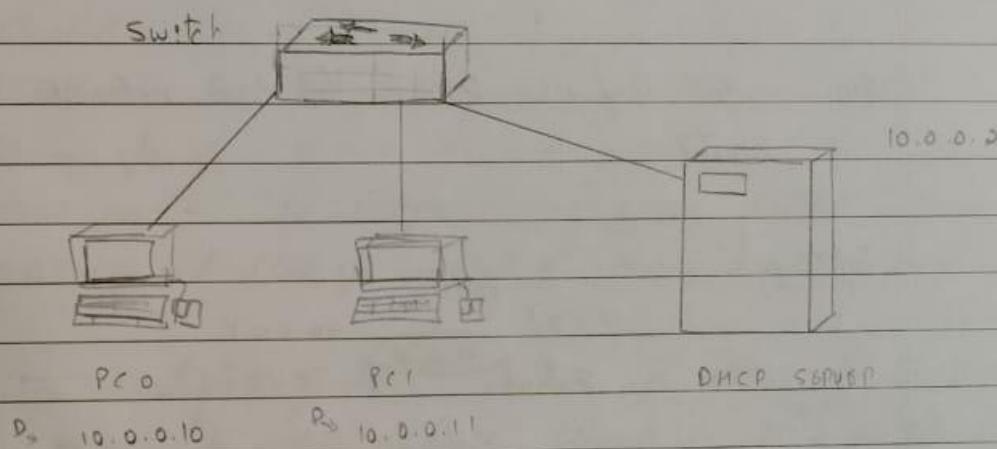
## Experiment - 4.

Page

Configure DHCP within the LAN and outside the LAN

Aim: To Configure DHCP within the LAN

Topology:



Procedure:

1. Two PCs are connected to a switch and a server is connected.
2. The server's IP is set statically at 10.0.0.2 and its default gateway is 10.0.0.1.
3. In the services > DHCP is switched on, now the server acts as a DHCP server.
4. For the pool name Server Pool, set default gateway, set the start IP address and the number of users. Click on save.
5. Now on each PC press Config > Ethernet > DHCP. All PCs are given an IP dynamically.
6. Open Desktop > IP Configuration to check.

Result:

IPV4 address	10.0.0.10
Subnet Mask	255.0.0.0
Default gateway	0.0.0.0
DNS server	0.0.0.0

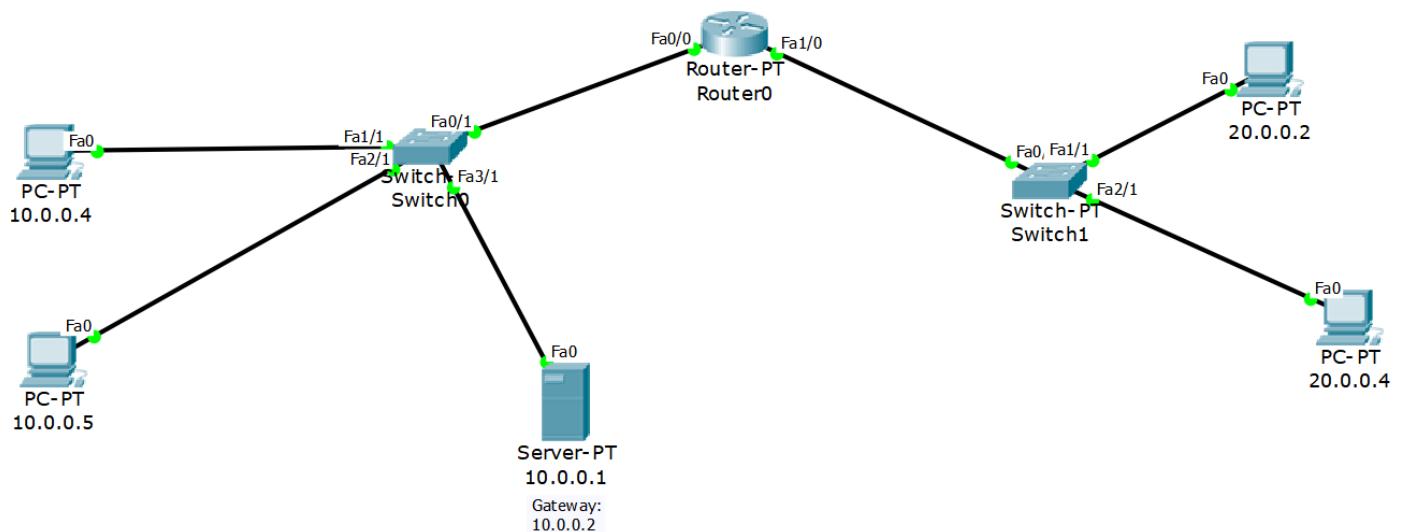
## 2.4 Experiment - 4:

### 2.4.1 Question:

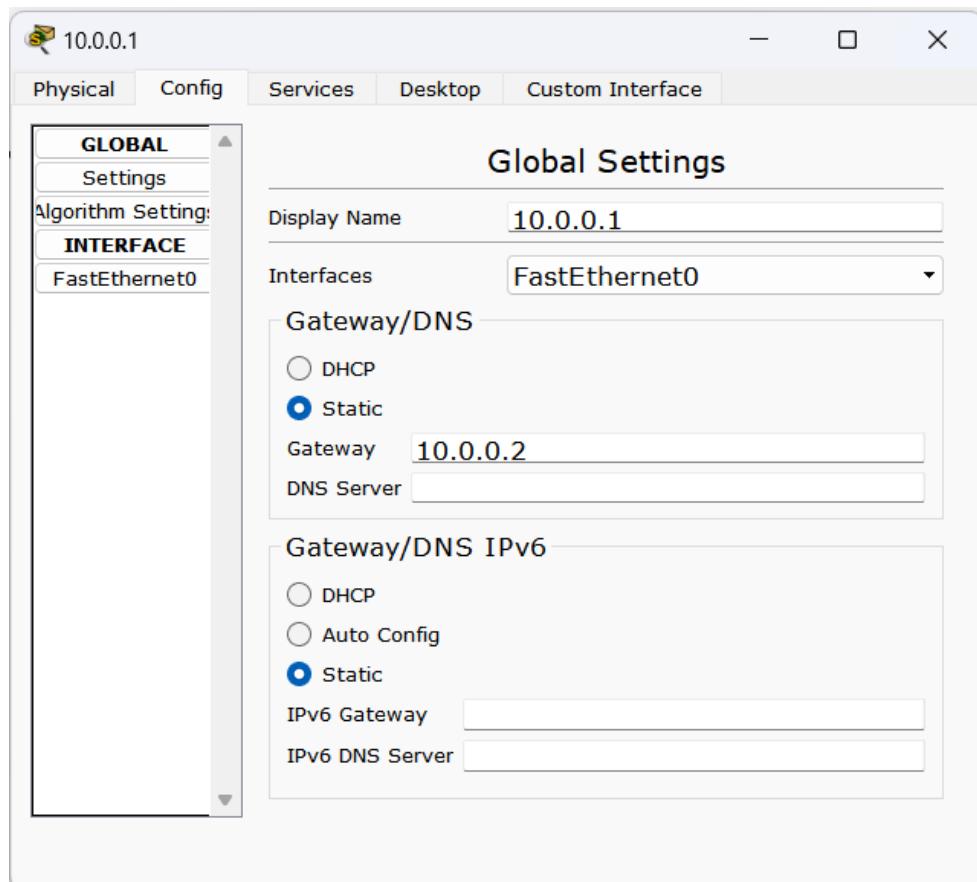
Configure DHCP within a LAN and outside LAN.

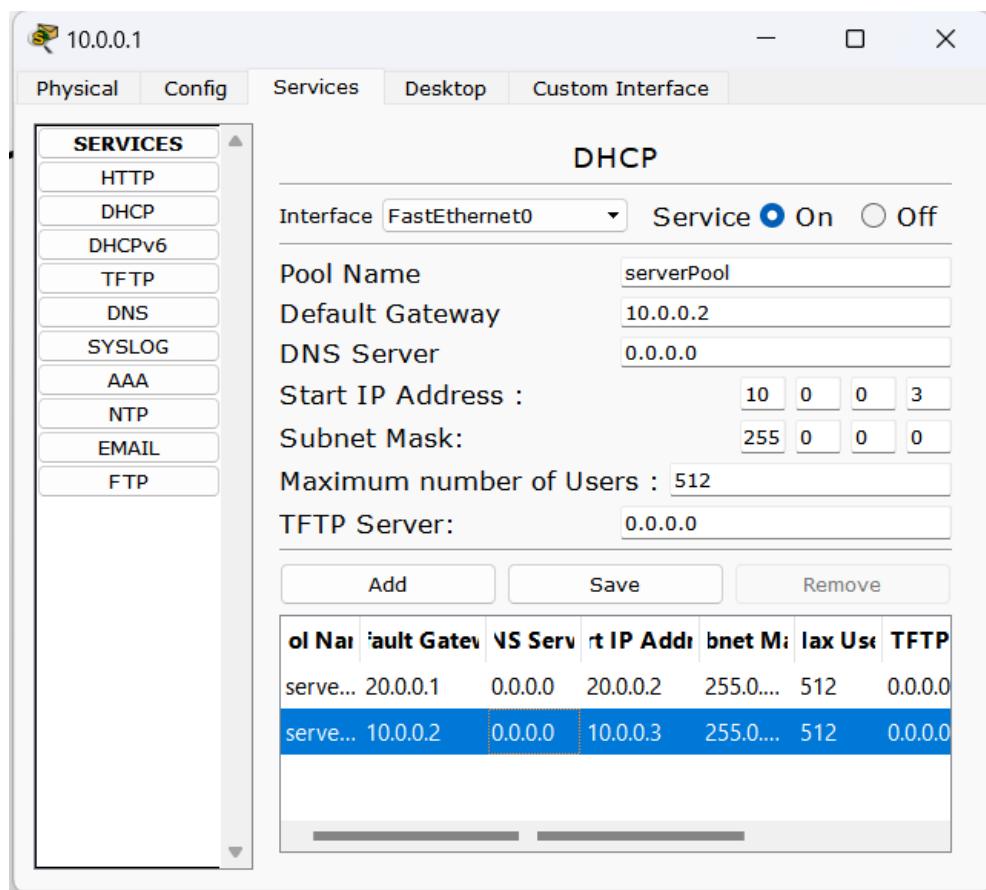
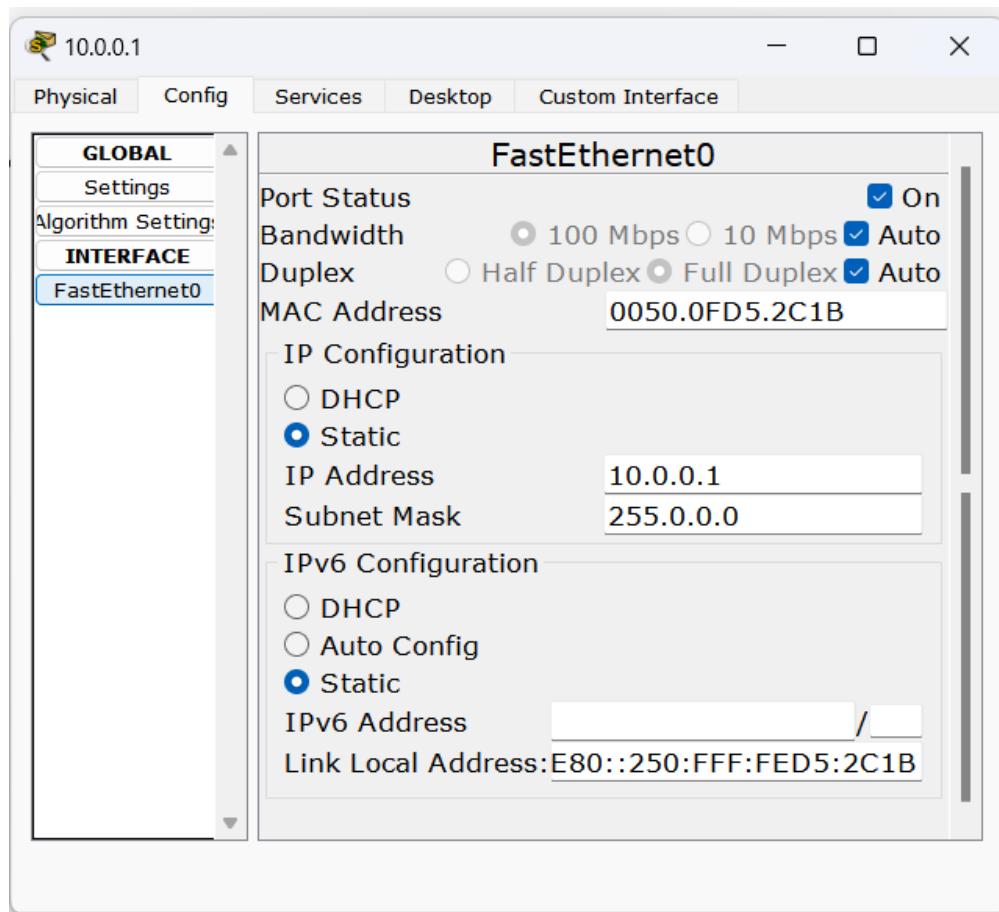
### 2.4.2 Screenshots (Topology, Configurations & Output):

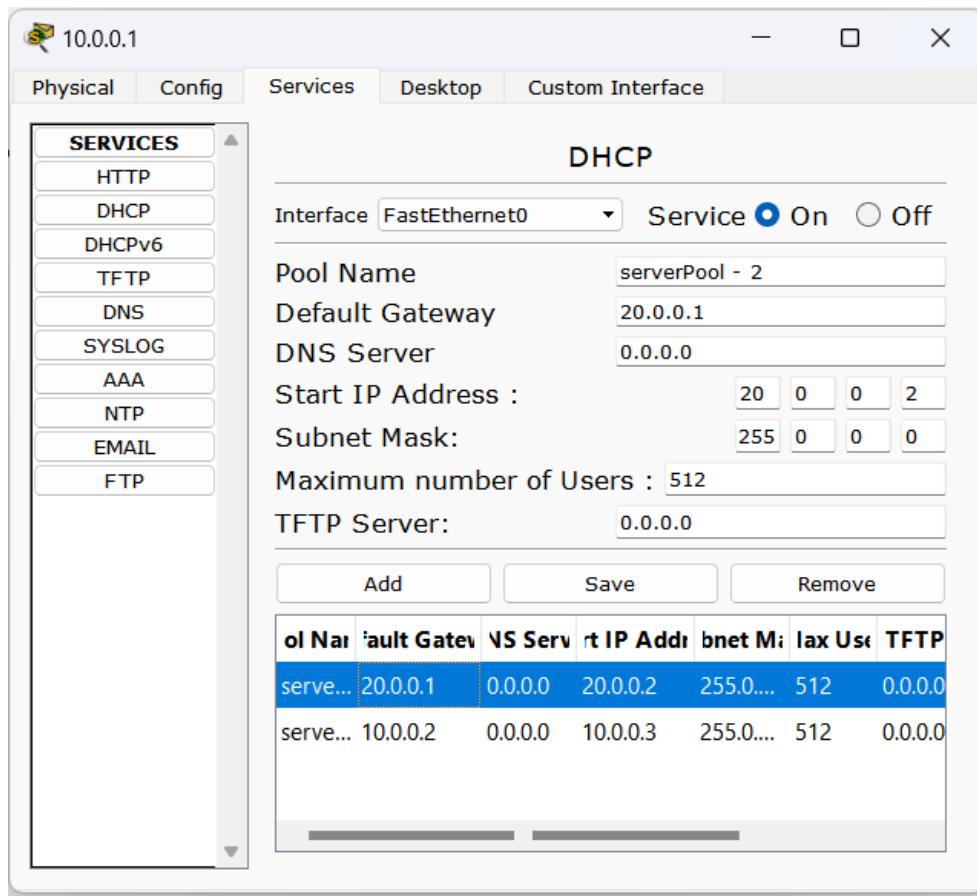
#### Topology - 1:



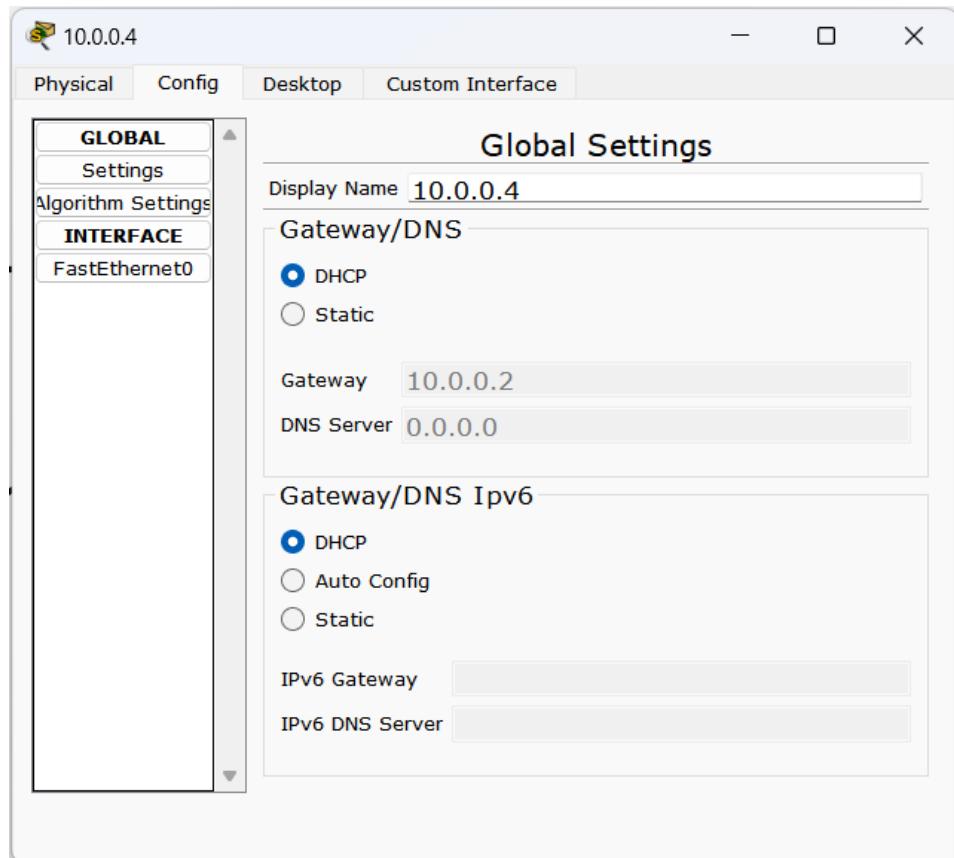
#### Server Configuration:

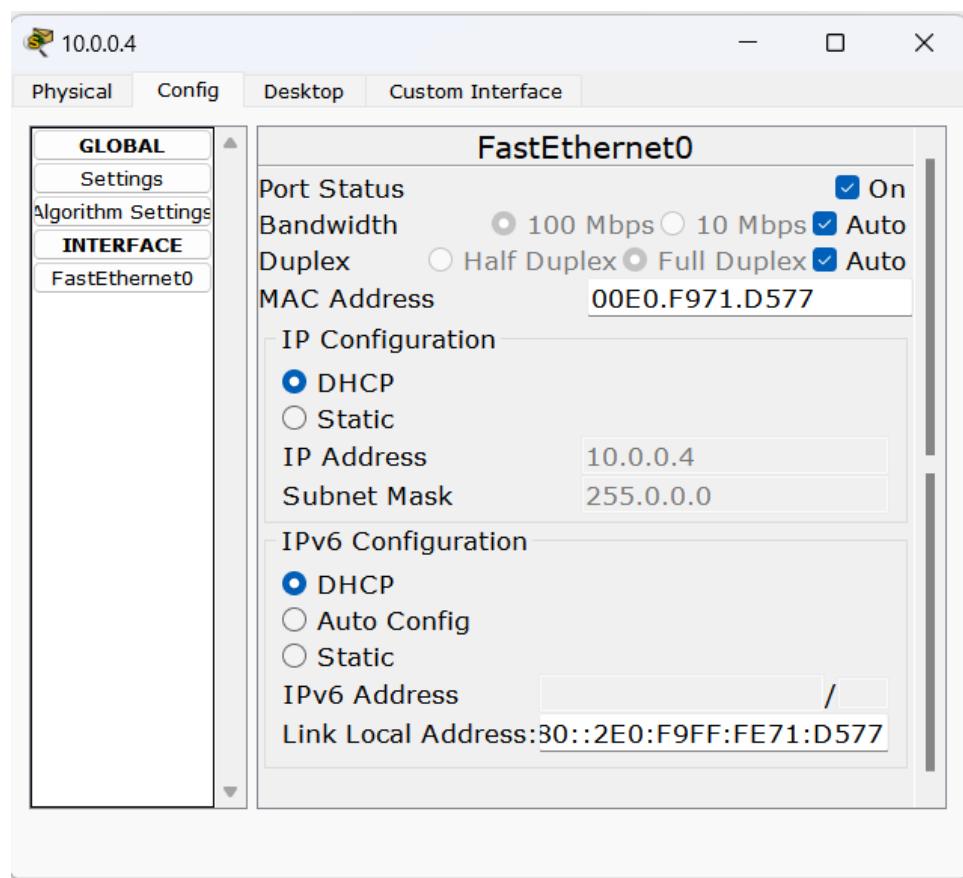




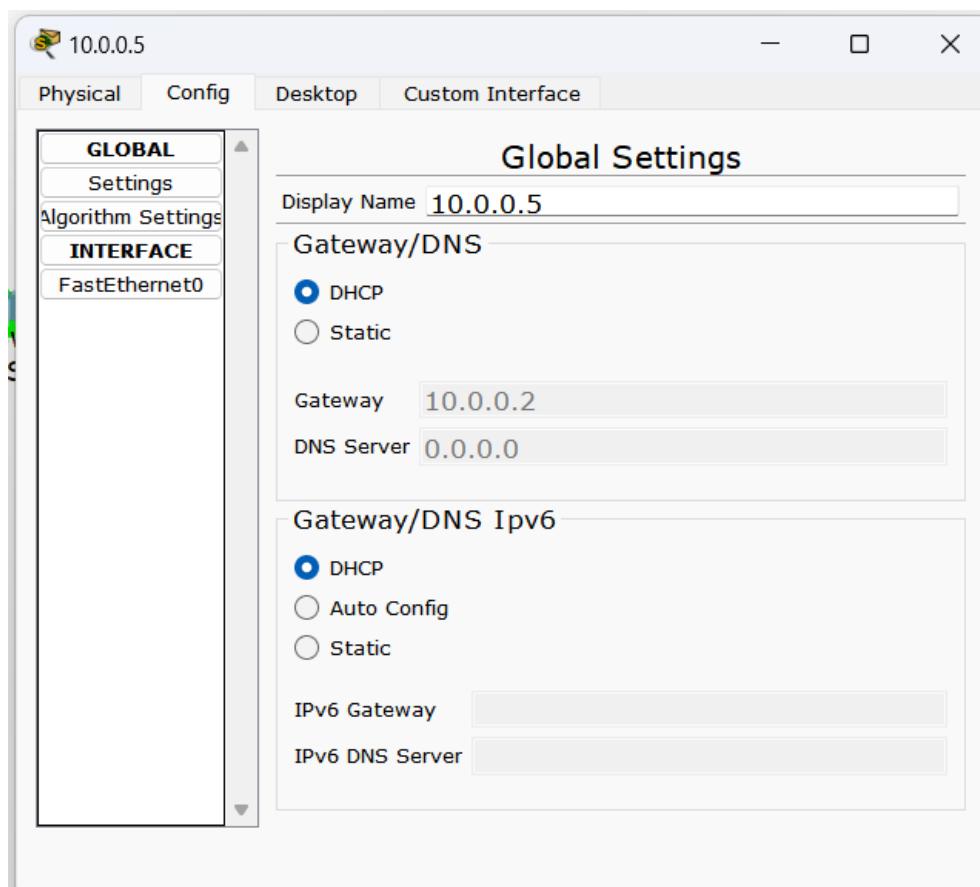


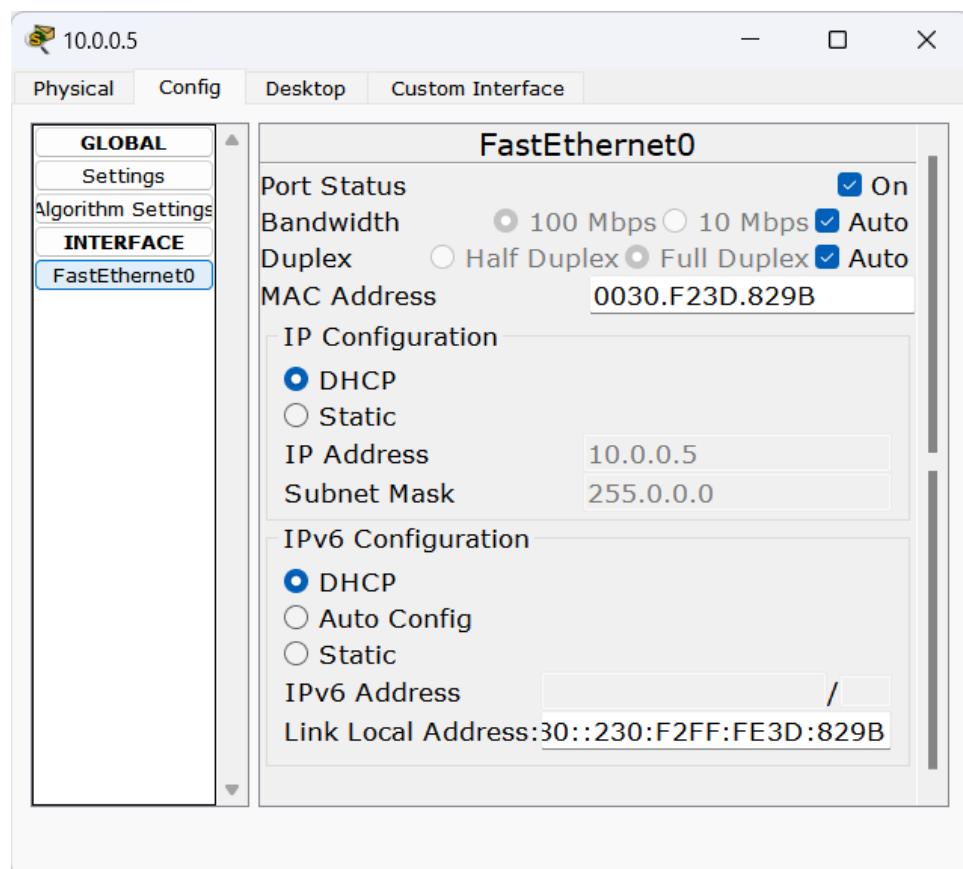
## PC - 1 Configuration(Through DHCP):



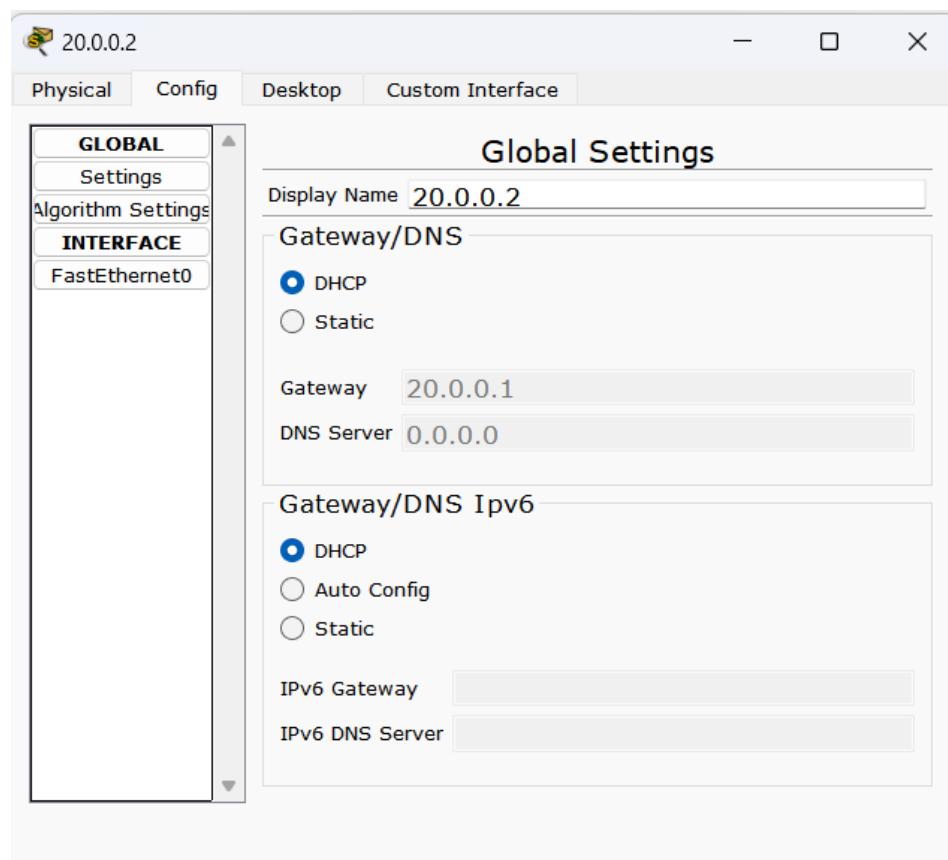


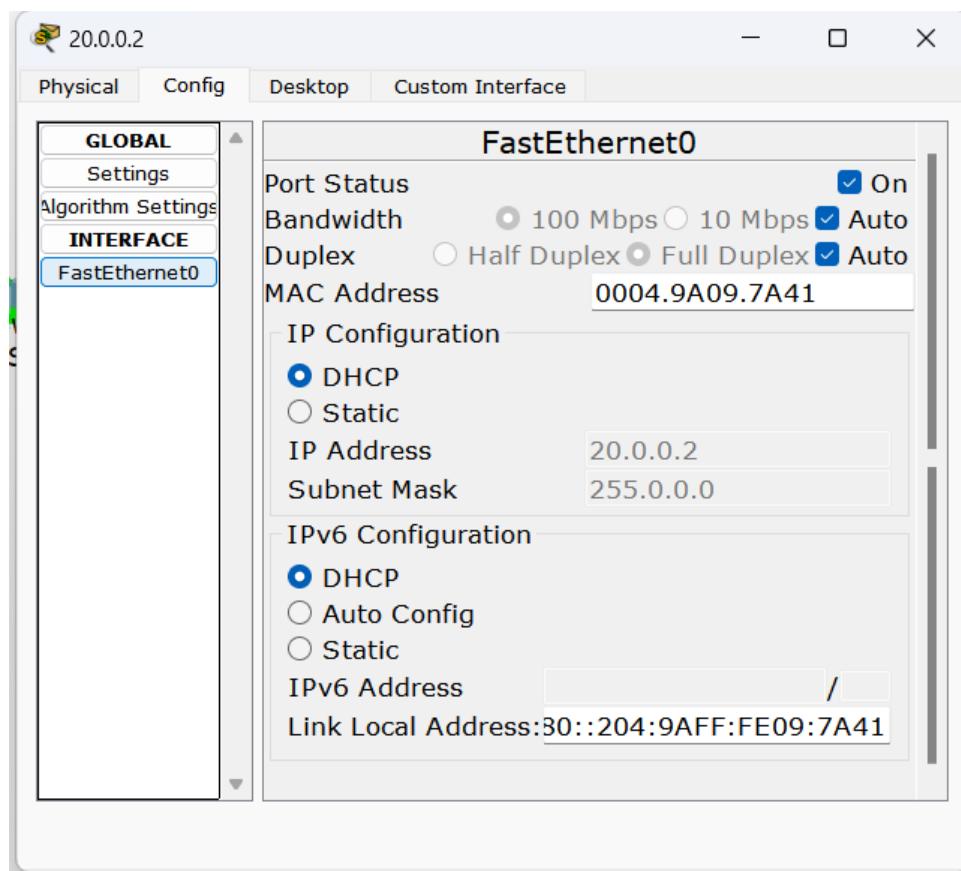
## PC - 2 Configuration (Through DHCP):



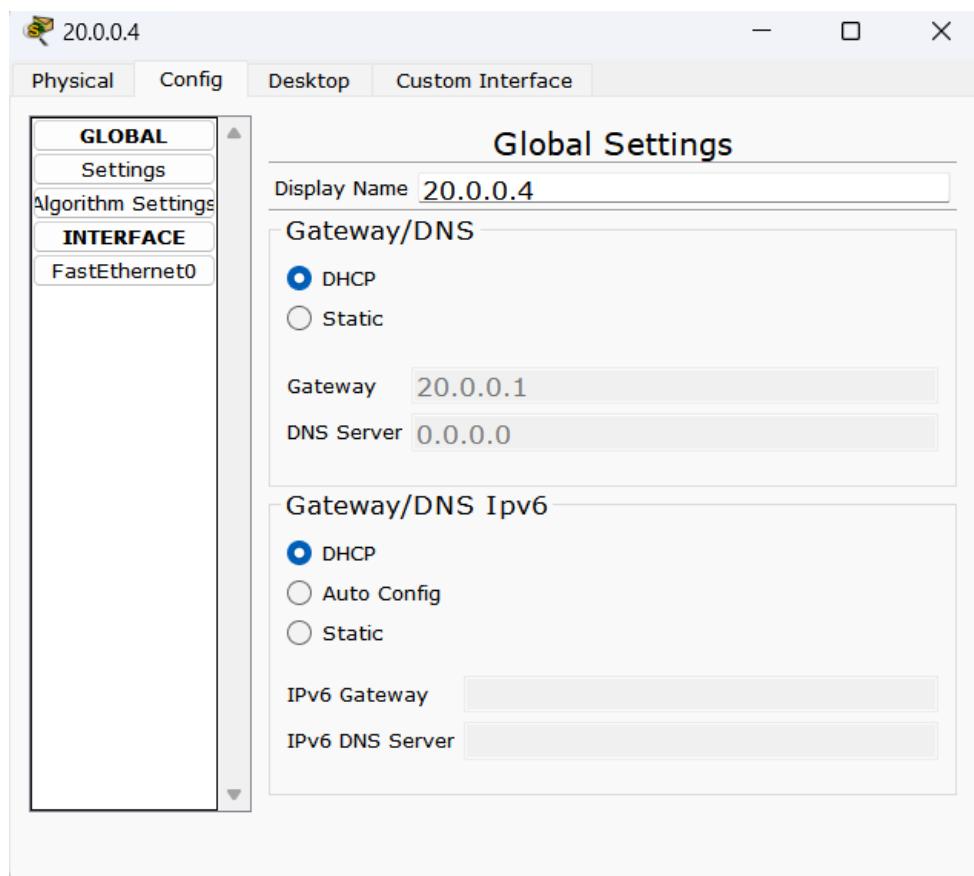


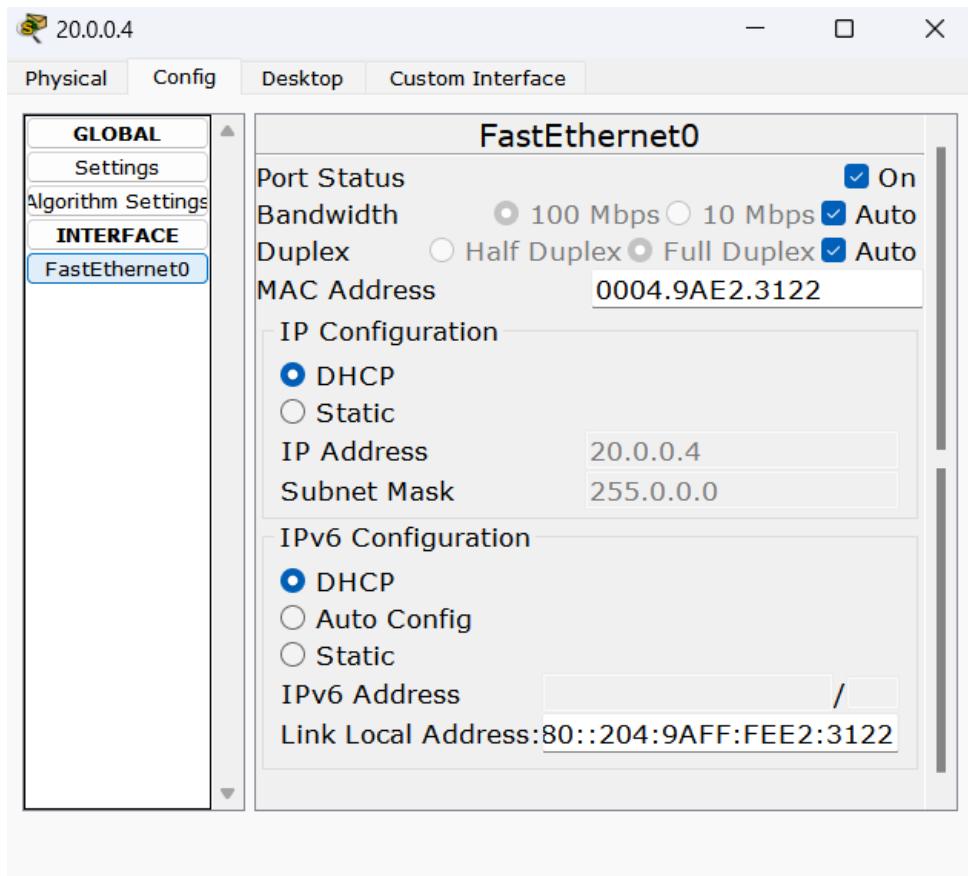
### PC - 3 Configuration (Through DHCP):





#### PC - 4 Configuration (Through DHCP):





## Router Configuration:

The screenshot shows the "IOS Command Line Interface" window for a router named "Router0". The tabs at the top are "Physical", "Config", and "CLI", with "Config" selected. The main area displays the following configuration commands:

```
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 10.0.0.2 255.0.0.0
Router(config-if)#no shutdown

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)#interface Fa1/0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#no shutdown

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

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

Router(config-if)#exit
```

At the bottom right of the CLI window are "Copy" and "Paste" buttons.

Router0

Physical Config CLI

### IOS Command Line Interface

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

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

Router(config-if)#exit
Router(config)#ip helper-address 10.0.0.1
^
% Invalid input detected at '^' marker.

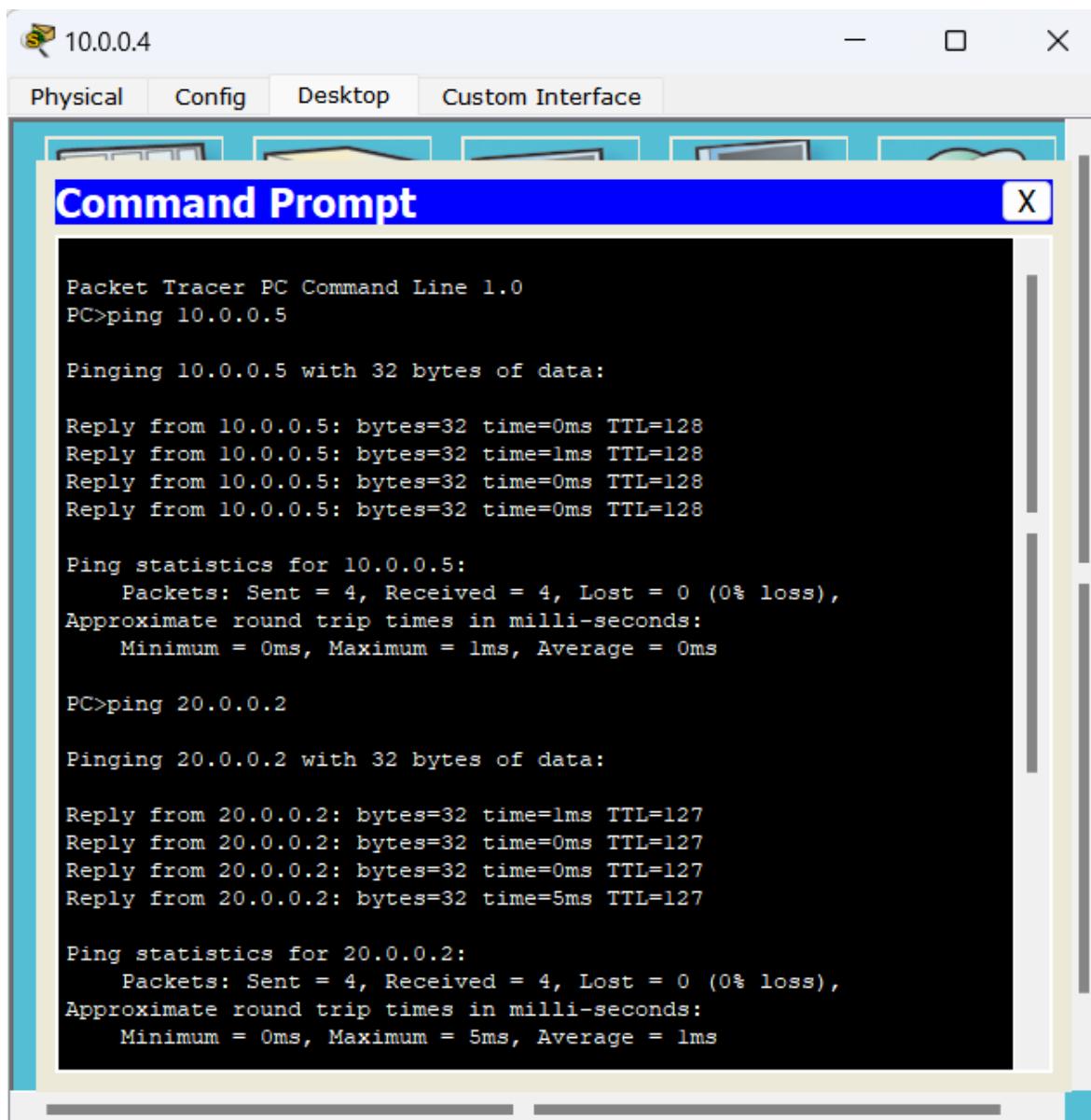
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Fa1/0
Router(config-if)#ip helper-address 10.0.0.1
Router(config-if)#exit|
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#
```

## Output (Ping Messages):

From PC1 to All other PCs:



The screenshot shows a Windows Command Prompt window titled "Command Prompt". The window title bar includes icons for minimizing, maximizing, and closing, and the title itself. Below the title bar is a menu bar with tabs: "Physical", "Config", "Desktop", and "Custom Interface". The main area of the window displays the output of ping commands. The output is as follows:

```
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.5

Pinging 10.0.0.5 with 32 bytes of data:

Reply from 10.0.0.5: bytes=32 time=0ms TTL=128
Reply from 10.0.0.5: bytes=32 time=1ms TTL=128
Reply from 10.0.0.5: bytes=32 time=0ms TTL=128
Reply from 10.0.0.5: bytes=32 time=0ms TTL=128

Ping statistics for 10.0.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

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=5ms 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 = 5ms, Average = 1ms
```

The screenshot shows a Cisco Configuration Utility window titled "Command Prompt". The window has tabs at the top: Physical, Config, Desktop, and Custom Interface. The desktop tab is selected. Below the tabs is a toolbar with icons for Print, Copy, Paste, and others. The main area is a terminal window with the following text:

```
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=5ms 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 = 5ms, Average = 1ms

PC>ping 20.0.0.4
Pinging 20.0.0.4 with 32 bytes of data:
Reply from 20.0.0.4: bytes=32 time=0ms TTL=127

Ping statistics for 20.0.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

PC>
```

## From PC2 to All other PCs:

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=1ms TTL=128  
Reply from 10.0.0.4: bytes=32 time=1ms TTL=128  
Reply from 10.0.0.4: bytes=32 time=0ms TTL=128  
Reply from 10.0.0.4: bytes=32 time=1ms 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 = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 20.0.0.2

Pinging 20.0.0.2 with 32 bytes of data:

Request timed out.  
Reply from 20.0.0.2: bytes=32 time=0ms TTL=127  
Reply from 20.0.0.2: bytes=32 time=0ms TTL=127  
Reply from 20.0.0.2: bytes=32 time=13ms TTL=127

Ping statistics for 20.0.0.2:  
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),  
Approximate round trip times in milli-seconds:  
Minimum = 0ms, Maximum = 13ms, Average = 4ms

The screenshot shows a Cisco Packet Tracer interface with a "Command Prompt" window open. The window title is "Command Prompt". The content of the window shows two ping operations:

```
PC>ping 20.0.0.2
Pinging 20.0.0.2 with 32 bytes of data:
Request timed out.
Reply from 20.0.0.2: bytes=32 time=0ms TTL=127
Reply from 20.0.0.2: bytes=32 time=0ms TTL=127
Reply from 20.0.0.2: bytes=32 time=13ms TTL=127

Ping statistics for 20.0.0.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 13ms, Average = 4ms

PC>ping 20.0.0.4
Pinging 20.0.0.4 with 32 bytes of data:
Request timed out.
Reply from 20.0.0.4: bytes=32 time=1ms TTL=127
Reply from 20.0.0.4: bytes=32 time=1ms TTL=127
Reply from 20.0.0.4: bytes=32 time=1ms TTL=127

Ping statistics for 20.0.0.4:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms
```

## From PC3 to All other PCs:

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=0ms TTL=127  
Reply from 10.0.0.4: bytes=32 time=2ms TTL=127  
Reply from 10.0.0.4: bytes=32 time=0ms TTL=127  
Reply from 10.0.0.4: bytes=32 time=0ms TTL=127  
  
Ping statistics for 10.0.0.4:  
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
Minimum = 0ms, Maximum = 2ms, Average = 0ms  
  
PC>ping 10.0.0.5  
  
Pinging 10.0.0.5 with 32 bytes of data:  
  
Reply from 10.0.0.5: bytes=32 time=0ms TTL=127  
Reply from 10.0.0.5: bytes=32 time=0ms TTL=127  
Reply from 10.0.0.5: bytes=32 time=1ms TTL=127  
Reply from 10.0.0.5: bytes=32 time=0ms TTL=127  
  
Ping statistics for 10.0.0.5:  
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
Minimum = 0ms, Maximum = 1ms, Average = 0ms

The screenshot shows a Cisco Packet Tracer simulation window titled "Command Prompt". The window contains terminal output for two ping commands. The first command, PC>ping 10.0.0.5, shows four successful replies from 10.0.0.5 with TTL=127. The second command, PC>ping 20.0.0.4, shows four successful replies from 20.0.0.4 with varying round trip times (1ms, 3ms, 1ms, 1ms) and an average of 1ms.

```
PC>ping 10.0.0.5
Pinging 10.0.0.5 with 32 bytes of data:
Reply from 10.0.0.5: bytes=32 time=0ms TTL=127
Reply from 10.0.0.5: bytes=32 time=0ms TTL=127
Reply from 10.0.0.5: bytes=32 time=1ms TTL=127
Reply from 10.0.0.5: bytes=32 time=0ms TTL=127

Ping statistics for 10.0.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 20.0.0.4
Pinging 20.0.0.4 with 32 bytes of data:
Reply from 20.0.0.4: bytes=32 time=1ms TTL=128
Reply from 20.0.0.4: bytes=32 time=3ms TTL=128
Reply from 20.0.0.4: bytes=32 time=0ms TTL=128
Reply from 20.0.0.4: bytes=32 time=1ms TTL=128

Ping statistics for 20.0.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 3ms, Average = 1ms

PC>
```

## From PC4 to All other PCs:

The screenshot shows a Cisco Packet Tracer Command Line interface window titled "Command Prompt". The window title bar includes icons for Physical, Config, Desktop, and Custom Interface tabs, along with a close button (X). The main text area displays the following command-line session:

```
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=0ms TTL=127
Reply from 10.0.0.4: bytes=32 time=0ms TTL=127
Reply from 10.0.0.4: bytes=32 time=0ms TTL=127
Reply from 10.0.0.4: bytes=32 time=1ms TTL=127

Ping statistics for 10.0.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 10.0.0.5

Pinging 10.0.0.5 with 32 bytes of data:

Reply from 10.0.0.5: bytes=32 time=2ms TTL=127
Reply from 10.0.0.5: bytes=32 time=0ms TTL=127
Reply from 10.0.0.5: bytes=32 time=4ms TTL=127
Reply from 10.0.0.5: bytes=32 time=0ms TTL=127

Ping statistics for 10.0.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 4ms, Average = 1ms
```

The screenshot shows a Cisco Packet Tracer interface with a window titled "Command Prompt". The window contains terminal output for two ping commands. The first command, "PC>ping 10.0.0.5", shows four successful replies from the target IP address. The second command, "PC>ping 20.0.0.2", also shows four successful replies. Both commands include ping statistics at the end.

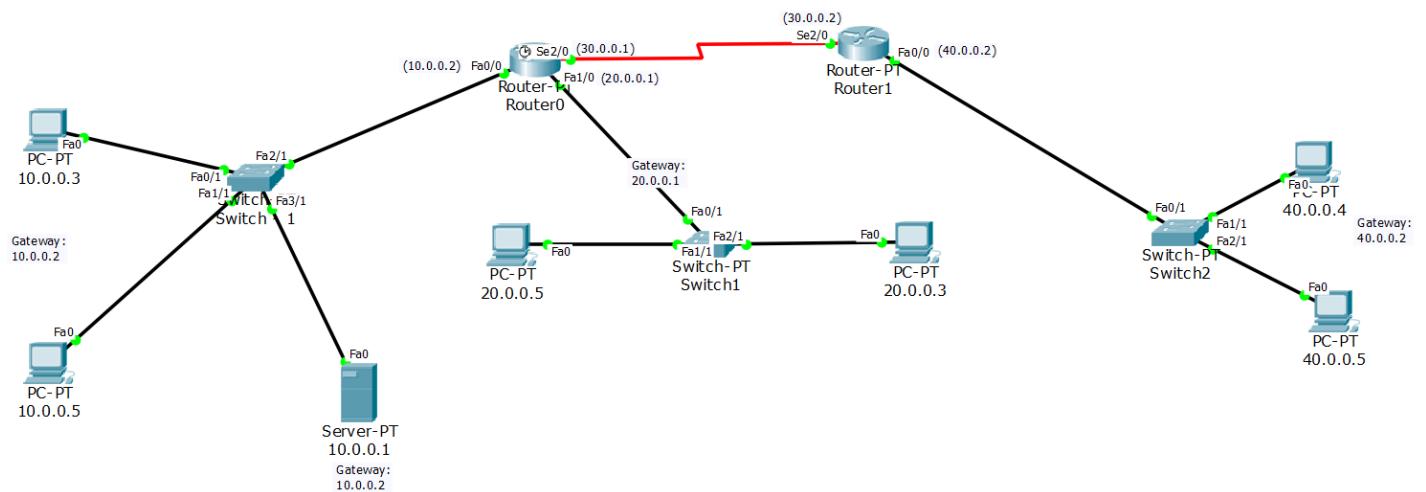
```
PC>ping 10.0.0.5
Pinging 10.0.0.5 with 32 bytes of data:
Reply from 10.0.0.5: bytes=32 time=2ms TTL=127
Reply from 10.0.0.5: bytes=32 time=0ms TTL=127
Reply from 10.0.0.5: bytes=32 time=4ms TTL=127
Reply from 10.0.0.5: bytes=32 time=0ms TTL=127

Ping statistics for 10.0.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 4ms, Average = 1ms

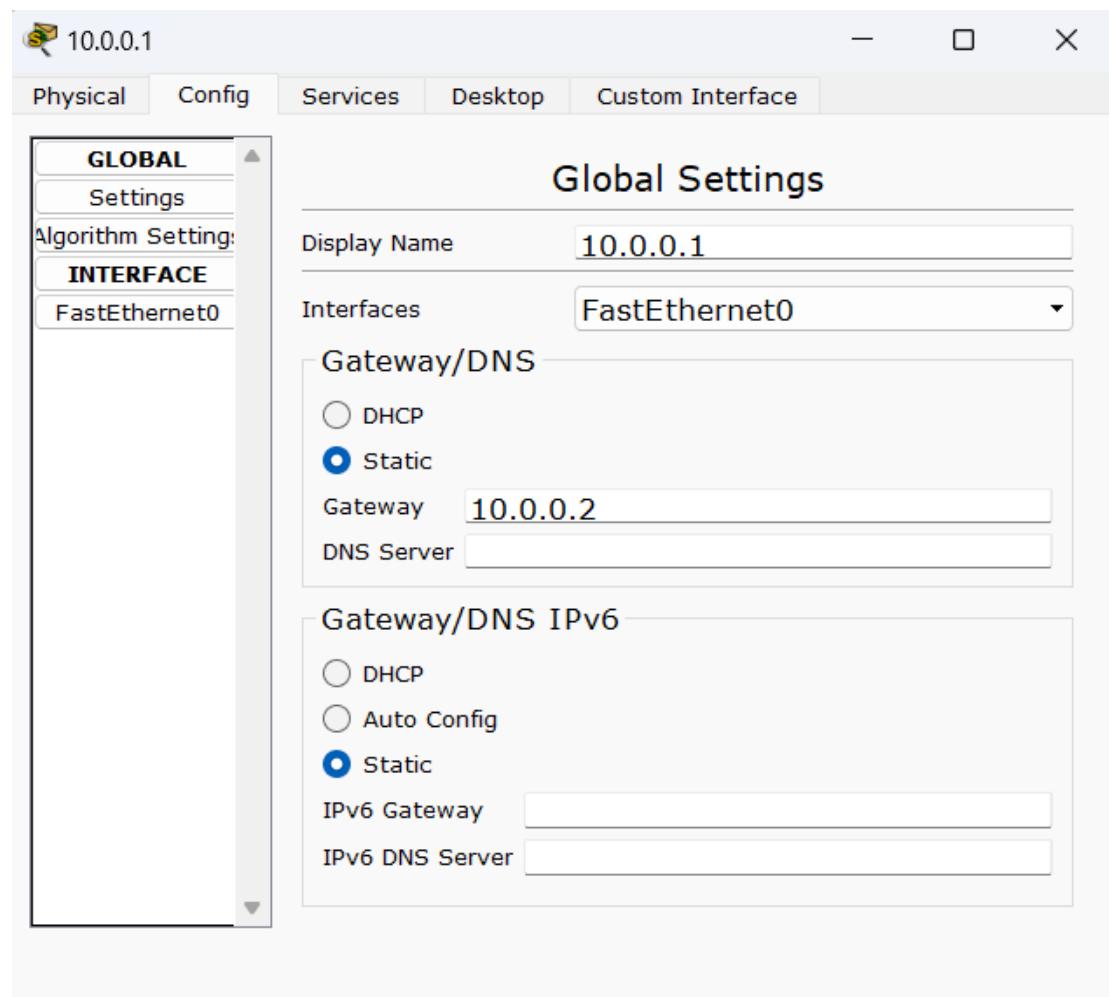
PC>ping 20.0.0.2
Pinging 20.0.0.2 with 32 bytes of data:
Reply from 20.0.0.2: bytes=32 time=1ms TTL=128
Reply from 20.0.0.2: bytes=32 time=0ms TTL=128
Reply from 20.0.0.2: bytes=32 time=0ms TTL=128
Reply from 20.0.0.2: bytes=32 time=6ms TTL=128

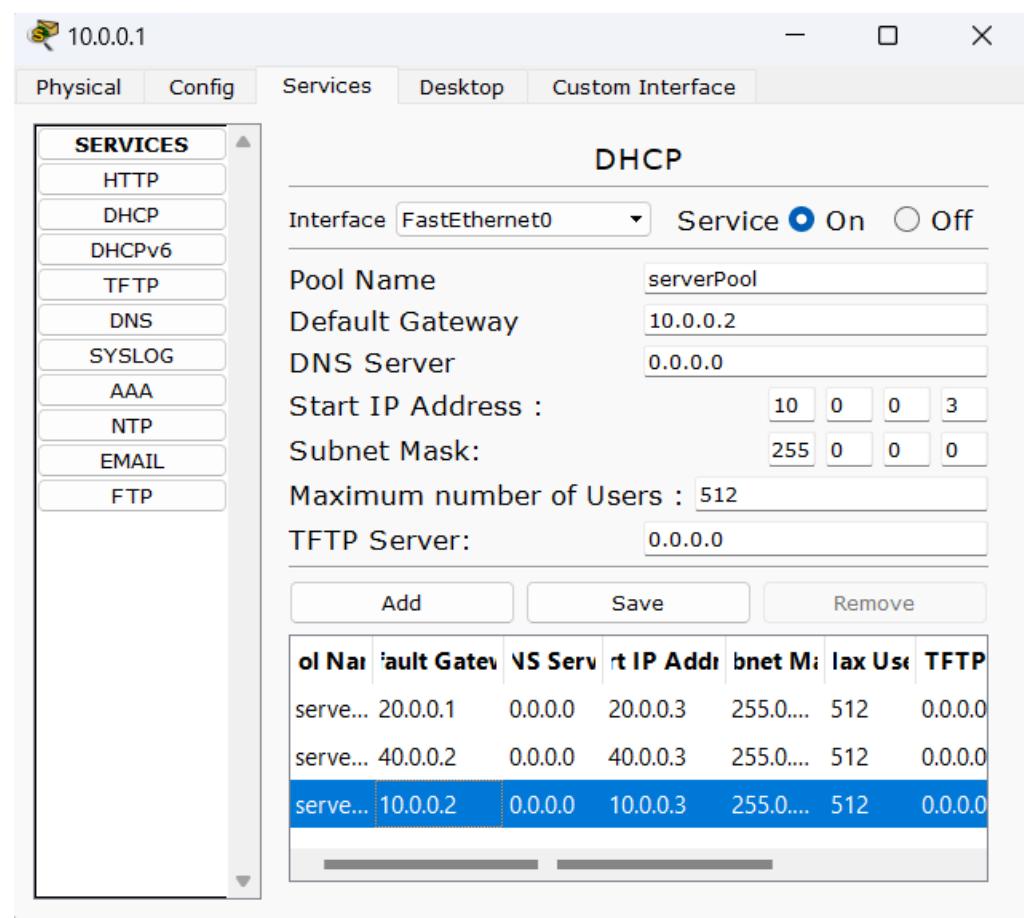
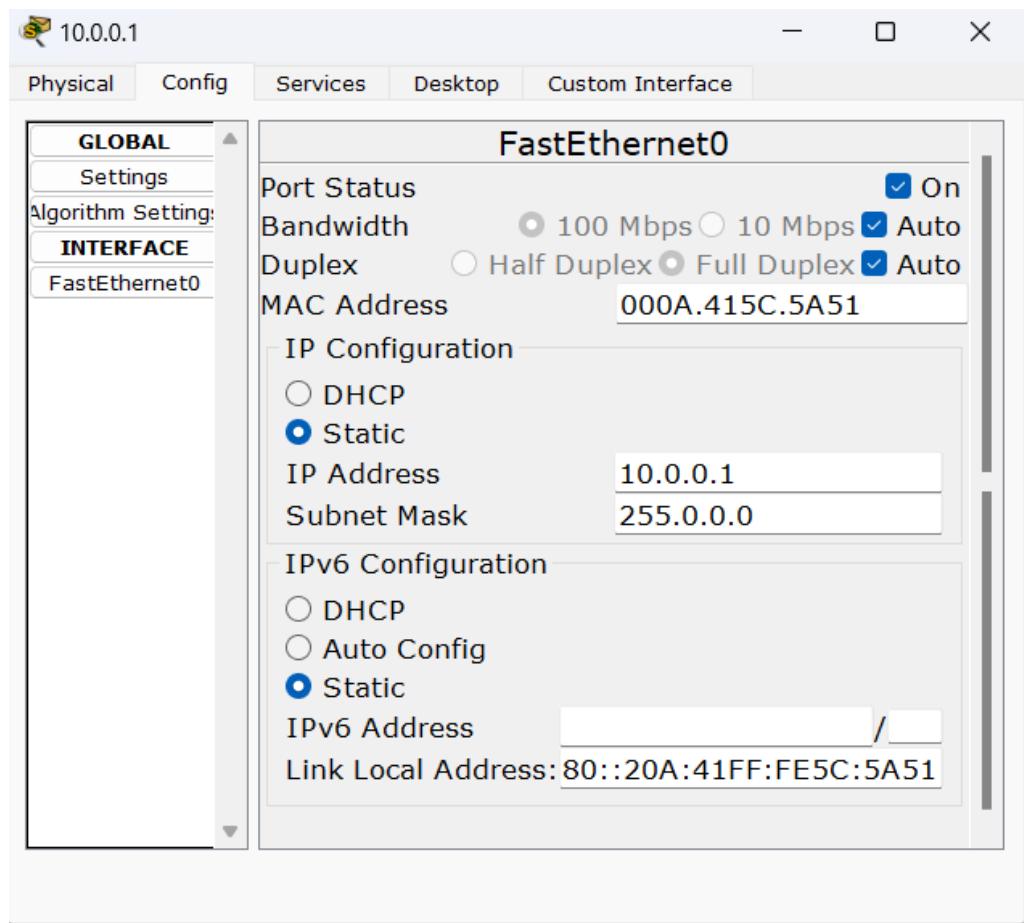
Ping statistics for 20.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 6ms, Average = 1ms
```

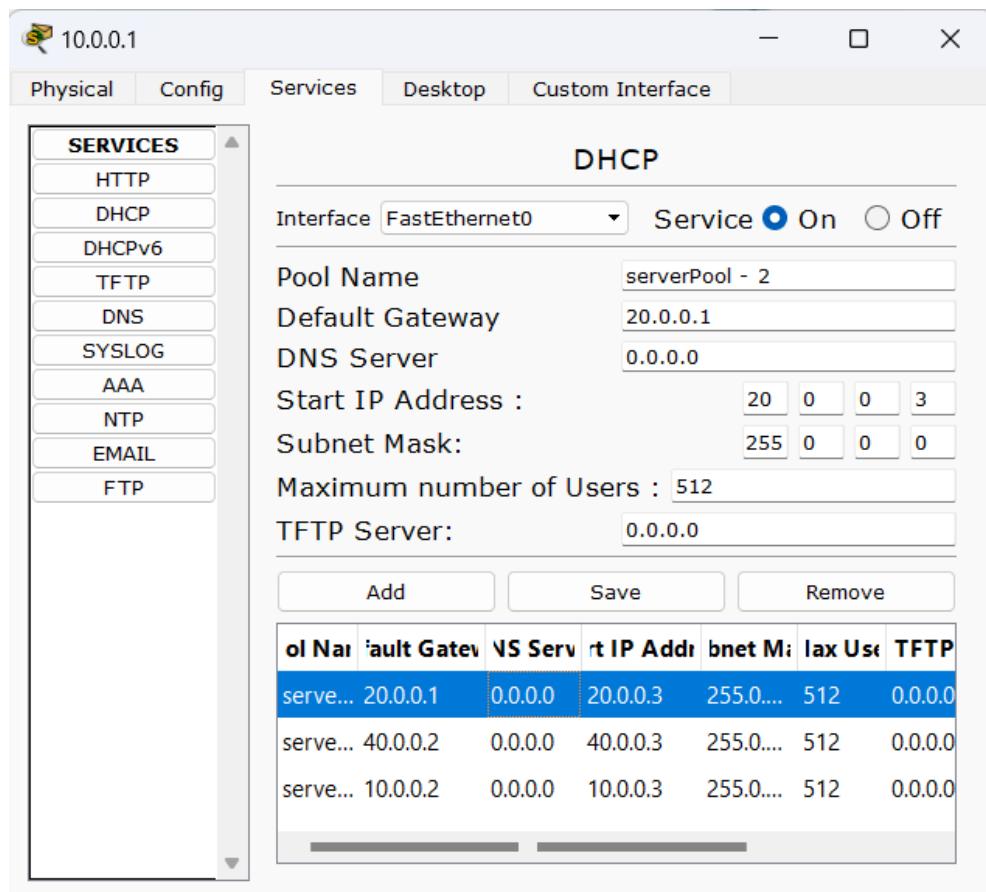
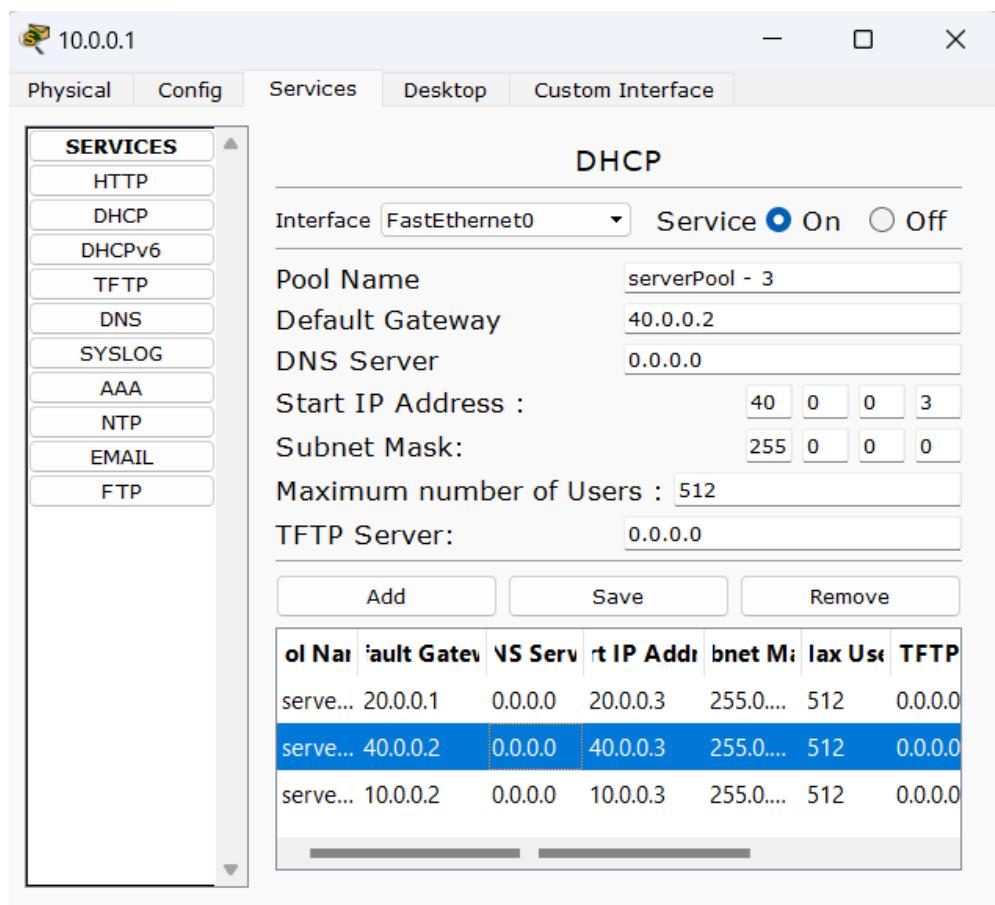
## Topology - 2:



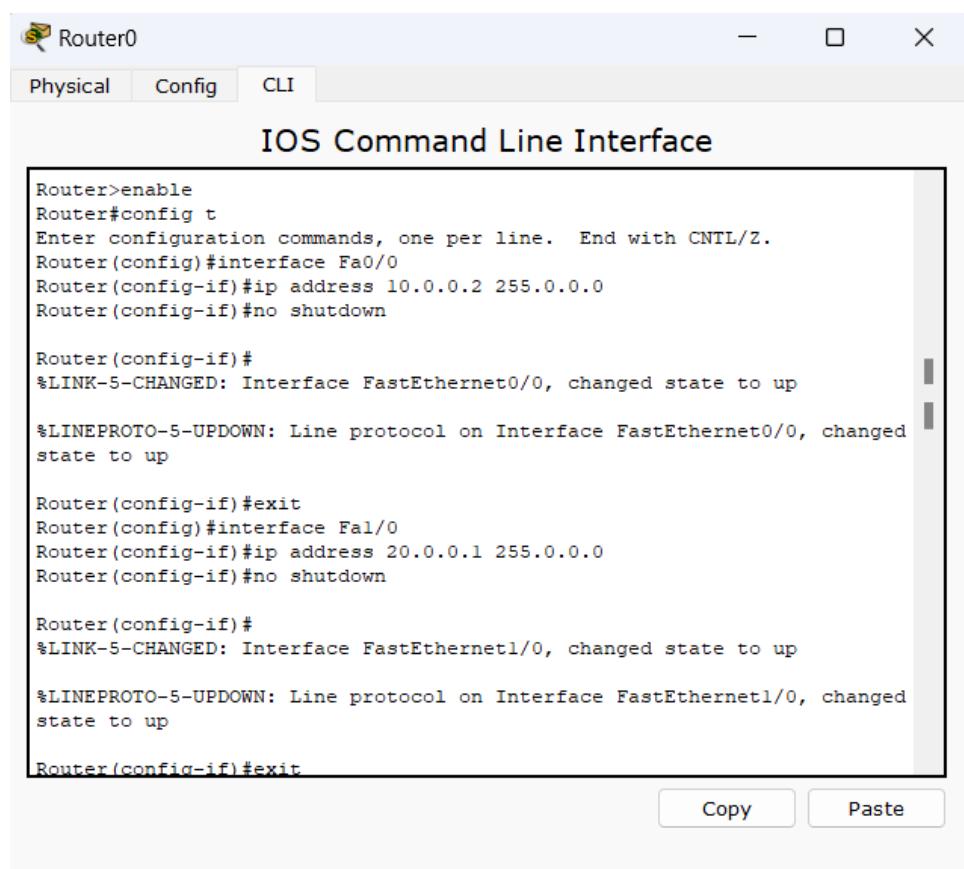
## Server Configuration:







## Router - 0 (Configuration)



The window title is "Router0". The tab bar shows "Physical", "Config" (which is selected), and "CLI". The main area is titled "IOS Command Line Interface". The command history is as follows:

```
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 10.0.0.2 255.0.0.0
Router(config-if)#no shutdown

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

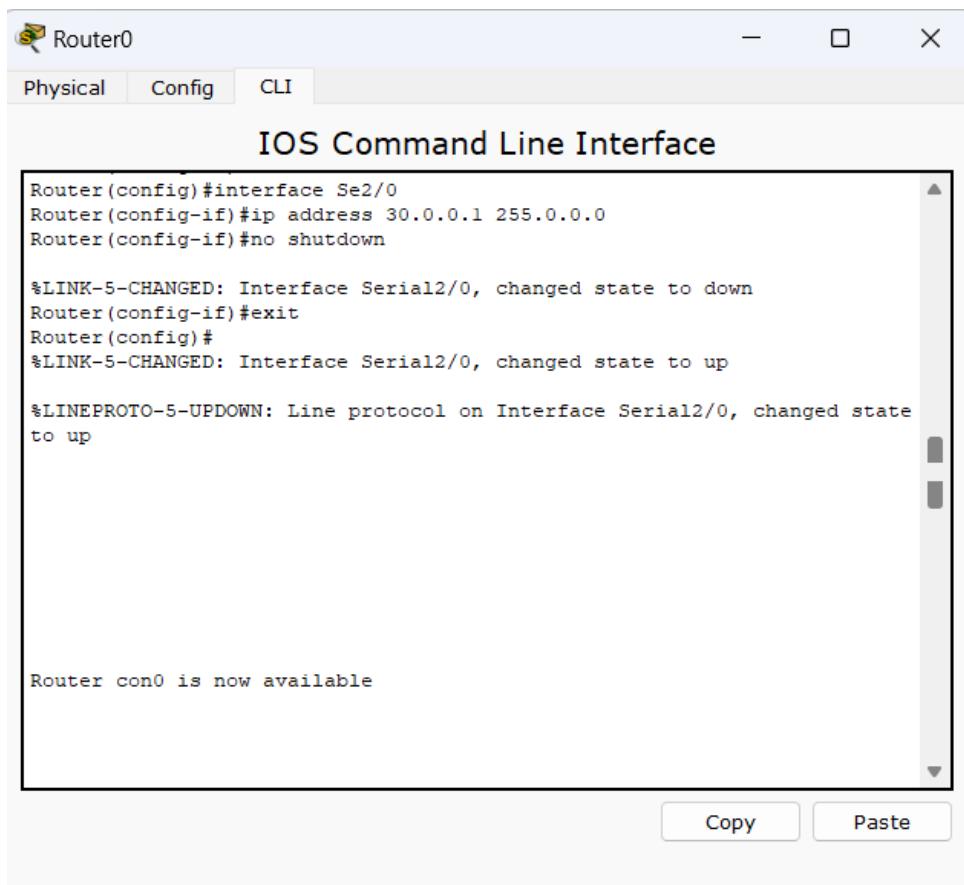
Router(config-if)#exit
Router(config)#interface Fa1/0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#no shutdown

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

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

Router(config-if)#exit
```

At the bottom right are "Copy" and "Paste" buttons.



The window title is "Router0". The tab bar shows "Physical", "Config" (which is selected), and "CLI". The main area is titled "IOS Command Line Interface". The command history is as follows:

```
Router(config)#interface Se2/0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#no shutdown

%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 con0 is now available
```

At the bottom right are "Copy" and "Paste" buttons.

 Router0

Physical Config CLI

### IOS Command Line Interface

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Fa1/0
Router(config-if)#ip helper-address 10.0.0.1
Router(config-if)#exit
Router(config)#show ip route
^
% Invalid input detected at '^' marker.

Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
      inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set
```

 Router0

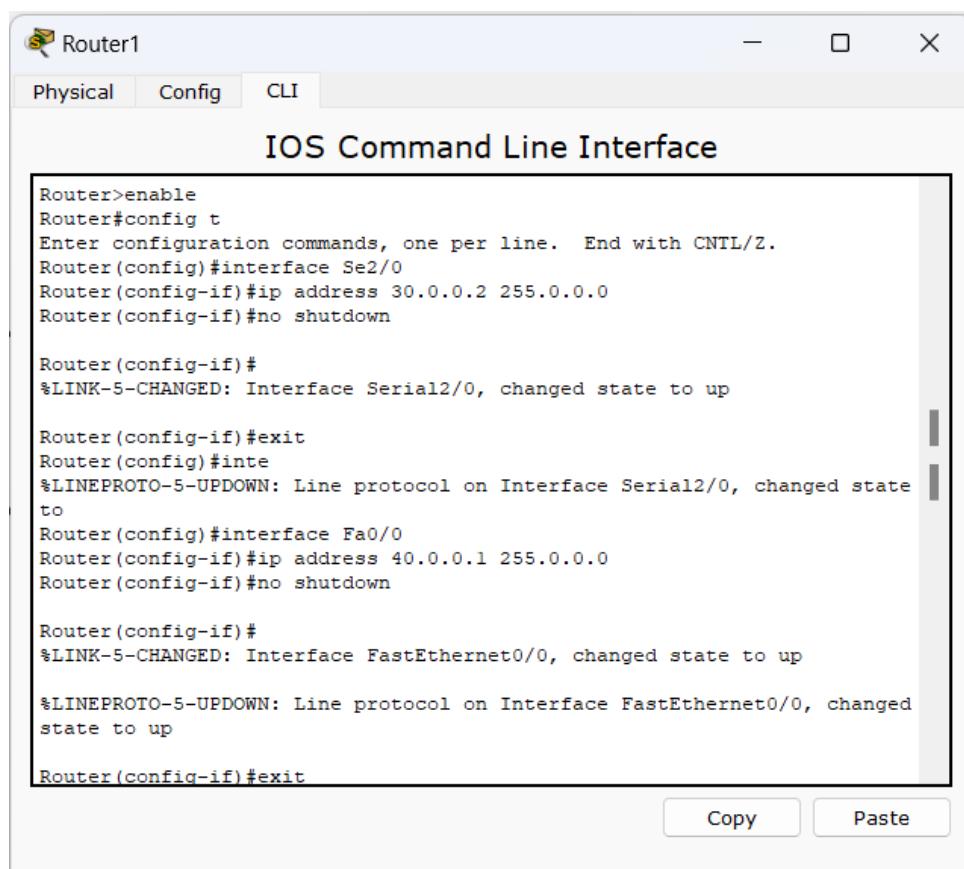
Physical Config CLI

### IOS Command Line Interface

```
C    10.0.0.0/8 is directly connected, FastEthernet0/0
C    20.0.0.0/8 is directly connected, FastEthernet1/0
C    30.0.0.0/8 is directly connected, Serial2/0
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 40.0.0.0 255.0.0.0 30.0.0.2
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 40.0.0.0 255.0.0.0 30.0.0.2

Router con0 is now available
```

## Router - 1 Configuration:



The screenshot shows a software interface for configuring a Cisco router. The title bar says "Router1". The tabs at the top are "Physical", "Config" (which is selected), and "CLI". The main window is titled "IOS Command Line Interface". It contains the following configuration commands:

```
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)#no shutdown

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

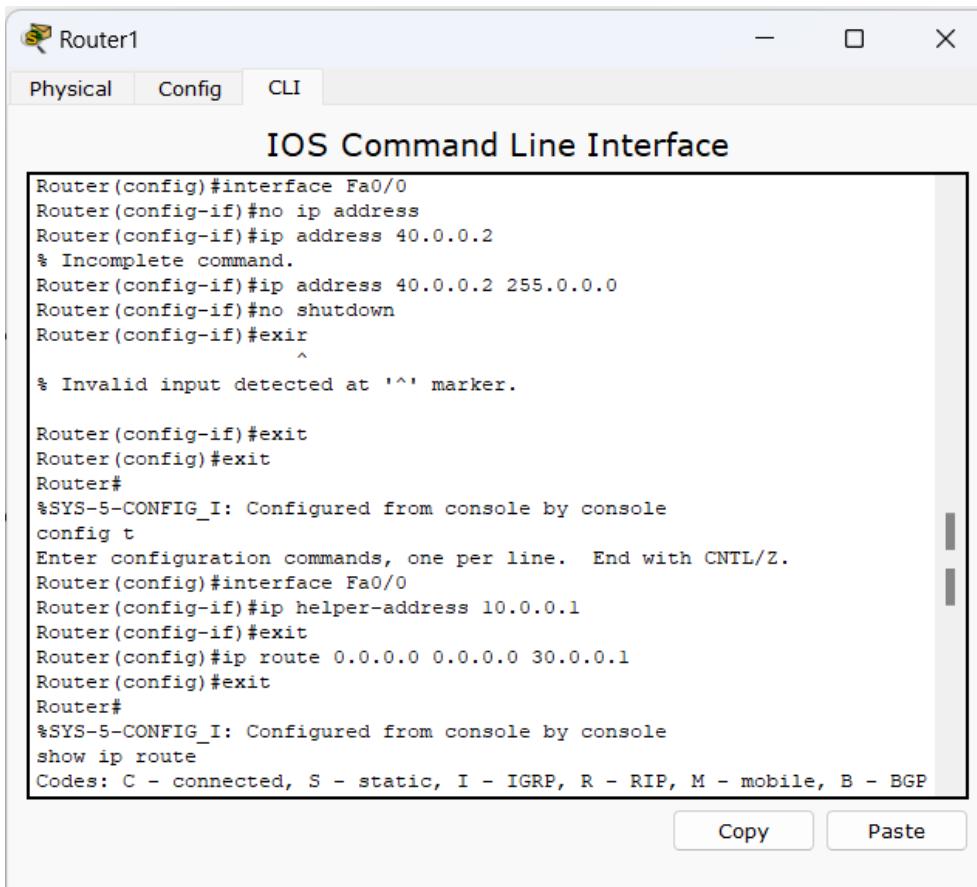
Router(config-if)#exit
Router(config)#inte
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to
to
Router(config)#interface Fa0/0
Router(config-if)#ip address 40.0.0.1 255.0.0.0
Router(config-if)#no shutdown

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
```

At the bottom right of the command window are "Copy" and "Paste" buttons.



The screenshot shows a software interface for configuring a Cisco router. The title bar says "Router1". The tabs at the top are "Physical", "Config" (which is selected), and "CLI". The main window is titled "IOS Command Line Interface". It contains the following configuration commands, with error messages displayed:

```
Router(config)#interface Fa0/0
Router(config-if)#no ip address
Router(config-if)#ip address 40.0.0.2
% Incomplete command.
Router(config-if)#ip address 40.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exir
^
% Invalid input detected at '^' marker.

Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Fa0/0
Router(config-if)#ip helper-address 10.0.0.1
Router(config-if)#exit
Router(config)#ip route 0.0.0.0 0.0.0.0 30.0.0.1
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
```

At the bottom right of the command window are "Copy" and "Paste" buttons.

**Router1**

Physical Config CLI

### IOS Command Line Interface

```

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 30.0.0.1 to network 0.0.0.0

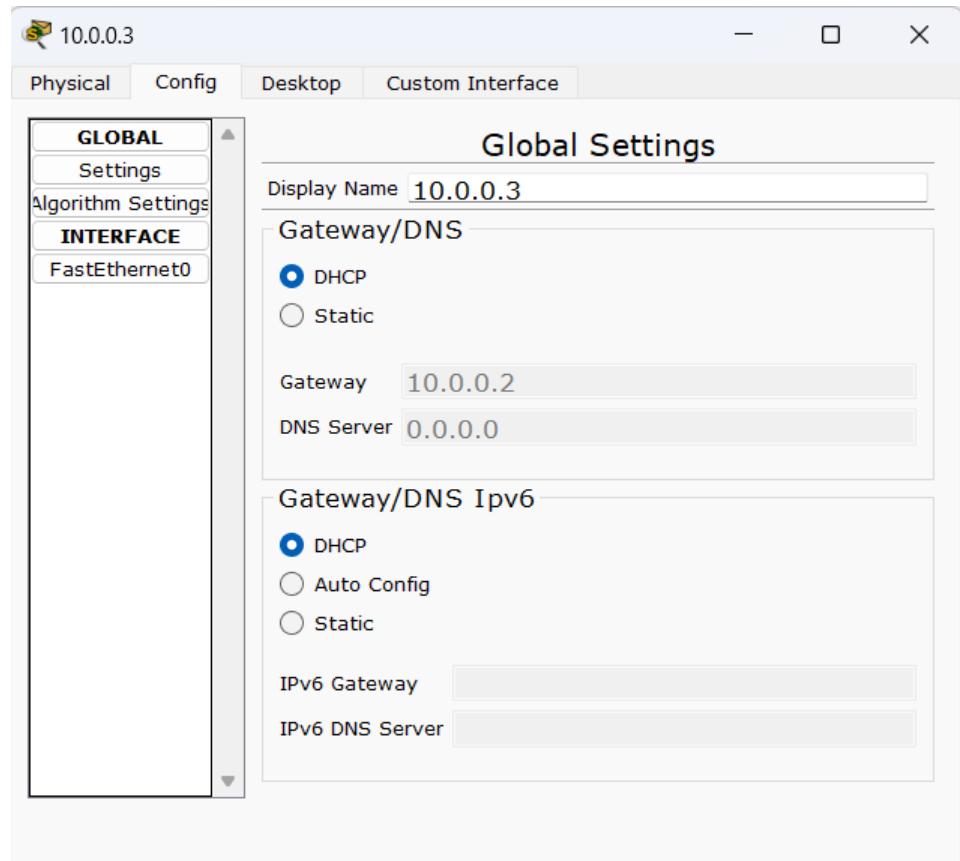
C      30.0.0.0/8 is directly connected, Serial2/0
C      40.0.0.0/8 is directly connected, FastEthernet0/0
S*    0.0.0.0/0 [1/0] via 30.0.0.1
Router#

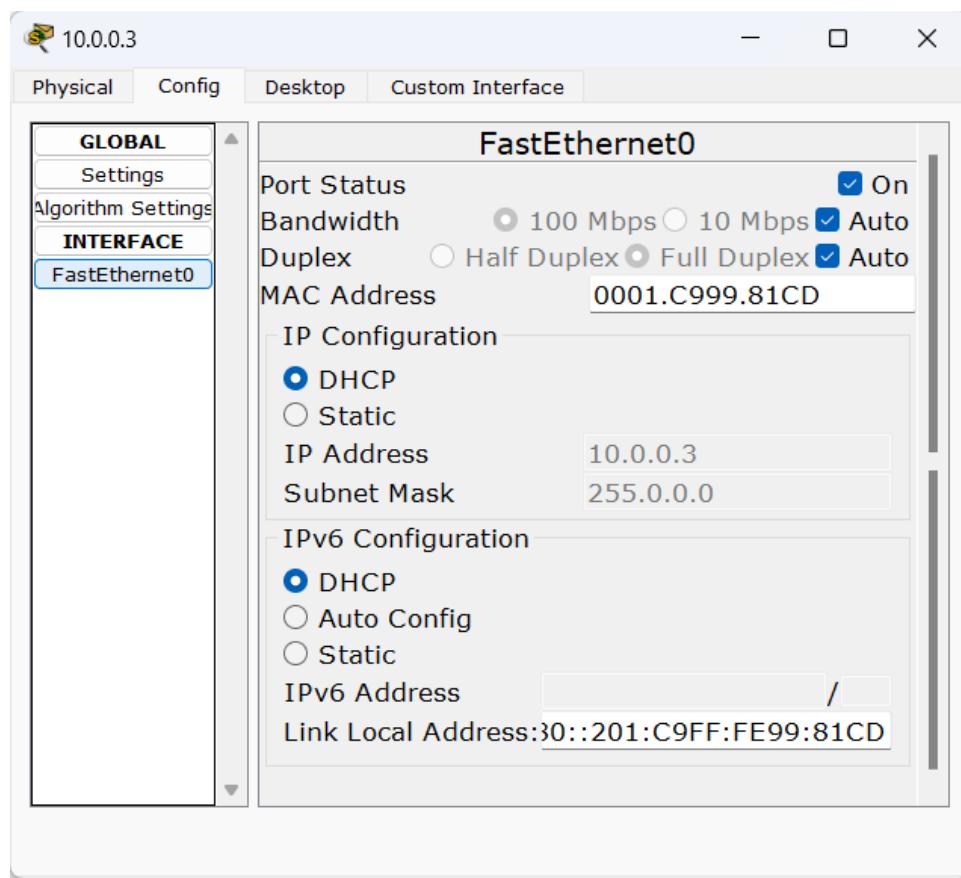
```

Router con0 is now available

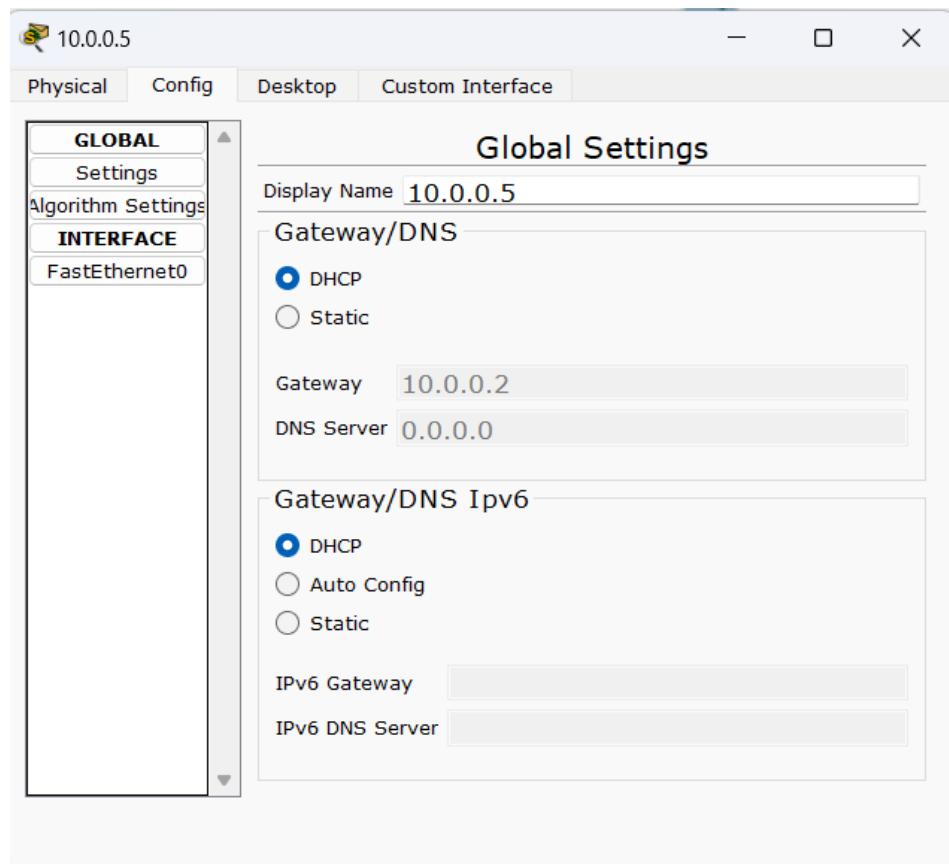
Copy Paste

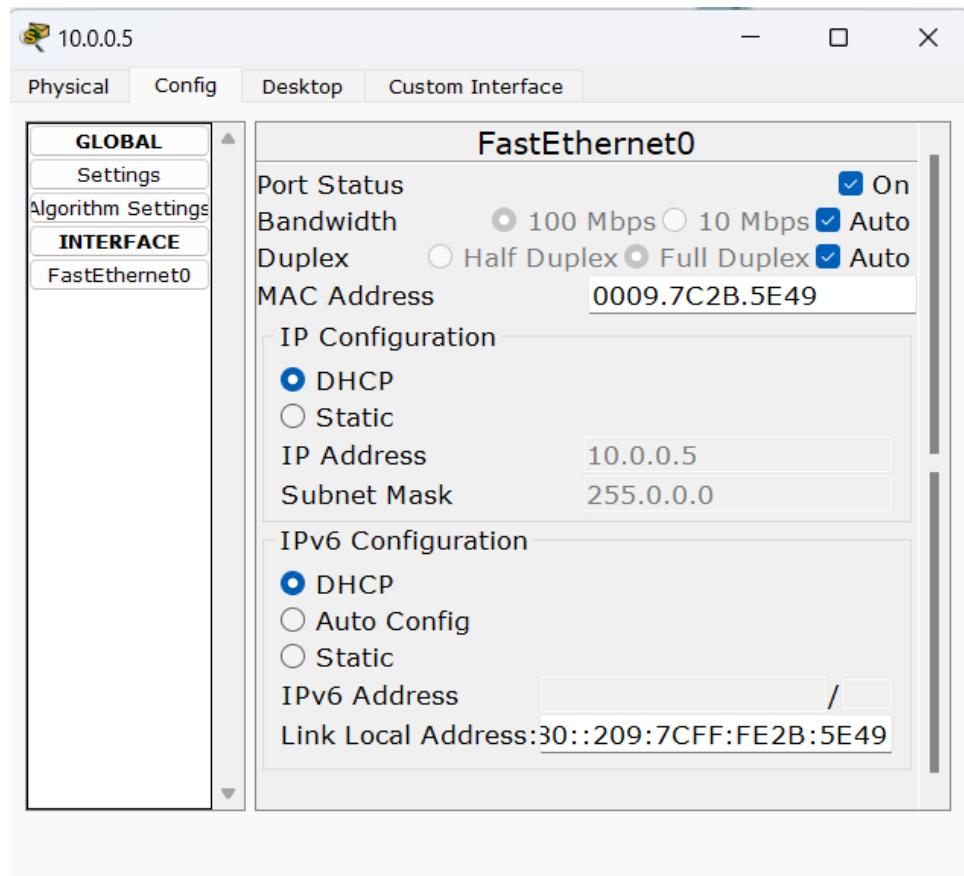
## PC - 1 Configuration (Through DHCP):



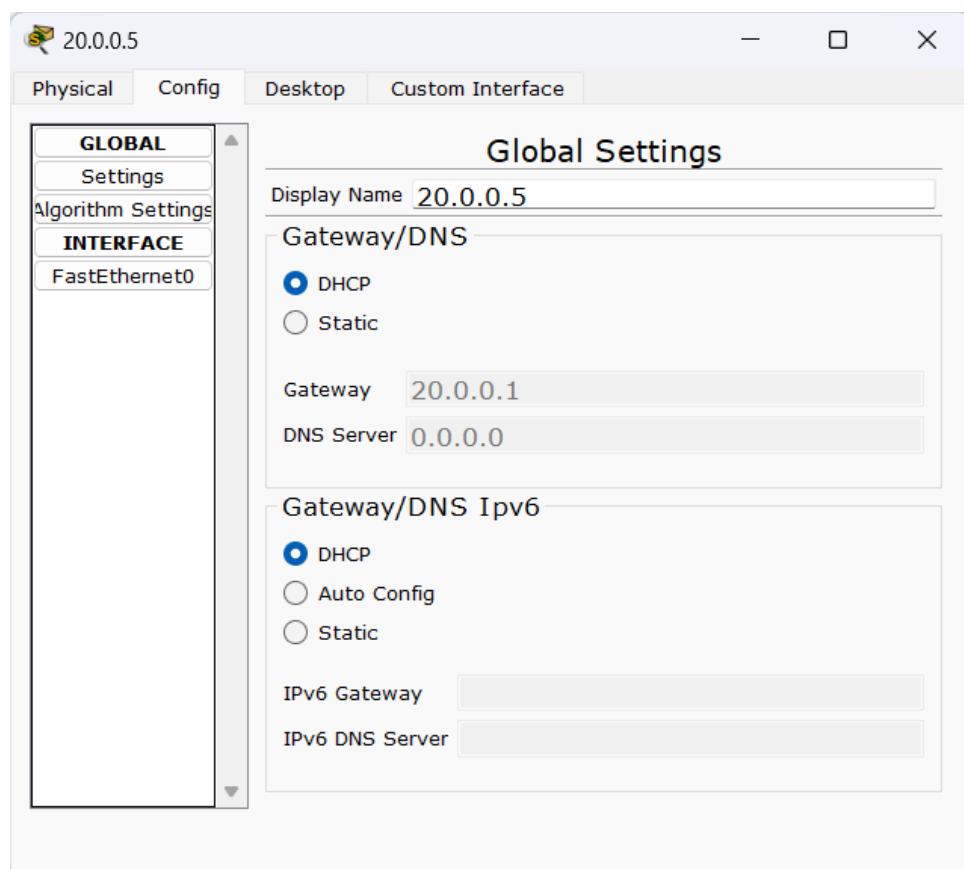


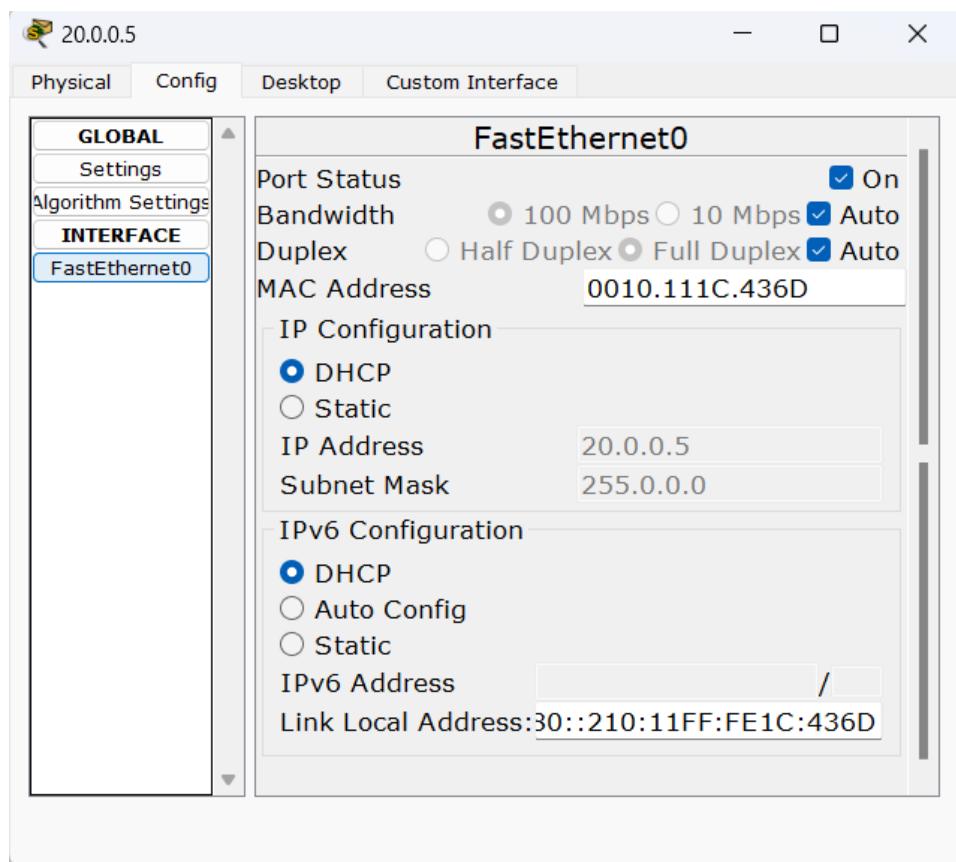
## PC - 2 Configuration (Through DHCP):



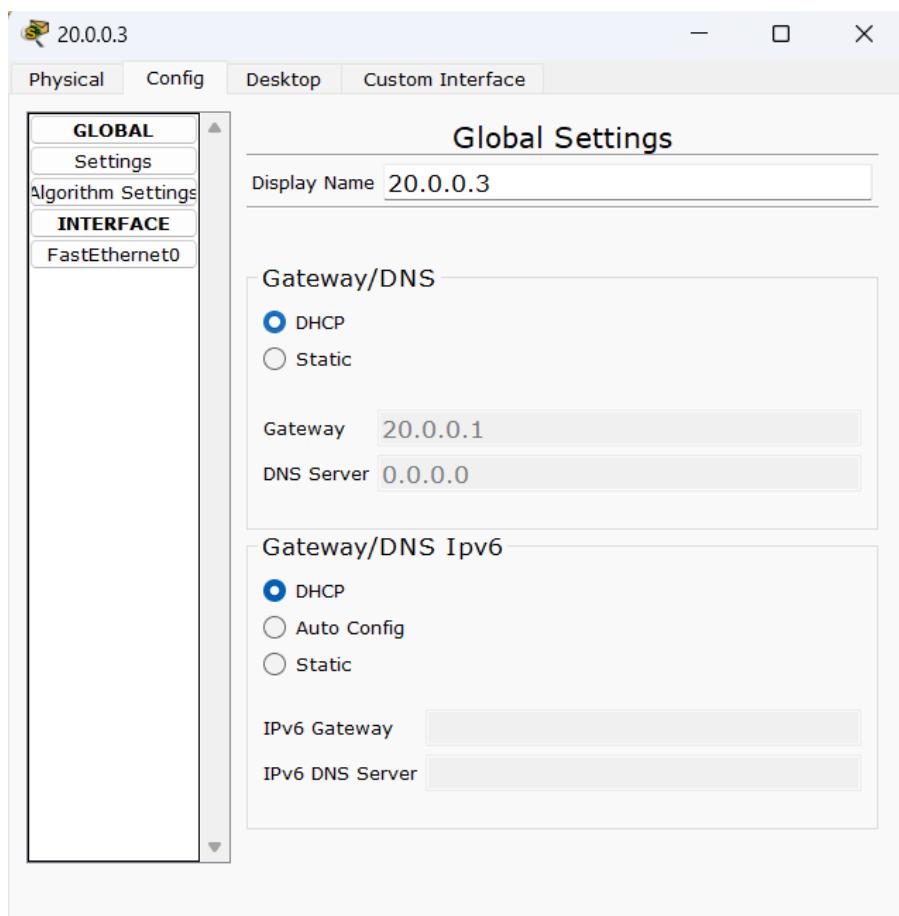


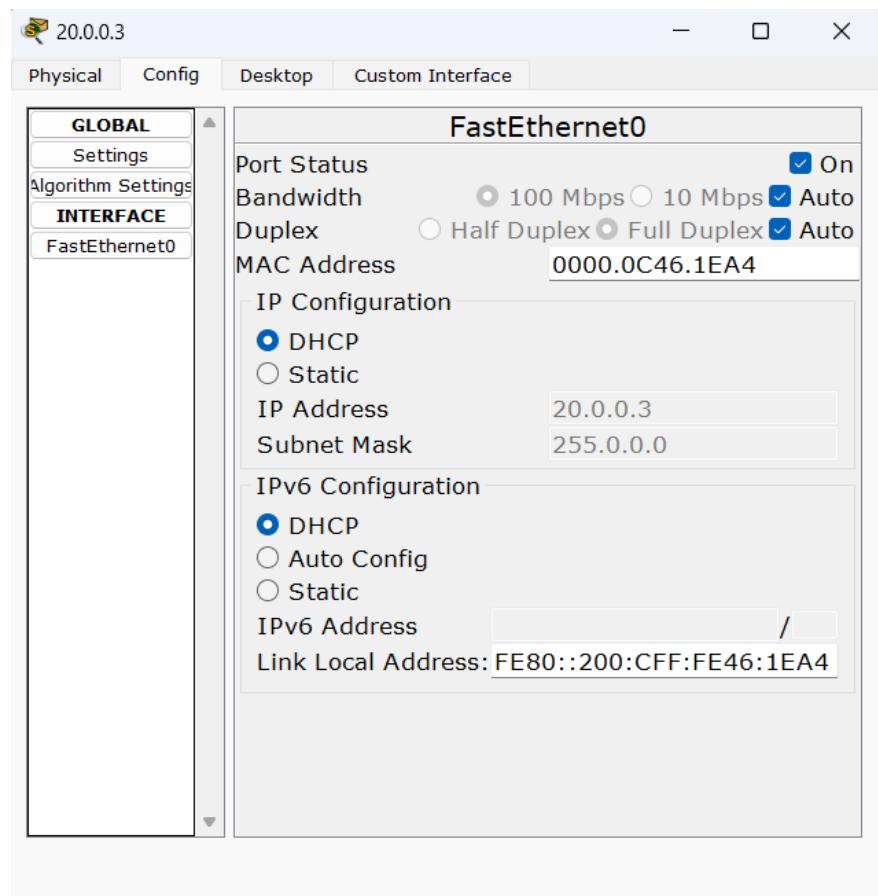
### PC - 3 Configuration (Through DHCP):



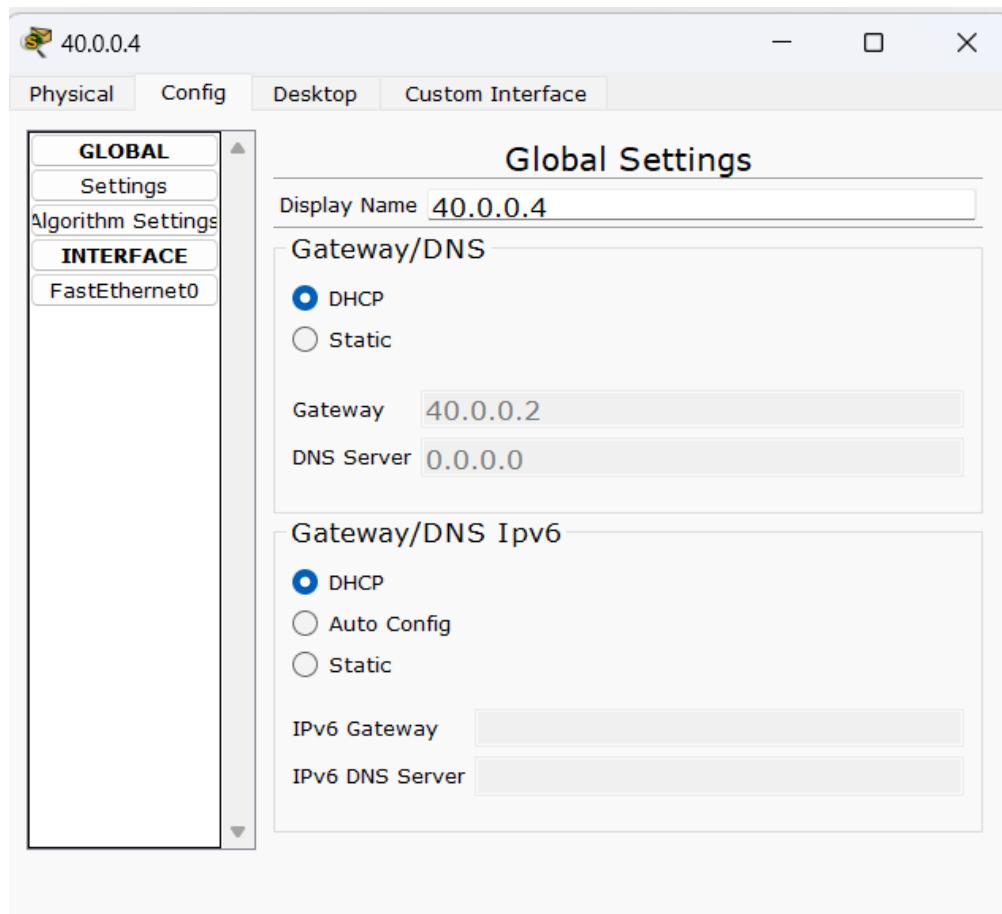


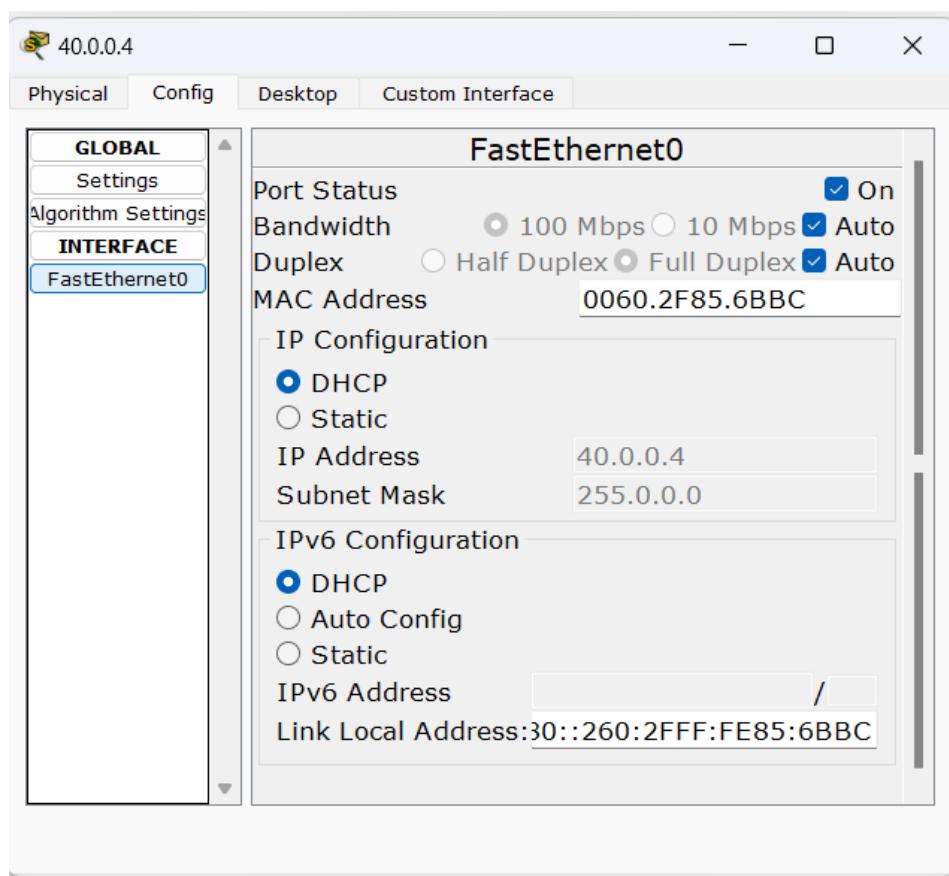
#### PC - 4 Configuration (Through DHCP):



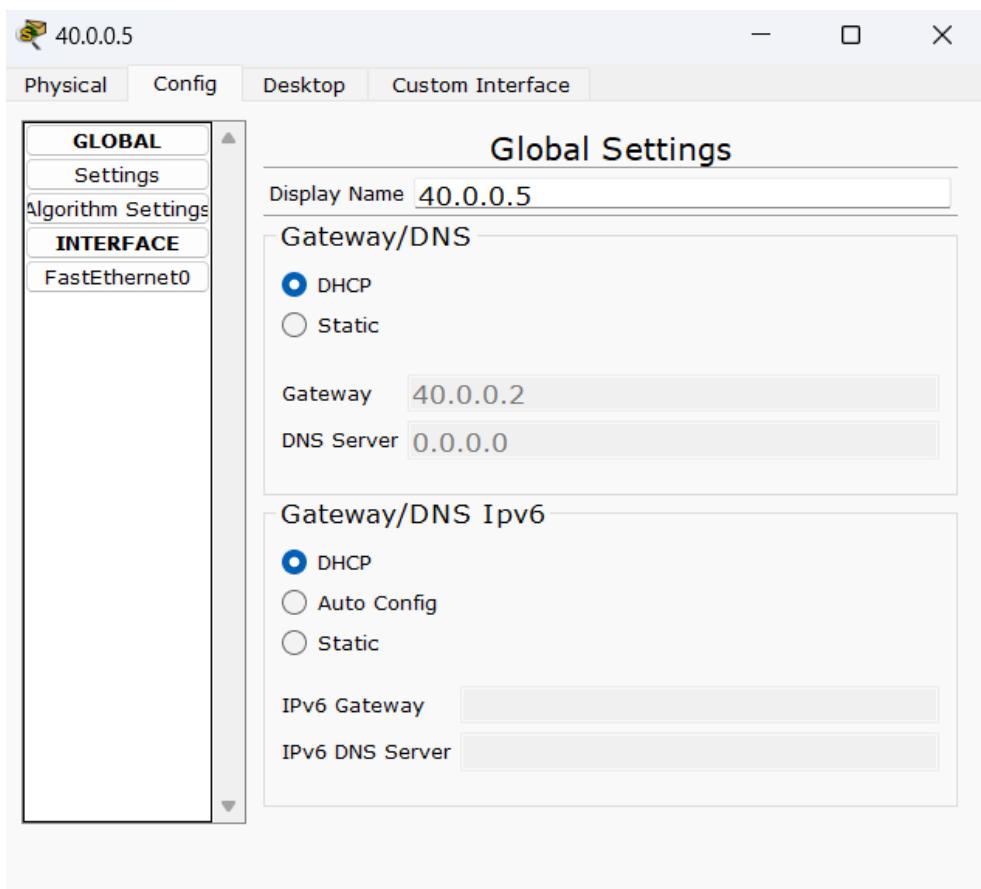


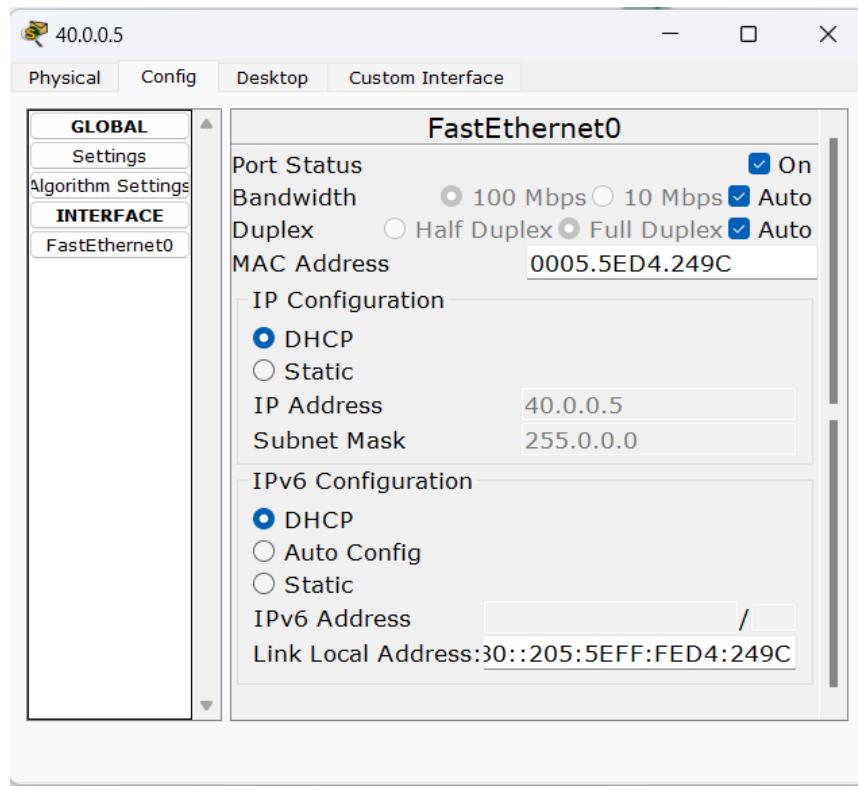
### PC - 5 Configuration (Through DHCP):





## PC - 6 Configuration (Through DHCP):





## Output (Ping Messages)

**From PC - 1 to All Other PCs:**

```

Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.5

Pinging 10.0.0.5 with 32 bytes of data:

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

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

PC>ping 20.0.0.5

Pinging 20.0.0.5 with 32 bytes of data:

Request timed out.
Reply from 20.0.0.5: bytes=32 time=0ms TTL=127
Reply from 20.0.0.5: bytes=32 time=0ms TTL=127
Reply from 20.0.0.5: bytes=32 time=0ms TTL=127

Ping statistics for 20.0.0.5:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
  
```

10.0.0.3

Physical Config Desktop Custom Interface

**Command Prompt**

```
PC>ping 20.0.0.3
Pinging 20.0.0.3 with 32 bytes of data:
Request timed out.
Reply from 20.0.0.3: bytes=32 time=1ms TTL=127
Reply from 20.0.0.3: bytes=32 time=0ms TTL=127
Reply from 20.0.0.3: bytes=32 time=7ms TTL=127

Ping statistics for 20.0.0.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 7ms, Average = 2ms

PC>ping 40.0.0.4
Pinging 40.0.0.4 with 32 bytes of data:
Request timed out.
Reply from 40.0.0.4: bytes=32 time=6ms TTL=126
Reply from 40.0.0.4: bytes=32 time=14ms TTL=126
Reply from 40.0.0.4: bytes=32 time=1ms TTL=126

Ping statistics for 40.0.0.4:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 14ms, Average = 7ms

PC>ping 40.0.0.5
```

10.0.0.3

Physical Config Desktop Custom Interface

**Command Prompt**

```
PC>ping 40.0.0.4
Pinging 40.0.0.4 with 32 bytes of data:
Request timed out.
Reply from 40.0.0.4: bytes=32 time=6ms TTL=126
Reply from 40.0.0.4: bytes=32 time=14ms TTL=126
Reply from 40.0.0.4: bytes=32 time=1ms TTL=126

Ping statistics for 40.0.0.4:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 14ms, Average = 7ms

PC>ping 40.0.0.5
Pinging 40.0.0.5 with 32 bytes of data:
Request timed out.
Reply from 40.0.0.5: bytes=32 time=12ms TTL=126
Reply from 40.0.0.5: bytes=32 time=4ms TTL=126
Reply from 40.0.0.5: bytes=32 time=5ms TTL=126

Ping statistics for 40.0.0.5:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 12ms, Average = 7ms

PC>
```

**From PC - 2 to All Other PCs:**

10.0.0.5

Physical Config Desktop Custom Interface

**Command Prompt**

```
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time=0ms TTL=128
Reply from 10.0.0.3: bytes=32 time=5ms 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 = 5ms, Average = 1ms

PC>ping 20.0.0.5

Pinging 20.0.0.5 with 32 bytes of data:

Reply from 20.0.0.5: bytes=32 time=1ms TTL=127
Reply from 20.0.0.5: bytes=32 time=0ms TTL=127
Reply from 20.0.0.5: bytes=32 time=0ms TTL=127
Reply from 20.0.0.5: bytes=32 time=0ms TTL=127

Ping statistics for 20.0.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

10.0.0.5

Physical Config Desktop Custom Interface

**Command Prompt**

```
PC>ping 20.0.0.3

Pinging 20.0.0.3 with 32 bytes of data:

Reply from 20.0.0.3: bytes=32 time=0ms TTL=127

Ping statistics for 20.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

PC>ping 40.0.0.4

Pinging 40.0.0.4 with 32 bytes of data:

Reply from 40.0.0.4: bytes=32 time=93ms TTL=126
Reply from 40.0.0.4: bytes=32 time=4ms TTL=126
Reply from 40.0.0.4: bytes=32 time=1ms TTL=126
Reply from 40.0.0.4: bytes=32 time=5ms TTL=126

Ping statistics for 40.0.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 93ms, Average = 25ms

PC>ping 40.0.0.5
```

```
PC>ping 40.0.0.4

Pinging 40.0.0.4 with 32 bytes of data:

Reply from 40.0.0.4: bytes=32 time=93ms TTL=126
Reply from 40.0.0.4: bytes=32 time=4ms TTL=126
Reply from 40.0.0.4: bytes=32 time=1ms TTL=126
Reply from 40.0.0.4: bytes=32 time=5ms TTL=126

Ping statistics for 40.0.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 93ms, Average = 25ms

PC>ping 40.0.0.5

Pinging 40.0.0.5 with 32 bytes of data:

Reply from 40.0.0.5: bytes=32 time=1ms TTL=126
Reply from 40.0.0.5: bytes=32 time=1ms TTL=126
Reply from 40.0.0.5: bytes=32 time=8ms TTL=126
Reply from 40.0.0.5: bytes=32 time=1ms TTL=126

Ping statistics for 40.0.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 8ms, Average = 2ms

PC>
```

## From PC - 3 to All Other PCs:

```
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time=0ms TTL=127
Reply from 10.0.0.3: bytes=32 time=1ms TTL=127
Reply from 10.0.0.3: bytes=32 time=1ms TTL=127
Reply from 10.0.0.3: bytes=32 time=0ms TTL=127

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 = 1ms, Average = 0ms

PC>ping 10.0.0.5

Pinging 10.0.0.5 with 32 bytes of data:

Reply from 10.0.0.5: bytes=32 time=1ms TTL=127
Reply from 10.0.0.5: bytes=32 time=0ms TTL=127
Reply from 10.0.0.5: bytes=32 time=0ms TTL=127
Reply from 10.0.0.5: bytes=32 time=0ms TTL=127

Ping statistics for 10.0.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

20.0.0.5

Physical Config Desktop Custom Interface

**Command Prompt**

```
PC>ping 20.0.0.3
Pinging 20.0.0.3 with 32 bytes of data:
Reply from 20.0.0.3: bytes=32 time=1ms TTL=128
Reply from 20.0.0.3: bytes=32 time=1ms TTL=128
Reply from 20.0.0.3: bytes=32 time=17ms TTL=128
Reply from 20.0.0.3: bytes=32 time=0ms TTL=128

Ping statistics for 20.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 17ms, Average = 4ms

PC>ping 40.0.0.4
Pinging 40.0.0.4 with 32 bytes of data:
Reply from 40.0.0.4: bytes=32 time=1ms TTL=126
Reply from 40.0.0.4: bytes=32 time=1ms TTL=126
Reply from 40.0.0.4: bytes=32 time=16ms TTL=126
Reply from 40.0.0.4: bytes=32 time=6ms TTL=126

Ping statistics for 40.0.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 16ms, Average = 6ms

PC>ping 40.0.0.5
```

20.0.0.5

Physical Config Desktop Custom Interface

**Command Prompt**

```
PC>ping 40.0.0.4
Pinging 40.0.0.4 with 32 bytes of data:
Reply from 40.0.0.4: bytes=32 time=1ms TTL=126
Reply from 40.0.0.4: bytes=32 time=1ms TTL=126
Reply from 40.0.0.4: bytes=32 time=16ms TTL=126
Reply from 40.0.0.4: bytes=32 time=6ms TTL=126

Ping statistics for 40.0.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 16ms, Average = 6ms

PC>ping 40.0.0.5
Pinging 40.0.0.5 with 32 bytes of data:
Reply from 40.0.0.5: bytes=32 time=1ms TTL=126
Reply from 40.0.0.5: bytes=32 time=6ms TTL=126
Reply from 40.0.0.5: bytes=32 time=1ms TTL=126
Reply from 40.0.0.5: bytes=32 time=5ms TTL=126

Ping statistics for 40.0.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 6ms, Average = 3ms

PC>
```

**From PC - 4 to All Other PCs:**

```
20.0.0.3
Physical Config Desktop Custom Interface
Command Prompt X
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time=0ms TTL=127
Reply from 10.0.0.3: bytes=32 time=0ms TTL=127
Reply from 10.0.0.3: bytes=32 time=0ms TTL=127
Reply from 10.0.0.3: bytes=32 time=1ms TTL=127

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 = 1ms, Average = 0ms

PC>ping 10.0.0.5

Pinging 10.0.0.5 with 32 bytes of data:

Reply from 10.0.0.5: bytes=32 time=79ms TTL=127
Reply from 10.0.0.5: bytes=32 time=1ms TTL=127
Reply from 10.0.0.5: bytes=32 time=0ms TTL=127
Reply from 10.0.0.5: bytes=32 time=0ms TTL=127

Ping statistics for 10.0.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 79ms, Average = 20ms
```

```
20.0.0.3
Physical Config Desktop Custom Interface
Command Prompt X
PC>ping 20.0.0.5

Pinging 20.0.0.5 with 32 bytes of data:

Reply from 20.0.0.5: bytes=32 time=3ms TTL=128
Reply from 20.0.0.5: bytes=32 time=0ms TTL=128
Reply from 20.0.0.5: bytes=32 time=0ms TTL=128
Reply from 20.0.0.5: bytes=32 time=0ms TTL=128

Ping statistics for 20.0.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 3ms, Average = 0ms

PC>ping 40.0.0.4

Pinging 40.0.0.4 with 32 bytes of data:

Reply from 40.0.0.4: bytes=32 time=5ms TTL=126
Reply from 40.0.0.4: bytes=32 time=1ms TTL=126
Reply from 40.0.0.4: bytes=32 time=11ms TTL=126
Reply from 40.0.0.4: bytes=32 time=6ms TTL=126

Ping statistics for 40.0.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 11ms, Average = 5ms

PC>ping 40.0.0.5
```

```
PC>ping 40.0.0.4

Pinging 40.0.0.4 with 32 bytes of data:

Reply from 40.0.0.4: bytes=32 time=5ms TTL=126
Reply from 40.0.0.4: bytes=32 time=1ms TTL=126
Reply from 40.0.0.4: bytes=32 time=11ms TTL=126
Reply from 40.0.0.4: bytes=32 time=6ms TTL=126

Ping statistics for 40.0.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 11ms, Average = 5ms

PC>ping 40.0.0.5

Pinging 40.0.0.5 with 32 bytes of data:

Reply from 40.0.0.5: bytes=32 time=1ms TTL=126
Reply from 40.0.0.5: bytes=32 time=1ms TTL=126
Reply from 40.0.0.5: bytes=32 time=2ms TTL=126
Reply from 40.0.0.5: bytes=32 time=1ms TTL=126

Ping statistics for 40.0.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 2ms, Average = 1ms

PC>
```

## From PC - 5 to All Other PCs:

```
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time=1ms TTL=126
Reply from 10.0.0.3: bytes=32 time=3ms TTL=126
Reply from 10.0.0.3: bytes=32 time=4ms TTL=126
Reply from 10.0.0.3: bytes=32 time=87ms TTL=126

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 87ms, Average = 23ms

PC>ping 10.0.0.5

Pinging 10.0.0.5 with 32 bytes of data:

Reply from 10.0.0.5: bytes=32 time=1ms TTL=126
Reply from 10.0.0.5: bytes=32 time=1ms TTL=126
Reply from 10.0.0.5: bytes=32 time=82ms TTL=126
Reply from 10.0.0.5: bytes=32 time=3ms TTL=126

Ping statistics for 10.0.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 82ms, Average = 21ms
```

```
PC>ping 20.0.0.5
Pinging 20.0.0.5 with 32 bytes of data:
Reply from 20.0.0.5: bytes=32 time=6ms TTL=126
Reply from 20.0.0.5: bytes=32 time=1ms TTL=126
Reply from 20.0.0.5: bytes=32 time=1ms TTL=126
Reply from 20.0.0.5: bytes=32 time=1ms TTL=126

Ping statistics for 20.0.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 6ms, Average = 2ms

PC>ping 20.0.0.3
Pinging 20.0.0.3 with 32 bytes of data:
Reply from 20.0.0.3: bytes=32 time=11ms TTL=126
Reply from 20.0.0.3: bytes=32 time=1ms TTL=126
Reply from 20.0.0.3: bytes=32 time=4ms TTL=126
Reply from 20.0.0.3: bytes=32 time=4ms TTL=126

Ping statistics for 20.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 11ms, Average = 5ms

PC>ping 40.0.0.5
```

```
PC>ping 20.0.0.3
Pinging 20.0.0.3 with 32 bytes of data:
Reply from 20.0.0.3: bytes=32 time=11ms TTL=126
Reply from 20.0.0.3: bytes=32 time=1ms TTL=126
Reply from 20.0.0.3: bytes=32 time=4ms TTL=126
Reply from 20.0.0.3: bytes=32 time=4ms TTL=126

Ping statistics for 20.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 11ms, Average = 5ms

PC>ping 40.0.0.5
Pinging 40.0.0.5 with 32 bytes of data:
Reply from 40.0.0.5: bytes=32 time=4294967295ms TTL=128
Reply from 40.0.0.5: bytes=32 time=0ms TTL=128
Reply from 40.0.0.5: bytes=32 time=0ms TTL=128
Reply from 40.0.0.5: bytes=32 time=0ms TTL=128

Ping statistics for 40.0.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 4294967295ms, Average = 1073741823ms

PC>
```

From PC - 6 to All Other PCs:

40.0.0.5

Physical Config Desktop Custom Interface

**Command Prompt**

```
PC>ping 20.0.0.5

Pinging 20.0.0.5 with 32 bytes of data:

Reply from 20.0.0.5: bytes=32 time=9ms TTL=126
Reply from 20.0.0.5: bytes=32 time=4ms TTL=126
Reply from 20.0.0.5: bytes=32 time=6ms TTL=126
Reply from 20.0.0.5: bytes=32 time=4ms TTL=126

Ping statistics for 20.0.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 9ms, Average = 5ms

PC>ping 40.0.0.4

Pinging 40.0.0.4 with 32 bytes of data:

Reply from 40.0.0.4: bytes=32 time=0ms TTL=128
Reply from 40.0.0.4: bytes=32 time=0ms TTL=128
Reply from 40.0.0.4: bytes=32 time=0ms TTL=128
Reply from 40.0.0.4: bytes=32 time=2ms TTL=128

Ping statistics for 40.0.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 0ms

PC>
```

40.0.0.5

Physical Config Desktop Custom Interface

**Command Prompt**

```
PC>ping 10.0.0.5

Pinging 10.0.0.5 with 32 bytes of data:

Reply from 10.0.0.5: bytes=32 time=13ms TTL=126
Reply from 10.0.0.5: bytes=32 time=1ms TTL=126
Reply from 10.0.0.5: bytes=32 time=4ms TTL=126
Reply from 10.0.0.5: bytes=32 time=8ms TTL=126

Ping statistics for 10.0.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 13ms, Average = 6ms

PC>ping 20.0.0.3

Pinging 20.0.0.3 with 32 bytes of data:

Reply from 20.0.0.3: bytes=32 time=10ms TTL=126
Reply from 20.0.0.3: bytes=32 time=1ms TTL=126
Reply from 20.0.0.3: bytes=32 time=2ms TTL=126
Reply from 20.0.0.3: bytes=32 time=4ms TTL=126

Ping statistics for 20.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 10ms, Average = 4ms

PC>ping 20.0.0.5
```

Packet Tracer PC Command Line 1.0  
PC>ping 10.0.0.3  
Pinging 10.0.0.3 with 32 bytes of data:  
Reply from 10.0.0.3: bytes=32 time=1ms TTL=126  
Reply from 10.0.0.3: bytes=32 time=8ms TTL=126  
Reply from 10.0.0.3: bytes=32 time=5ms TTL=126  
Reply from 10.0.0.3: bytes=32 time=4ms TTL=126  
Ping statistics for 10.0.0.3:  
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
Minimum = 1ms, Maximum = 8ms, Average = 4ms  
PC>ping 10.0.0.5  
Pinging 10.0.0.5 with 32 bytes of data:  
Reply from 10.0.0.5: bytes=32 time=13ms TTL=126  
Reply from 10.0.0.5: bytes=32 time=1ms TTL=126  
Reply from 10.0.0.5: bytes=32 time=4ms TTL=126  
Reply from 10.0.0.5: bytes=32 time=8ms TTL=126  
Ping statistics for 10.0.0.5:  
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
Minimum = 1ms, Maximum = 13ms, Average = 6ms

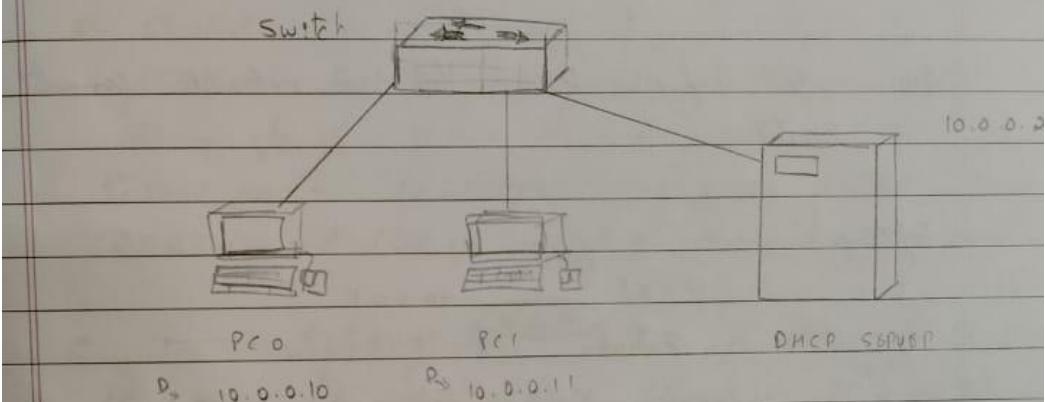
### 2.4.3 Observation Book Pictures

Experiment -4.

Configure DHCP within the LAN and control the LAN

Aim: To Configure DHCP within the LAN

Topology:



Procedure:

1. Two PCs are connected to a switch and a server is connected.
2. The server's IP is set statically as 10.0.0.2 and its default gateway is set.
3. In the server Services > DHCP is switched on, now the server acts as a DHCP server.
4. For the pool name Server Pool, set default gateway, set the start IP address and the number of users. Click on save.
5. Now on each PC press config > Follow this OS DHCP. All PCs are given an IP dynamically.
6. Open Desktop > IP Configuration to check.

Result:

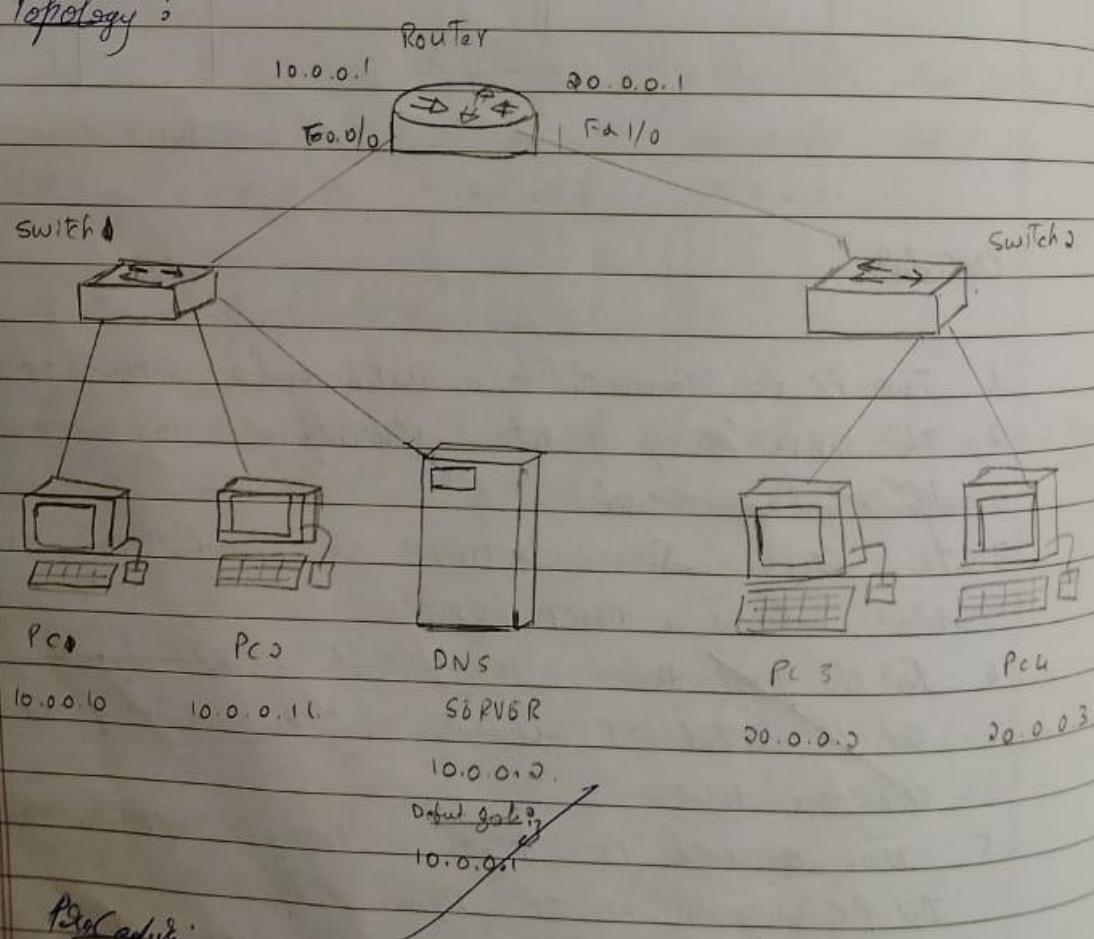
IPV4 address	10.0.0.10
Subnet Mask	255.0.0.0
Default gateway	0.0.0.0
DNS server	0.0.0.0

## Observation:

DHCP servers are used to allocate IP's for end users in networks where the number of users is very high. DHCP can allocate IP addresses, default gateway and DNS server addresses.

Aim: To configure DHCP for two networks connected via router.

## Topology:



## Procedure:

1. Connect two PCs and a switch is connected to a switch serially another switch is connected with two PCs. The two switches are connected to a router's two different interfaces.
2. T

2. The interface of the Router is configured with ip address of 10.0.0.1 and subnet mask 255.0.0.0.

The Server is configured with an ip address of 10.0.0.2 and default gateway of 10.0.0.1.

- Server Services > DHCP is switched on and two IP pools are created.

first pool has a default gateway of 10.0.0.1 with starting ip of 10.0.0.10 and ended

second pool - '2nd Service pool' is given default gateway of 20.0.0.1 and start ip address of 20.0.0.2 and ended.

5. The interface of Router with ip address of 20.0.0.1 is given ip helper address which is same as the ip address of the DNS server.

Router (Config #) > interface Fast1/0.

Router (Config-if) # ip helper-address 10.0.0.2.

Router (Config-if) # exit.

6. The DHCP is selected in config > FastEthernet 0 of all end devices.

7. Go to ~~Network~~ Desktop > ip Config.

Router

Fast1/0

IPV4 address 10.0.0.10

Subnet Mask 255.0.0.0

Default gateway 10.0.0.1

DNS server 0.0.0.0

PC2

IPV4 address : 20.0.0.2

Subnet Mask : 255.0.0.0

Default gateway : 20.0.0.1

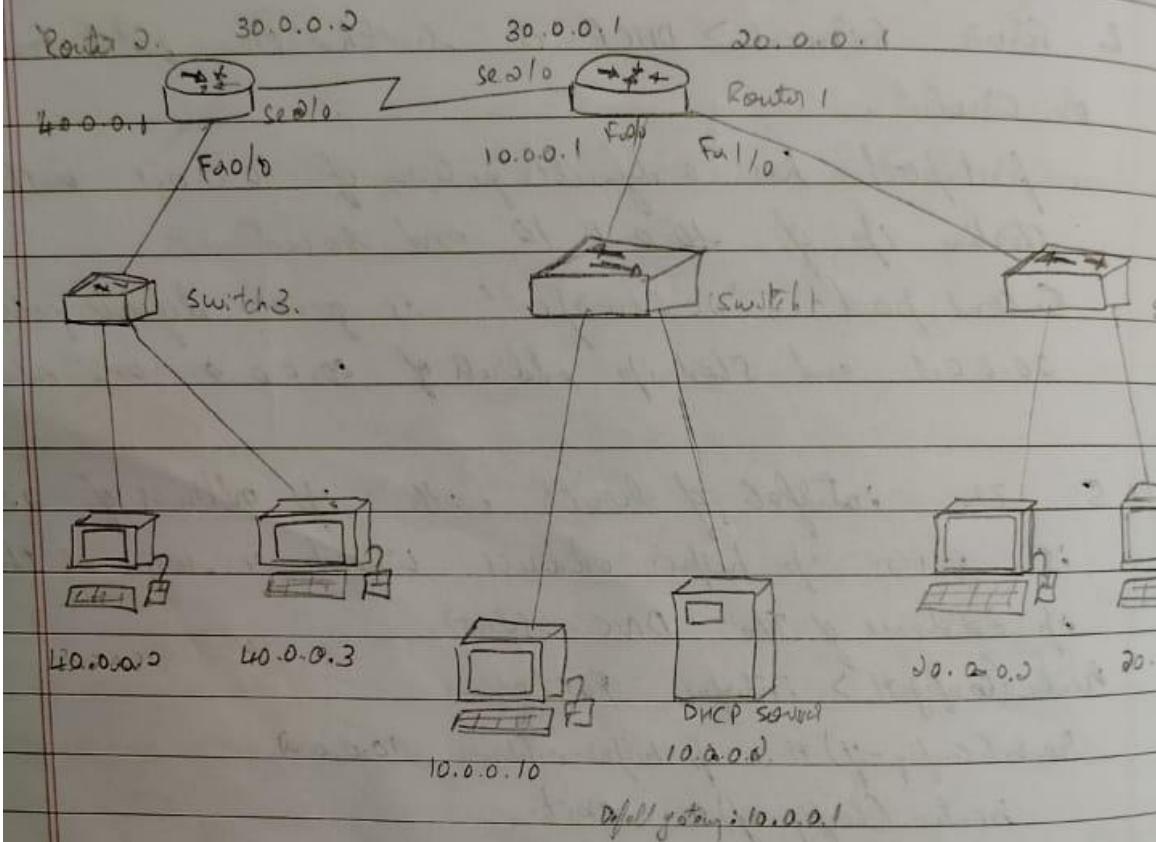
DNS server : 0.0.0.0

Observation:

To configure ip address of a network with no DHCP server, the interface of router it is connected to should be provisioned with an ip helper address that is same as ip of DHCP server.

Aim: To configure DHCP server for three networks via two routers.

### Topology:



### Procedure:

1. Create a top network as shown in the previous topology and add another router connects a switch which intern is connects to two other end device.
2. The new router is connected to the previous router and the interface **Se2/0** is set on IP of **30.0.0.2** and interface **Fa0/0** is given on IP of **40.0.0.1**.  
The interface **F0/0** is deleted in the old router and helper address of **10.0.0.5** is set.
3. In the DHCP server create one more Subnet

Set Pool name : Second Pool - 3

Default Gateway : 40.0.0.1

DNS Server : 0.0.0.0

Start IP address : 40.0.0.2

Click on Add.

#### 4. Configure IP routes on both routers.

Set IP route in Router 2 by going through default route  
Router > enable

Router # configure terminal

Router (config)# ip route 0.0.0.0 0.0.0.0 30.0

Router (config)# exit

Router # show ip route

In Router 1, in configuration mode

Router (config)# ip route 192.0.0.0 0.0.0.0 30.0

Router (config)# exit

Router # show ip route

#### 5. switch DHCP on for all end device

Result :-

Router 1>

C 10.0.0.18 is directly connected, FastEthernet0/0

C 20.0.0.18 is directly connected, FastEthernet0/0

C 30.0.0.18 is directly connected, S0/0/0

S 40.0.0.0 [1/0] via 30.0.0.2

Router 2>

C 40.0.0.18 is directly connected, FastEthernet0/0

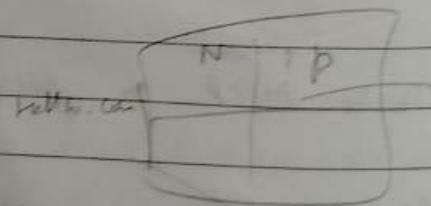
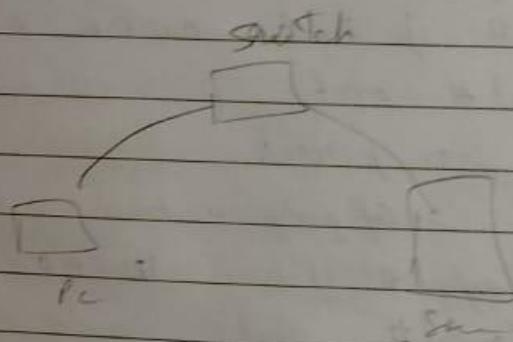
C 300.0.0.18 is directly connected, S0/0/0

S\* 0.0.0.0/0 R1/0/7 via 30.0.0.1

observation!

For ~~an~~ chlorotony ip address to ad device via DHCP serv, the DHCP serv pool should be provided with starting address, DNS serv, default gateway.

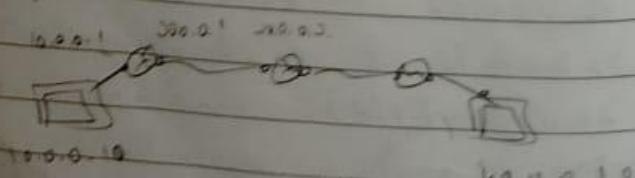
The router should be provided with ip helper address and ip route.



&lt;network.htm&gt;

RSP

Rank of ports



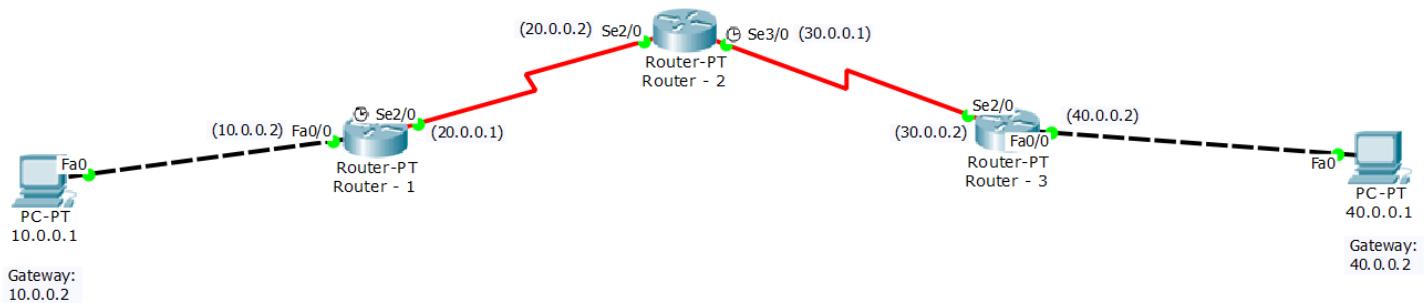
## 2.5 Experiment - 5:

### 2.5.1 Question:

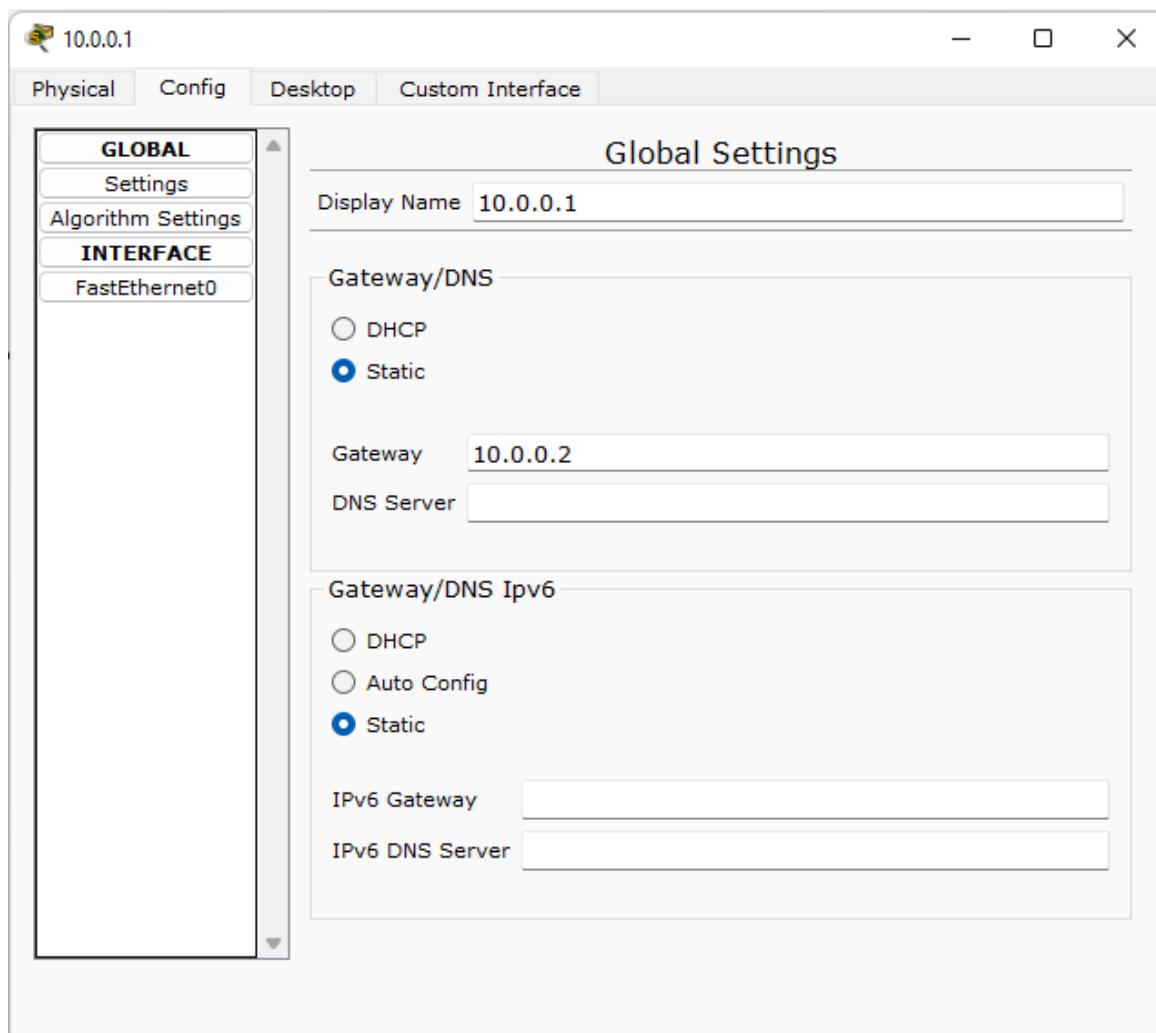
Configure RIP routing Protocol in Routers.

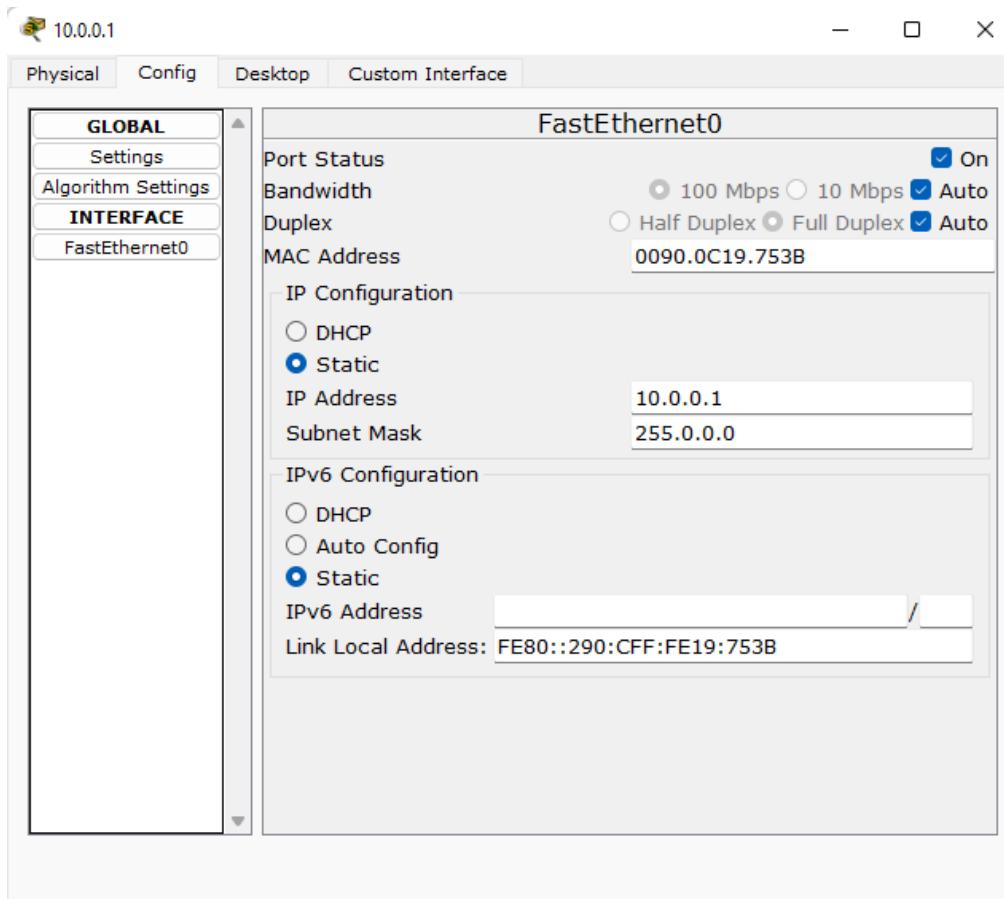
### 2.5.2 Screenshots (Topology, Configurations & Output):

#### Topology:

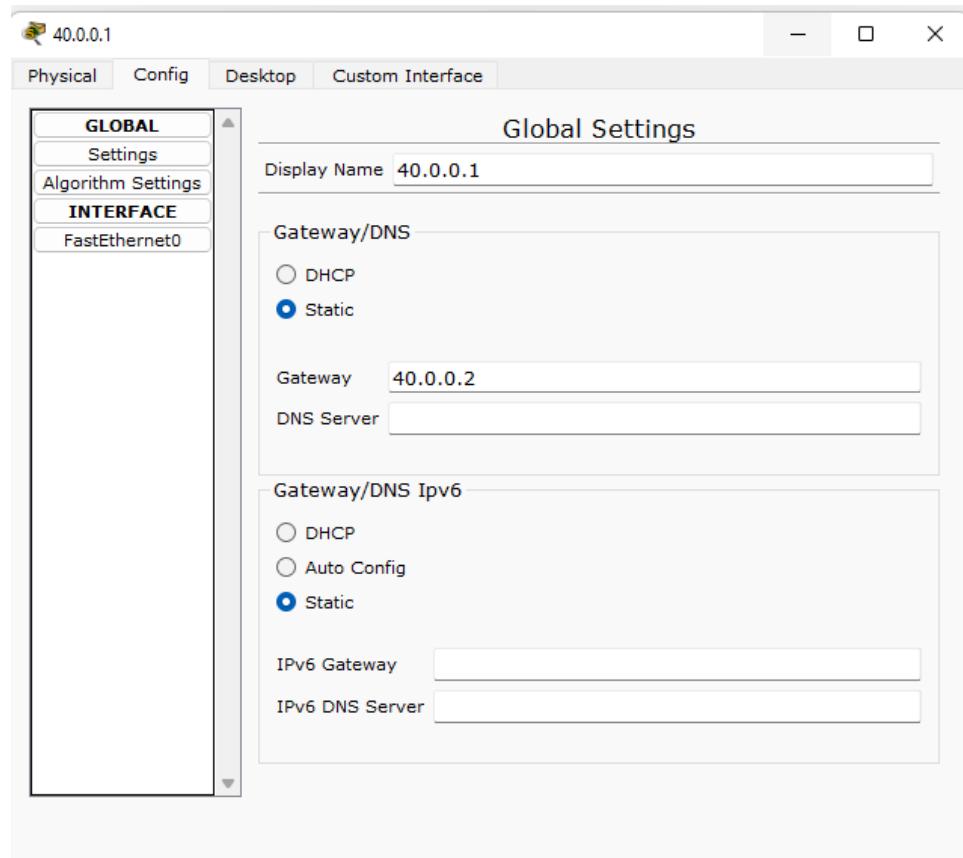


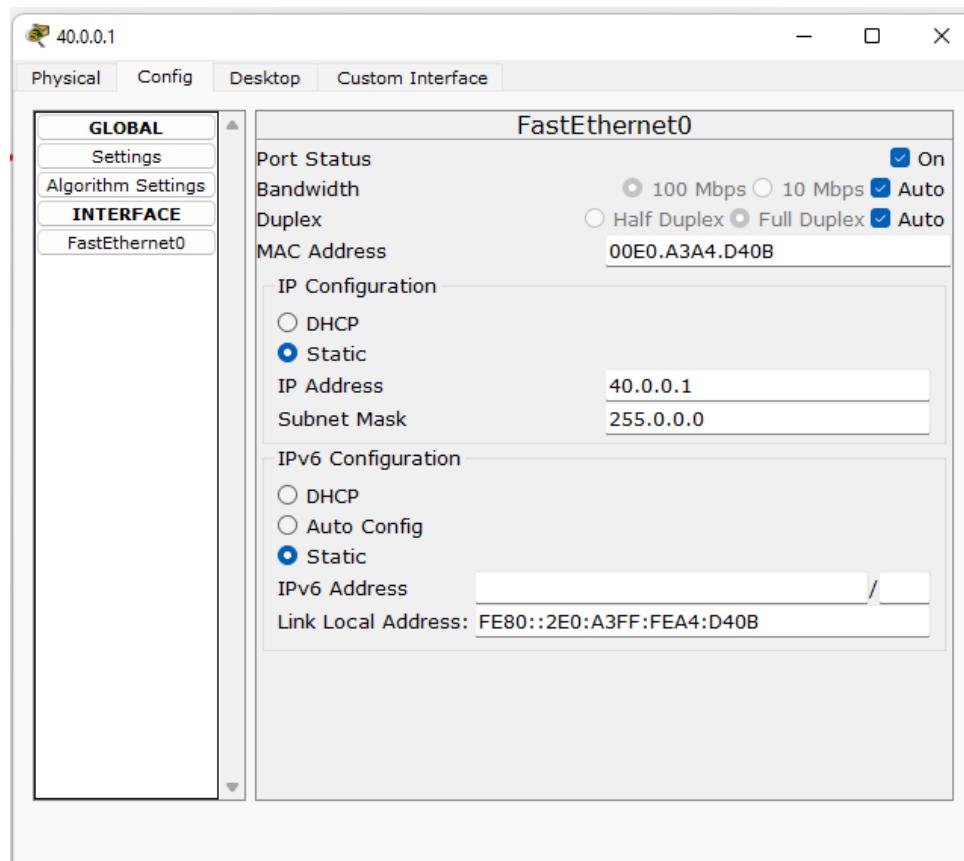
#### PC - 1 Configuration:





## PC - 2 Configuration:





## Router - 1 Configuration:

The screenshot shows the IOS Command Line Interface for Router - 1. The session starts with a configuration dialog prompt: "Continue with configuration dialog? [yes/no]: no". It then displays a message: "Press RETURN to get started!". The configuration commands entered are:

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Fa0/0
Router(config-if)#ip address 10.0.0.2 255.0.0.0
Router(config-if)#no shutdown

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

Router(config-if)#exit
Router(config)#interface Se2/0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router(config-if)#encapsulation ppp
Router(config-if)#clock rate 64000
Router(config-if)#exit
```

At the bottom right of the terminal window, there are "Copy" and "Paste" buttons.

Router - 1

Physical Config CLI

IOS Command Line Interface

```
Router(config-if)#  
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up  
  
Router(config-if)#wxit  
^  
% Invalid input detected at '^' marker.  
  
Router(config-if)#exit  
Router(config)#interface Se2/0  
Router(config-if)#ip address 20.0.0.1 255.0.0.0  
Router(config-if)#no shutdown  
  
%LINK-5-CHANGED: Interface Serial2/0, changed state to down  
Router(config-if)#encapsulation ppp  
Router(config-if)#clock rate 64000  
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  
  
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up  
  
Router(config)#route rip  
Router(config-router)#network 10.0.0.0  
Router(config-router)#network 20.0.0.0  
Router(config-router)#exit  
Router(config)#
```

Copy Paste

## Router - 2 Configuration:

Router - 2

Physical Config CLI

IOS Command Line Interface

```
Continue with configuration dialog? [yes/no]: n  
  
Press RETURN to get started!  
  
Router>enable  
Router#config t  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#interface Se2/0  
Router(config-if)#ip address 20.0.0.2 255.0.0.0  
Router(config-if)#no shutdown  
  
Router(config-if)#  
%LINK-5-CHANGED: Interface Serial2/0, changed state to up  
  
Router(config-if)#encapsulation ppp  
Router(config-if)#  
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up  
  
Router(config-if)#exit  
Router(config)#interface Se3/0  
Router(config-if)#ip address 30.0.0.1 255.0.0.0  
Router(config-if)#no shutdown  
  
%LINK-5-CHANGED: Interface Serial3/0, changed state to down  
Router(config-if)#encapsulation ppp  
Router(config-if)#exit
```

Copy Paste

Router - 2

Physical Config CLI

IOS Command Line Interface

```
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

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

Router(config-if)#exit
Router(config)#interface Se3/0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial3/0, changed state to down
Router(config-if)#encapsulation ppp
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)#interface Se3/0
Router(config-if)#clock rate 64000
Router(config-if)#exit
Router(config)#route rip
Router(config-router)#network 20.0.0.0
Router(config-router)#network 30.0.0.0
Router(config-router)#exit
Router(config)#

```

Copy Paste

## Router - 3 Configuration:

Router - 3

Physical Config CLI

IOS Command Line Interface

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

Press RETURN to get started!

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)#no shutdown

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

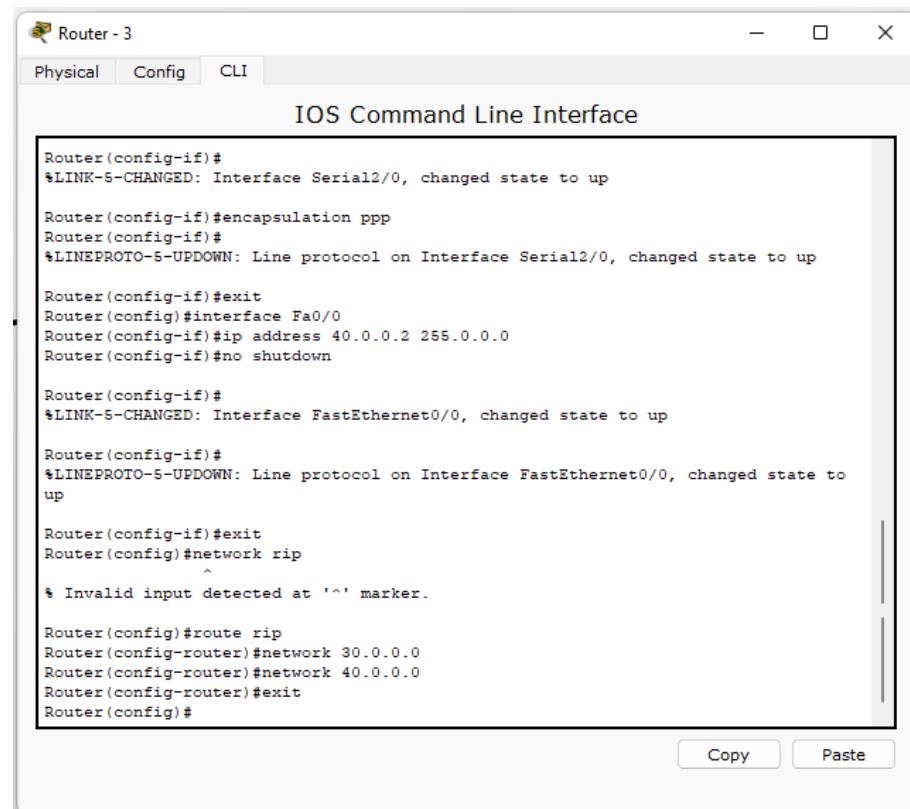
Router(config-if)#encapsulation ppp
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router(config-if)#exit
Router(config)#interface Fa0/0
Router(config-if)#ip address 40.0.0.2 255.0.0.0
Router(config-if)#no shutdown

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

```

Copy Paste



The screenshot shows a window titled "Router - 3" with three tabs: "Physical", "Config", and "CLI". The "CLI" tab is selected, displaying the "IOS Command Line Interface". The terminal window contains the following configuration commands:

```

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

Router(config-if)#encapsulation ppp
Router(config-if)#
*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 40.0.0.2 255.0.0.0
Router(config-if)#no shutdown

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

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

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

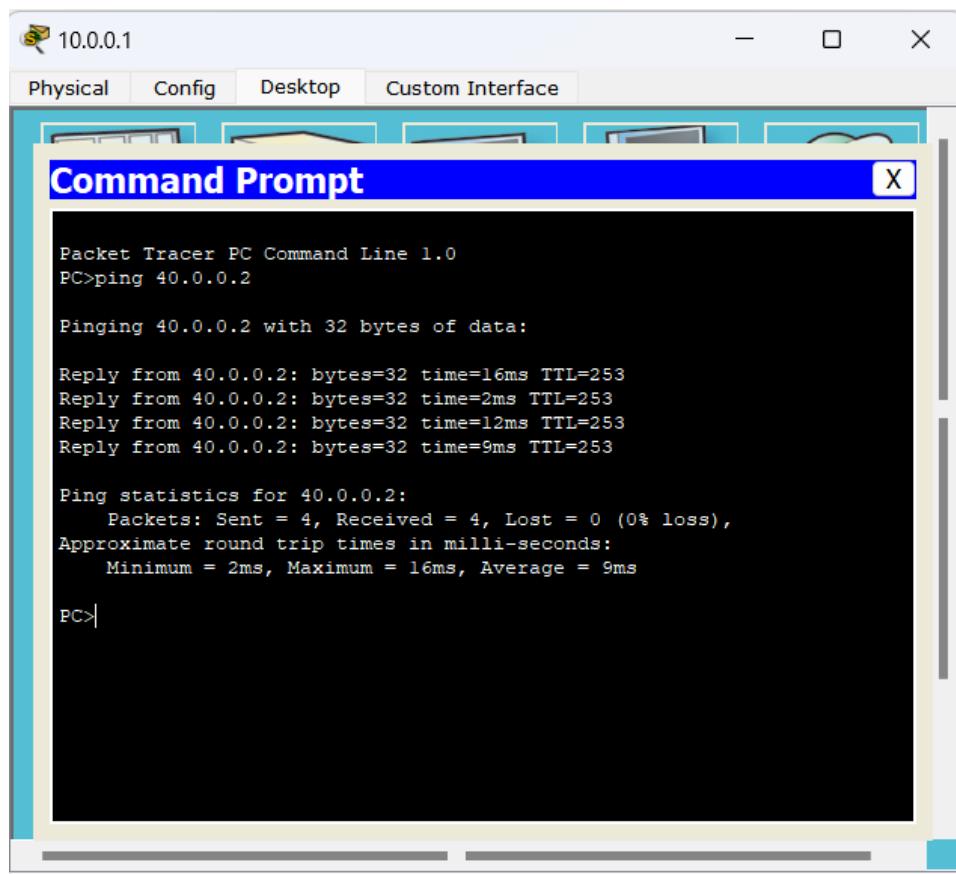
Router(config)#route rip
Router(config-router)#network 30.0.0.0
Router(config-router)#network 40.0.0.0
Router(config-router)#exit
Router(config)#

```

At the bottom of the terminal window, there are "Copy" and "Paste" buttons.

## Output:

**Ping from PC - 1 to PC - 2:**



The screenshot shows a window titled "10.0.0.1" with tabs: "Physical", "Config", "Desktop", and "Custom Interface". A "Command Prompt" window is open, showing the output of a ping command. The text in the window is:

```

Command Prompt X

Packet Tracer PC Command Line 1.0
PC>ping 40.0.0.2

Pinging 40.0.0.2 with 32 bytes of data:

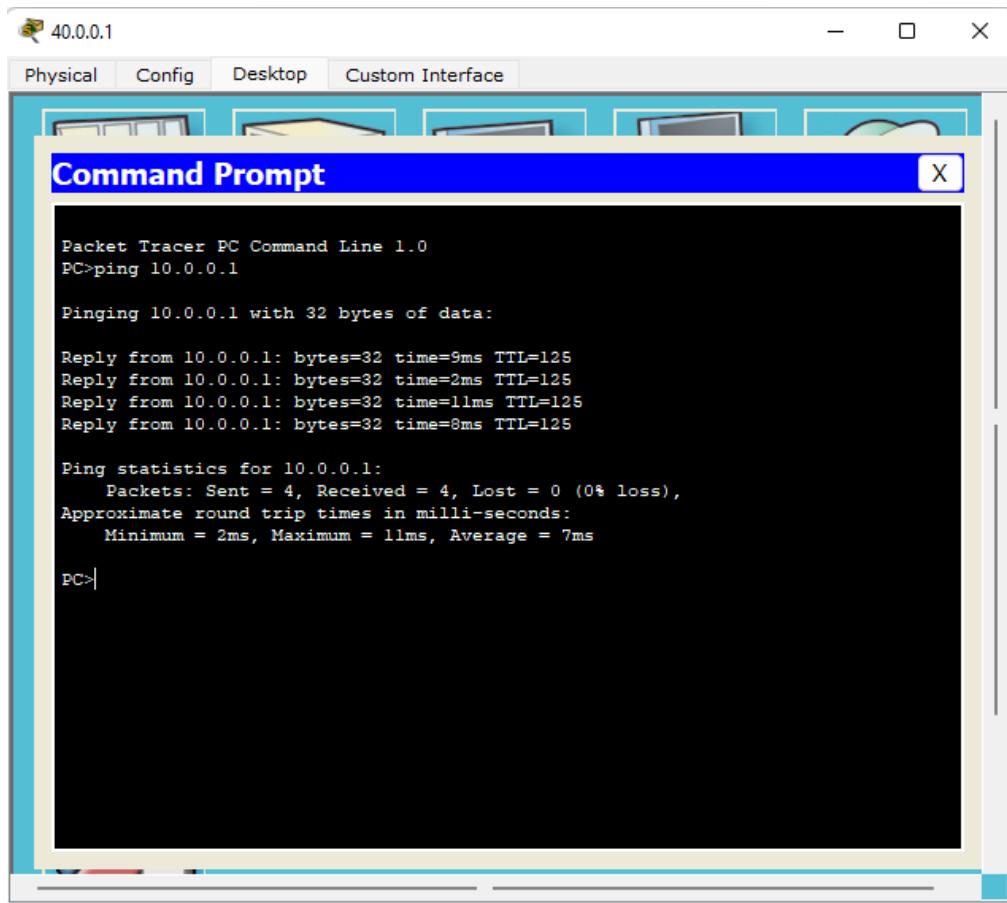
Reply from 40.0.0.2: bytes=32 time=16ms TTL=253
Reply from 40.0.0.2: bytes=32 time=2ms TTL=253
Reply from 40.0.0.2: bytes=32 time=12ms TTL=253
Reply from 40.0.0.2: bytes=32 time=9ms TTL=253

Ping statistics for 40.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 16ms, Average = 9ms

PC>

```

**Ping from PC - 2 to PC - 1:**



### 2.5.3 Observation Book Pictures:

classmate  
Date \_\_\_\_\_  
Page \_\_\_\_\_

18x/15

Configure Web server, DNS within a LAN.

Aim: To configure DNS within a LAN.

Topology:

PC1  
10.0.0.10

DNS SERVER  
10.0.0.11  
(Semantik.com)

Procedure:

1. Connect PC and a server to a switch.
2. Set the ip address for the PC and the server.  
• i.e 10.0.0.10 & 10.0.0.11
3. Configure DNS in server.  
~~Server > Services > DNS. Turn on the service.  
Under Local Database Records.  
Set name: Semantik.com.  
Address: 10.0.0.11.~~  
Click on Add.
4. Edit the index.html file under SEMANTIK.  
to include any information you want and host.
5. In PC1 Desktop > Web browser.  
In the URL type the website name (Semantik.com).

Result:-

~~Code~~.

index.html.

<html>

<center> <font size='+2' color='blue'> Somerth </font>  
</center>

<br> WELCOME!

<p> USN: IBM21CS184

</html>

In the webb,

Somerth

WELCOME!

USN: IBM21CS184,

Observation:

DNS server is used to map domain names ~~with~~ my  
to their respective IP's. This is done because it is easier  
to remember domain names than IP numbers.

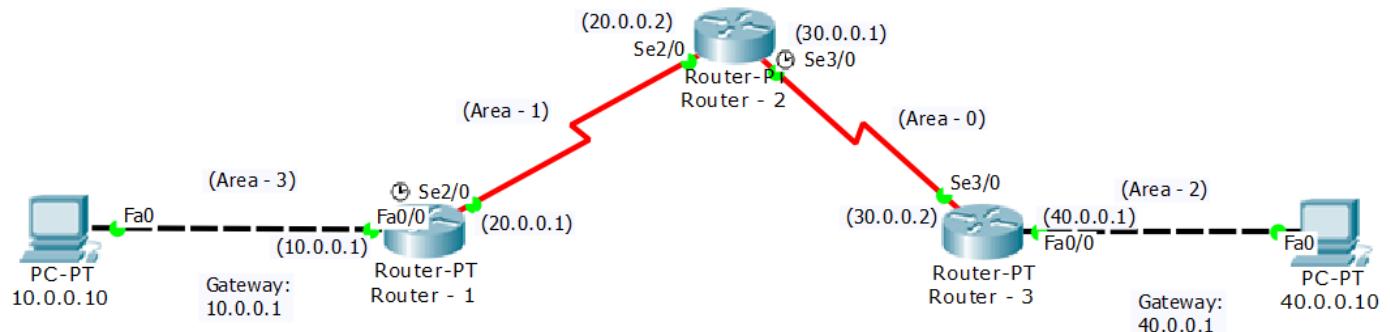
## 2.6 Experiment - 6:

### 2.6.1 Question:

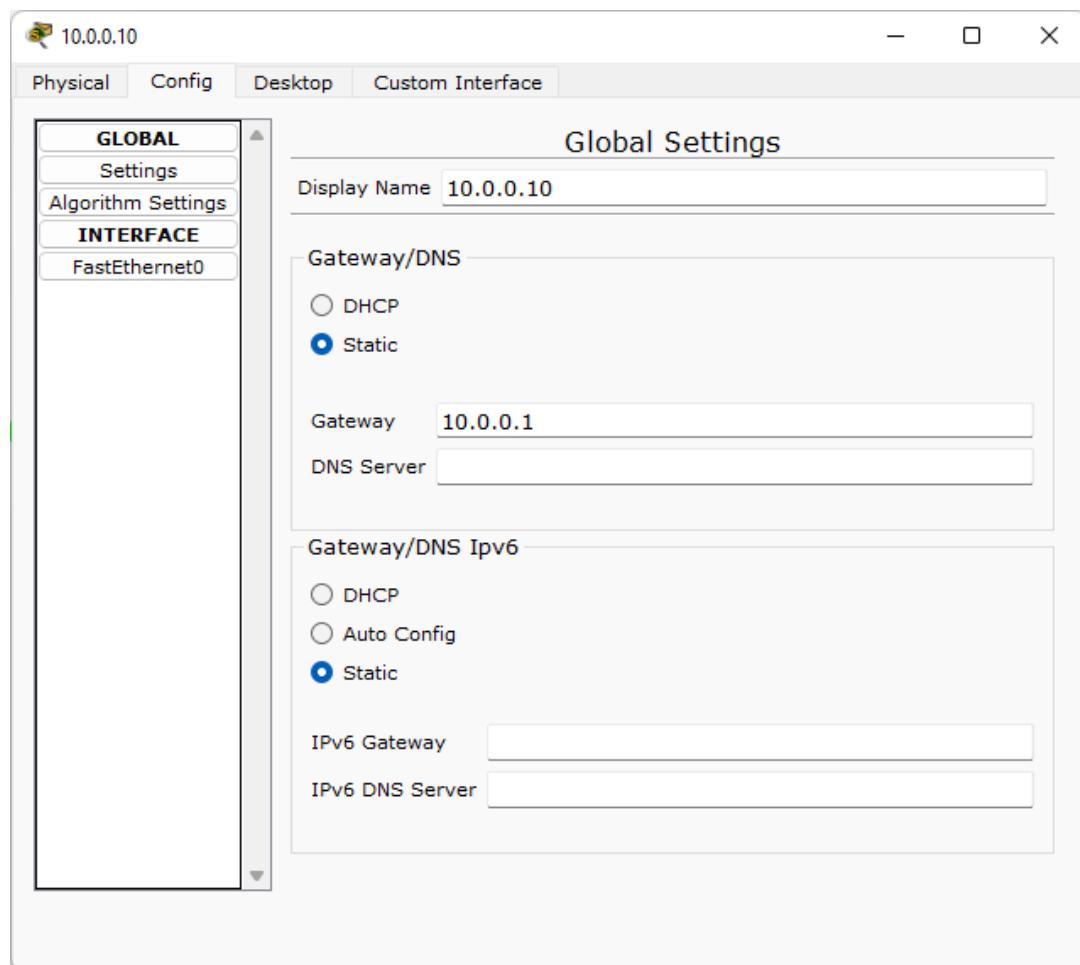
Configure OSPF routing protocol.

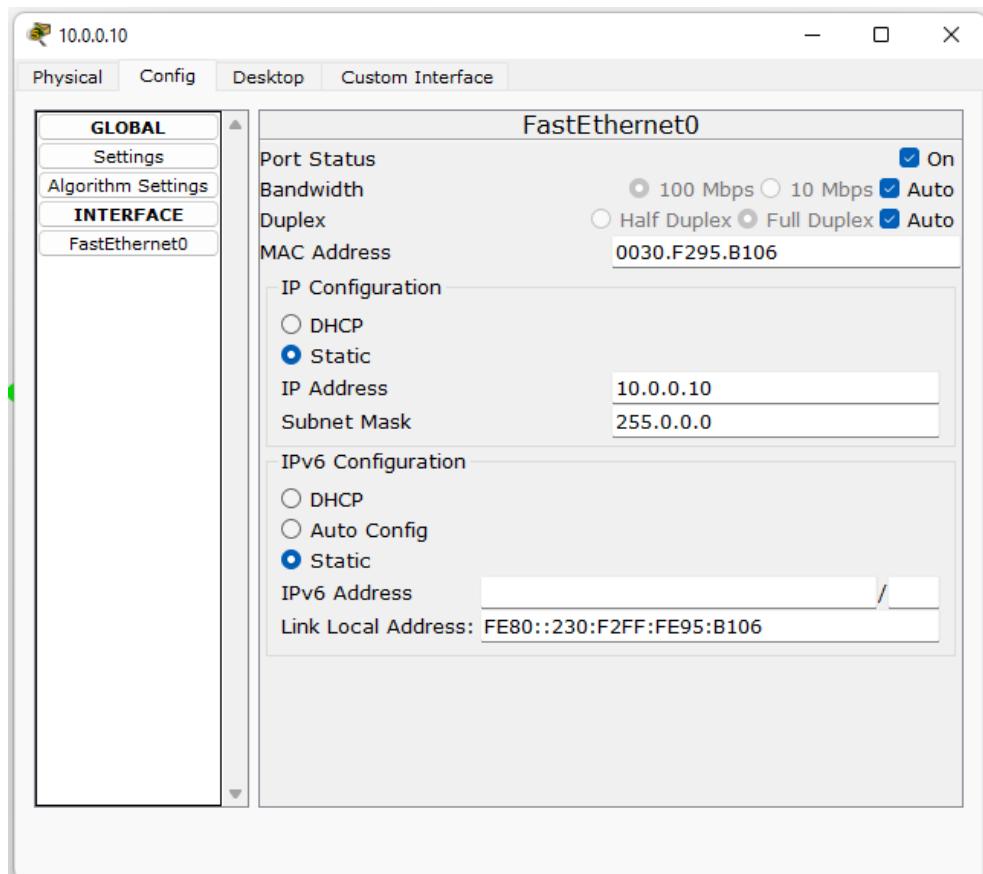
### 2.6.2 Screenshots (Topology, Configurations & Output):

#### Topology:

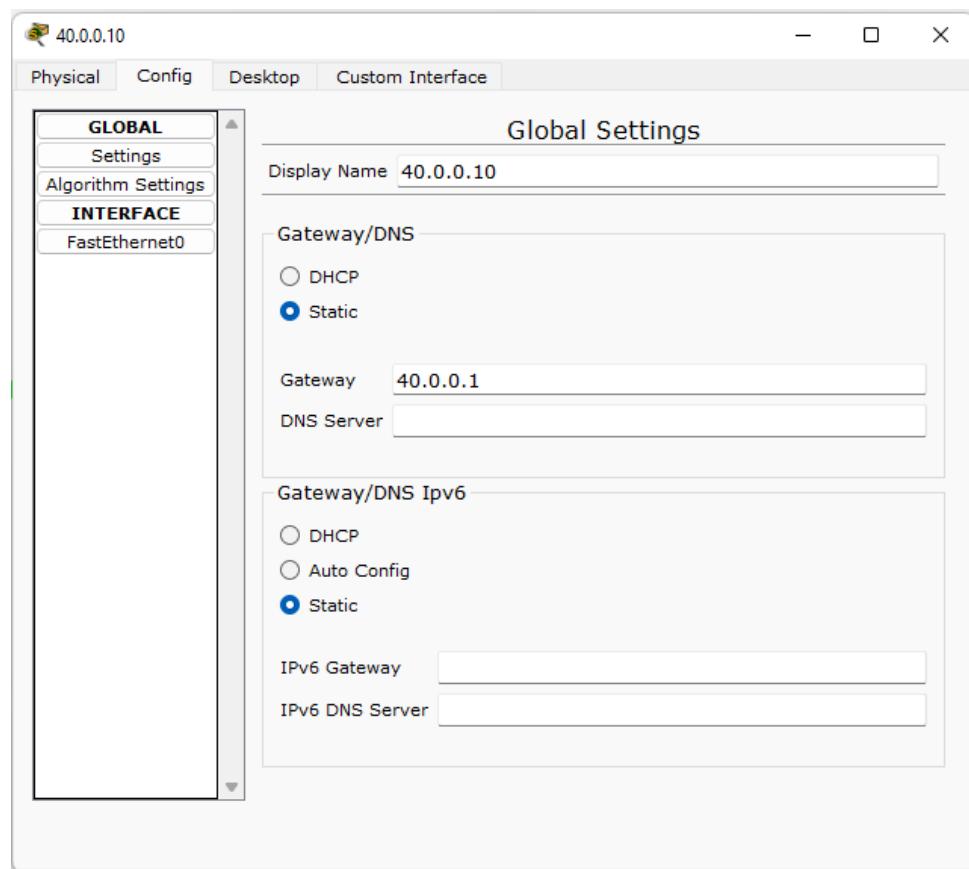


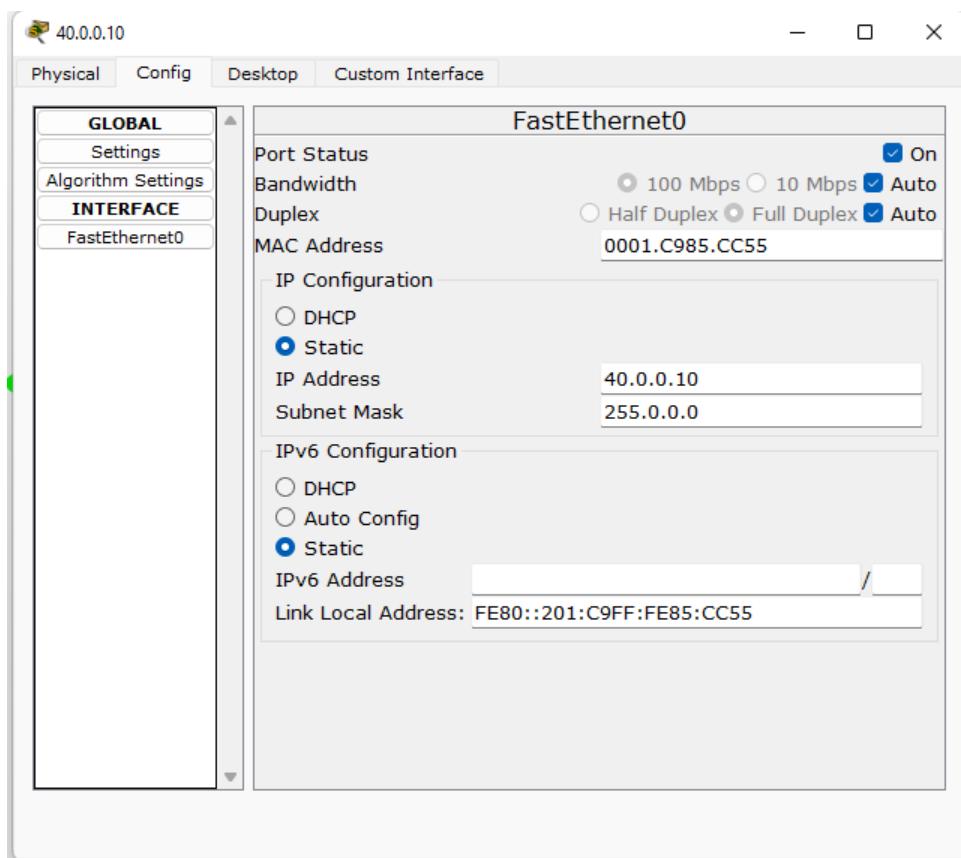
#### PC - 1 Configuration:





## PC - 2 Configuration:





## Router - 1 Configuration:

Router - 1

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 Se2/0
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)#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

```

Copy Paste

Router - 1

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 Se2/0
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)#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)#exit
```

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Router - 1

Physical Config CLI

### IOS Command Line Interface

```
Router>enable
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)#
00:14:47: %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
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#router ospf 1
Router(config-router)#area 1 virtual-link 2.2.2.2
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#
```

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**Router - 1**

Physical Config CLI

### IOS Command Line Interface

```

Router(config-if)#no shut
Router(config-if)#exit
Router(config)#router ospf 1
Router(config-router)#area 1 virtual-link 2.2.2.2
Router(config-router)#exit
Router(config)#exit
Router#
*SYS-5-CONFIG_I: Configured from console by console

Router#
00:22:08: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on OSPF_VL0 from LOADING to FULL,
Loading Done

Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

C    10.0.0.0/8 is directly connected, FastEthernet0/0
     20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C      20.0.0.0/8 is directly connected, Serial2/0
C      20.0.0.2/32 is directly connected, Serial2/0
O  30.0.0.0/8 [110/128] via 20.0.0.2, 00:00:04, Serial2/0
O IA 40.0.0.0/8 [110/129] via 20.0.0.2, 00:00:04, Serial2/0
C  172.16.0.0/16 is directly connected, Loopback0
Router#

```

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## Router - 2 Configuration:

**Router - 2**

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

```

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Router - 2

Physical Config CLI

### IOS Command Line Interface

```
Router>enable
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)#net
00:14:46: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial2/0 from LOADING to
FULL, Loading Done
* Ambiguous command: "ne"
Router(config-router)#network 30.0.0.0 0.255.255.255 area 0
Router(config-router)#exit
Router(config)#
00:16:02: %OSPF-5-ADJCHG: Process 1, Nbr 3.3.3.3 on Serial3/0 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 172.16.1.253 255.255.0.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#
00:20:56: %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
```

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Router - 2

Physical Config CLI

### IOS Command Line Interface

```
00:21:06: %OSPF-4-ERRRCV: Received invalid packet: mismatch area ID, from backbone
area must be virtual-link but not found from 20.0.0.2, Serial2/0

Router(config)#router os
00:21:16: %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
* Incomplete command.
Router(config)#router ospf 1
Router(config-router)#
00:21:26: %OSPF-4-ERRRCV: Received invalid packet: mismatch area ID, from backbone
area must be virtual-link but not found from 20.0.0.2, Serial2/0

Router(config-router)#area 1 virtual-1
00:21:36: %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
^
* Invalid input detected at '^' marker.

Router(config-router)#area 1 virtual-link 1.1.1.1
^
* Invalid input detected at '^' marker.

Router(config-router)#
00:21:46: %OSPF-4-ERRRCV: Received invalid packet: mismatch area ID, from backbone
area must be virtual-link but not found from 20.0.0.2, Serial2/0

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

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**Router - 2**

Physical Config CLI

**IOS Command Line Interface**

```

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

Router#
00:22:06: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on OSPF_VL0 from LOADING to FULL,
Loading Done

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

O IA 10.0.0.0/8 [110/65] via 20.0.0.1, 00:00:04, Serial2/0
  20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C     20.0.0.0/8 is directly connected, Serial2/0
C     20.0.0.1/32 is directly connected, Serial2/0
  30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C     30.0.0.0/8 is directly connected, Serial3/0
C     30.0.0.2/32 is directly connected, Serial3/0
O IA 40.0.0.0/8 [110/65] via 30.0.0.2, 00:06:03, Serial3/0
C     172.16.0.0/16 is directly connected, Loopback0

Router#

```

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## Router - 3 Configuration:

**Router - 3**

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 Se3/0
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 Serial3/0, changed state to up

Router(config-if)#exit
Router(config)#interface
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state
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)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#exit

```

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**Router - 3**

Physical Config CLI

### IOS Command Line Interface

```

Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#router-id 3.3.3.3
Router(config-router)#network 30.0.0.0 0.255.255.255 area 0
Router(config-router)#
00:16:01: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial3/0 from LOADING to
FULL, Loading Done

Router(config-router)#network 40.0.0.0 0.255.255.255 area 2
Router(config-router)#exit
Router(config)#interface Se3/0
Router(config-if)#interface loopback 0

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

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

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

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

```

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**Router - 3**

Physical Config CLI

### IOS Command Line Interface

```

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
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 not set

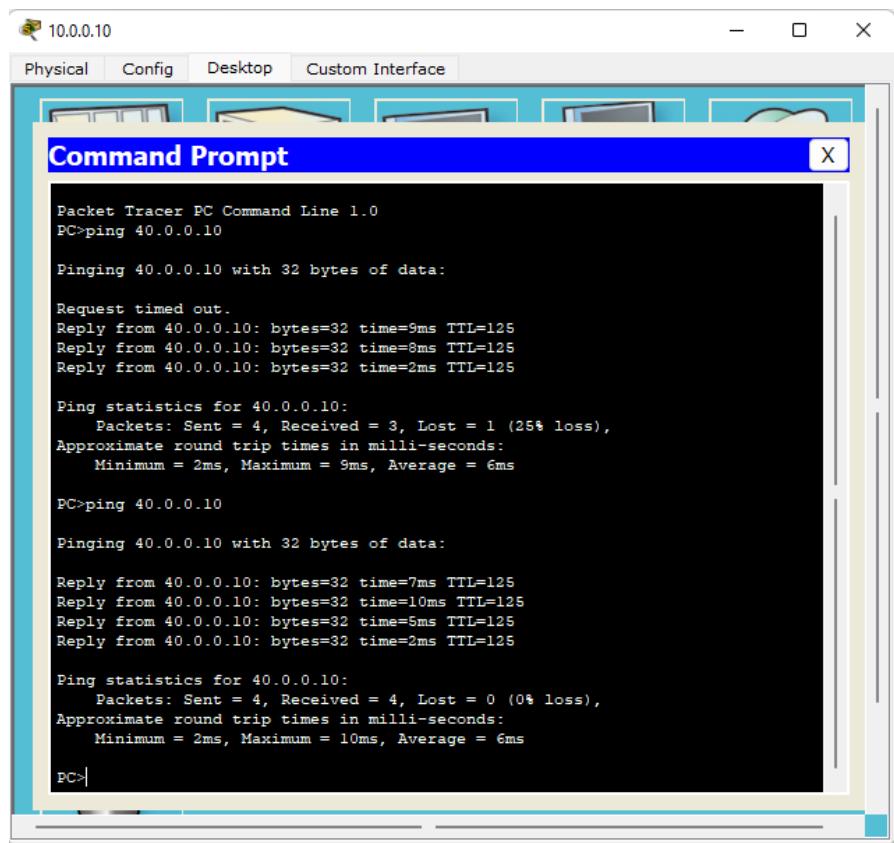
O IA 10.0.0.0/8 [110/129] via 30.0.0.1, 00:00:32, Serial3/0
O IA 20.0.0.0/8 [110/128] via 30.0.0.1, 00:06:36, Serial3/0
      30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       30.0.0.0/8 is directly connected, Serial3/0
C       30.0.0.1/32 is directly connected, Serial3/0
C       40.0.0.0/8 is directly connected, FastEthernet0/0
C       172.16.0.0/16 is directly connected, Loopback0
Router#

```

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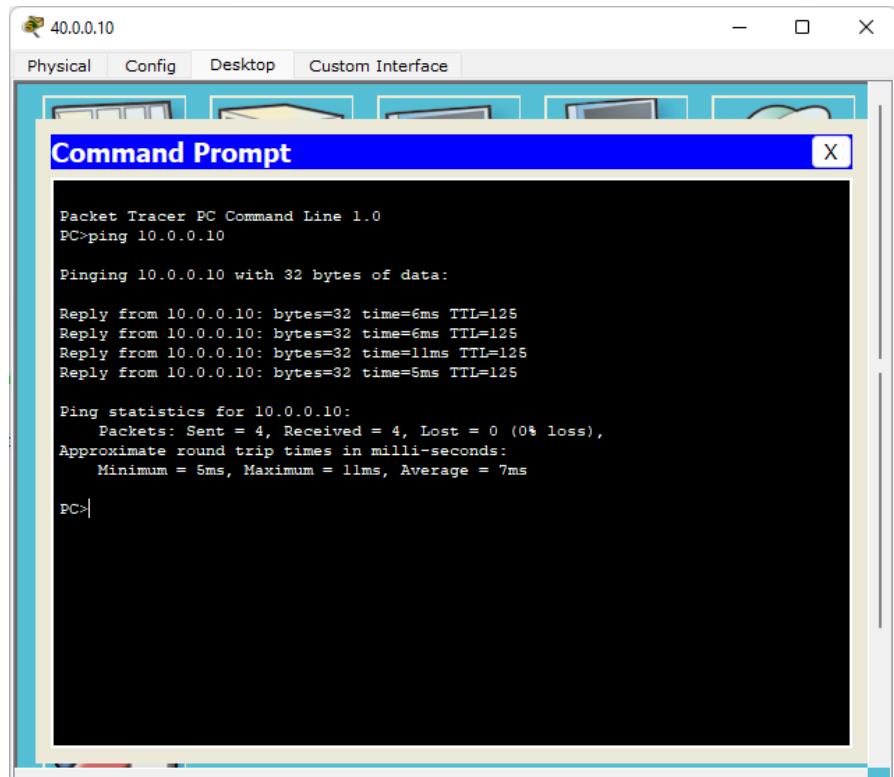
## Output:

## Pinging from PC - 1 to PC - 2:



Packet Tracer PC Command Line 1.0  
PC>ping 40.0.0.10  
  
Pinging 40.0.0.10 with 32 bytes of data:  
  
Request timed out.  
Reply from 40.0.0.10: bytes=32 time=5ms TTL=125  
Reply from 40.0.0.10: bytes=32 time=8ms TTL=125  
Reply from 40.0.0.10: bytes=32 time=2ms TTL=125  
  
Ping statistics for 40.0.0.10:  
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),  
Approximate round trip times in milli-seconds:  
    Minimum = 2ms, Maximum = 9ms, Average = 6ms  
  
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=7ms TTL=125  
Reply from 40.0.0.10: bytes=32 time=10ms TTL=125  
Reply from 40.0.0.10: bytes=32 time=5ms TTL=125  
Reply from 40.0.0.10: bytes=32 time=2ms 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 = 10ms, Average = 6ms  
  
PC>

## Pinging from PC - 2 to PC - 1:



Packet Tracer PC Command Line 1.0  
PC>ping 10.0.0.10  
  
Pinging 10.0.0.10 with 32 bytes of data:  
  
Reply from 10.0.0.10: bytes=32 time=6ms TTL=125  
Reply from 10.0.0.10: bytes=32 time=6ms TTL=125  
Reply from 10.0.0.10: bytes=32 time=11ms TTL=125  
Reply from 10.0.0.10: bytes=32 time=5ms TTL=125  
  
Ping statistics for 10.0.0.10:  
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
    Minimum = 5ms, Maximum = 11ms, Average = 7ms  
  
PC>

### 2.6.3 Observation Book Pictures:

classmate  
Date \_\_\_\_\_  
Page \_\_\_\_\_

0xpc

Configure RIP routing protocol in Router.

Aims To configure routers with RIP.

Topology:

Router 1: F0 (10.0.0.10), Se1/0 (30.0.0.3), Se3/0 (30.0.0.1)

Router 2: F0 (20.0.0.1), Se2/0 (30.0.0.2)

Router 3: F0 (40.0.0.1), Se4/0 (30.0.0.5)

PC1: 10.0.0.1

PC2: 40.0.0.10

Default gateway: 10.0.0.1

Default gateway: 40.0.0.1

Protocols

1. Connect DC to a router using (cable) straight through cable. Configure the PC with IP: 10.0.0.10 & default gateway 10.0.0.1. Repeat the same for PC2. and Router 3.

2. The Router 1, 2 and 3 are connected with 2nd DCE 3 Configure Fast Ethernet in Router 1 and 2 with IP 10.0.0.1 and 20.0.0.2 respectively.

4. The serial interfaces of each router will be:  
 Router 1, Se2/0 = 20.0.0.1  
 Router 2, Se3/0 = 20.0.0.2  
 Router 2, Se3/0 = 30.0.0.1  
 Router 3, Se4/0 = 30.0.0.2.

5. All connections are now green.
6. For all serial interfaces on encapsulation ppp is enabled.  
Router (config-if) # encapsulation ppp.

7. Serial interface with clock of DCE are to provide clock rate of 64000 bps.

Router 1:

Router (Config-if) # clock rate 64000 (S0/1/0)

Router 2:

Router (Config-if) # clock rate 64000 (S0 3/0)  
exit

8. For each router RIP is configured with its network addresses.

Router 1:

Router (Config) # Router rip

Router (Config-router) # network 10.0.0.0

Router (Config-router) # network 20.0.0.0

Router 2:

Router (Config) # Router rip

Router (Config-router) # network 20.0.0.0

Router (Config-router) # network 30.0.0.0

Router 3:

Router (Config-router) # network 30.0.0.0

Router (Config-router) # network 40.0.0.0

9. Send a ping from PC1 to PC2.

CLASSMATE

Date \_\_\_\_\_

Page \_\_\_\_\_

Result:

Pinging 40.0.0.10 with 32 bytes of data.

Reply from 40.0.0.10: bytes=32 time=16ms TTL=258

Reply from 40.0.0.10: bytes=32 time=4ms TTL=253

Reply from 40.0.0.10: bytes=32 time=3ms TTL=253

Reply from 40.0.0.10: bytes=32 time=12ms TTL=253

Ping statistics for 40.0.0.1:

Packet: Sent = 4, Received = 4, Lost = 0 (0% loss)

Approximate round trip times in milliseconds:

Minimum = 3ms, Maximum = 16ms, Average = 9ms.

Observation:

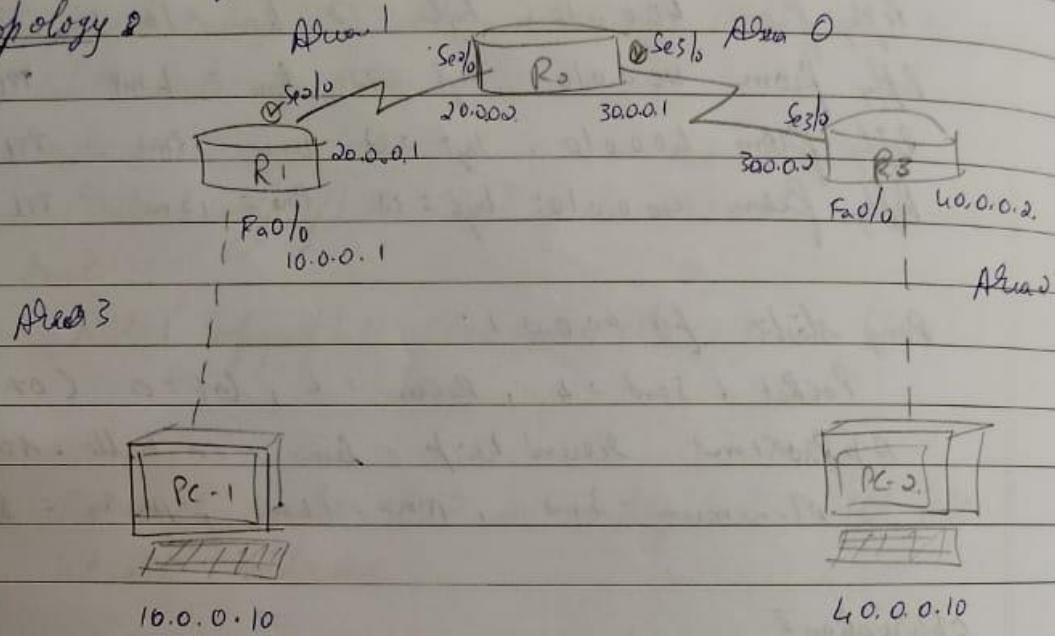
The common colors between routers when Point-to-point protocol. RIP is used to set the routes learnt dynamically using RIP forwarding table.

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Page

Aim: To find shortest path using ospf command  
To Configure OSPF protocol and connect areas.

Topology 2



Procedure:

- 1) Connect SP and 3 routers as shown above
- 2) Configure the IP address of the end device and routers.
- 3) For all of interface enable encapsulation and set link-layer for 802.1Q in R1 and R3 in R2.

Router - Config # Global-se2/0

Router (Config-if) # encapsulate ppp

Router (Config-if) # clock rate 64000  
# exit

- 4). enable ip routing using ospf routers protocol.  
for all routers.

Router # enable 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 40.0.0.0 0.255.255.255 Area 1

5) Now configure loopback address to each routers.

Router - Config # interface ~~set~~ loopback0

Router (Config-Router)# interface 1 ip add 172.16.1.252 255.255.0.0  
Router (Config-Router)# no shutdown

6) Create a virtual link between the routers R<sub>1</sub> and R<sub>2</sub> to connect area 0 and area 3.

Router R1

(Config) # router ospf 1

(Config-router) # area 1 virtual link 2.2.0.0

Router R2

(Config) # router ospf 1

(Config-router) # area 1 virtual link 1.1.1.1

Ping PC1 from PC1

Result:

Pinging 40.0.0.10 with 30 bytes of data

Reply from 40.0.0.10; bytes=32 time <8ms TTL=255

Reply from 40.0.0.10; bytes=32 time <13ms TTL=255

Reply from 40.0.0.10; bytes=32 time <6ms TTL=255

Reply from 40.0.0.10; bytes=32 time <10ms TTL=255

Ping statistics for 40.0.0.10

Packets: sent=4 received=4 loss=0 (0%)

Approximate round trip in milliseconds

minimum = 2ms maximum = 15ms average = 7 ms

Observations:

OSPF is a routing protocol which is based on shortest distance. The switches configured with OSPF are given a loopback address to help keep updating the routing table.

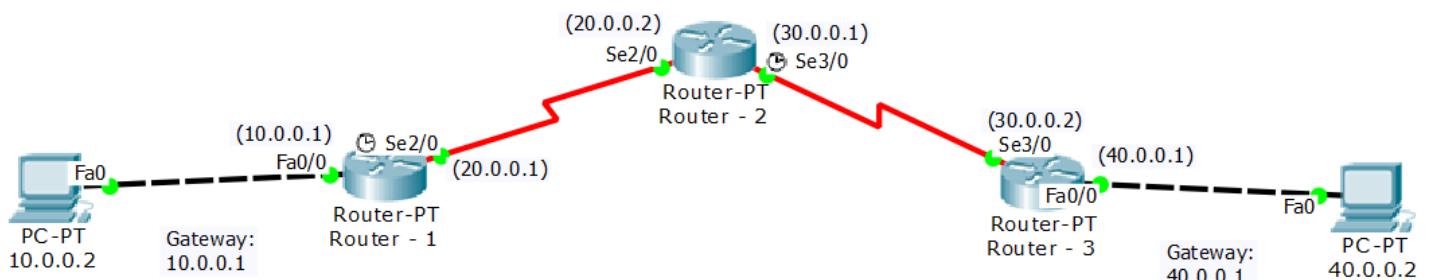
## 2.7 Experiment - 7:

### 2.7.1 Question:

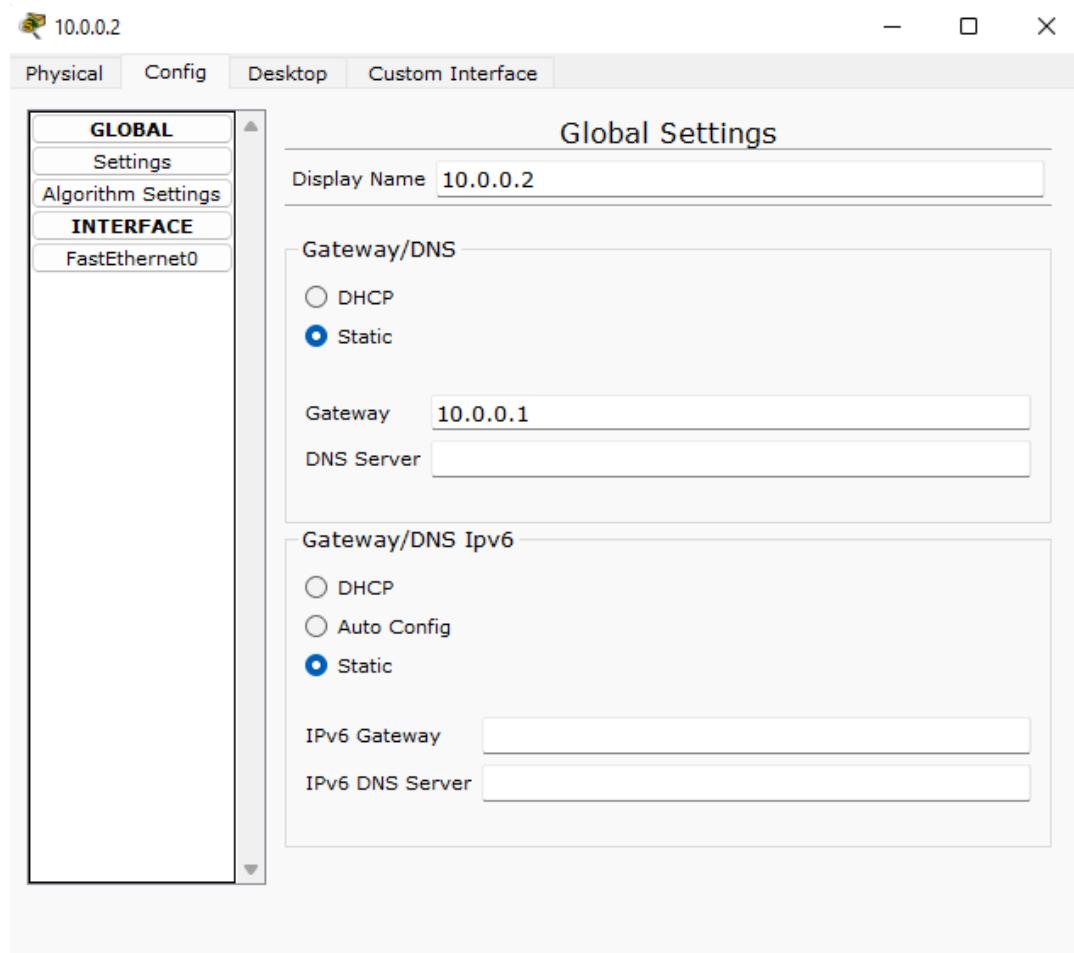
Demonstrate the TTL/ Life of a Packet.

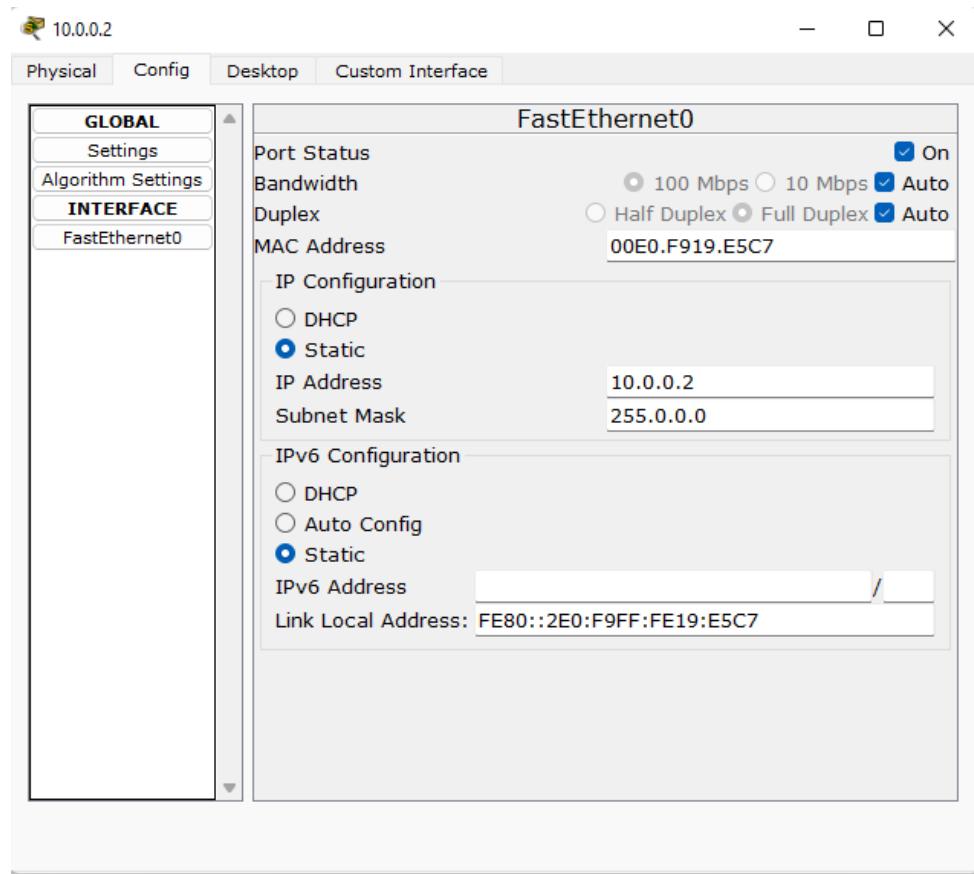
### 2.7.2 Screenshots (Topology, Configurations & Output):

#### Topology:

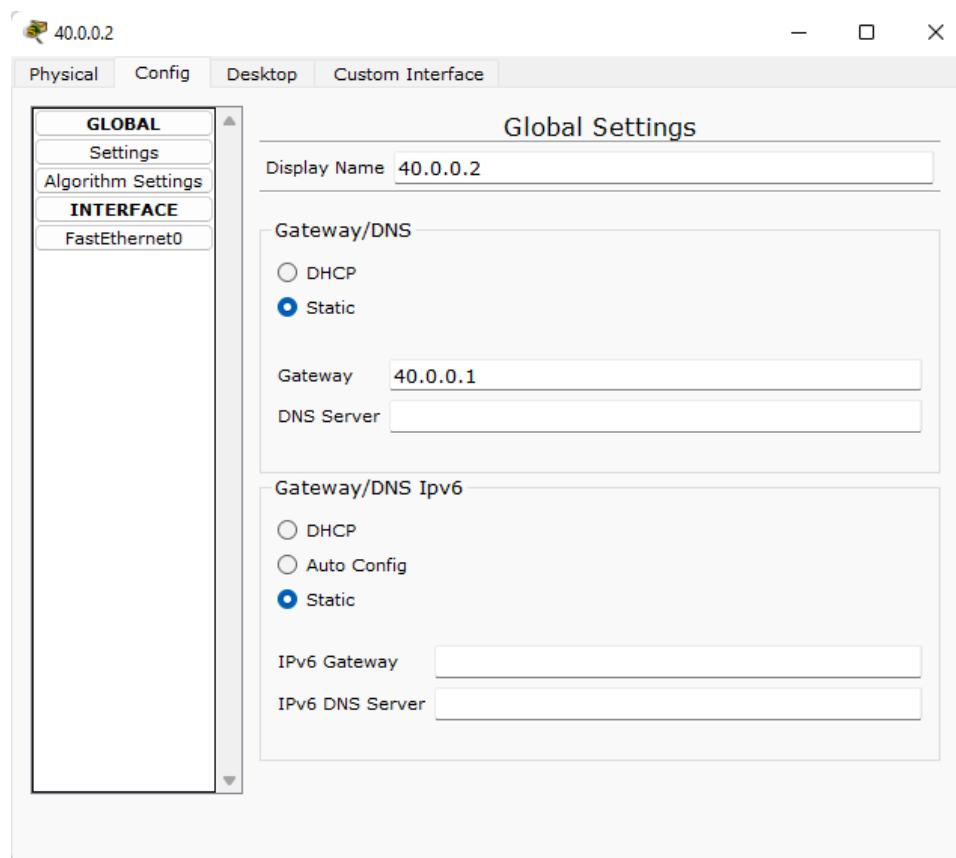


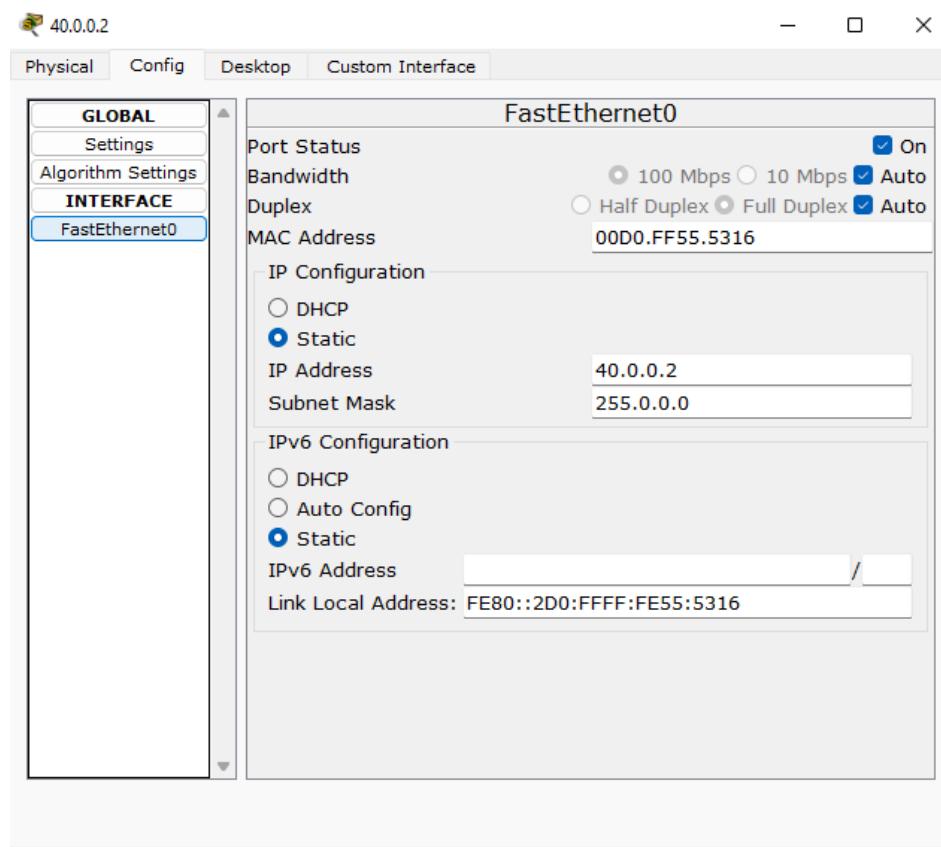
#### PC - 1 Configuration:





## PC - 2 Configuration:





## Router - 1 Configuration:

The screenshot shows the IOS Command Line Interface (CLI) window titled 'IOS Command Line Interface'. It displays the following configuration commands entered at the Router prompt:

```

Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fa0/0
Router(config-if)#ip add 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
exit
Router(config)#interface se2/0
Router(config-if)#ip add 20.0.0.1 255.0.0.0
Router(config-if)#no shut

%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router(config)#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)#interface se2/0
Router(config-if)#exit
Router(config)ip route 0.0.0.0 0.0.0.0 20.0.0.2
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

```

At the bottom of the window are 'Copy' and 'Paste' buttons.

**Router - 1**

Physical Config CLI

### IOS Command Line Interface

```
*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)#interface se2/0
Router(config-if)#exit
Router(config)#ip route 0.0.0.0 0.0.0.0 20.0.0.2
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 20.0.0.2 to network 0.0.0.0

C    10.0.0.0/8 is directly connected, FastEthernet0/0
C    20.0.0.0/8 is directly connected, Serial2/0
S*   0.0.0.0/0 [1/0] via 20.0.0.2
Router#
```

[Copy](#) [Paste](#)

## Router - 2 Configuration:

**Router - 2**

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 se2/0
Router(config-if)#ip add 20.0.0.2 255.0.0.0
Router(config-if)#no shut

Router(config-if)#
*LINK-5-CHANGED: Interface Serial2/0, changed state to up
exit
Router(config)#interface se3/0
Router(config-if)#
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to u
Router(config-if)#ip add 30.0.0.1 255.0.0.0
Router(config-if)#no shut

*LINK-5-CHANGED: Interface Serial3/0, changed state to down
Router(config-if)#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)#ip route 10.0.0.0 255.0.0.0 20.0.0.1
Router(config)#ip route 40.0.0.0 255.0.0.0 30.0.0.2
Router(config)#exit
Router#
*SYS-5-CONFIG_I: Configured from console by console
```

[Copy](#) [Paste](#)

**Router - 2**

Physical Config CLI

### IOS Command Line Interface

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

S    10.0.0.0/8 [1/0] via 20.0.0.1
C    20.0.0.0/8 is directly connected, Serial2/0
C    30.0.0.0/8 is directly connected, Serial3/0
S    40.0.0.0/8 [1/0] via 30.0.0.2
Router#
```

**Copy**    **Paste**

## Router - 3 Configuration:

**Router - 3**

Physical Config CLI

### IOS Command Line Interface

```
Router>enabl
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface se3/0
Router(config-if)#ip address 30.0.0.2 255.0.0.0
Router(config-if)#no shut

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

Router(config-if)#exit
Router(config)#interface
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

* Incomplete command.
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)#ip route 0.0.0.0 0.0.0.0 30.0.0.1
Router(config)#exit
Router#
*SYS-5-CONFIG_I: Configured from console by console
```

**Copy**    **Paste**

Router - 3

Physical Config CLI

### IOS Command Line Interface

```
Router>
Router>enable
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

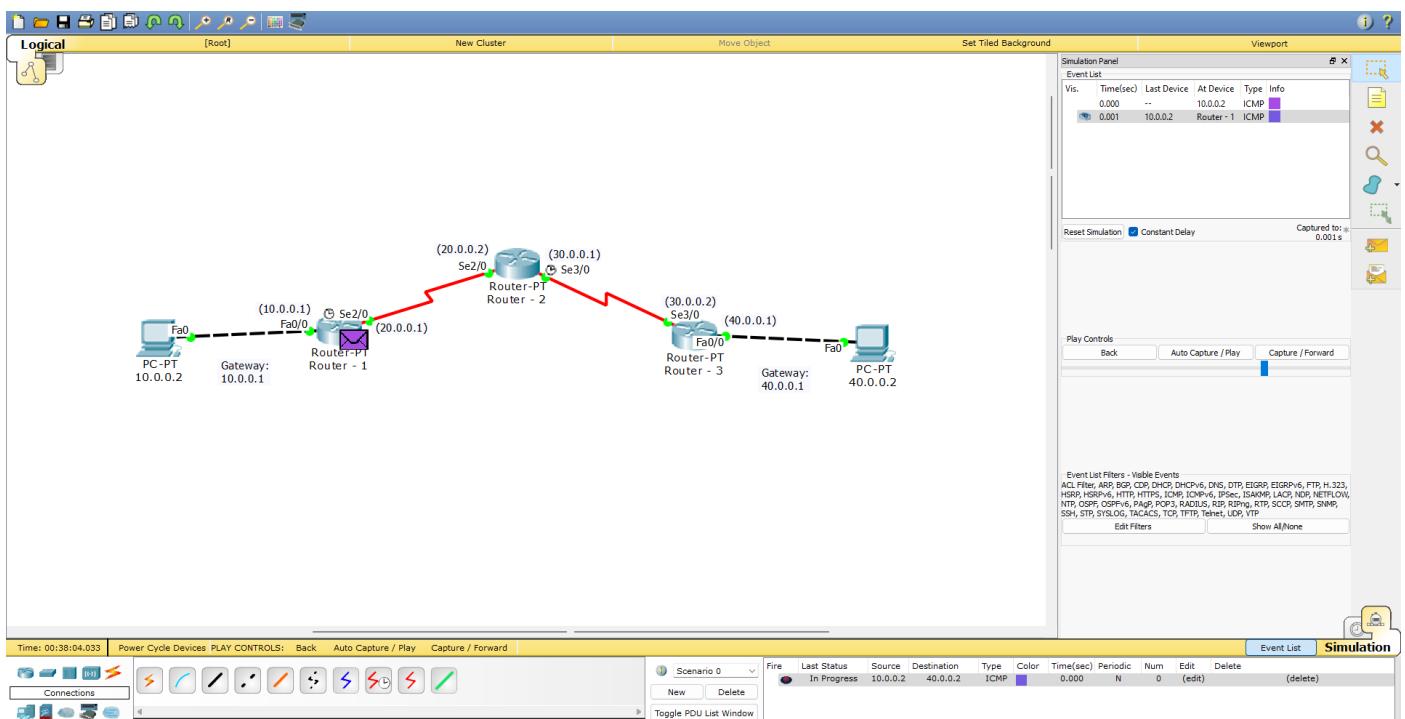
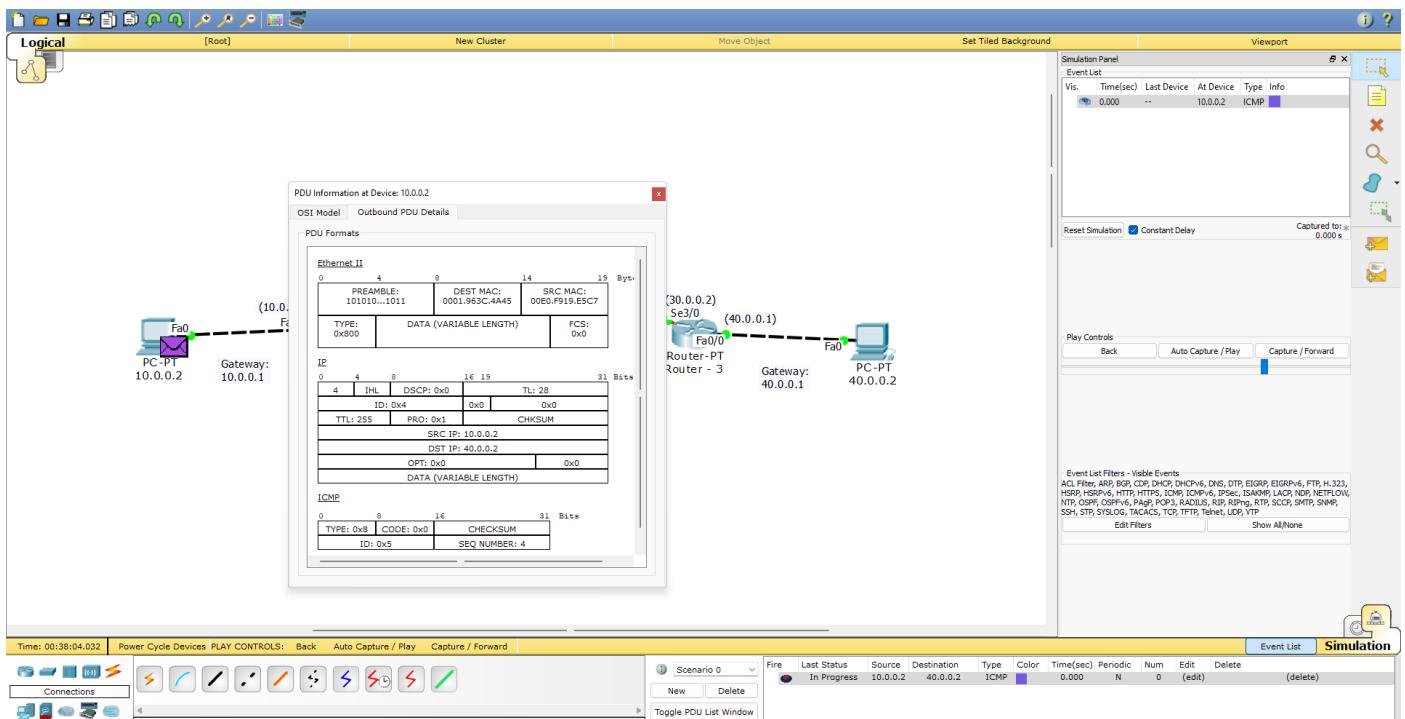
Gateway of last resort is 30.0.0.1 to network 0.0.0.0

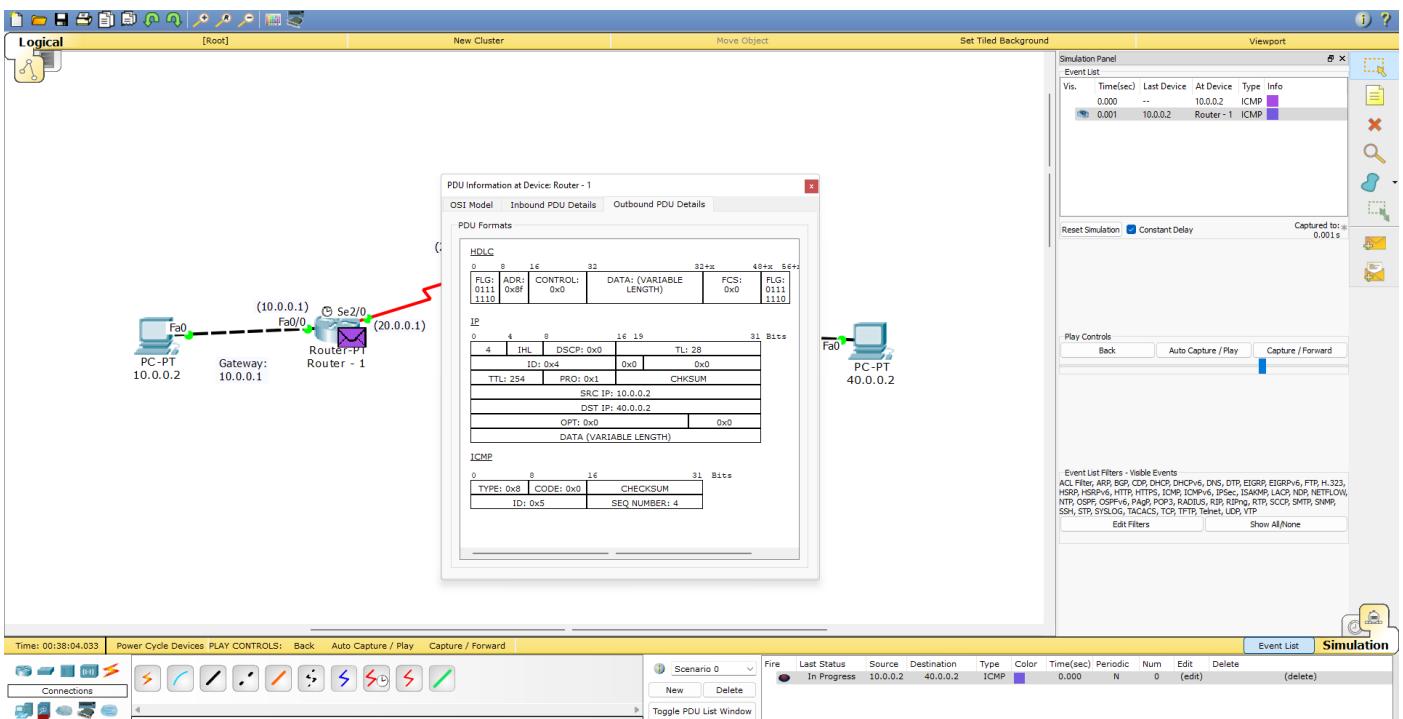
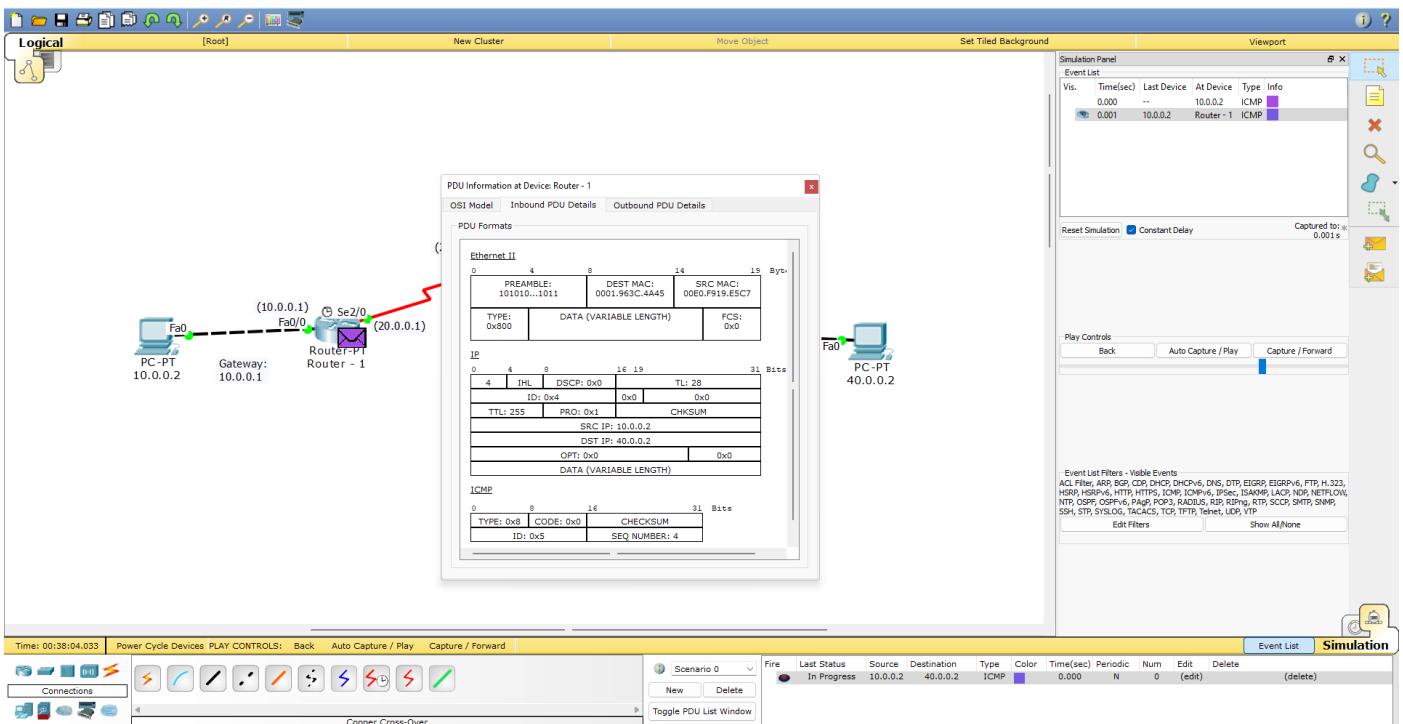
C    30.0.0.0/8 is directly connected, Serial3/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0
S*   0.0.0.0/0 [1/0] via 30.0.0.1
Router#
```

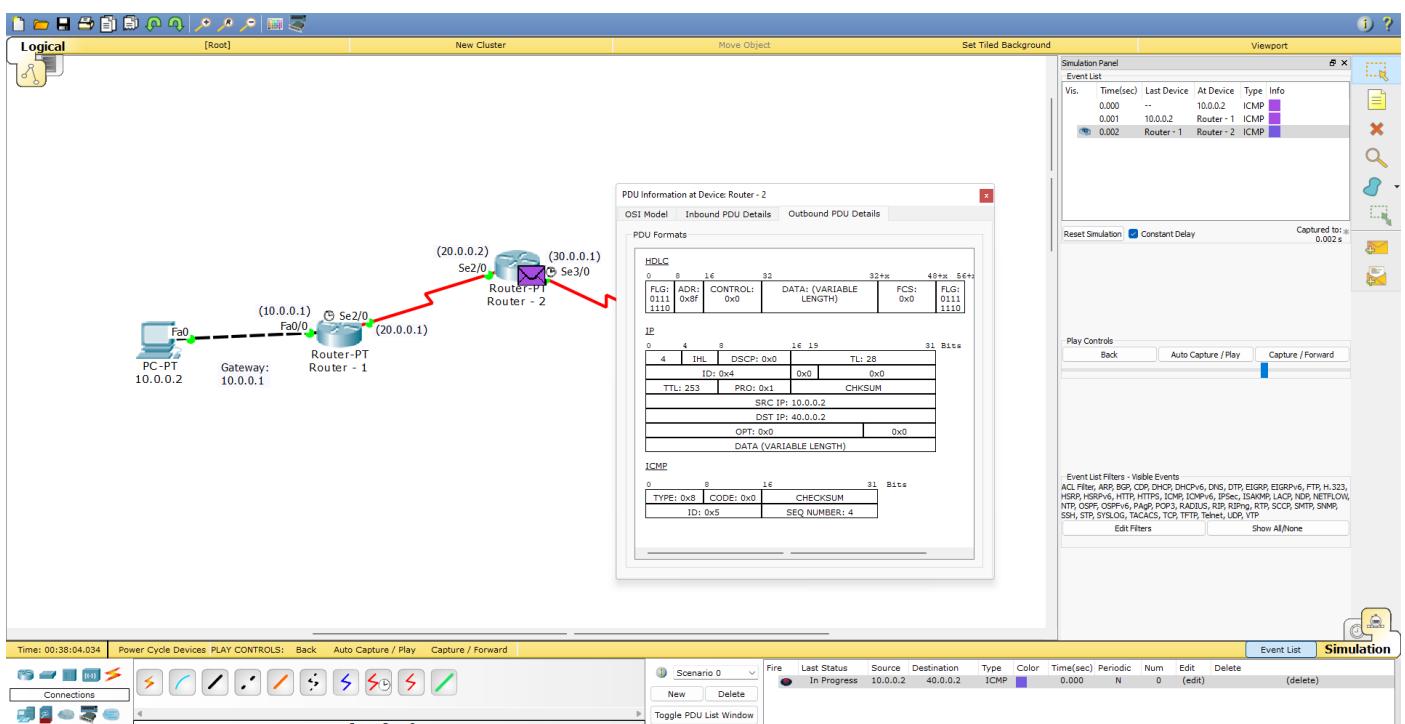
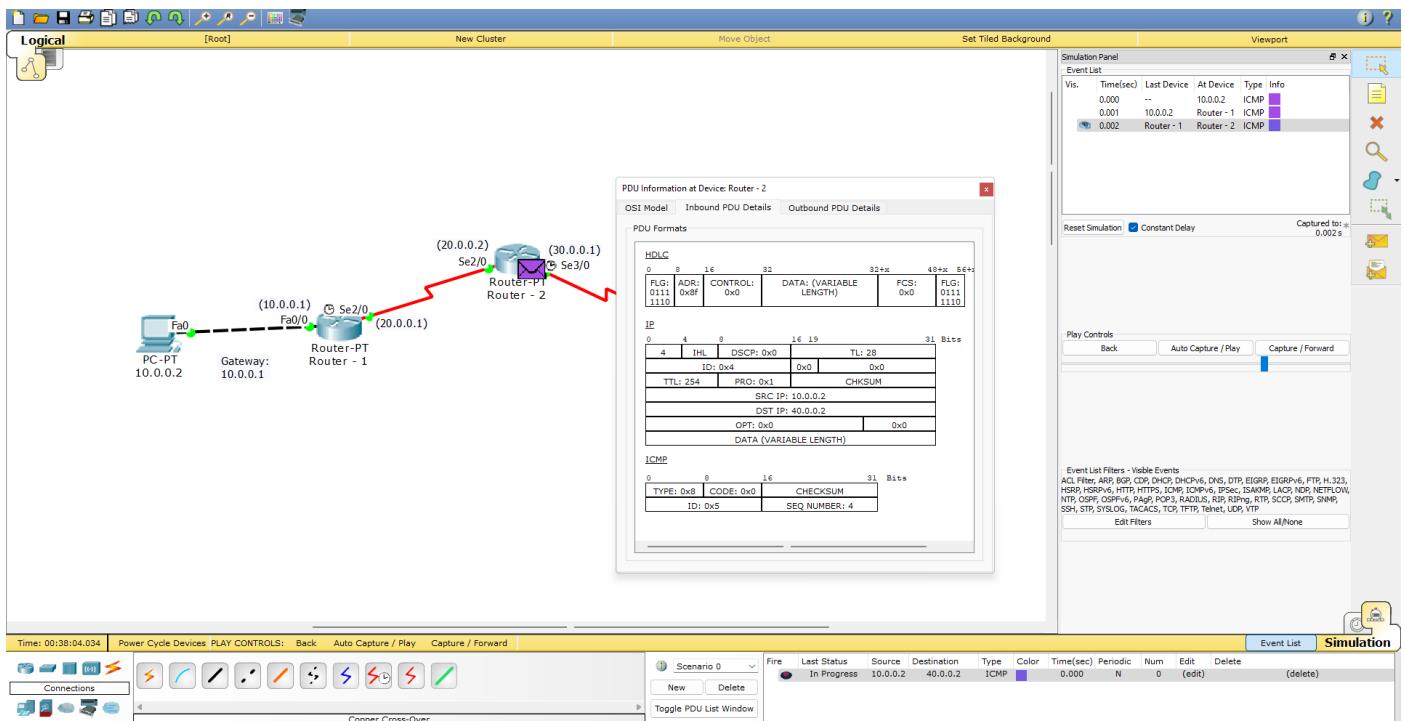
Copy

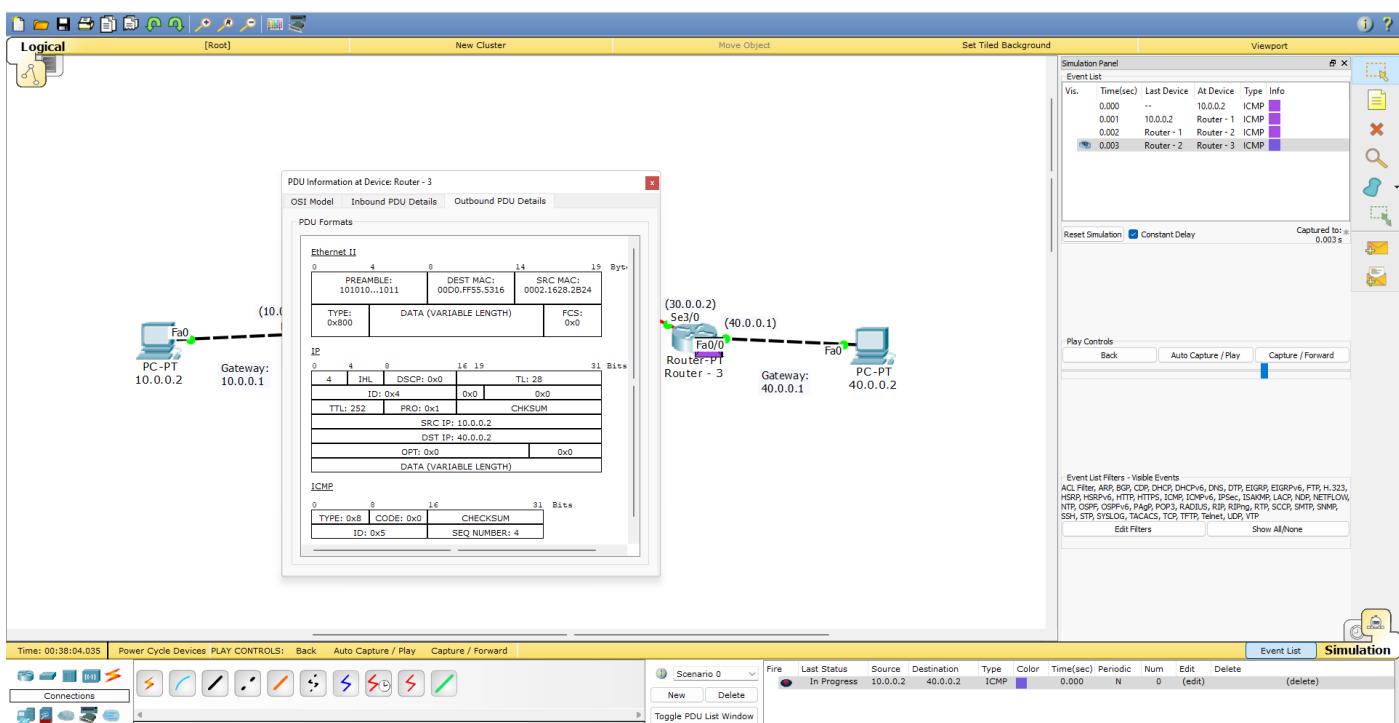
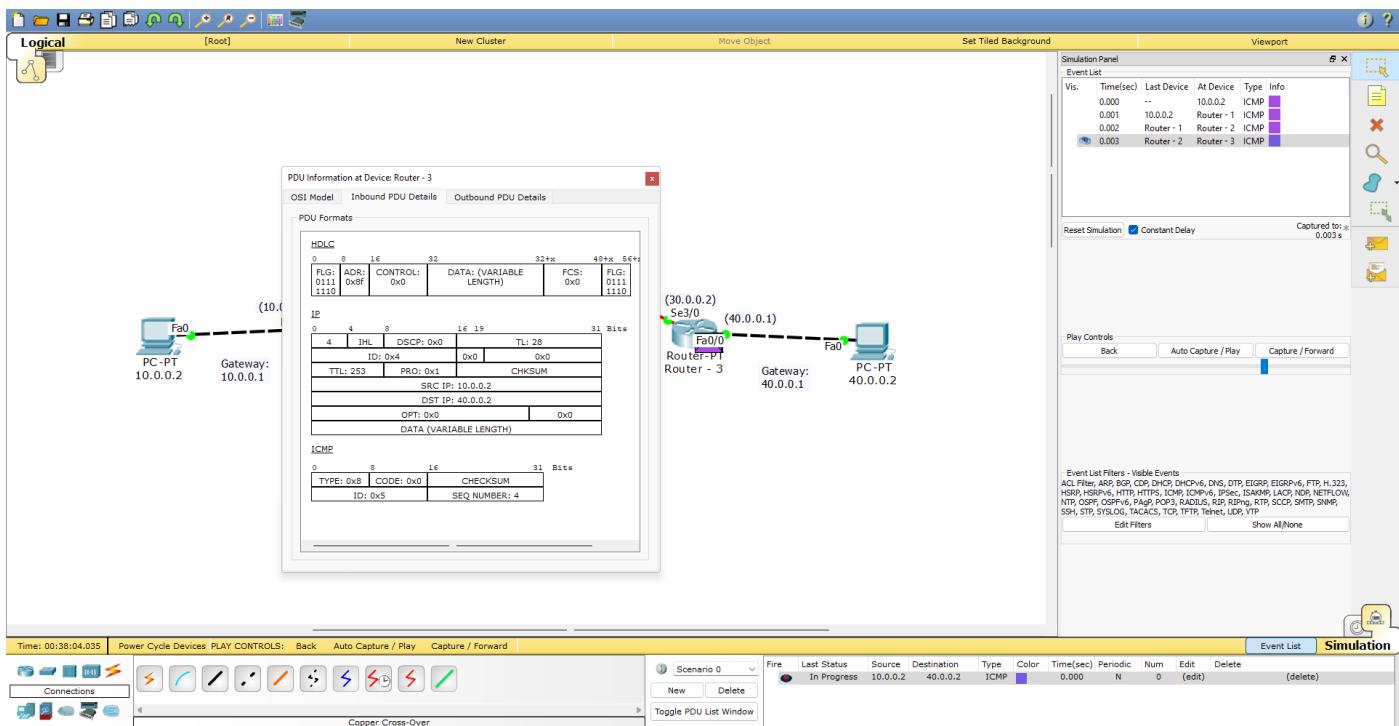
Paste

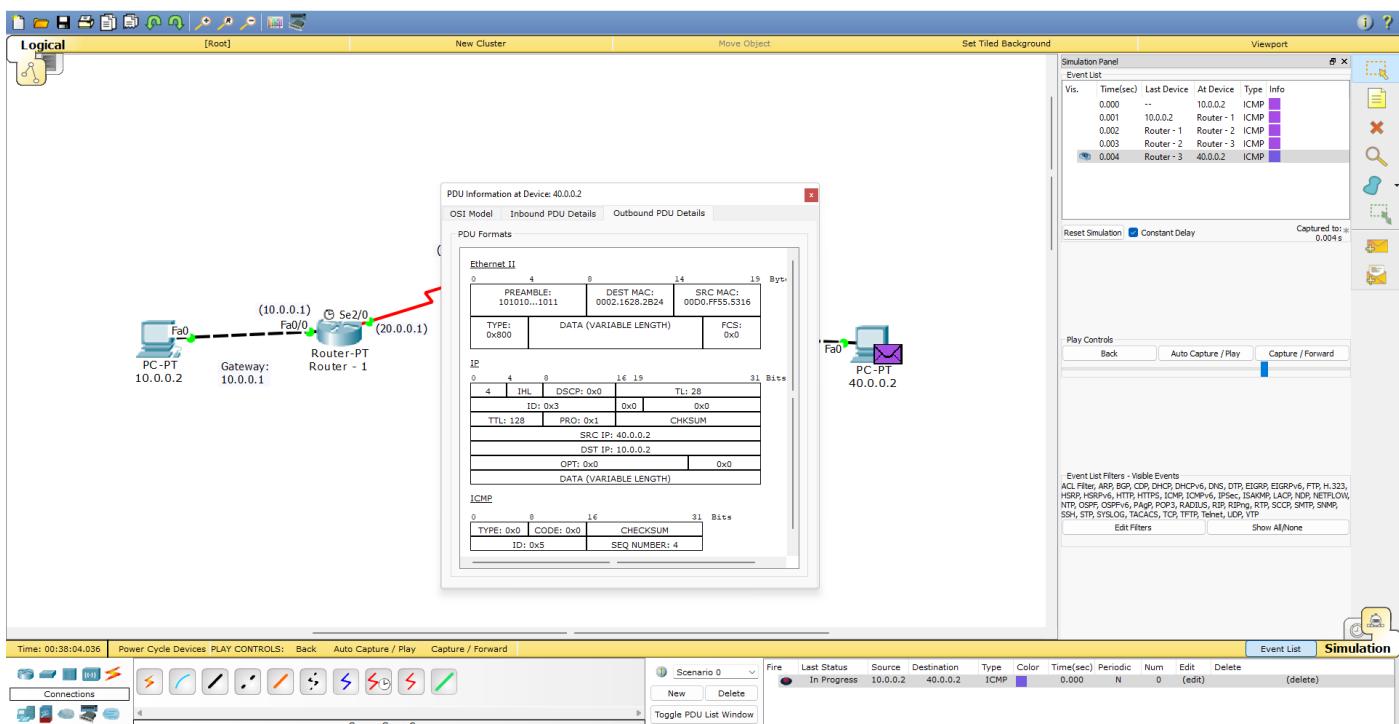
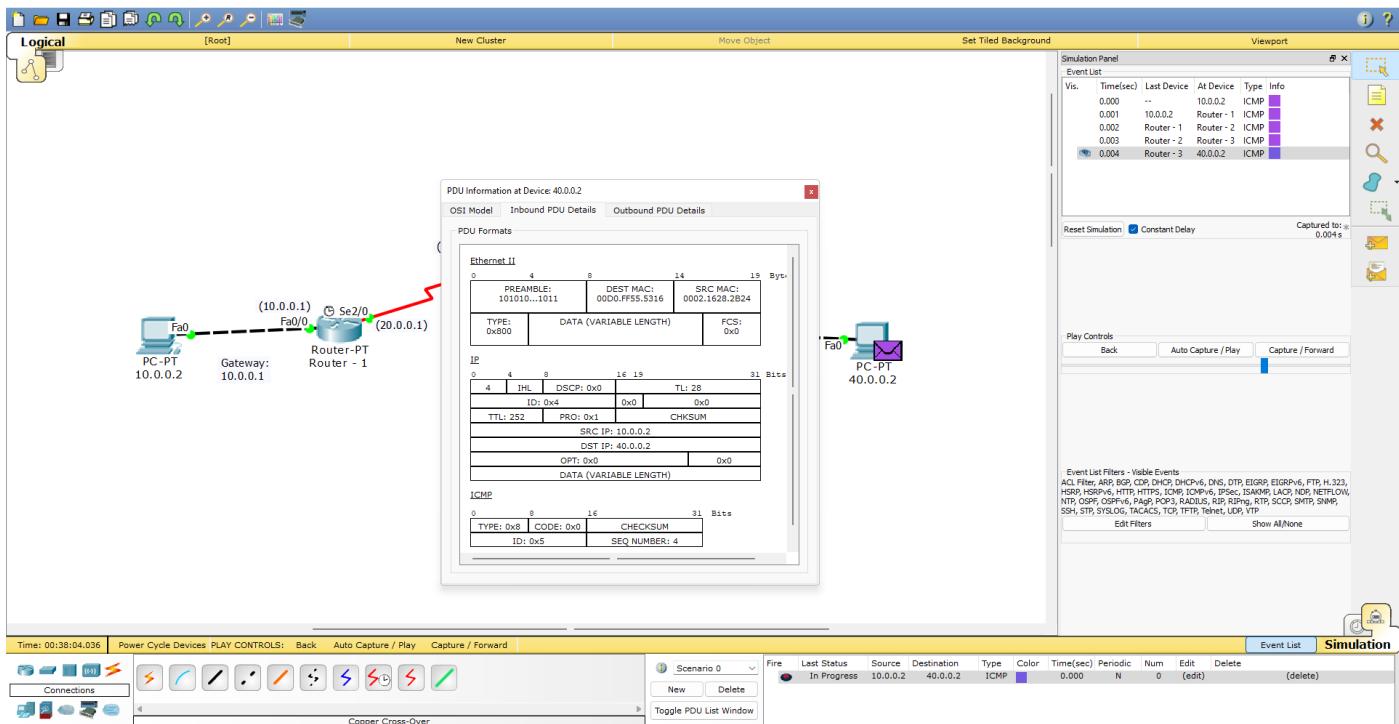
## Sending a PDU from PC - 1 to PC - 2:

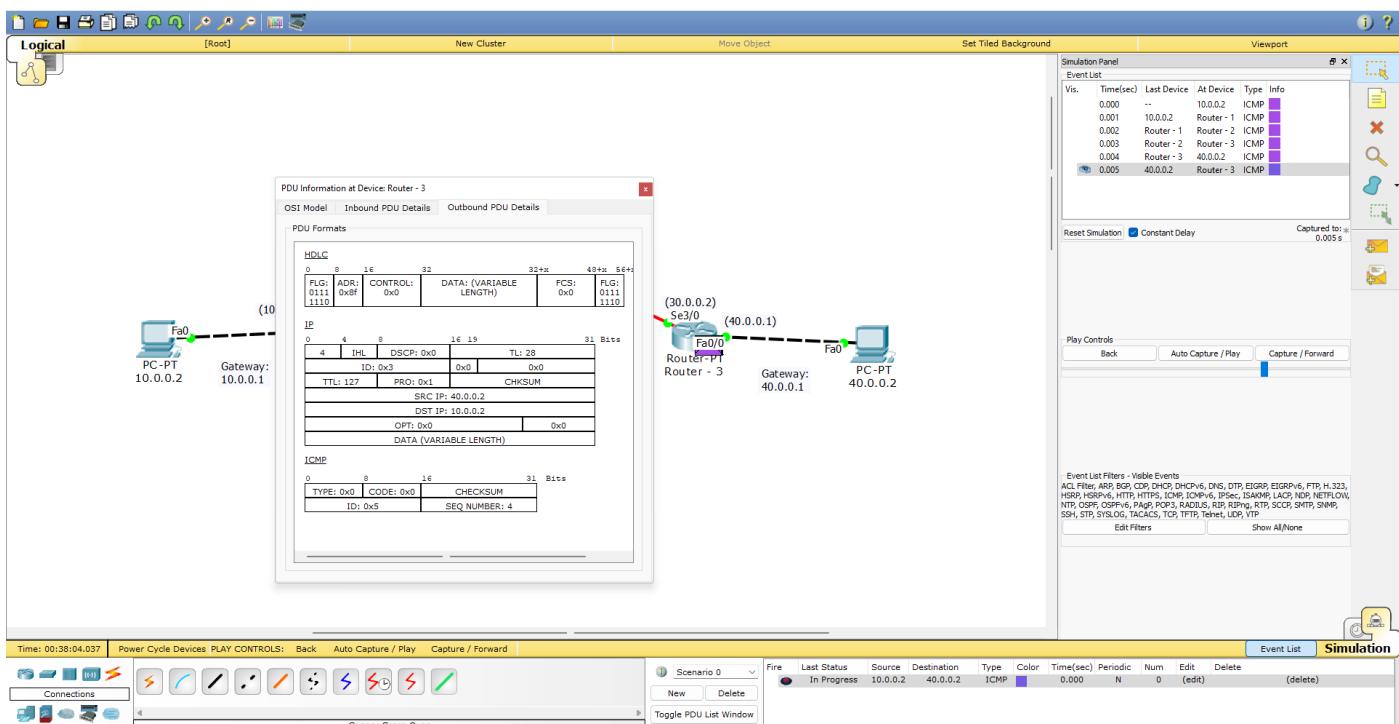
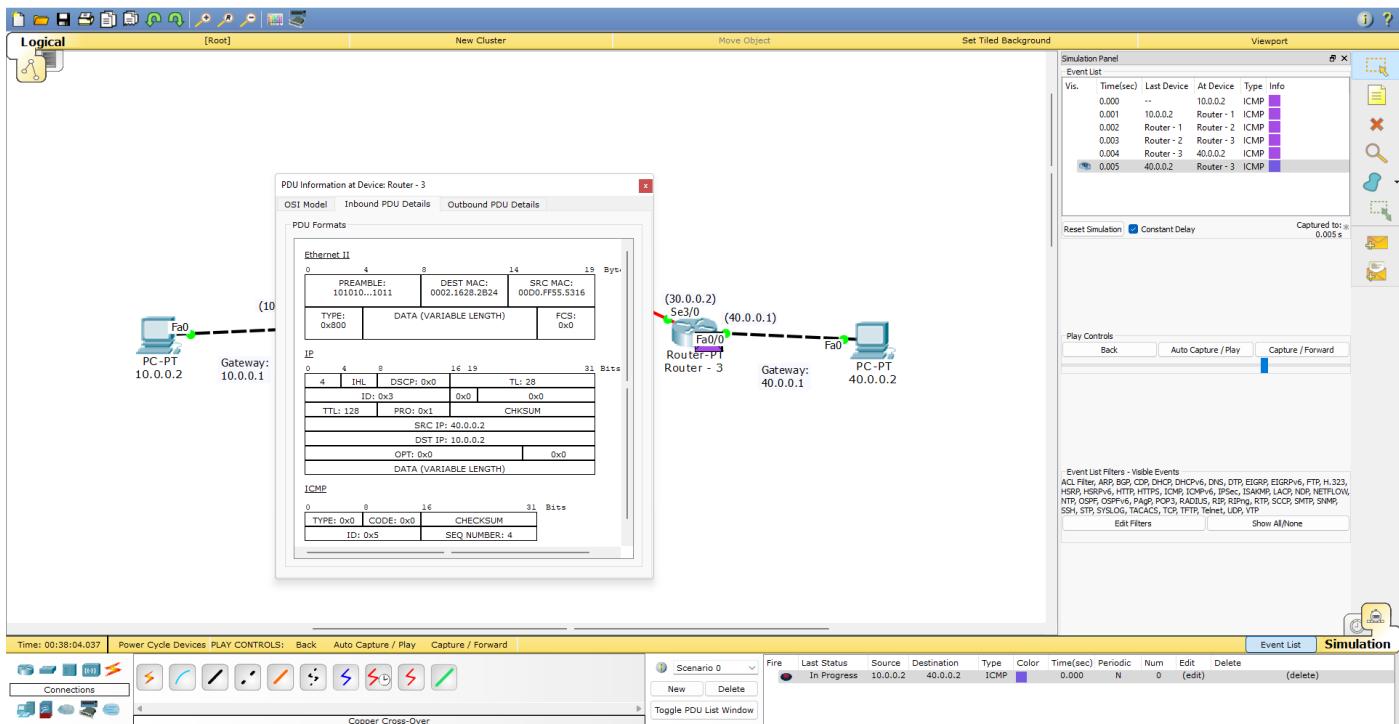


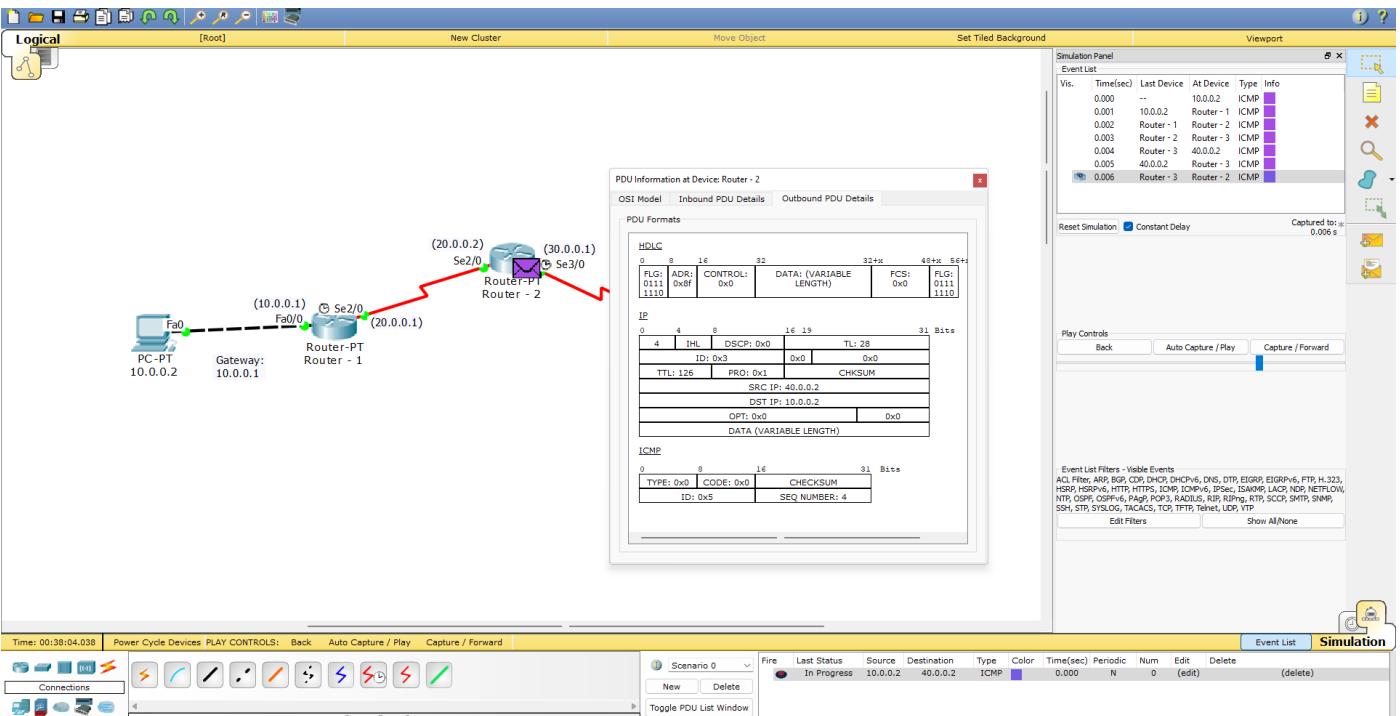
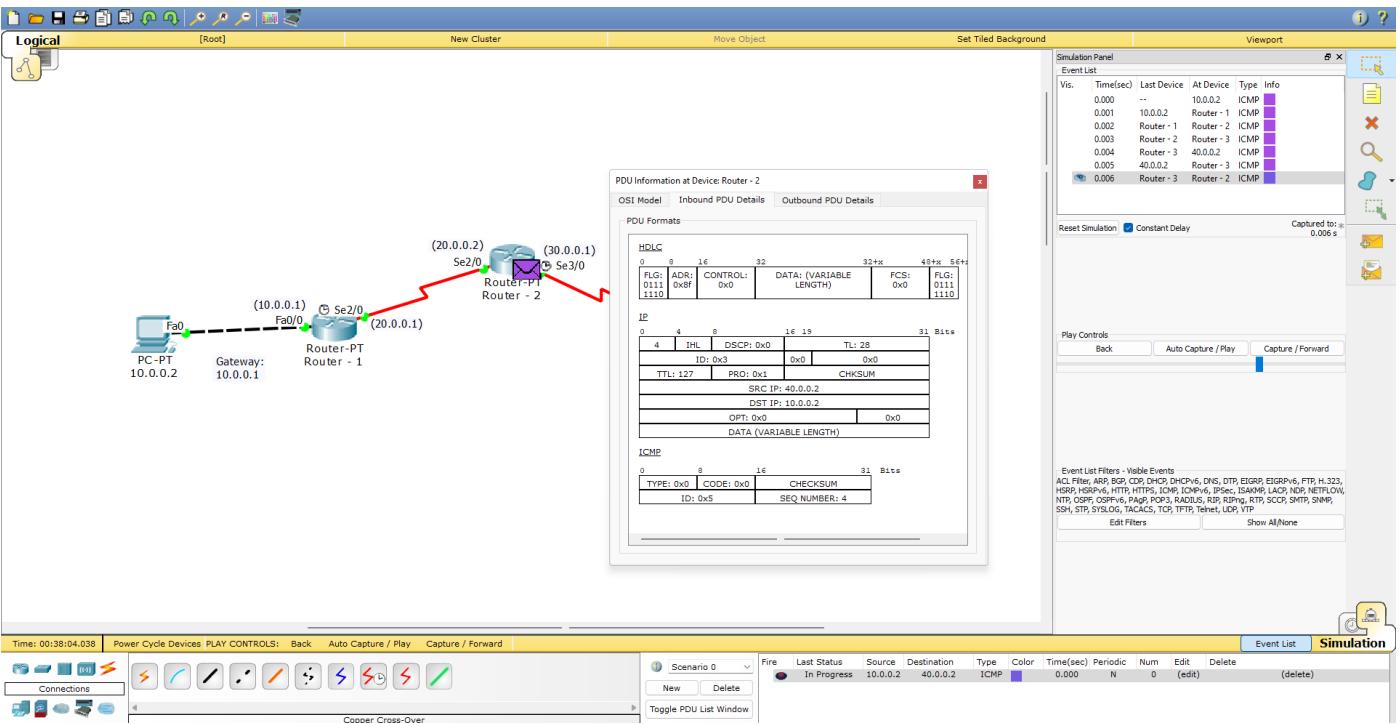


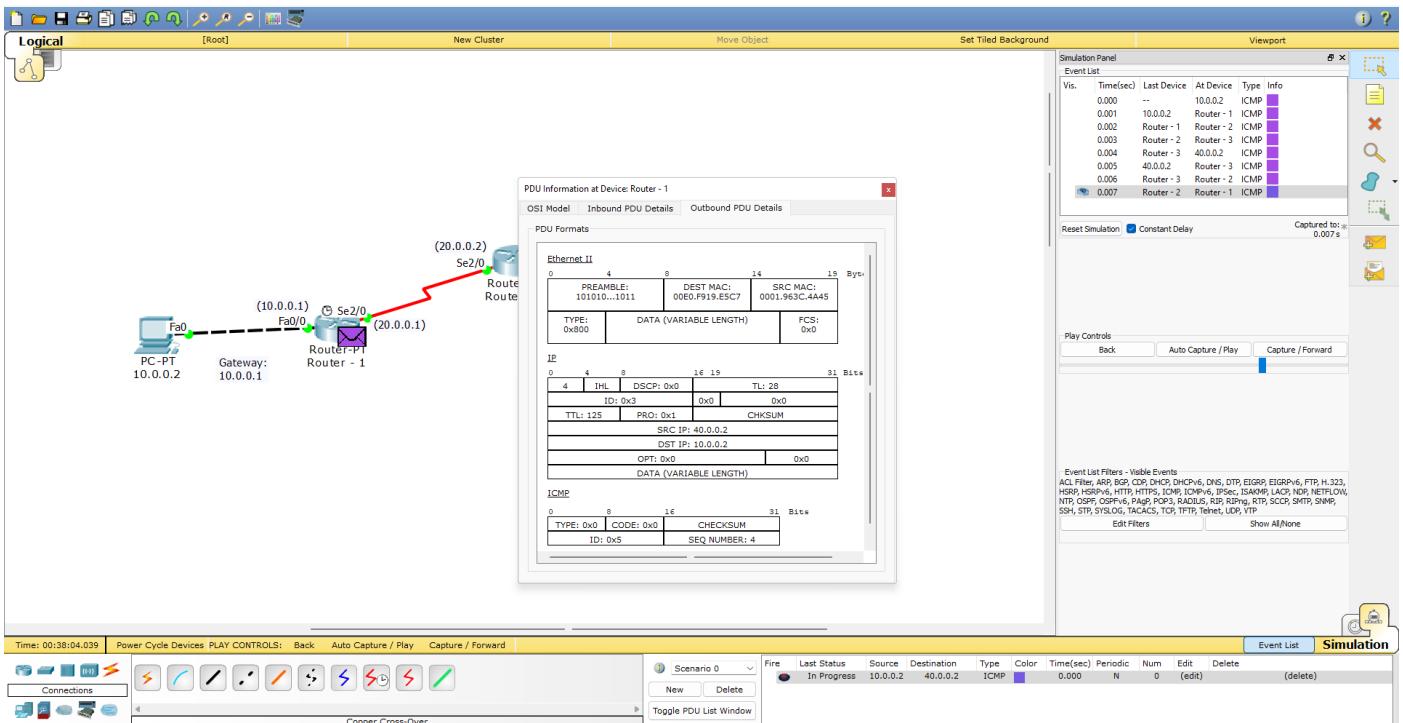
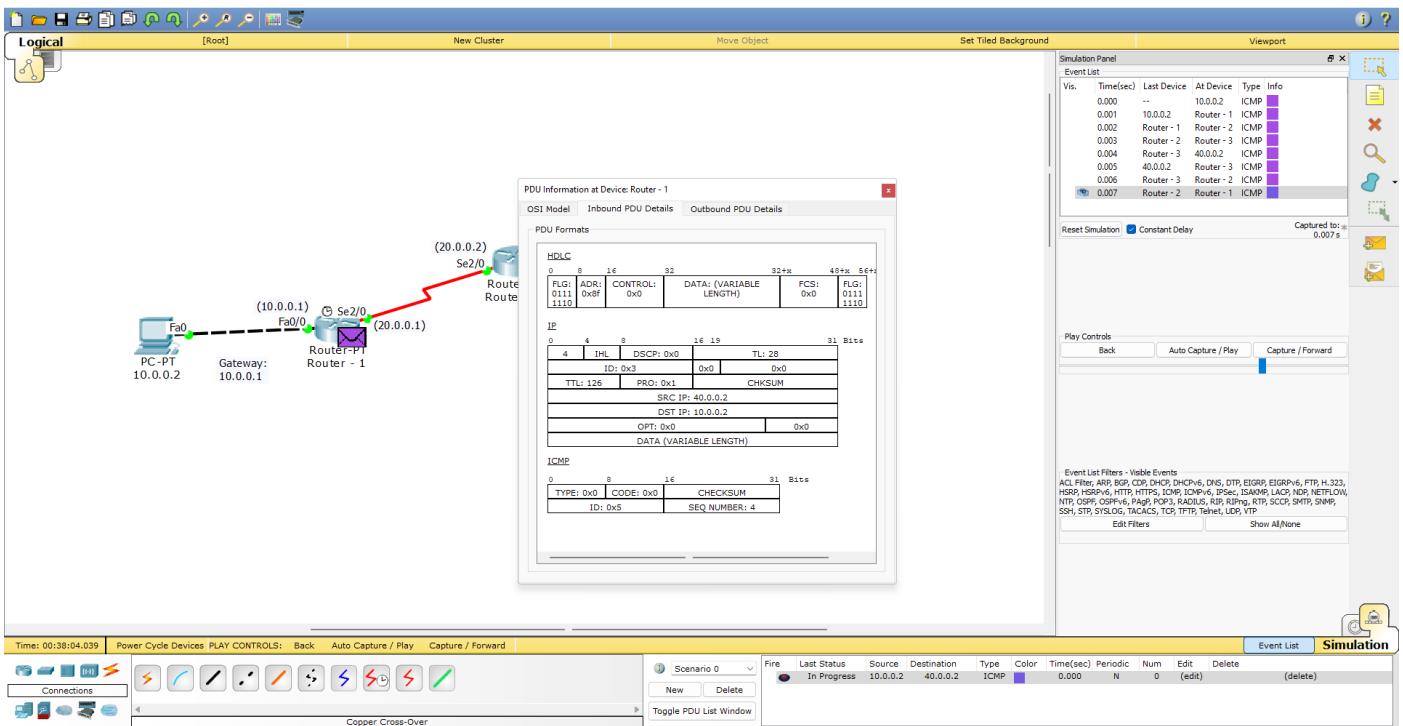


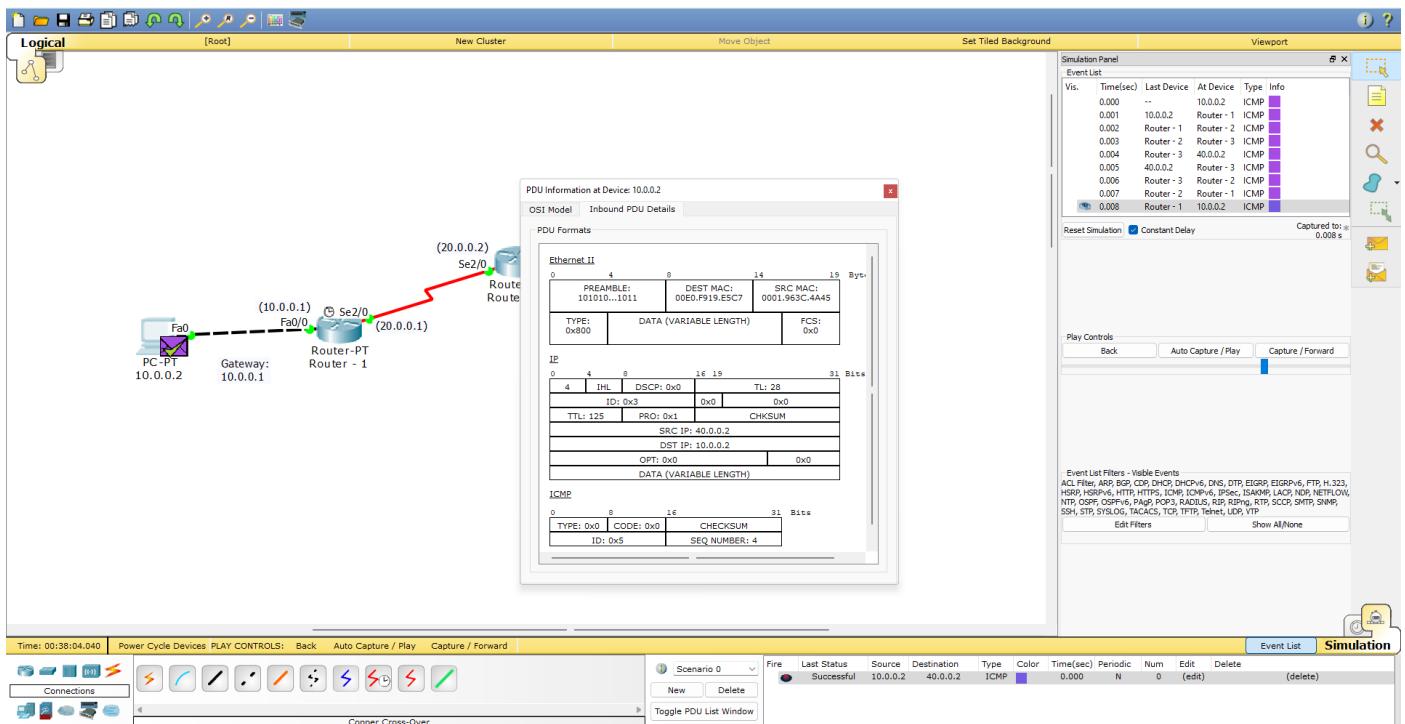












## Pinging from PC - 1 to PC - 2:

```

10.0.0.2

Physical Config Desktop Custom Interface

Command Prompt X

Packet Tracer PC Command Line 1.0
PC>ping 40.0.0.2

Pinging 40.0.0.2 with 32 bytes of data:

Reply from 40.0.0.2: bytes=32 time=14ms TTL=125
Reply from 40.0.0.2: bytes=32 time=7ms TTL=125
Reply from 40.0.0.2: bytes=32 time=7ms TTL=125
Reply from 40.0.0.2: bytes=32 time=5ms TTL=125

Ping statistics for 40.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 5ms, Maximum = 14ms, Average = 8ms

PC>

```

## Pinging from PC - 2 to PC - 1:

40.0.0.2

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=7ms TTL=125
Reply from 10.0.0.2: bytes=32 time=8ms TTL=125
Reply from 10.0.0.2: bytes=32 time=10ms TTL=125
Reply from 10.0.0.2: bytes=32 time=11ms TTL=125

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 7ms, Maximum = 11ms, Average = 9ms

PC>
```

## 2.7.3 Observation Book Pictures:

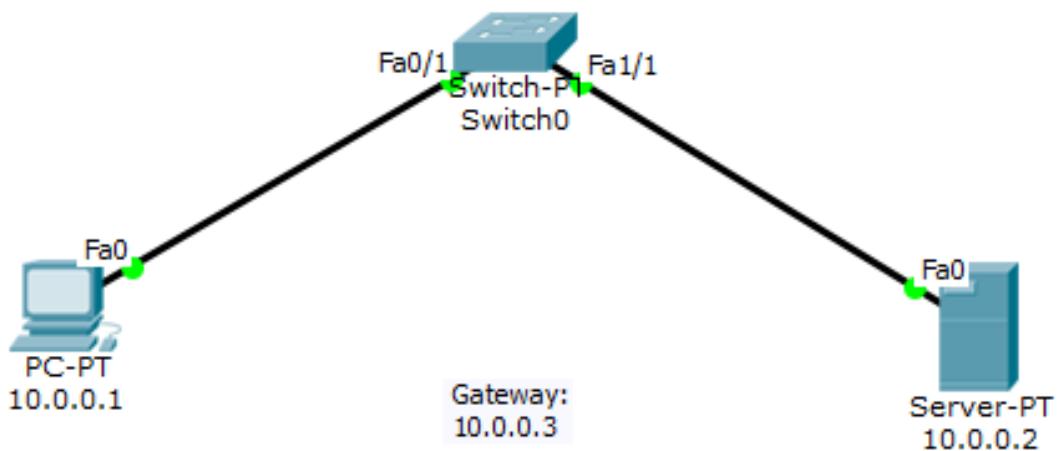
## 2.8 Experiment - 8:

### 2.8.1 Question:

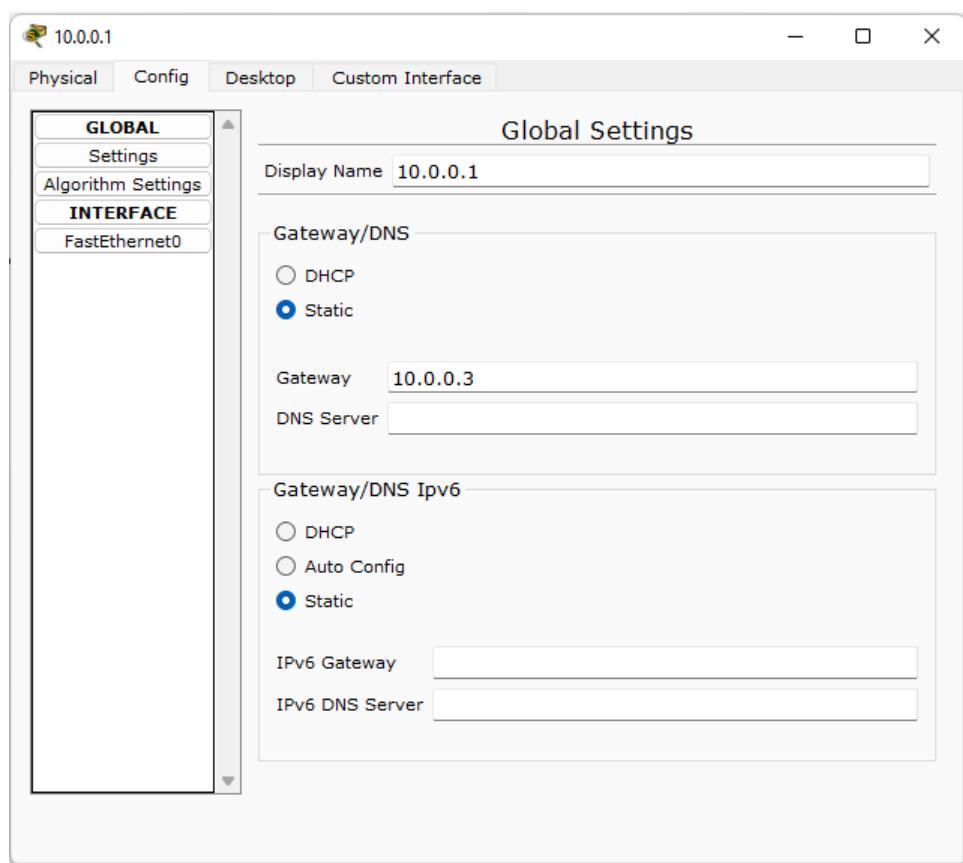
Configure Web Server, DNS within a LAN.

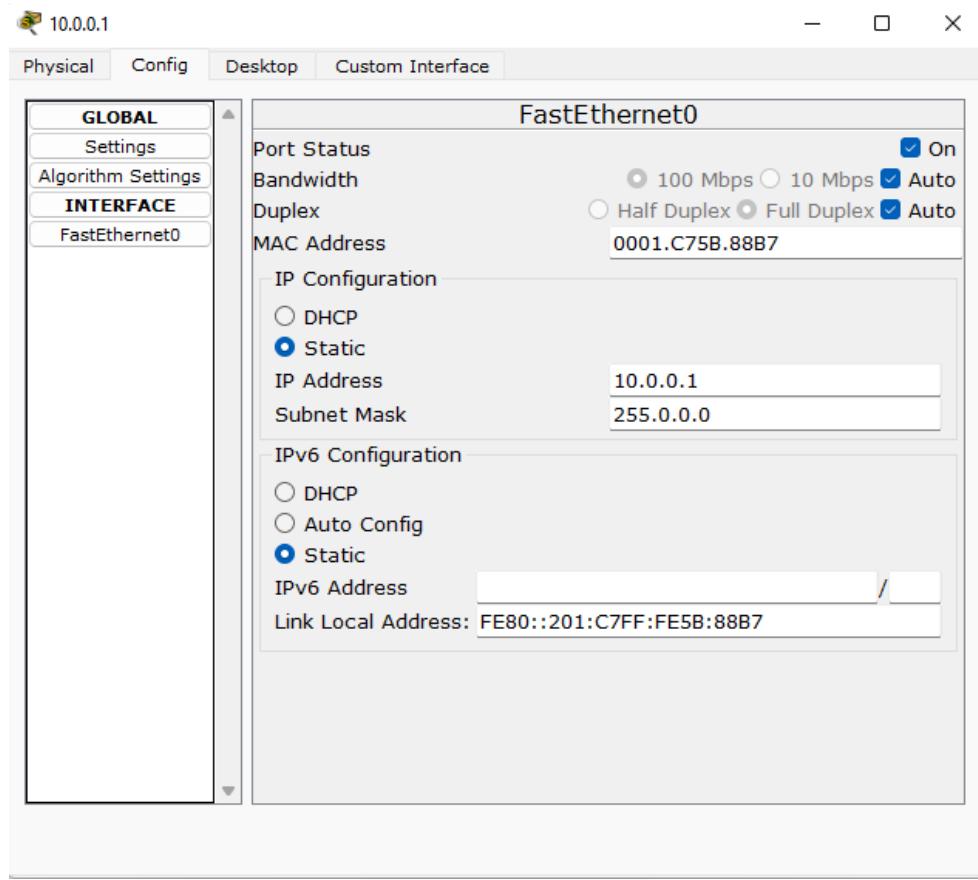
### 2.8.2 Screenshots (Topology, Configurations & Output):

#### Topology:

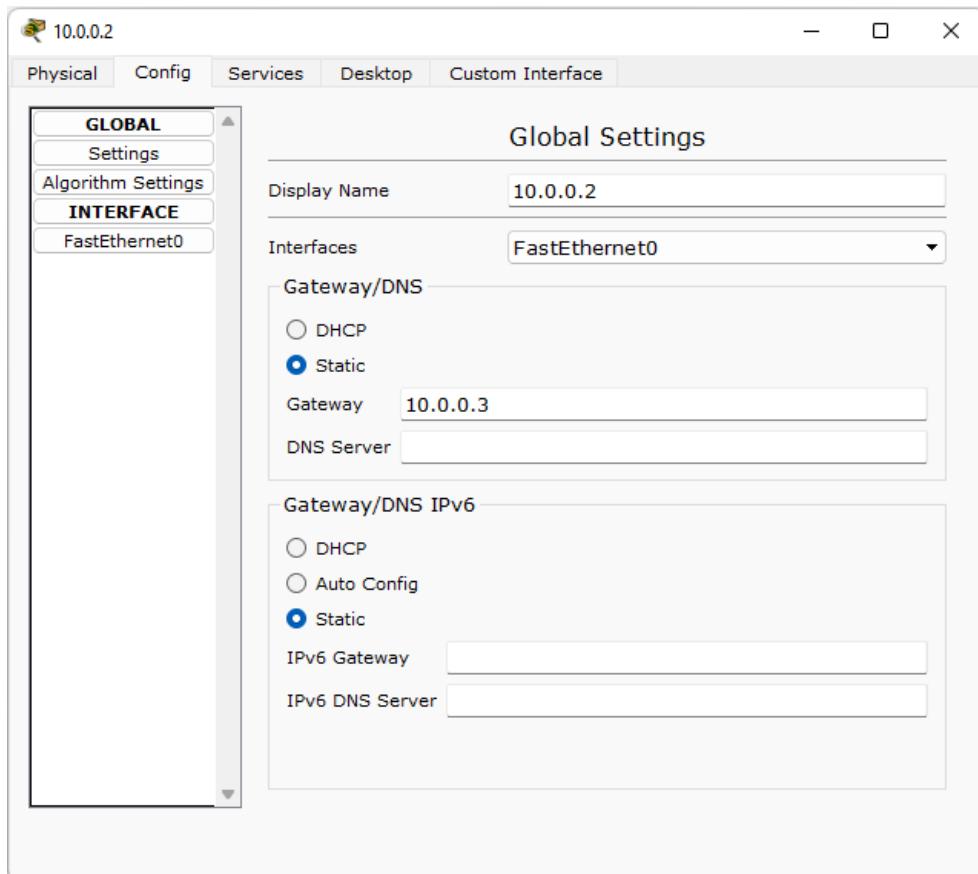


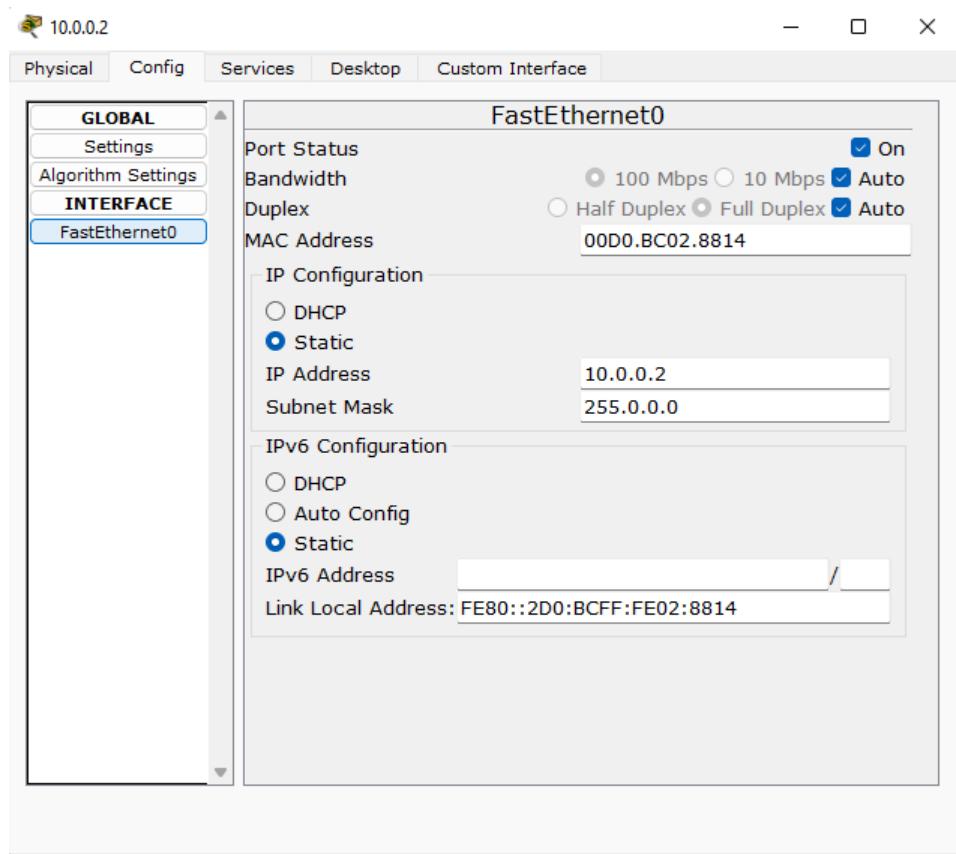
#### PC - 1 Configuration:





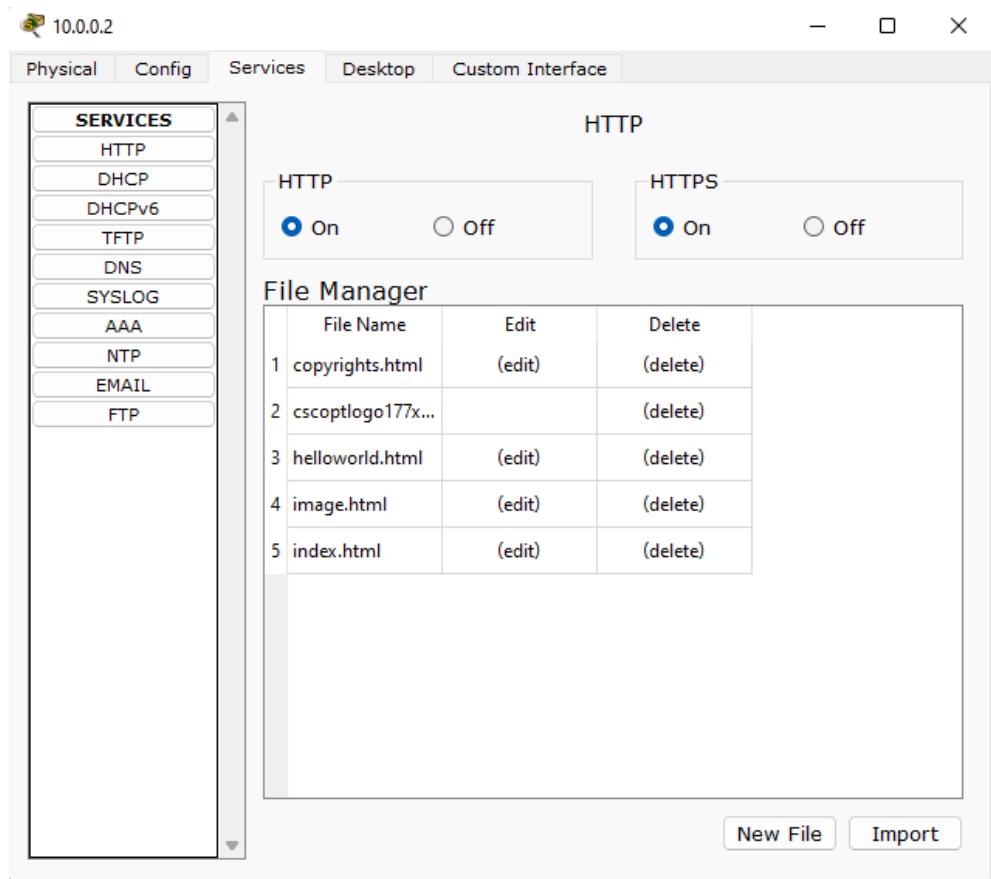
## Server Configuration:





## Configuring DNS in Server:

## Editing the index.html page:



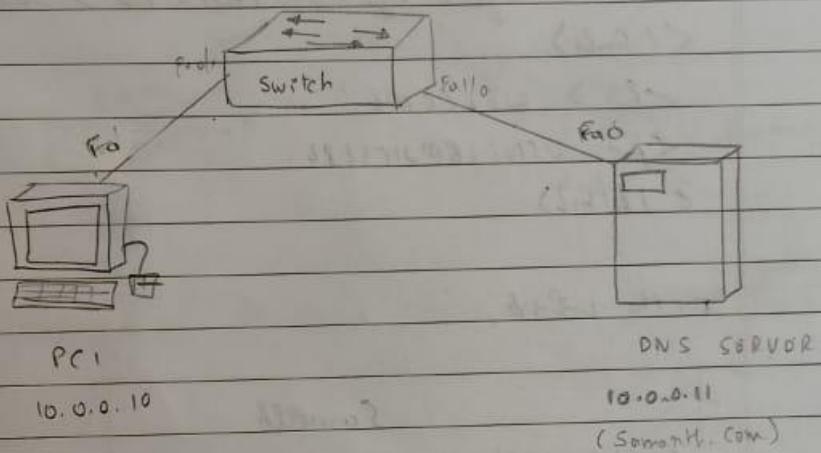
### 2.8.3 Observation Book Pictures:

Expt

Configure Web server, DNS within a LAN.

Aim: To Configure DNS within a LAN.

Topology:



Procedure:

1. Connect PC and a Server to a switch.
2. Set the ip address for the PC and the server.  
PC: 10.0.0.10 & 10.0.0.11
3. Configure DNS in server.  
~~Server > Services > DNS > Turn on the service.~~  
~~Under Records resource records.~~  
Set name: Somanyt.com  
Address: 10.0.0.11  
Click on Add!
4. Edit the index.html file under server > http.  
To include any information you want and save.
5. In PC1 Desktop > Web browser.  
In the URL type the website name (Somanyt.com).

Result:-

~~index.html~~.

index.html.

<html>

<center> <font size='+2' color='blue'> Somerth </font>  
</center>

<br> WELCOME!

<p> USN: IBM21CS184

</html>

In the webb,

Somerth

WELCOME!

USN: IBM21CS184,

Observation:

DNS server is used to map domain names ~~with~~ my  
to their respective IP's. This is done because it is easier  
to remember domain names than IP numbers.

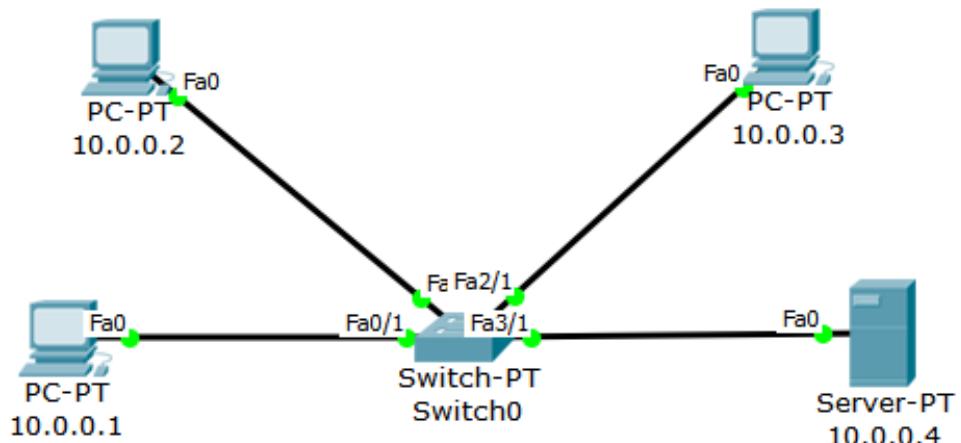
## 2.9 Experiment - 9:

### 2.9.1 Question:

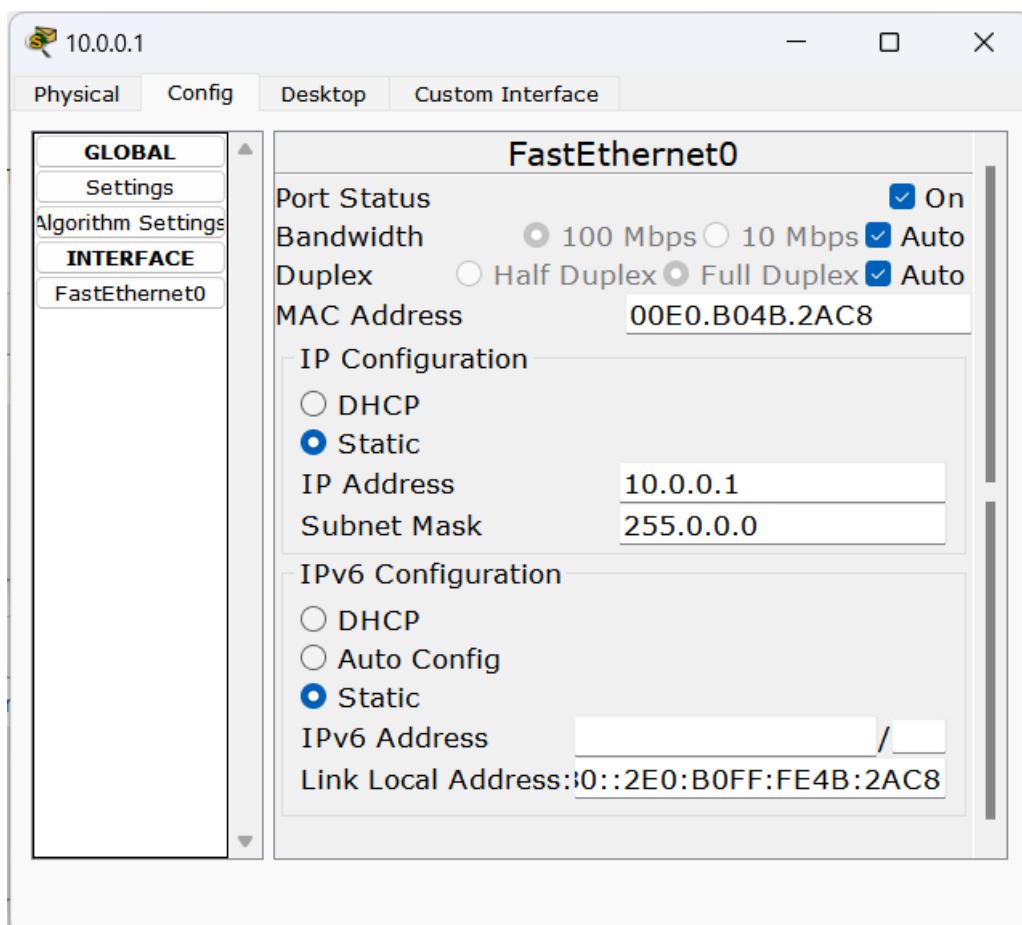
To construct simple LAN and understand the concept and operation of Address Resolution Protocol (ARP).

### 2.9.2 Screenshots (Topology, Configurations & Output):

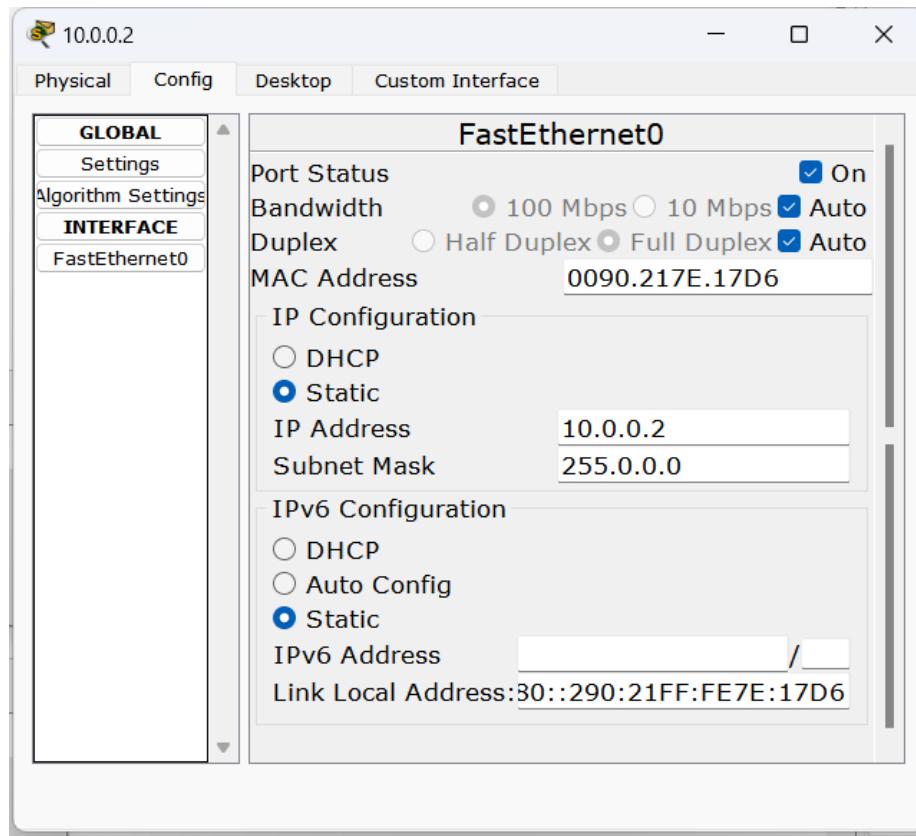
#### Topology:



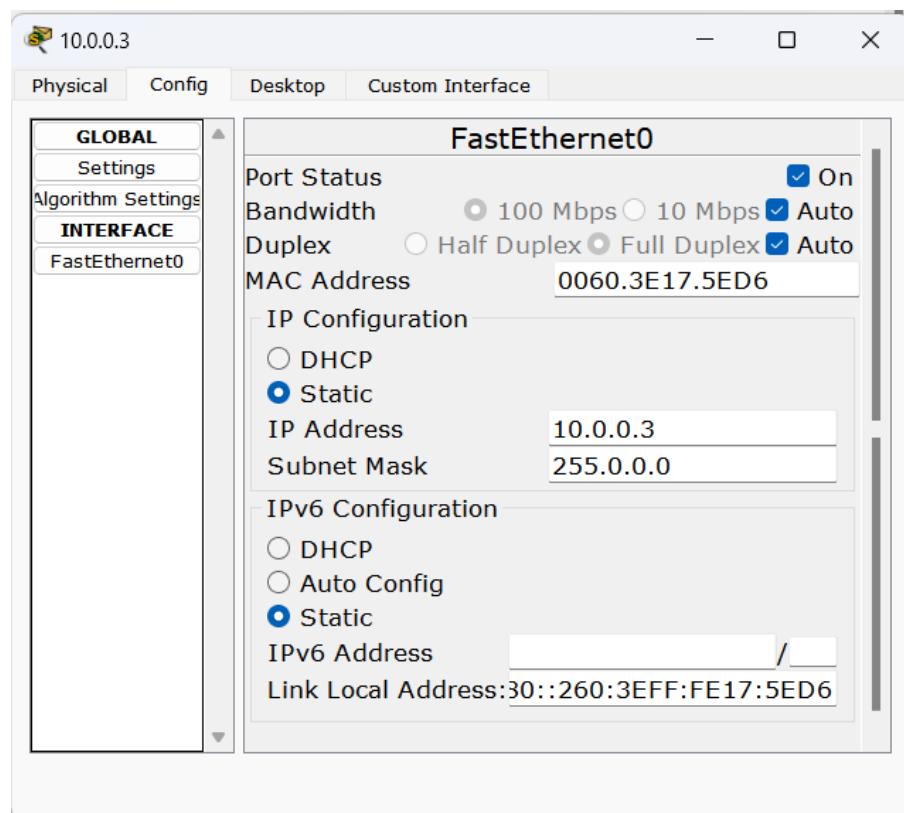
#### PC - 1 Configuration:



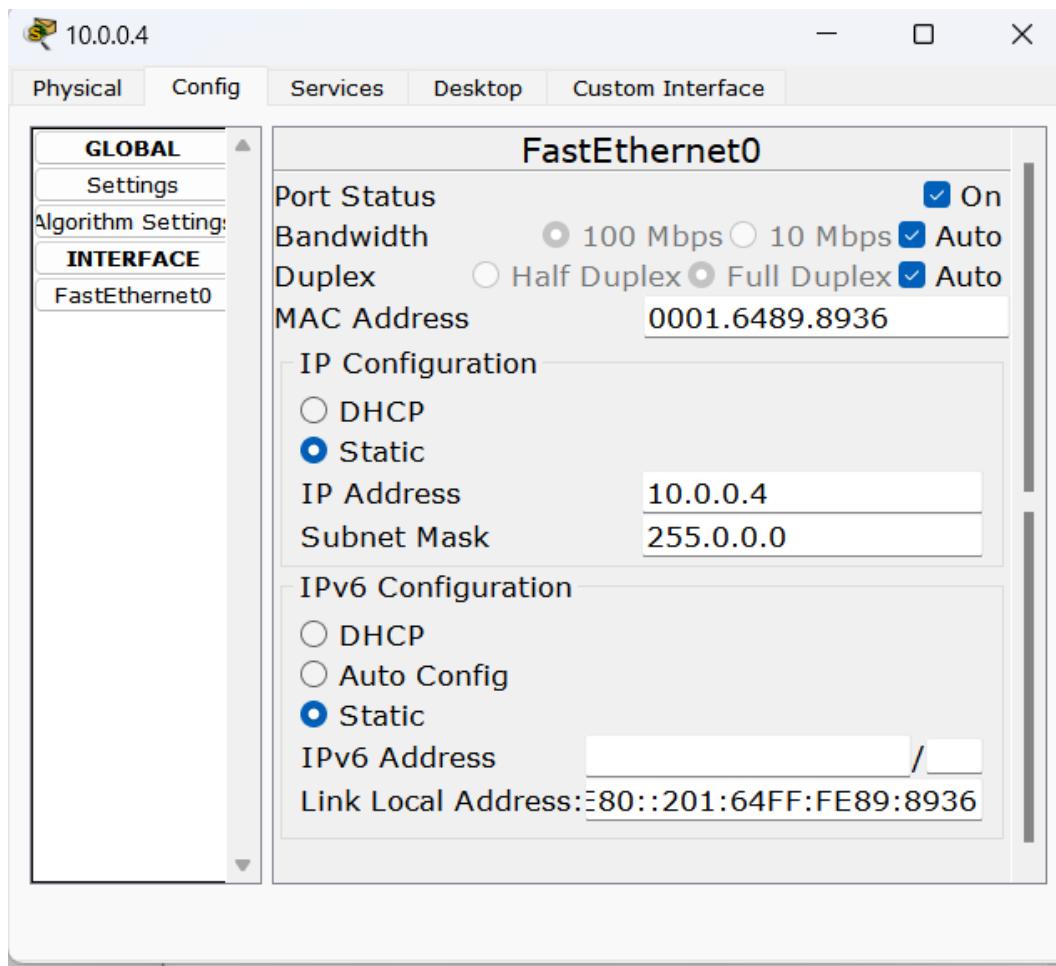
#### PC - 2 Configuration:



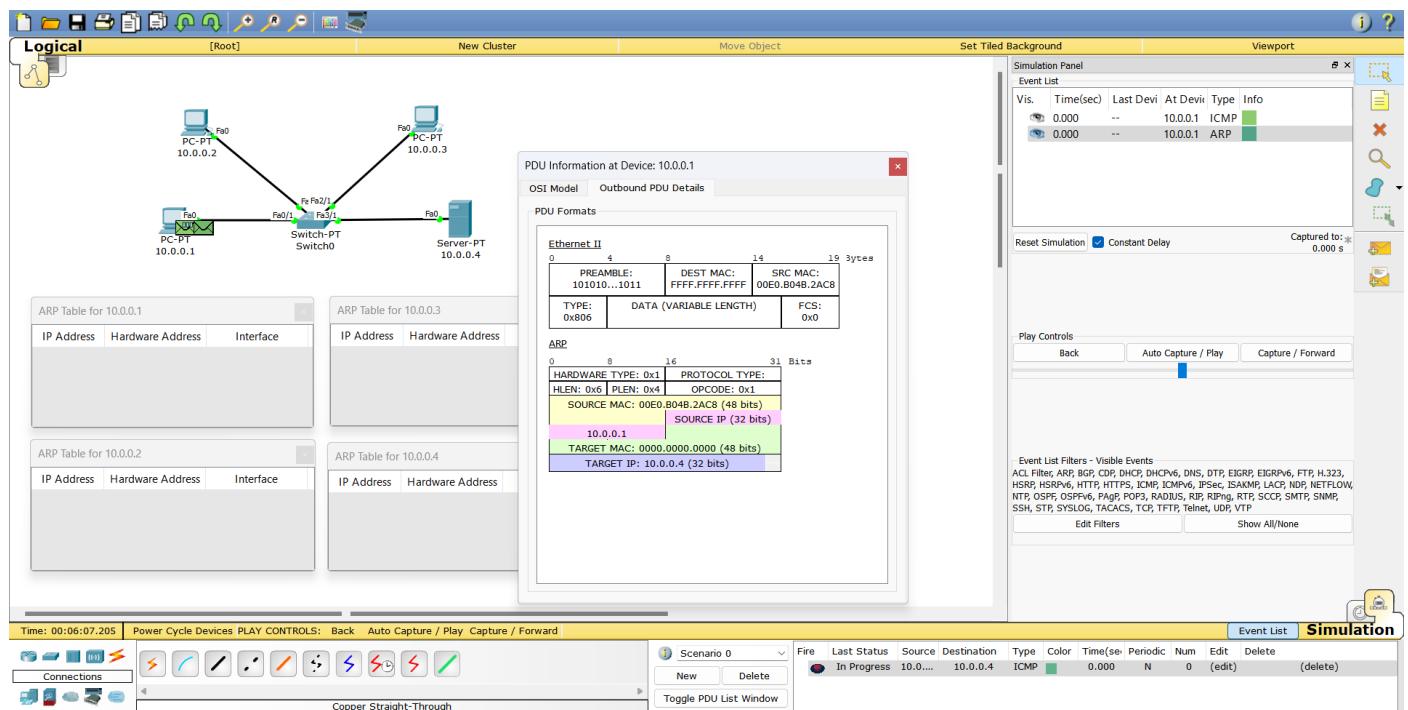
### PC - 3 Configuration:

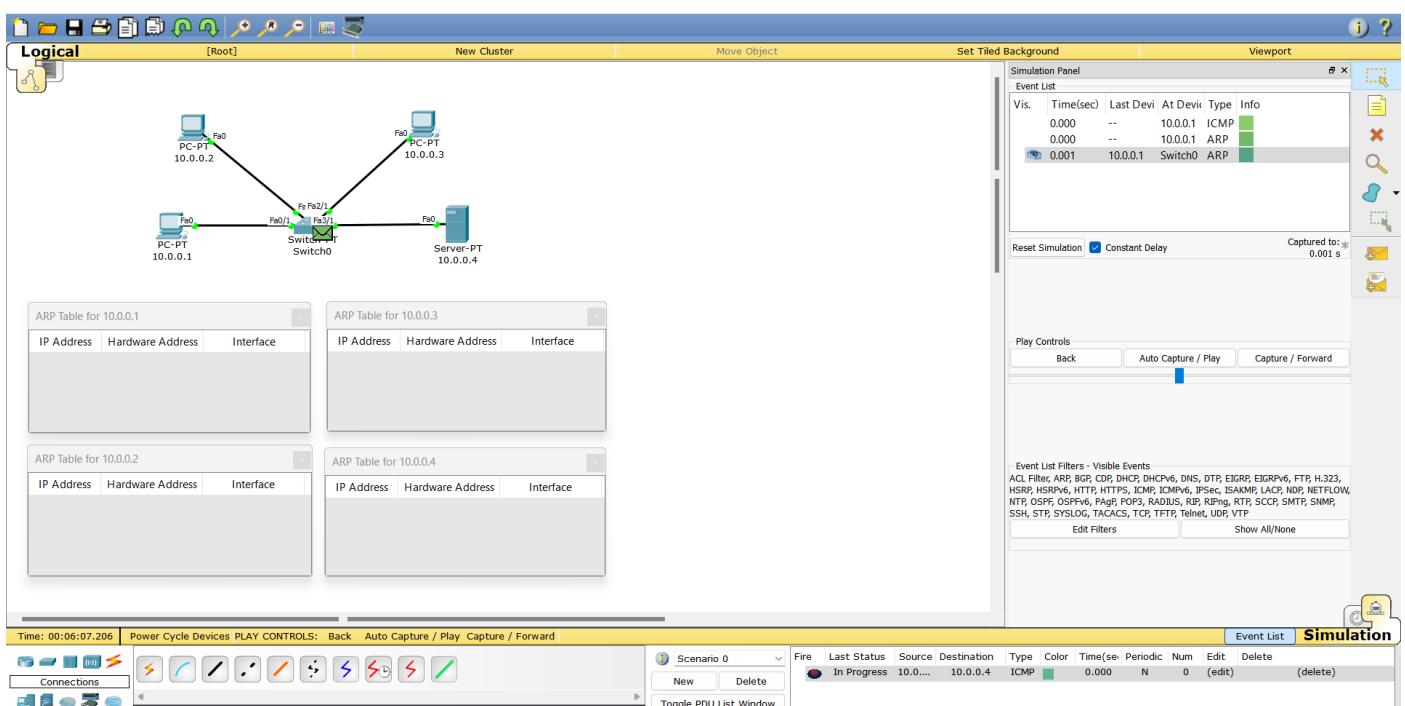
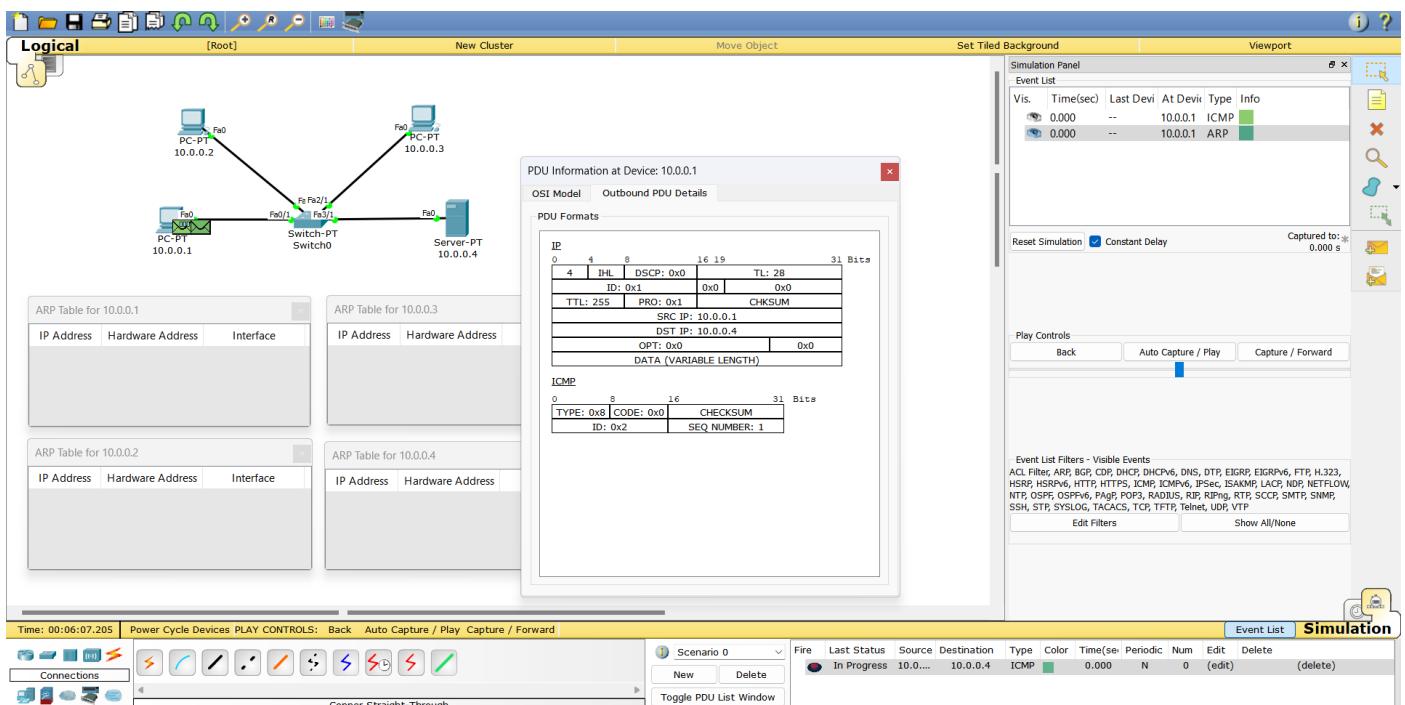


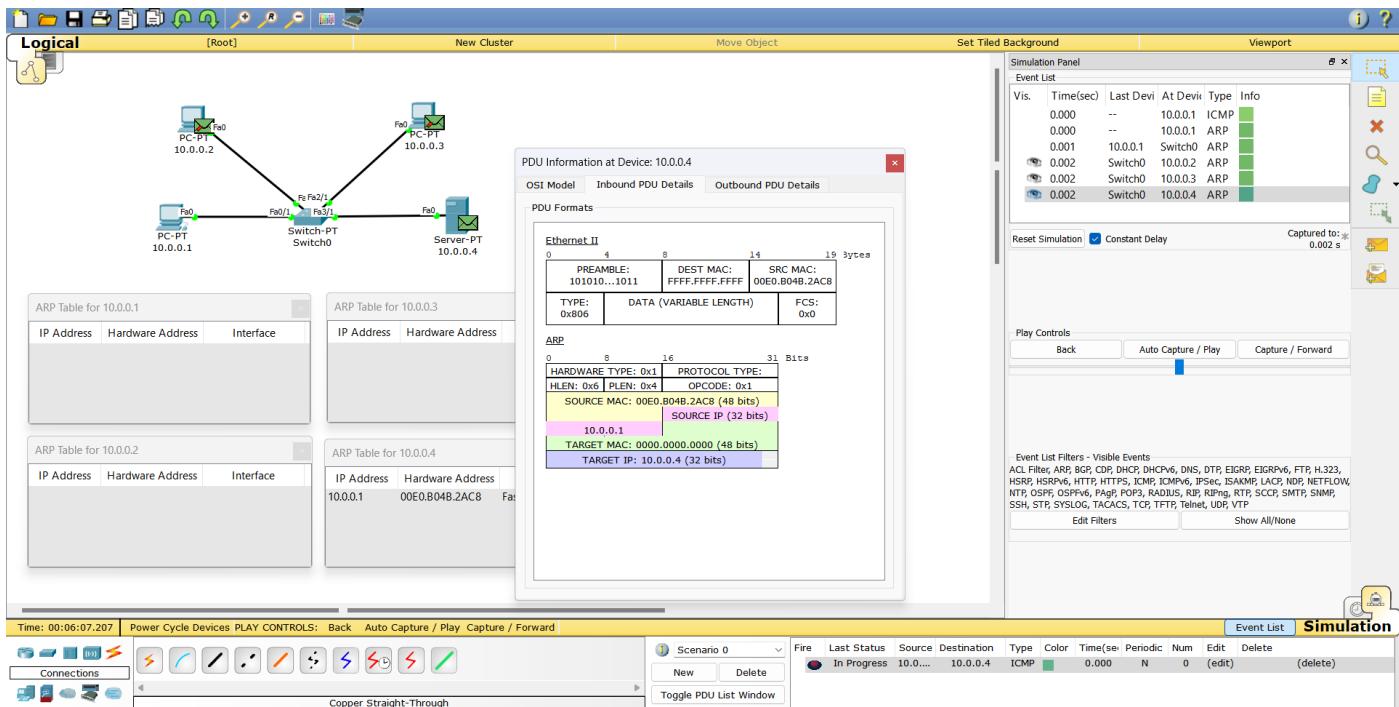
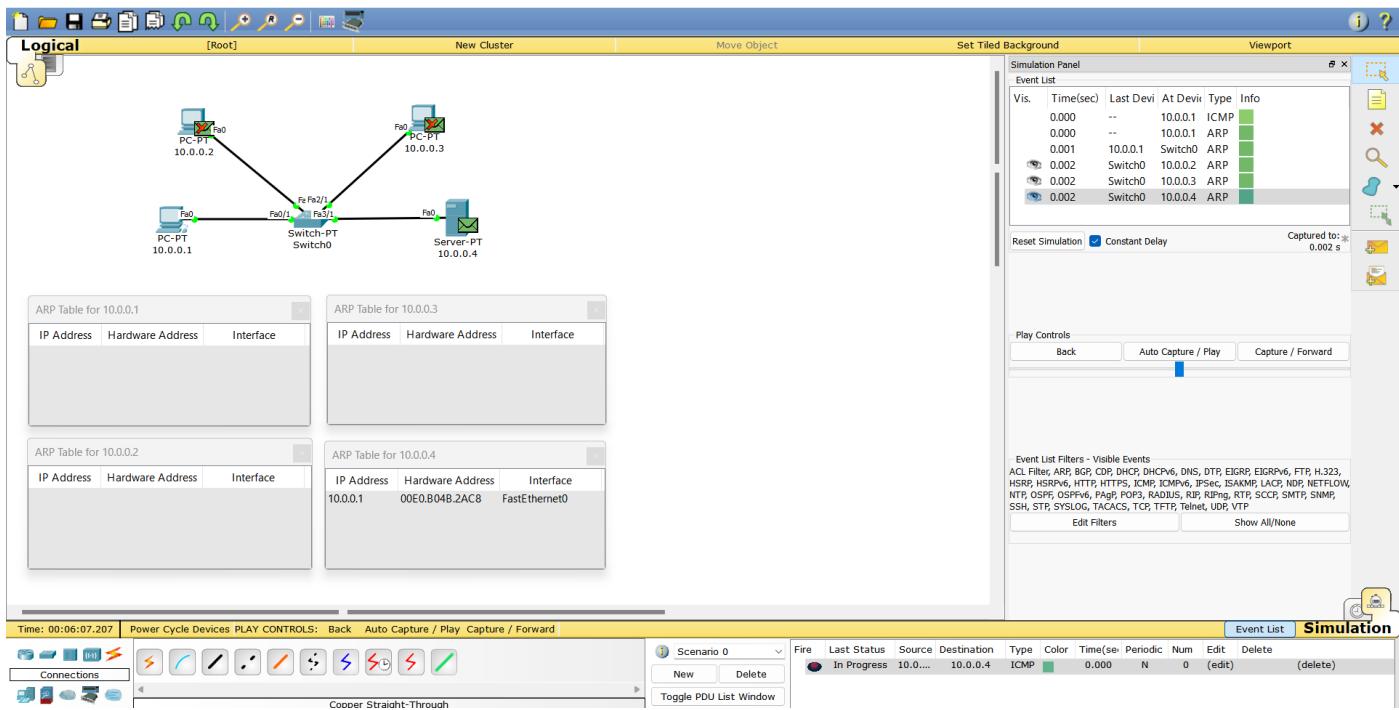
### Server Configuration:

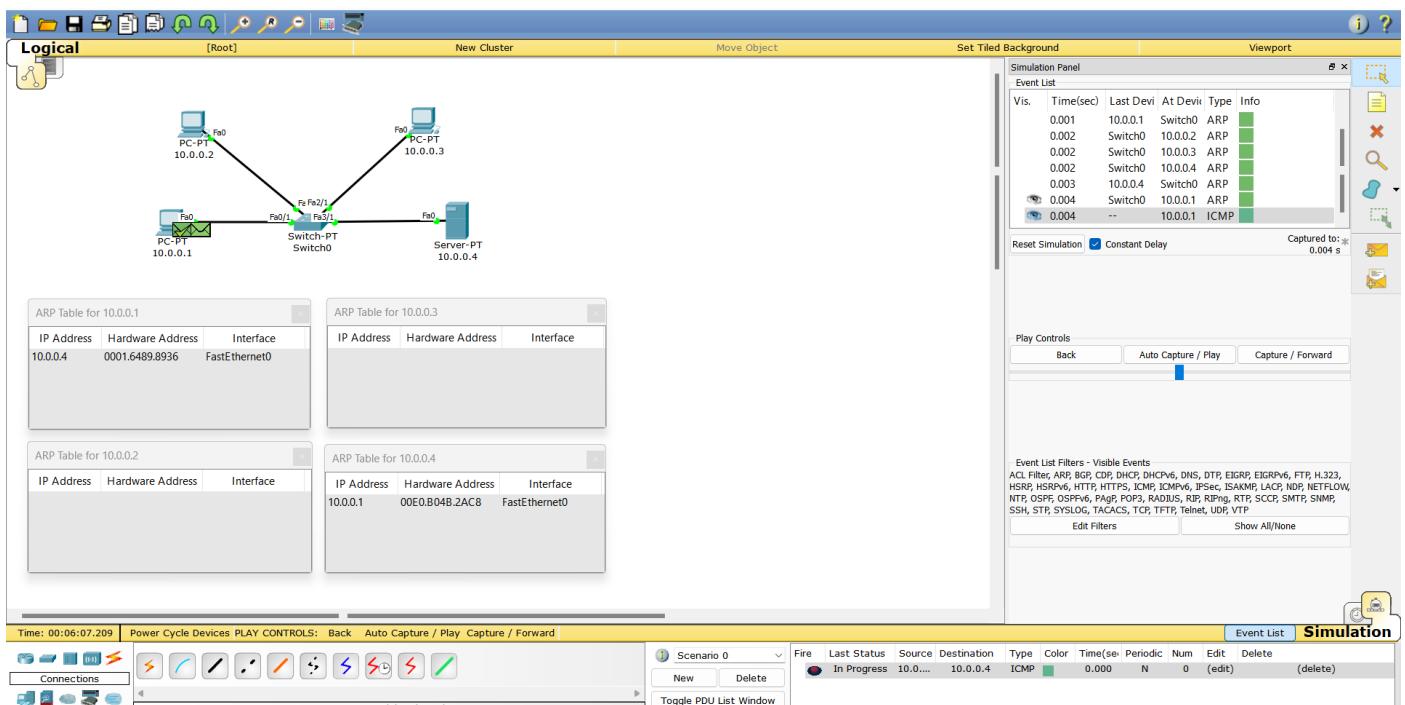
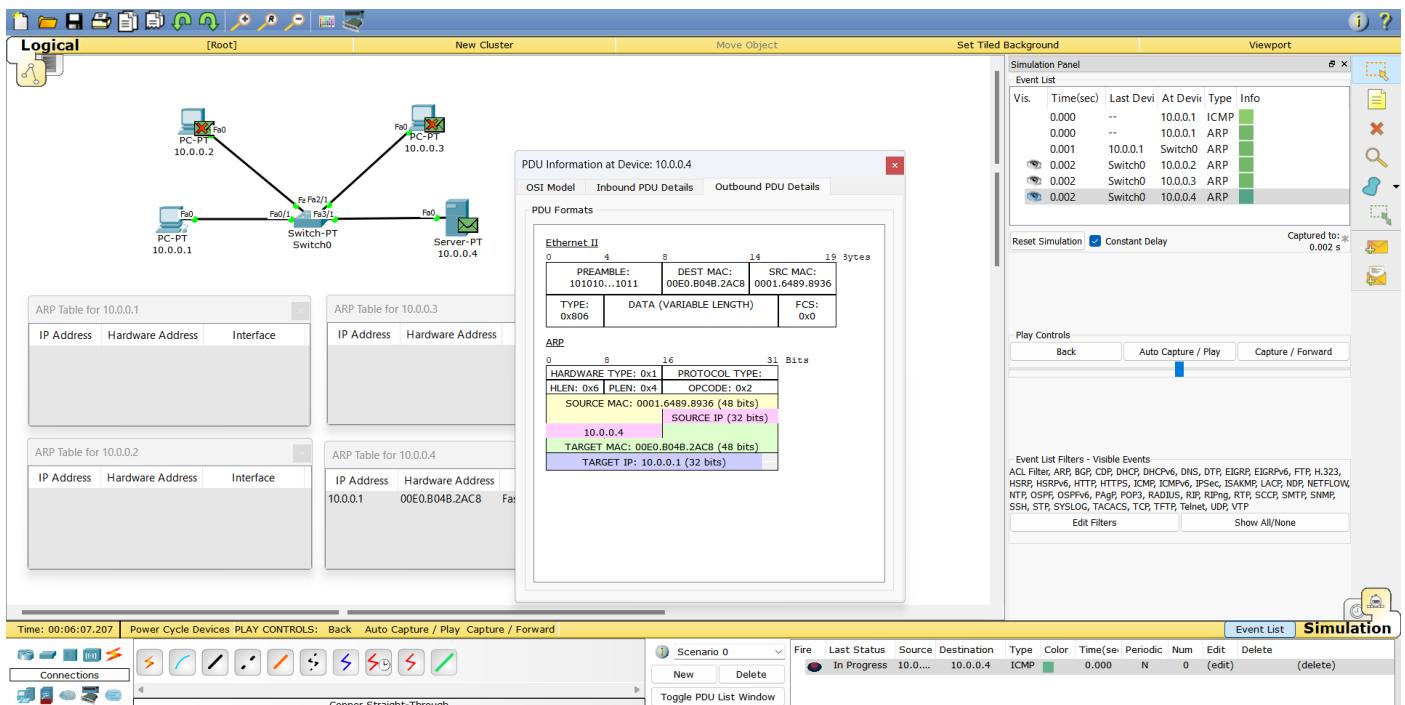


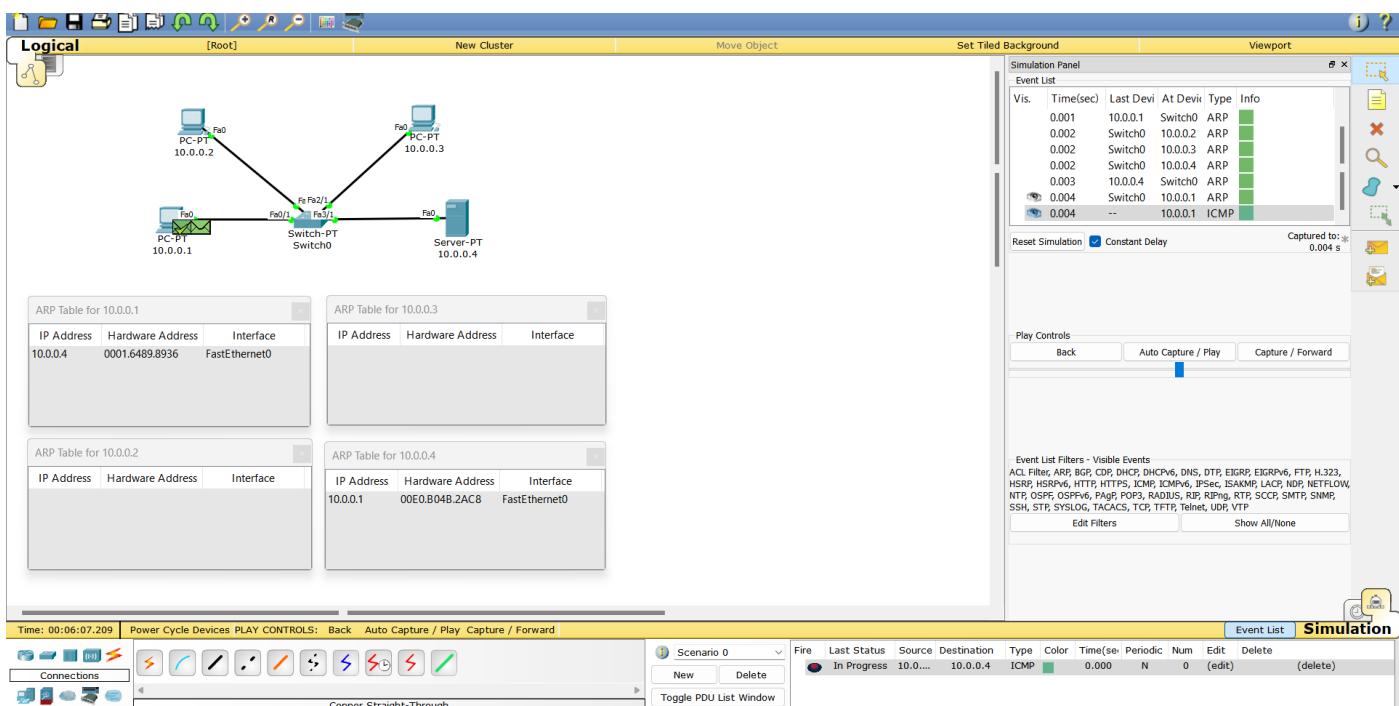
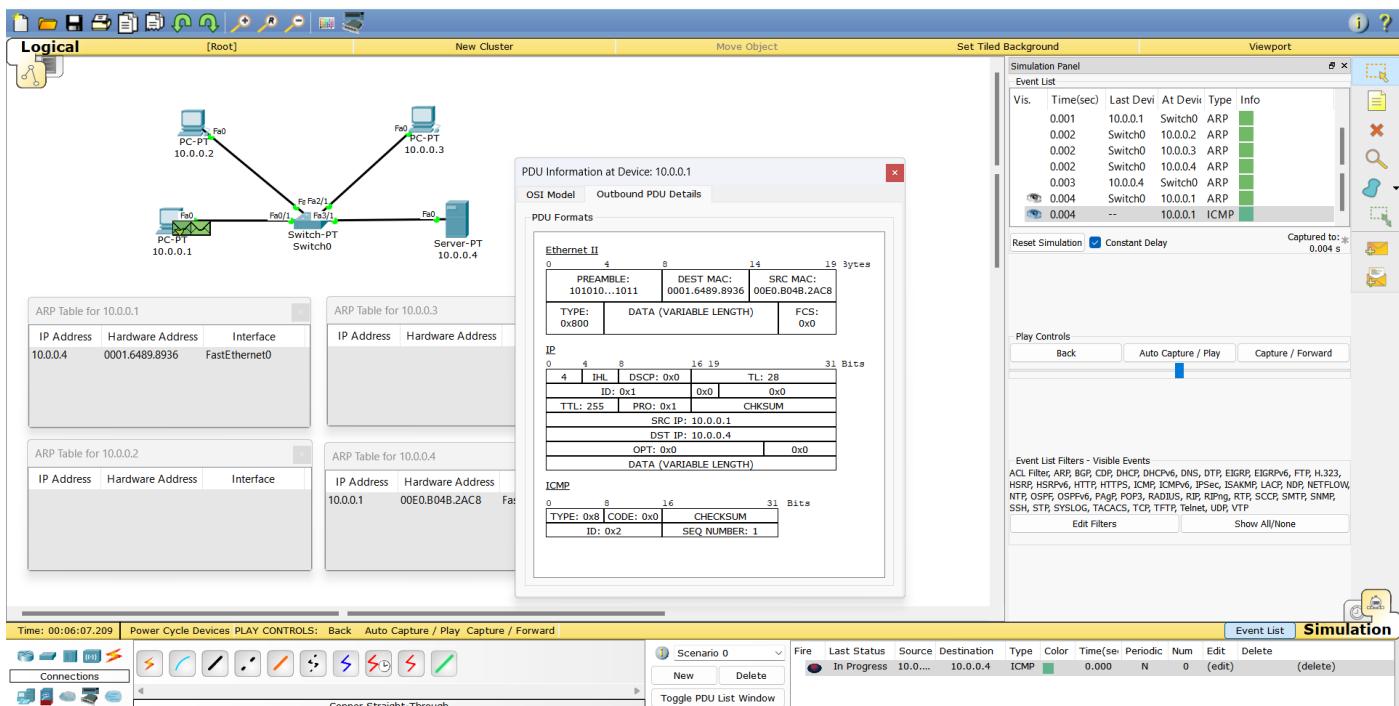
## Sending PDU from PC - 1 to Server:



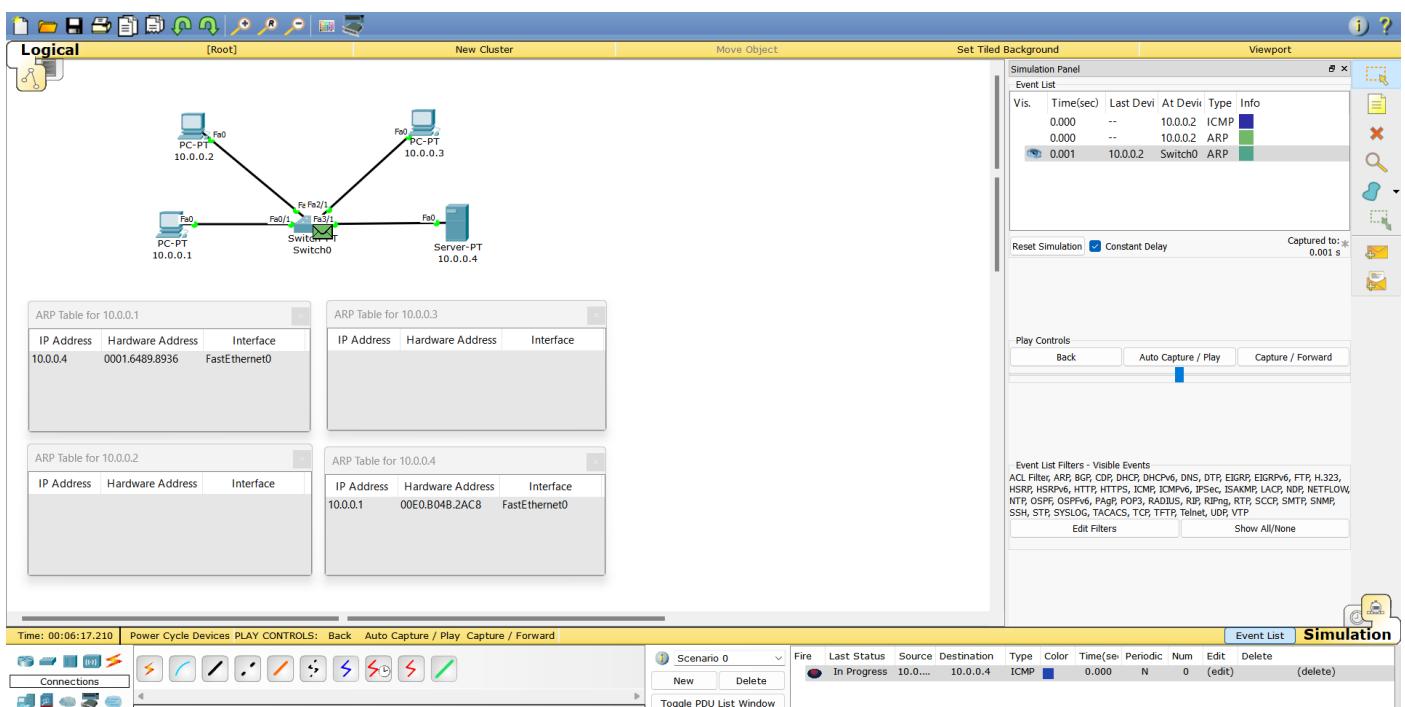
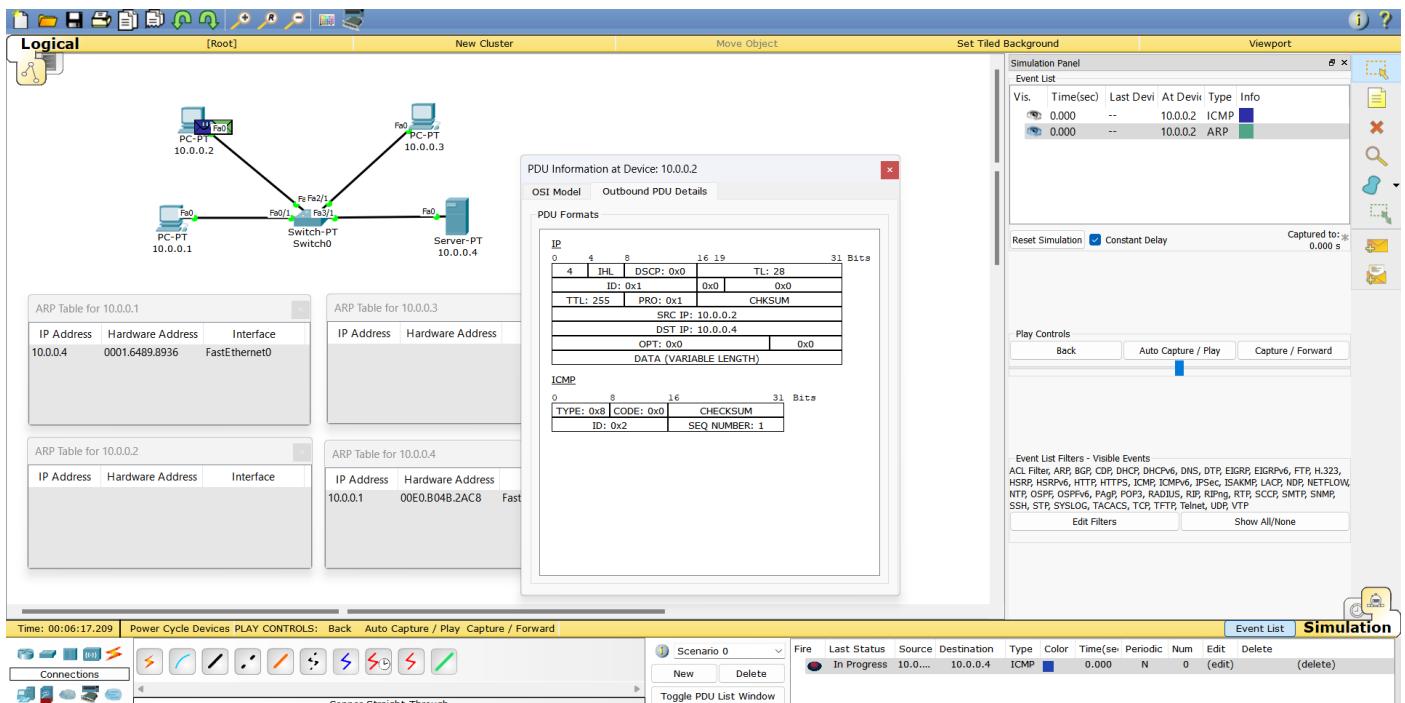


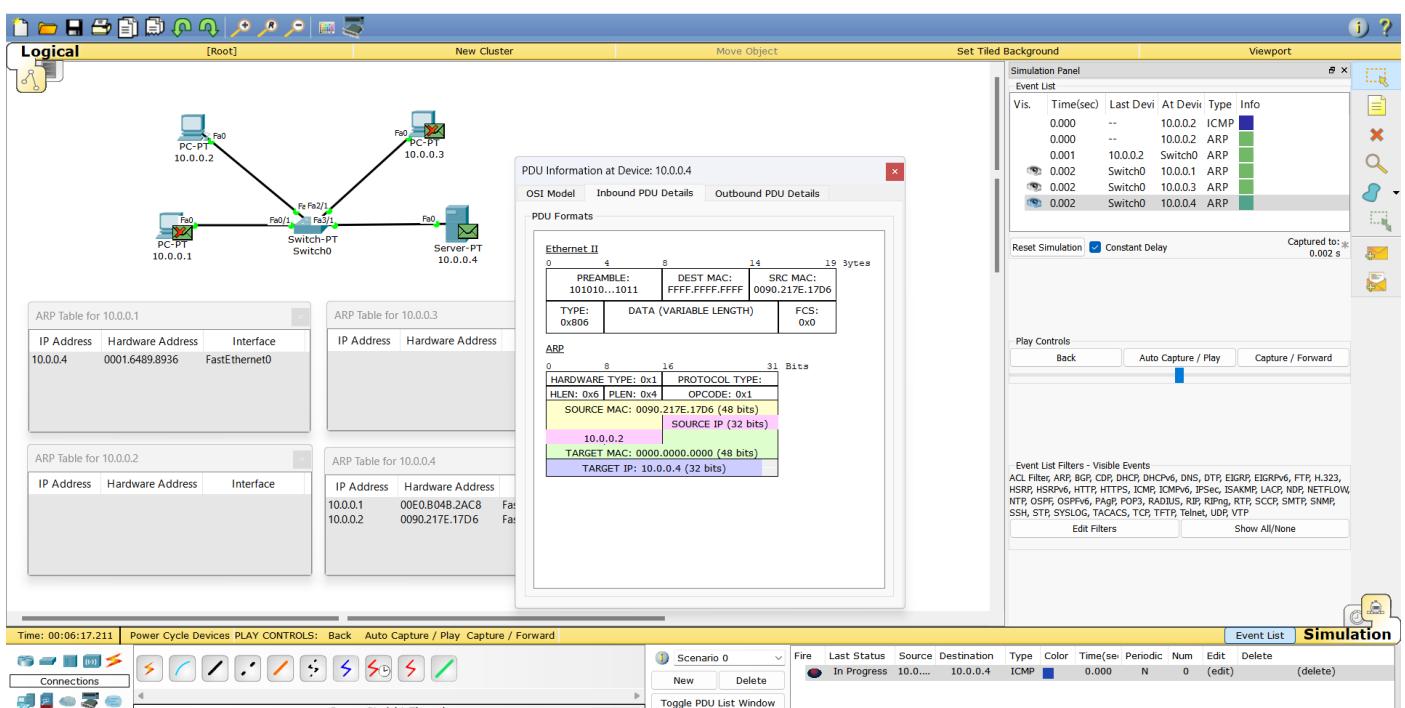
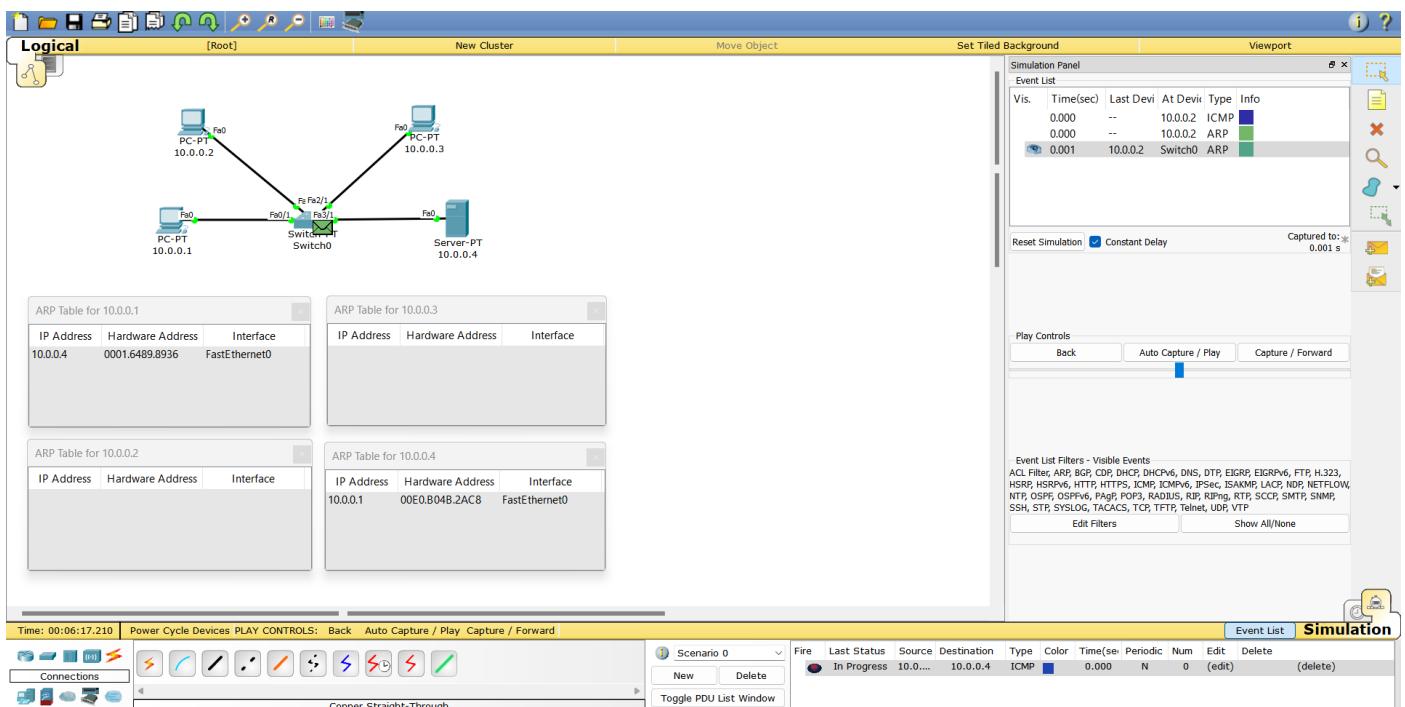


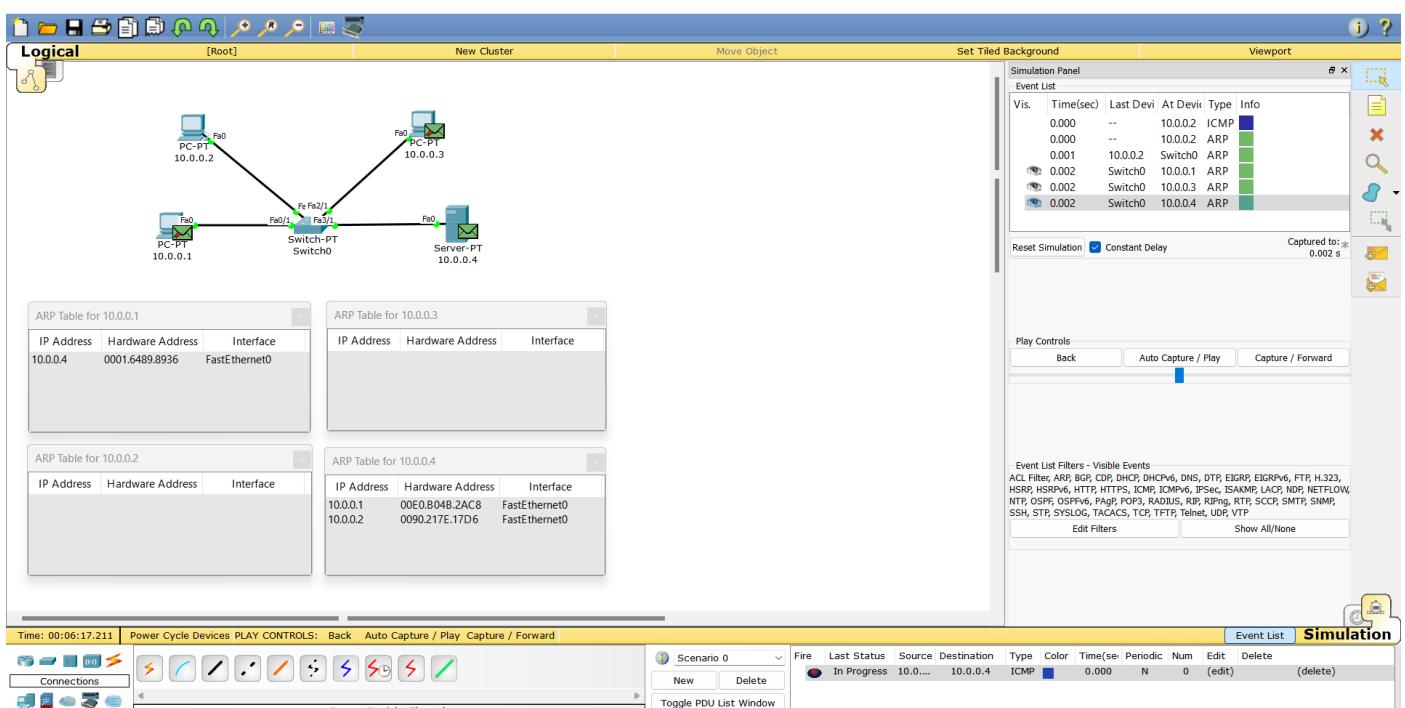
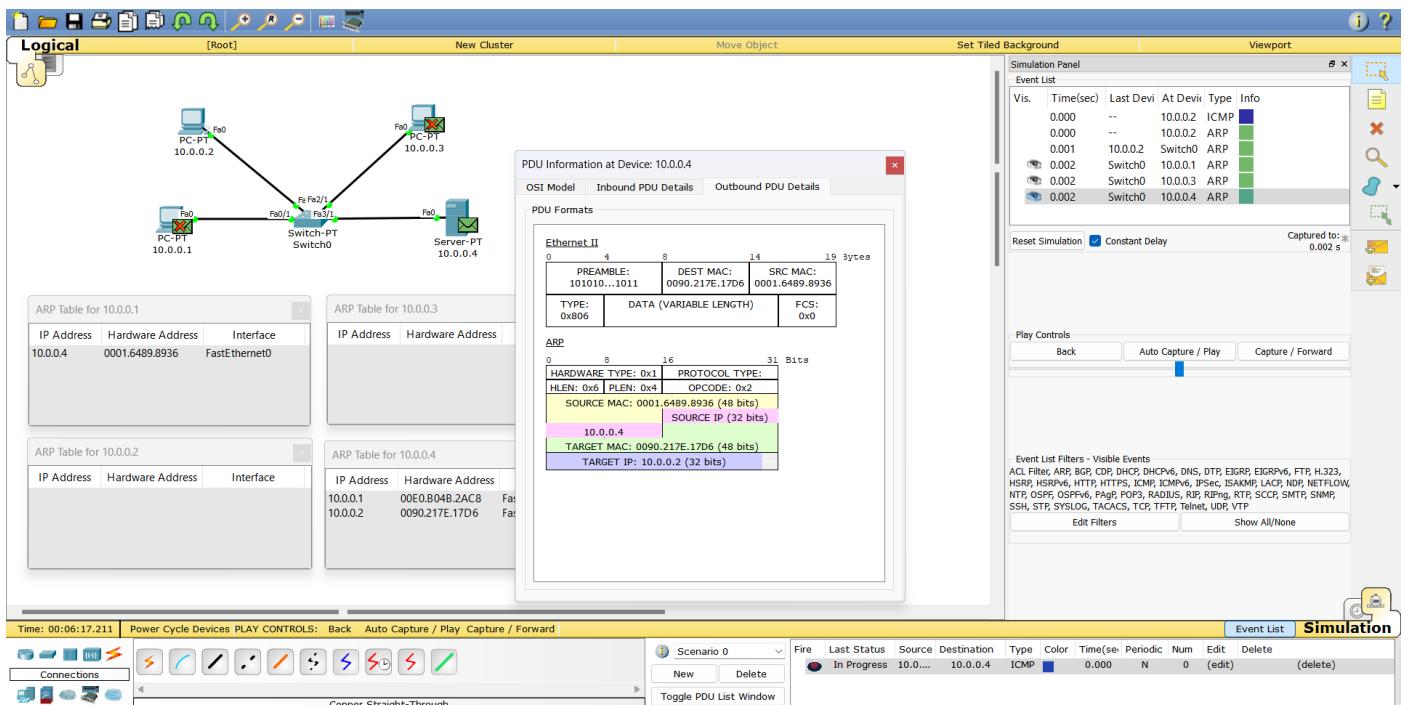


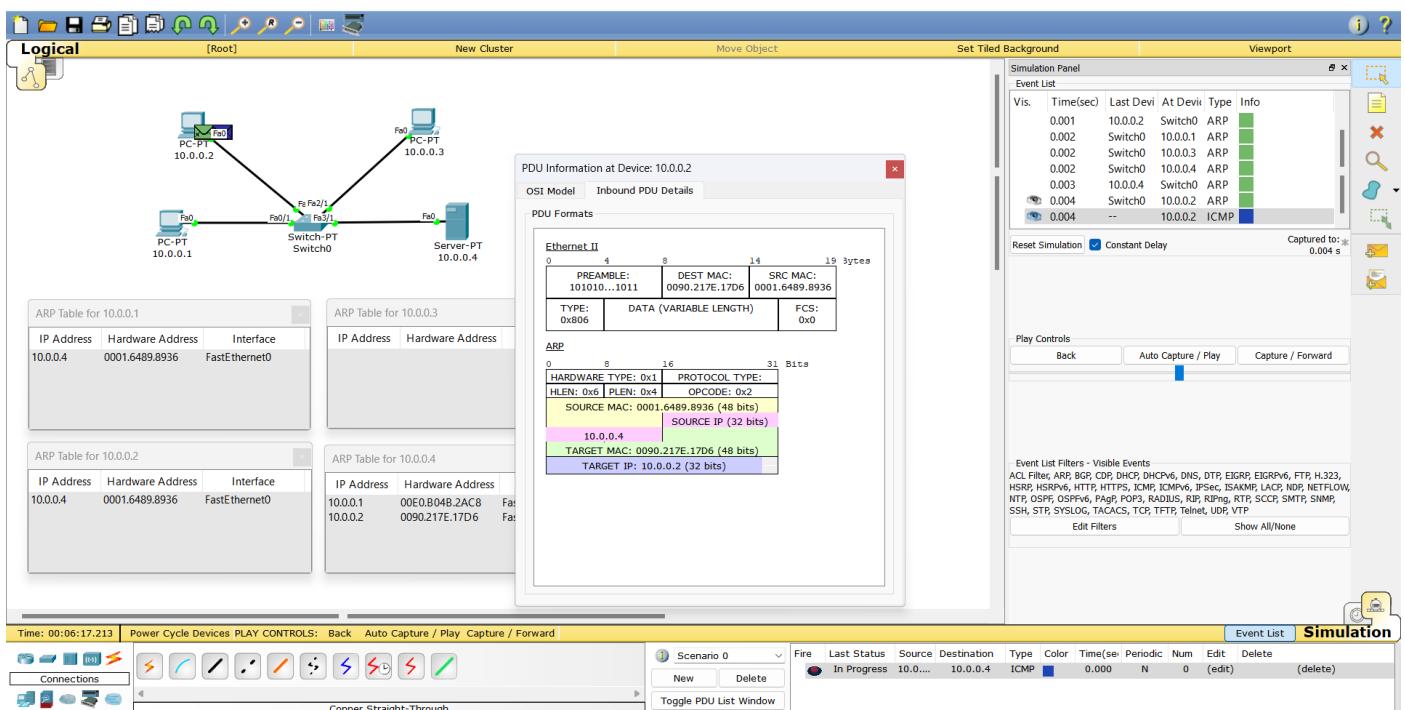
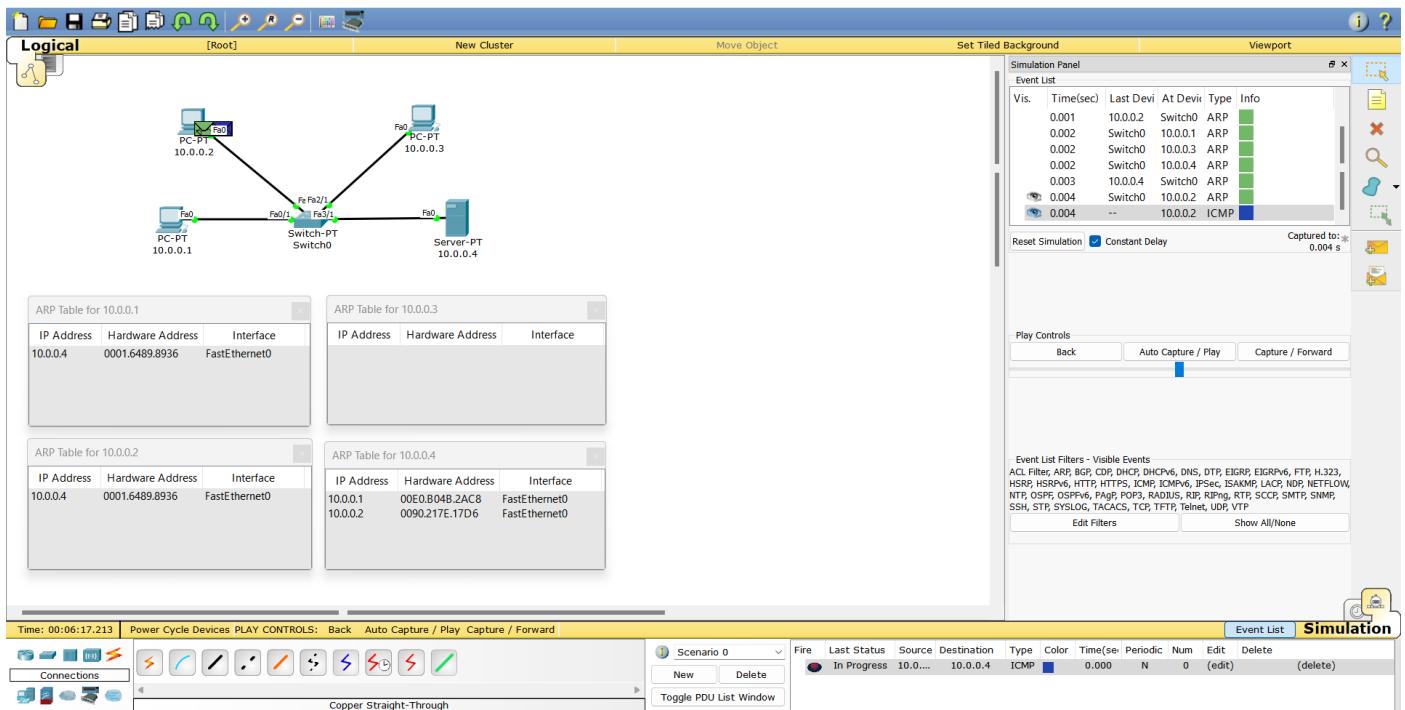


## Sending PDU from PC - 2 to Server:

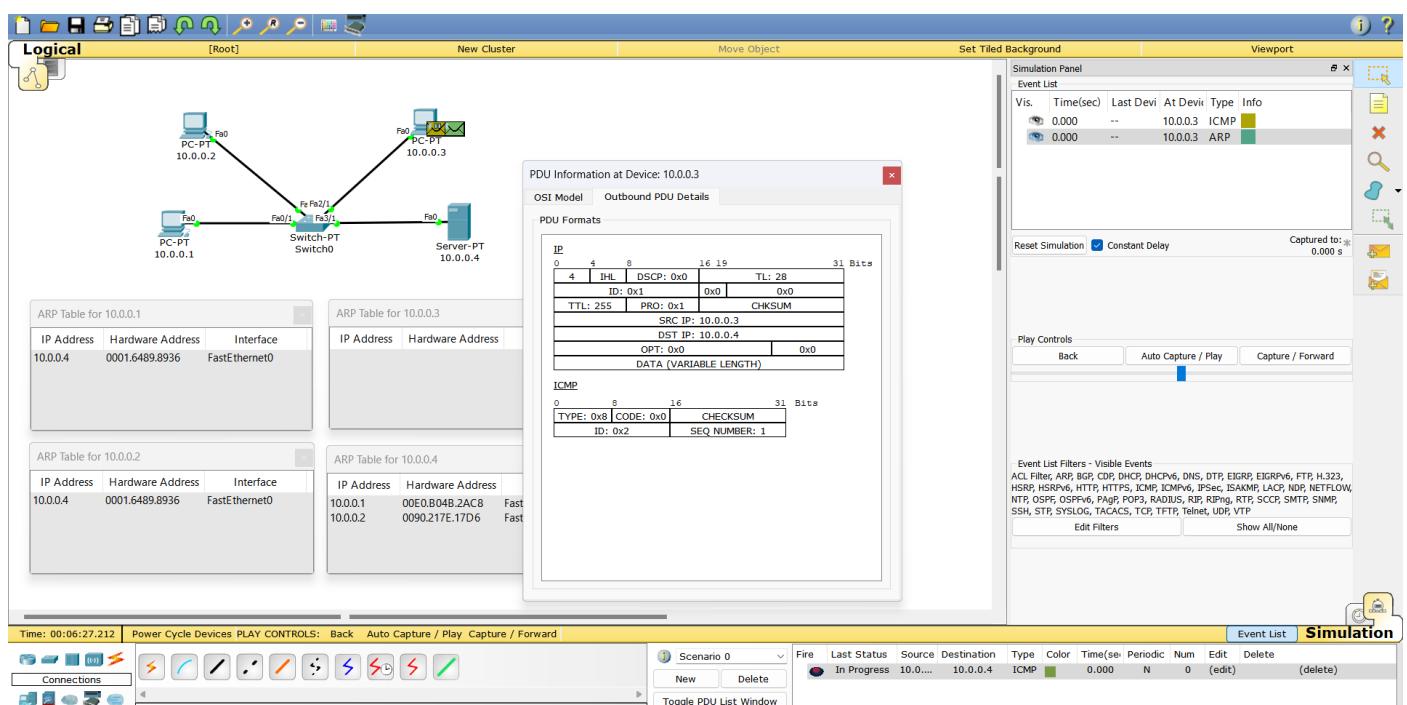
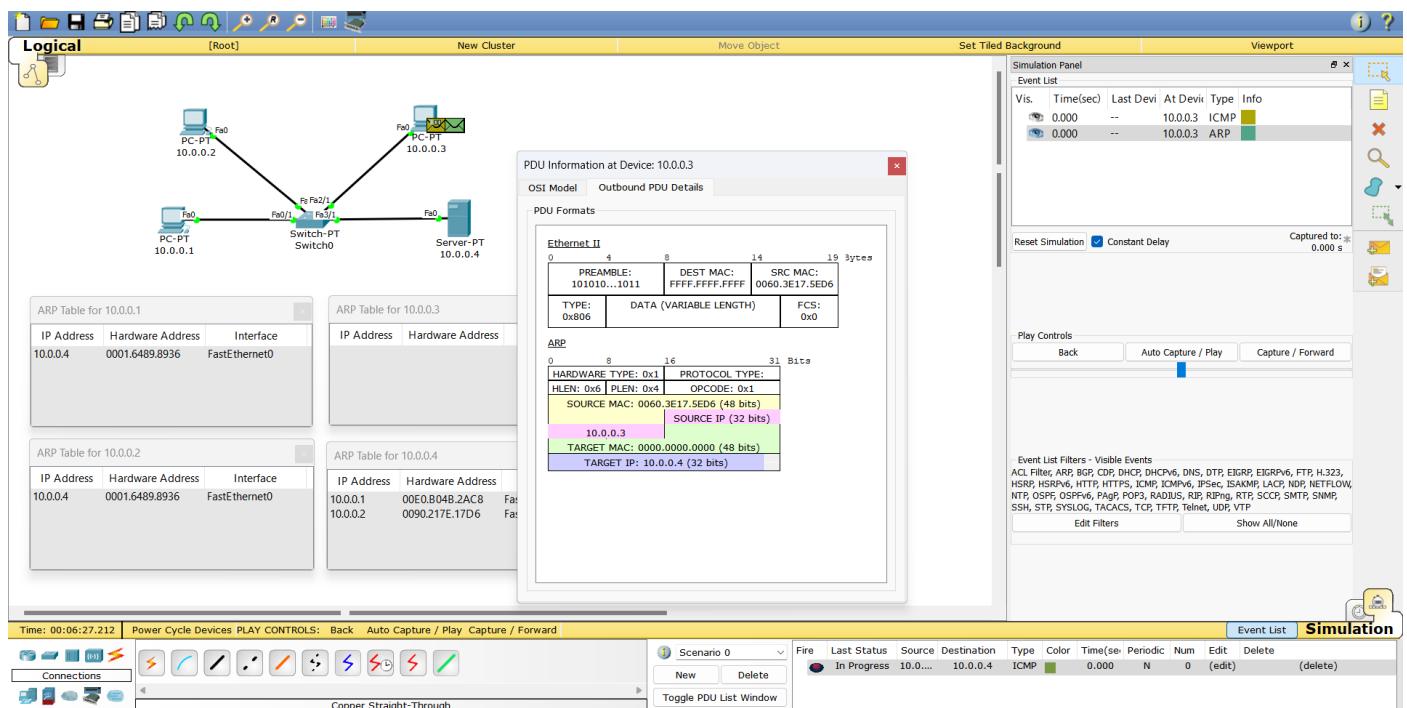


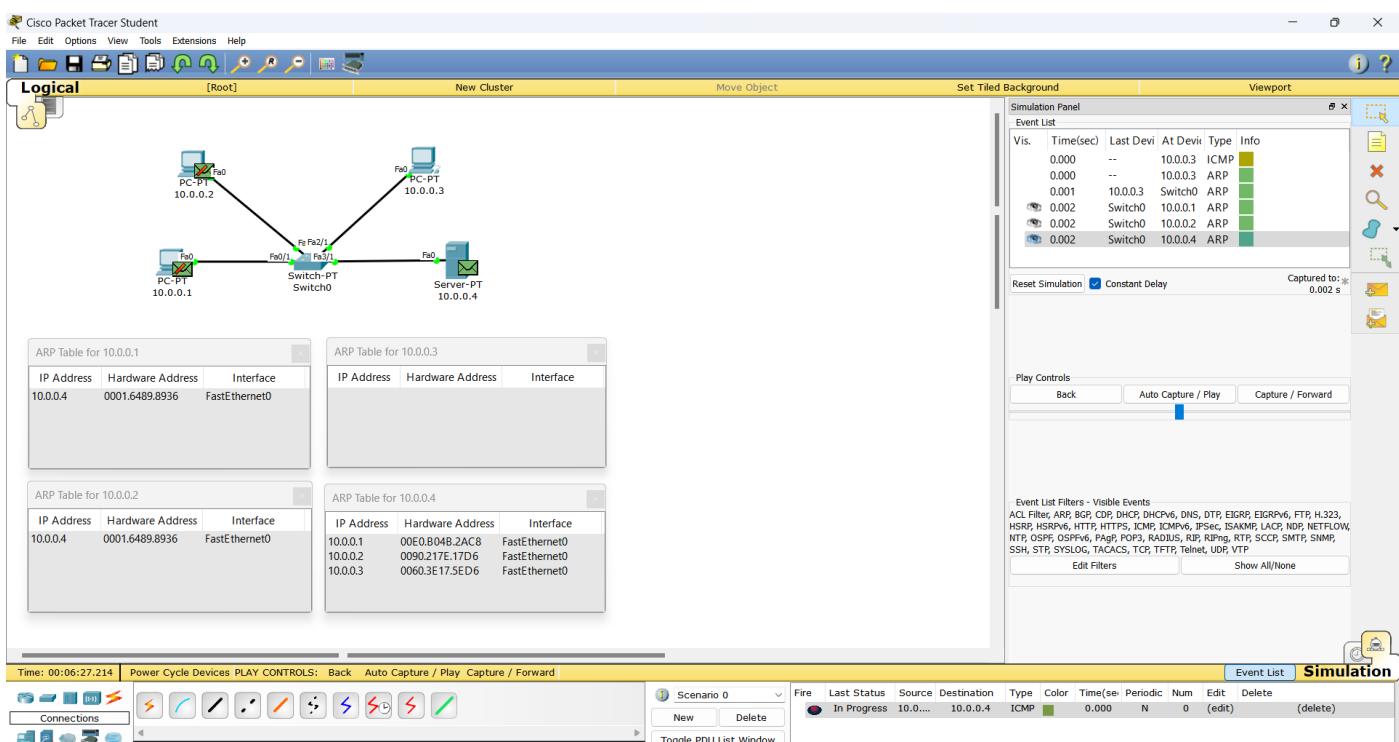
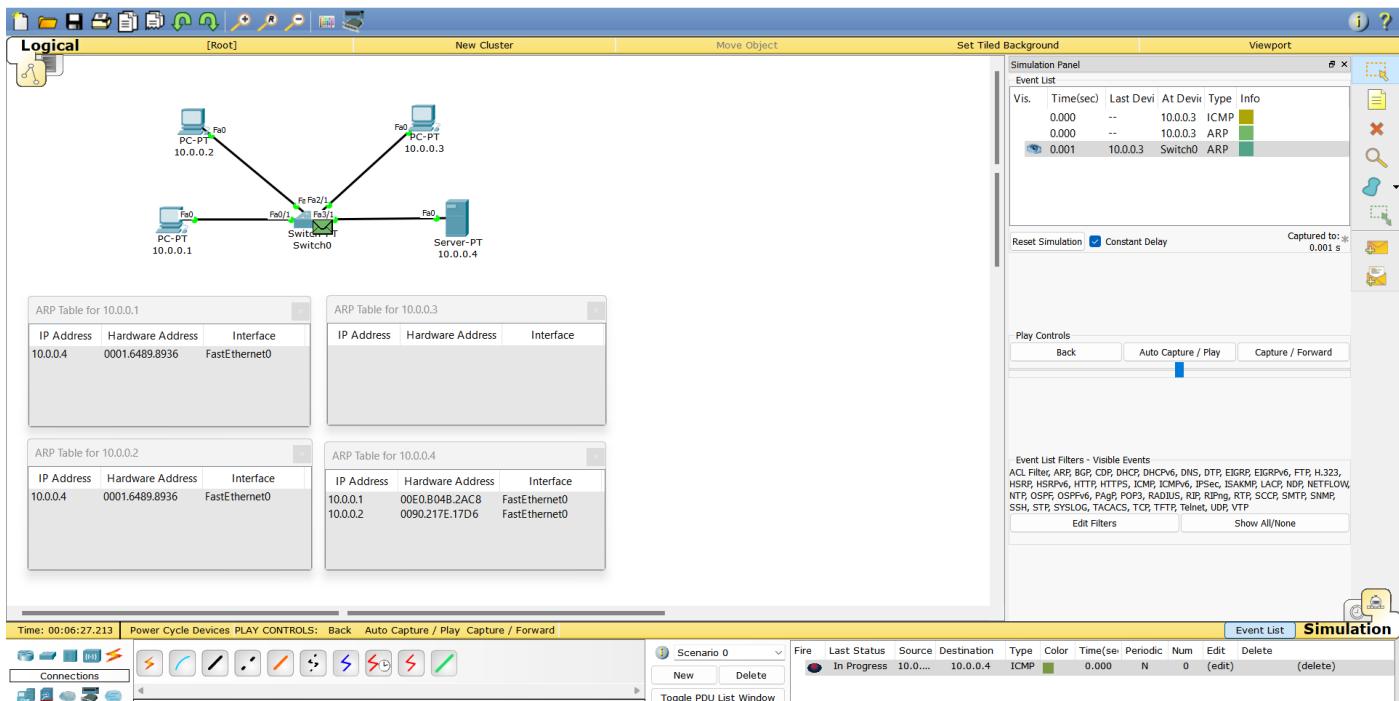


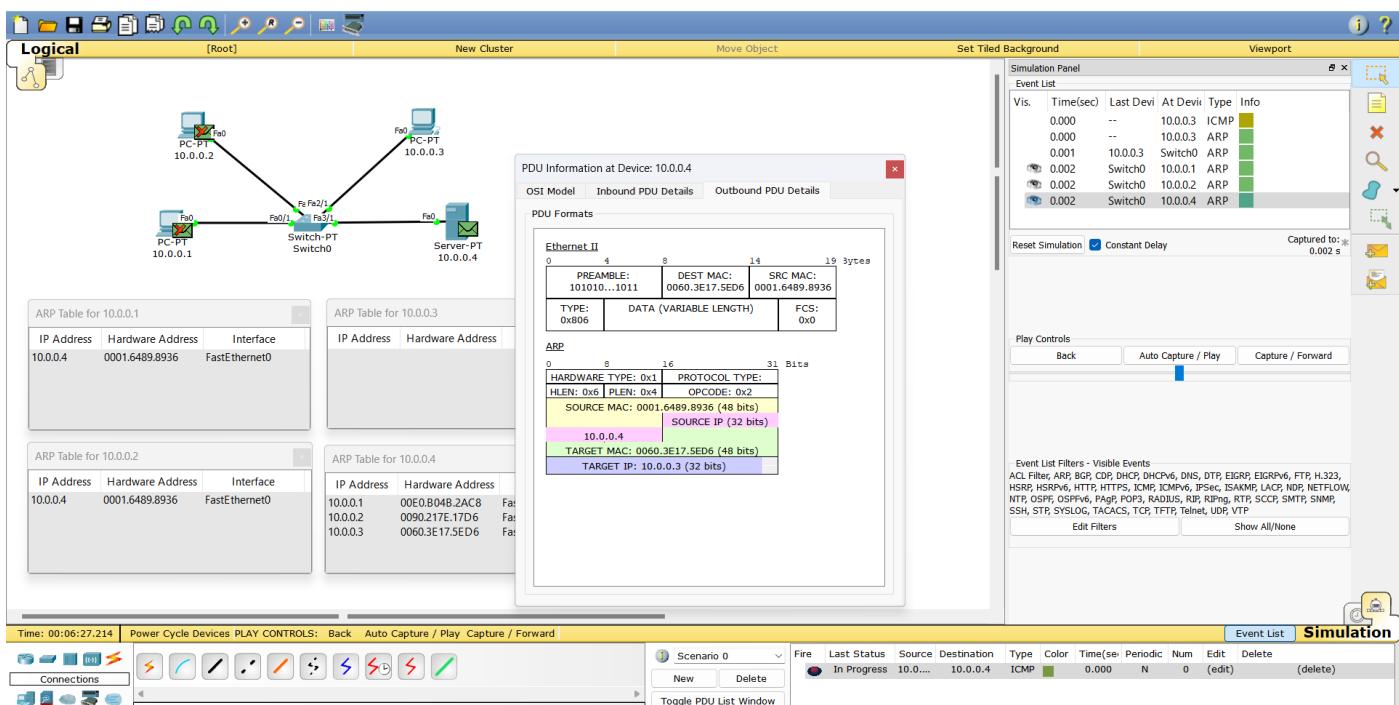
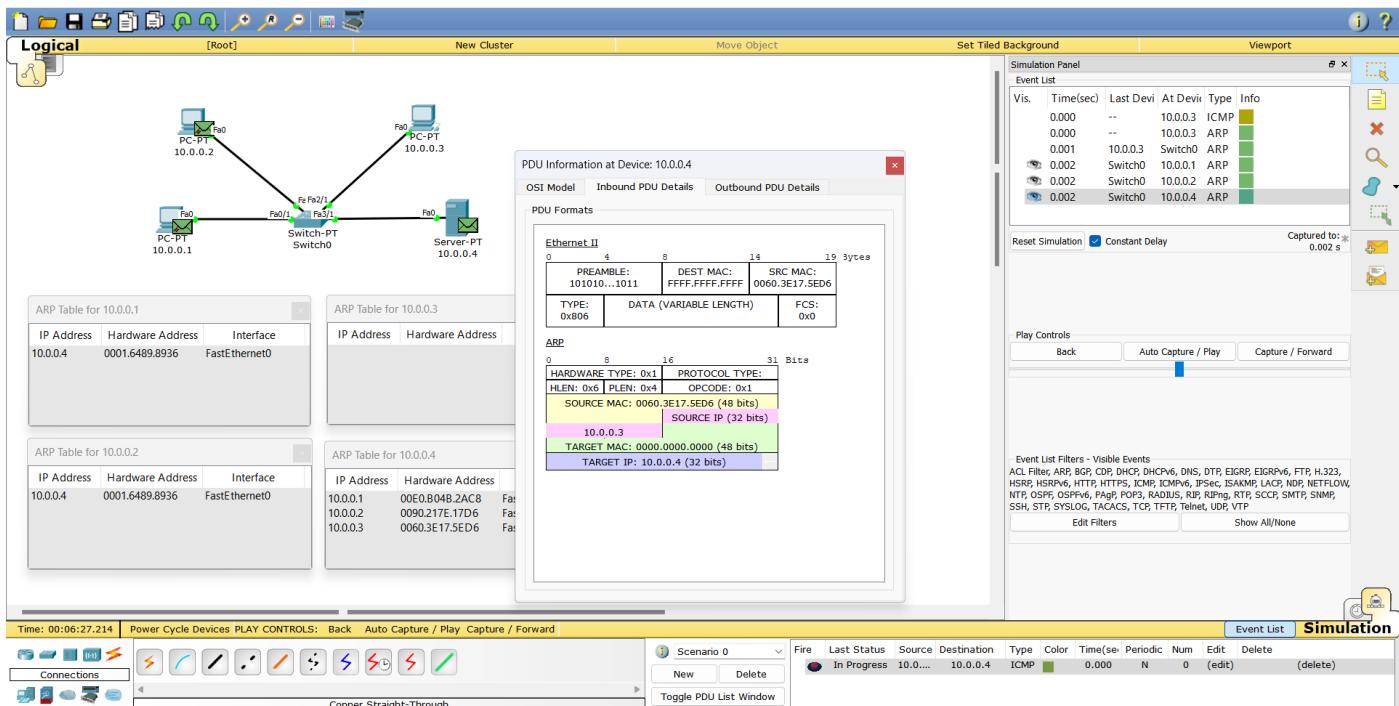


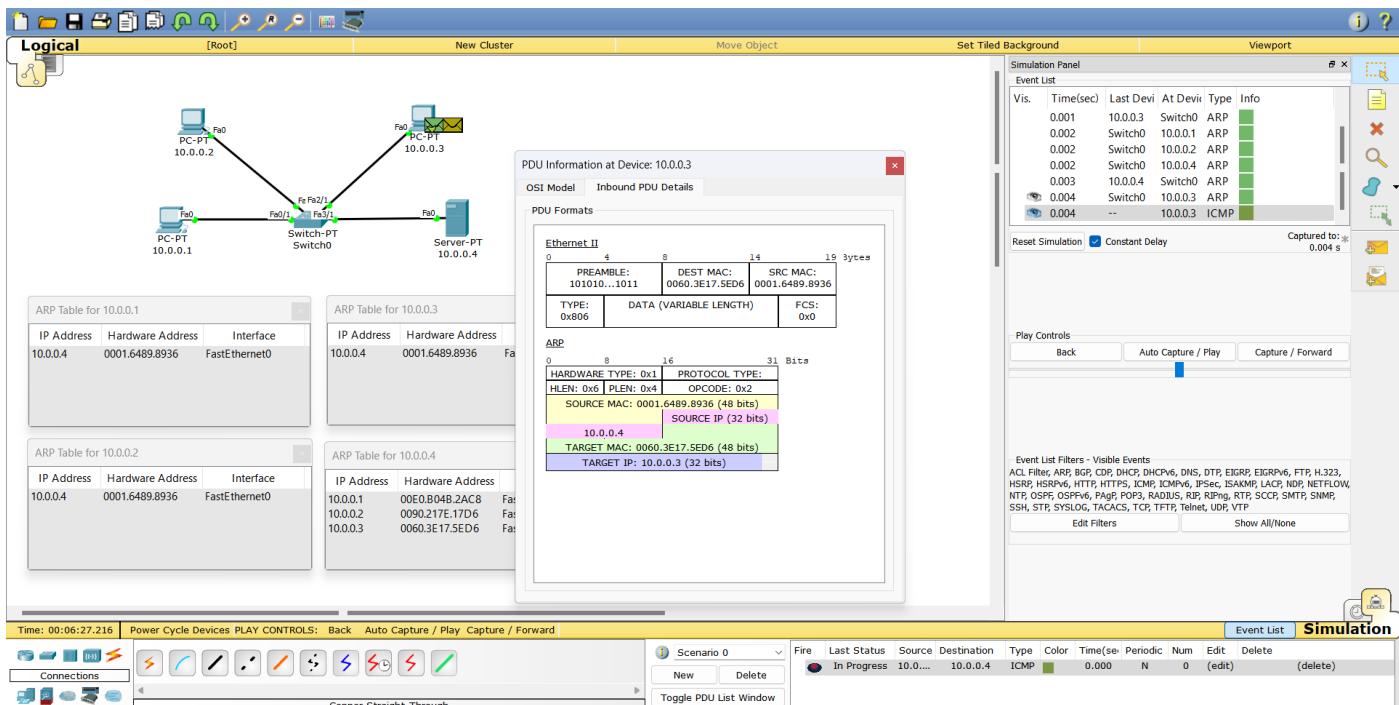
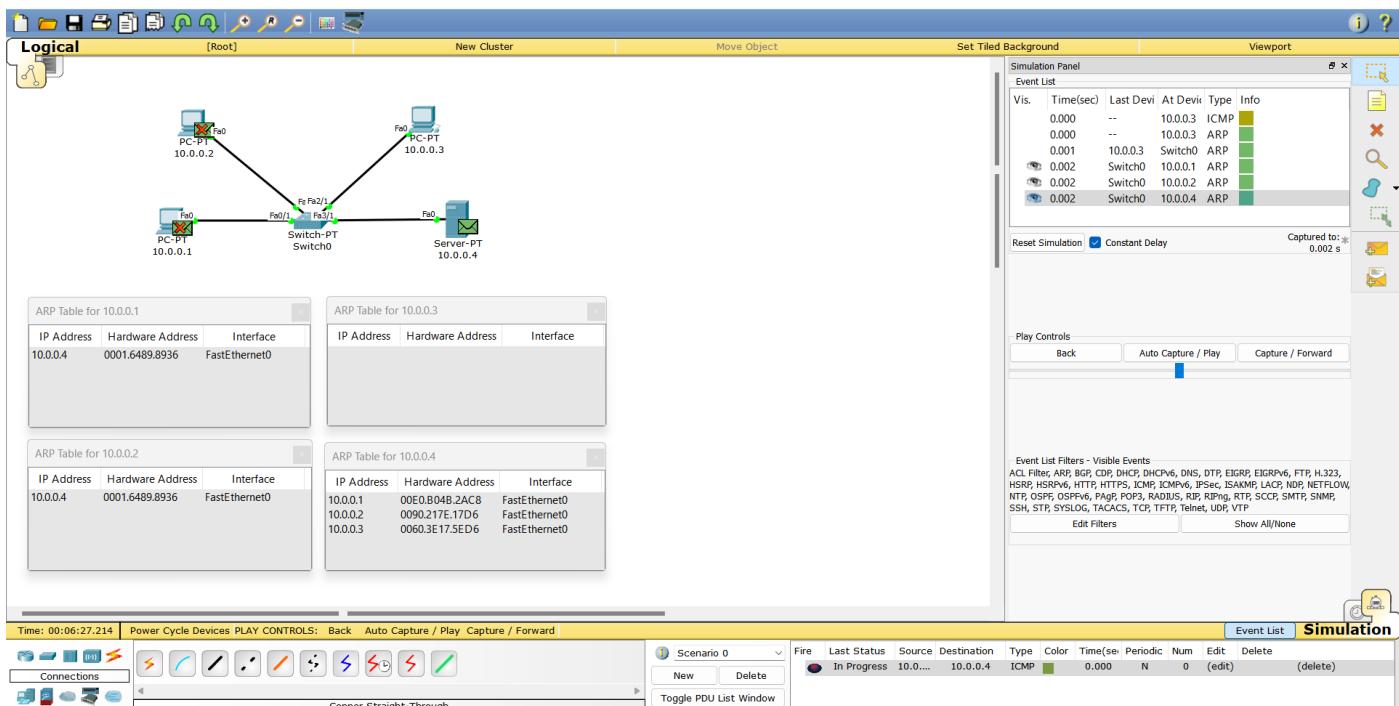


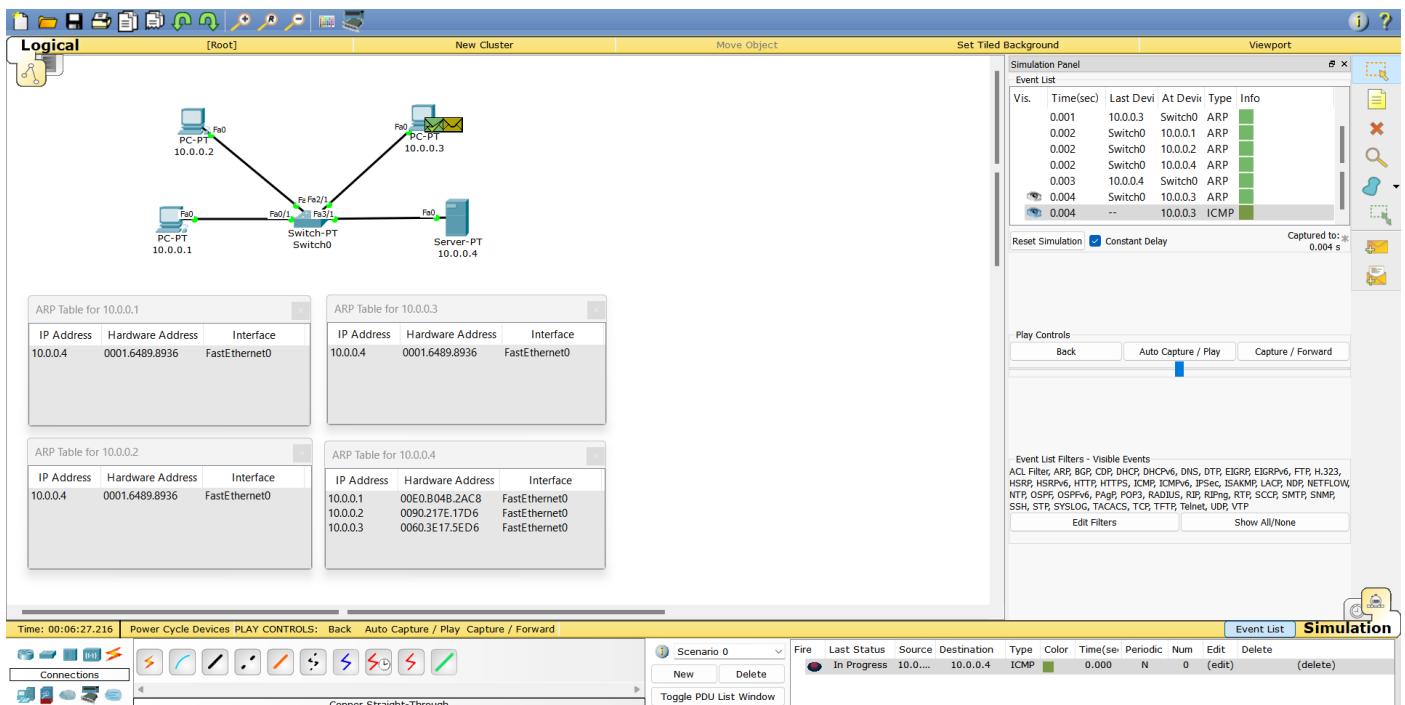
## Sending PDU from PC - 3 to Server:



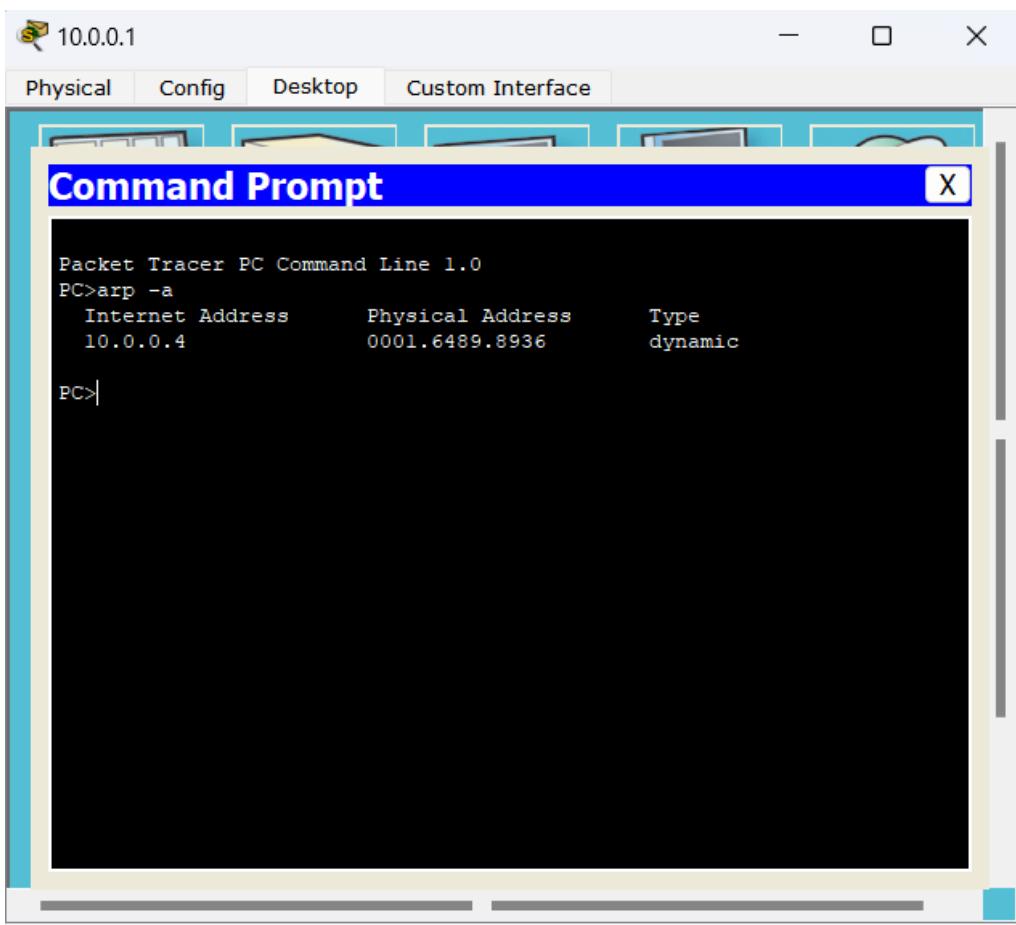


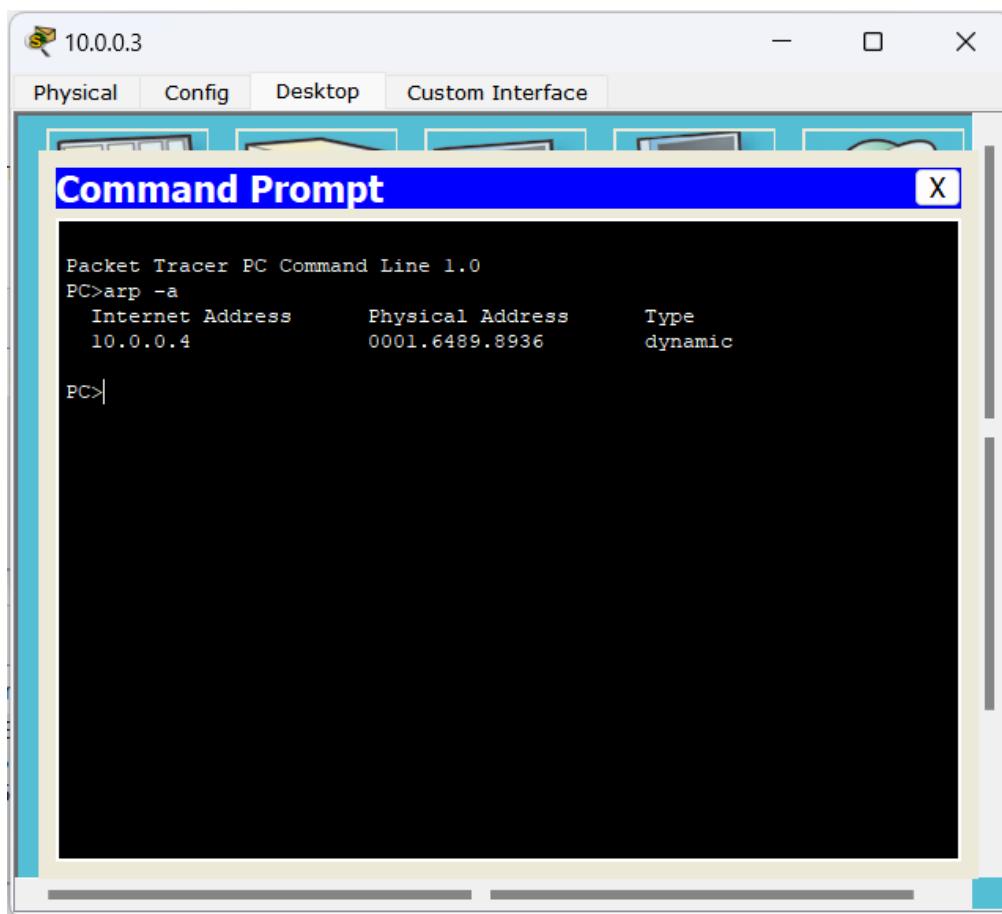
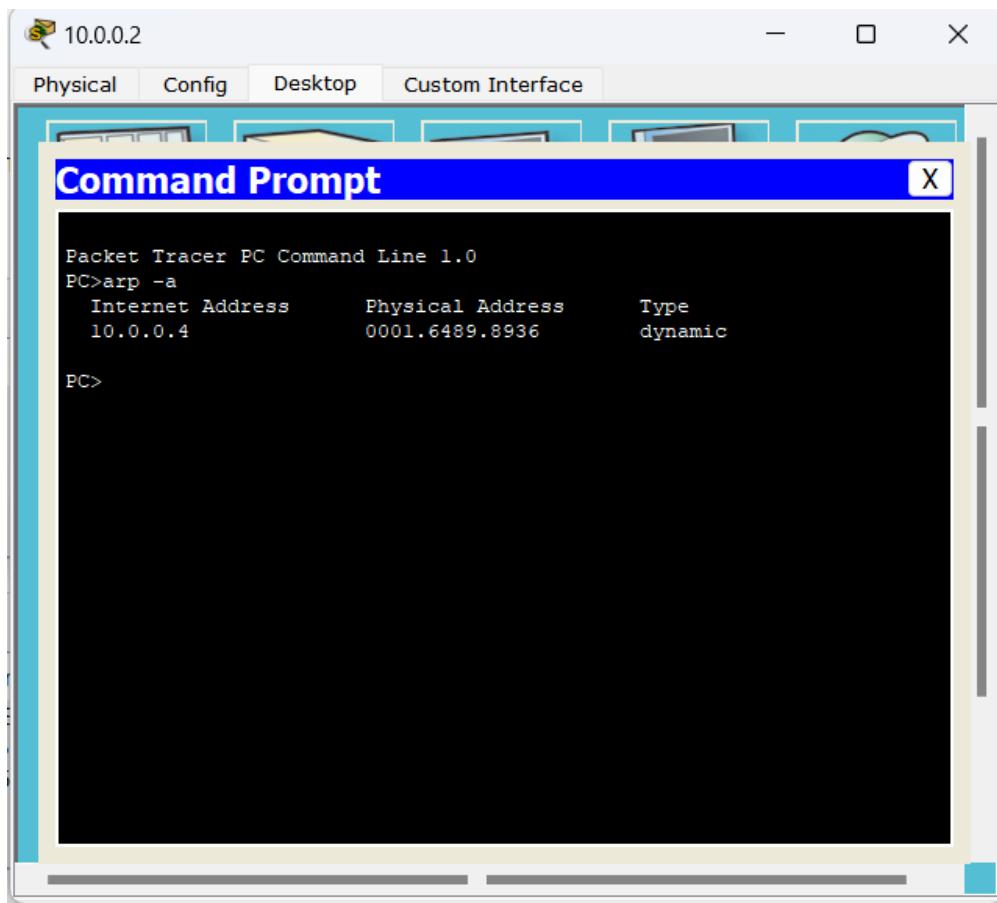






## Checking ARP Table through Command Prompt:





Packet Tracer SERVER Command Line 1.0  
SERVER>arp -a

Internet Address	Physical Address	Type
10.0.0.1	00e0.b04b.2ac8	dynamic
10.0.0.2	0090.217e.17d6	dynamic
10.0.0.3	0060.3e17.5ed6	dynamic

SERVER>

ARP Table for 10.0.0.1		
IP Address	Hardware Address	Interface
10.0.0.4	0001.6489.8936	FastEthernet0

ARP Table for 10.0.0.3		
IP Address	Hardware Address	Interface
10.0.0.4	0001.6489.8936	FastEthernet0

ARP Table for 10.0.0.2		
IP Address	Hardware Address	Interface
10.0.0.4	0001.6489.8936	FastEthernet0

ARP Table for 10.0.0.4		
IP Address	Hardware Address	Interface
10.0.0.1	00E0.B04B.2AC8	FastEthernet0
10.0.0.2	0090.217E.17D6	FastEthernet0
10.0.0.3	0060.3E17.5ED6	FastEthernet0

### 2.9.3 Observation Book Pictures:

Expt 7

Aim: To construct simple LAN and understand the concept of Address resolution protocol.

Topology:

Procedures:

- 1) Connect PCs and a server to a switch as shown in the above topology.
- 2) Configure IP of 10.0.0.1, 10.0.0.2, 10.0.0.3, & 10.0.0.4 to PC1, PC2, PC3 and Server.
- 3) Check ARP table of server. command prompt:  
arp -a
- 4) Now ping server (10.0.0.4) using PC1, PC2 & PC3.
- 5) Again check arp table of server using arp  
arp -a

Result:

> arp -a  
no arp entries found.

After pinging

> arp -a,

physical address	inetnet address	type
00:19:21:76:1F80	10.0.0.1	dynamic
00:5E:8B:00:43:00	10.0.0.3	dynamic
00:19:11:72:1D:70	10.0.0.3	dynamic

observation:

Initially the arp table is initially empty. For any PDU sent within the LAN one ARP broadcast is sent so the arp table eventually fills up.

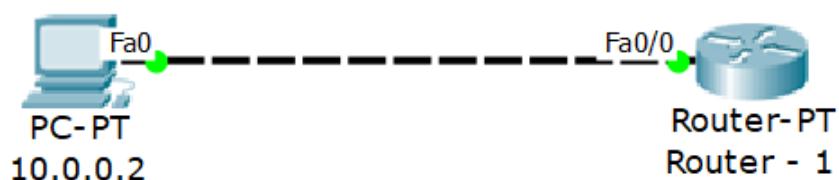
## 2.10 Experiment - 10:

### 2.10.1 Question:

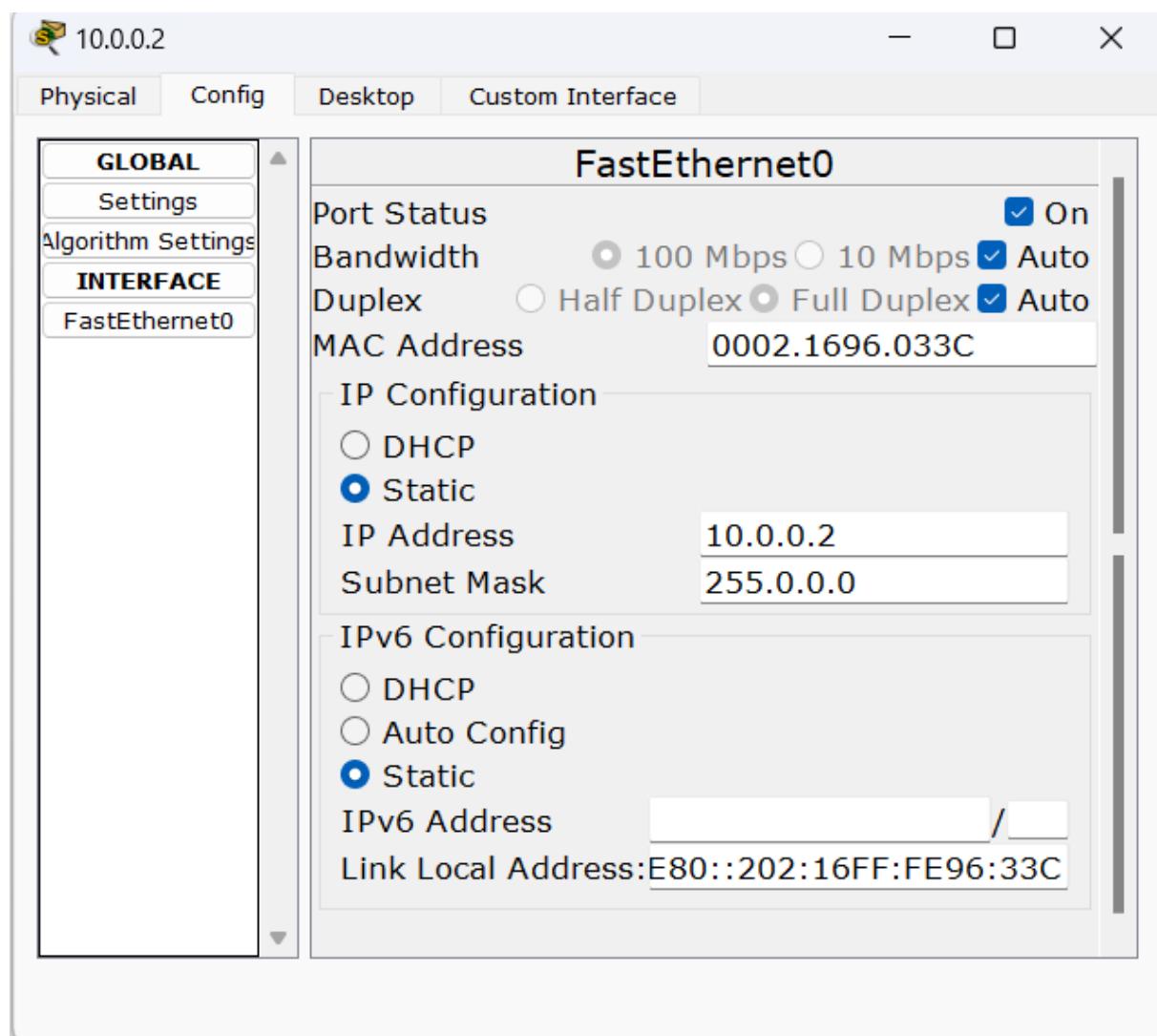
To understand the operation of TELNET by accessing the router in server room from a PC in IT office.

### 2.10.2 Screenshots (Topology, Configurations & Output):

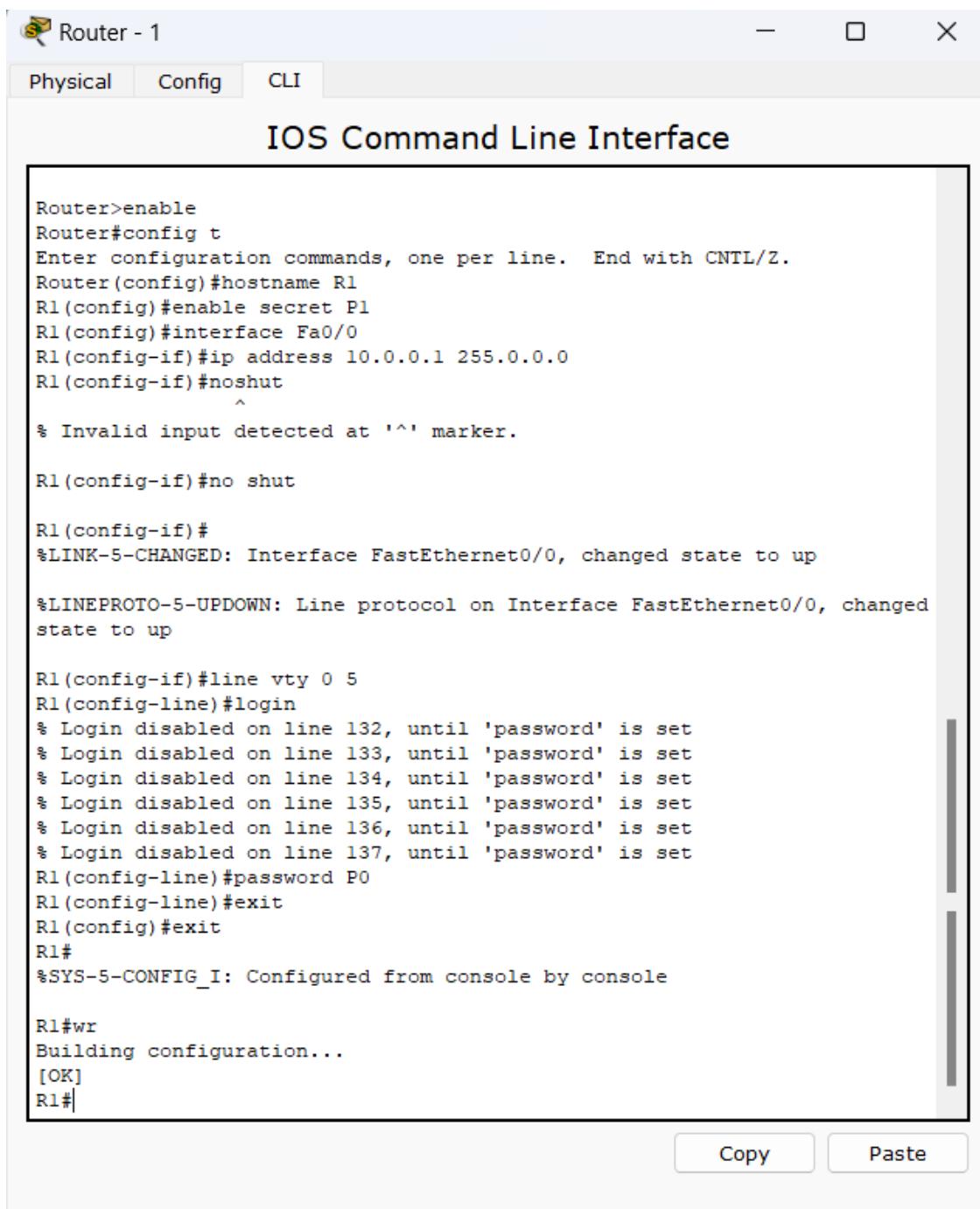
#### Topology:



#### PC - 1 Configuration:



## Router - 1 Configuration:



The image shows a software interface titled "Router - 1" with three tabs: "Physical", "Config" (which is selected), and "CLI". The main area is titled "IOS Command Line Interface". It displays the following configuration commands:

```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R1
R1(config)#enable secret Pl
R1(config)#interface Fa0/0
R1(config-if)#ip address 10.0.0.1 255.0.0.0
R1(config-if)#noshut
^
% Invalid input detected at '^' marker.

R1(config-if)#no shut

R1(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

R1(config-if)#line vty 0 5
R1(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
R1(config-line)#password P0
R1(config-line)#exit
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#wr
Building configuration...
[OK]
R1#
```

At the bottom right of the CLI window are two buttons: "Copy" and "Paste".

## PC - 1 (Command Prompt):

The screenshot shows a Cisco Packet Tracer window titled "Command Prompt". The window contains the following command-line session:

```
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=0ms TTL=255

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

PC>telnet 10.0.0.1
Trying 10.0.0.1 ...Open

User Access Verification

Password:
R1>enable
Password:
R1#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter
area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

C    10.0.0.0/8 is directly connected, FastEthernet0/0
R1#
```

Password for User Access Verification is: **P0**

Password for enable is: **P1**

### 2.10.3 Observation Book Pictures:

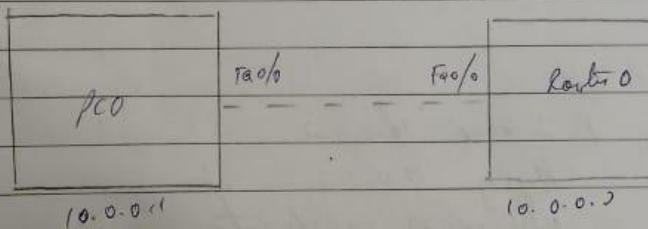
28 Lab 8.



Aim:

To understand the operation of TELNET by collecting the routes in mind from a PC in I7 office.

Topology:



Procedure:

- 1) Draw a topology using one PC and one Router or three
- 2) Set the IP address and gateway of 10.0.0.1 and 10.0.0.2 for the PC.
- 3) In the Router go to CLI.

Router > enable

Router # config-t

Router (Config)# hostname R1

R1# config# enable secret 81

R1# config# interface fa 0/0

R1# config# ip address 10.0.0.2 255.0.0.0

R1# config# no shutdown

R1# config# line vty 0 5

R1# config# login

4. Login is asked on line 1 to 5 until password is set.

R1# config# password

R1# config# exit

R1# wr

4) In command prompt of PC

PC is ping 10.0.0.2

pinging 10.0.0.2 with 32 bytes of data.

Reply from 10.0.0.2: bytes=32 time=0ms

5) Now run command of Telnet 10.0.0.2

### Result:

PC is telnet 10.0.0.2

trying 10.0.0.2 --- open  
with access verification

password: po

2.1> enable.

password: p1

It shows IP route

node > (- connected)

C 10.0.0.0/1 is directly connected

### Observation:

Thus using TELNET protocol we can view the routes  
from the PC (directly connected).

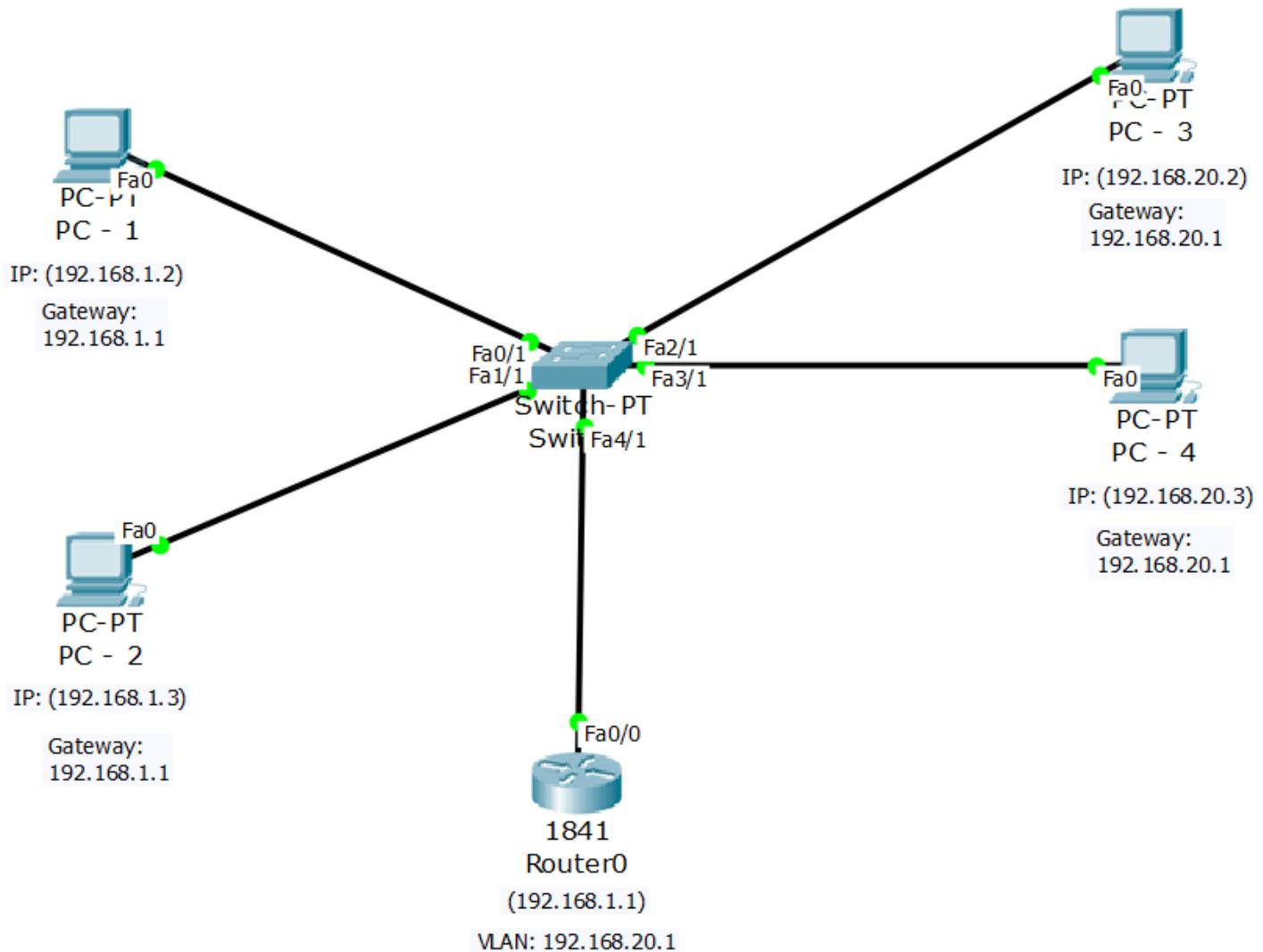
## 2.11 Experiment - 11:

### 2.11.1 Question:

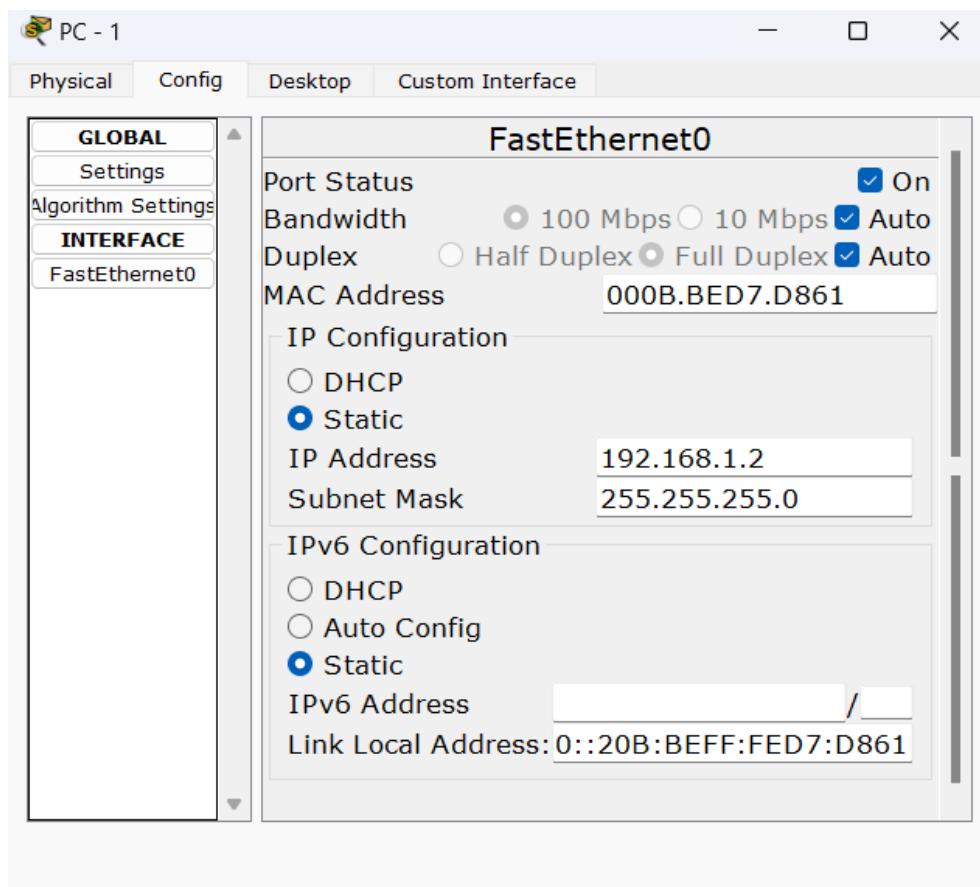
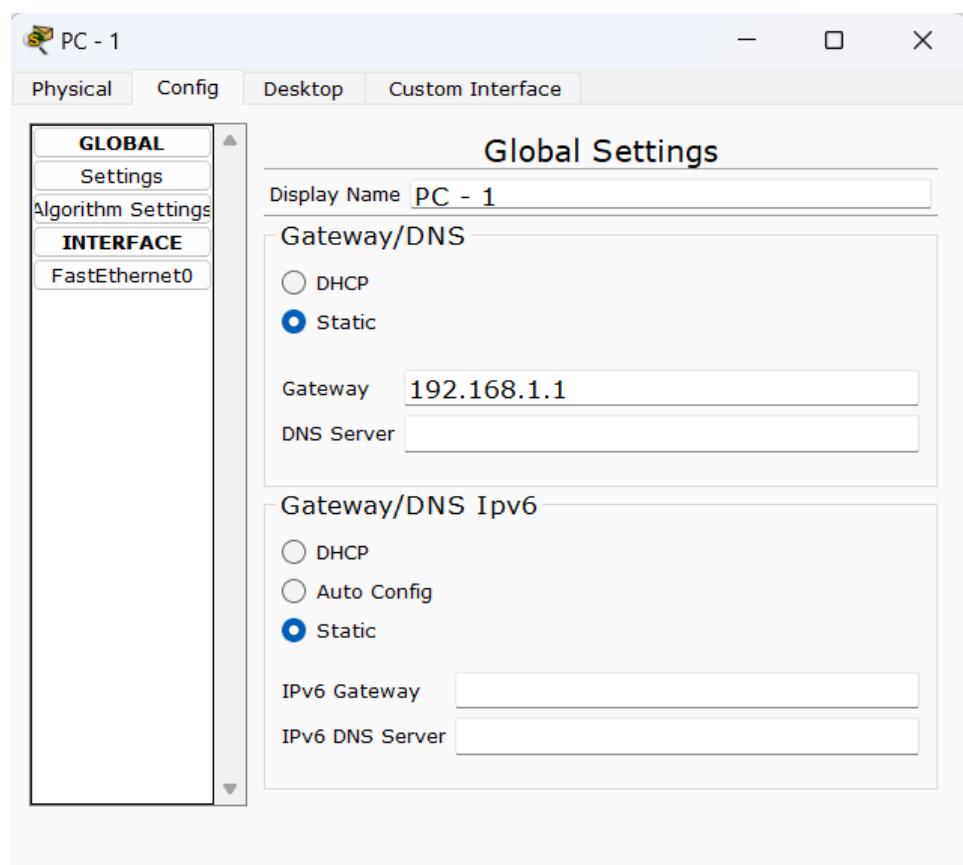
To construct a VLAN and make the PC's communicate among a VLAN

### 2.11.2 Screenshots (Topology, Configurations & Output):

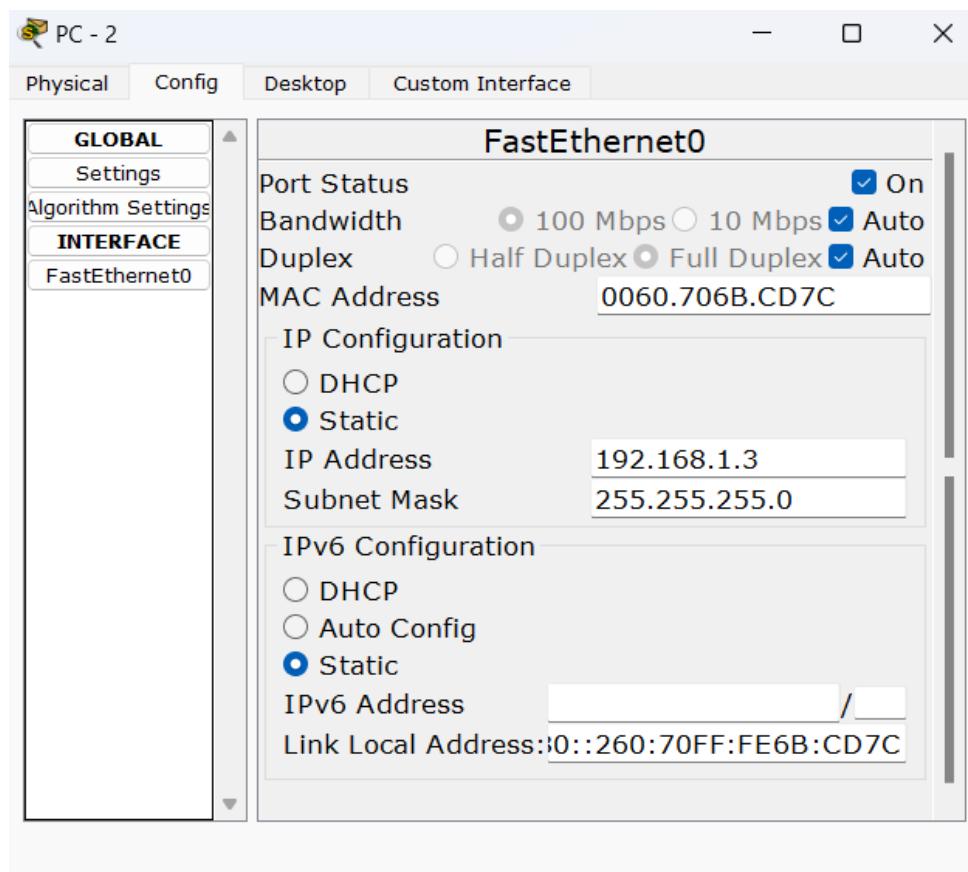
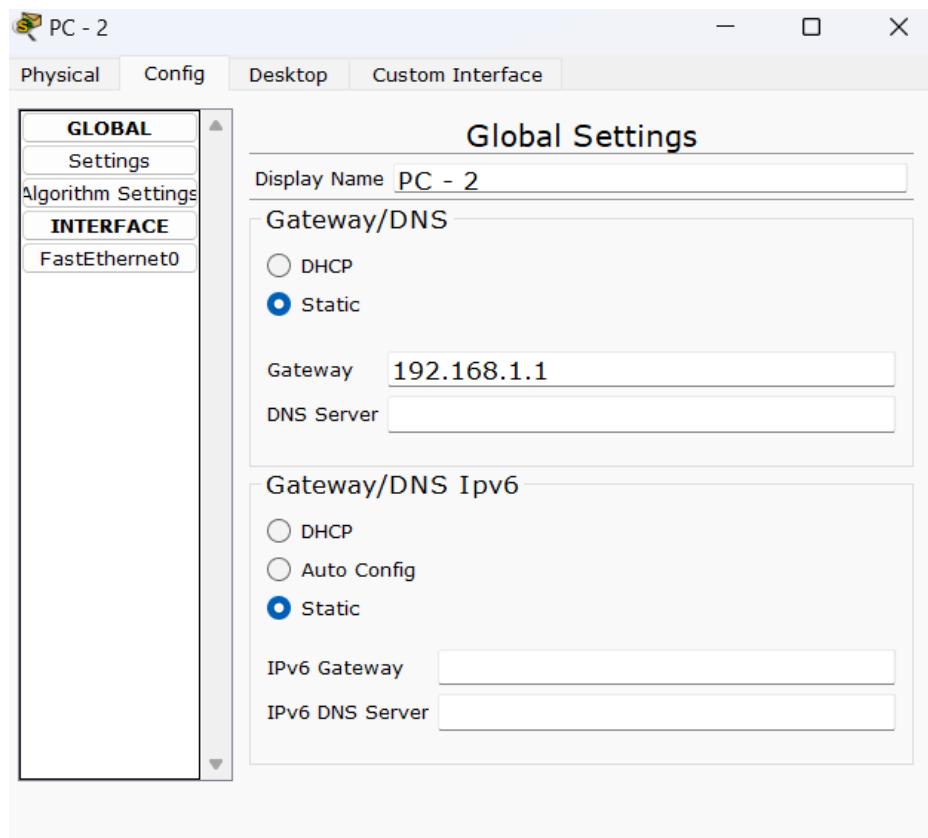
#### Topology:



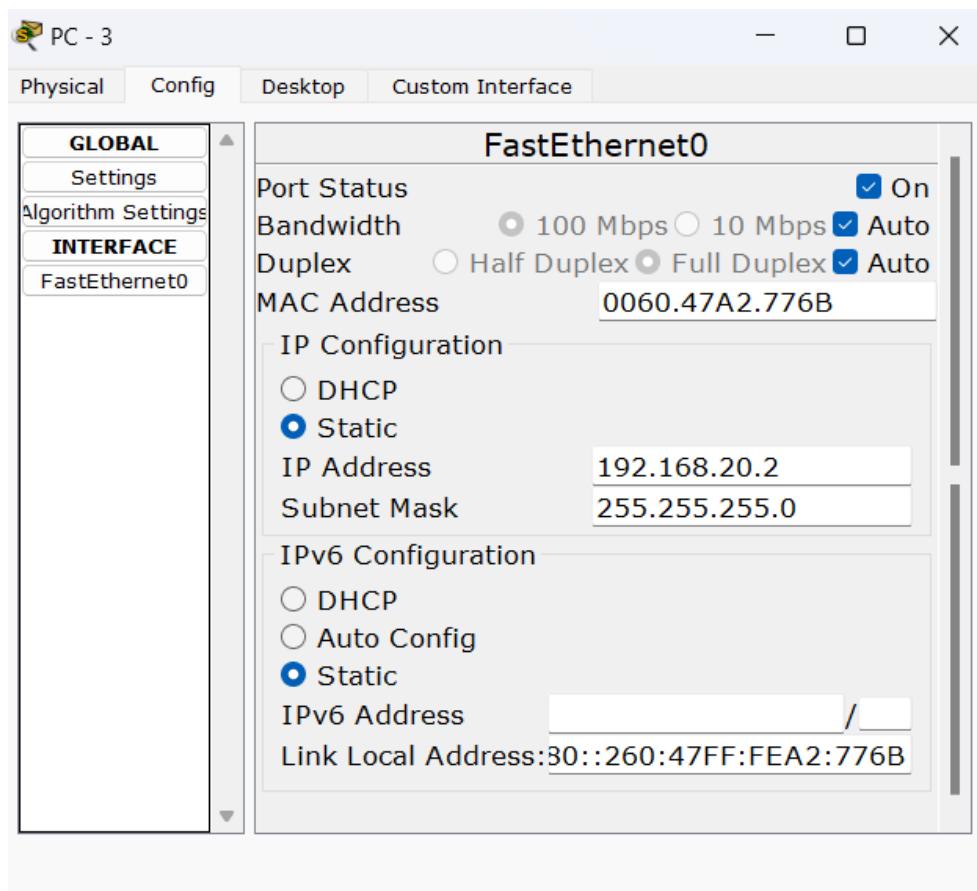
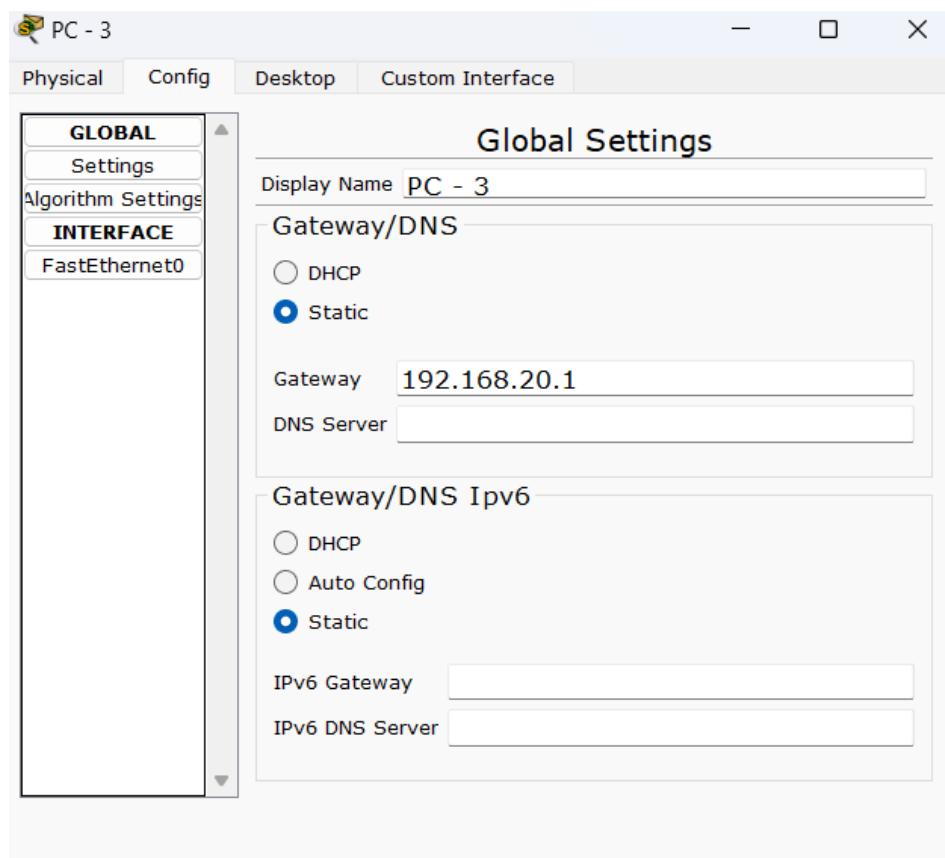
## PC - 1 Configuration:



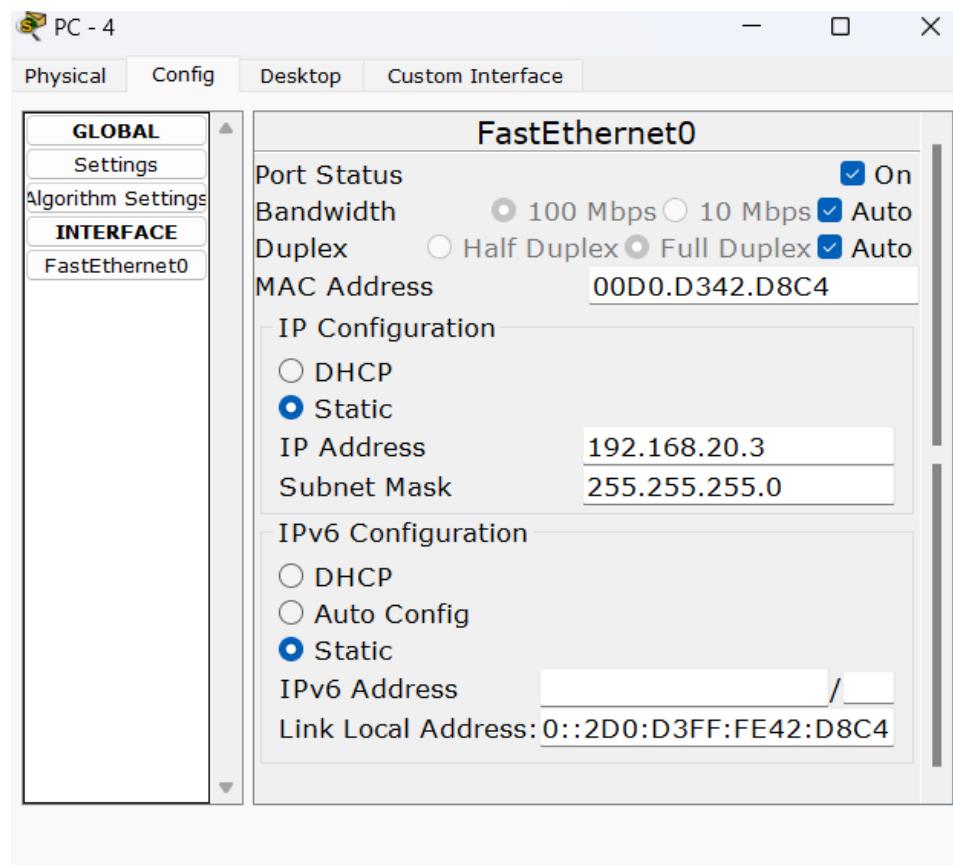
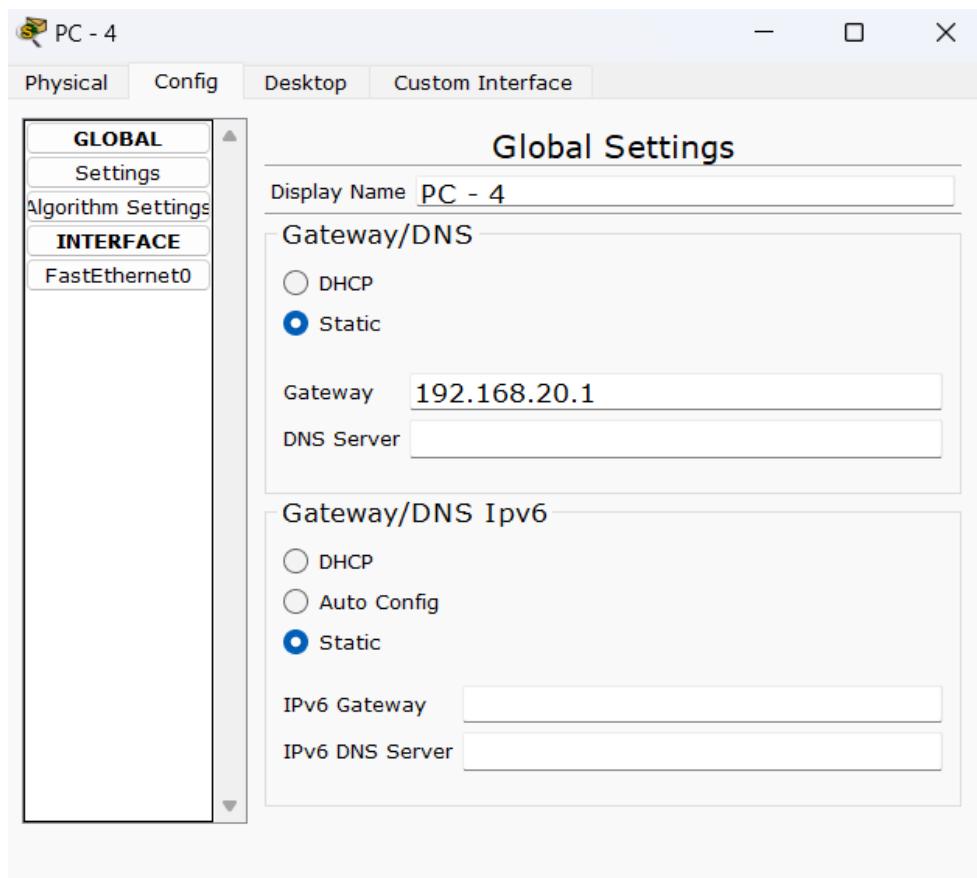
## PC - 2 Configuration:



## PC - 3 Configuration:



## PC - 4 Configuration:



## Router - 1 Configuration:

Router0

Physical Config CLI

### IOS Command Line Interface

```

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

Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#no shutdown

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
ip address 192.168.1.1 255.255.255.0
Router(config-if)#

```

Copy Paste

Router0

Physical Config CLI

### VLAN Configuration

VLAN No	VLAN Name
1	default
2	<b>NEWVLAN</b>
1002	fddi-default
1003	token-ring-default
1004	fddinet-default
1005	trnet-default

Add Remove

Equivalent IOS Commands

```

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)#

```

**Router0**

Physical Config CLI

### IOS Command Line Interface

```

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 2 name NEWVLAN
VLAN 2 modified:
  Name: NEWVLAN
Router(vlan)#
Router(vlan)#exit
APPLY completed.
Exiting....
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Fa0/0.1
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 2
Router(config-subif)#ip address 192.168.20.1 255.255.255.0

```

[Copy](#) [Paste](#)

**Router0**

Physical Config CLI

### IOS Command Line Interface

```

Router(config-subif)#no shut
^
% Invalid input detected at '^' marker.

Router(config-subif)#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

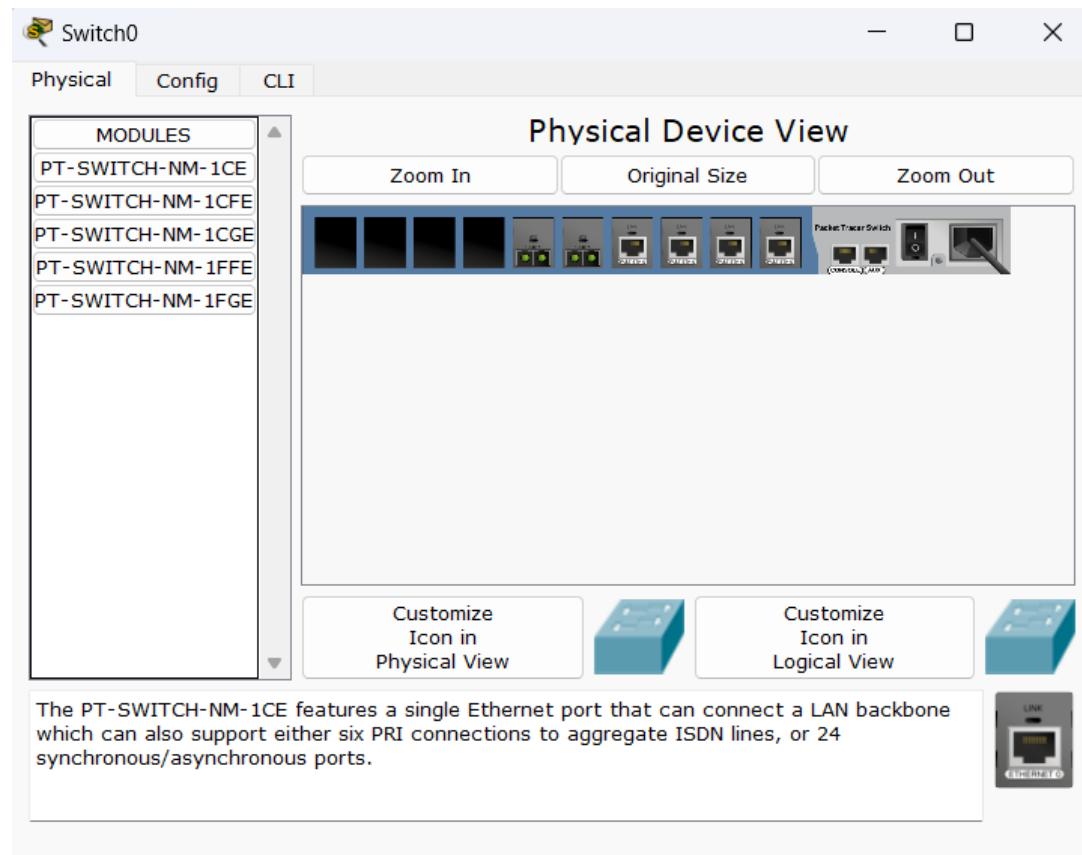
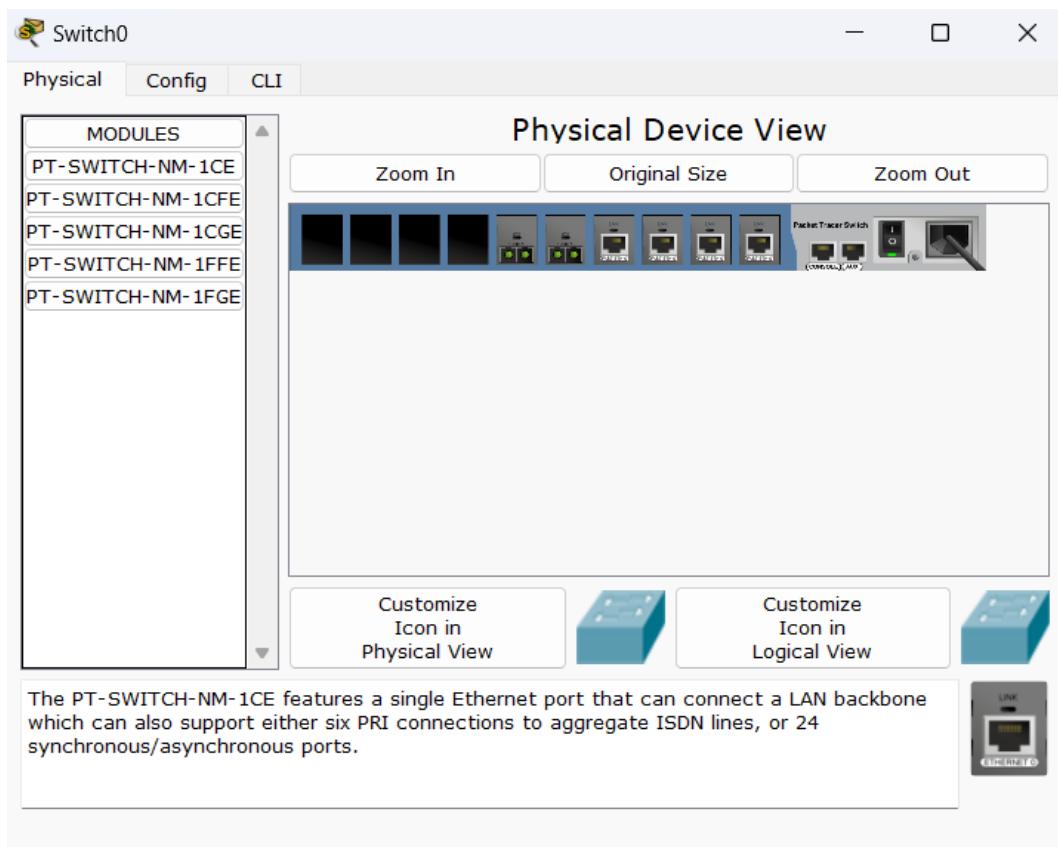
Gateway of last resort is not set

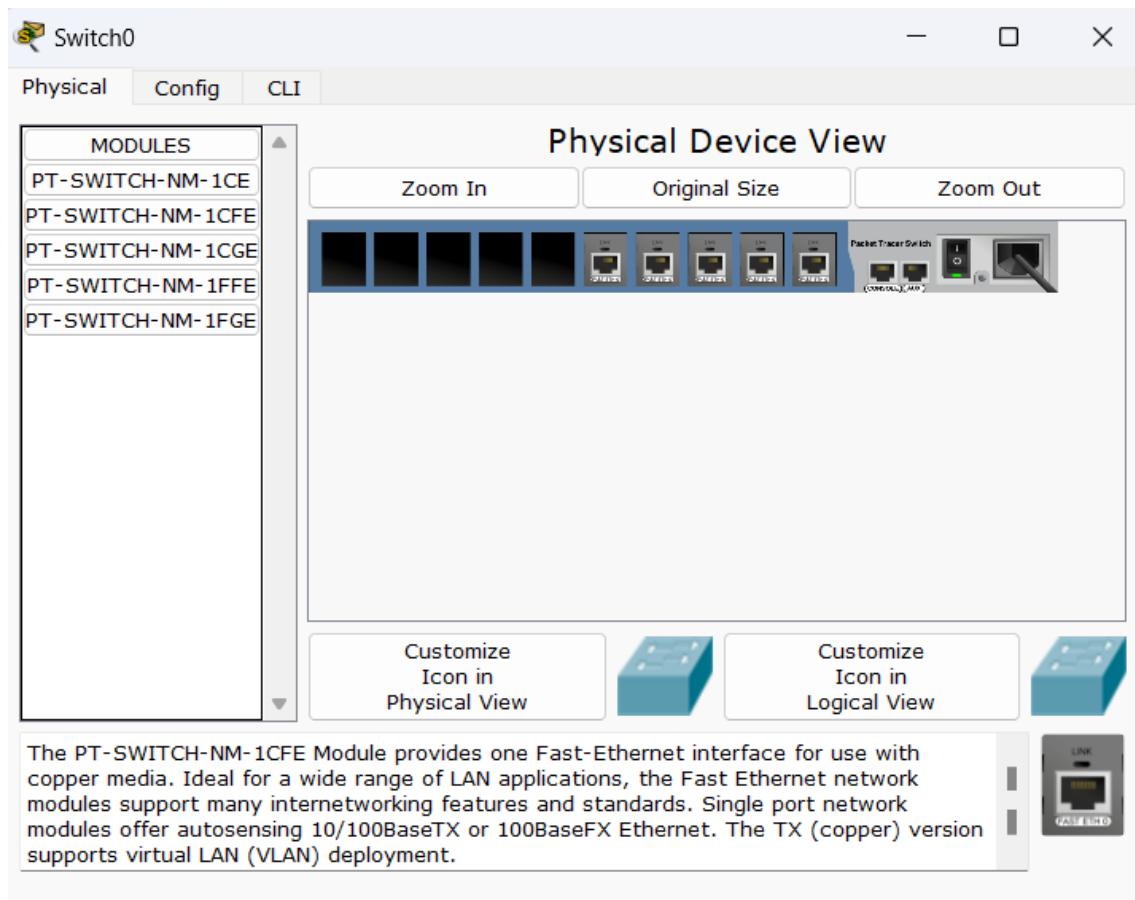
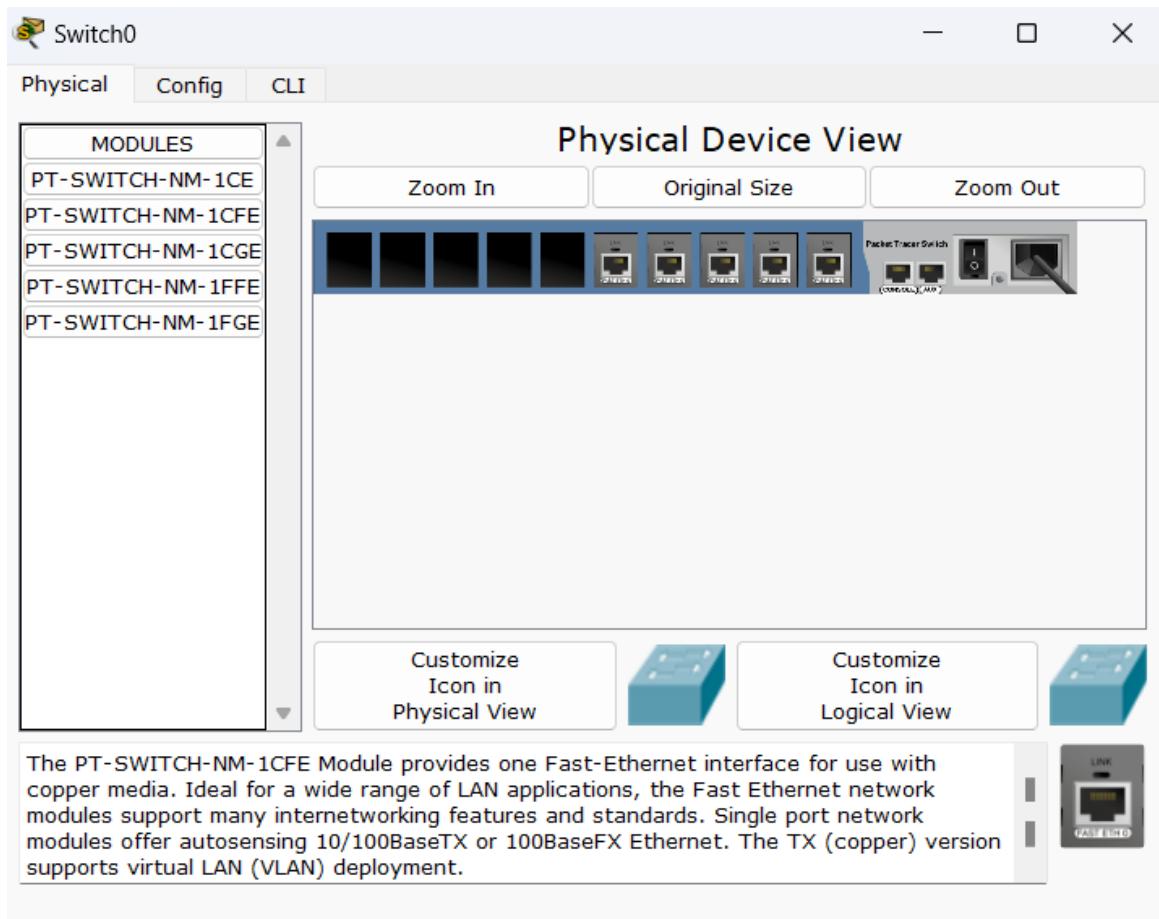
C    192.168.1.0/24 is directly connected, FastEthernet0/0
C    192.168.20.0/24 is directly connected, FastEthernet0/0.1
Router#

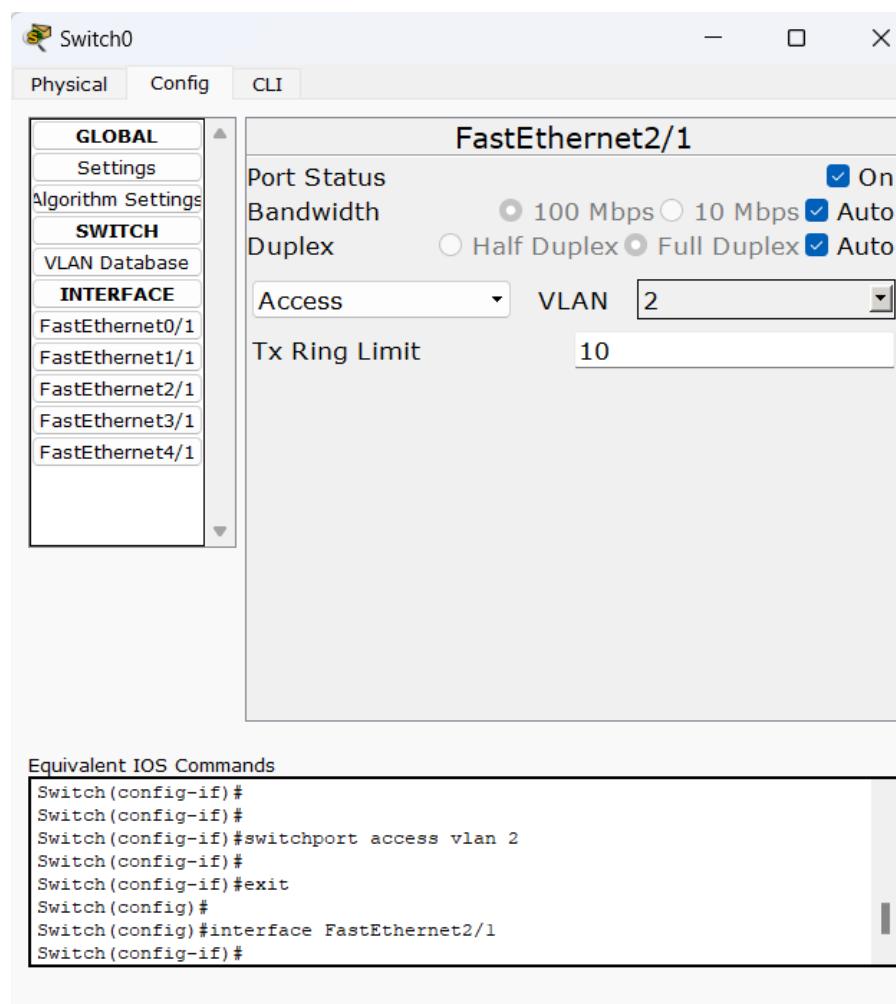
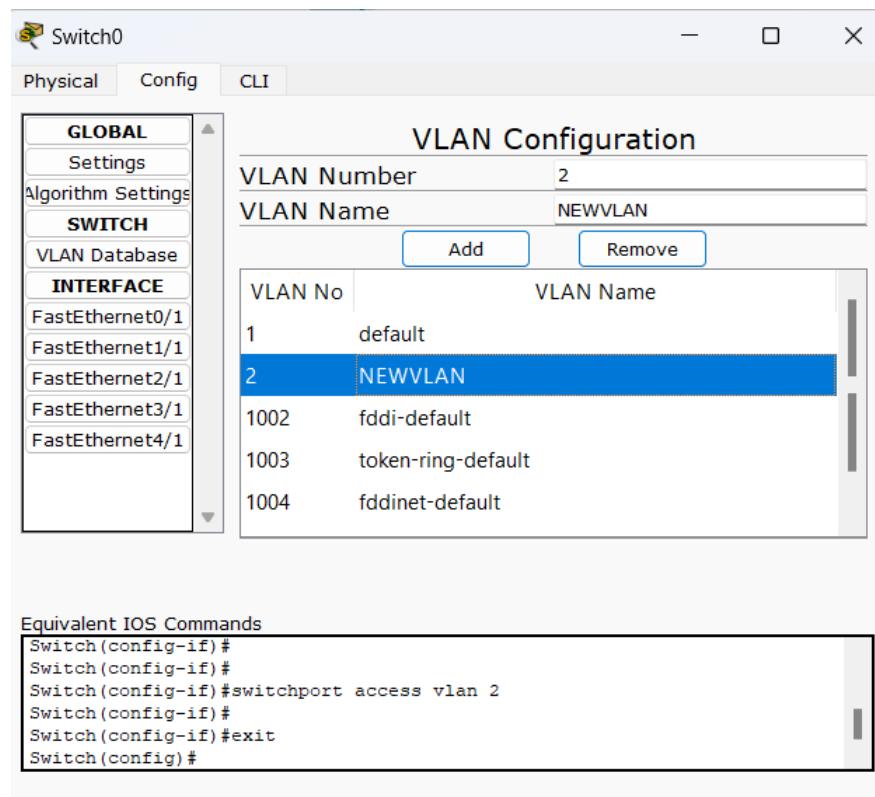
```

[Copy](#) [Paste](#)

## Switch - 1 Configuration:







Switch0

Physical Config CLI

**GLOBAL**

Settings  
Algorithm Settings

**SWITCH**

VLAN Database

**INTERFACE**

FastEthernet0/1  
FastEthernet1/1  
FastEthernet2/1  
**FastEthernet3/1**  
FastEthernet4/1

▲ ▼

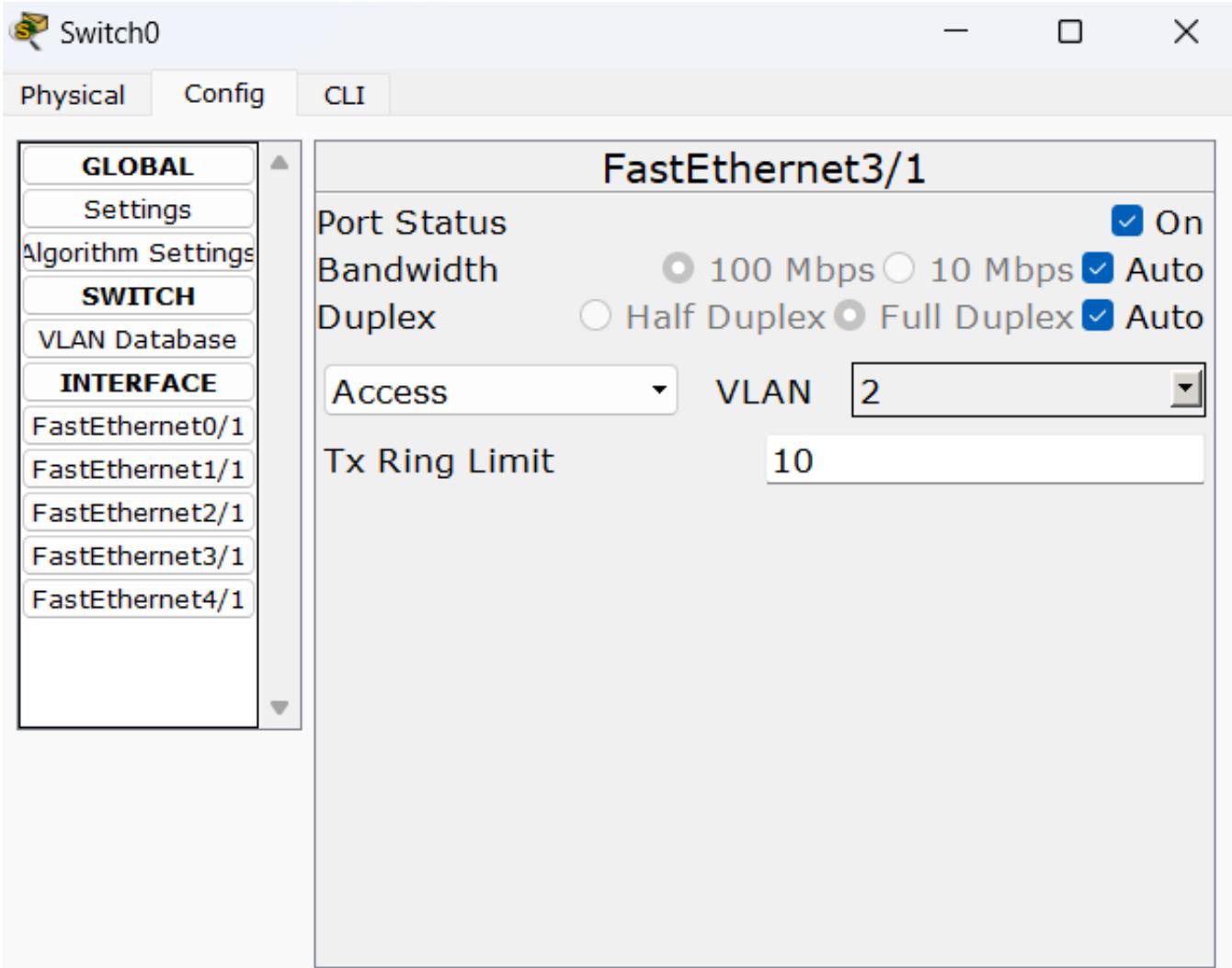
**FastEthernet3/1**

Port Status  On  
 100 Mbps  10 Mbps  Auto  
 Half Duplex  Full Duplex  Auto

Bandwidth  
Duplex

Access VLAN 2

Tx Ring Limit 10



Equivalent IOS Commands

```
Switch(config-if)#  
Switch(config-if)#exit  
Switch(config)#  
Switch(config)#interface FastEthernet2/1  
Switch(config-if)#  
Switch(config-if)#exit  
Switch(config)#interface FastEthernet3/1  
Switch(config-if)#[
```

Switch0

Physical Config CLI

**GLOBAL**

Settings  
Algorithm Settings

**SWITCH**

VLAN Database

**INTERFACE**

FastEthernet0/1  
FastEthernet1/1  
FastEthernet2/1  
FastEthernet3/1  
**FastEthernet4/1**

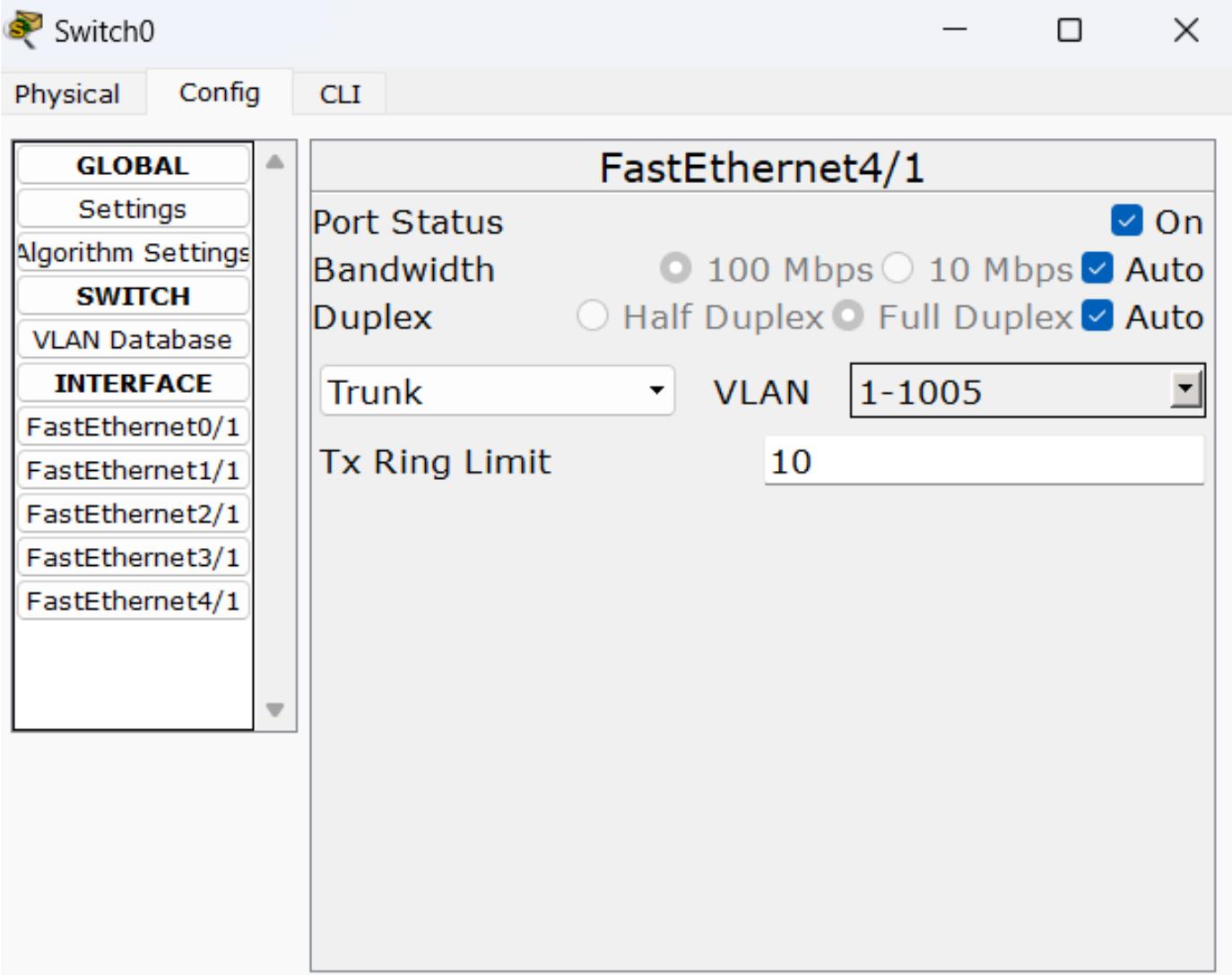
**FastEthernet4/1**

Port Status  On  
 100 Mbps  10 Mbps  Auto

Duplex  Half Duplex  Full Duplex  Auto

Trunk VLAN 1-1005

Tx Ring Limit 10



#### Equivalent IOS Commands

```
Switch(config)#interface FastEthernet2/1
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet3/1
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet4/1
Switch(config-if)#

```



Switch0



Physical Config CLI

## IOS Command Line Interface

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 2
Switch(config-vlan)#name NEWVLAN
Switch(config-vlan)#exit
Switch(config)#
Switch(config)#interface FastEthernet4/1
Switch(config-if)#
Switch(config-if)#switchport mode trunk

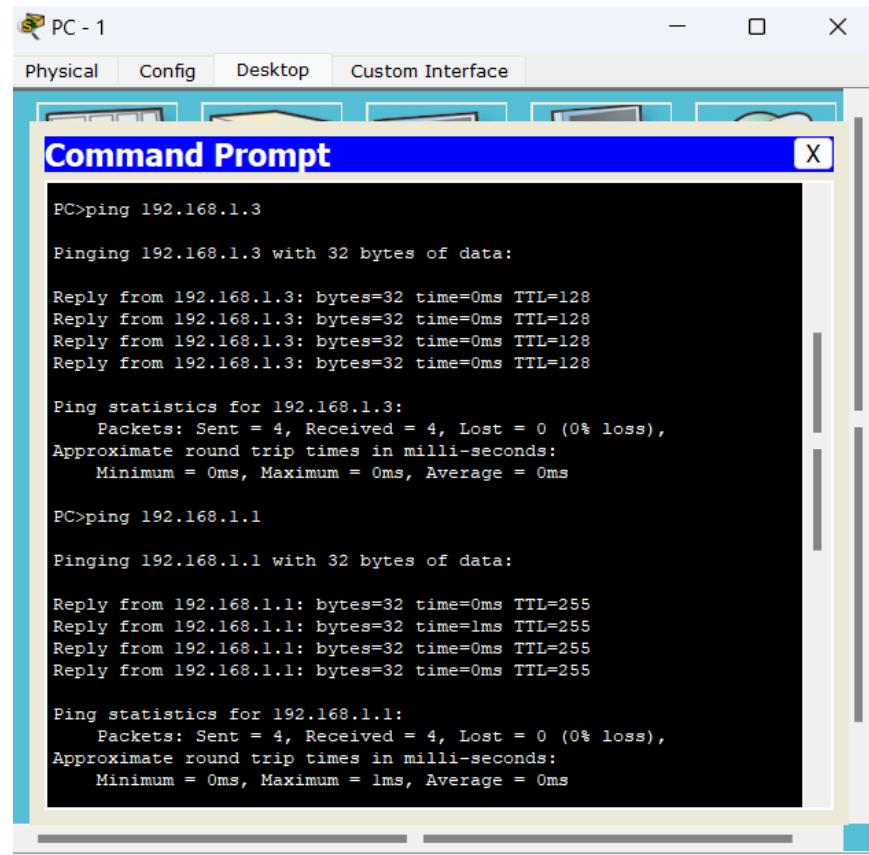
Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet4/1, changed
state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet4/1, changed
state to up

Switch(config-if)#exit
Switch(config)#interface FastEthernet2/1
Switch(config-if)#
Switch(config-if)#
Switch(config-if)#switchport access vlan 2
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet3/1
Switch(config-if)#
Switch(config-if)#
Switch(config-if)#switchport access vlan 2
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#

```

## Ping from PC - 1 to all other devices:

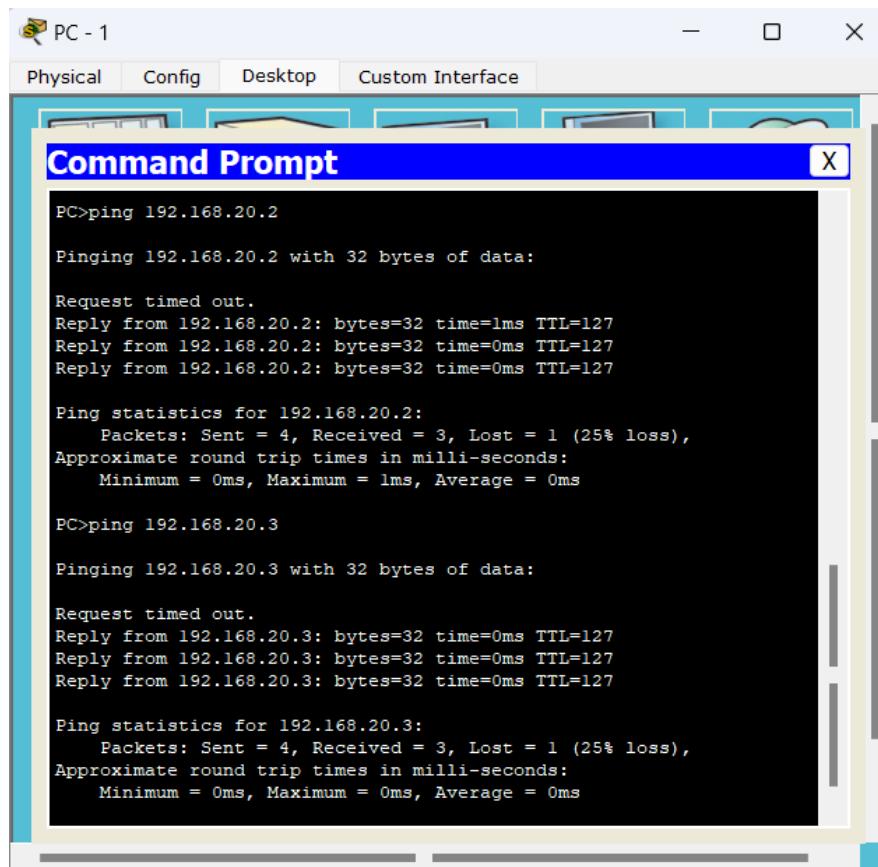


```
PC>ping 192.168.1.3
Pinging 192.168.1.3 with 32 bytes of data:
Reply from 192.168.1.3: bytes=32 time=0ms TTL=128

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

PC>ping 192.168.1.1
Pinging 192.168.1.1 with 32 bytes of data:
Reply from 192.168.1.1: bytes=32 time=0ms TTL=255
Reply from 192.168.1.1: bytes=32 time=1ms TTL=255
Reply from 192.168.1.1: bytes=32 time=0ms TTL=255
Reply from 192.168.1.1: bytes=32 time=0ms TTL=255

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```



```
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=1ms TTL=127
Reply from 192.168.20.2: bytes=32 time=0ms TTL=127
Reply from 192.168.20.2: bytes=32 time=0ms 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>ping 192.168.20.3
Pinging 192.168.20.3 with 32 bytes of data:
Request timed out.
Reply from 192.168.20.3: bytes=32 time=0ms TTL=127
Reply from 192.168.20.3: bytes=32 time=0ms TTL=127
Reply from 192.168.20.3: bytes=32 time=0ms TTL=127

Ping statistics for 192.168.20.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

## Ping from PC - 2 to all other devices:

```
PC>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=0ms TTL=128
Reply from 192.168.1.2: bytes=32 time=7ms TTL=128
Reply from 192.168.1.2: bytes=32 time=0ms TTL=128
Reply from 192.168.1.2: bytes=32 time=0ms TTL=128

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 7ms, Average = 1ms

PC>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time=1ms TTL=255
Reply from 192.168.1.1: bytes=32 time=0ms TTL=255
Reply from 192.168.1.1: bytes=32 time=0ms TTL=255
Reply from 192.168.1.1: bytes=32 time=0ms TTL=255

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

```
PC>ping 192.168.20.2

Pinging 192.168.20.2 with 32 bytes of data:

Reply from 192.168.20.2: bytes=32 time=5ms TTL=127
Reply from 192.168.20.2: bytes=32 time=1ms TTL=127
Reply from 192.168.20.2: bytes=32 time=0ms TTL=127
Reply from 192.168.20.2: bytes=32 time=0ms TTL=127

Ping statistics for 192.168.20.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 5ms, Average = 1ms

PC>ping 192.168.20.3

Pinging 192.168.20.3 with 32 bytes of data:

Reply from 192.168.20.3: bytes=32 time=1ms TTL=127
Reply from 192.168.20.3: bytes=32 time=0ms TTL=127
Reply from 192.168.20.3: bytes=32 time=0ms TTL=127
Reply from 192.168.20.3: bytes=32 time=0ms TTL=127

Ping statistics for 192.168.20.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>
```

## Ping from PC - 3 to all other devices:

PC - 3

Physical Config Desktop Custom Interface

**Command Prompt**

```
Packet Tracer PC Command Line 1.0
PC>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time=1ms TTL=255
Reply from 192.168.1.1: bytes=32 time=0ms TTL=255
Reply from 192.168.1.1: bytes=32 time=0ms TTL=255
Reply from 192.168.1.1: bytes=32 time=0ms TTL=255

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=0ms TTL=127
Reply from 192.168.1.2: bytes=32 time=6ms TTL=127
Reply from 192.168.1.2: bytes=32 time=0ms TTL=127
Reply from 192.168.1.2: bytes=32 time=1ms TTL=127

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 6ms, Average = 1ms
```

PC - 3

Physical Config Desktop Custom Interface

**Command Prompt**

```
PC>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Reply from 192.168.1.3: bytes=32 time=0ms TTL=127

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

PC>ping 192.168.20.3

Pinging 192.168.20.3 with 32 bytes of data:

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

Ping statistics for 192.168.20.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

## Ping from PC - 4 to all other devices:

PC - 4

Physical Config Desktop Custom Interface

**Command Prompt**

```
Packet Tracer PC Command Line 1.0
PC>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time=lms TTL=255
Reply from 192.168.1.1: bytes=32 time=0ms TTL=255
Reply from 192.168.1.1: bytes=32 time=0ms TTL=255
Reply from 192.168.1.1: bytes=32 time=lms TTL=255

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = lms, Average = 0ms

PC>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=lms TTL=127
Reply from 192.168.1.2: bytes=32 time=0ms TTL=127
Reply from 192.168.1.2: bytes=32 time=0ms TTL=127
Reply from 192.168.1.2: bytes=32 time=lms TTL=127

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = lms, Average = 0ms
```

PC - 4

Physical Config Desktop Custom Interface

**Command Prompt**

```
PC>ping 192.168.20.2

Pinging 192.168.20.2 with 32 bytes of data:

Reply from 192.168.20.2: bytes=32 time=lms TTL=128
Reply from 192.168.20.2: bytes=32 time=0ms TTL=128
Reply from 192.168.20.2: bytes=32 time=0ms TTL=128
Reply from 192.168.20.2: bytes=32 time=lms TTL=128

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

PC>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Reply from 192.168.1.3: bytes=32 time=0ms TTL=127
Reply from 192.168.1.3: bytes=32 time=0ms TTL=127
Reply from 192.168.1.3: bytes=32 time=lms TTL=127
Reply from 192.168.1.3: bytes=32 time=lms TTL=127

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

PC>
```

### 2.11.3 Observation Book Pictures:

Date \_\_\_\_\_  
Page \_\_\_\_\_

*(Handwritten notes)*

Aim: To construct a VLAN and make the PCs communicate among a VLAN

Topology:

```

graph TD
    R[Router R] --- Fa0/0[FastEthernet 0/0]
    R --- Fa0/1[FastEthernet 0/1]
    R --- Fa0/2[FastEthernet 0/2]
    R --- Fa0/3[FastEthernet 0/3]
    Fa0/0 --- S[Switch]
    Fa0/1 --- S
    Fa0/2 --- S
    Fa0/3 --- S
    S --- PC0[PC-0]
    S --- PC1[PC-1]
    S --- PC2[PC-2]
    PC0 --- IP0["IP 10.0.0.1"]
    PC1 --- IP1["IP 10.0.0.2"]
    PC2 --- IP2["IP 10.0.0.3"]
    Fa0/0 --- IP3["IP 192.0.0.1"]
  
```

Protocols:

- 1) Create a topology as shown above using 3PC + switch (2960) and one router (1841)
- 2) Configure the IP address of PC as shown in the topology.  
192.168.1.2, 192.168.1.3, 192.168.20.2, 192.168.20.3
- 3) Configure the IP address for each interface.  
~~Router > enable.~~  
Router # config  
Router (Config)# interface Fa0/0  
Router (Config)# IP address 192.168.1.1 255.255.255.0  
Router (Config-if) Router#
- 4) On the switch go to VLAN database & create / add new VLAN database.
- 5) Now, under fast ethernet 0/1 make it trunk in VLAN everything need to be selected.

Now, in router add VLAN database. Enter the no & name entered before. Also in switch for interface 0/3 & 0/4 VLAN should be selected as.

at the CLI in router & give following commands

router # configt

router (config)# interface fasto/1

router (config-if)# encapsulation dot1q 2

router (config-subif)# ip address 192.168.20.1 255.255.255.

router (config-subif)# no shut.

Q) Ping from PC0 to PC3.

Result:

Pinging 192.168.20.2 with 32 bytes of data.

Reply from 192.168.20.2 : bytes=32 , time = 4ms TTL=127

Reply from 192.168.20.2 : bytes=32 , time = 0ms TTL=127

Reply from 192.168.20.2 : bytes=32 , time = 3ms 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 = 4 , lost = 0 (0% loss)

Approximate round trip time in milli-seconds

minimum = 0ms , maximum = 7ms , Avg = 1ms.

Observation

Two networks connected to same switch account of different networks connected to different switches.

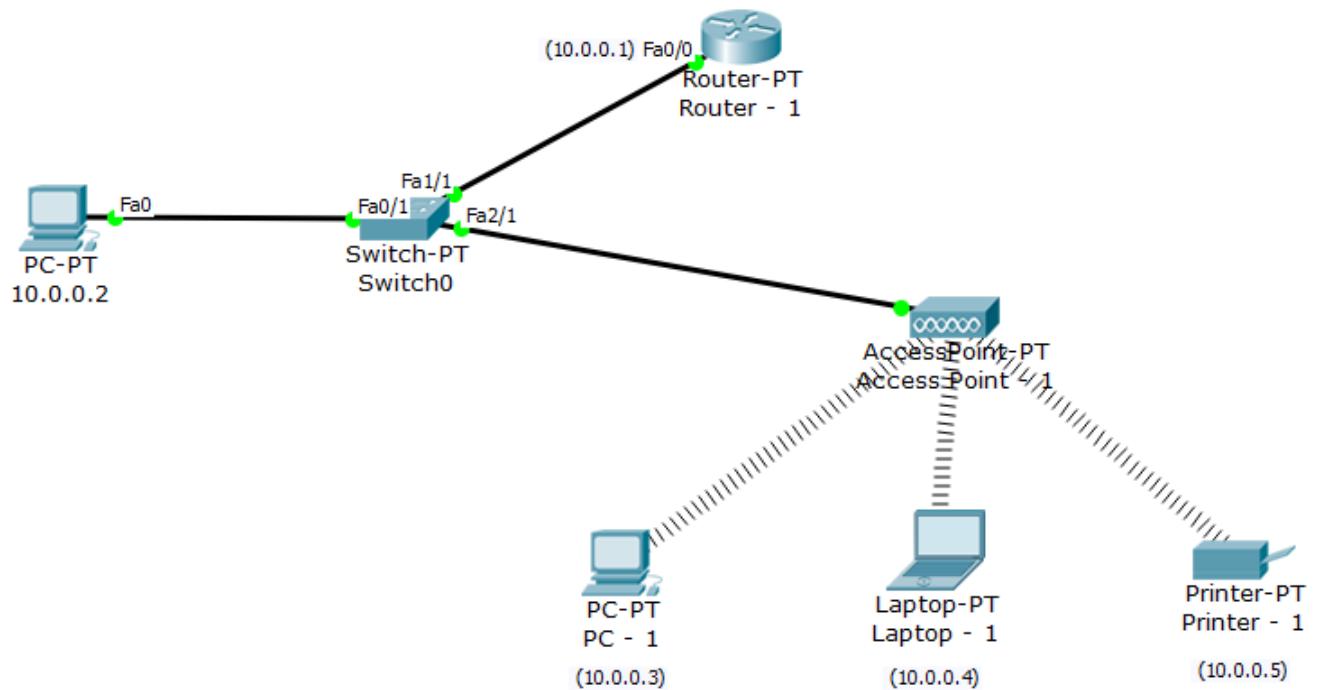
## Experiment - 12:

### 2.11.4 Question:

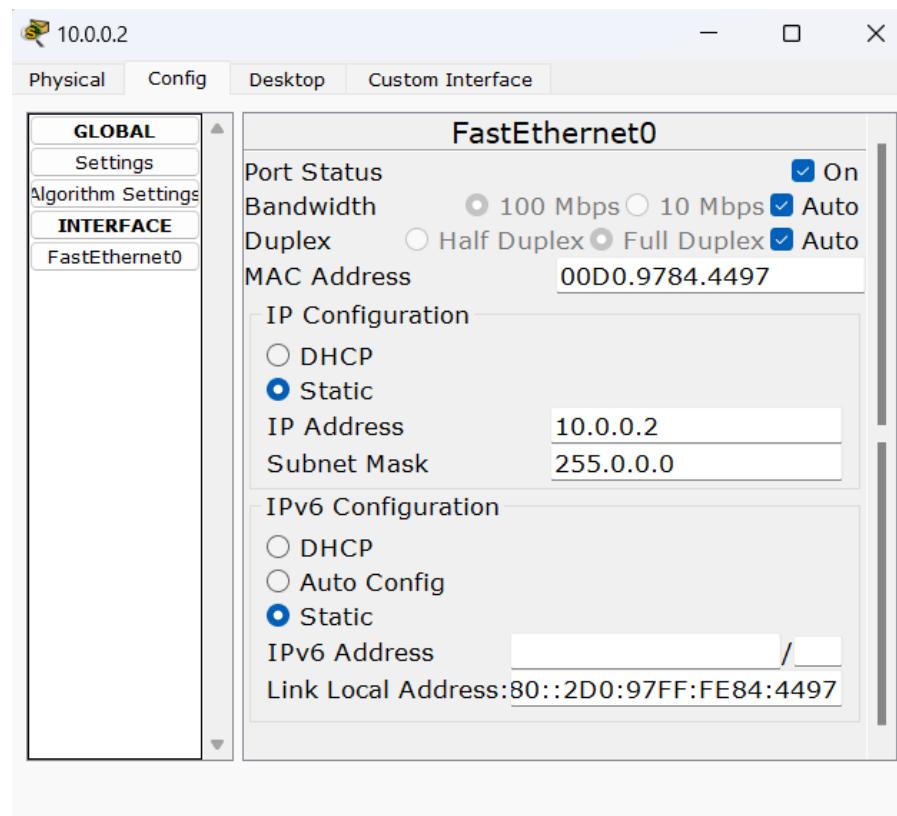
To construct a WLAN and make the nodes communicate wirelessly.

### 2.11.5 Screenshots (Topology, Configurations & Output):

#### Topology:



## PC Configuration:



## Router - 1 Configuration:

The screenshot shows a software window titled 'Router - 1' with tabs for Physical, Config, and CLI. The CLI tab is selected. The title bar says 'IOS Command Line Interface'. The main area displays the following IOS CLI session:

```
Press RETURN to get started!

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

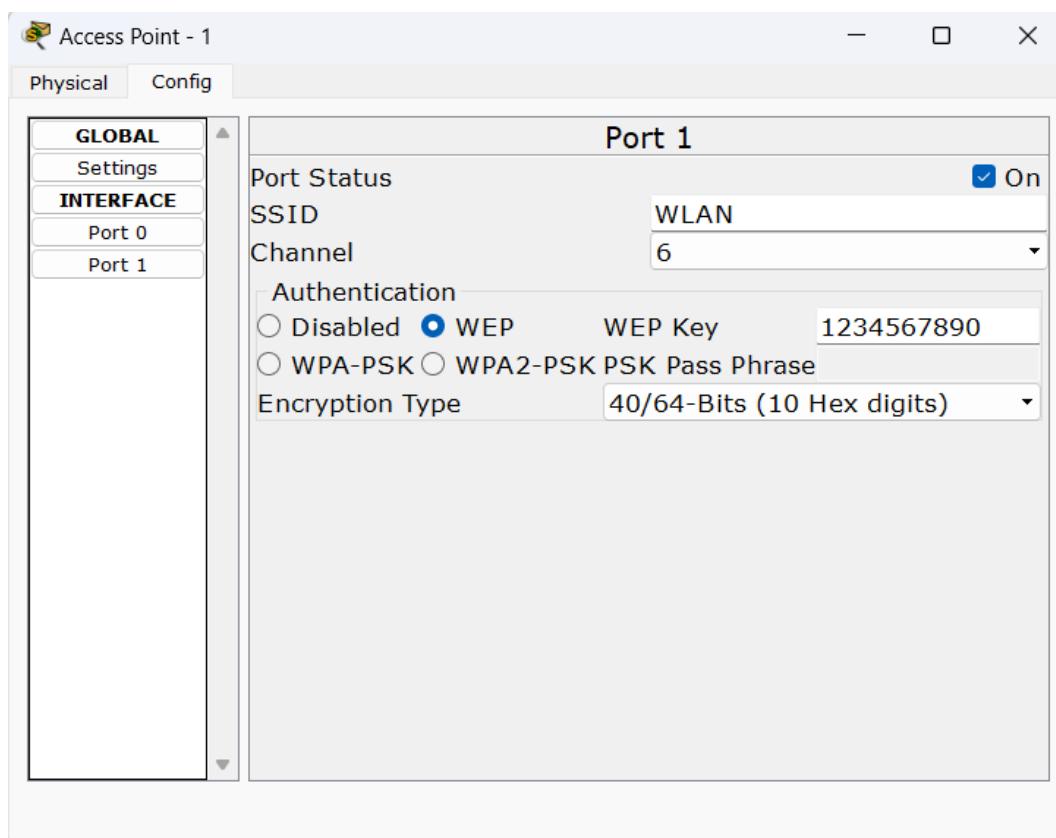
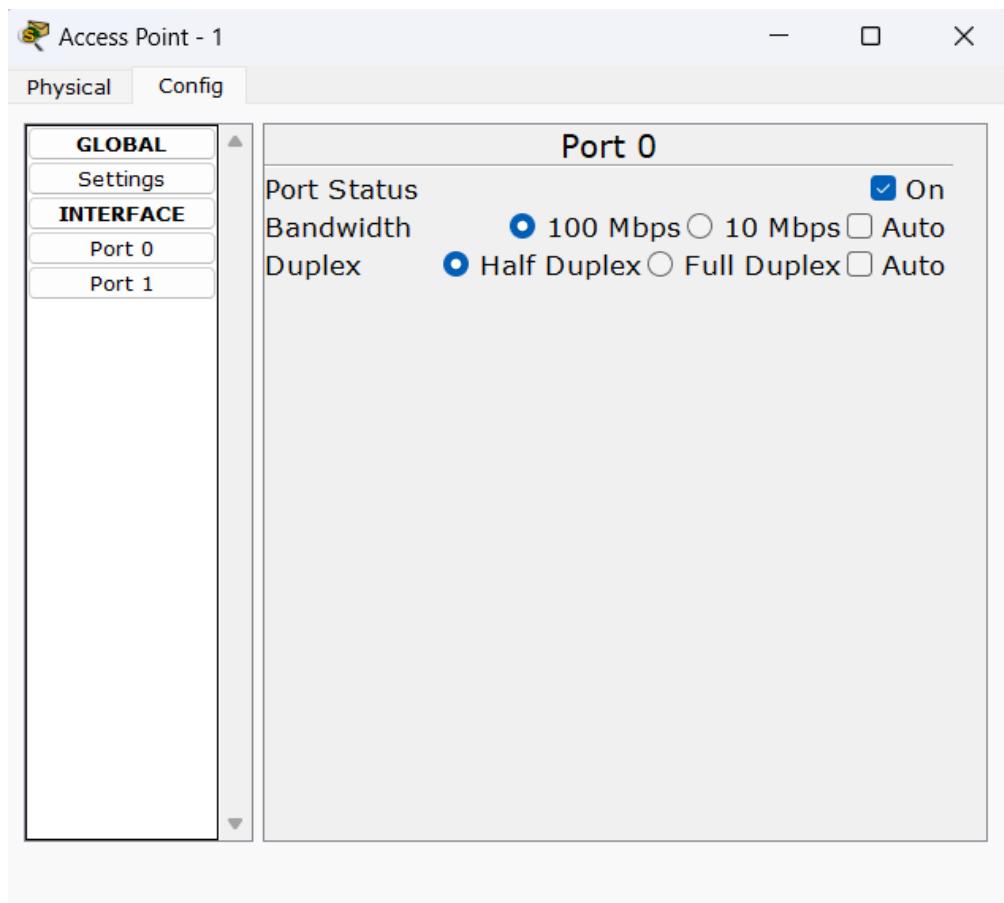
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up

Router(config-if)#exit
Router(config)#

```

At the bottom right are 'Copy' and 'Paste' buttons.

## Access Point - 1 Configuration:



## PC - 1 Configuration:



PC - 1



Physical

Config

Desktop

Custom Interface

## MODULES

- WMP300N
- PT-HOST-NM-1AM
- PT-HOST-NM-1CE
- PT-HOST-NM-1CFE
- PT-HOST-NM-1CGE
- PT-HOST-NM-1FFE
- PT-HOST-NM-1FGE
- PT-HOST-NM-1W
- PT-HOST-NM-1W-A
- PT-HOST-NM-3G/4G
- PT-HEADPHONE
- PT-MICROPHONE
- PT-CAMERA
- PT-USB-HARD-DRIVE

## Physical Device View

Zoom In

Original Size

Zoom Out

[Customize  
Icon in  
Physical View](#)[Customize  
Icon in  
Logical View](#)

The Linksys-WMP300N module provides one 2.4GHz wireless interface suitable for connection to wireless networks. The module supports protocols that use Ethernet for LAN access.



PC - 1

Physical Config Desktop Custom Interface

MODULES

- WMP300N
- PT-HOST-NM-1AM
- PT-HOST-NM-1CE
- PT-HOST-NM-1CFE
- PT-HOST-NM-1CGE
- PT-HOST-NM-1FFE
- PT-HOST-NM-1FGE
- PT-HOST-NM-1W
- PT-HOST-NM-1W-A
- PT-HOST-NM-3G/4G
- PT-HEADPHONE
- PT-MICROPHONE
- PT-CAMERA
- PT-USB-HARD-DRIVE

Physical Device View

Zoom In Original Size Zoom Out

Customize Icon in Physical View

Customize Icon in Logical View

The Linksys-WMP300N module provides one 2.4GHz wireless interface suitable for connection to wireless networks. The module supports protocols that use Ethernet for LAN access.

Physical Config Desktop Custom Interface

MODULES
WMP300N
PT-HOST-NM-1AM
PT-HOST-NM-1CE
PT-HOST-NM-1CFE
PT-HOST-NM-1CGE
PT-HOST-NM-1FFE
PT-HOST-NM-1FGE
PT-HOST-NM-1W
PT-HOST-NM-1W-A
PT-HOST-NM-3G/4G
PT-HEADPHONE
PT-MICROPHONE
PT-CAMERA
PT-USB-HARD-DRIVE

## Physical Device View

Zoom In

Original Size

Zoom Out



Customize  
Icon in  
Physical View



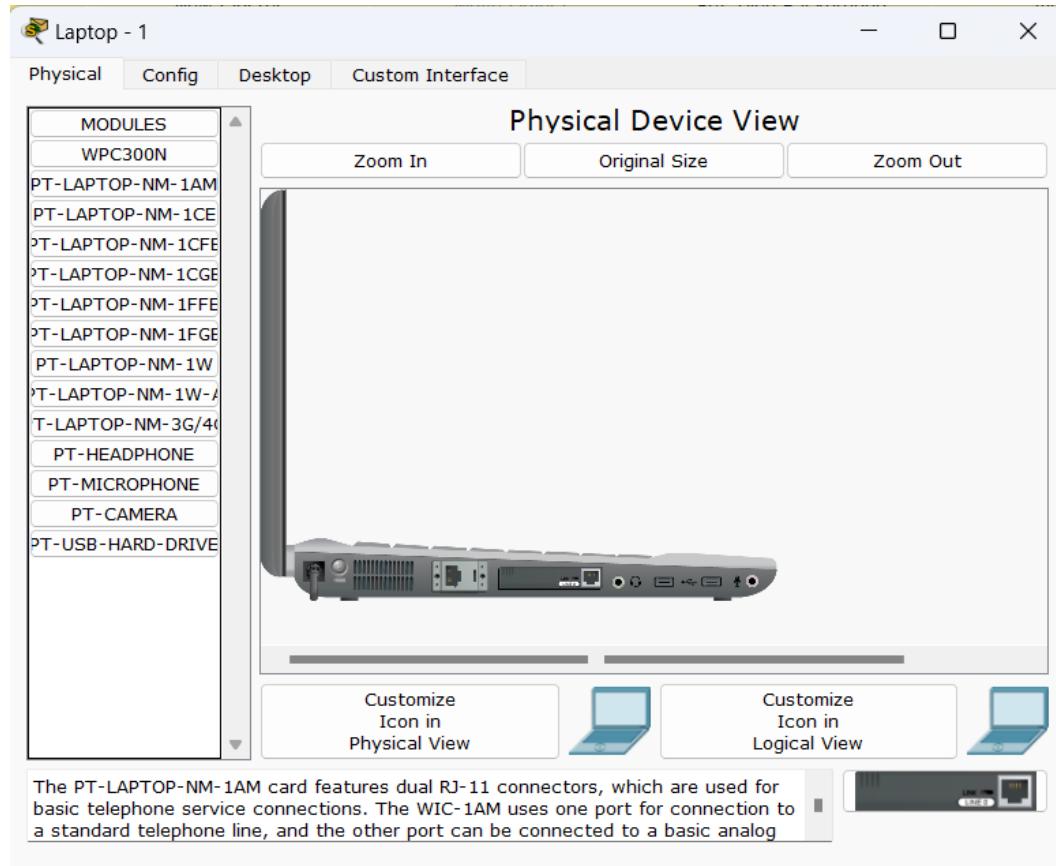
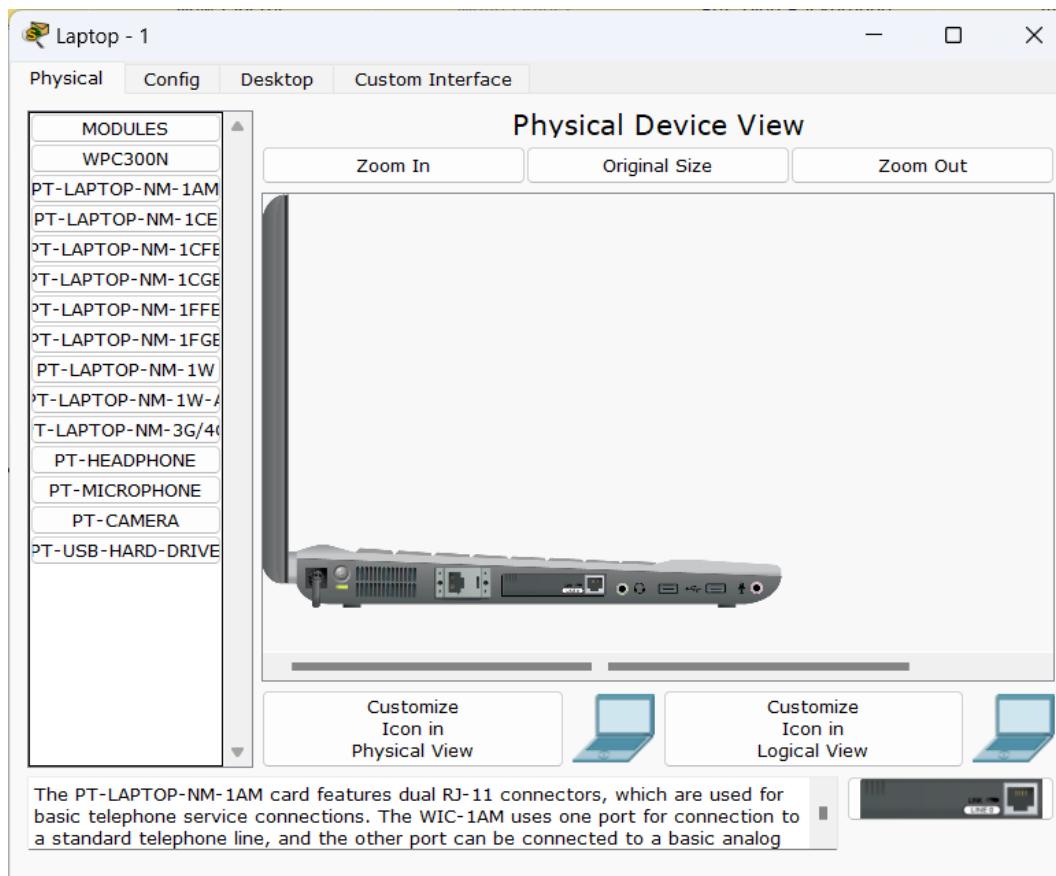
Customize  
Icon in  
Logical View

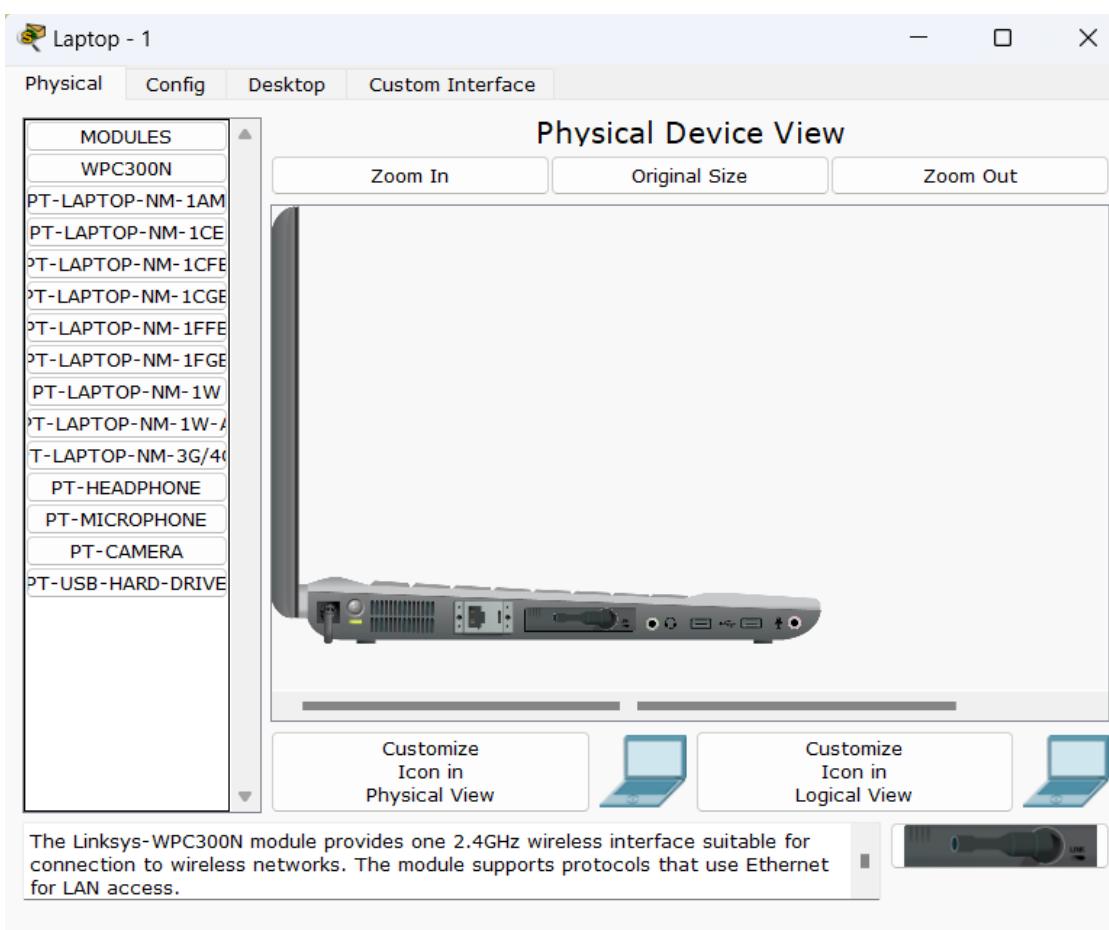
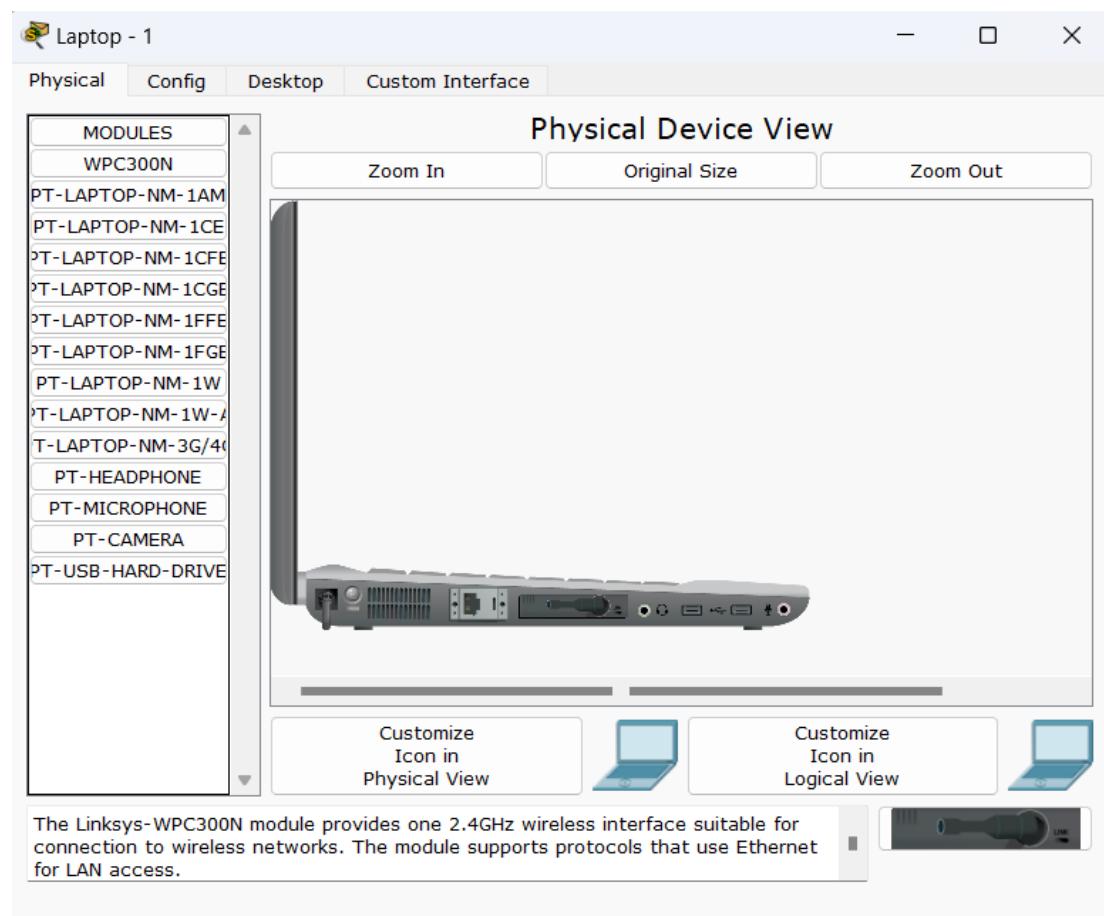


The Linksys-WMP300N module provides one 2.4GHz wireless interface suitable for connection to wireless networks. The module supports protocols that use Ethernet for LAN access.



## Laptop - 1 Configuration:





Laptop - 1

Physical Config Desktop Custom Interface

**GLOBAL**

Settings

Algorithm Settings

**INTERFACE**

Wireless0

**Wireless0**

Port Status On

Bandwidth 11 Mbps

MAC Address 0001.97C7.3DDE

SSID WLAN

Authentication

Disabled  WEP WEP Key 1234567890

WPA-PSK  WPA2-PSK PSK Pass Phrase

WPA  WPA2 User ID

Encryption Type Password 40/64-Bits (10 Hex digits)

IP Configuration

DHCP  Static

IP Address 10.0.0.4

Subnet Mask 255.0.0.0

IPv6 Configuration

DHCP  Auto Config  Static

IPv6 Address /

Link Local Address: FE80::201:97FF:FEC7:3DDE

## Printer - 1 Configuration:

Printer - 1

Physical Config

MODULES

- WMP300N
- PT-HOST-NM-1CE
- PT-HOST-NM-1CFE
- PT-HOST-NM-1CGE
- PT-HOST-NM-1FFE
- PT-HOST-NM-1FGE
- PT-HOST-NM-1W
- PT-HOST-NM-1W-A
- PT-HOST-NM-3G/4G

Physical Device View

Zoom In Original Size Zoom Out

Customize Icon in Physical View

Customize Icon in Logical View

The Linksys-WMP300N module provides one 2.4GHz wireless interface suitable for connection to wireless networks. The module supports protocols that use Ethernet for LAN access.

Printer - 1

Physical Config

MODULES

- WMP300N
- PT-HOST-NM-1CE
- PT-HOST-NM-1CFE
- PT-HOST-NM-1CGE
- PT-HOST-NM-1FFE
- PT-HOST-NM-1FGE
- PT-HOST-NM-1W
- PT-HOST-NM-1W-A
- PT-HOST-NM-3G/4G

Physical Device View

Zoom In Original Size Zoom Out

Customize Icon in Physical View

Customize Icon in Logical View

The Linksys-WMP300N module provides one 2.4GHz wireless interface suitable for connection to wireless networks. The module supports protocols that use Ethernet for LAN access.

Printer - 1

Physical Config

MODULES

- WMP300N
- PT-HOST-NM-1CE
- PT-HOST-NM-1CFE
- PT-HOST-NM-1CGE
- PT-HOST-NM-1FFE
- PT-HOST-NM-1FGE
- PT-HOST-NM-1W
- PT-HOST-NM-1W-A
- PT-HOST-NM-3G/4G

**Physical Device View**

Zoom In Original Size Zoom Out

Customize Icon in Physical View

Customize Icon in Logical View

The Linksys-WMP300N module provides one 2.4GHz wireless interface suitable for connection to wireless networks. The module supports protocols that use Ethernet for LAN access.

Printer - 1

Physical Config

MODULES

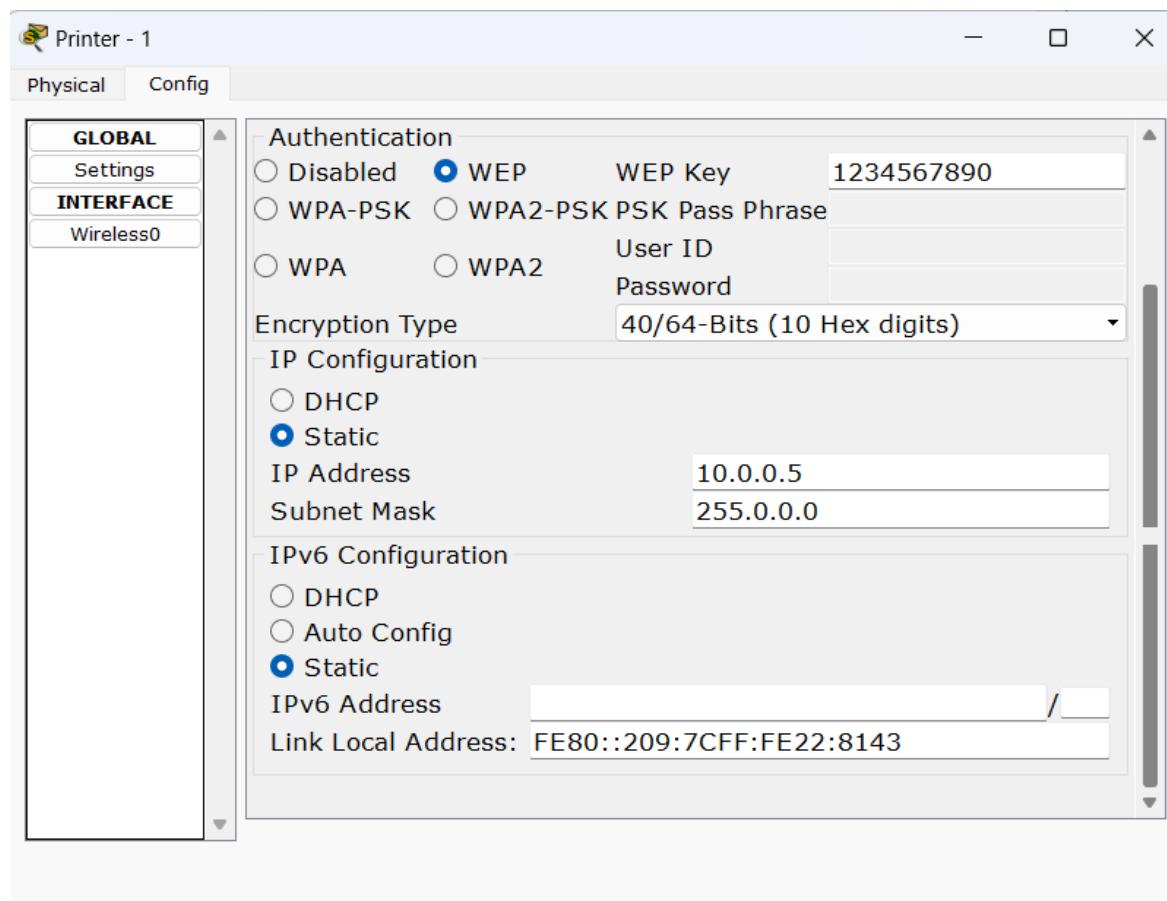
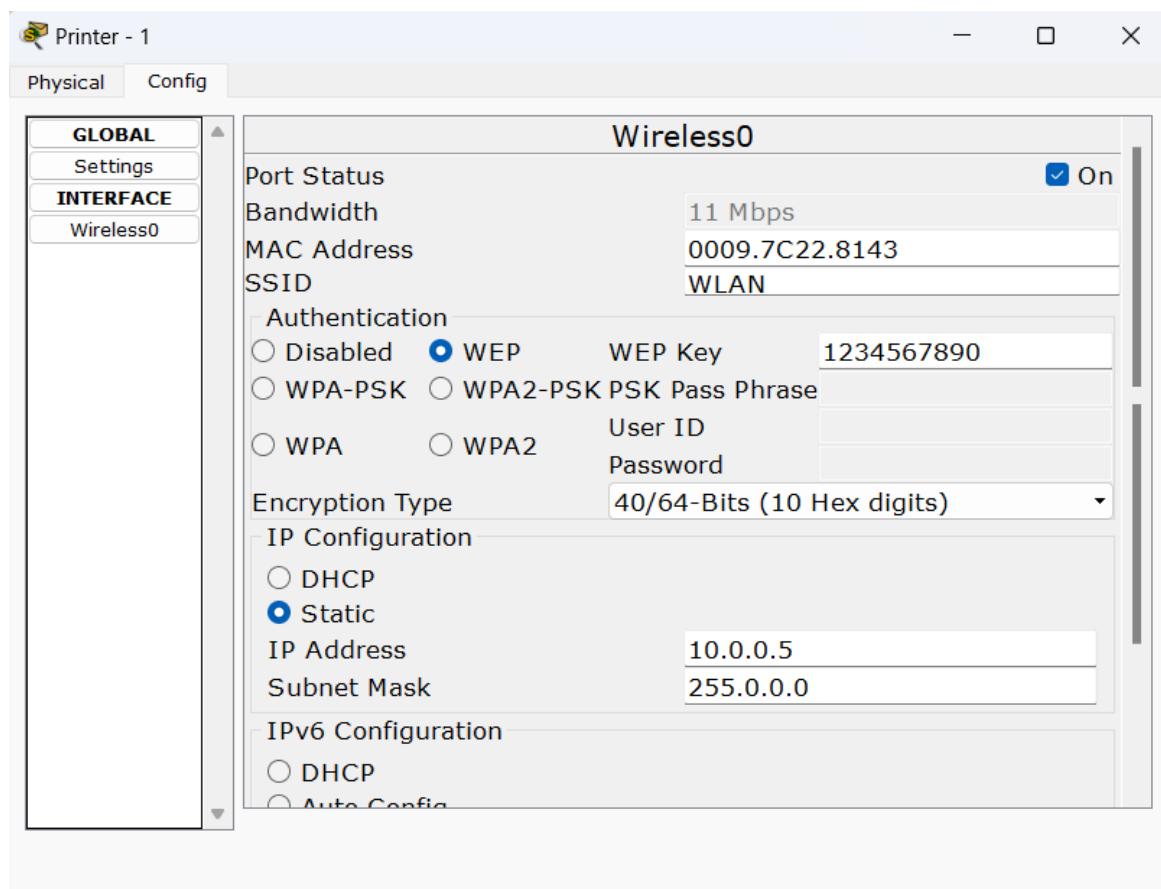
- WMP300N
- PT-HOST-NM-1CE
- PT-HOST-NM-1CFE
- PT-HOST-NM-1CGE
- PT-HOST-NM-1FFE
- PT-HOST-NM-1FGE
- PT-HOST-NM-1W
- PT-HOST-NM-1W-A
- PT-HOST-NM-3G/4G

## Physical Device View

Zoom In      Original Size      Zoom Out

Customize Icon in Physical View      Customize Icon in Logical View

The Linksys-WMP300N module provides one 2.4GHz wireless interface suitable for connection to wireless networks. The module supports protocols that use Ethernet for LAN access.



## Ping From PC to all other devices:

The screenshot shows a Windows Command Prompt window titled "Command Prompt". The window title bar also includes the IP address "10.0.0.2". The menu bar at the top has tabs: Physical, Config, Desktop, and Custom Interface. Below the menu bar are five icons representing different interface types. The main area of the window displays the output of a ping command from a "Packet Tracer PC Command Line 1.0" environment.

```
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=0ms TTL=255
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

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

PC>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time=25ms TTL=128
Reply from 10.0.0.3: bytes=32 time=11ms TTL=128
Reply from 10.0.0.3: bytes=32 time=12ms TTL=128
Reply from 10.0.0.3: bytes=32 time=8ms 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 = 8ms, Maximum = 25ms, Average = 14ms

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=29ms TTL=128
Reply from 10.0.0.4: bytes=32 time=11ms TTL=128
Reply from 10.0.0.4: bytes=32 time=6ms 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 = 6ms, Maximum = 29ms, Average = 14ms
```

## Ping From PC - 1 to all other devices:

The screenshot shows a 'Command Prompt' window from Cisco Packet Tracer. The window title is 'Command Prompt'. The menu bar includes 'Physical', 'Config', 'Desktop', and 'Custom Interface'. The main area displays the following command-line session:

```
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=31ms TTL=255
Reply from 10.0.0.1: bytes=32 time=10ms TTL=255
Reply from 10.0.0.1: bytes=32 time=11ms TTL=255
Reply from 10.0.0.1: bytes=32 time=10ms 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 = 10ms, Maximum = 31ms, Average = 15ms

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=15ms TTL=128
Reply from 10.0.0.2: bytes=32 time=16ms TTL=128
Reply from 10.0.0.2: bytes=32 time=8ms TTL=128
Reply from 10.0.0.2: bytes=32 time=13ms TTL=128

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 8ms, Maximum = 16ms, Average = 13ms

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=29ms TTL=128
Reply from 10.0.0.4: bytes=32 time=18ms TTL=128
Reply from 10.0.0.4: bytes=32 time=14ms TTL=128
Reply from 10.0.0.4: bytes=32 time=15ms 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 = 14ms, Maximum = 29ms, Average = 19ms

PC>
```

## Ping From Laptop - 1 to all other devices:

Laptop - 1

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=24ms TTL=255
Reply from 10.0.0.1: bytes=32 time=17ms TTL=255
Reply from 10.0.0.1: bytes=32 time=14ms TTL=255
Reply from 10.0.0.1: bytes=32 time=10ms 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 = 10ms, Maximum = 24ms, Average = 16ms

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=9ms TTL=128
Reply from 10.0.0.2: bytes=32 time=9ms TTL=128
Reply from 10.0.0.2: bytes=32 time=12ms TTL=128
Reply from 10.0.0.2: bytes=32 time=7ms 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 = 7ms, Maximum = 12ms, Average = 9ms

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=16ms TTL=128
Reply from 10.0.0.3: bytes=32 time=20ms TTL=128
Reply from 10.0.0.3: bytes=32 time=17ms TTL=128
Reply from 10.0.0.3: bytes=32 time=16ms 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 = 16ms, Maximum = 20ms, Average = 17ms

PC>
```

## 2.11.6 Observation Book Pictures:

classmate  
Date \_\_\_\_\_  
Page \_\_\_\_\_

Aim: To configure a WLAN and make the Host. communication wireless.

Topology:

Procedure:

- 1) Create a topology as shown above with switch, router access point and laptop.
- 2) Configure PC0 and router as normally done ~~normally~~.
- 3) Configure the access point 1, go to Port 1 and give any name under SSID.
- 4) Select WEP and give a 10 digit hex key password (0123456789). Configure PC1 and Laptop using wireless standards.
- 5) Switch off the device. Drag the existing P1-Hotkey-NM-ZAM to the component listed in the left hand tab. Drag WHP300N wireless interface to the empty port. Switch on the device.

6) In the Config tab a new wireless interface would have been selected. Now configure SSID, WEP, and WEP Key, IP address and gateway as normally done to a device.

Result:

In PING

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=47ms TTL=128.

Reply from 10.0.0.3: bytes=32 time=32ms TTL=128

Reply from 10.0.0.3: bytes=32 time=35ms TTL=128.

Reply from 10.0.0.3: bytes=32 time=3ms TTL=128

Ping starts at 10.0.0.3

Packets: sent=4, received=4, loss=0 (0%)

Approximate round trip time in 11.5 seconds.

Minimum=3ms, Maximum=17ms, Average=21ms.

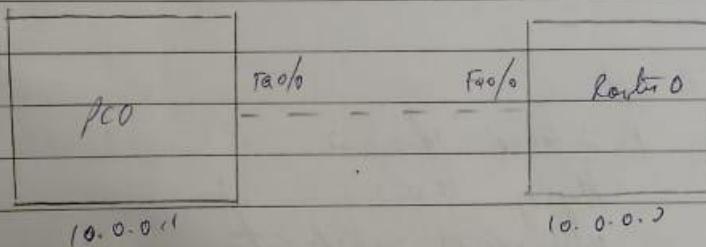
Observation:

By using access point component and setting the SSID, WEP and WEP key we connect the device wirelessly to the same network.

A.m.

To understand the operation of TELNET by  
calling the routes in river from a PC in  
IT offce.

## Topology



### Procedure:

- 1) Create a topology using one PC and one Router or Switch
  - 2) Set the IP address and gateway of 10.0.0.1 and 10.0.0.2 for the PC.
  - 3) In the Router go to CLI.  
Router > enable  
Router # copy t  
~~Router (Config) # hostname R1~~  
~~R1 (Config) # enable secret R1~~  
R1 (Config) # interface fa 0/0  
R1 (Config-if) # ip address 10.0.0.2 255.0.0.0  
R1 (Config-if) # no shutdown  
R1 (Config-if) # line vty 0 5  
R1 (Config-line) # login  
4. Login credentials on line 1<2 and password is R1.  
R1 (Config-line) # password  
R1 (Config-line) # exit  
R1 #

4) In command prompt of PC

PC is ping 10.0.0.2

pinging 10.0.0.2 with 32 bytes of data.

Reply from 10.0.0.2: bytes=32 time=0ms

5) Now run command of Telnet 10.0.0.2

### Result:

PC is telnet 10.0.0.2

trying 10.0.0.2 --- open  
with access verification

password: po

2.1> enable.

password: p1

It shows IP route

node > (- connected)

C 10.0.0.0/1 is directly connected

### Observation:

Thus using TELNET protocol we can view the routes  
from the PC (directly connected).

## 2.12 Experiment - 13:

### 2.12.1 Question:

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

### 2.12.2 Code:

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

```
char data[100], crc[16], gen[17];
int len, i, j;
```

```
void calc_crc() {
    for (i = 0; i < strlen(gen); i++)
        crc[i] = data[i];
    do {
        if (crc[0] == '1') {
            for (j = 1; j < strlen(gen); j++)
                crc[j] = ((crc[j] == gen[j]) ? '0' : '1');
        }
        for (j = 0; j < strlen(gen) - 1; j++)
            crc[j] = crc[j + 1];
        crc[j] = data[i++];
    } while (i <= len + strlen(gen) - 1);
}
```

```
int main() {
    printf("Enter Bit string: ");
    scanf("%s", data);
    len = strlen(data);

    printf("Enter generating polynomial (16 bits): ");
    scanf("%s", gen);
    if (strlen(gen) != 16) {
        printf("Generator polynomial must be 16 bits.\n");
        return 1;
    }
}
```

```
printf("Generating Polynomial: %s\n", gen);
```

```
for (i = len; i < len + strlen(gen) - 1; i++)
    data[i] = '0';
```

```
printf("Modified Data is: %s\n", data);
calc_crc();
printf("Checksum is: %s\n", crc);
```

```

for (i = len; i < len + strlen(gen) - 1; i++)
    data[i] = crc[i - len];

printf("Final Codeword is: %s\n", data);
printf("Test Error detection\n1(Yes) / 0(No)? : ");
scanf("%d", &i);

if (i == 1) {
    printf("Enter position to insert an error: ");
    scanf("%d", &i);
    data[i] = (data[i] == '0') ? '1' : '0';
    printf("Erroneous data: %s\n", data);
}

calc_crc();

for (i = 0; (i < strlen(gen) - 1) && (crc[i] != '1'); i++);

if (i < strlen(gen) - 1)
    printf("Error detected.\n");
else
    printf("No Error Detected.\n");

return 0;
}

```

### 2.12.3 Output:

```

C:\Users\Acer\Desktop\Notes (4th Semester)\Labs\Computer Networks (CN)\Cycle 2\Experiment - 1>gcc CRC.c
C:\Users\Acer\Desktop\Notes (4th Semester)\Labs\Computer Networks (CN)\Cycle 2\Experiment - 1>a
Enter Bit string: 110110101
Enter generating polynomial (16 bits): 1101100000000001
Generating Polynomial: 1101100000000001
Modified Data is: 110110101000000000000000
Checksum is: 101000100000110
Final Codeword is: 110110101101000100000110
Test Error detection
1(Yes) / 0(No)? : 0
No Error Detected.

C:\Users\Acer\Desktop\Notes (4th Semester)\Labs\Computer Networks (CN)\Cycle 2\Experiment - 1>a
Enter Bit string: 110110101
Enter generating polynomial (16 bits): 1101100000000001
Generating Polynomial: 1101100000000001
Modified Data is: 110110101000000000000000
Checksum is: 101000100000110
Final Codeword is: 110110101101000100000110
Test Error detection
1(Yes) / 0(No)? : 1
Enter position to insert an error: 7
Erroneous data: 110110111101000100000110
Error detected.

```

## 2.12.4 Observation Book Pictures:

(cycle - 0.0)

Write a program for error detection code using CRC-8

#include <stdio.h>

char n[10], g[10], A[10], q[10], temp[10],

void arr[10];

int i, j;

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

for (i = 0; i < 16; i++)  
 arr[i] = m[i];

for (i = 0; i < n - 1; i++)  
 if (g[i] == '1')  
 arr[i] = '1';  
 arr[i] =

else

g[i] = '0';  
 shift();

}

g[10] = m[17 + i];

g[10] = '10';

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

q[n - 11] = '0';

void arr[10];

int i, j;

for (i = 0; i < 10; i++)  
 arr[i] =

$$arr[i] = [(arr[i] - 48) * (10^8) + arr[i - 1]] + k;$$

void shift()

int i;

for (i = 1; i < 16; i++)

$m[i-1] = g[i]$

}

void b (int n)

int i, k = 0;

for (i = n - 16; i < n; i++)

$m[i] = \lceil (int) m[i] - 68 \rceil + [e_{i+1} / n (r+i) - 48] + 48$

$m[i] = '10'$

}

void known()

int n, i = 0;

char ch, flag = 0;

printf ("\\nEnter the string : ")

while ((ch = getc (fdin)) != 'n')

$m[n+i] = ch$ ,

$n = i$ ;

for (i = 0; i < 16; i++)

$m[n+i] = '0'$ ;

$m[n] = '10'$ ;

~~printf ("\\nNo change of file appending 16 char ! %w\n");~~

for (i = 0; i < 16; i++)

$g[i] = '0'$ ;

$g[0] = g[n] = g[1] = g[10] = '1'$ ,

$g[11] = '0'$ ,

printf ("\\n Generated : %s\\n", g);

ORC (n);

printf ("\\n Answer : %s\\n", b);

b(n);

printf ("In Divisional Frame: %s", m);

printf ("In Entry - Remainder Frame: %s", r);

scanf ("%s", m);

printf ("RC checksum (%u),",

RC(n),

printf ("In Last remainder , %u, R),

for (i = 0; i < 16; i++)

if (AC[i] == 0)

flag = 1;

else

continue;

if (flag == 1),

printf ("In Error"),

else

printf ("From the correct");

output:

Enter from b'1's : 1011

Message of bits after division 16 3/4.

101 0000 0000 0000 0000

generation : 10001000000100001

quotient : 1011

remainder : 1011 1011 0001 0110 1011

19/27 Enter - Remainder frame.

1011 1011 0001 0110 1011

for remainder 0000 0000 0000 0000

So user frame is correct.

## **Experiment - 14:**

### **2.12.5 Question:**

Write a program for congestion control using Leaky bucket algorithm.

### **2.12.6 Code:**

```
#include <stdio.h>
#include <stdlib.h>
struct packet
{
    int time;
    int size;
} p[50];

int main()
{
    int i, n, m, k = 0;
    int bsize, bfilled, outrate;
    printf("Enter the number of packets:");
    scanf("%d", &n);
    printf("Enter packets in the order of their arrival time\n");
    for (i = 0; i < n; i++)
    {
        printf("Enter the time and size:");
        scanf("%d%d", &p[i].time, &p[i].size);
    }
    printf("Enter the bucket size:");
    scanf("%d", &bsize);
    printf("Enter the output rate:");
    scanf("%d", &outrate);

    m = p[n - 1].time;
    i = 1;
    k = 0;
    bfilled = 0;
    while (i <= m || bfilled != 0)
    {
        printf("\n\nAt time %d", i);

        if (p[k].time == i)
        {
            if (bsize >= bfilled + p[k].size)
            {
                bfilled = bfilled + p[k].size;
                printf("\n%d byte packet is inserted", p[k].size);
                k = k + 1;
            }
        }
    }
}
```

```

    }
else
{
    printf("\n%d byte packet is discarded", p[k].size);
    k = k + 1;
}

if (bfilled == 0)
{
    printf("\nNo packets to transmit");
}
else if (bfilled >= outrate)
{
    bfilled = bfilled - outrate;
    printf("\n%dbytes transferred", outrate);
}

else
{
    printf("\n%dbytes transferred", bfilled);
    bfilled = 0;
}
printf("\npackets in the bucket %d byte", bfilled);
i++;
}
return 0;
}

```

## 2.12.7 Output:

```
C:\Users\Acer\Desktop\Notes (4th Semester)\Labs\Computer Networks (CN)\Cycle 2\Experiment - 2>
gcc Leaky_Bucket.c

C:\Users\Acer\Desktop\Notes (4th Semester)\Labs\Computer Networks (CN)\Cycle 2\Experiment - 2>
a
Enter the number of packets:2
Enter packets in the order of their arrival time
Enter the time and size:1 5
Enter the time and size:3 8
Enter the bucket size:10
Enter the output rate:6

At time 1
5byte packet is inserted
5bytes transferred
Packets in the bucket 0 byte

At time 2
No packets to transmitte
Packets in the bucket 0 byte

At time 3
8byte packet is inserted
6bytes transferred
Packets in the bucket 2 byte

At time 4
2bytes transferred
Packets in the bucket 0 byte
```

## 2.12.8 ObservatiOn Book Pictures:

classmate  
Date \_\_\_\_\_  
Page \_\_\_\_\_

WAP for congestion control using token bucket algorithm.

# include < stdw.h >

```

void main()
{
    int inCommy, outgoing, bucketSize, n, slotSize;
    printf("Enter bucket size, outgoing rate and no. of IP's");
    scanf("%d %d %d", &bucketSize, &outgoing, &n);
    while (n != 0)
    {
        printf("Enter incoming packet size (%d)", inCommy);
        if (inCommy <= (bucketSize - n))
        {
            printf("Bucket buffer size %d out of %d (%d), slot",
                  bucketSize - n);
            slotSize = bucketSize - n;
        }
        else
        {
            printf("Dropped %d no. of packets (%d)\n", inCommy - (bucketSize - n));
            printf("Bucket buffer size %d out of %d (%d), slot",
                  bucketSize - n);
            slotSize = bucketSize - n;
        }
        inCommy = 0;
    }
}

```

SlotSize = slotSize - outgoing;

printf("After outgoing %d packets left out %d in buffer (%d, slotSize, bucketSize);  
n = ");

}

Output:

Enter bucket size, outgoing state and no. of TPs  
20, 10, 2.

Enter the incoming packet size 30

Incoming packet size 30

Drops 10 number of packet

Bucket buffer size 0 out of 20

Aft outgoing 10 packet left and 20 in buffer.

Enter the incoming packet size = 10

Incoming packet size = 10

Bucket buffer size 10 out of 20

Aft outgoing 10 packet left and 20 in buffer.

## **2.13 Experiment - 15:**

### **2.13.1 Question:**

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.

### **2.13.2 Code:**

#### **ClientTCP.py**

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

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

#### **ServerTCP.py**

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

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

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

### 2.13.3 Output:

```
C:\Users\Acer\Desktop\Notes (4th Semester)\Labs\Computer Networks (CN)\Cycle 2\Experiment - 3>python ServerTCP.py
The server is ready to receive
```

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

```
C:\Users\Acer\Desktop\Notes (4th Semester)\Labs\Computer Networks (CN)\Cycle 2\Experiment - 3>python ClientTCP.py
```

```
Enter file name: ServerTCP.py
```

```
From Server:
```

```
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()
```

## 2.13.4 Observation Book Pictures:

### Program 3

Using TCP / IP socket, 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 file exists.

client.py

```
from socket import *
```

```
ServName = '127.0.0.1'
```

```
ServPort = 12000
```

```
ClientSocket = socket(AF_INET, SOCK_STREAM)
```

```
ClientSocket.connect((ServName, ServPort))
```

```
sentent = input("Enter file name")
```

```
ClientSocket.send(sentent.encode())
```

```
fileContent = ClientSocket.recv(1024).decode()
```

```
print("In Server Block: ")
```

```
print(fileContent)
```

```
ClientSocket.close()
```

### Serv TCP pg

from socket import \*

```
ServName = "127.0.0.1"
```

```
ServPort = 12000
```

```
ServerSocket = socket(AF_INET, SOCK_STREAM)
```

```
ServerSocket.bind((ServName, ServPort))
```

```
ServerSocket.listen()
```

```
ClientSocket, Address = ServerSocket.accept()
```

while 1:

```
print("The server is ready to receive")
```

```
ConnectionSocket, address = ClientSocket.accept()
```

```
sentent = ConnectionSocket.recv(1024)
```

```
.decode()
```

```
file = open(sentent, "r")
```

```
l = file.read(10)
```

conn = socket. socket(1, encode(1))  
client ("In send content of " + sentence)  
file. close()  
connection. socket. close()

out put

ServerTCP.py

Enter file name: SERVERTCP.py

The server is ready to receive.

Sent content of ServerTCP.py

The server is ready to receive

Client. Py

Enter file name: ServerTCP.py.

From Server:

from socket import \*

server name = "127.0.0.1"

## **Experiment - 16:**

### **2.13.5 Question:**

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.

### **2.13.6 Code:**

#### **ClientUDP.py**

```
from socket import *
serverName = "127.0.0.1"
serverPort = 12000
clientSocket = socket(AF_INET, SOCK_DGRAM)

sentence = input("\nEnter file name: ")

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

filecontents,serverAddress = clientSocket.recvfrom(2048)
print ('\nReply from Server:\n')
print (filecontents.decode("utf-8"))
# for i in filecontents:
#     print(str(i), end = '')
clientSocket.close()
clientSocket.close()
```

#### **ServerUDP.py**

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

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

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

## 2.13.7 Output:

```
C:\Users\Acer\Desktop\Notes (4th Semester)\Labs\Computer Networks (CN)\Cycle 2\Experiment - 4>python ServerUDP.py
The server is ready to receive

Sent contents of  ServerUDP.py

C:\Users\Acer\Desktop\Notes (4th Semester)\Labs\Computer Networks (CN)\Cycle 2\Experiment - 4>python 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))
print ("The server is ready to receive")
while 1:
    sentence, clientAddress = serverSocket.recvfrom(2048)
    sentence = sentence.decode("utf-8")
    file=open(sentence,"r")
    con=file.read(2048)

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

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

## **2.13.8 Observation Book Pictures:**

## Programs

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

### client UDP.py

```
from socket import *
```

```
serverName = "127.0.0.1"
```

```
serverPort = 12000
```

```
clientSocket = socket(INET, AF_INET, SOCK_DGRAM)
```

```
*
```

```
sentence = input("Enter file name: ")
```

```
clientSocket.sendto(sentence.encode("utf-8"), (serverName, serverPort))
```

```
fileContent, serverAddress = clientSocket.recvfrom(2048)
```

```
print("Reply from server: ")
```

```
print(fileContent.decode("utf-8"))
```

```
clientSocket.close()
```

```
clientSocket.close()
```

### Server UDP.py

```
from socket import *
```

```
serverPort = 12000
```

```
serverName = "127.0.0.1"
```

```
serverSocket = socket(AF_INET, SOCK_DGRAM)
```

```
serverSocket.bind((serverName, serverPort))
```

```
print("Server is ready to receive")
```

```
while 1:
```

```
sentence, clientAddress = serverSocket.recvfrom(2048)
```

```
sentinel = sentinel.decode("utf-8")
```

file.open('sent.txt', 'r')

con = file.read(2048)

server socket. sendto ( bytes (con, "100-1"), client address )

print ("New Content of : ", end, "

print (content)

file.close()

Output:

Server VPP.py

The server is ready to receive

Content of server.VPP.py

The server is ready to receive

Client VPP.py

Enter - file name = server.VPP.py

Replies from server :

from socket import \*

server port = 1000

server Name = "127.0.0.1"