

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

“JnanaSangama”, Belgaum -590014, Karnataka.



LAB REPORT

on

Computer Network 22CS4PCCON

Submitted by

RYAN THAPA(1BM21CS174)

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 to September-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 Network**" carried out by **RYAN THAPA(1BM21CS174)**, who is bonafide student of **B.M.S. College of Engineering**. It is in partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum during the academic semester June-2023 to September-2023. The Lab report has been approved as it satisfies the academic requirements in respect of a **Computer Network(22CS4PCCON)** work prescribed for the said degree.

Name of the Lab-In charge

Lohit J J
Assistant Professor
Department of CSE
BMSCE, Bengaluru

Dr. Jyothi S Nayak
Professor and Head
Department of CSE
BMSCE, Bengaluru

INDEX SHEET

Lab Program No.	Program Details	Page No.
1	Create a topology and simulate sending a simple PDU from source to destination using hub and switch as connecting devices and demonstrate ping message. a.	6
2	Configure IP address to routers in packet tracer. Explore the following messages: ping responses, destination unreachable, request timed out, reply.	14
3	Configure default route, static route to the Router	18
4	Configure DHCP within a LAN and outside LAN.	27
5	Configure RIP routing Protocol in Routers.	46
6	Configure OSPF routing protocol.	54
7	Demonstrate the TTL/ Life of a Packet.	64
8	Configure Web Server, DNS within a LAN.	78
9	To construct simple LAN and understand the concept and operation of Address Resolution Protocol (ARP)	83
10	To understand the operation of TELNET by accessing the router in server room from a PC in IT office.	86
11	To construct a VLAN and make the PC's communicate among a VLAN	91

12	To construct a WLAN and make the nodes communicate wirelessly	103
13	Write a program for error detecting code using CRC CCITT (16-bits).	117
14	Write a program for congestion control using Leaky bucket algorithm.	121
15	Using TCP/IP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.	125
16	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.	128

Course Outcome

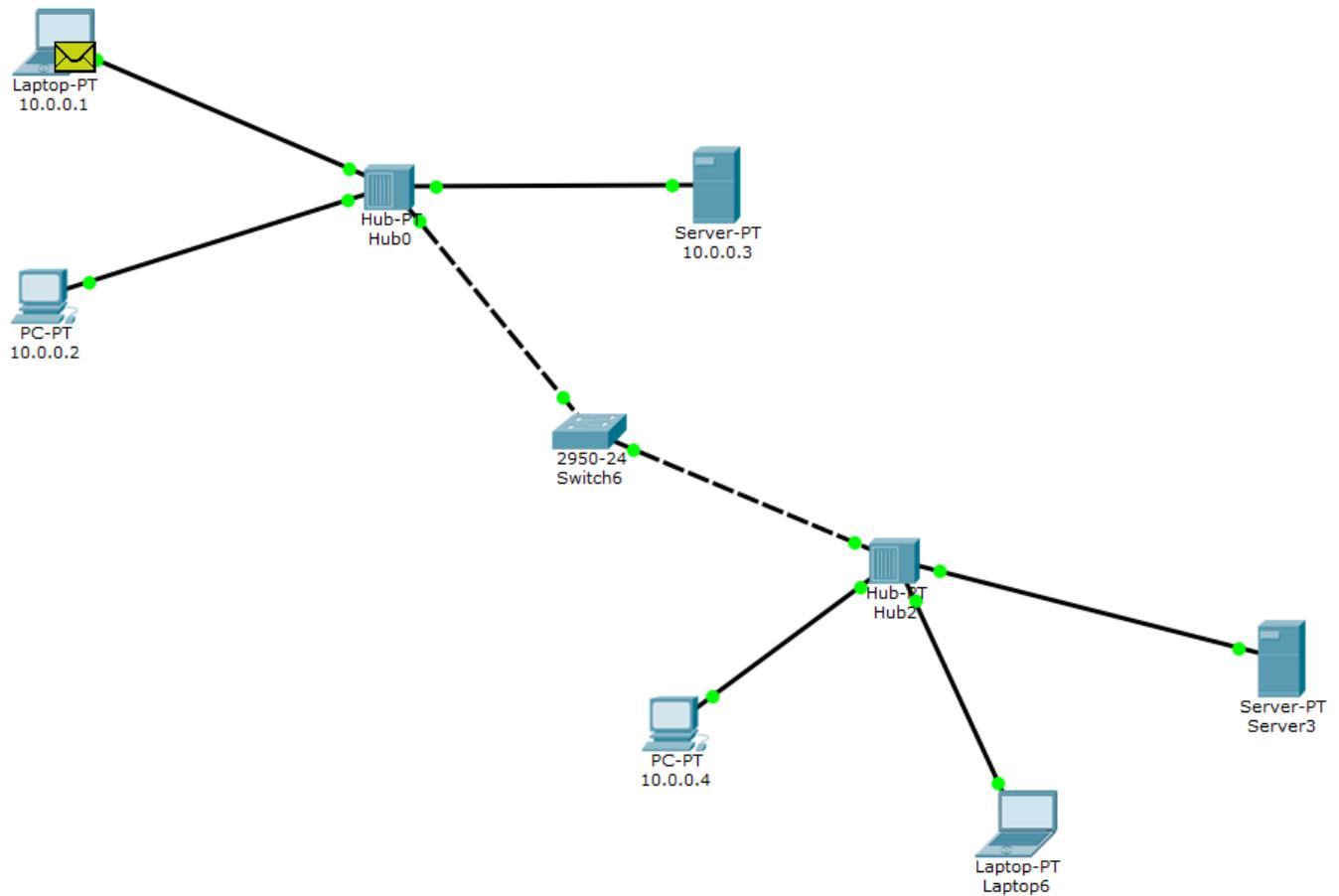
CO1	Analyze time complexity of Recursive and Non-recursive algorithms using asymptotic notations.
CO2	Apply various design techniques for the given problem.
CO3	Apply the knowledge of complexity classes P, NP, and NP-Complete and prove certain problems are NP-Complete
CO4	Design efficient algorithms and conduct practical experiments to solve problems.

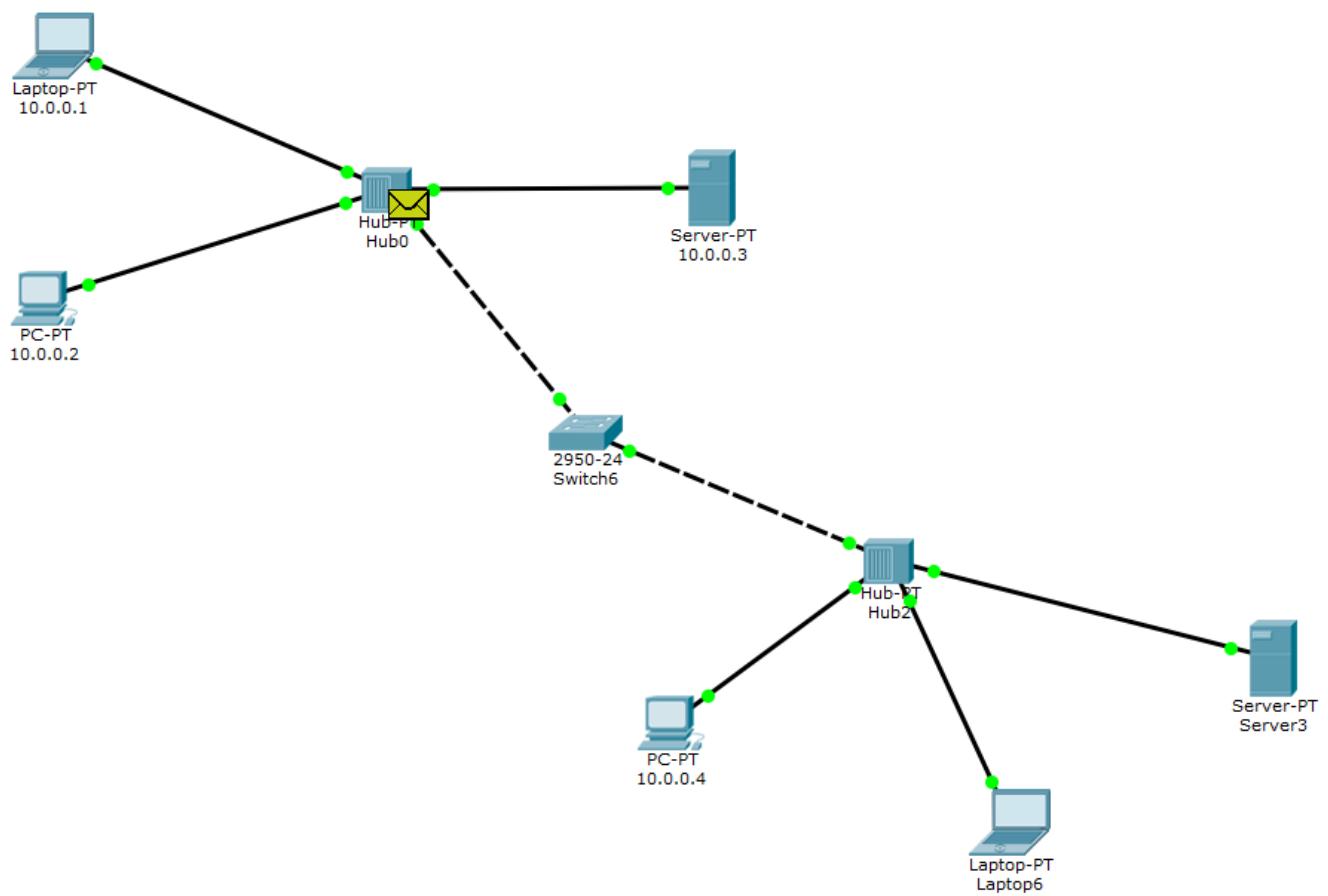
Lab 1

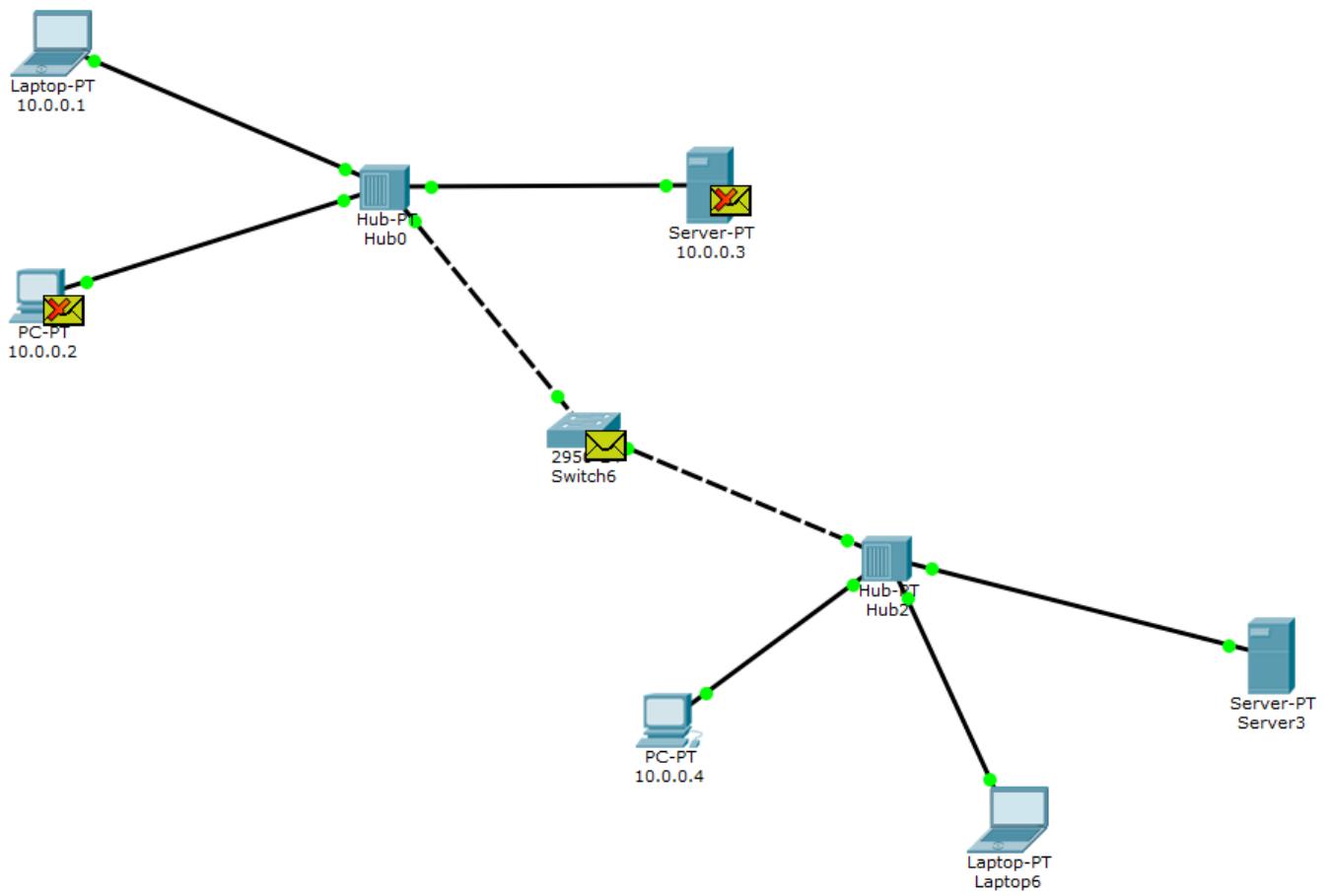
Create a topology and simulate sending a simple PDU from source to destination using hub and switch as connecting devices and demonstrate ping message.

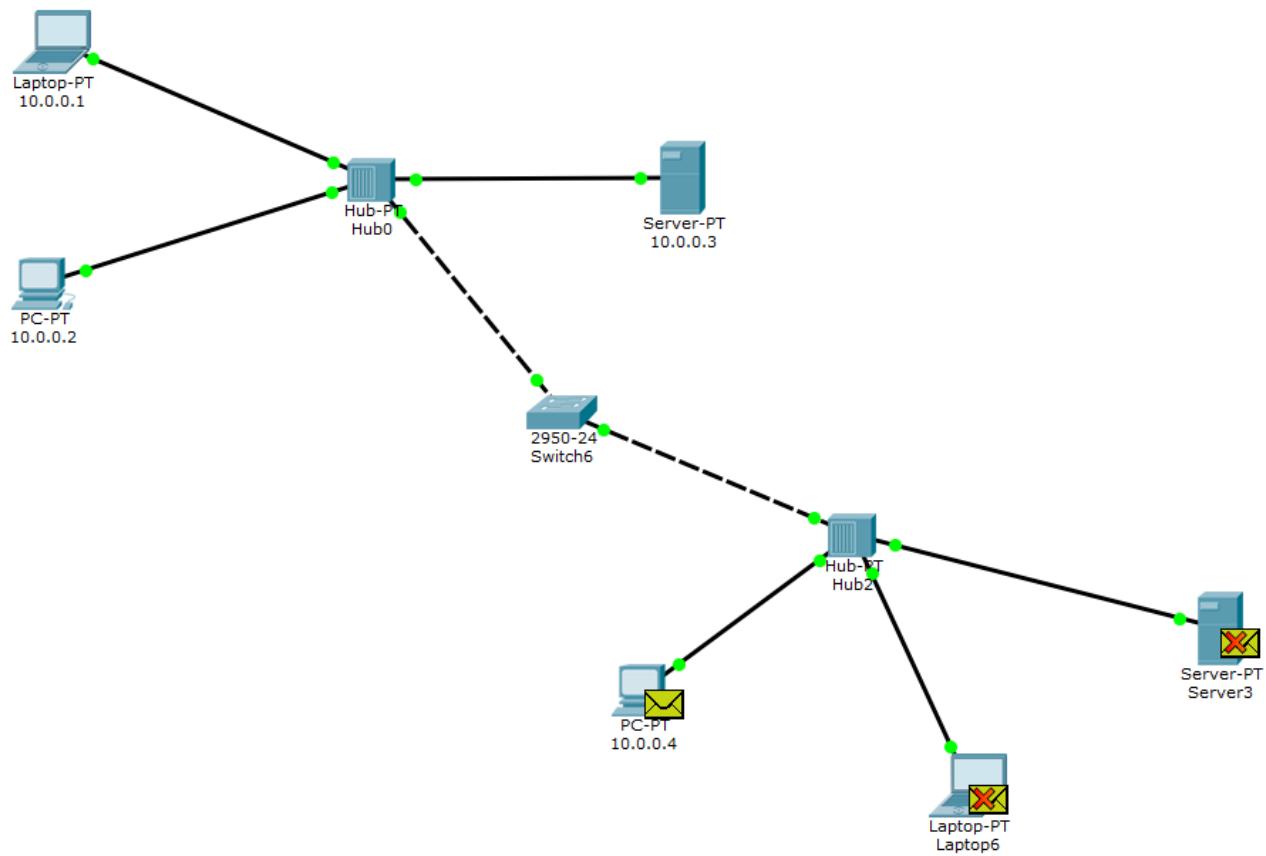
Output:

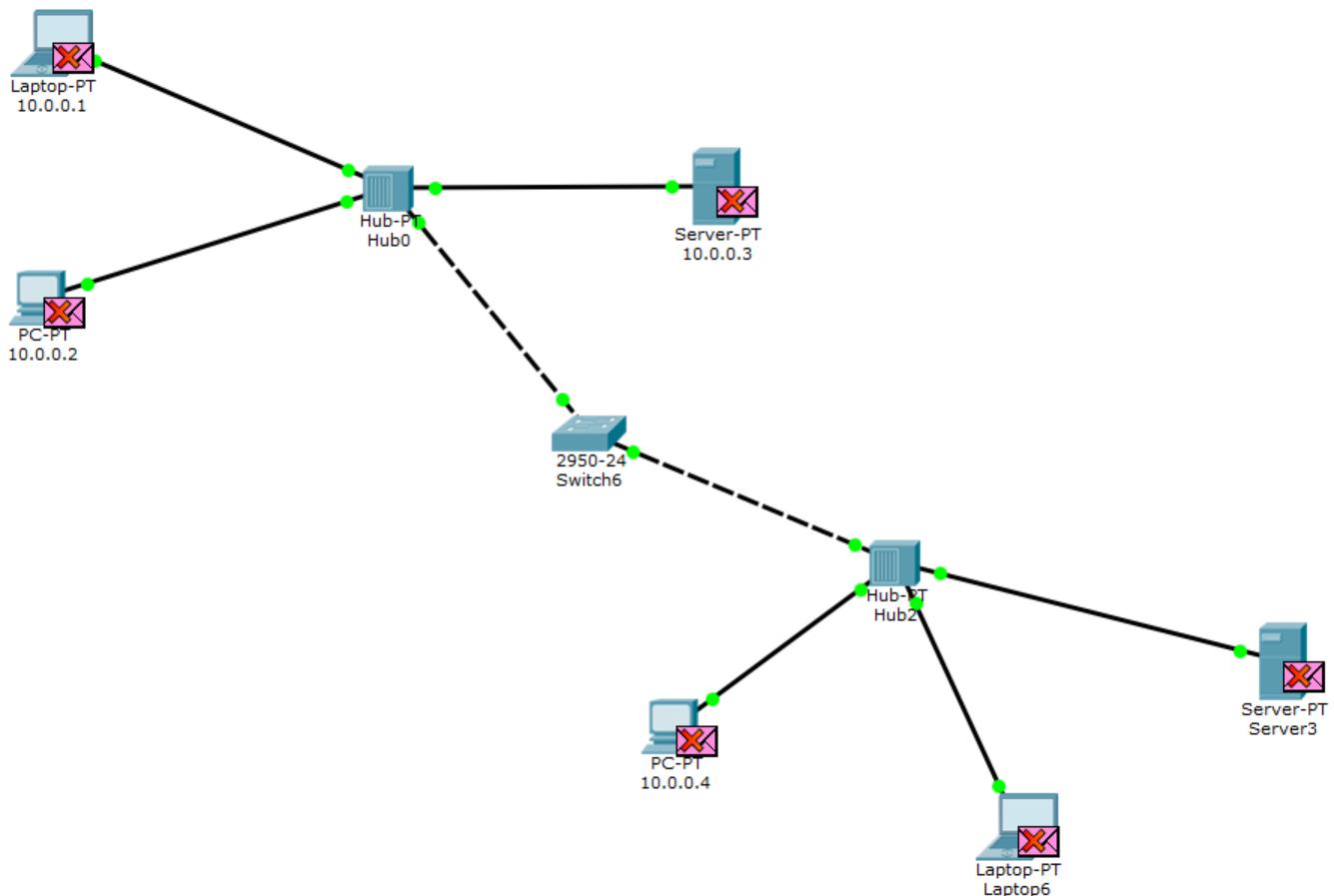
HUB-SWITCH HYBRID CONNECTION



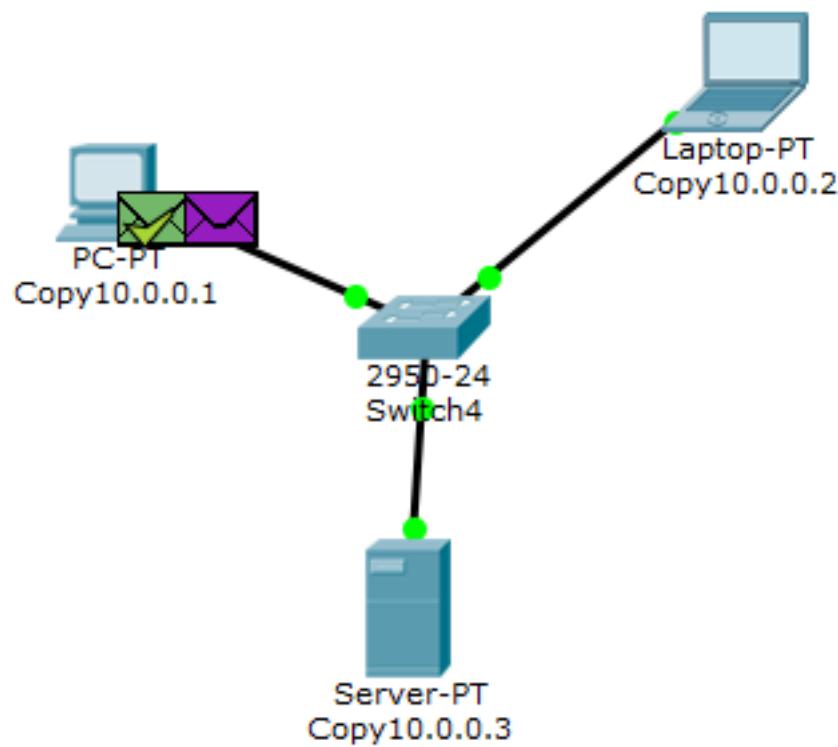
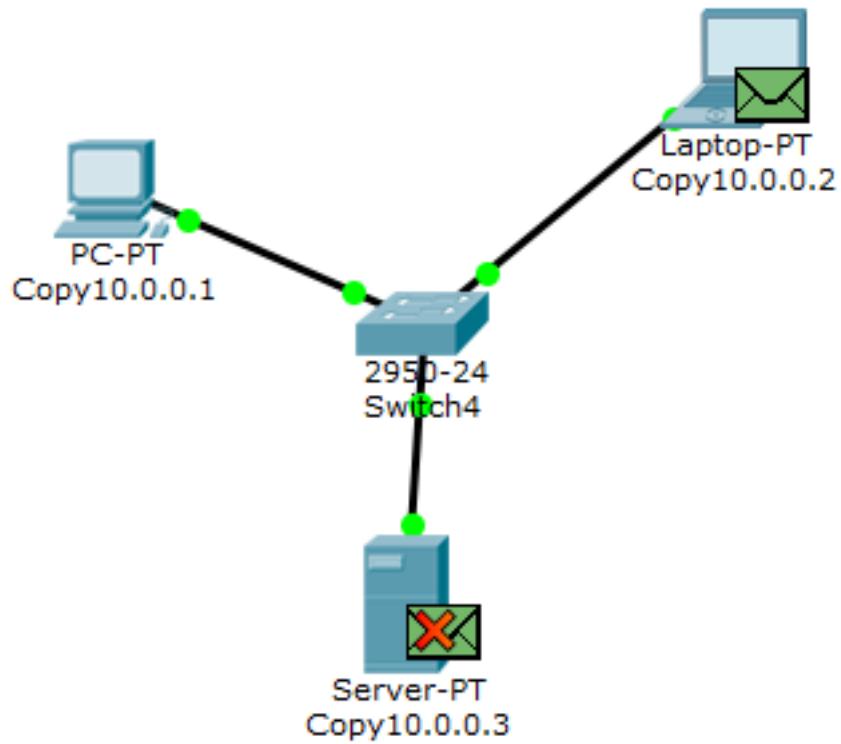




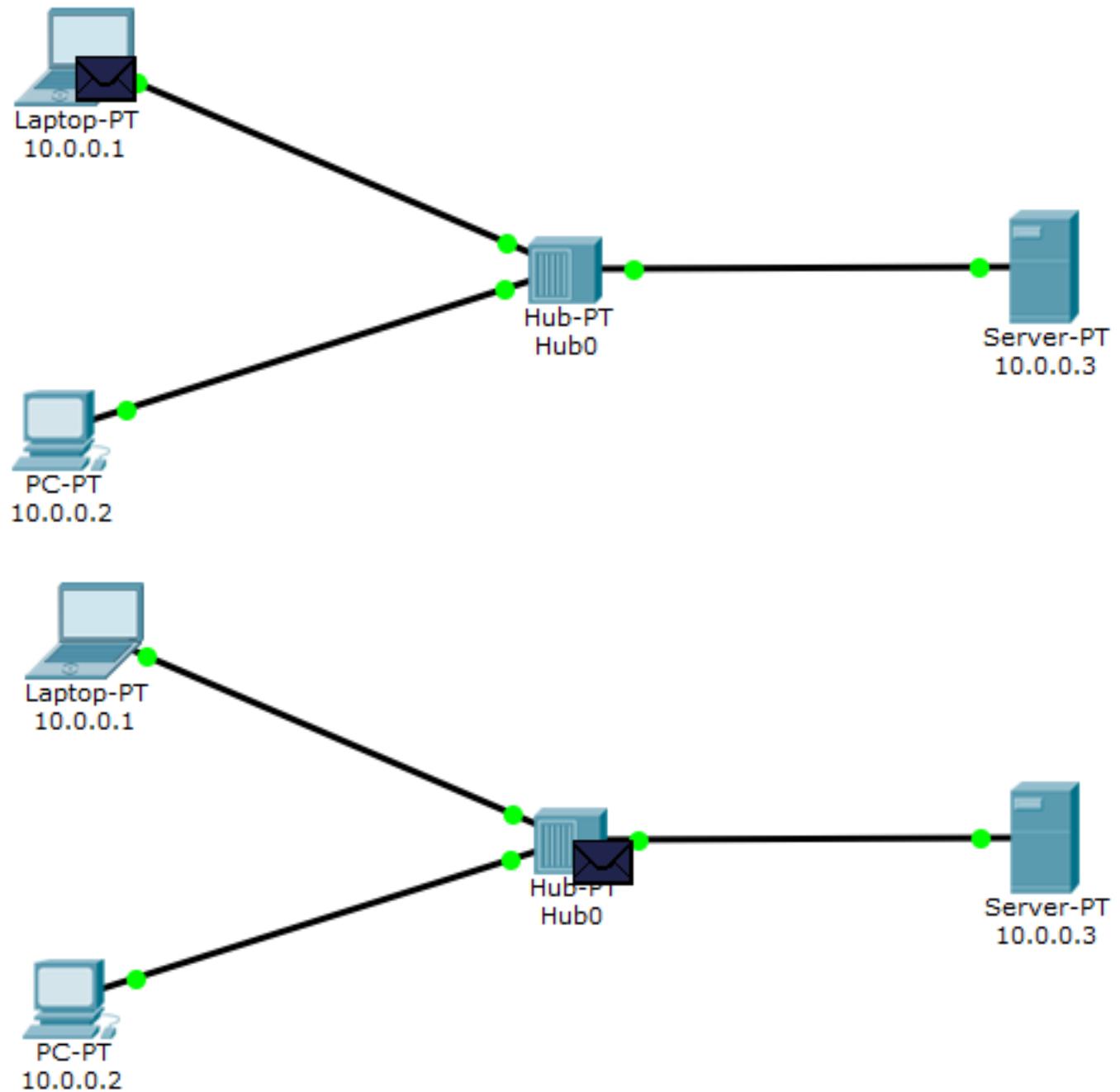


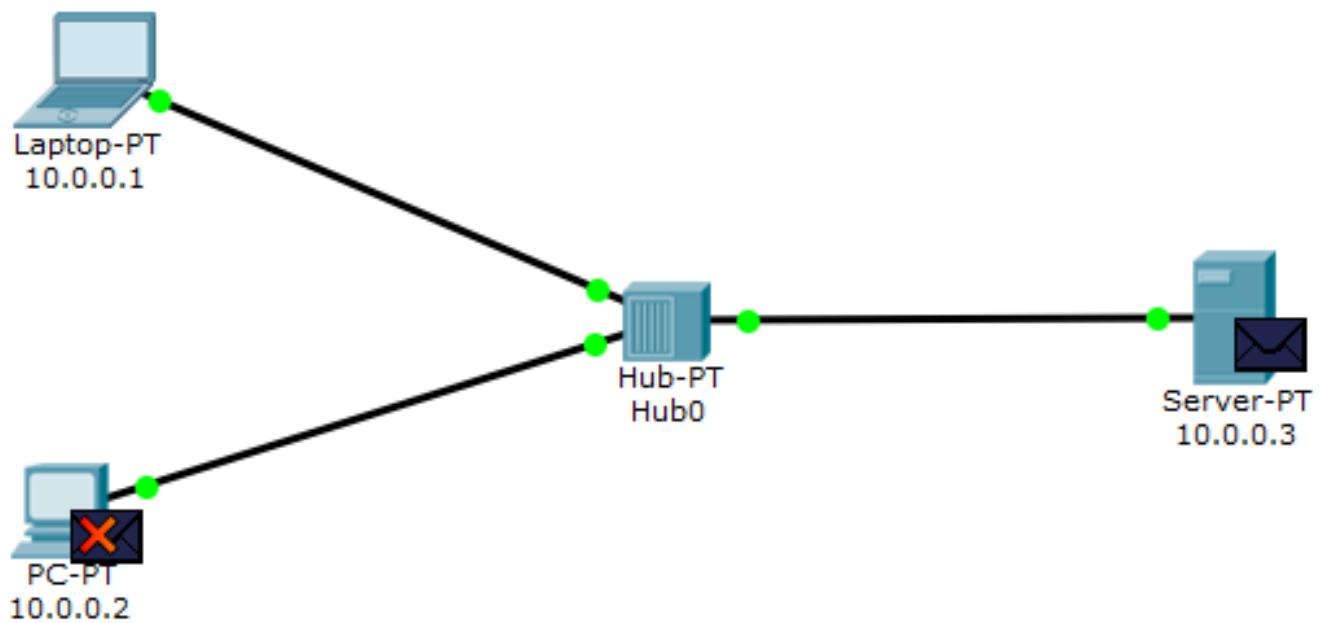


SWITCH CONNECTION



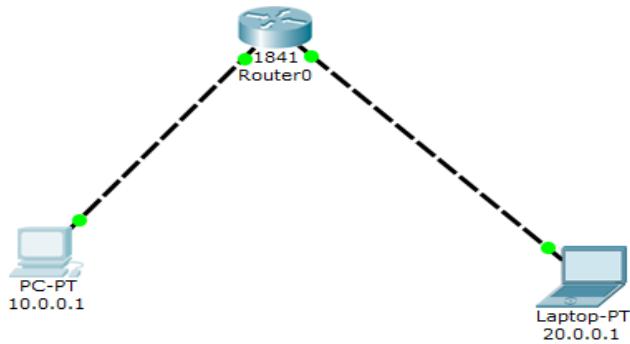
HUB CONNECTION





Lab 2

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



Packet loss:

```
Packet Tracer PC Command Line 1.0
PC>ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data:

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

Ping statistics for 20.0.0.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

10.0.0.1

Physical Config Desktop Custom Interface

Command Prompt

```

Request timed out.
Request timed out.

Ping statistics for 20.0.0.1:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
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=0ms TTL=255

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

PC>ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data:

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

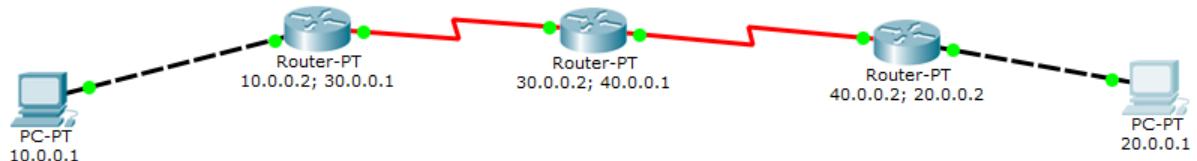
Ping statistics for 20.0.0.1:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
  Minimum = 0ms, Maximum = 0ms, Average = 0ms

PC>

```

Successful Connection

Multiple Router Connection:



Request time out:

```
Packet Tracer PC Command Line 1.0
PC>ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data:

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

Ping statistics for 20.0.0.1:
  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:

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

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

Destination Host Unreachable:

```
PC>ping 20.0.0.2

Pinging 20.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: Destination host unreachable.

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:

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:

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),
```

Sent:

```
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=0ms TTL=255

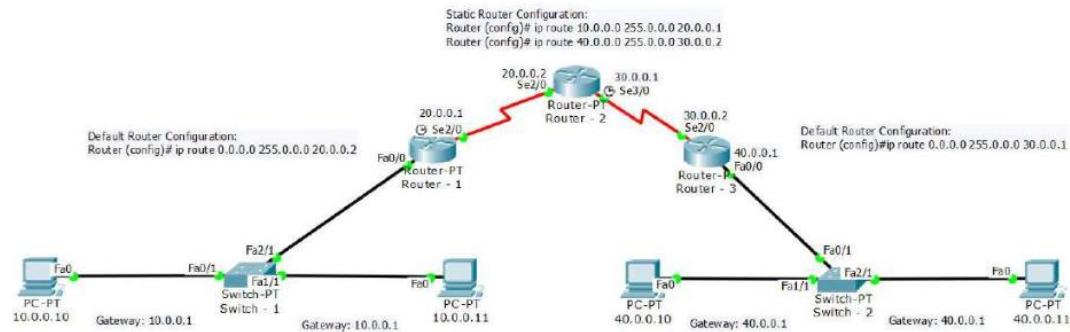
Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Lab 3

Question:

Configure default route, static route to the Router

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

Copy Paste
```

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#
```

Copy Paste

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
```

Copy Paste

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)#
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
```

Copy Paste

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

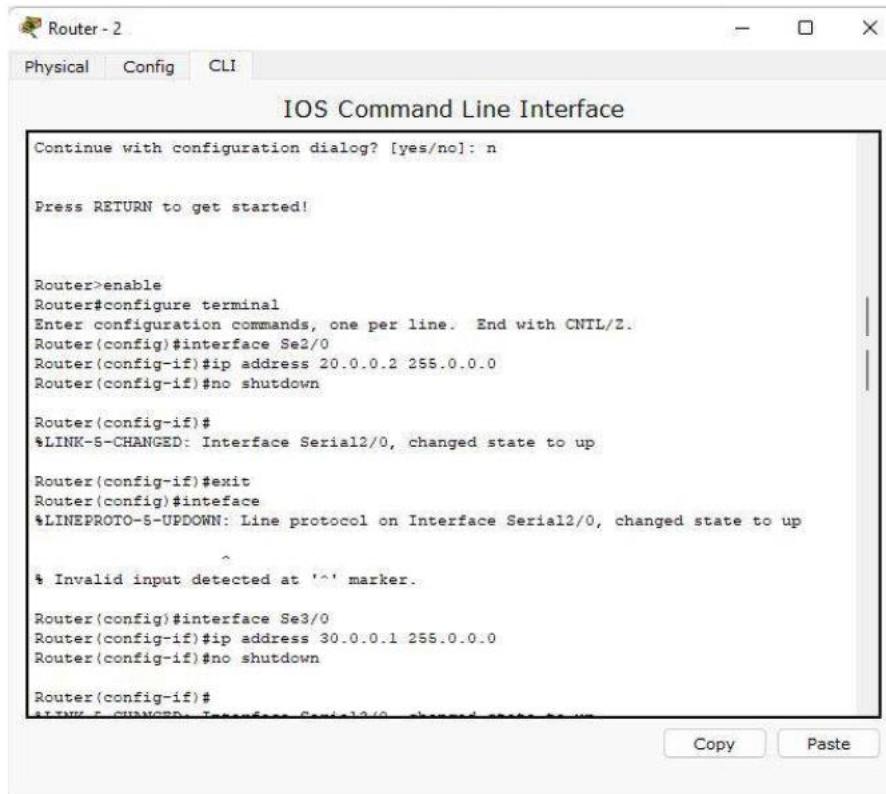
C    10.0.0.0/8 is directly connected, FastEthernet0/0
C    20.0.0.0/8 is directly connected, Serial2/0
S    40.0.0.0/8 [1/0] via 20.0.0.2
S*   0.0.0.0/0 [1/0] via 20.0.0.2
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#no ip route 40.0.0.0 255.0.0.0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

Copy Paste

Configuring Router - 2:



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

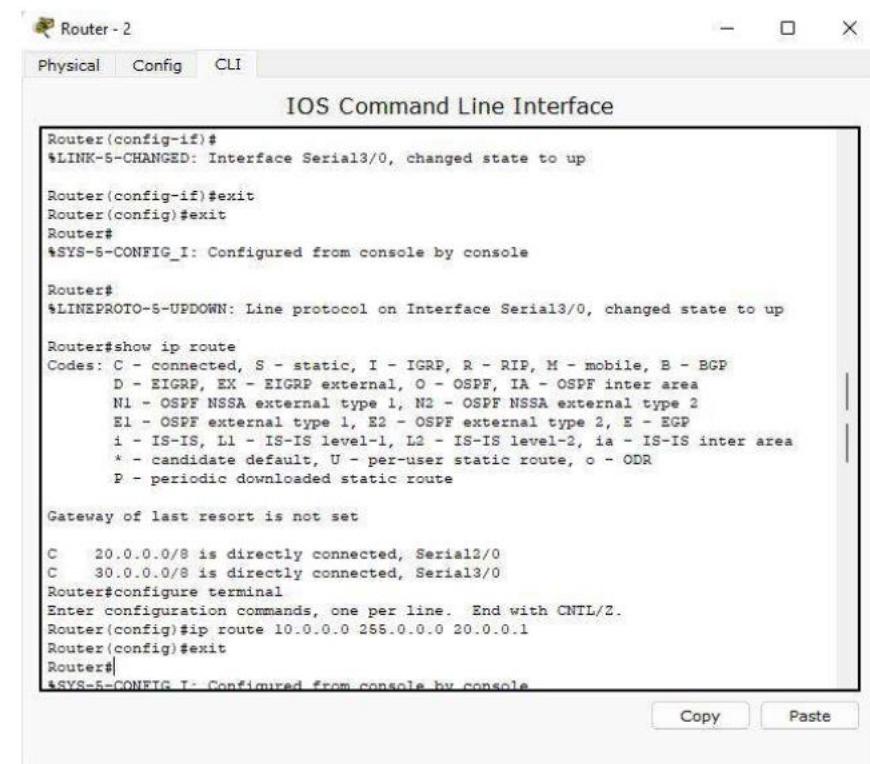
Router(config-if)#exit
Router(config)#inteface
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

% 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)#

Copy Paste



```
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
```

Copy Paste

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
```

Copy Paste

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.
```

Copy Paste

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
```

Copy Paste

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
```

Copy Paste

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
```

Copy Paste

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

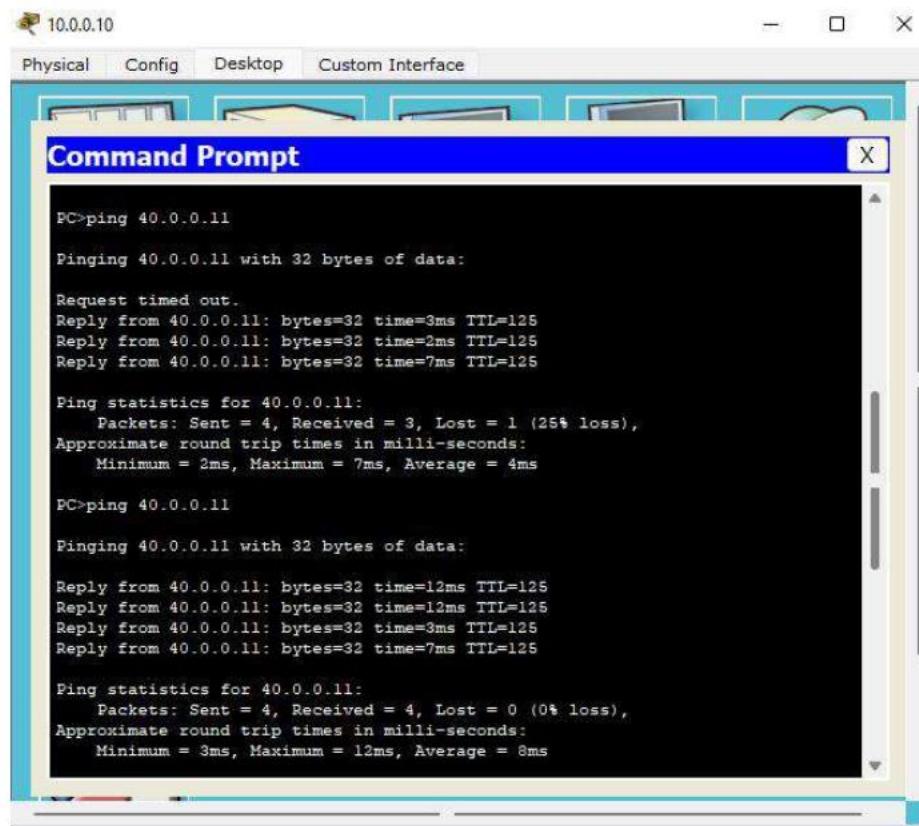
Pinging 40.0.0.10 with 32 bytes of data:

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 Command Prompt window titled "Command Prompt" running on a host with IP 10.0.0.10. The window displays two sets of ping results. The first set is for destination 40.0.0.11, showing one request timed out and three replies with TTL=125. The second set is also for 40.0.0.11, showing four successful replies with TTL=125. Both sets show approximate round trip times and averages.

```
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

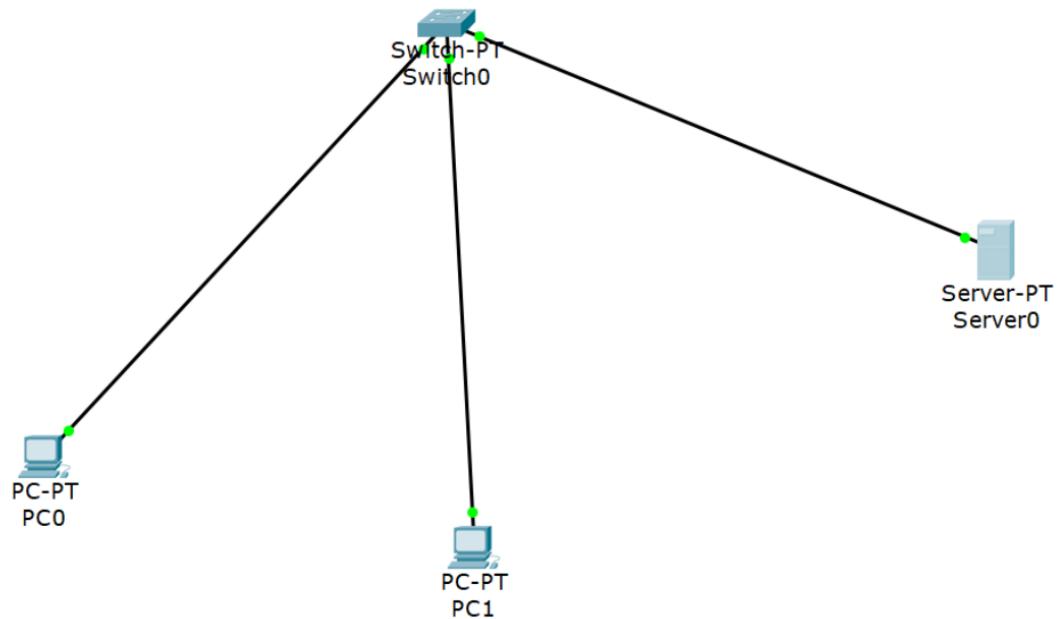
PC>ping 40.0.0.11
Pinging 40.0.0.11 with 32 bytes of data:
Reply from 40.0.0.11: bytes=32 time=12ms TTL=125
Reply from 40.0.0.11: bytes=32 time=12ms TTL=125
Reply from 40.0.0.11: bytes=32 time=3ms TTL=125
Reply from 40.0.0.11: bytes=32 time=7ms TTL=125

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
```

Lab 4

Configure DHCP within a LAN and outside LAN. ,

DHCP WITHIN LAN



Server0

Physical Config Services Desktop Custom Interface

SERVICES

- HTTP
- DHCP
- DHCPv6
- TFTP
- DNS
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP

DHCP

Interface: FastEthernet0 Service: On Off

Pool Name: serverPool

Default Gateway: 0.0.0.0

DNS Server: 0.0.0.0

Start IP Address : 10 0 0 0

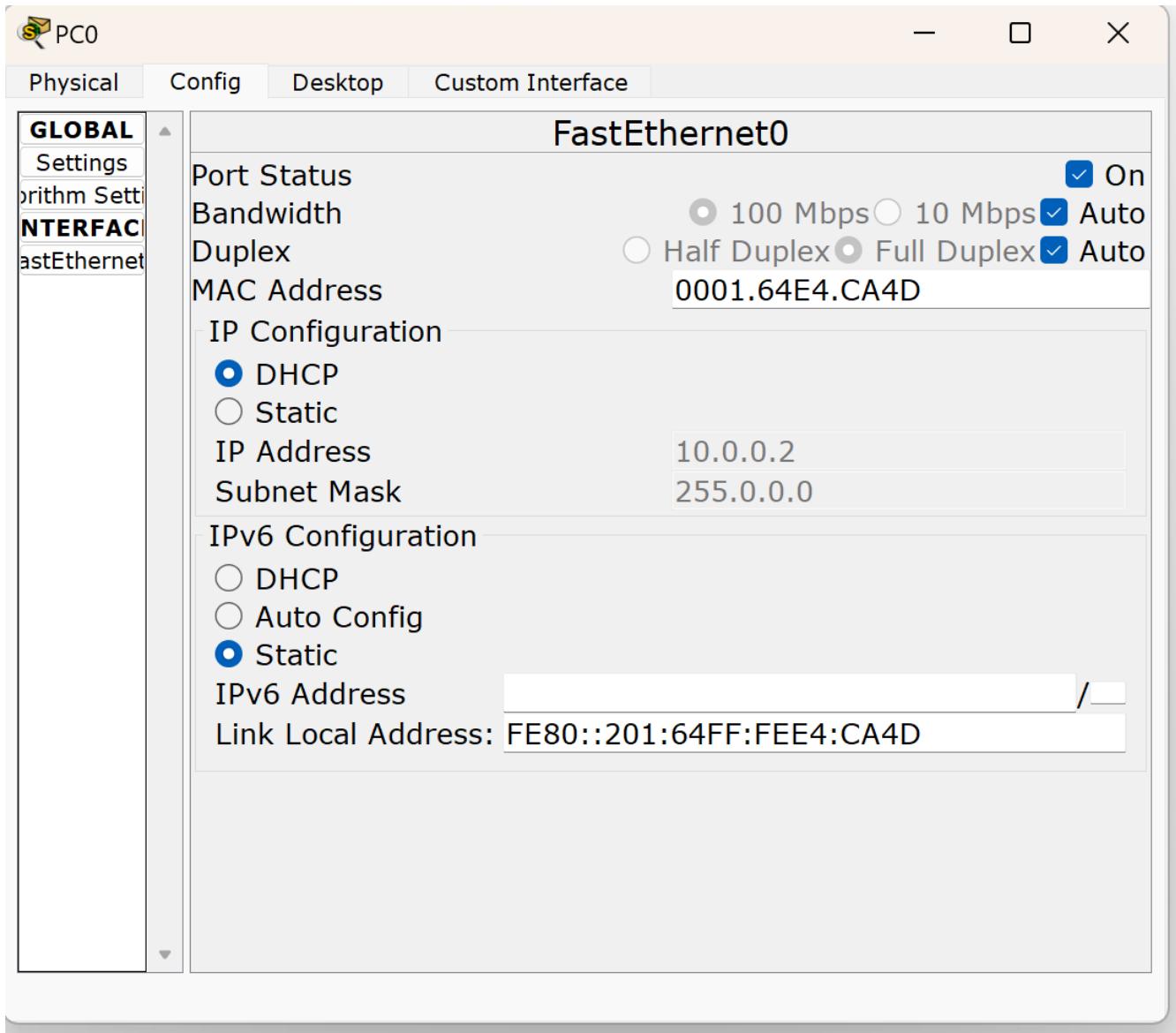
Subnet Mask: 55 0 0 0

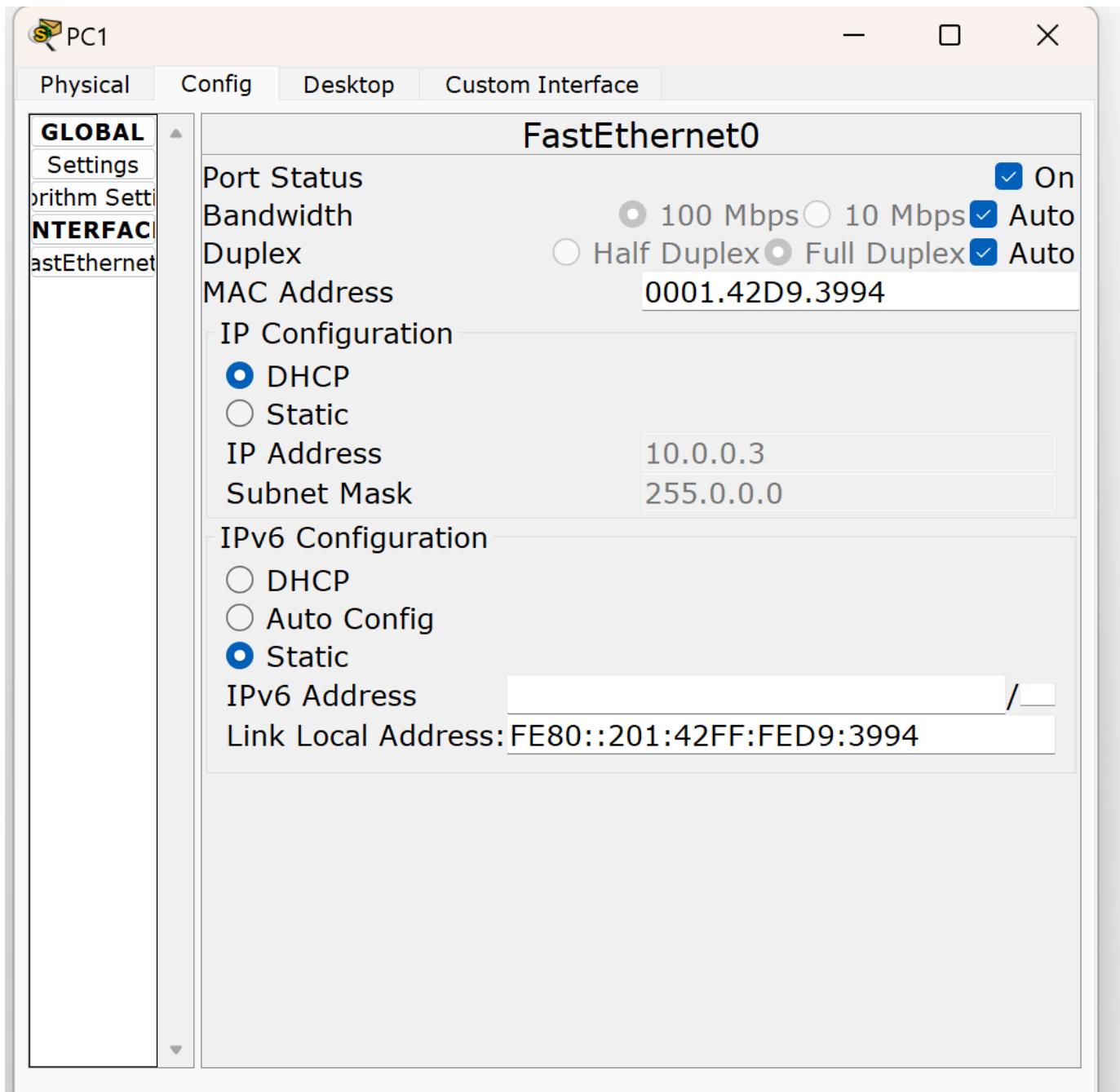
Maximum number of Users : 512

TFTP Server: 0.0.0.0

Add Save Remove

Pool Name	Default Gatew	DNS Serve	Start IP Addre	Subnet Mas	Max User	TFTP Serv
serverP...	0.0.0.0	0.0.0.0	10.0.0.0	255.0.0.0	512	0.0.0.0





The screenshot shows a window titled "Command Prompt" within a Cisco Packet Tracer interface. The window title bar is blue with white text. The main area of the window is black with white text, displaying the output of a ping command. The text reads:

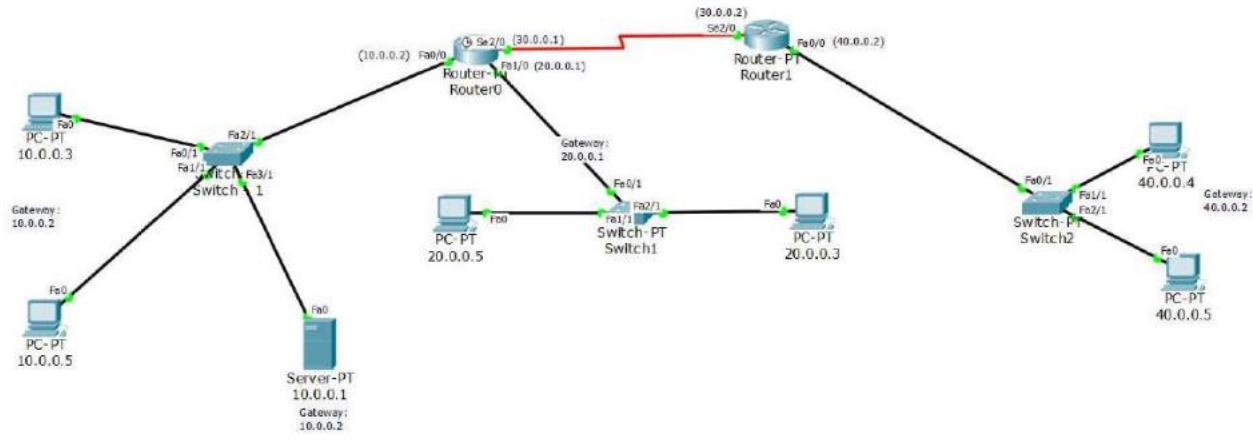
```
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

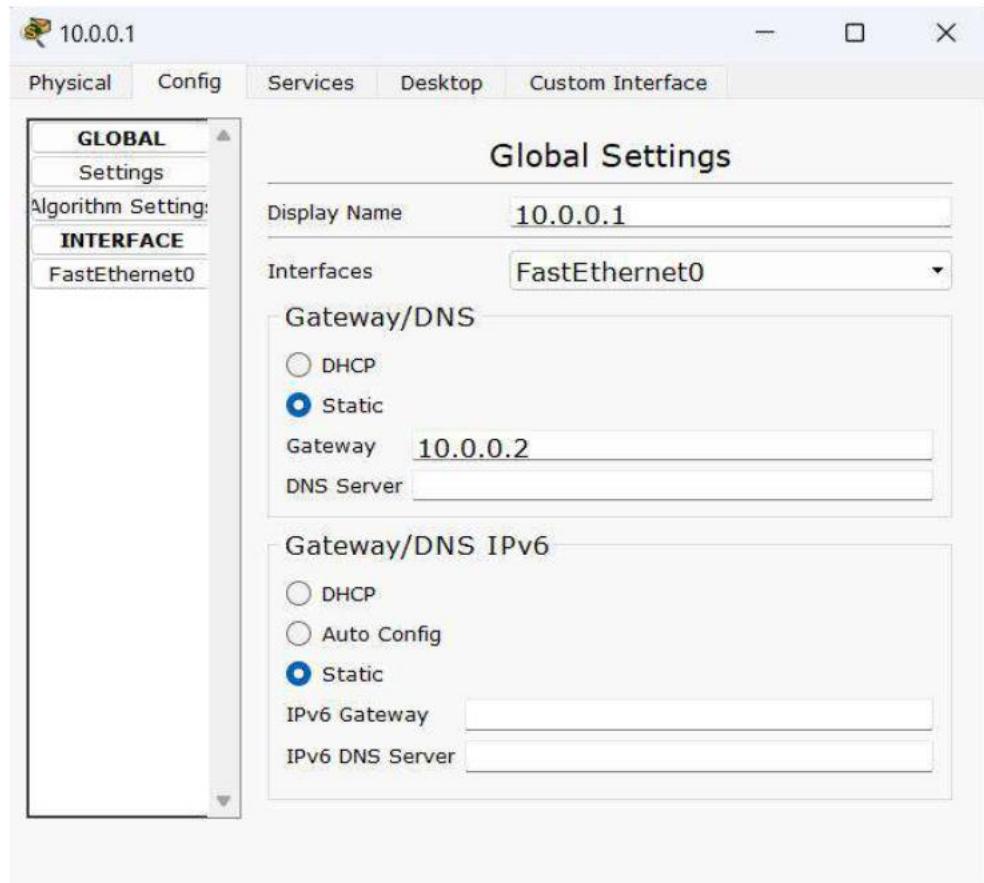
Reply from 10.0.0.3: bytes=32 time=0ms TTL=128

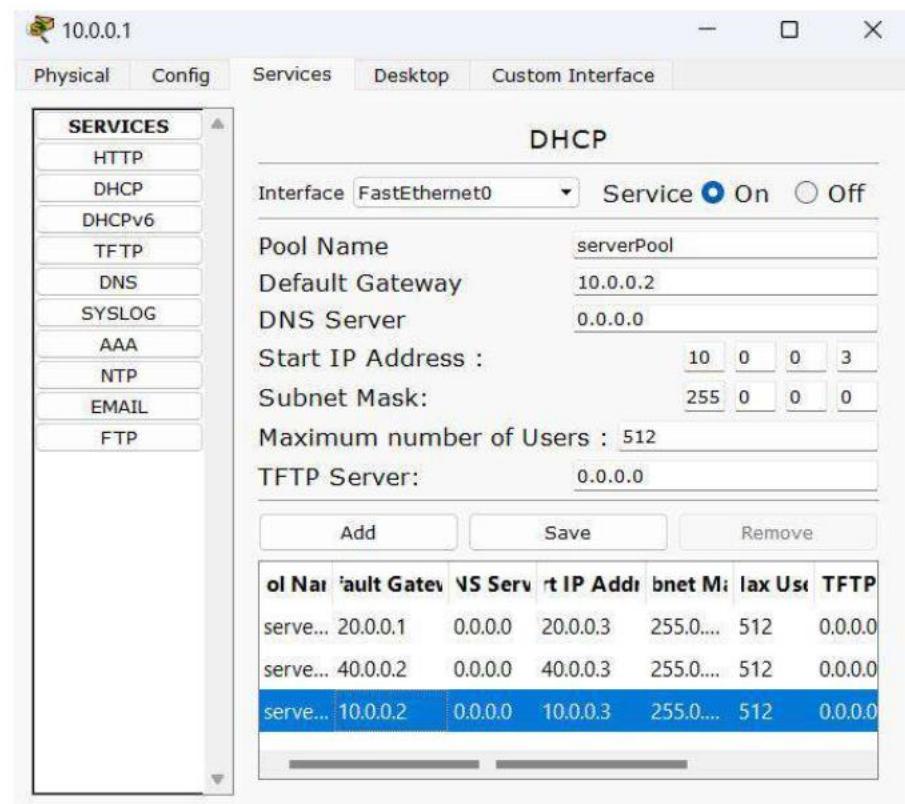
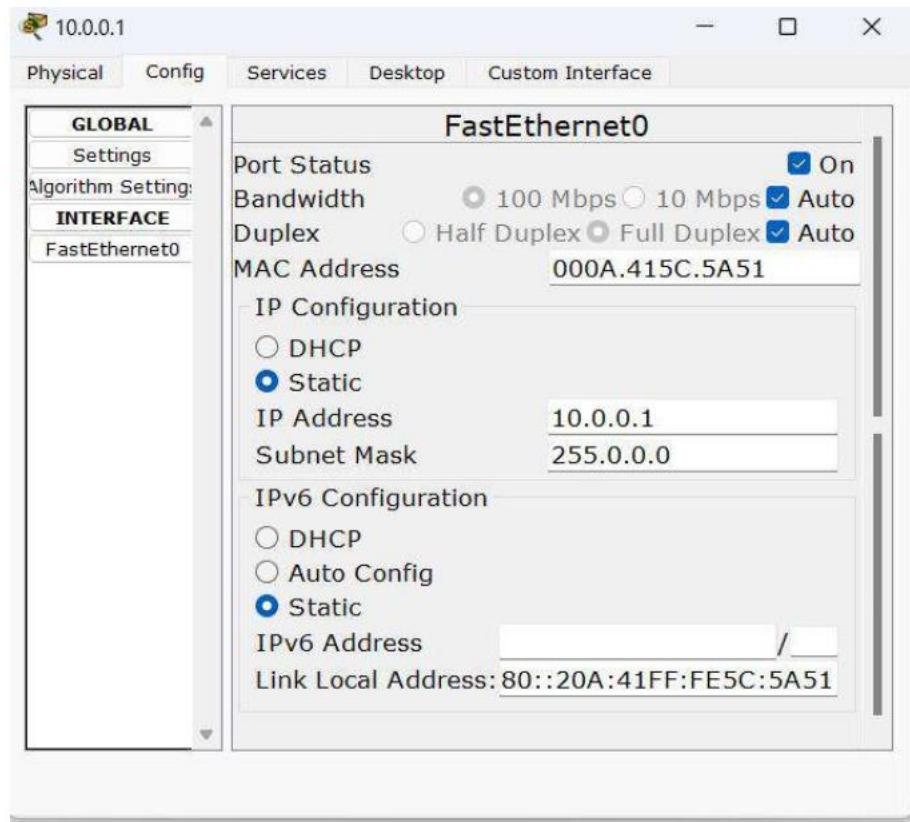
Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

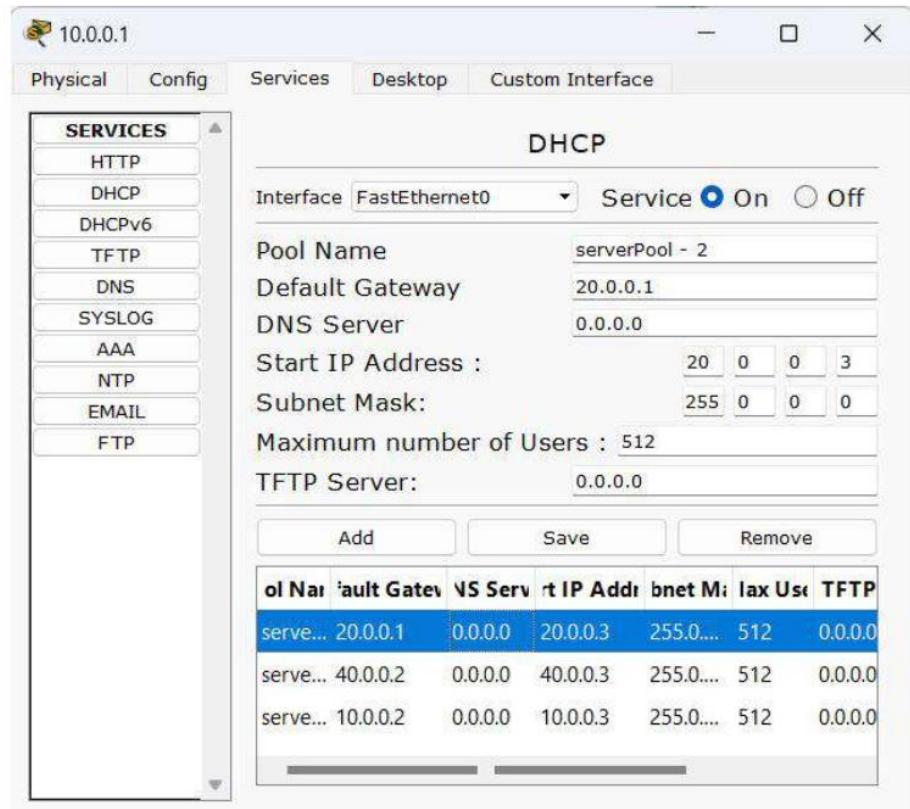
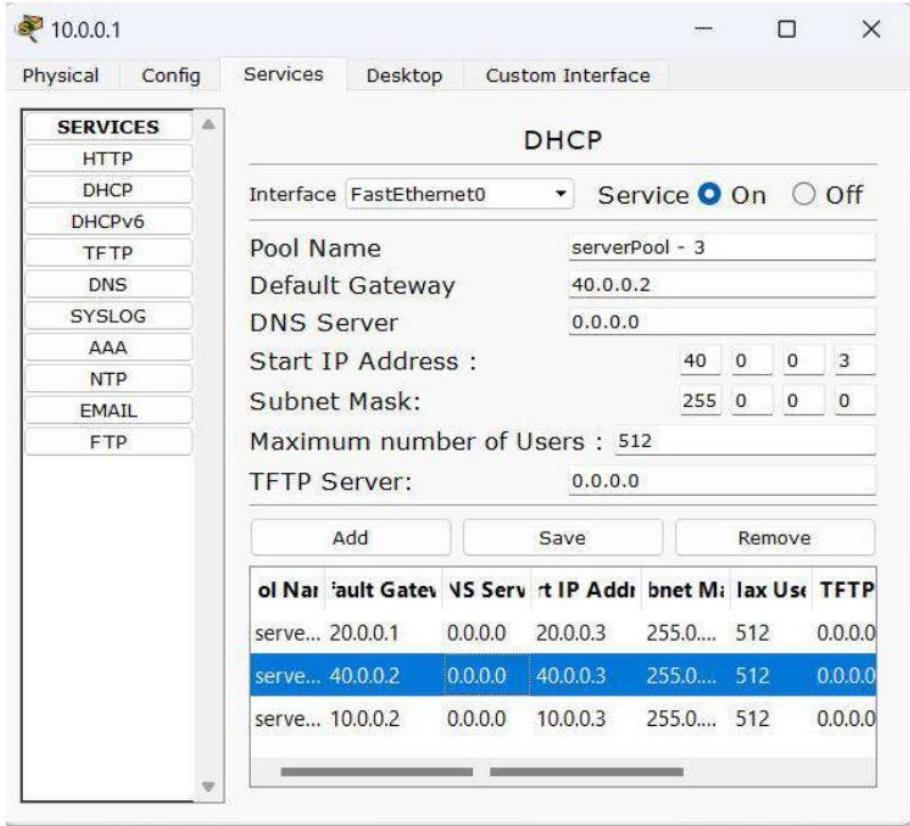
PC>
```



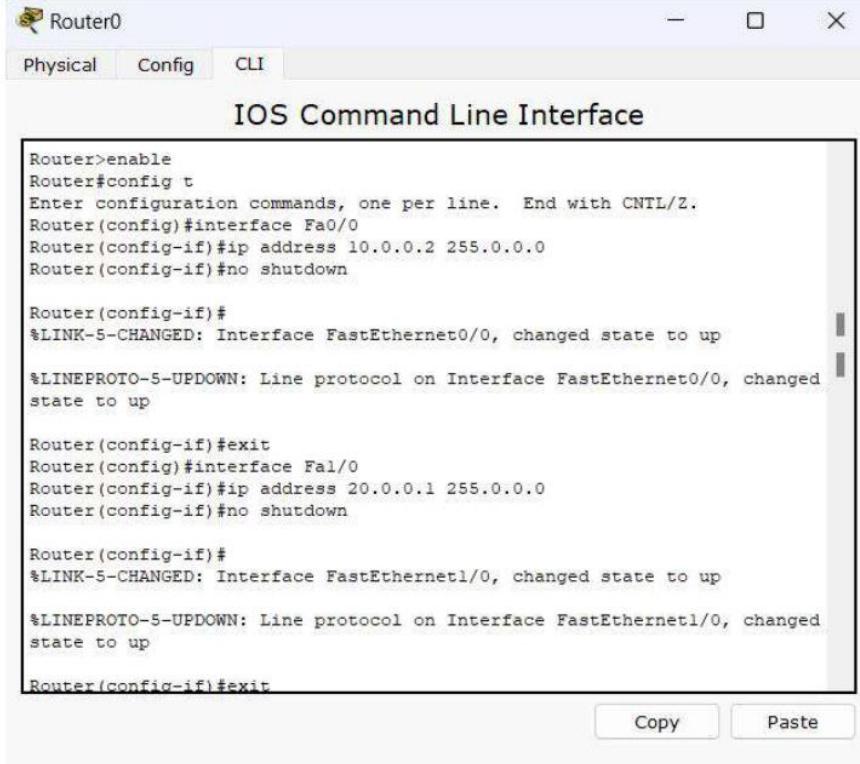
Server Configuration:







Router - 0 (Configuration)



The screenshot shows the IOS Command Line Interface window for Router0. The title bar says "Router0". The tabs at the top are "Physical", "Config" (which is selected), and "CLI". The main window title is "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

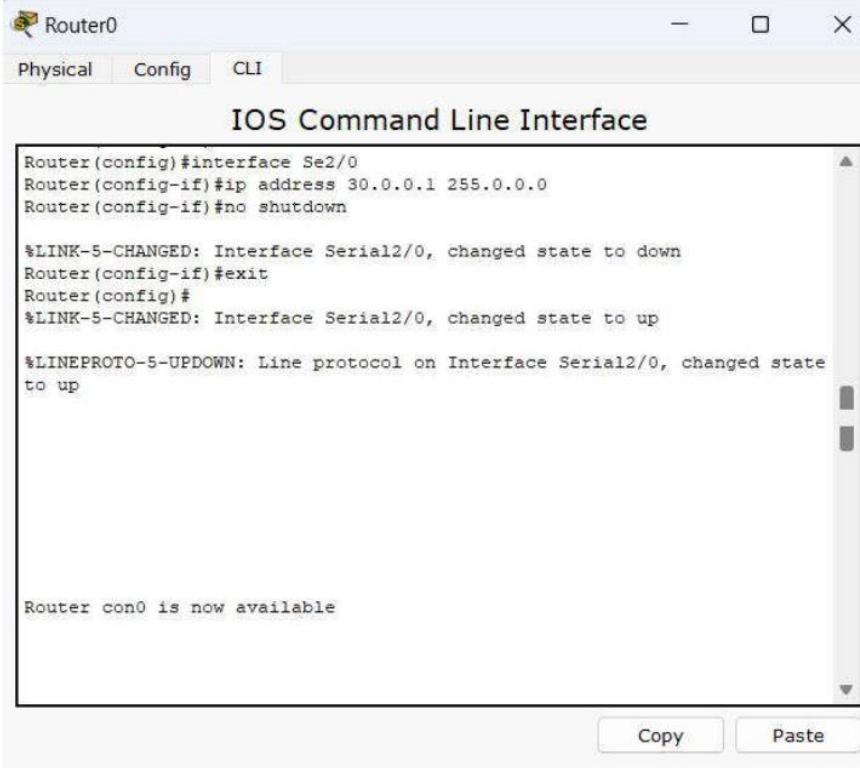
Router(config-if)#exit
Router(config)#interface Fa1/0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#no shutdown

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 of the window are "Copy" and "Paste" buttons.



The screenshot shows the IOS Command Line Interface window for Router0. The title bar says "Router0". The tabs at the top are "Physical", "Config" (which is selected), and "CLI". The main window title is "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 of the window 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
```

Copy Paste

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
```

Copy Paste

Router - 1 Configuration:

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

Copy Paste

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

Copy Paste

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

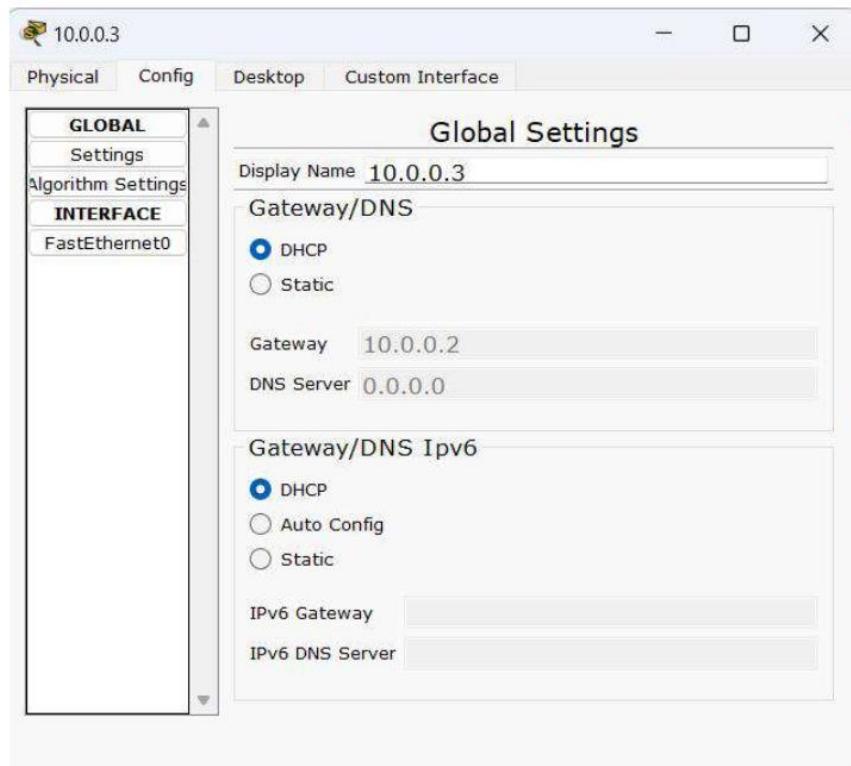
C    30.0.0.0/8 is directly connected, Serial2/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0
S*   0.0.0.0/0 [1/0] via 30.0.0.1
Router#

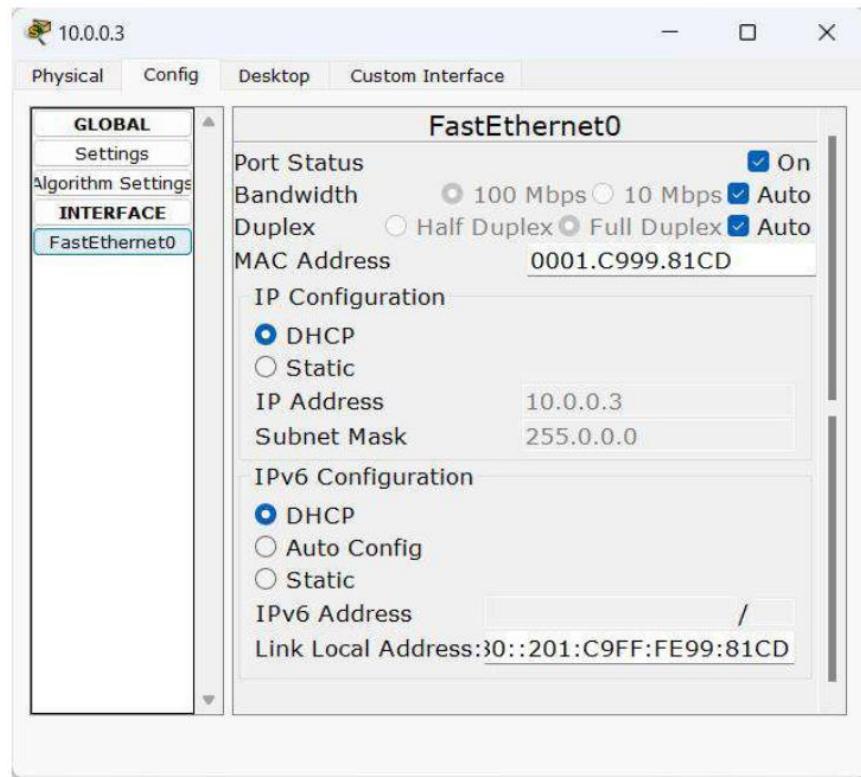
```

Router con0 is now available

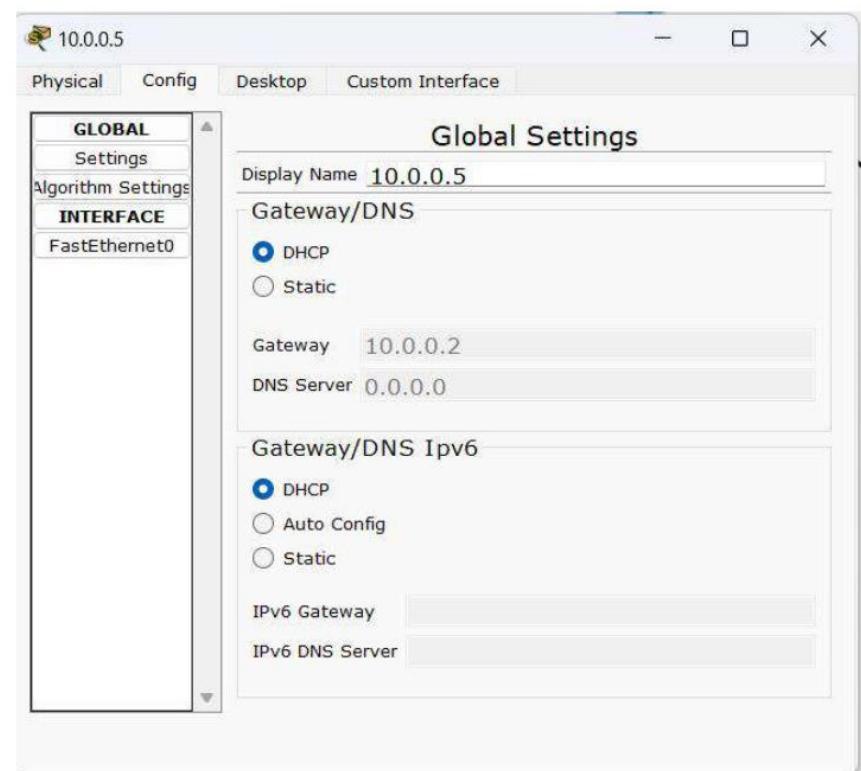
Copy Paste

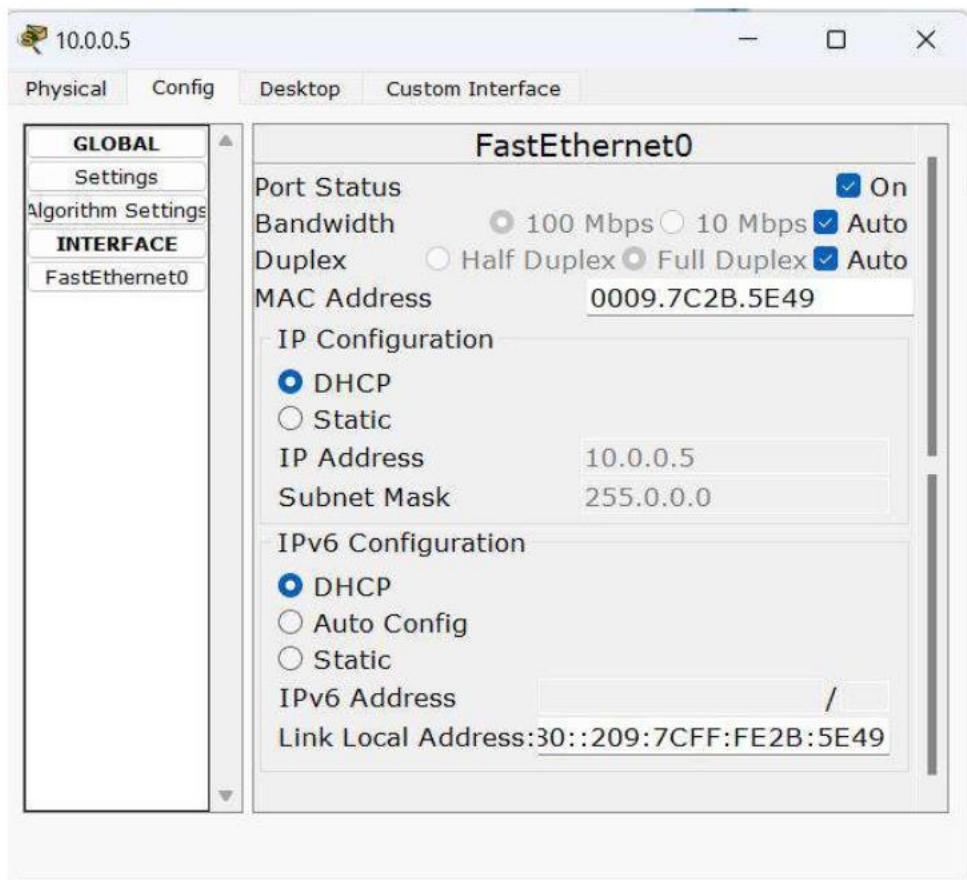
PC - 1 Configuration (Through DHCP):



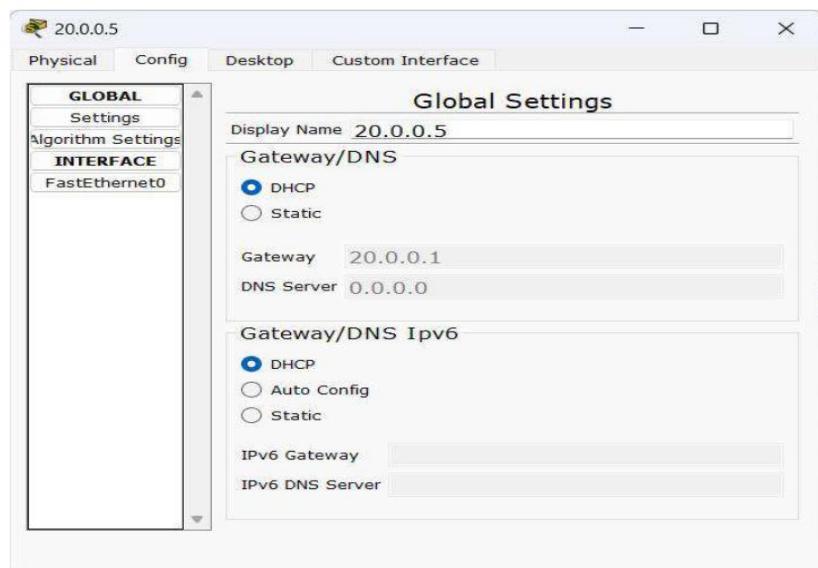


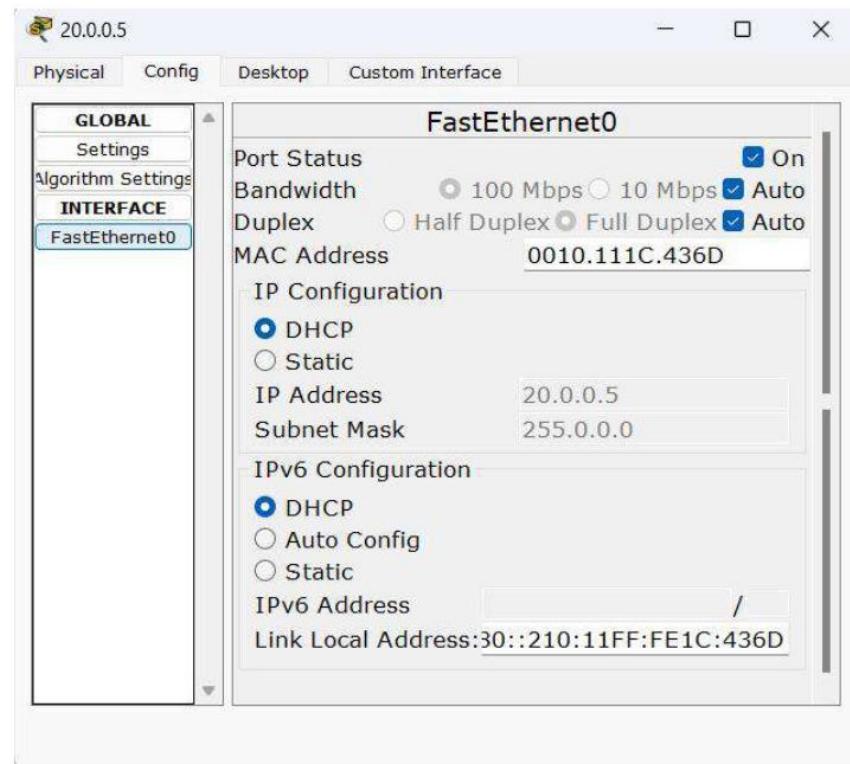
PC - 2 Configuration (Through DHCP):



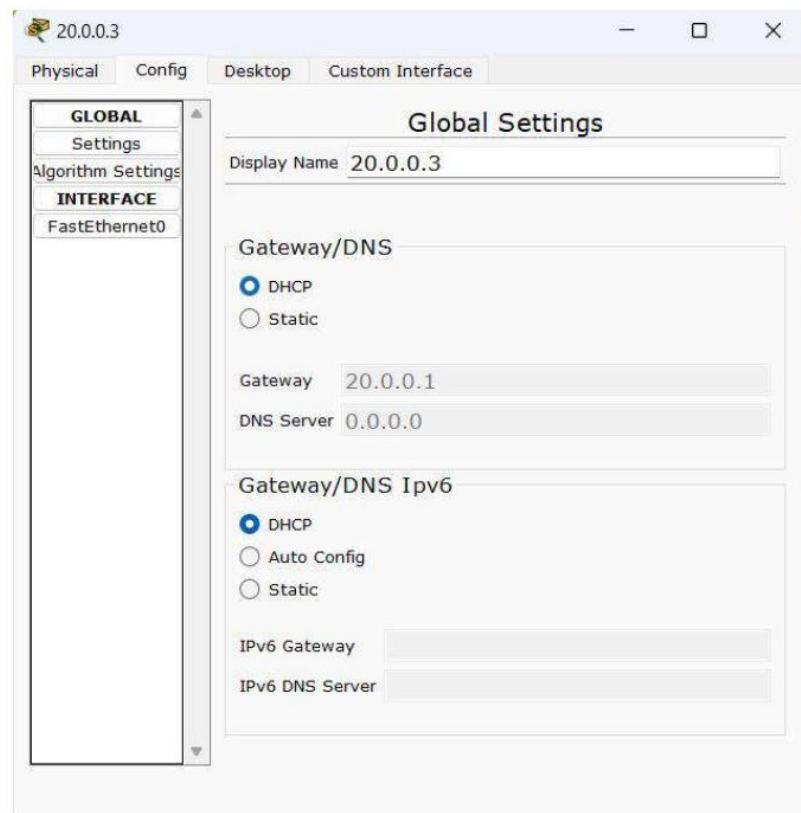


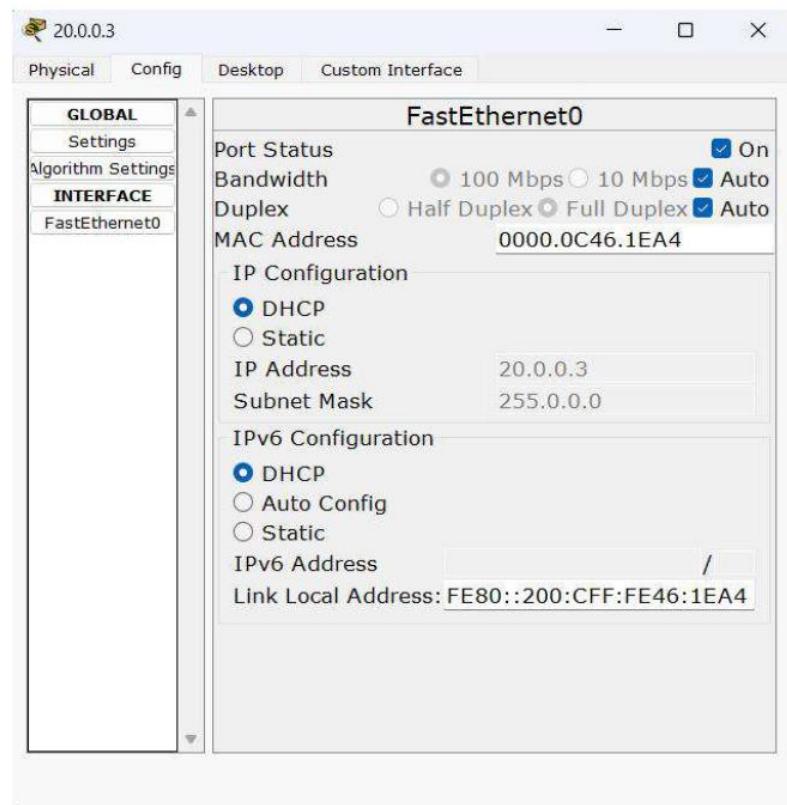
PC - 3 Configuration (Through DHCP):



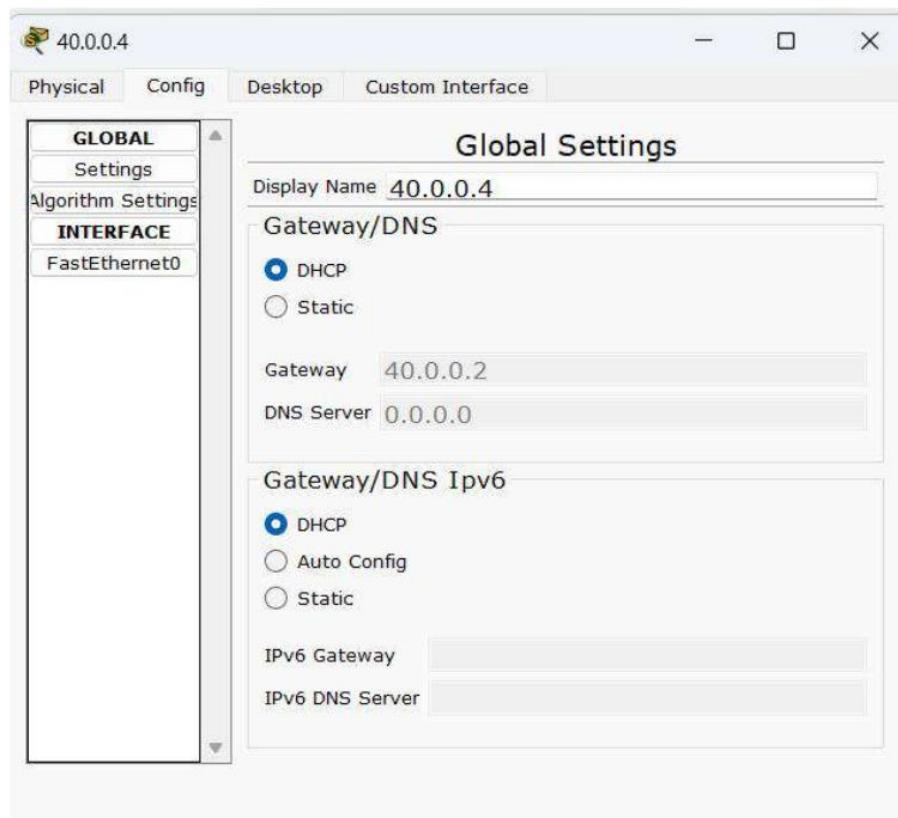


PC - 4 Configuration (Through DHCP):



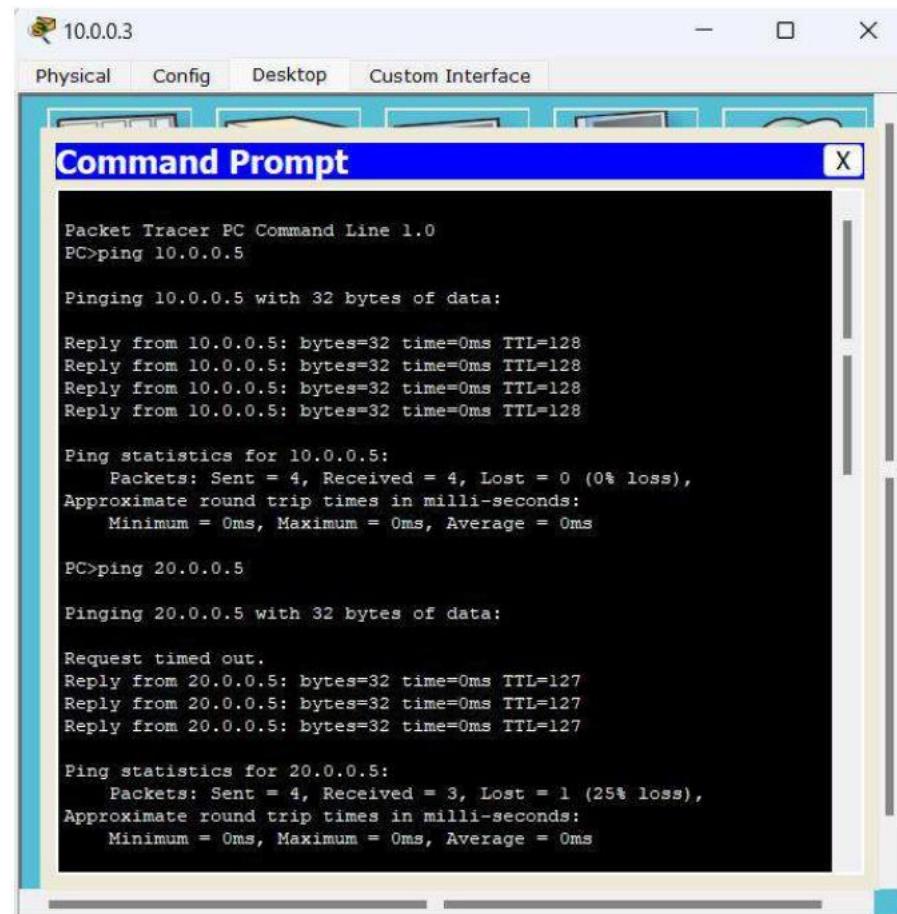


PC - 5 Configuration (Through DHCP):



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
```

```
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
```

```
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

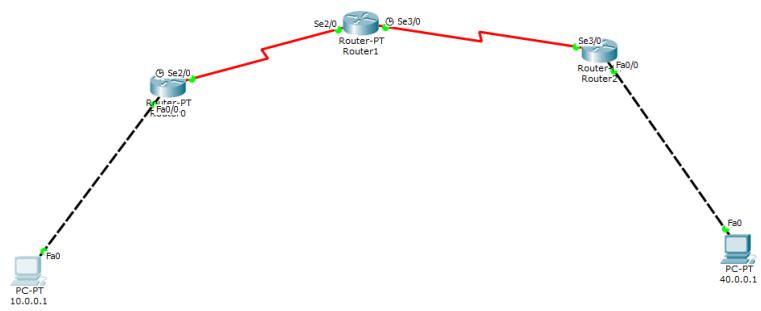
PC>ping 40.0.0.5
Pinging 40.0.0.5 with 32 bytes of data:
Request timed out.
Reply from 40.0.0.5: bytes=32 time=12ms TTL=126
Reply from 40.0.0.5: bytes=32 time=4ms TTL=126
Reply from 40.0.0.5: bytes=32 time=5ms TTL=126

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>
```

Lab 5

Configure RIP routing Protocol in Routers



The screenshot shows a software interface for managing network interfaces. At the top, there's a toolbar with icons for Physical, Config, Desktop, and Custom Interface. Below the toolbar, five interface cards are shown, each with a different icon representing a different type of interface. A blue bar labeled "Command Prompt" is overlaid on the interface cards. The main area contains the following text output from a terminal window:

```
PC>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Request timed out.
Reply from 40.0.0.1: bytes=32 time=5ms TTL=125
Reply from 40.0.0.1: bytes=32 time=6ms TTL=125
Reply from 40.0.0.1: bytes=32 time=10ms TTL=125

Ping statistics for 40.0.0.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 5ms, Maximum = 10ms, Average = 7ms

PC>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Reply from 40.0.0.1: bytes=32 time=10ms TTL=125
Reply from 40.0.0.1: bytes=32 time=6ms TTL=125
Reply from 40.0.0.1: bytes=32 time=13ms TTL=125
Reply from 40.0.0.1: bytes=32 time=2ms TTL=125

Ping statistics for 40.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 13ms, Average = 7ms

PC>
```

Router0

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
     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
R      30.0.0.0/8 [120/1] via 20.0.0.2, 00:00:25, Serial2/0
R      40.0.0.0/8 [120/2] via 20.0.0.2, 00:00:20, Serial2/0
Router>
```

Router1

Physical Config CLI

IOS Command Line Interface

```
Router(config)#enable
% Incomplete command.
Router(config)#router rip
Router(config-router)#network 20.0.0.0
Router(config-router)#network 30.0.0.0
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

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

Gateway of last resort is not set

R    10.0.0.0/8 [120/1] via 20.0.0.1, 00:00:11, 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
R    40.0.0.0/8 [120/1] via 30.0.0.2, 00:00:13, Serial3/0
Router#
```

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

Router2

Physical Config CLI

IOS Command Line Interface

```
*LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
exit
Router(config)#router rip
Router(config-router)#network 30.0.0.0
Router(config-router)#network 40.0.0.0
Router(config-router)#exit
Router(config)#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

R    10.0.0.0/8 [120/2] via 30.0.0.1, 00:00:10, Serial3/0
R    20.0.0.0/8 [120/1] via 30.0.0.1, 00:00:10, 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
Router#
```

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
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)#
%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 address 20.0.0.1 255.0.0.0
Router(config-if)#encapsulation PPP
Router(config-if)#clock rate 64000
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
```

Router1

Physical Config CLI

IOS Command Line Interface

```
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)#encapsulation ppp
Router(config-if)#no shutdown

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

Router(config)#interface 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 shutdown

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

Router2

Physical Config CLI

IOS Command Line Interface

```
Press RETURN to get started!

Router>enable
Router#configure terminal
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 shutdown

Router(config-if)#
*LINK-5-CHANGED: Interface Serial3/0, changed state to up
exit
Router(config)#
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
enable
* Incomplete command.
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
```

RIP:

For router0

```
Router(config)#router rip
Router(config-router)#network 10.0.0.0
Router(config-router)#network 20.0.0.0
Router(config-router)#exit
```

For router1

```
*LINEPROTO-5-UPDOWN: Line protocol on interface Serial0/0, changed state to up

Router(config)#enable
* Incomplete command.
Router(config)#router rip
Router(config-router)#network 20.0.0.0
Router(config-router)#network 30.0.0.0
Router(config-router)#exit
Router(config)#exit
```

For

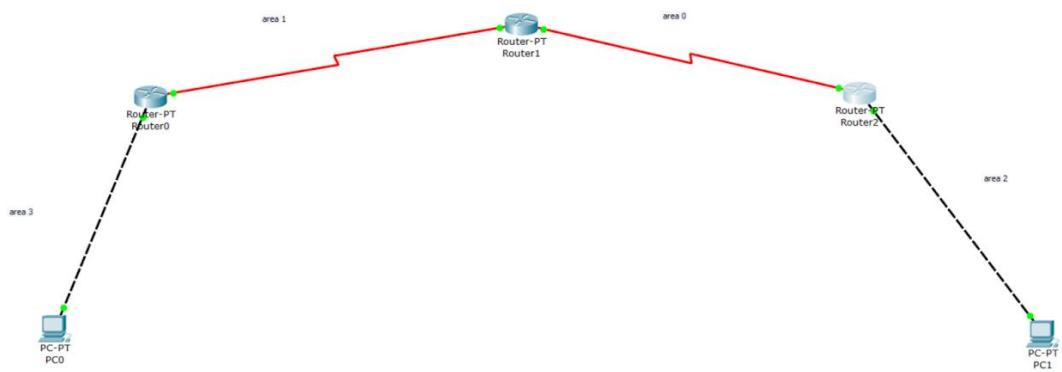
router2

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

Lab 5

Configure OSPF routing protocol

Topology:



Router0

Physical Config CLI

IOS Command Line Interface

```
2 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)

Press RETURN to get started!

%LINK-5-CHANGED: Interface Serial2/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, 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    10.0.0.0/8 is directly connected, FastEthernet0/0
     20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C      20.0.0.0/8 is directly connected, Serial2/0
C      20.0.0.2/32 is directly connected, Serial2/0
Router>ENABLE
Router#configure terminal
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)#
```

Router 1:

Router1

Physical Config CLI

IOS Command Line Interface

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

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

Router#router ospf 1
^
% Invalid input detected at '^' marker.

Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router-id 2.2.2.2
^
% Invalid input detected at '^' marker.

Router(config)#router ospf 1
Router(config-router)#router-id 2.2.2.2
Router(config-router)#network 20.0.0.0 0.255.255.255 area 1
Router(config-router)#network 30.0.0.0 0.255.255.255 area 0
Router(config-router)#exit
Router(config)#
00:11:12: %OSPF-5-ADJCHG: Process 1, Nbr 3.3.3.3 on Serial3/0 from
LOADING to FULL, Loading Done
|
```

Copy Paste

Router 2:

```
Router#enable
Router#configure terminal
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)#network 40.0.0.0 0.255.255.255 area 2
Router(config-router)#exit
^
% Invalid input detected at '^' marker.
```

Router0

IOS Command Line Interface

```
00:08:20: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial2/0 from
LOADING to FULL, Loading Done

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

Gateway of last resort is not set

C      10.0.0.0/8 is directly connected, FastEthernet0/0
        20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C          20.0.0.0/8 is directly connected, Serial2/0
C          20.0.0.2/32 is directly connected, Serial2/0
O IA 30.0.0.0/8 [110/128] via 20.0.0.2, 00:03:30, Serial2/0
O IA 40.0.0.0/8 [110/129] via 20.0.0.2, 00:01:38, Serial2/0
Router#
```

PC0

Physical Config Desktop Custom Interface

Command Prompt

```
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 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>
```

Loopback
Router 0:

```
C      10.0.0.0/8 is directly connected, FastEthernet0/0
C      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 IA 30.0.0.0/8 [110/128] via 20.0.0.2, 00:03:30, Serial2/0
O IA 40.0.0.0/8 [110/129] via 20.0.0.2, 00:01:38, Serial2/0
Router#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface loopback 0\
^
% Invalid input detected at '^' marker.

Router(config)#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 add 172.16.1.252 255.255.0.0
Router(config-if)#no shutdown
Router(config-if)#
Router(config-if)#
Router 1:
```

```
Router#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#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 add 172.16.1.253 255.255.0.0
Router(config-if)#no shutdown
Router(config-if)#
Router(config-if)#
Router 2:
```

```
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#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 add 172.16.1.254 255.255.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#exit
Router#
```

Show ip route after interface loopback for router 2

Router2

Physical Config CLI

IOS Command Line Interface

```

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

Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#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 add 172.16.1.254 255.255.0.0
Router(config-if)#no shutdown
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 20.0.0.0/8 [110/128] via 30.0.0.1, 00:10:30, 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#

```

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

We notice that router 3 does not know about area 3 (there is on 10.0.0.0 shown in the above fig)

Virtual link

Router 0:

```
%SYS-5-CONFIG_I: Configured from console by console

Router#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
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 1
from backbone area must be virtual-link but not found from 20.0.0.2,
Serial2/0

Router(config-router)#router ospf 1
Router(config-router)#area 1 virtual
00:31:23: %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)#area 1 virtual-link 1.1.1
00:31:33: %OSPF-4-ERRRCV: Received invalid packet: mismatch area ID,
from backbone area must be virtual-link but not found from 20.0.0.2,
Serial2/0
.1
Router(config-router)#area 1 virtual-link 1.1.1.1
Router(config-router)#exit
Router(config)#exi
00:31:48: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on OSPF_VL0 from
```

Show ip route command after configuring the virtual link so that router 2 knows that area 3

Router2

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

O IA 10.0.0.0/8 [110/129] via 30.0.0.1, 00:00:09, Serial3/0
O IA 20.0.0.0/8 [110/128] via 30.0.0.1, 00:20:45, 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>
```

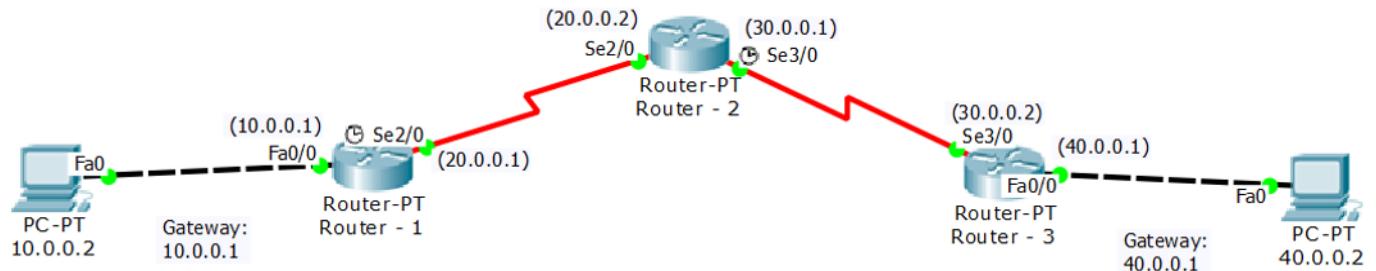
Copy **Paste**

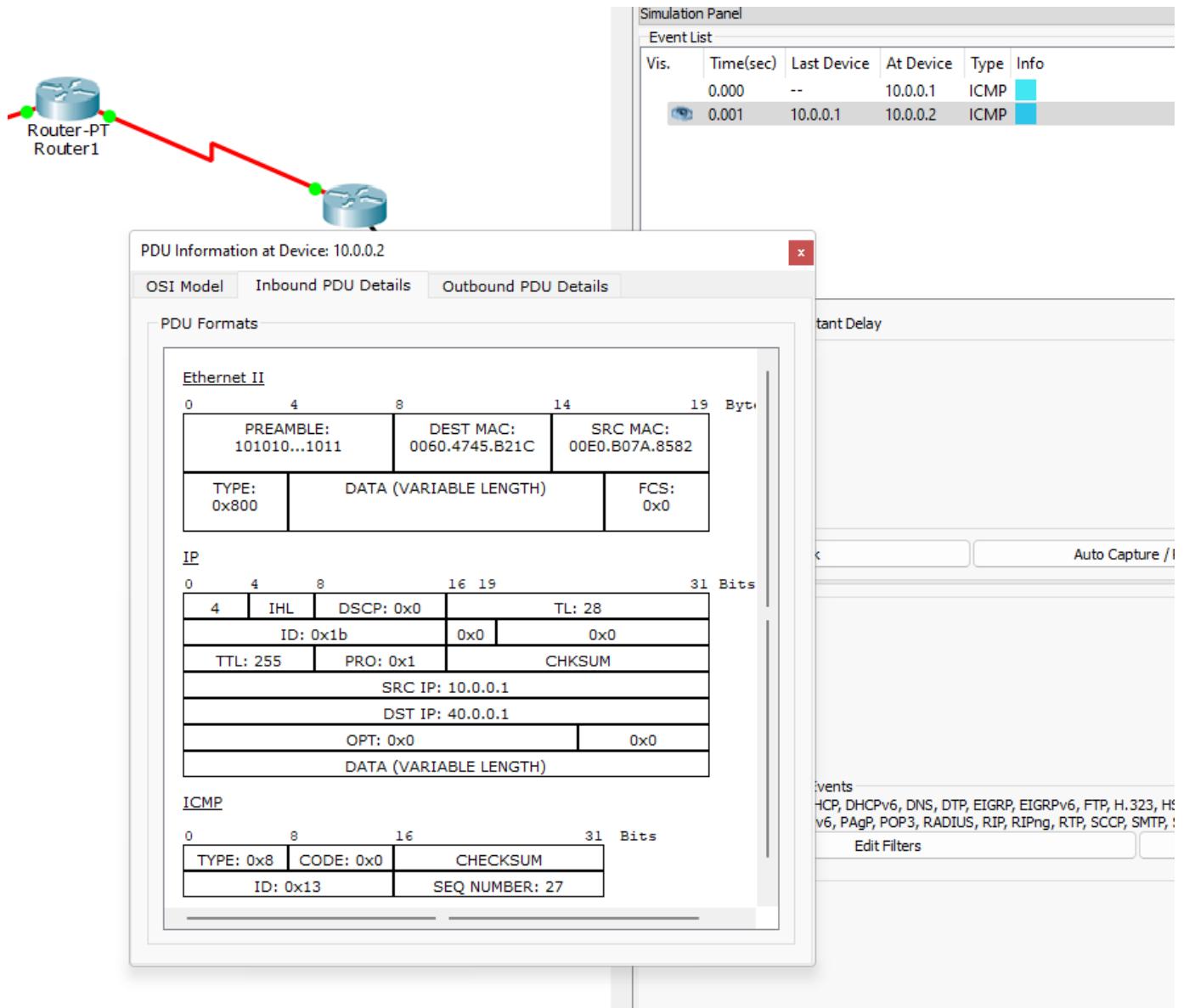
Now we see that the ping command works

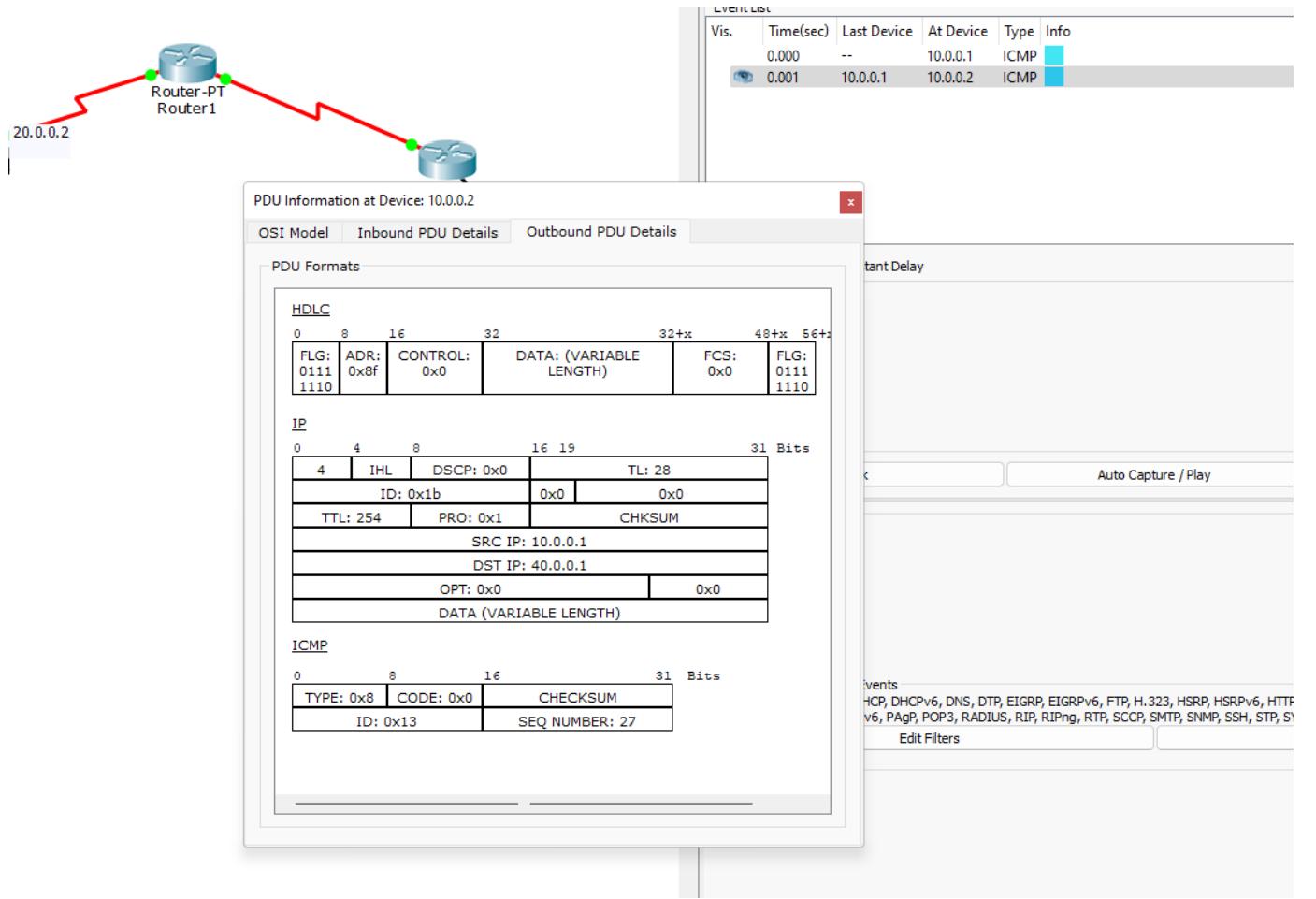
```
PC>ping 40.0.0.1/  
Ping request could not find host 40.0.0.1/. Please check the name and try again.  
PC>ping 40.0.0.1  
  
Pinging 40.0.0.1 with 32 bytes of data:  
  
Reply from 40.0.0.1: bytes=32 time=2ms TTL=125  
Reply from 40.0.0.1: bytes=32 time=2ms TTL=125  
Reply from 40.0.0.1: bytes=32 time=4ms TTL=125  
Reply from 40.0.0.1: bytes=32 time=4ms TTL=125  
  
Ping statistics for 40.0.0.1:  
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
    Minimum = 2ms, Maximum = 4ms, Average = 3ms  
  
PC>
```

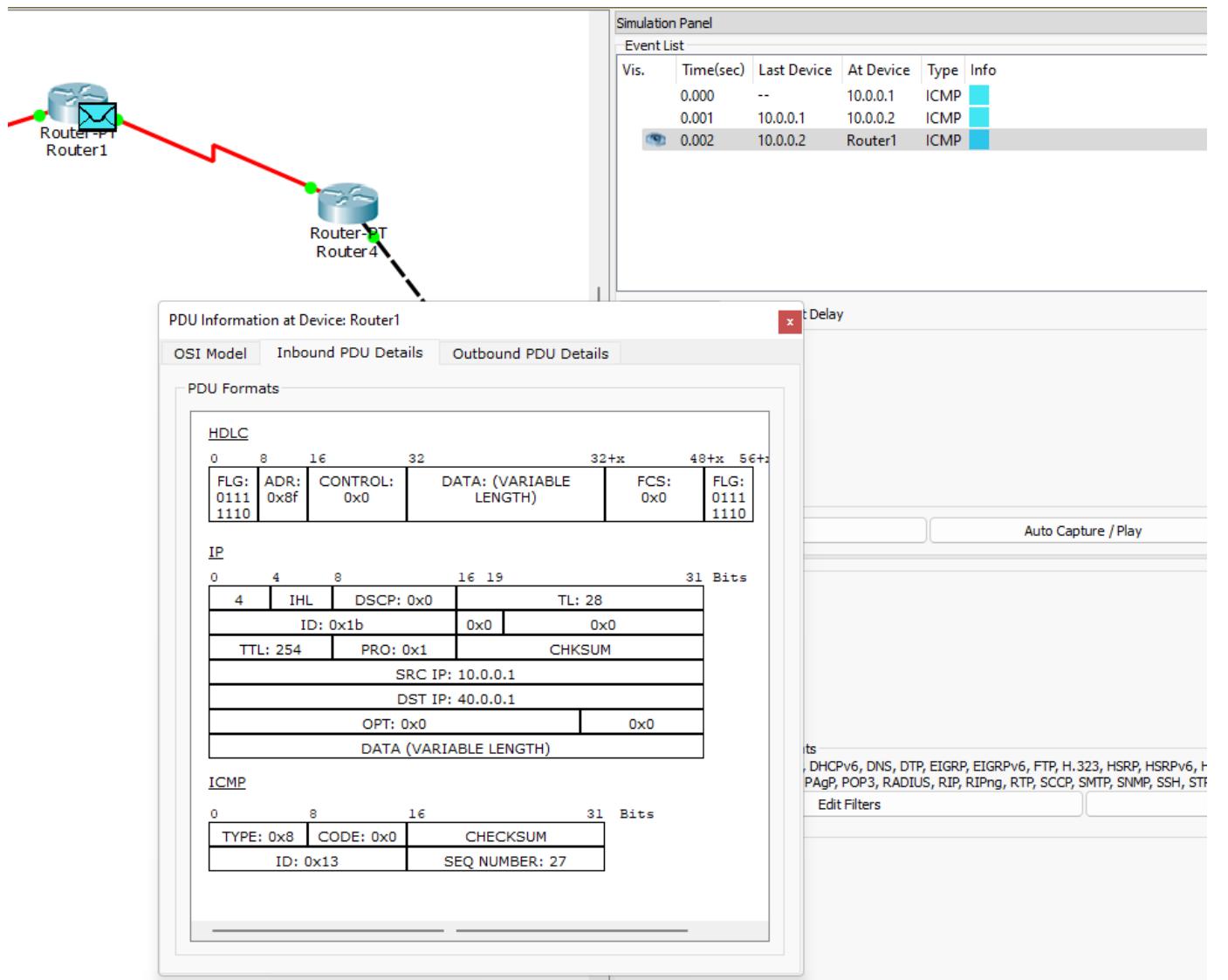
Lab 7

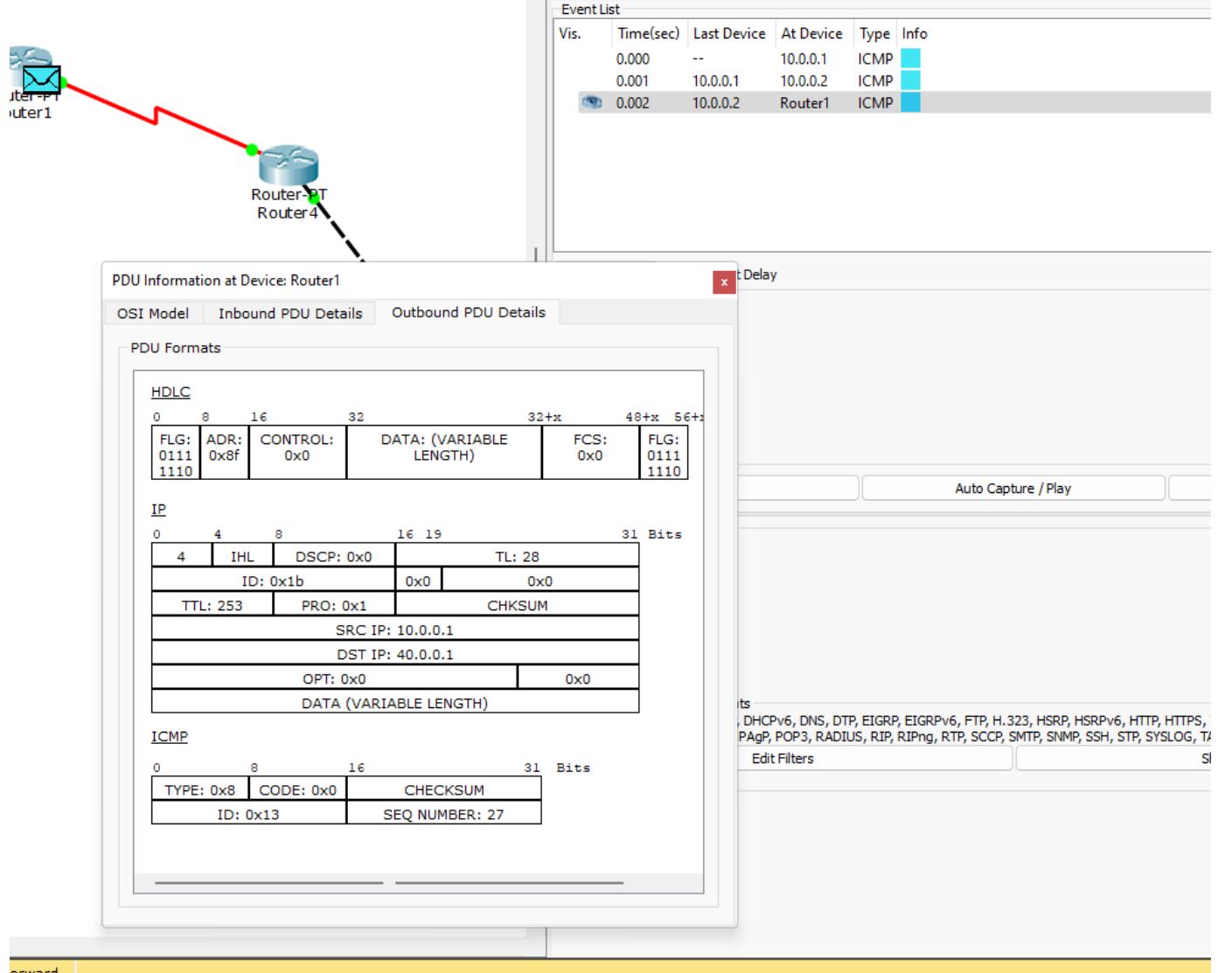
Demonstrate the TTL/ Life of a Packet

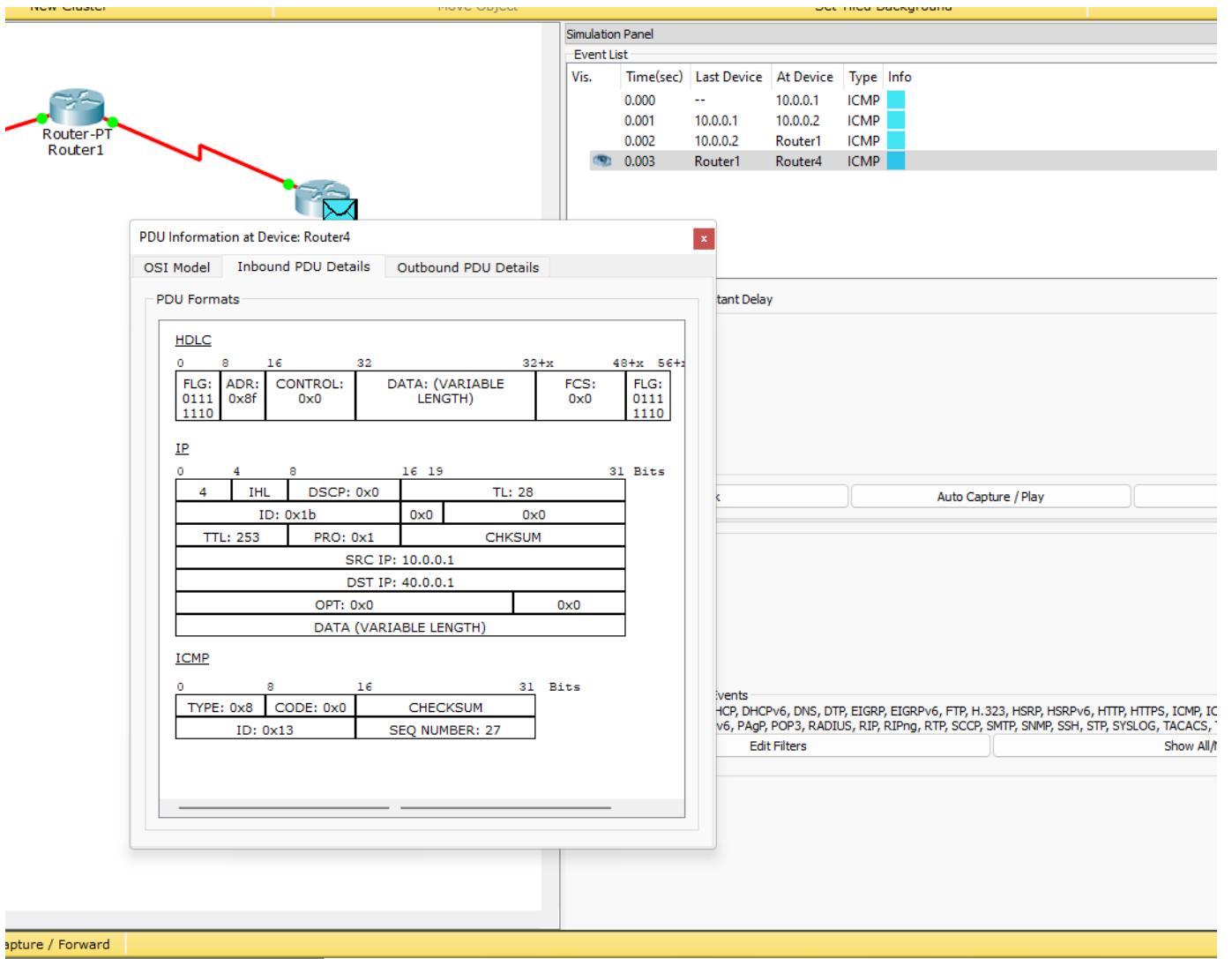


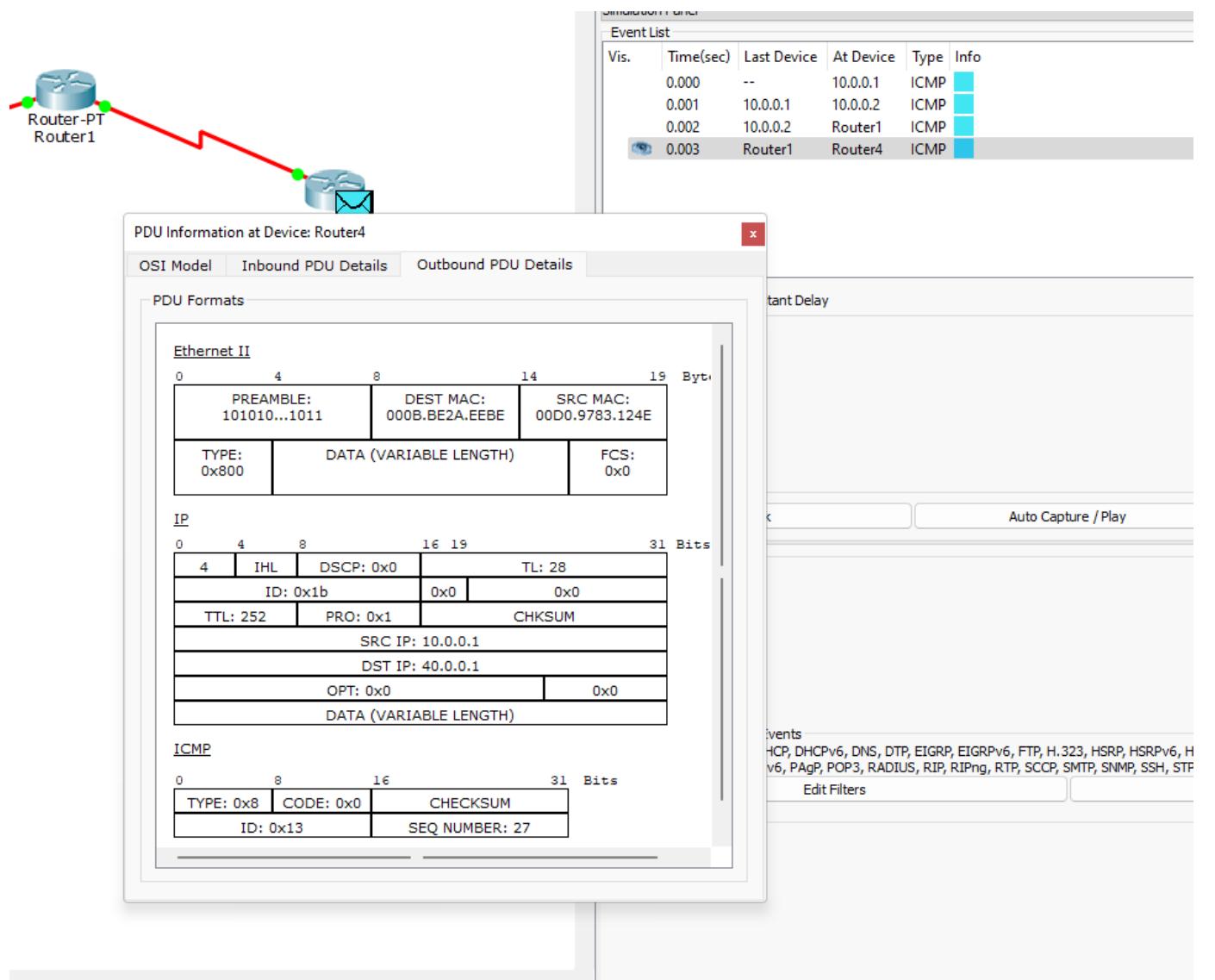


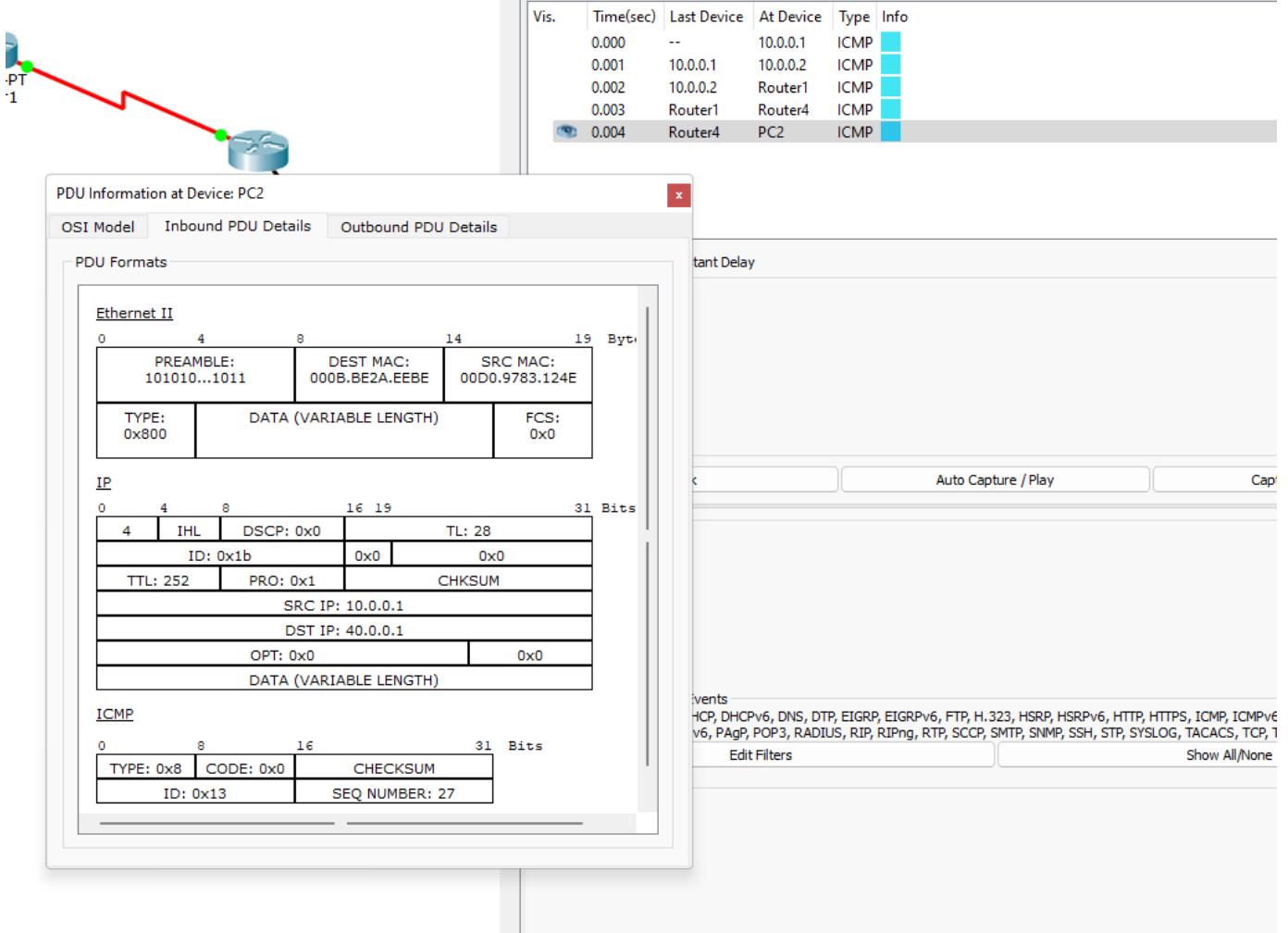


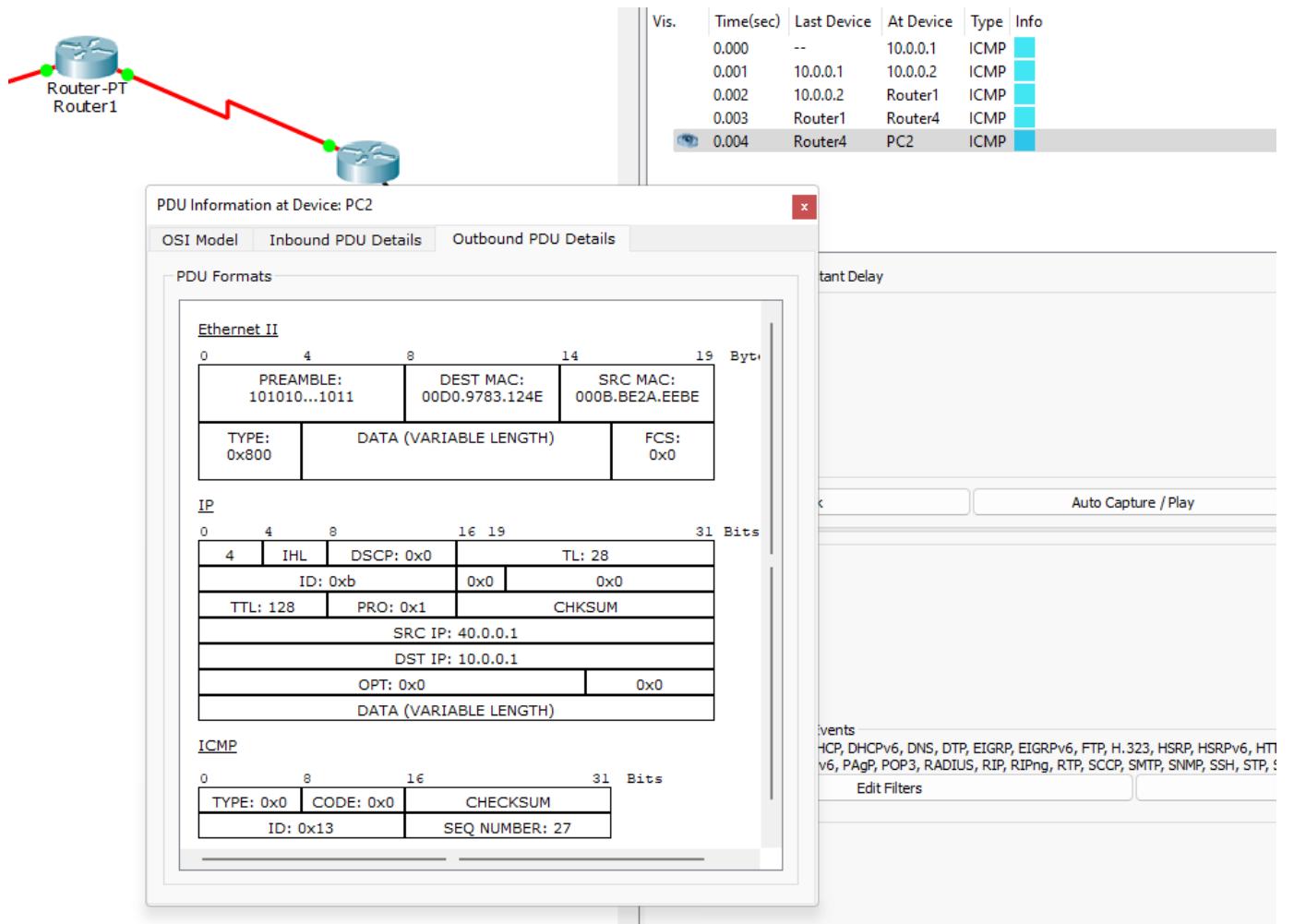


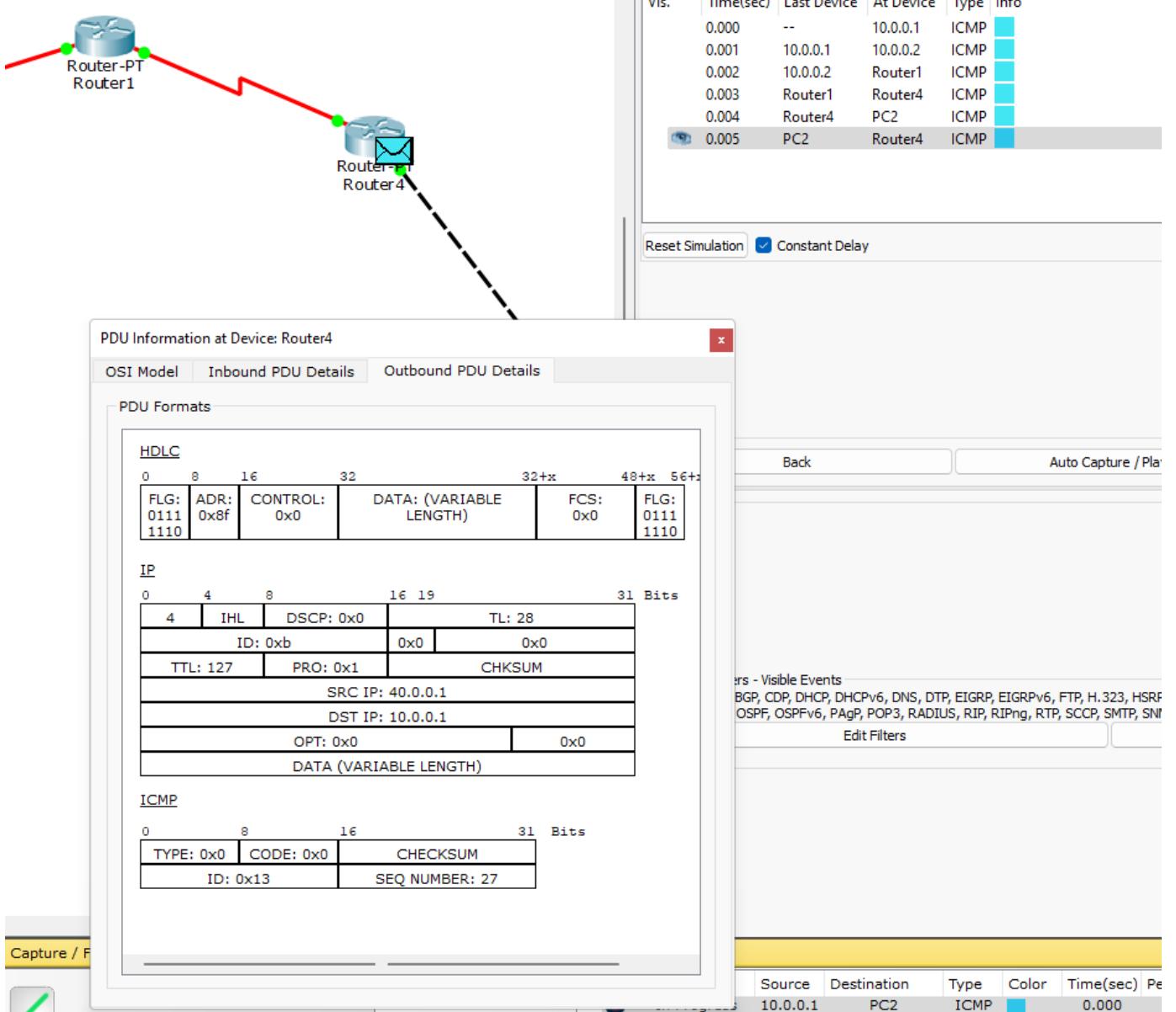


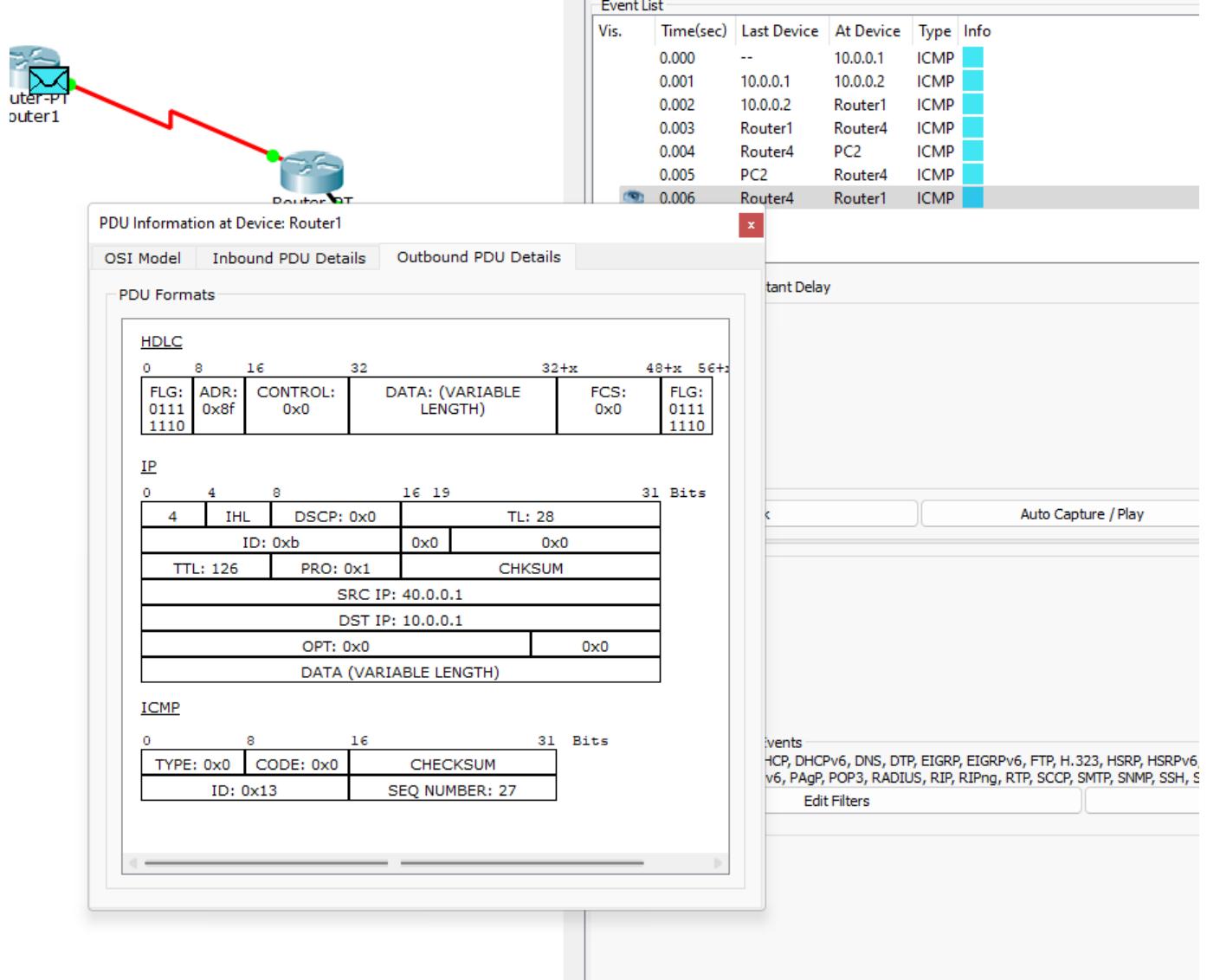


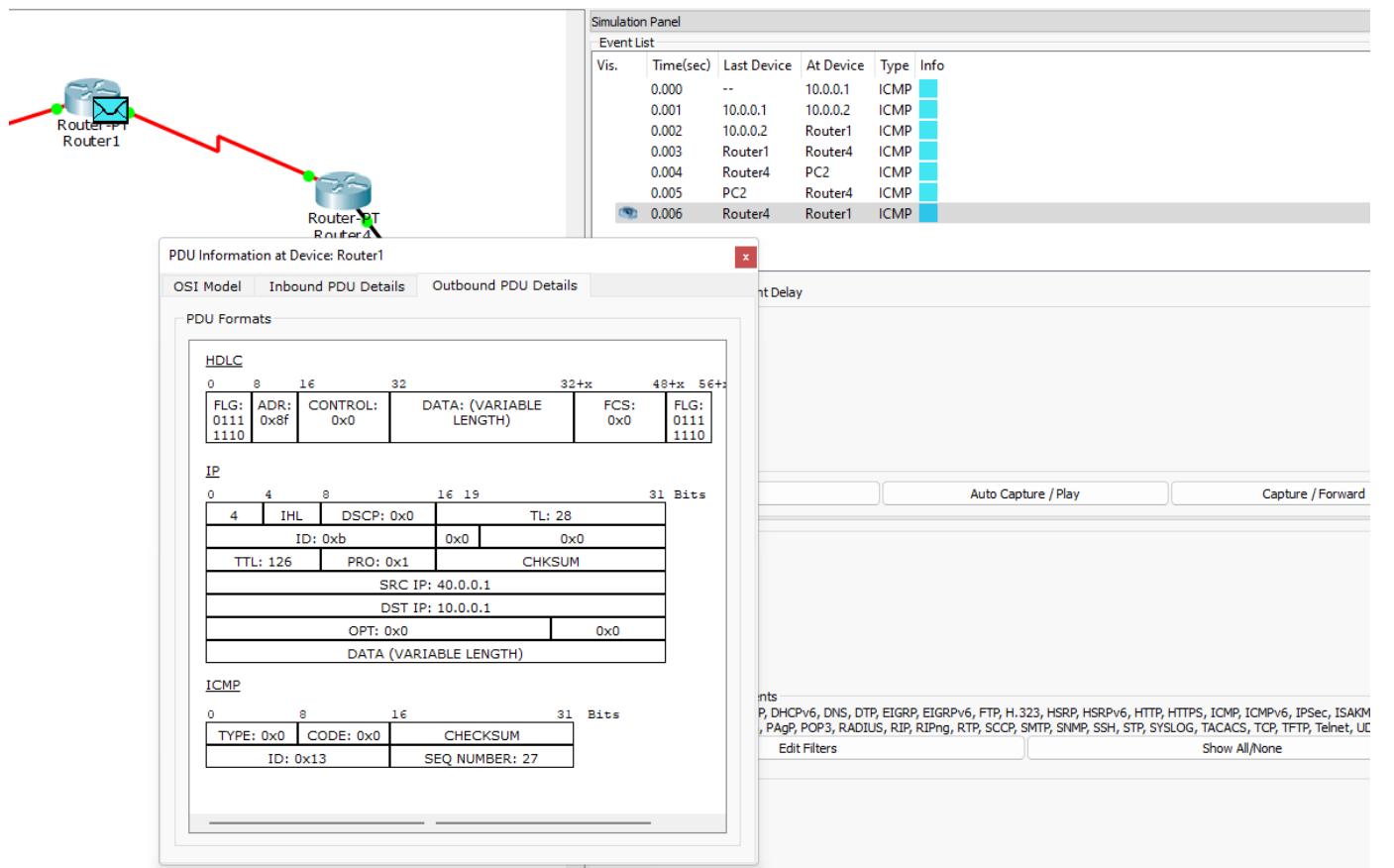


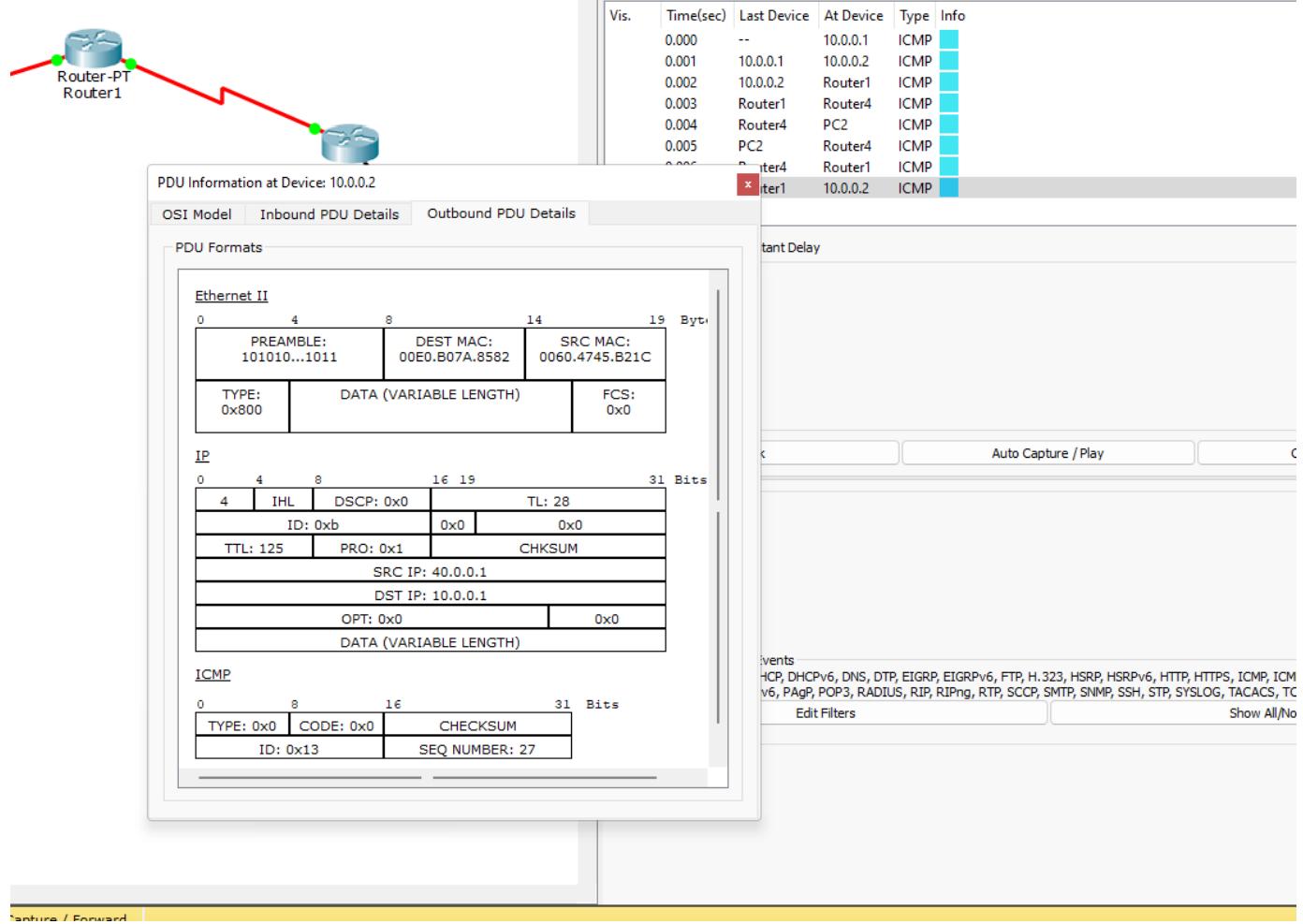












Router-PT
Router1

PDU Information at Device: 10.0.0.1

OSI Model Inbound PDU Details

PDU Formats

Ethernet II

0	4	8	14	19	Bytes
PREAMBLE: 101010...1011				DEST MAC: 00E0.B07A.8582	SRC MAC: 0060.4745.B21C
TYPE: 0x800		DATA (VARIABLE LENGTH)			FCS: 0x0

IP

0	4	8	16	19	31 Bits
IHL		DSCP: 0x0	TL: 28		
ID: 0xb		0x0	0x0		
TTL: 125	PRO: 0x1	CHKSUM			
SRC IP: 40.0.0.1					
DST IP: 10.0.0.1					
OPT: 0x0		0x0			
DATA (VARIABLE LENGTH)					

ICMP

0	8	16	31	Bits
TYPE: 0x0		CODE: 0x0	CHECKSUM	
ID: 0x13		SEQ NUMBER: 27		

Events

Auto Capture / Play

Capture / Forward

Scenario 0

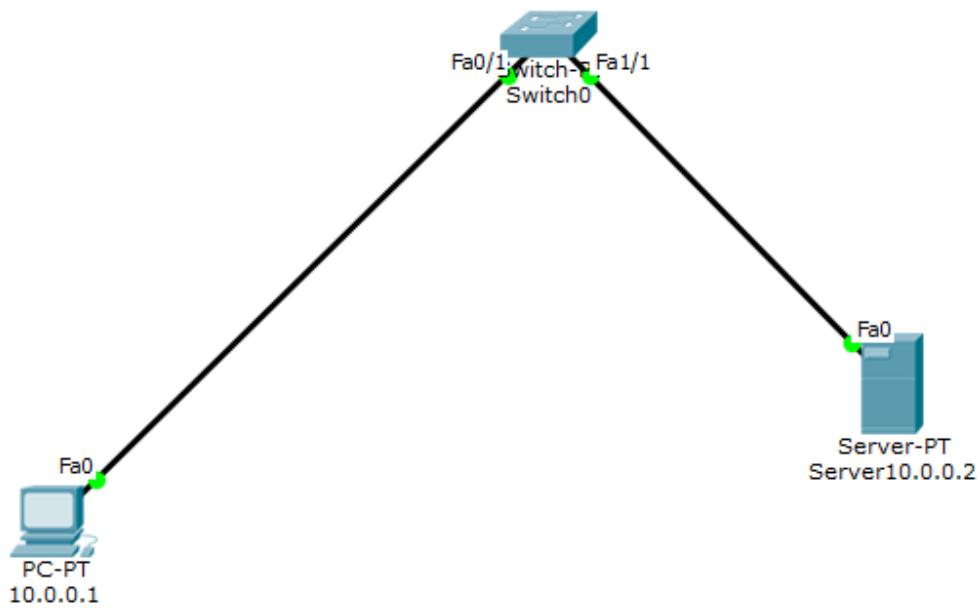
Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit

Successful 10.0.0.1 PC2 ICMP 0.000 N 0 (edit)

New Delete

Lab 8

Configure Web Server, DNS within a LAN.



Set the ip address of PC

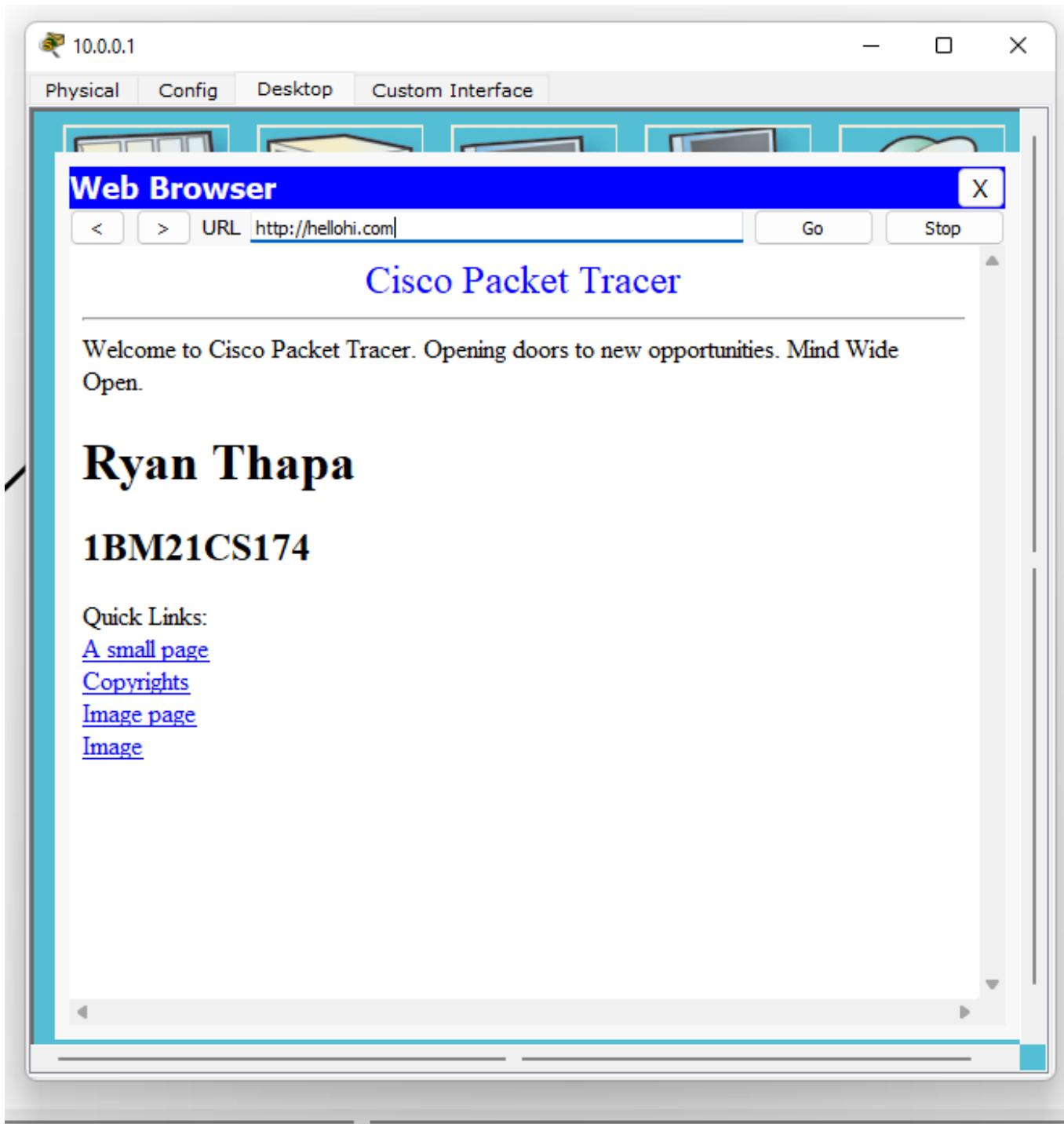
Then set the ip address of server

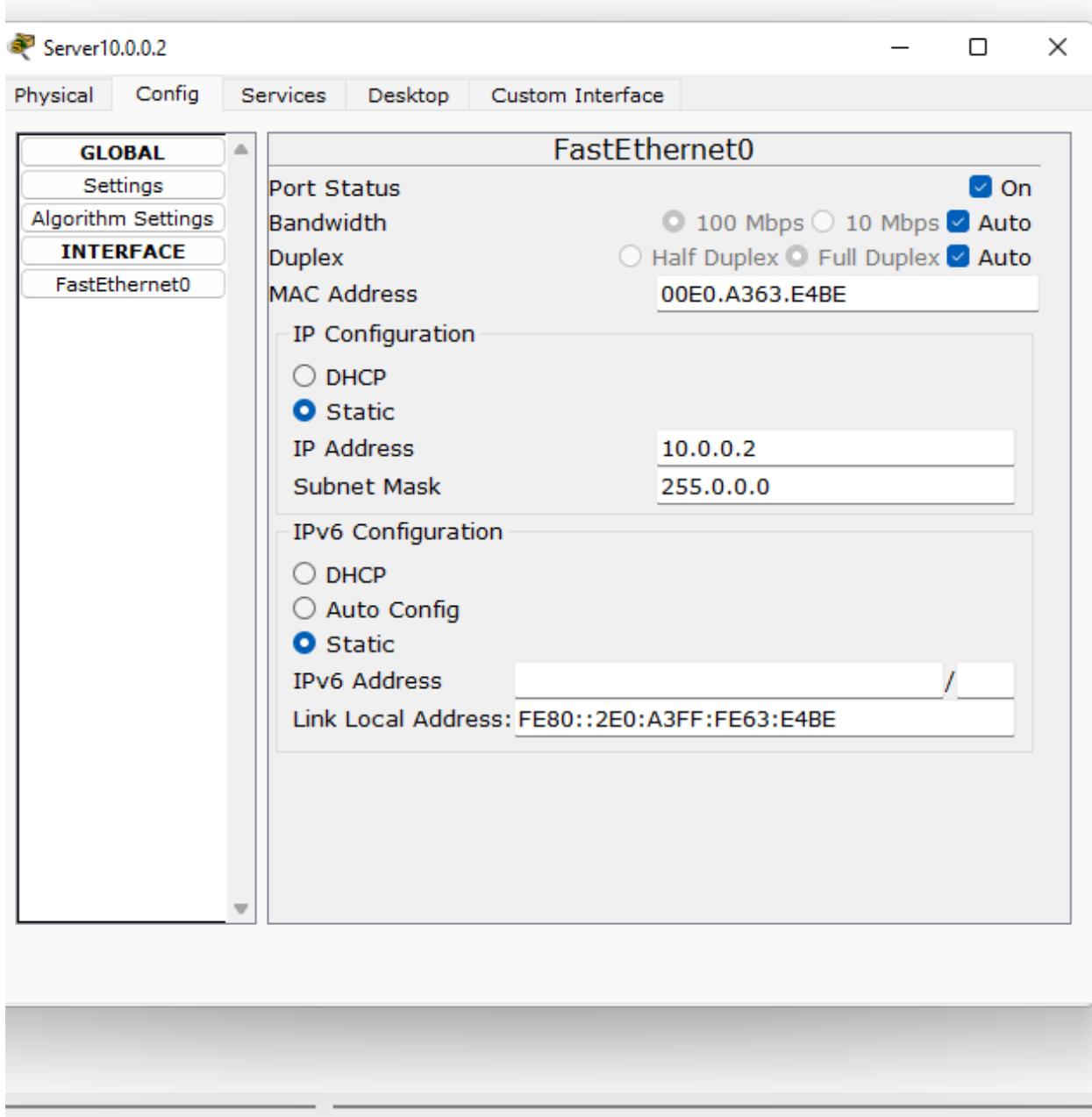
Go to DNS -> set the name and ip address of server as the server

Then go to pC and url and you should see the name of the site and it content

Go to DNS -> then Index.html and set the Name and usn using html tags

When we access the site through PC , we would see our site with name and usn





Server10.0.0.2

Physical Config Services Desktop Custom Interface

SERVICES

- HTTP
- DHCP
- DHCPv6
- TFTP
- DNS
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP

DNS

DNS Service On Off

Resource Records

Name Type

Address

No.	Name	Type	Detail
0	hellohi.com	A Record	10.0.0.2

Physical

Config

Services

Desktop

Custom Interface

SERVICES

HTTP

DHCP

DHCPv6

TFTP

DNS

SYSLOG

AAA

NTP

EMAIL

FTP

HTTP**HTTP** On Off**HTTPS** On Off**File Manager**

	File Name	Edit	Delete
1	copyrights.html	(edit)	(delete)
2	cscptlogo177x...		(delete)
3	helloworld.html	(edit)	(delete)
4	image.html	(edit)	(delete)
5	index.html	(edit)	(delete)

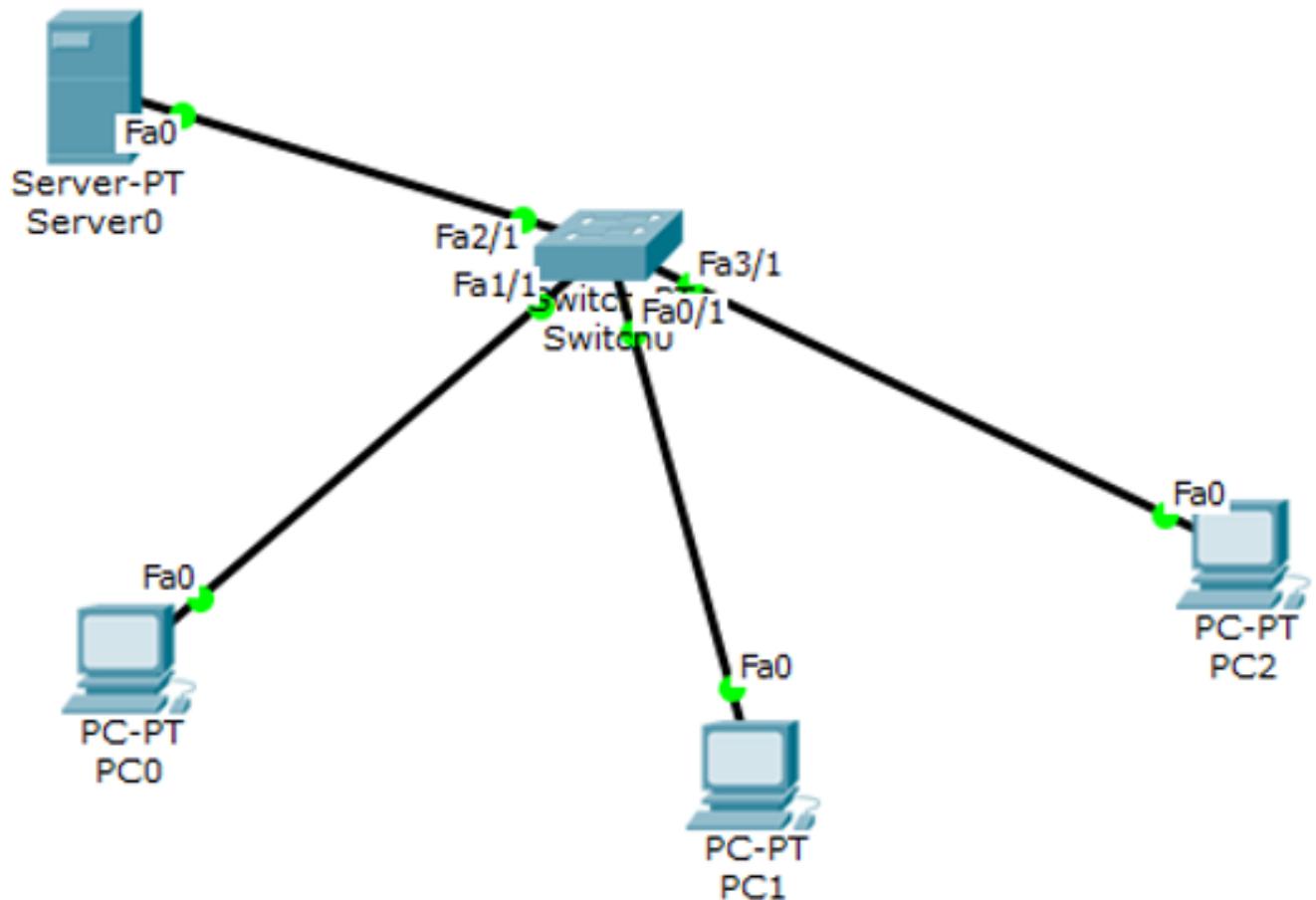
New File

Import

Lab 9

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

ARP



ARP Table for PC1

IP Address	Hardware Address	Interface
10.0.0.1	0001.635C.43B0	FastEthernet0
10.0.0.3	0000.0C51.041A	FastEthernet0

```
Switch>show mac address-table  
Mac Address Table
```

Vlan	Mac Address	Type	Ports
---	-----	-----	-----
1	0000.0c51.041a	DYNAMIC	Fa3/1
1	0001.635c.43b0	DYNAMIC	Fa1/1
1	000a.4118.b887	DYNAMIC	Fa0/1

PING PC2 TO PC3

```
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
```

```
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 = 0ms, Average = 0ms
```

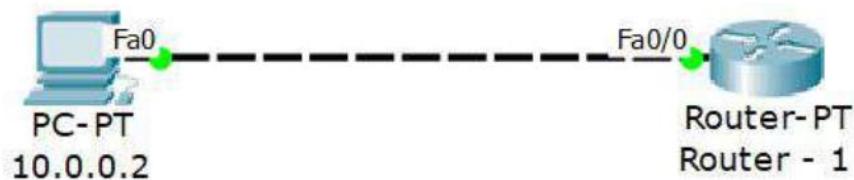
```
PC>arp -a
```

Internet Address	Physical Address	Type
10.0.0.1	0001.635c.43b0	dynamic
10.0.0.3	0000.0c51.041a	dynamic

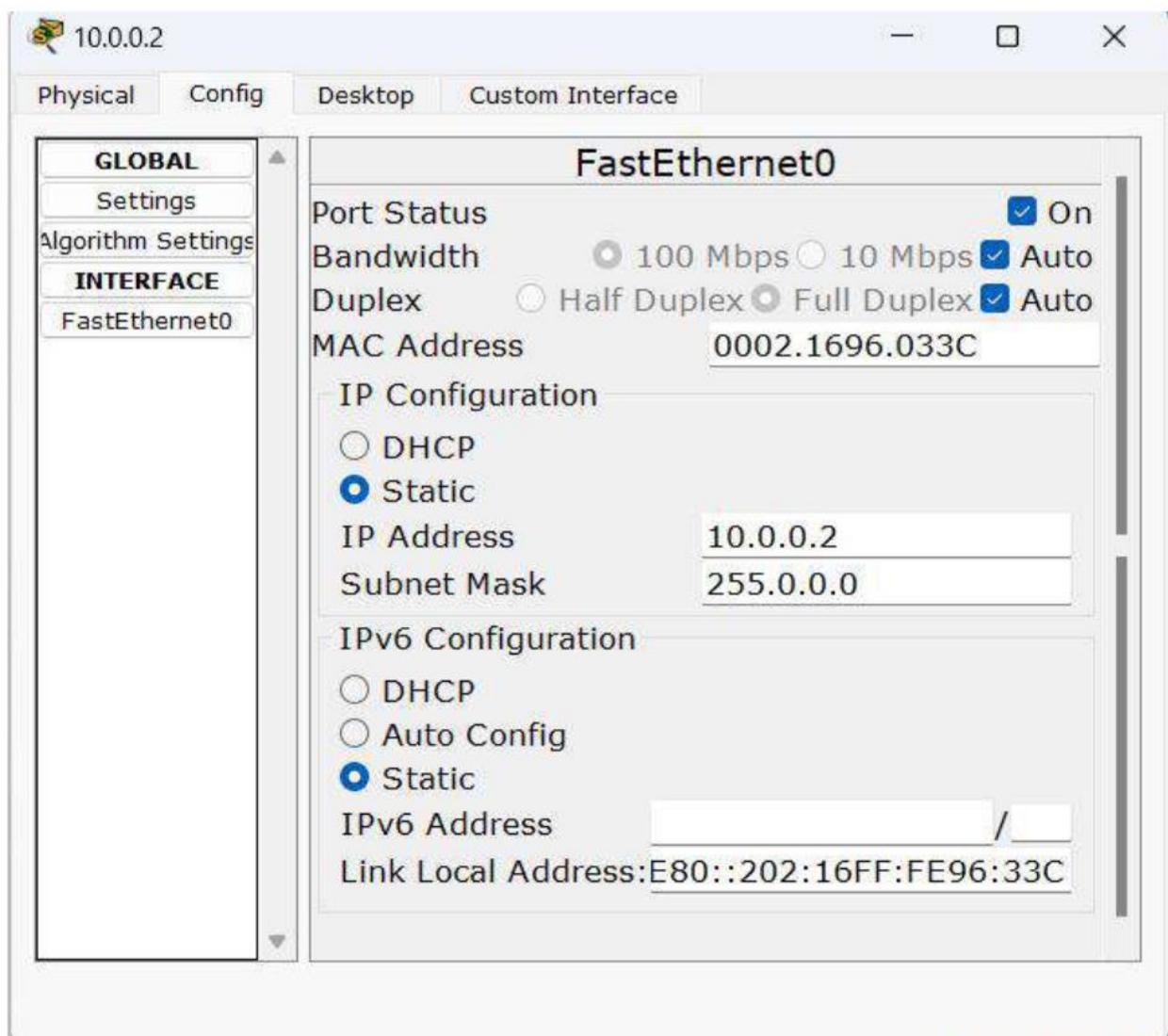
Lab 10

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

Topology:



PC - 1 Configuration:



Router - 1 Configuration:

The screenshot shows a window titled "Router - 1" with three tabs: "Physical", "Config", and "CLI". The "CLI" tab is selected, displaying the IOS Command Line Interface. The configuration commands entered are:

```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R1
R1(config)#enable secret 1
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

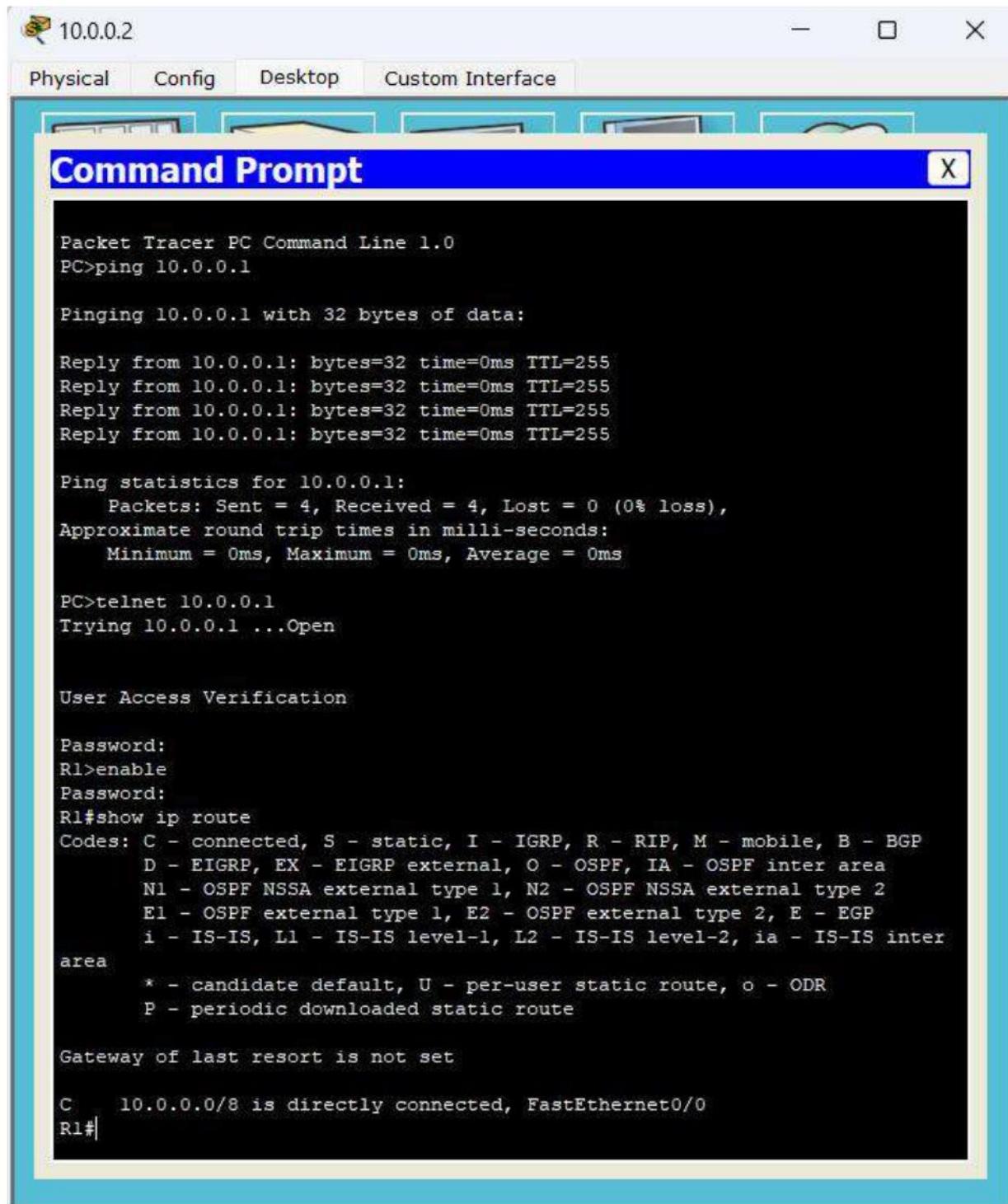
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up

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 of the window are two buttons: "Copy" and "Paste".

PC - 1 (Command Prompt):



The screenshot shows a Cisco Packet Tracer interface with a window titled "Command Prompt". The window displays the following terminal 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 - EGP
      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#
```

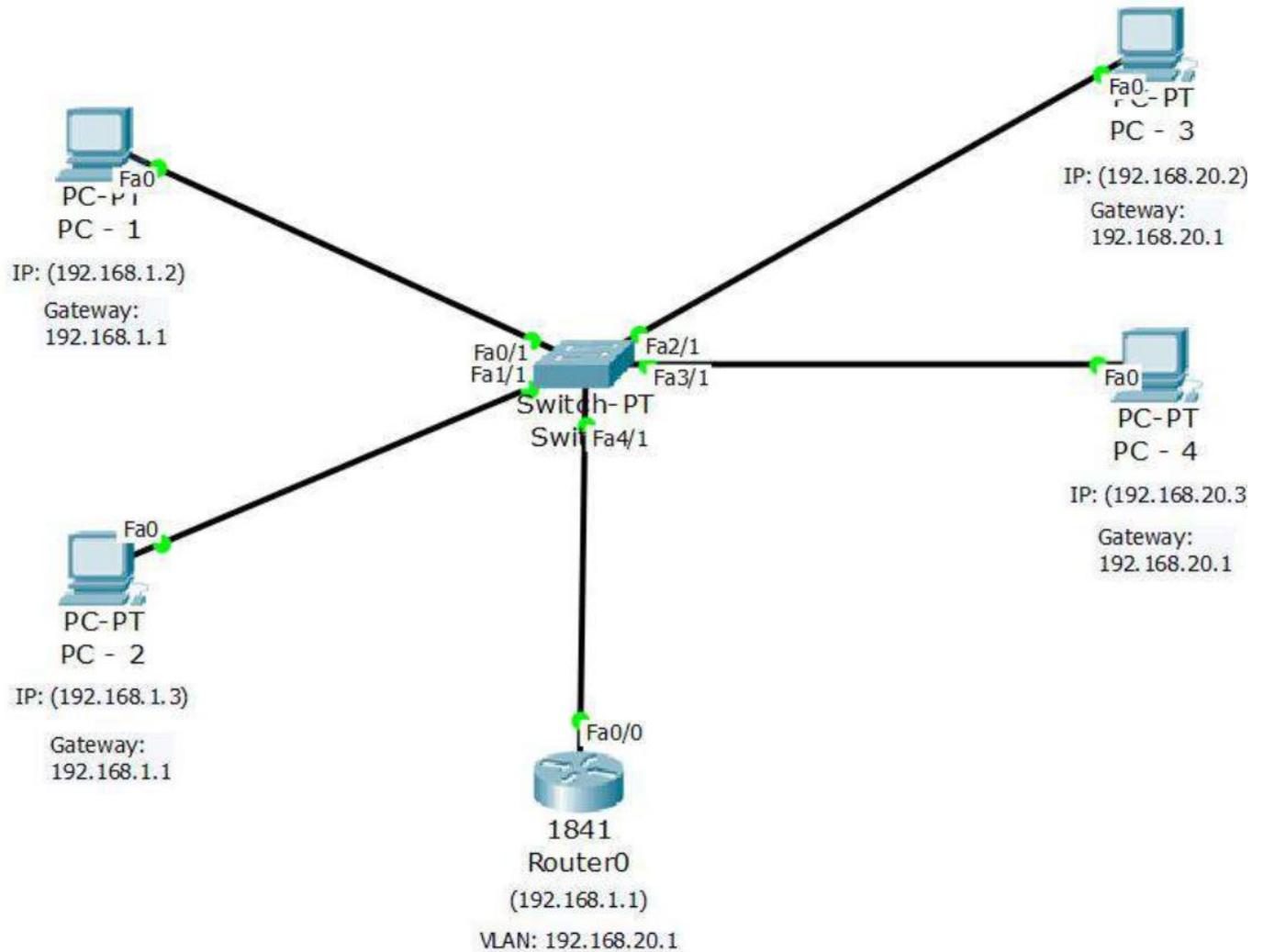
Password for User Access Verification is: **P0**

Password for enable is: **P1**

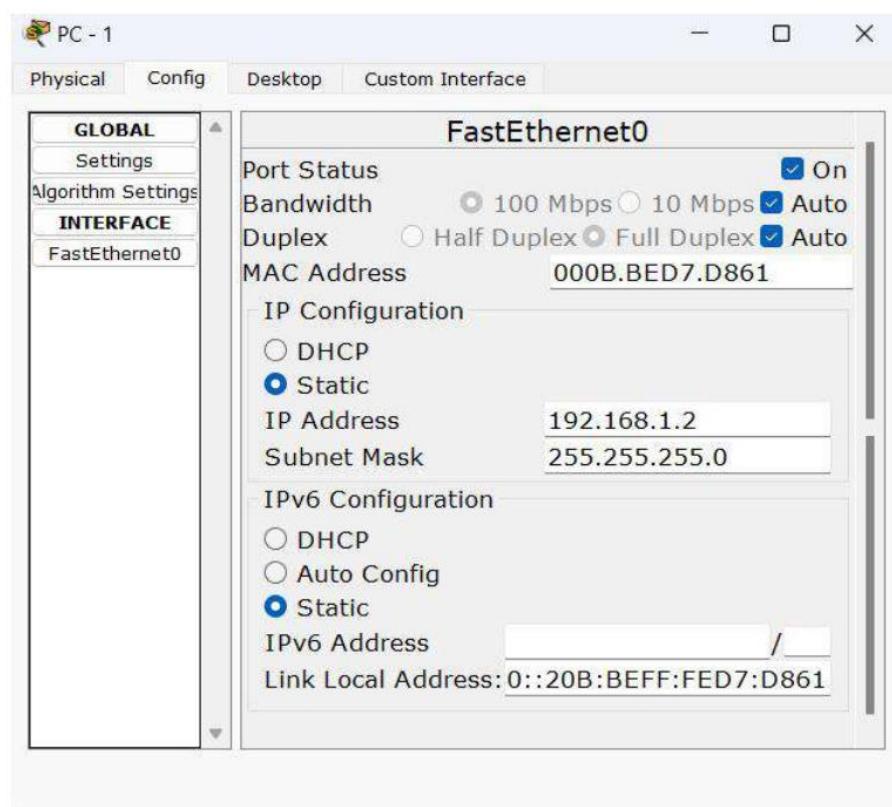
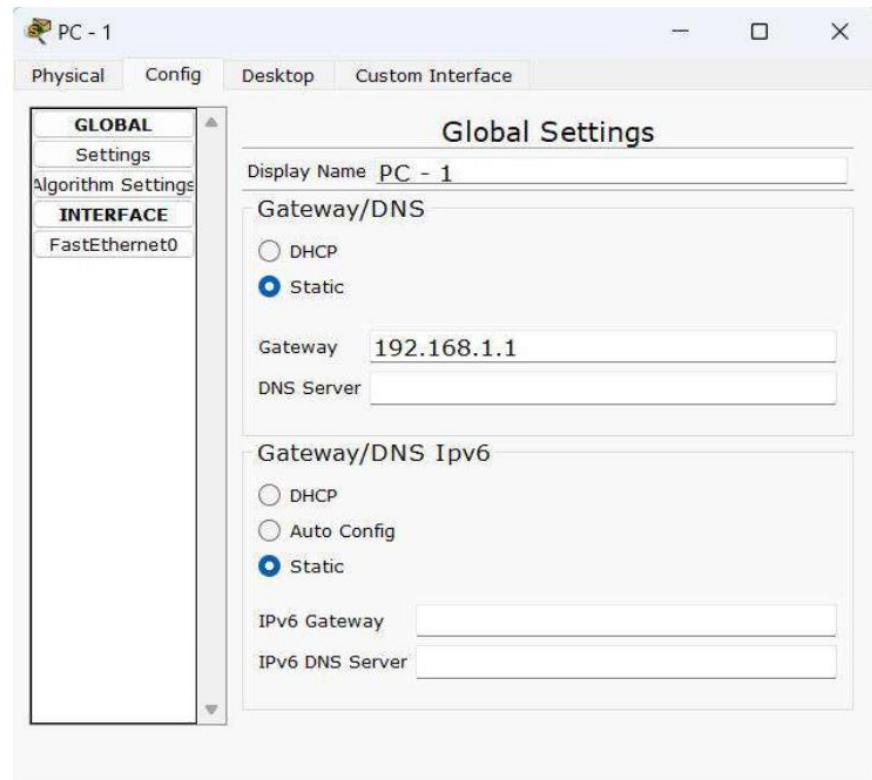
Lab 11

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

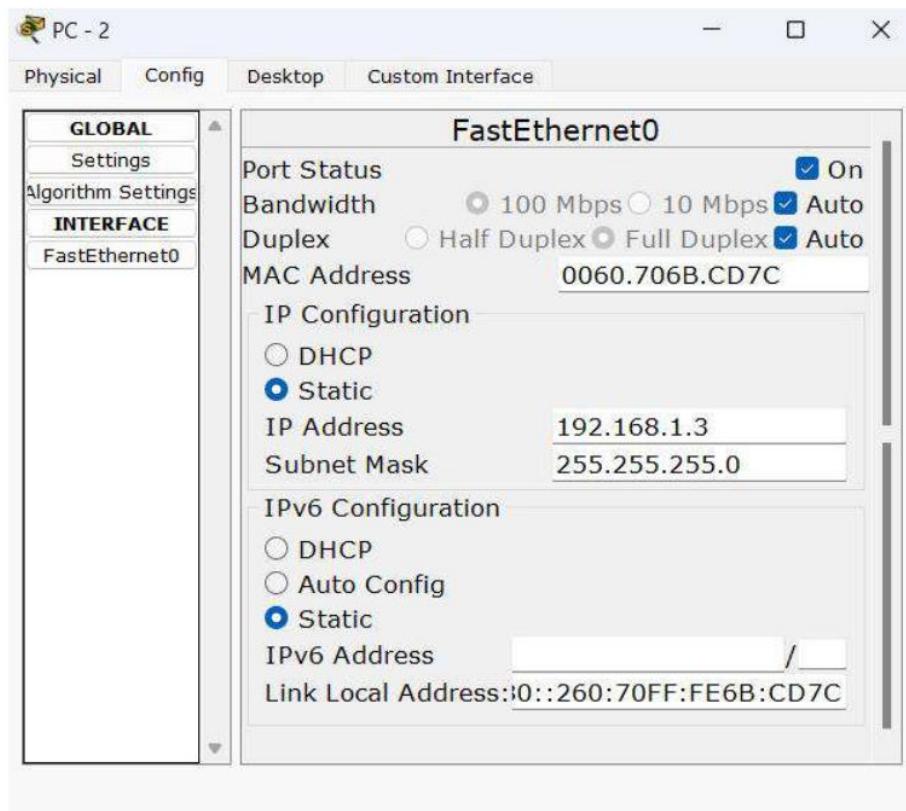
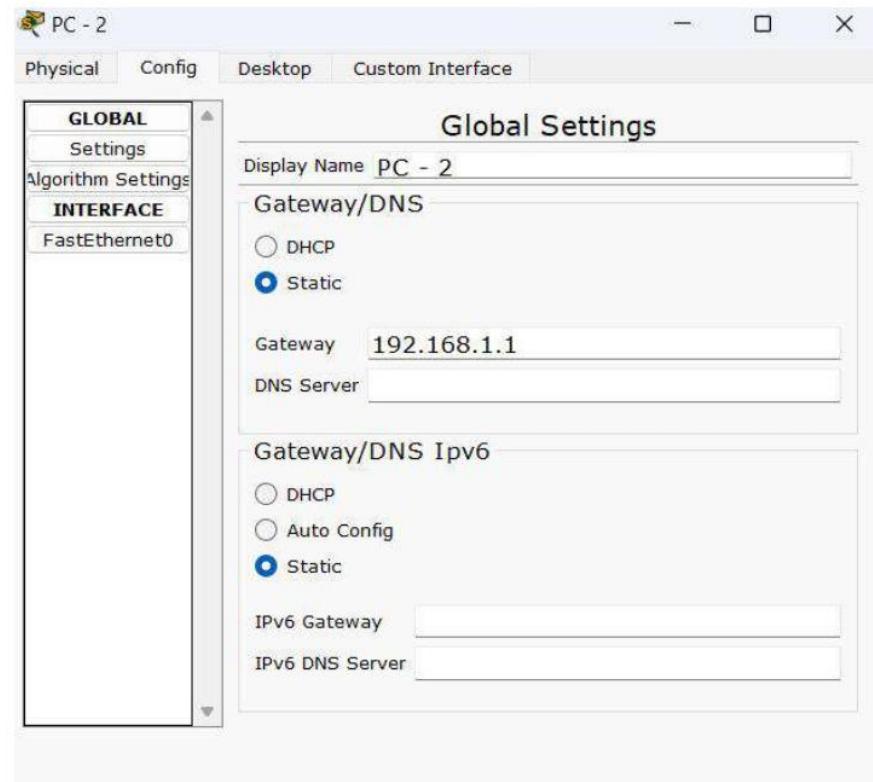
Topology:



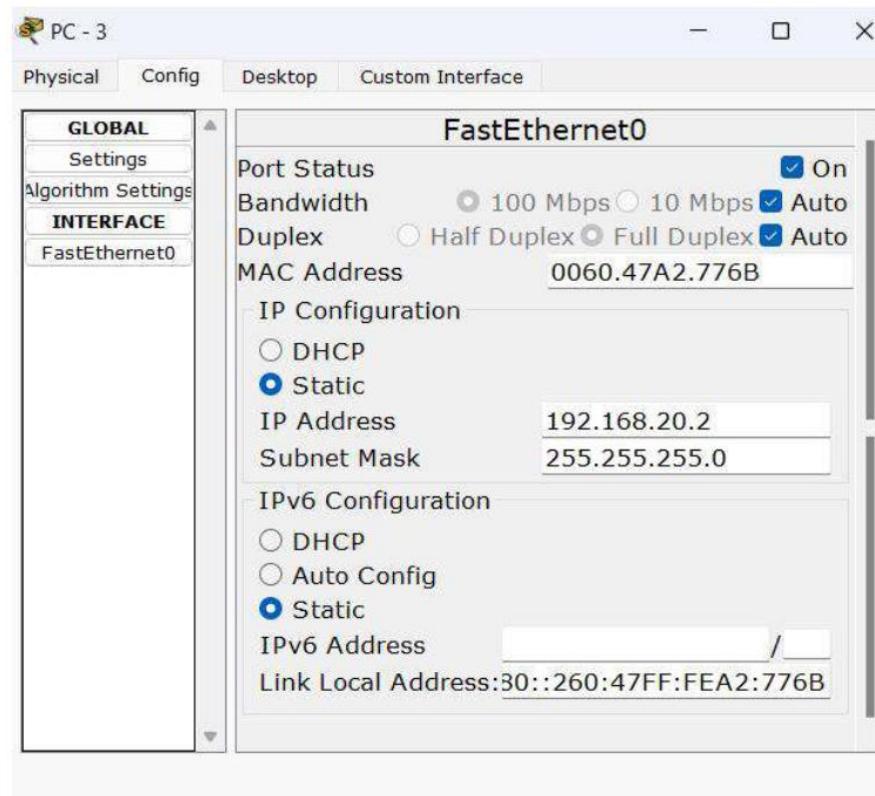
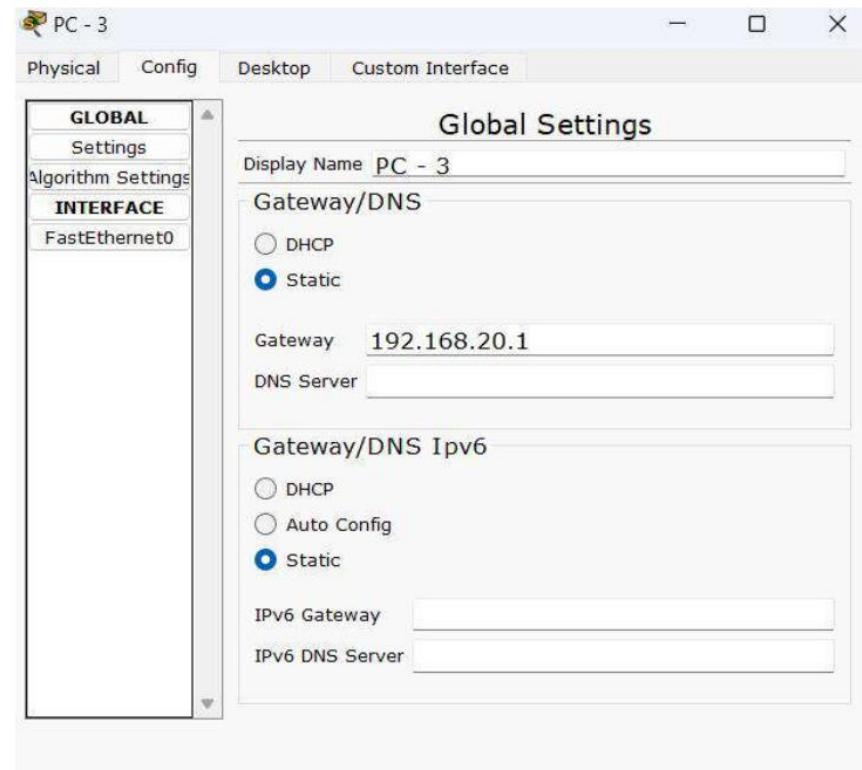
PC - 1 Configuration:



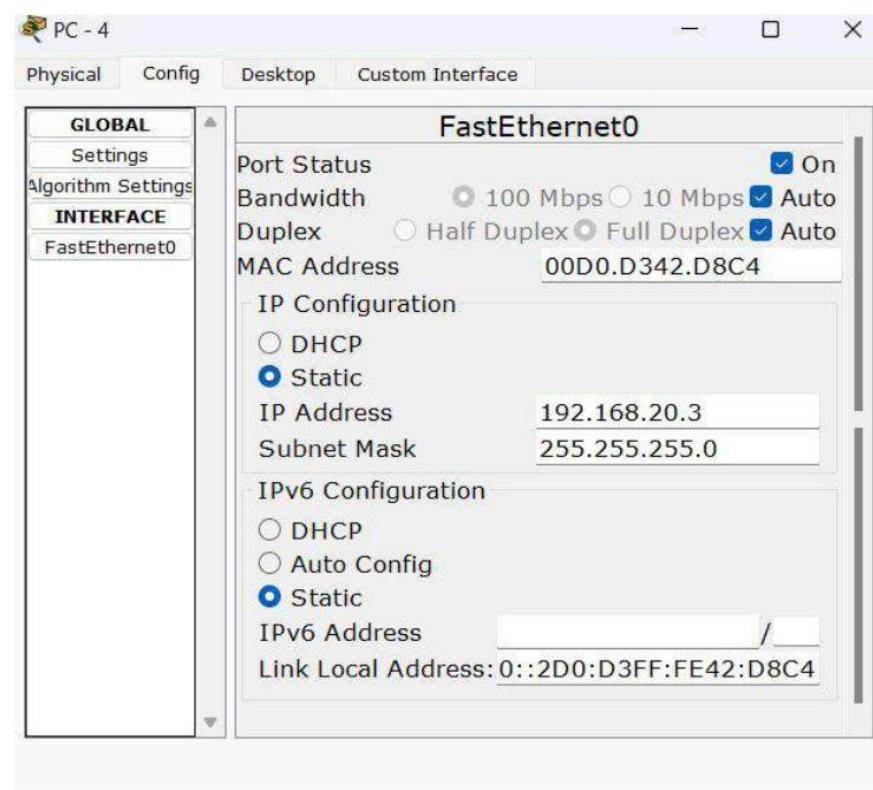
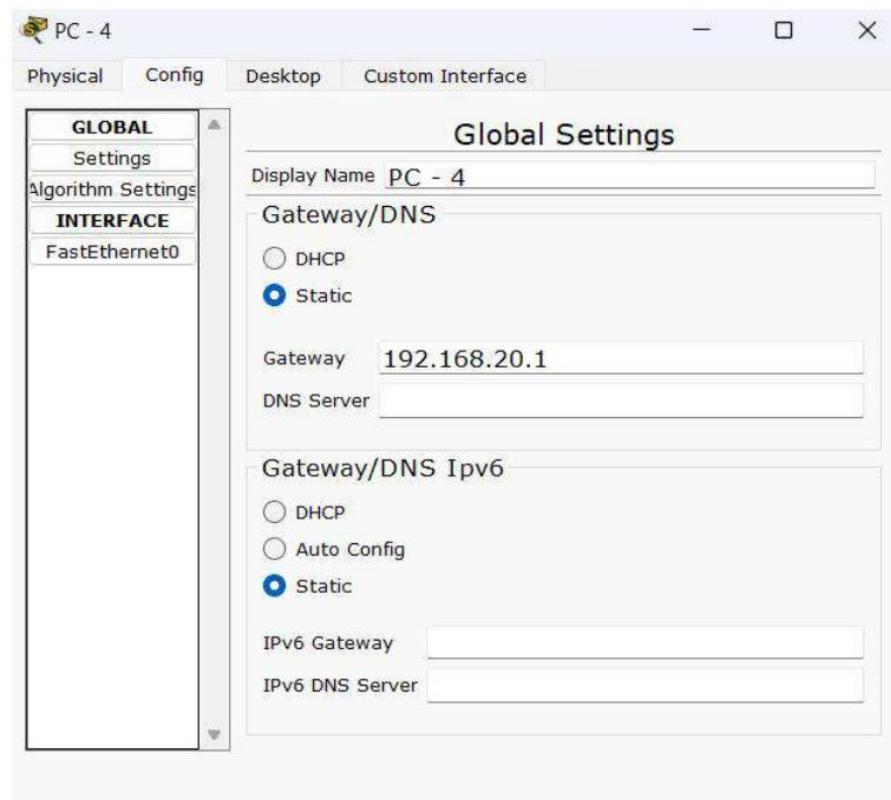
PC - 2 Configuration:



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 Number	2
VLAN Name	NEWVLAN
Add	Remove
VLAN No	VLAN Name
1	default
2	NEWVLAN
1002	fddi-default
1003	token-ring-default
1004	fddinet-default
1005	trnet-default

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

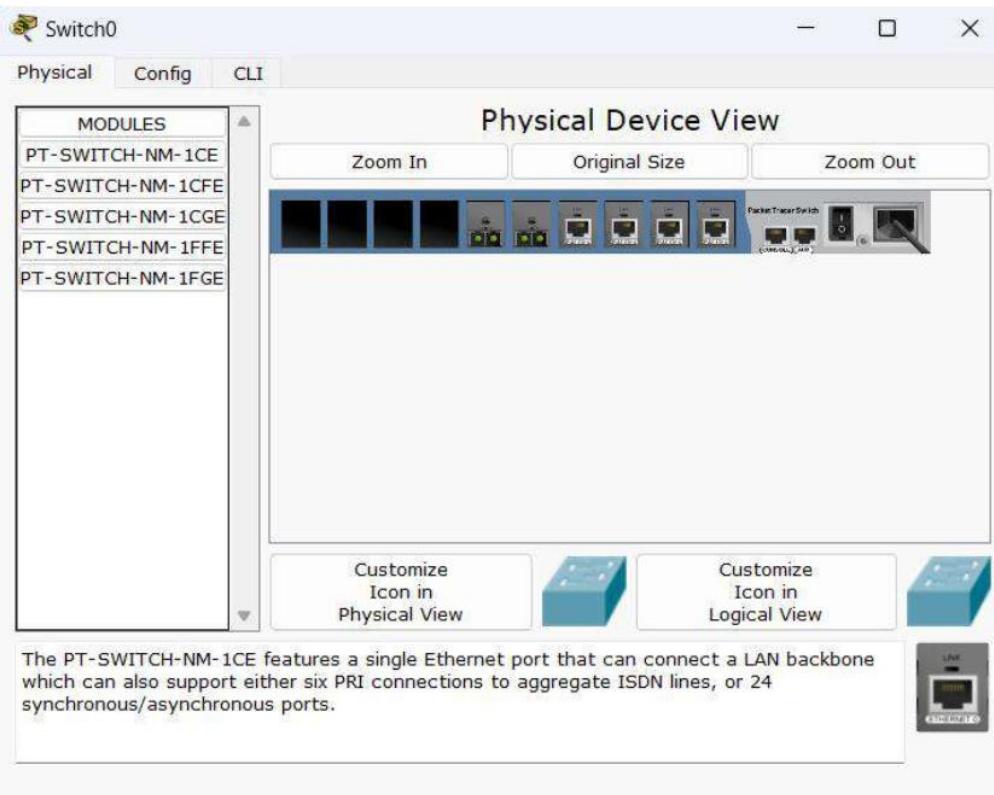
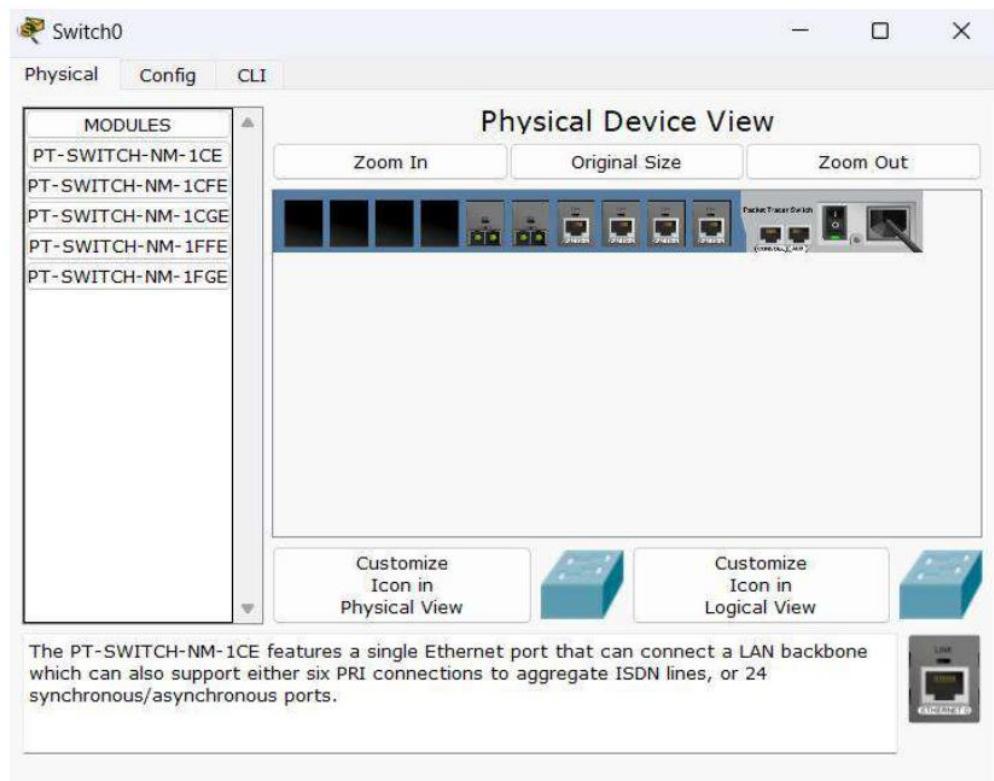
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      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

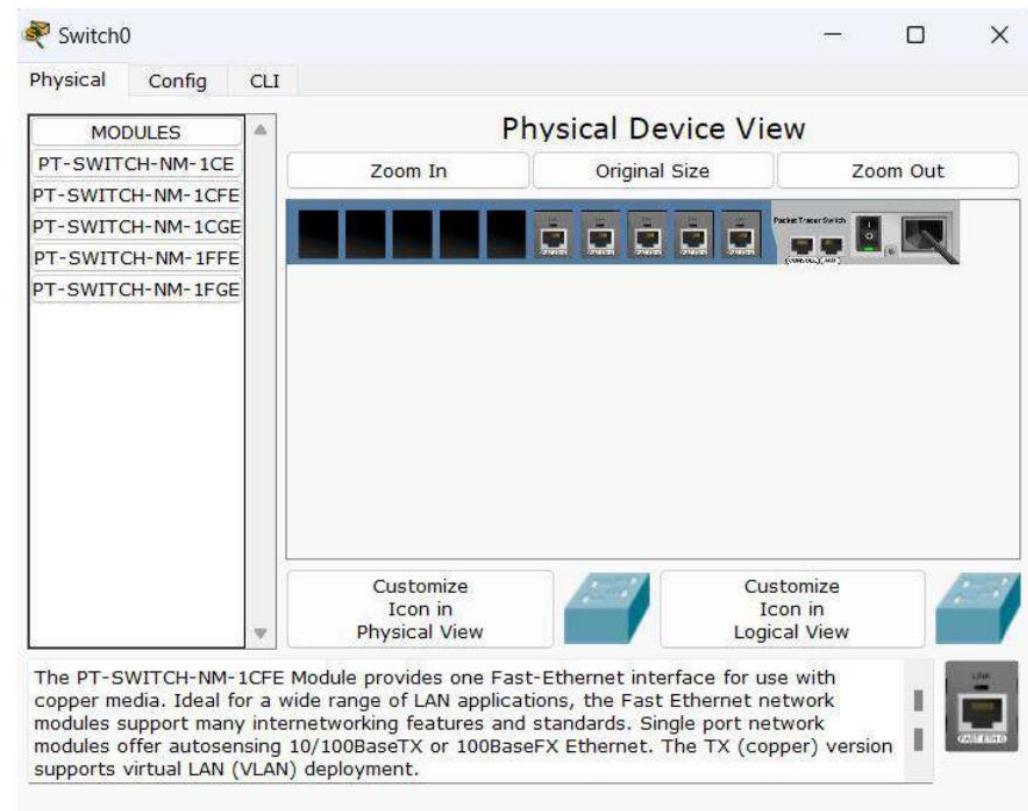
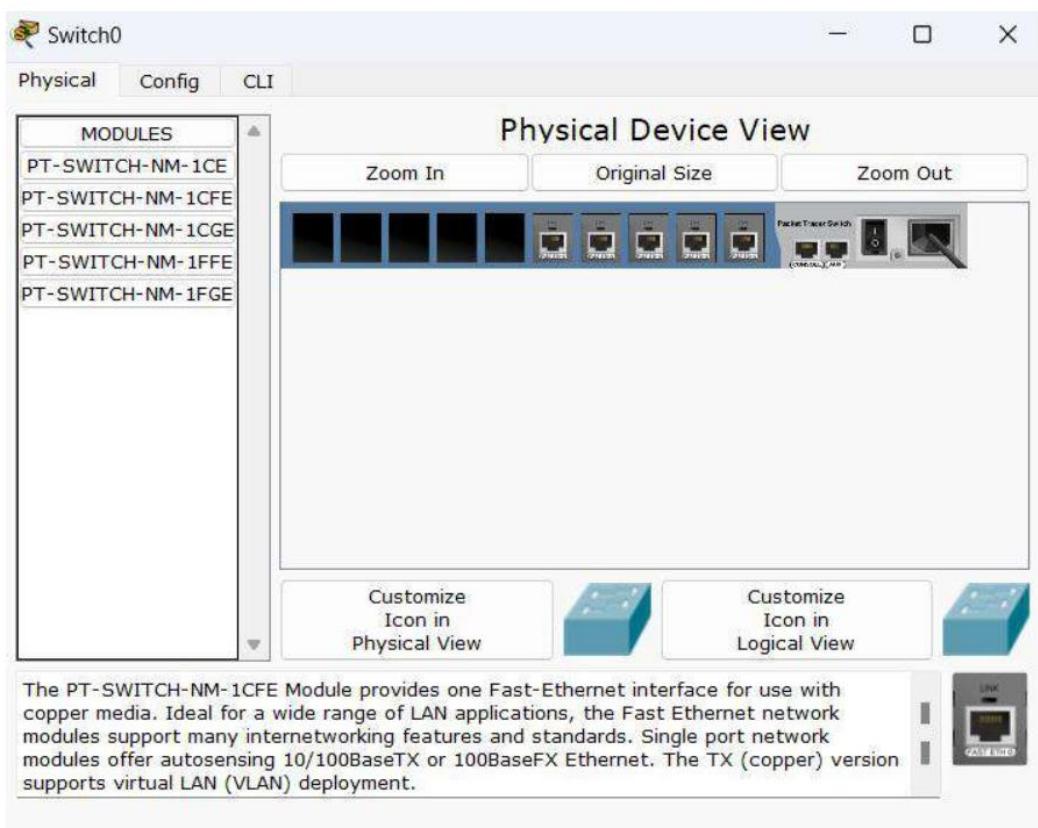
Gateway of last resort is not set

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

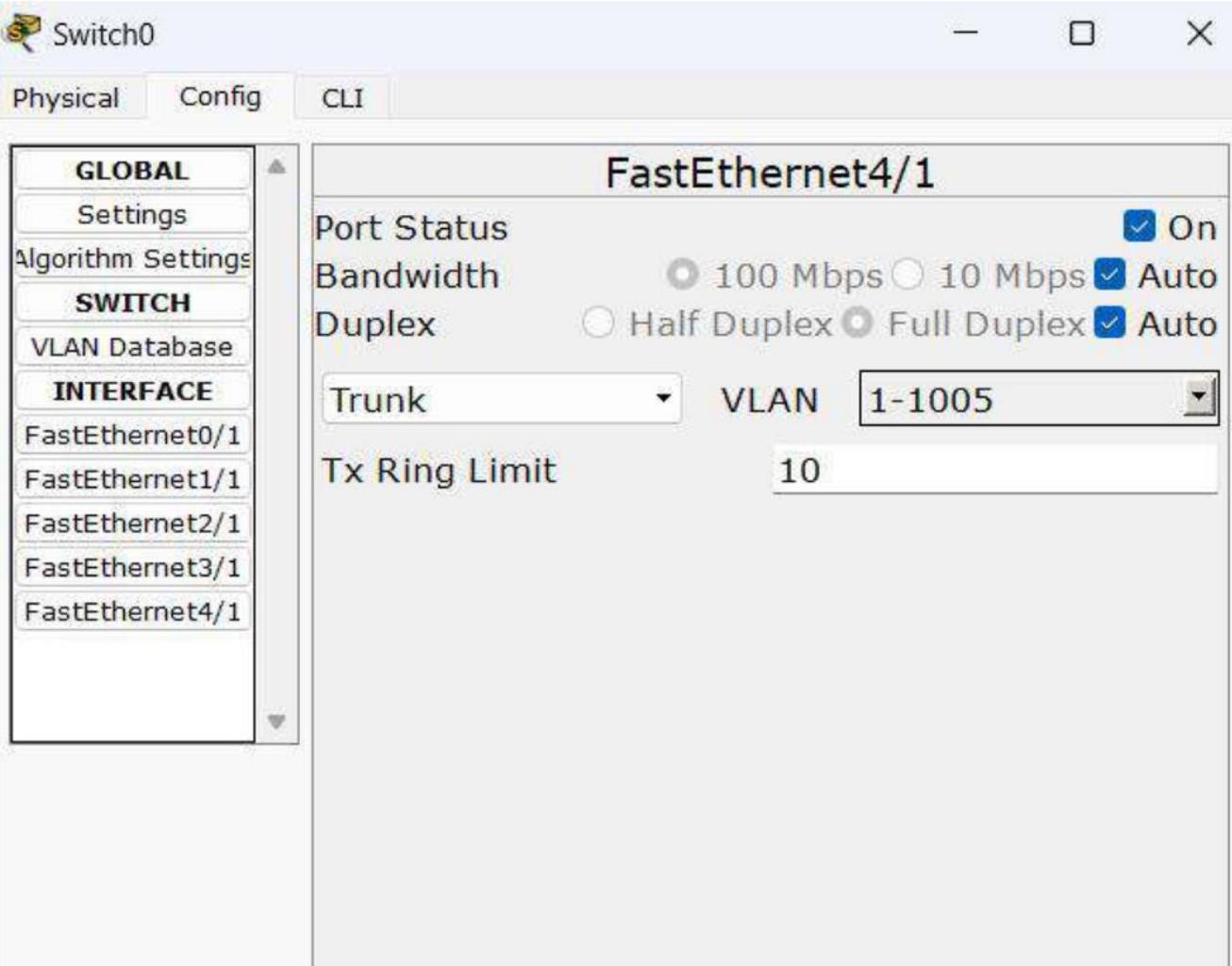
FastEthernet0/1
FastEthernet1/1
FastEthernet2/1
FastEthernet3/1
FastEthernet4/1

FastEthernet4/1

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

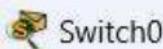
Trunk VLAN 1-1005

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)#{
```



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)#

```

[Copy](#)

[Paste](#)

PC - 1

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=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 - 1

Physical Config Desktop Custom Interface

Command Prompt

```
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

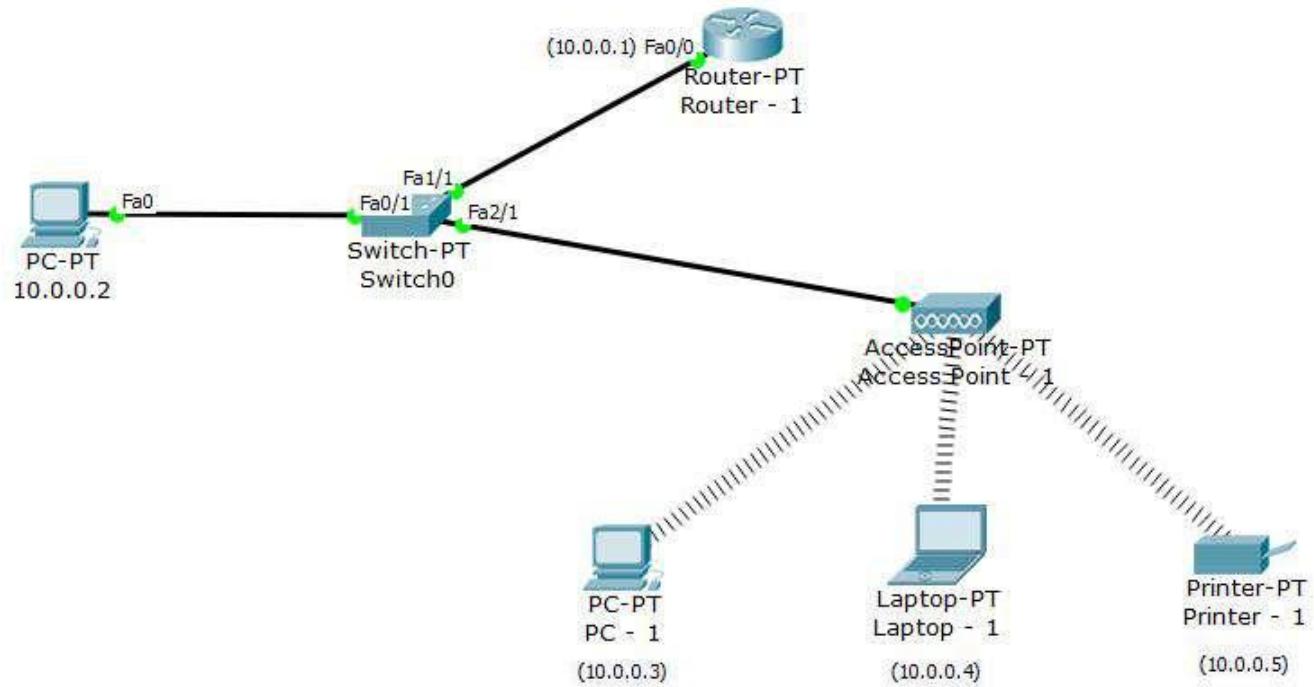
Pinging 192.168.20.3 with 32 bytes of data:

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

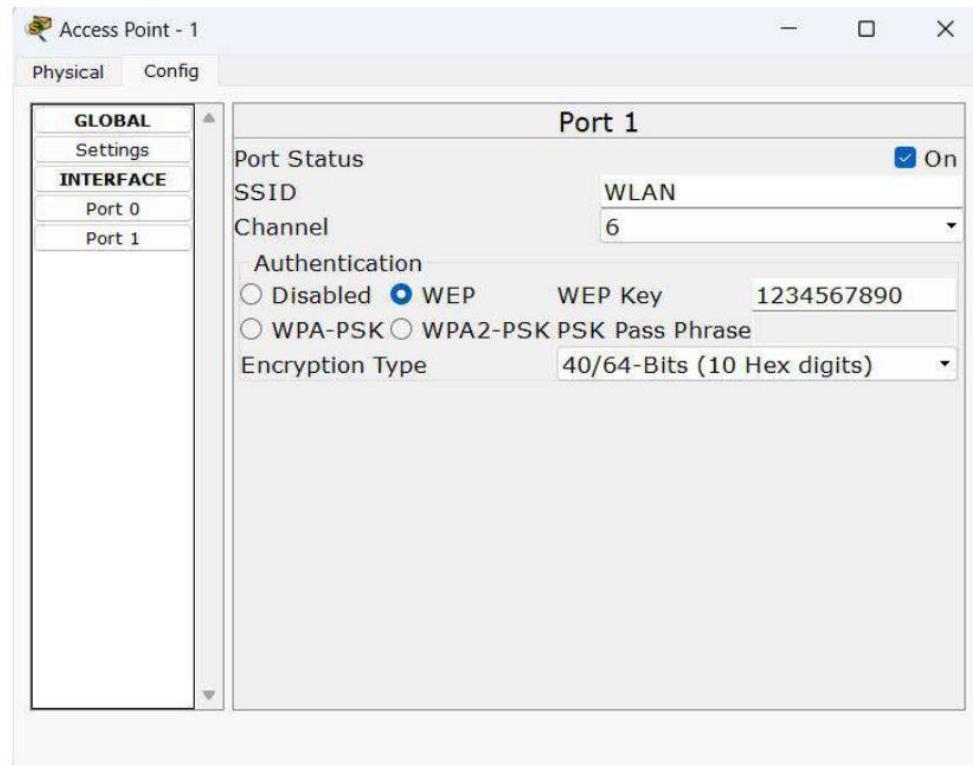
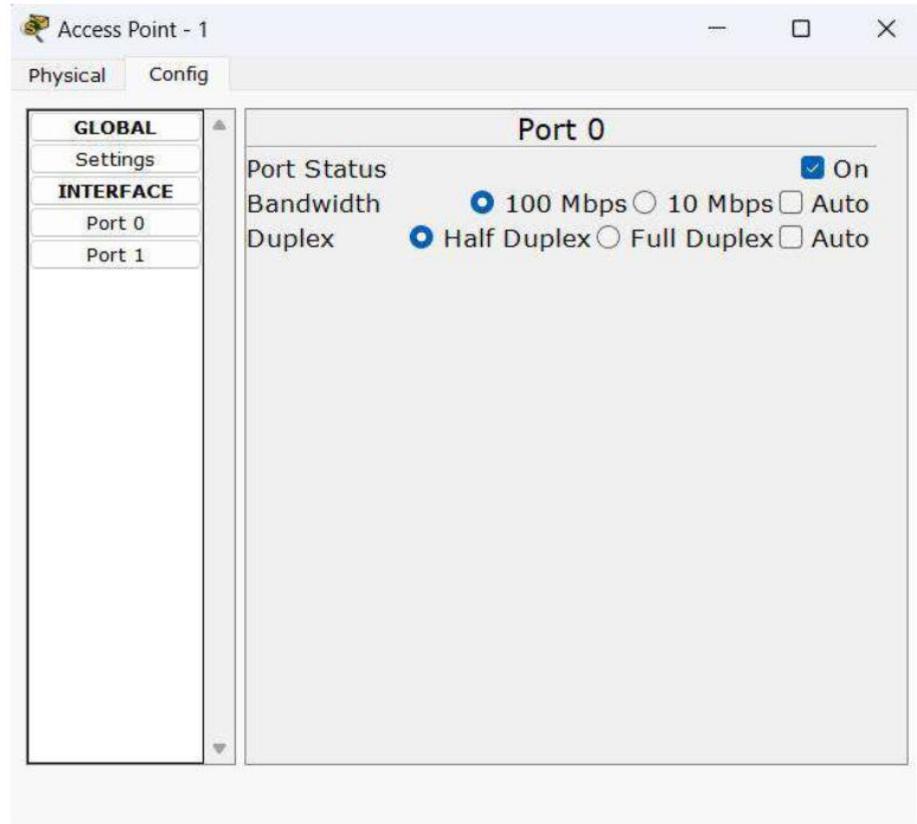
Ping statistics for 192.168.20.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Lab 12

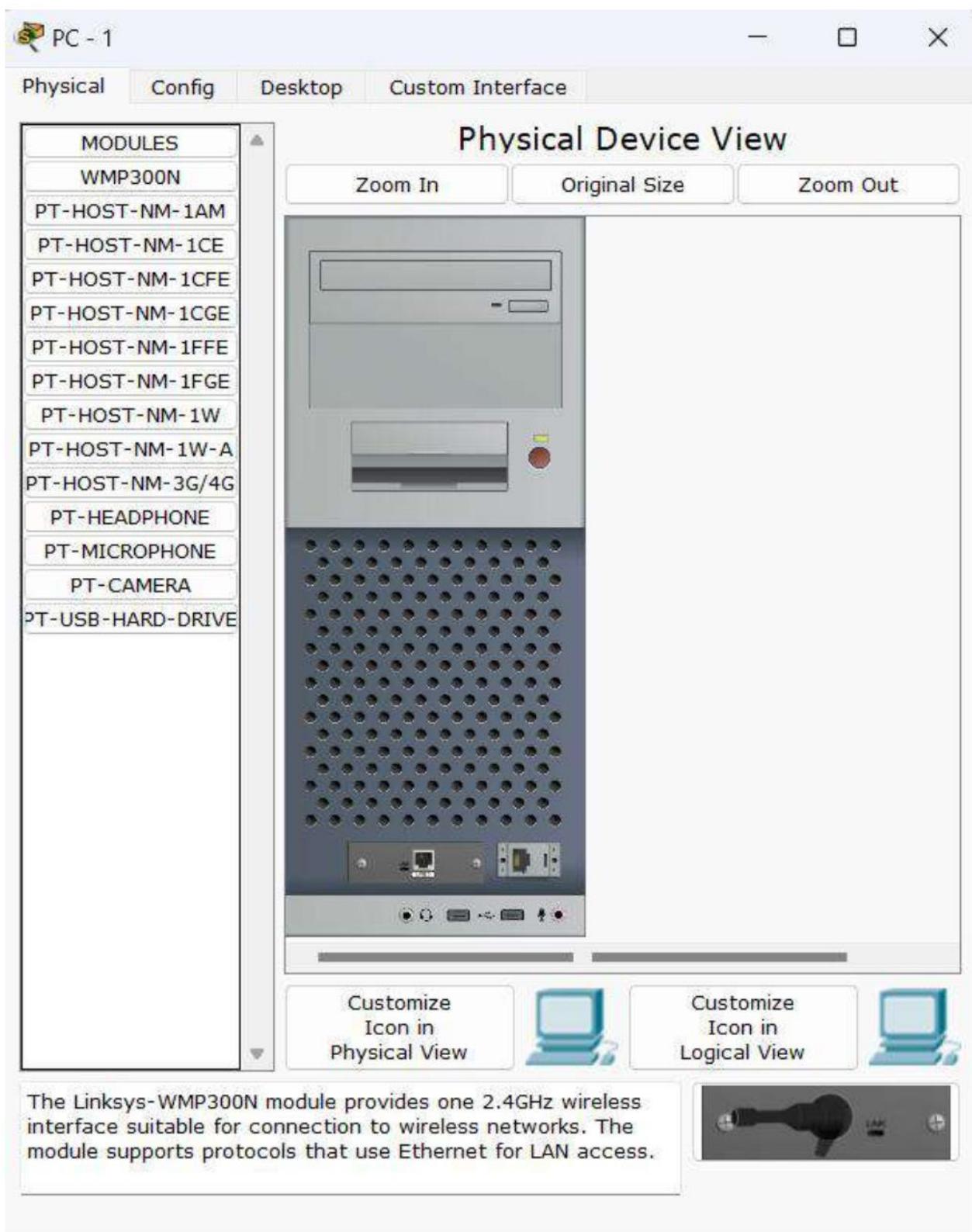
To construct a WLAN and make the nodes communicate wirelessly.



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**

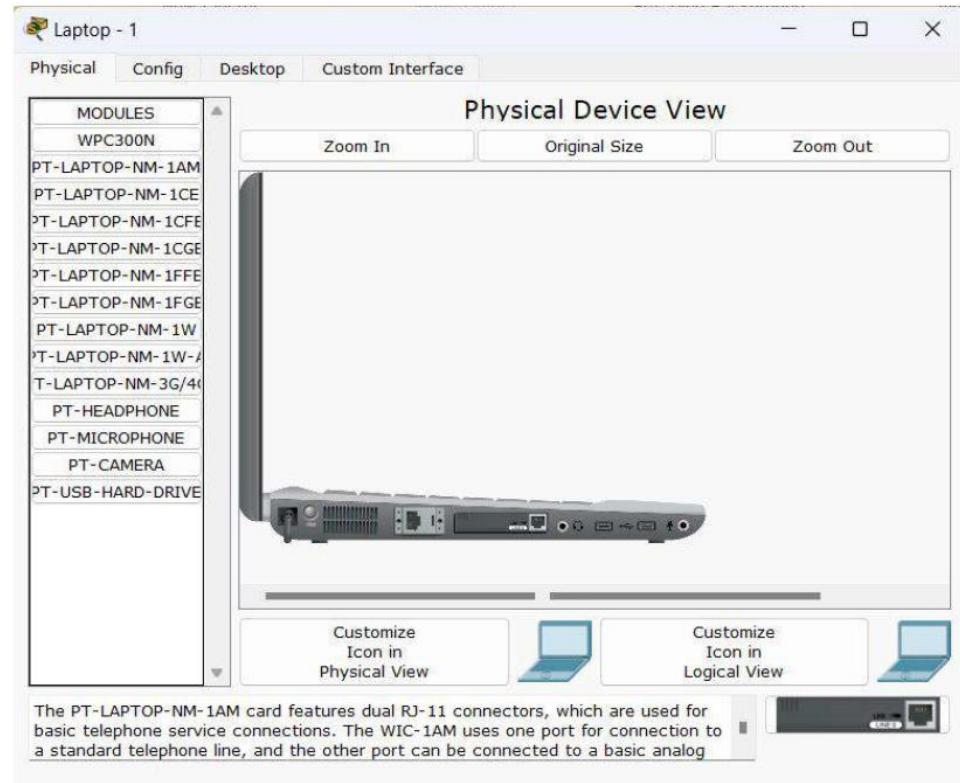
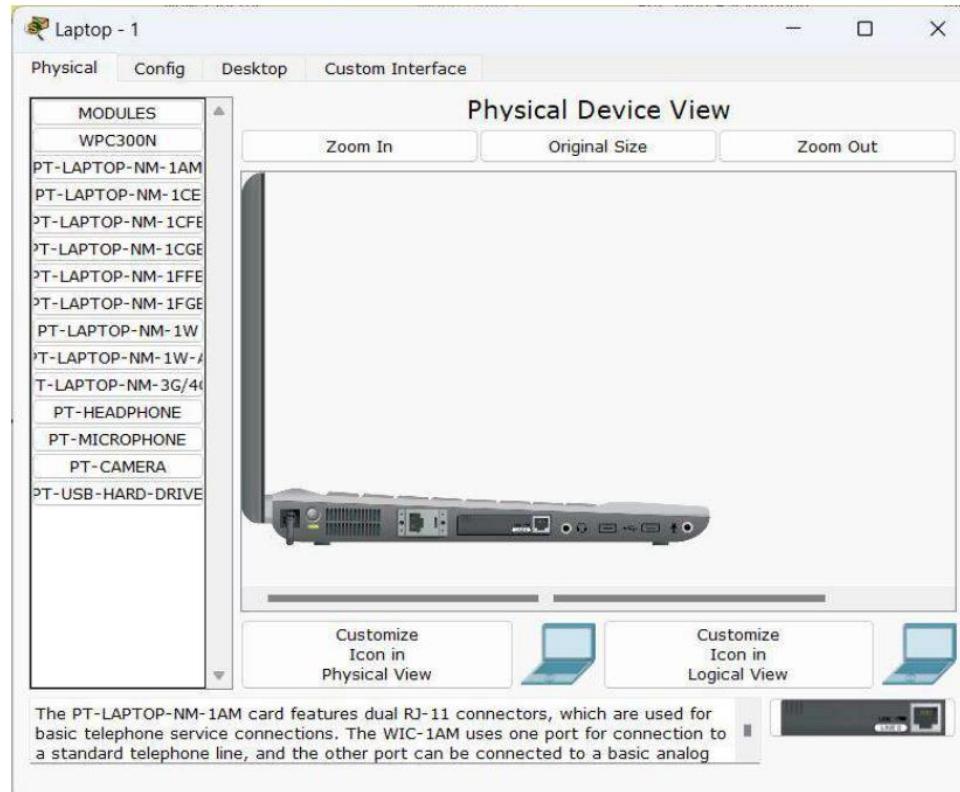
- WMP300N
- PT-HOST-NM-1AM
- PT-HOST-NM-1CE
- PT-HOST-NM-1CFE
- PT-HOST-NM-1CGE
- PT-HOST-NM-1FFE
- PT-HOST-NM-1FGE
- PT-HOST-NM-1W
- PT-HOST-NM-1W-A
- PT-HOST-NM-3G/4G
- PT-HEADPHONE
- PT-MICROPHONE
- PT-CAMERA
- PT-USB-HARD-DRIVE

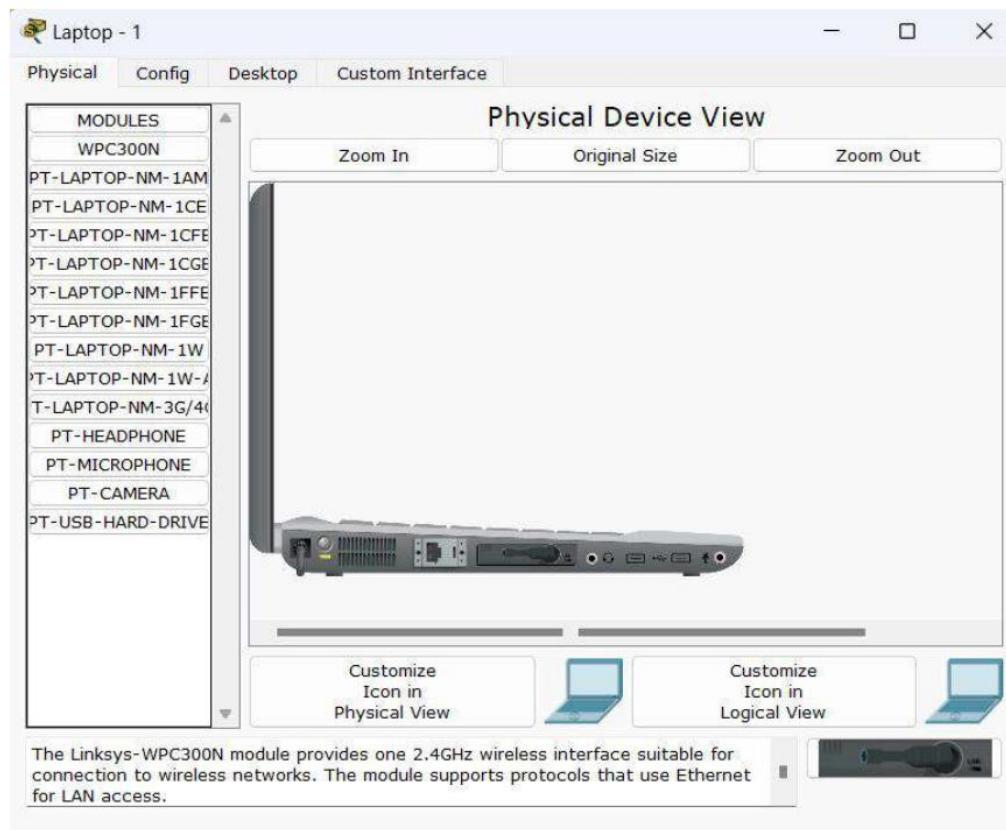
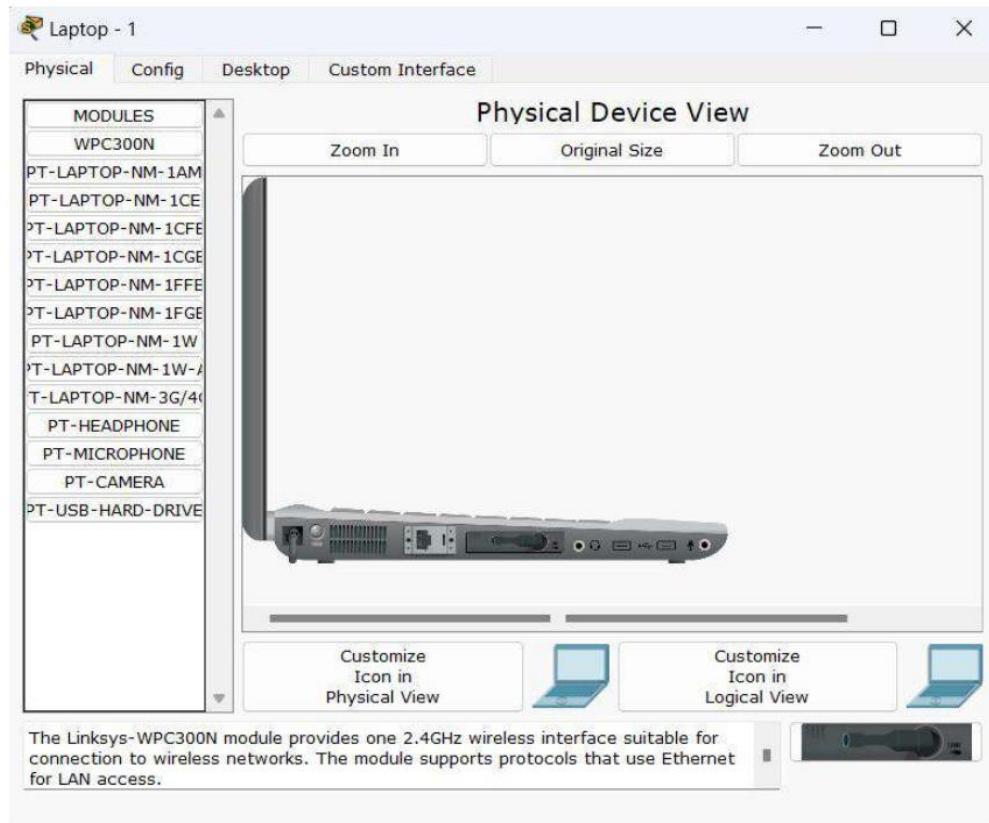
Physical Device View[Zoom In](#)[Original Size](#)[Zoom Out](#)[Customize
Icon in
Physical View](#)[Customize
Icon in
Logical View](#)

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.



Laptop - 1 Configuration:





Laptop - 1

Physical Config Desktop Custom Interface

GLOBAL

Settings

Algorithm Settings

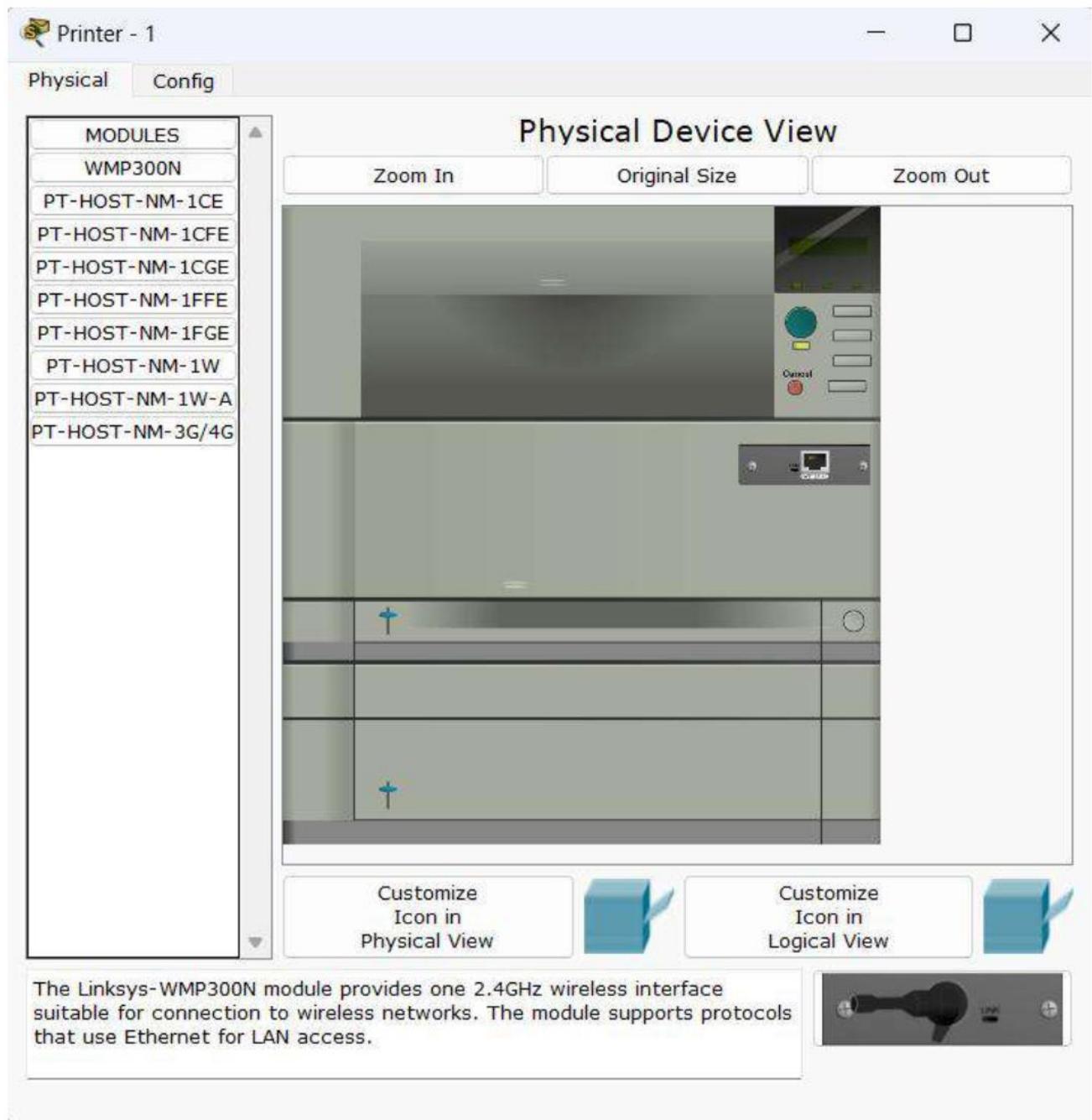
INTERFACE

Wireless0

Wireless0

Port Status	<input checked="" type="checkbox"/> On
Bandwidth	11 Mbps
MAC Address	0001.97C7.3DDE
SSID	WLAN
Authentication	
<input type="radio"/> Disabled	<input checked="" type="radio"/> WEP
<input type="radio"/> WPA-PSK	<input type="radio"/> WPA2-PSK
<input type="radio"/> WPA	<input type="radio"/> WPA2
WEP Key	1234567890
PSK Pass Phrase	
User ID	
Password	
Encryption Type	40/64-Bits (10 Hex digits)
IP Configuration	
<input type="radio"/> DHCP	
<input checked="" type="radio"/> Static	
IP Address	10.0.0.4
Subnet Mask	255.0.0.0
IPv6 Configuration	
<input type="radio"/> DHCP	
<input type="radio"/> Auto Config	
<input checked="" type="radio"/> 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

The Physical Device View displays a printer with a WMP300N module installed. The printer has a control panel with a small screen, several buttons, and a red power button labeled 'On/Off'. The WMP300N module is visible at the top of the printer's body. The printer is shown from a front-on perspective.

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.

A detailed description of the WMP300N module is provided, stating it offers a 2.4GHz wireless interface and supports Ethernet for LAN access. Below this text is a small icon of the module.

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

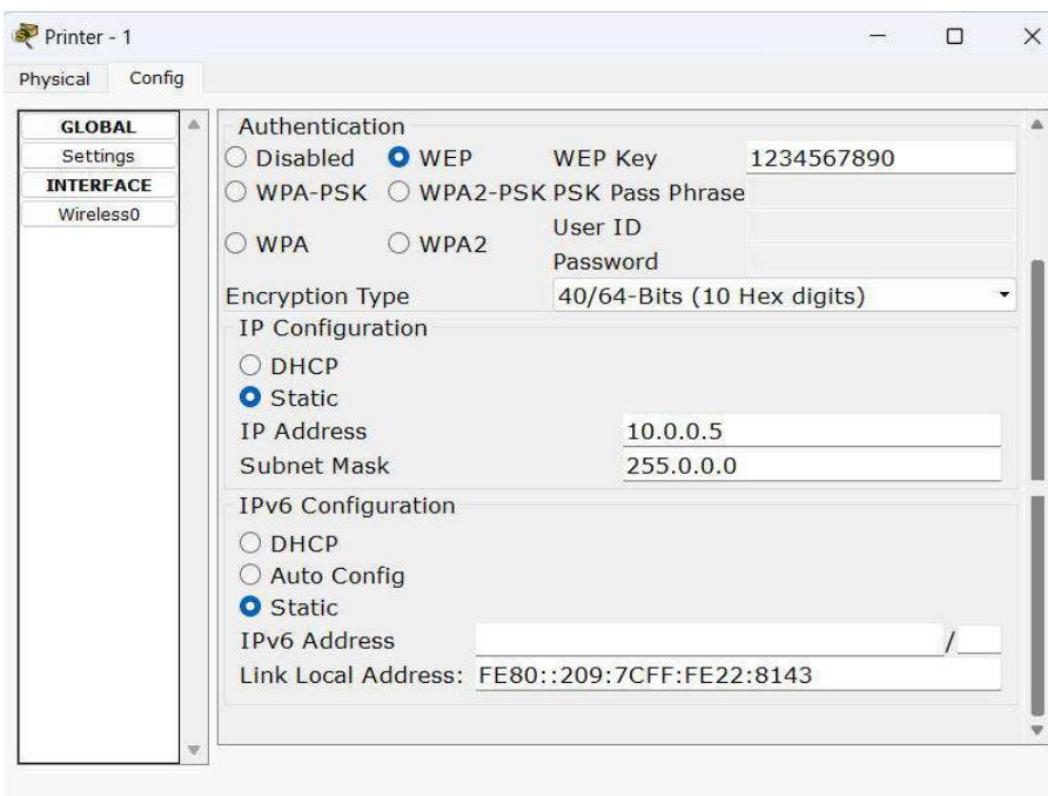
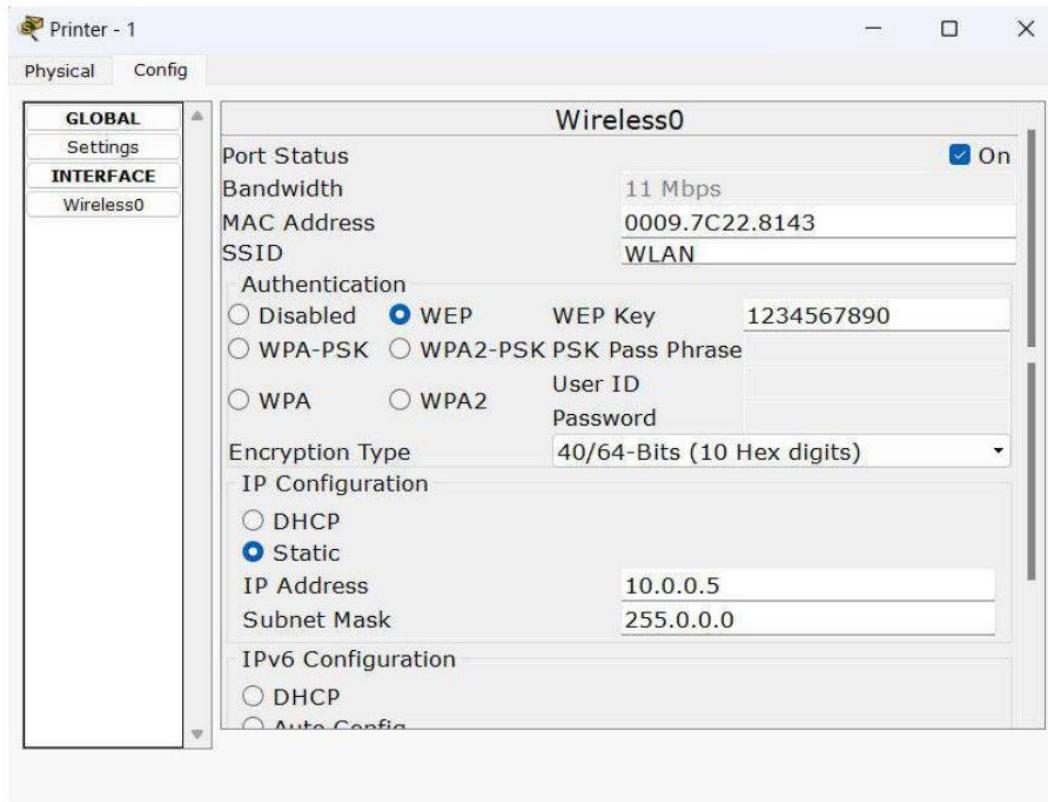
Physical Device View

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:

10.0.0.2

Physical Config Desktop Custom Interface

Command Prompt X

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

Pinging 10.0.0.1 with 32 bytes of data:

Reply from 10.0.0.1: bytes=32 time=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
```

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>
```

Lab 13

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

```

#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;
}

```

```
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.
```

Lab 14

Write a program for congestion control using Leaky bucket algorithm.

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%dbyte packet is inserted", p[k].size);
            }
        }
    }
}

```

```

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

if (bfilled == 0)
{
    printf("\nNo packets to transmitte");
}
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;
}

```

```
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
```

Lab 15

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

Code:

ClientTCP.py

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

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

ServerTCP.py

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

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

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

```
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()
```

Lab 16

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.

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()
```

```
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()
```