

**VISVESVARAYA TECHNOLOGICAL UNIVERSITY**  
“JnanaSangama”, Belgaum -590014, Karnataka.



**LAB REPORT**  
**on**  
**Computer Networks**

*Submitted by*

**Shivani Sathyanarayanan (1BM21CS203)**

*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**  
**May-2023 to July-2023**

**B. M. S. College of Engineering,**  
**Bull Temple Road, Bangalore 560019**  
(Affiliated To Visvesvaraya Technological University, Belgaum)  
**Department of Computer Science and Engineering**



**CERTIFICATE**

This is to certify that the Lab work entitled "**Computer Networks**" carried out by **Shivani Sathyanarayanan (1BM21CS203)**, 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 May-2023 to July-2023. The Lab report has been approved as it satisfies the academic requirements in respect of an **Computer Networks (22CS4PCCON)** work prescribed for the said degree.

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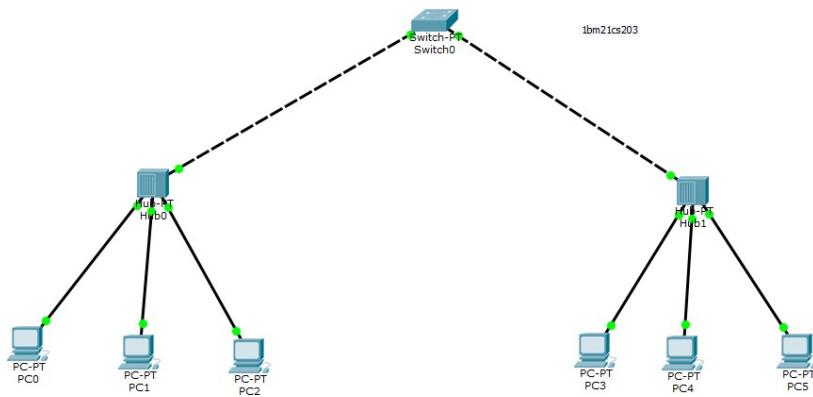
**Dr. Jyothi S Nayak**

Professor and Head  
Department of CSE  
BMSCE, Bengaluru

# COMPUTER NETWORKS LAB 1

Create a topology consisting of two or more end devices connected with the help of hub and switch and simulate a simple PDU.

## 1) Switch and hub hybrid



## Output

A screenshot of a Windows Command Prompt window titled "Command Prompt". The window shows the following text output:

```
Packet Tracer PC Command Line 1.0
PC>ipconfig

FastEthernet0 Connection:(default port)

  Link-local IPv6 Address.....: FE80::202:4AFF:FE4D:2D1B
  IP Address.....: 10.0.0.1
  Subnet Mask.....: 255.0.0.0
  Default Gateway.....: 0.0.0.0

PC>ping 10.0.0.5

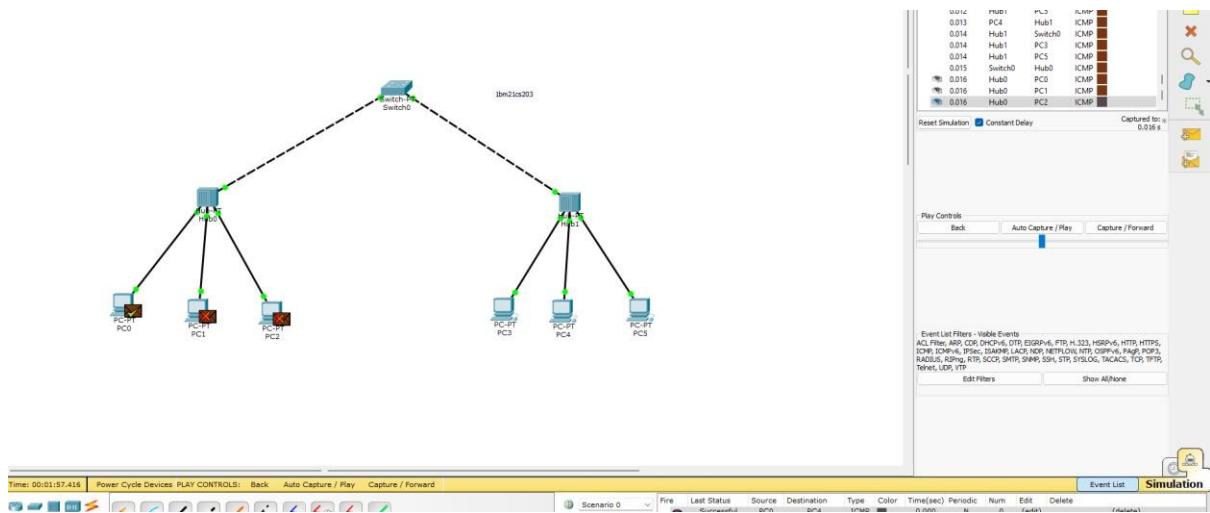
Pinging 10.0.0.5 with 32 bytes of data:

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

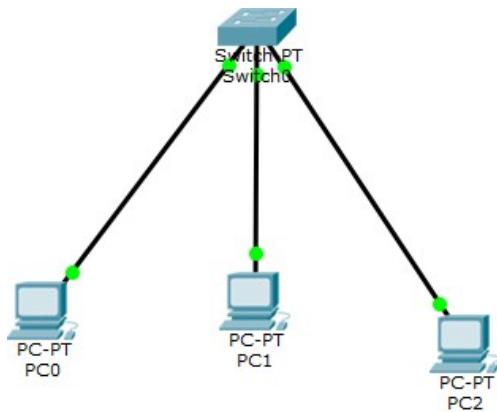
Ping statistics for 10.0.0.5:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
  Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

PC>
```

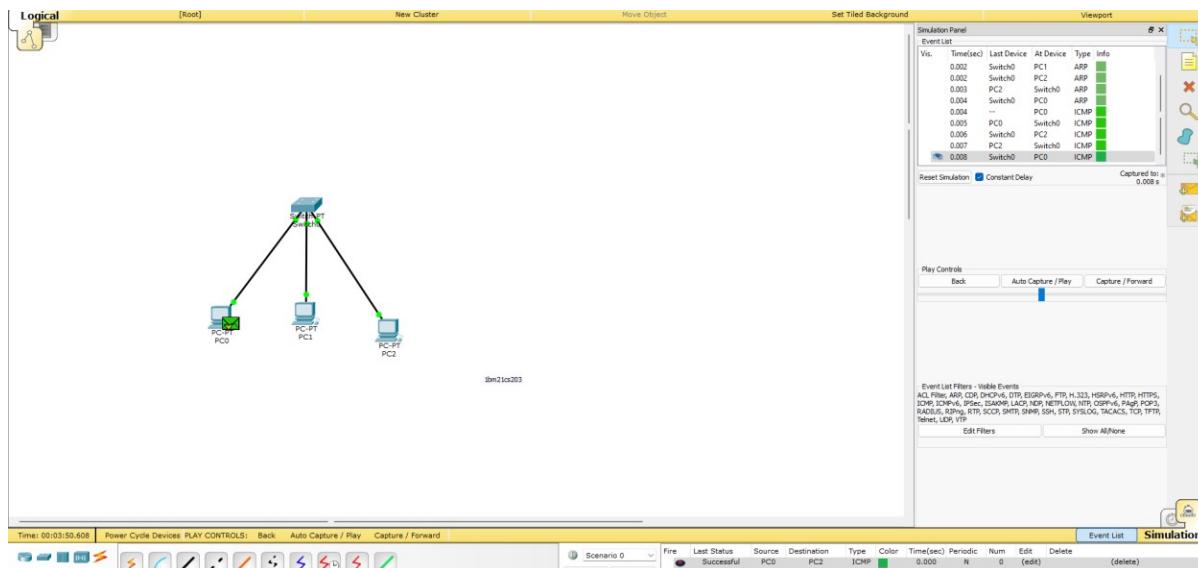
Simulation:



## 2) Switch



Simulation:



Output:

The terminal window title is "Command Prompt". The session starts with "Packet Tracer PC Command Line 1.0" followed by "PC>ipconfig". It shows the configuration for "FastEthernet0 Connection:(default port)". The IP address is 10.0.0.1, subnet mask is 255.0.0.0, and the default gateway is 0.0.0.0. Next, "PC>ping 10.0.0.3" is run, resulting in four successful replies from the target IP. Finally, "Ping statistics for 10.0.0.3:" is displayed, showing a 0% loss and round trip times of 0ms.

```

Packet Tracer PC Command Line 1.0
PC>ipconfig

FastEthernet0 Connection:(default port)

Link-local IPv6 Address.....: FE80::260:47FF:FE04:A764
IP Address.....: 10.0.0.1
Subnet Mask.....: 255.0.0.0
Default Gateway.....: 0.0.0.0

PC>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

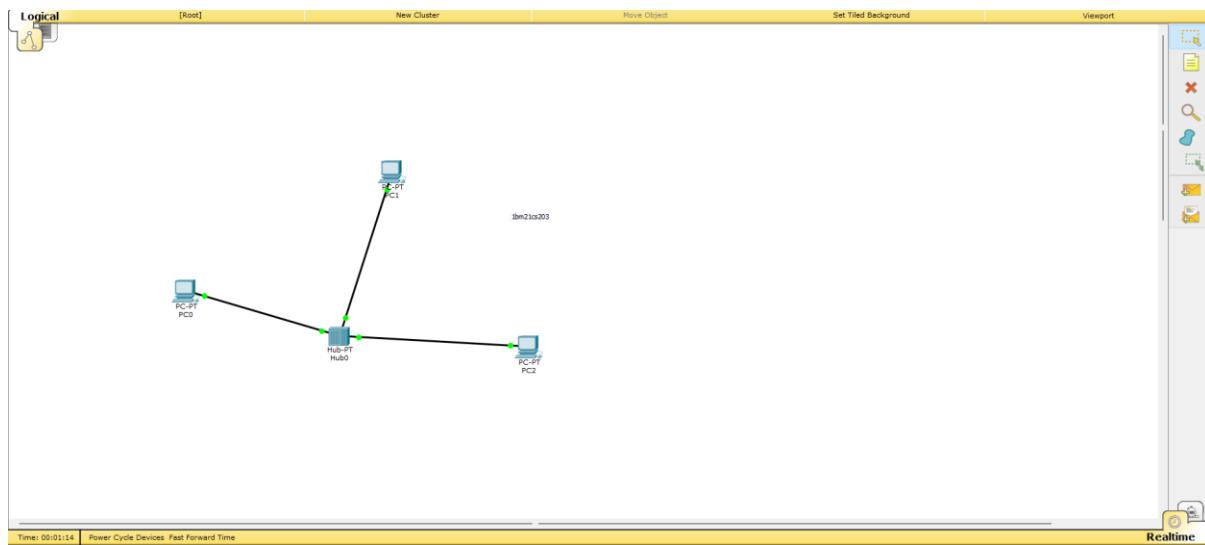
Reply from 10.0.0.3: bytes=32 time=0ms TTL=128

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>

```

### 3) Hub:



Output:

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

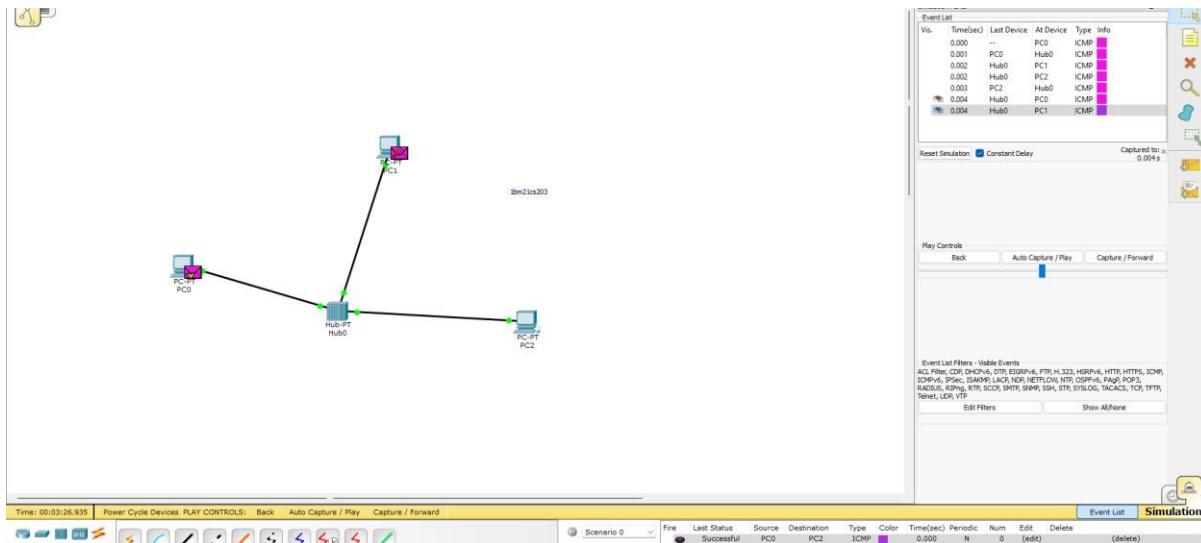
Pinging 10.0.0.3 with 32 bytes of data:

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>
```

## Simulation:



## Outcome:

**Outcome with Hub:**

In real time, when we use ping command, we notice that response is received from destination.

In simulation mode, hub gets PDU, it broadcast to all the connected devices, then one device accepts the others drop or reject.

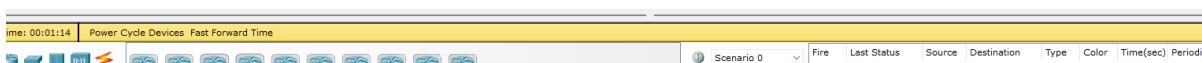
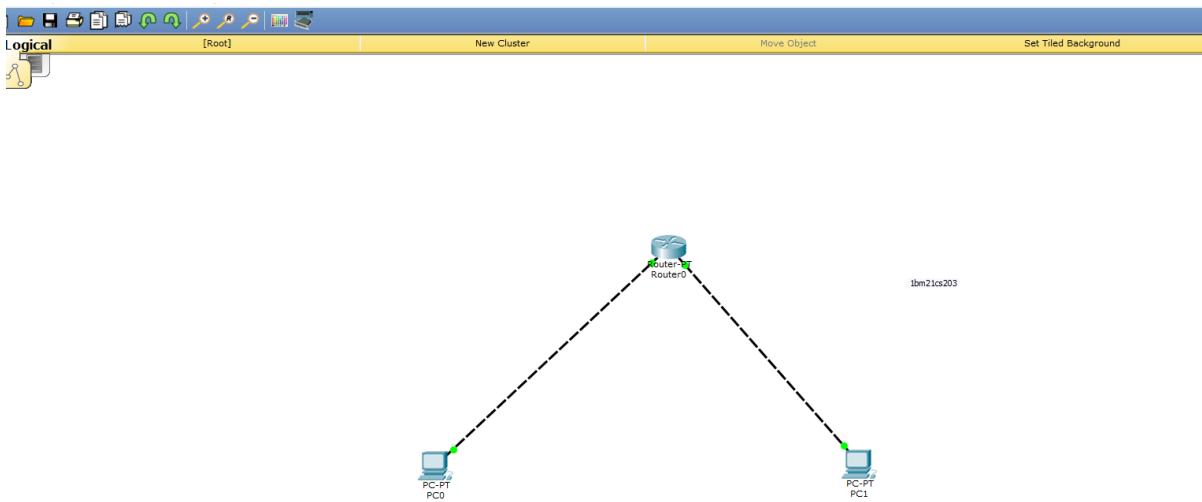
**Outcome with Switch:**

In simulation mode, as it receives the PDU, switch only transmits or forwards to the destination/ mentioned end device.

**Outcome with Hybrid:**

The hub broadcasts to all the connected devices including the switch, then the switch, then the switch forwards the PDU only to destination drive.

## CN LAB 2-ROUTER



A screenshot of a terminal window titled "Router0". The window has tabs for Physical, Config, and CLI, with the Config tab selected. The title bar also says "IOS Command Line Interface". The main pane displays the following configuration commands:

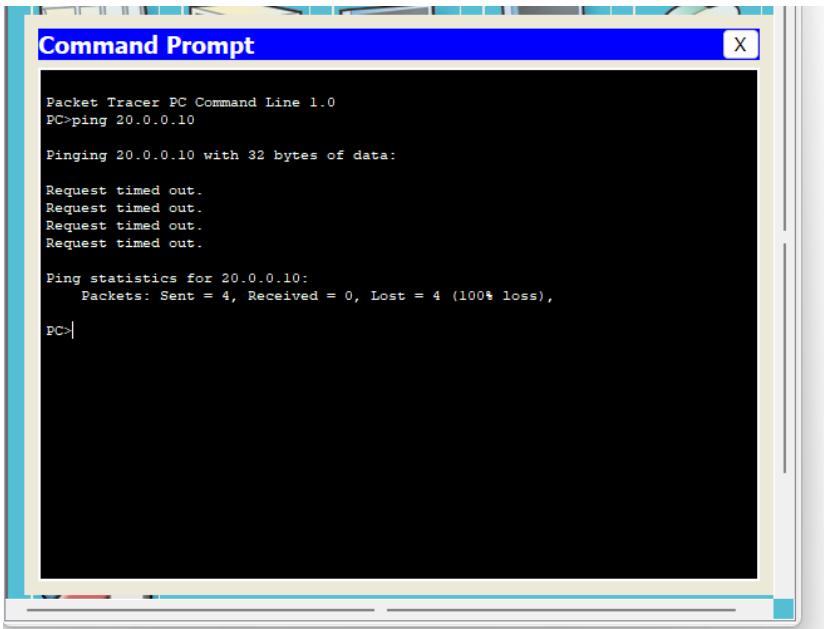
```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastEthernet 0/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#no shutdown

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
exit
Router(config)#exit
Router#
*SYS-5-CONFIG_I: Configured from console by console
enable
Router#configure terminal
^
* Invalid input detected at '^' marker.

Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastEthernet 1/0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#no shutdown
```

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

## Output:

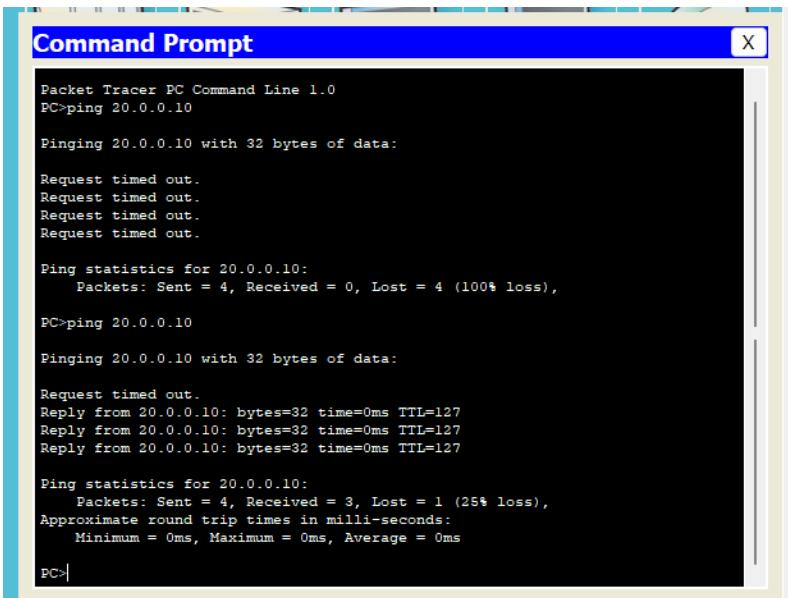


```
Packet Tracer PC Command Line 1.0
PC>ping 20.0.0.10

Pinging 20.0.0.10 with 32 bytes of data:

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

Ping statistics for 20.0.0.10:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
PC>
```



```
Packet Tracer PC Command Line 1.0
PC>ping 20.0.0.10

Pinging 20.0.0.10 with 32 bytes of data:

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

Ping statistics for 20.0.0.10:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
PC>ping 20.0.0.10

Pinging 20.0.0.10 with 32 bytes of data:

Request timed out.
Reply from 20.0.0.10: bytes=32 time=0ms TTL=127
Reply from 20.0.0.10: bytes=32 time=0ms TTL=127
Reply from 20.0.0.10: bytes=32 time=0ms TTL=127

Ping statistics for 20.0.0.10:
  Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
  Minimum = 0ms, Maximum = 0ms, Average = 0ms
PC>
```

**Command Prompt**

```
PC>ping 20.0.0.10
Pinging 20.0.0.10 with 32 bytes of data:
Request timed out.
Reply from 20.0.0.10: bytes=32 time=0ms TTL=127
Reply from 20.0.0.10: bytes=32 time=0ms TTL=127
Reply from 20.0.0.10: bytes=32 time=0ms TTL=127

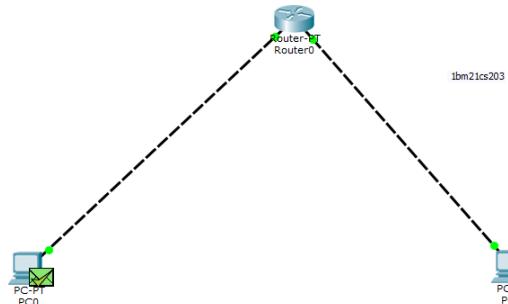
Ping statistics for 20.0.0.10:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

PC>ping 20.0.0.10
Pinging 20.0.0.10 with 32 bytes of data:
Reply from 20.0.0.10: bytes=32 time=0ms TTL=127

Ping statistics for 20.0.0.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

PC->
```

Simulation:

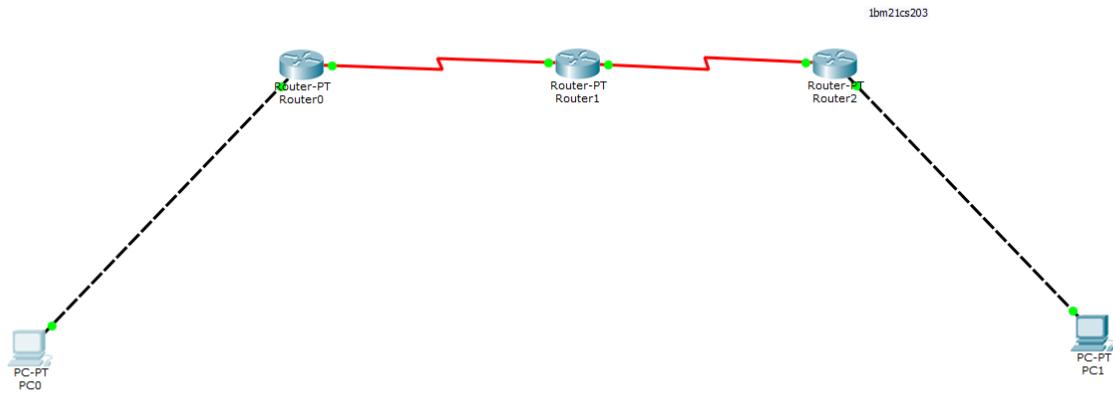


Outcome:

A router transmits messages between two different networks. The router configuration is done using CLI. The IP Address of the router on each side, that is connected to end device must have the same network address as that of the end device connected on that side. Transmission of message fails when default gateway is not assigned to the end devices. Therefore on executing ping command without assigning default gateway we get connection timed out output. Default

gateway of the each end device is the IP address of the router on that particular connected side interface. After assigning default gateway the transmission becomes successful.

## WEEK 3 CN LAB-ROUTER



Configuring routers:

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 fastEthernet0/0
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
exit
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 serial 2/0
^
* Invalid input detected at '^' marker.

Router(config)#interface serial 2/0
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)#exit
```

Copy Paste

Router1

Physical Config CLI

### IOS Command Line Interface

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

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 serial 3/0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#no shutdown

*LINK-5-CHANGED: Interface Serial3/0, changed state to down
Router(config-if)#exit
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 serial3/0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
```

Copy Paste

Router2

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 serial2/0
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
exit
Router(config)#e
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
xit
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 fastEthernet0/0
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
exit
Router(config)#exit
```

Copy Paste

## OUTPUTS:

```
PC>ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data:

Reply from 10.0.0.1: bytes=32 time=1ms TTL=255
Reply from 10.0.0.1: bytes=32 time=0ms TTL=255
Reply from 10.0.0.1: bytes=32 time=0ms TTL=255
Reply from 10.0.0.1: bytes=32 time=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 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
Reply from 20.0.0.1: bytes=32 time=2ms TTL=255
Reply from 20.0.0.1: bytes=32 time=0ms TTL=255
Reply from 20.0.0.1: bytes=32 time=1ms 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 = 2ms, Average = 0ms
```

When router doesn't know about ip address of other routers:

```
Command Prompt X

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

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

PC>ping 30.0.0.1

Pinging 30.0.0.1 with 32 bytes of data:

Reply from 10.0.0.1: Destination host unreachable.
Reply from 10.0.0.1: Destination host unreachable.
Request timed out.
Reply from 10.0.0.1: Destination host unreachable.

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

PC>ping 30.0.0.2

Pinging 30.0.0.2 with 32 bytes of data:

Reply from 10.0.0.1: Destination host unreachable.

Ping statistics for 30.0.0.2:
```

**Command Prompt**

```

Reply from 10.0.0.1: Destination host unreachable.
Reply from 10.0.0.1: Destination host unreachable.
Reply from 10.0.0.1: Destination host unreachable.

Ping statistics for 30.0.0.2:
  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 10.0.0.1: Destination host unreachable.

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

PC>ping 40.0.0.10

Pinging 40.0.0.10 with 32 bytes of data:

Reply from 10.0.0.1: Destination host unreachable.

Ping statistics for 40.0.0.10:

```

Configuring ip routes:

Router 0:

 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)#ip route 30.0.0.0 255.0.0.0 20.0.0.2
Router(config)#ip route 40.0.0.0 255.0.0.0 20.0.0.2
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

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

Gateway of last resort is not set

C    10.0.0.0/8 is directly connected, FastEthernet0/0
C    20.0.0.0/8 is directly connected, Serial2/0
S    30.0.0.0/8 [1/0] via 20.0.0.2
S    40.0.0.0/8 [1/0] via 20.0.0.2
Router#

```

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Router 1:

Router1

Physical Config CLI

### IOS Command Line Interface

```

* Invalid input detected at '^' marker.

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 10.0.0.0 255.0.0.0 20.0.0.1
Router(config)#ip route 40.0.0.0 255.0.0.0 30.0.0.2
Router(config)#exit
Router#
*SYS-5-CONFIG_I: Configured from console by console

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

Gateway of last resort is not set

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

```

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## Router 2:

Router2

Physical Config CLI

### IOS Command Line Interface

```

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 20.0.0.0 255.0.0.0 30.0.0.1
Router(config)#ip route 10.0.0.0 255.0.0.0 20.0.0.1
Router(config)#exit
Router#
*SYS-5-CONFIG_I: Configured from console by console

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

Gateway of last resort is not set

S    10.0.0.0/8 [1/0] via 20.0.0.1
S    20.0.0.0/8 [1/0] via 30.0.0.1
C    30.0.0.0/8 is directly connected, Serial2/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0
Router#

```

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After configuring ip routes for all routers:

## Command Prompt

```
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=8ms TTL=125
Reply from 40.0.0.10: bytes=32 time=6ms TTL=125
Reply from 40.0.0.10: bytes=32 time=6ms TTL=125

Ping statistics for 40.0.0.10:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 6ms, Maximum = 8ms, Average = 6ms

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>ping 20.0.0.1
```

## Command Prompt

```
Pinging 20.0.0.1 with 32 bytes of data:

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

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

PC>ping 20.0.0.2
Pinging 20.0.0.2 with 32 bytes of data:

Reply from 20.0.0.2: bytes=32 time=4ms TTL=254
Reply from 20.0.0.2: bytes=32 time=4ms TTL=254
Reply from 20.0.0.2: bytes=32 time=5ms TTL=254
Reply from 20.0.0.2: bytes=32 time=4ms TTL=254

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

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

## Command Prompt

X

```
PC>ping 30.0.0.1

Pinging 30.0.0.1 with 32 bytes of data:

Reply from 30.0.0.1: bytes=32 time=1ms TTL=254
Reply from 30.0.0.1: bytes=32 time=4ms TTL=254
Reply from 30.0.0.1: bytes=32 time=3ms TTL=254
Reply from 30.0.0.1: bytes=32 time=4ms TTL=254

Ping statistics for 30.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 4ms, Average = 3ms

PC>ping 30.0.0.2

Pinging 30.0.0.2 with 32 bytes of data:

Reply from 30.0.0.2: bytes=32 time=7ms TTL=253
Reply from 30.0.0.2: bytes=32 time=6ms TTL=253
Reply from 30.0.0.2: bytes=32 time=7ms TTL=253
Reply from 30.0.0.2: bytes=32 time=8ms TTL=253

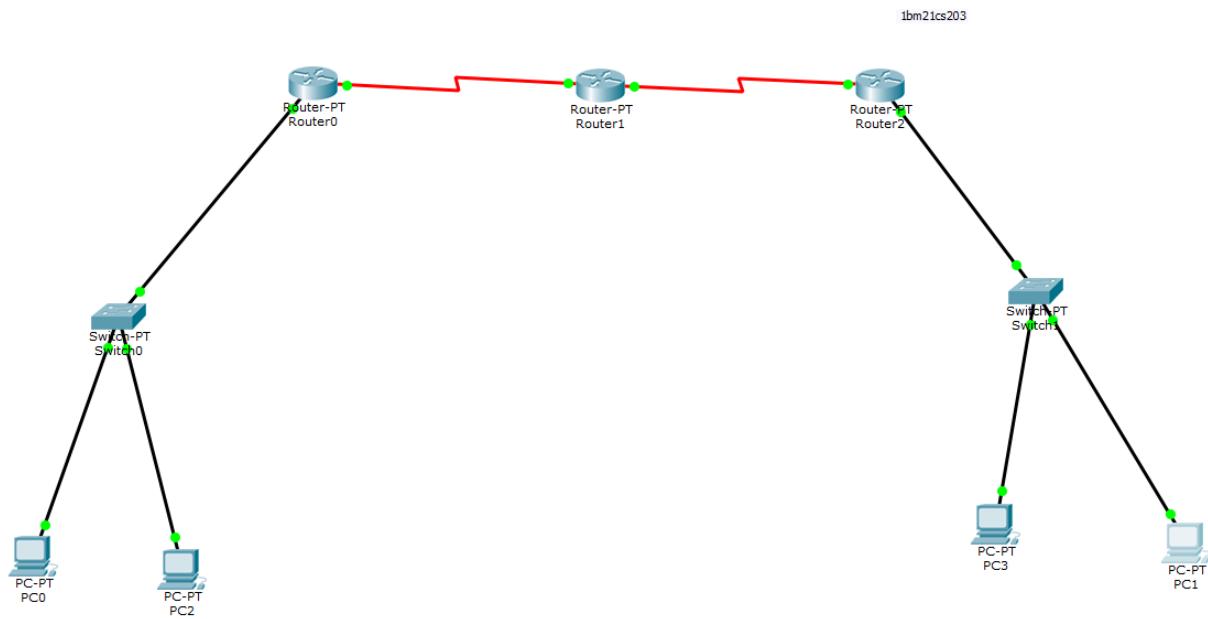
Ping statistics for 30.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 6ms, Maximum = 8ms, Average = 7ms

PC>
```

### Outcome:

Pinging before default gateway: Request timed out message. After setting default gateway: Destination host unreachable since ip route between routers is not yet set. After setting ip route between routers, we get successful replies for all ping commands

## CN LAB 4-1BM21CS203



Output:

## Command Prompt

```
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=4ms TTL=125
Reply from 40.0.0.11: bytes=32 time=8ms TTL=125
Reply from 40.0.0.11: bytes=32 time=6ms 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 = 4ms, Maximum = 8ms, Average = 6ms

PC>ping 40.0.0.10
Pinging 40.0.0.10 with 32 bytes of data:

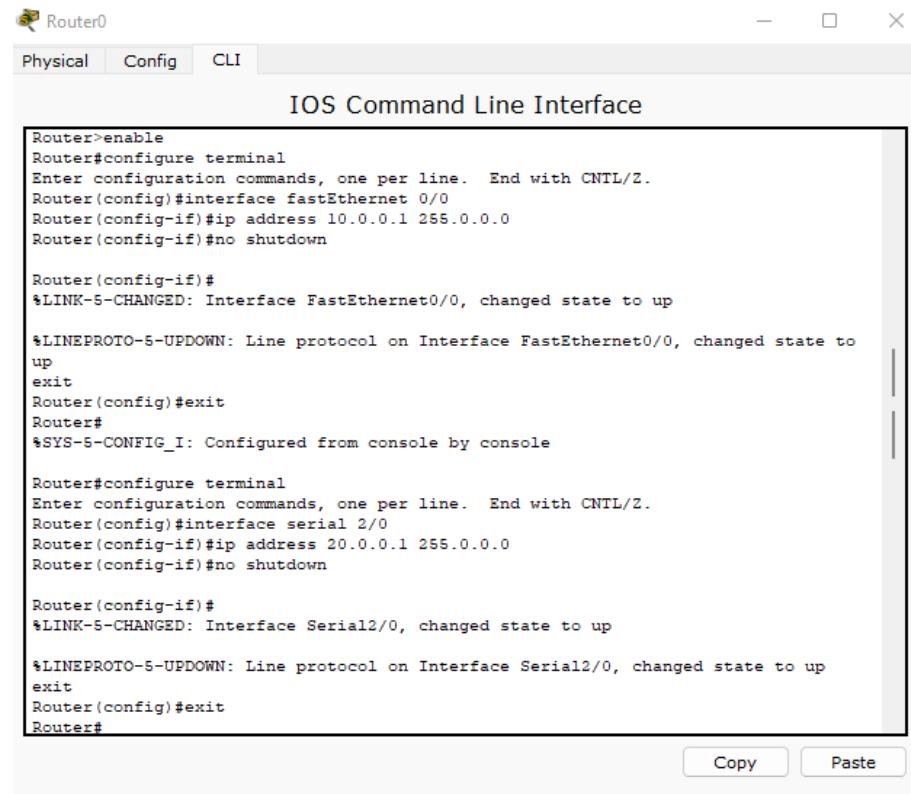
Request timed out.
Reply from 40.0.0.10: bytes=32 time=4ms TTL=125
Reply from 40.0.0.10: bytes=32 time=6ms TTL=125
Reply from 40.0.0.10: bytes=32 time=9ms TTL=125

Ping statistics for 40.0.0.10:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 4ms, Maximum = 9ms, Average = 6ms

PC>
```

CLI:

Router 0:



The image shows a window titled "IOS Command Line Interface" for "Router0". The window has tabs at the top: "Physical", "Config", and "CLI". The "CLI" tab is selected. The main area displays the following configuration commands:

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastEthernet 0/0
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
exit
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 serial 2/0
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 Serial2/0, changed state to up

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

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

Router0

Physical Config CLI

### IOS Command Line Interface

```

M - Our external type 1, N - Our external type 2, E - OSPF
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#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 0.0.0.0 0.0.0.0 20.0.0.2
Router(config)#exit
Router#
*SYS-5-CONFIG_I: Configured from console by console
show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is 20.0.0.2 to network 0.0.0.0

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

```

Copy Paste

## Router 1:

Router1

Physical Config CLI

### IOS Command Line Interface

```

Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface serial 2/0
Router(config-if)#ip address 20.0.0.2 255.0.0.0
Router(config-if)#no shutdown

*LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router(config-if)#exit
Router(config)#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 serial 3/0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#no shutdown

*LINK-5-CHANGED: Interface Serial3/0, changed state to down
Router(config-if)#exit
Router(config)#exit
Router#
*SYS-5-CONFIG_I: Configured from console by console

*LINK-5-CHANGED: Interface Serial2/0, changed state to up

*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
*LINK-5-CHANGED: Interface Serial3/0, changed state to up

```

Copy Paste

Router1

Physical Config CLI

IOS Command Line Interface

```
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)#ip route 40.0.0.0 255.0.0.0 30.0.0.2
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

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

Gateway of last resort is not set

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

Copy Paste

Router 2:

Router2

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 serial 2/0
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
exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

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

Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastEthernet 0/0
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
exit
Router(config)#exit

```

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

Router2

Physical Config CLI

### IOS Command Line Interface

```

      1  is is, 2  is is level 1, 3  is is level 2, 4  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 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

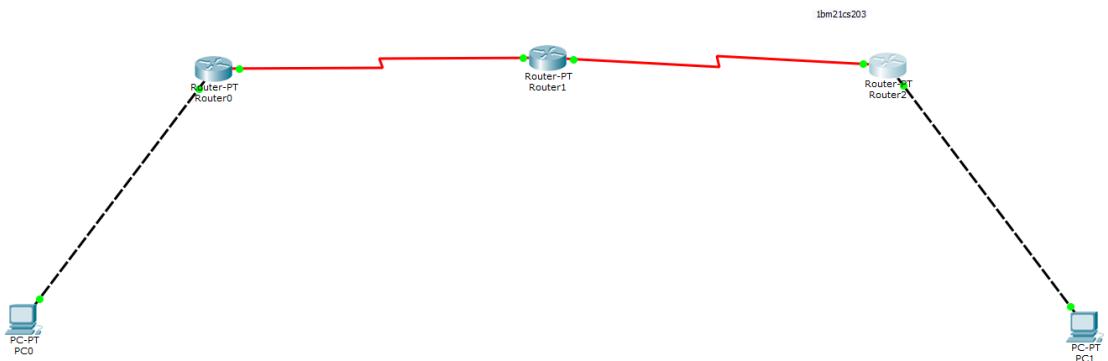
Gateway of last resort is 30.0.0.1 to network 0.0.0.0

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](#)

## EXPERIMENT 2: Configuring RIP protocol to router



Output:

**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=7ms TTL=125
Reply from 40.0.0.10: bytes=32 time=4ms TTL=125
Reply from 40.0.0.10: bytes=32 time=5ms TTL=125

Ping statistics for 40.0.0.10:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 7ms, Average = 5ms

PC>

```

CLI:

Router 0:

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 fastEthernet 0/0
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)#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 serial 2/0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#encapsulation ppp
Router(config-if)#clockrate 64000
^
* Invalid input detected at '^' marker.

Router(config-if)#clock rate 64000
Router(config-if)#no shutdown
```

Copy Paste

Router0

Physical Config CLI

### IOS Command Line Interface

```
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface serial 2/0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#encapsulation ppp
Router(config-if)#clockrate 64000
^
* Invalid input detected at '^' marker.

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

Copy Paste

Router0

Physical Config CLI

### IOS Command Line Interface

```
*LINK-5-CHANGED: Interface Serial2/0, 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 rip
Router(config-router)#network 10.0.0.0
Router(config-router)#network 20.0.0.0
Router(config-router)#exit
Router(config)#exit
```

Copy Paste

Router0

Physical Config CLI

### IOS Command Line Interface

```
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 rip
Router(config-router)#network 10.0.0.0
Router(config-router)#network 20.0.0.0
Router(config-router)#exit
Router(config)#exit
Router#
*SYS-5-CONFIG_I: Configured from console by console

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, 00:00:02, Serial2/0
R    40.0.0.0/8 [120/2] via 20.0.0.2, 00:00:02, Serial2/0
Router#
```

Copy Paste

Router 1:

Router1

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 serial 2/0
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
Router(config)#ex
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
it
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 serial 3/0
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)#exit
Router#
*SYS-5-CONFIG_I: Configured from console by console

```

Router1

Physical Config CLI

### IOS Command Line Interface

```

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 20.0.0.0
Router(config-router)#network 30.0.0.0
Router(config-router)#exit
Router(config)#exit
Router#
*SYS-5-CONFIG_I: Configured from console by console

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, 00:00:02, 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, 00:00:05, Serial3/0
Router#

```

Router 2:

Router2

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 serial 2/0
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 Serial2/0, changed state to up
exit
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 fastEthernet 0/0
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
exit
Router(config)#exit

```

**Copy** **Paste**

Router2

Physical Config CLI

### IOS Command Line Interface

```

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

Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
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, 00:00:25, Serial2/0
R    20.0.0.0/8 [120/1] via 30.0.0.1, 00:00:25, Serial2/0
      30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C      30.0.0.0/8 is directly connected, Serial2/0
C      30.0.0.1/32 is directly connected, Serial2/0
C      40.0.0.0/8 is directly connected, FastEthernet0/0
Router#

```

**Copy** **Paste**

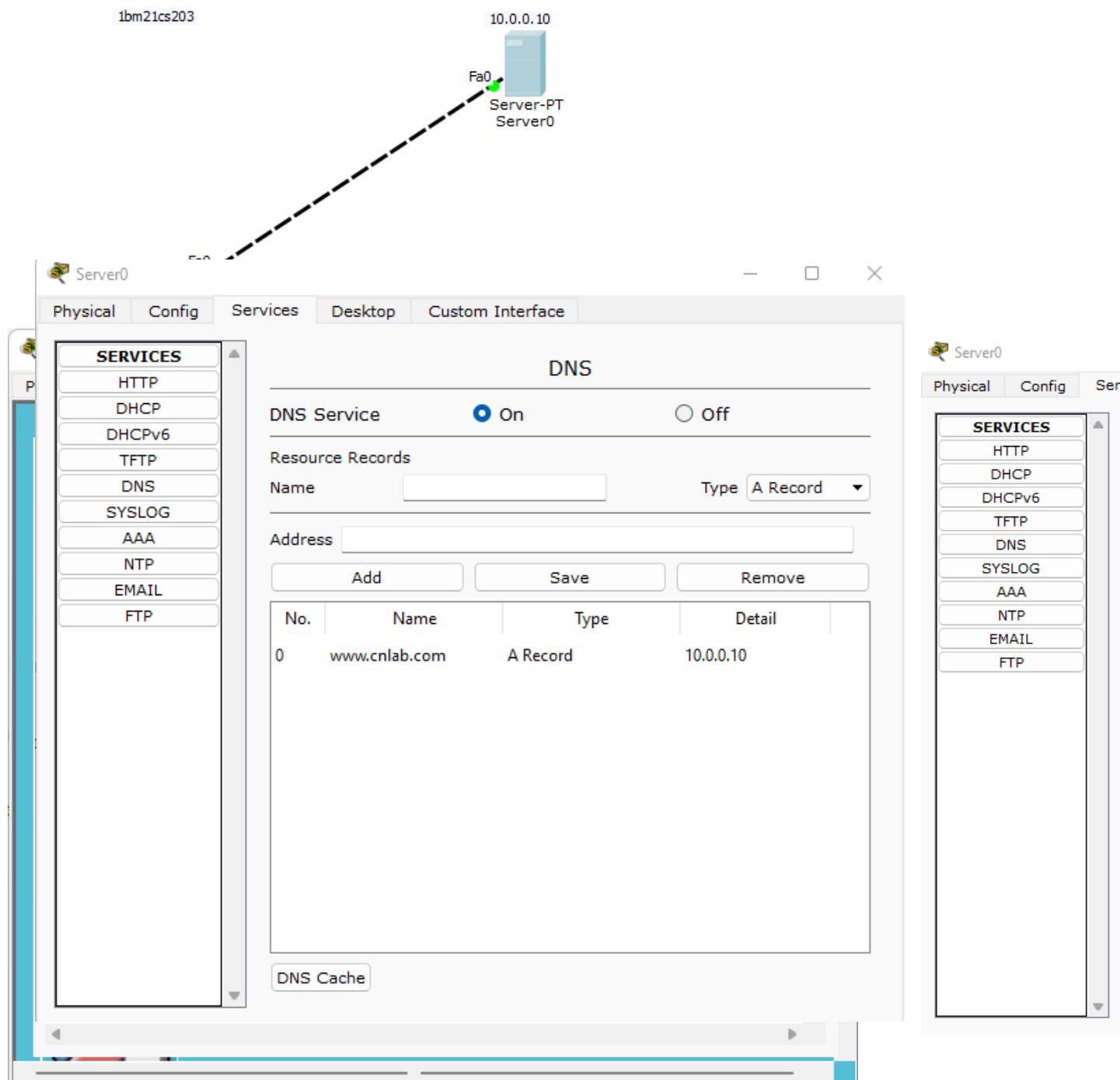
## OUTCOME:

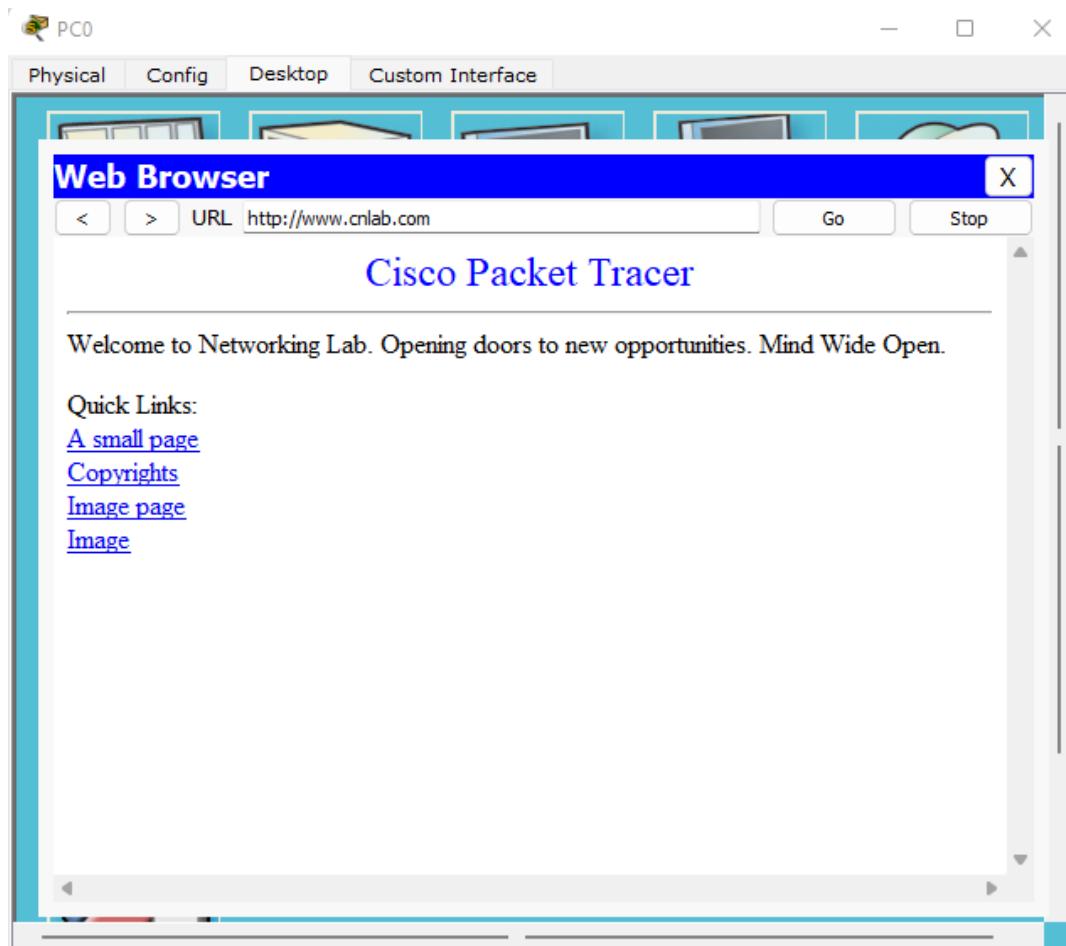
There are different ways of assigning ip route : static and default. In assigning default ip route for routers in a topology, we assign default ip routes to router 0 and router 2 and assign static ip

route to router 1. The messages are routed to router 1 and router 1 takes care of forwarding the message appropriately. Routers maintain communication among each other and source and destination through routing protocols. Here, in experiment 2, we have used RIP routing protocol. In cases, where we don't implement routing protocols, we assign static and default ip routes.

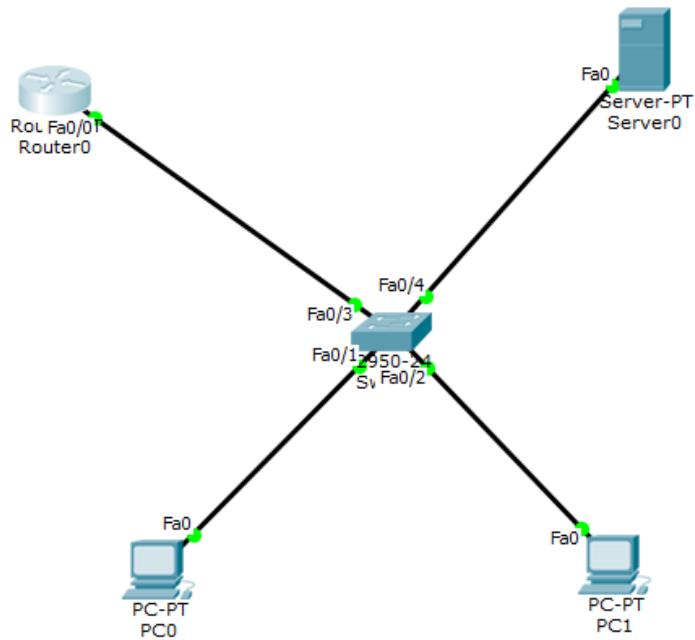
## CN Lab 5-Shivani Sathyanarayanan

Configuring http and dns





Configuring dhcp



## Router cli:

Router0

Physical Config CLI

IOS Command Line Interface

```

32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)

--- System Configuration Dialog ---

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

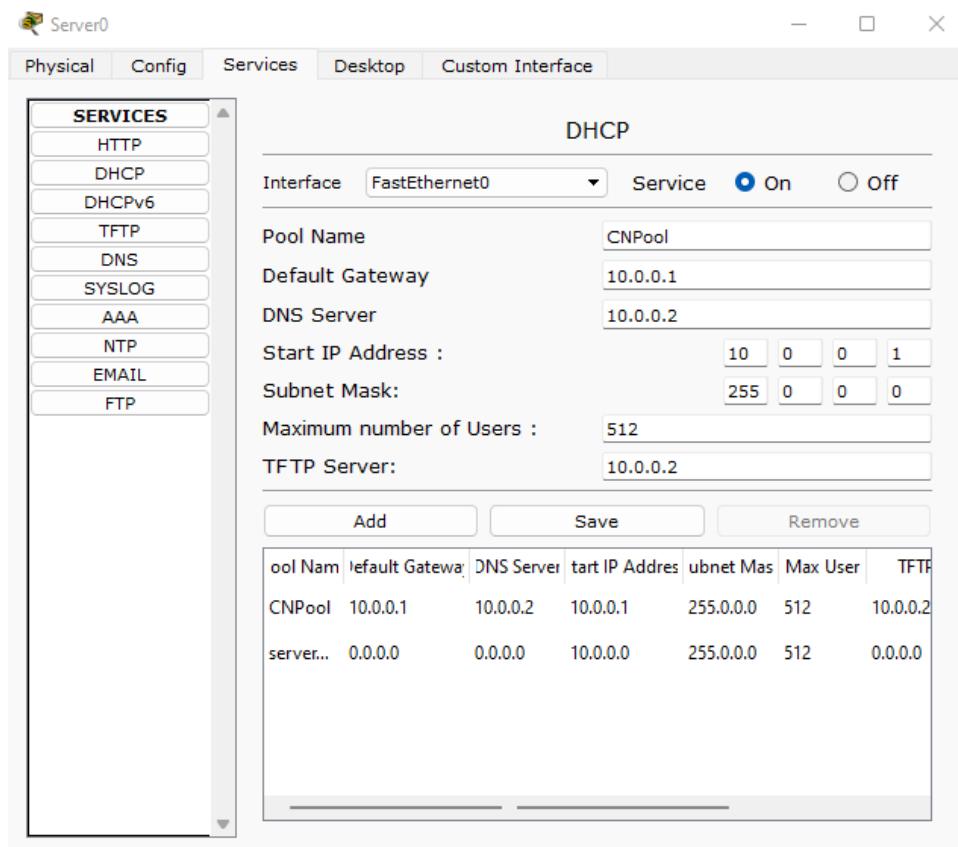
Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface fastEthernet0/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#no shutdown

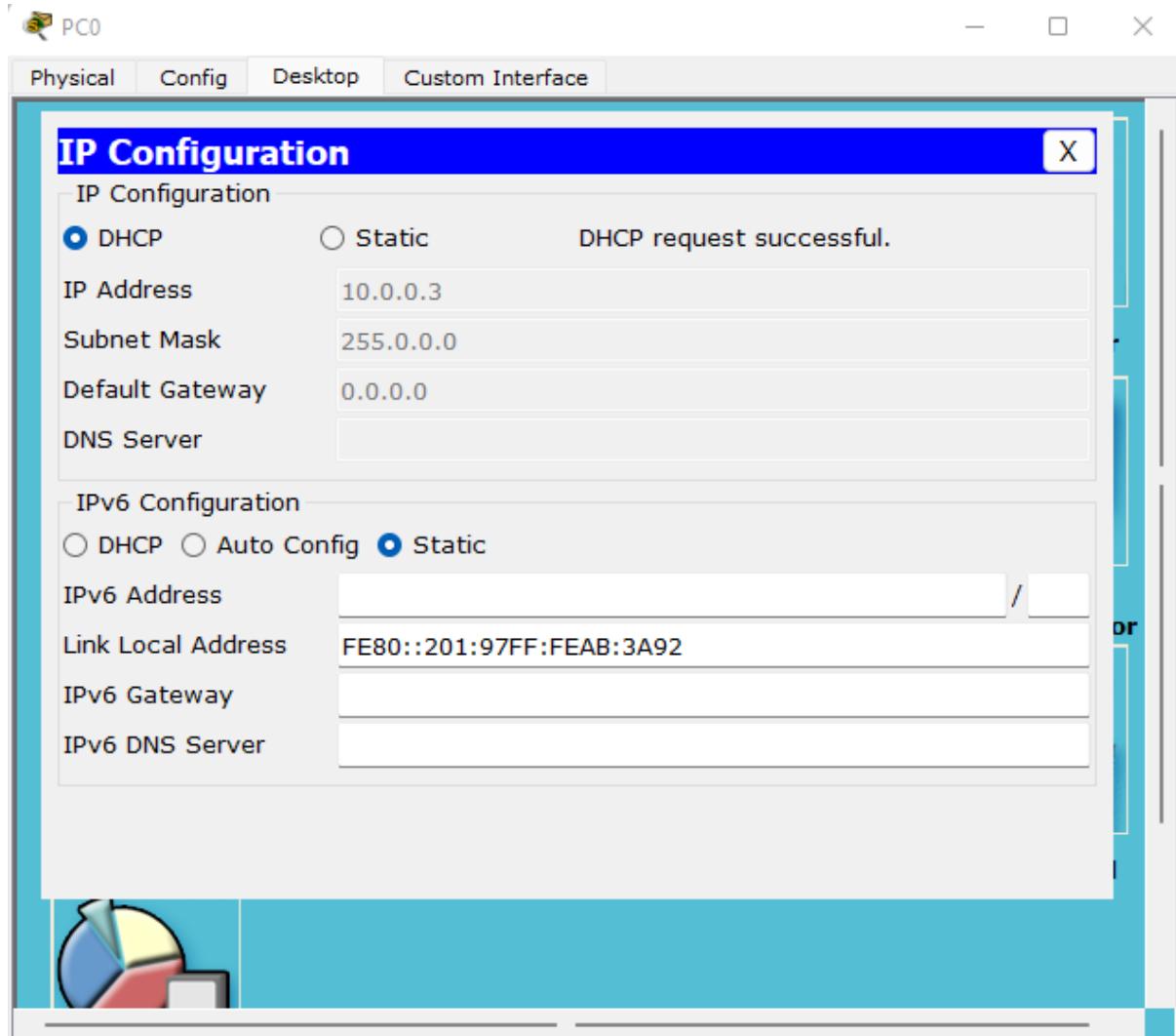
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

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

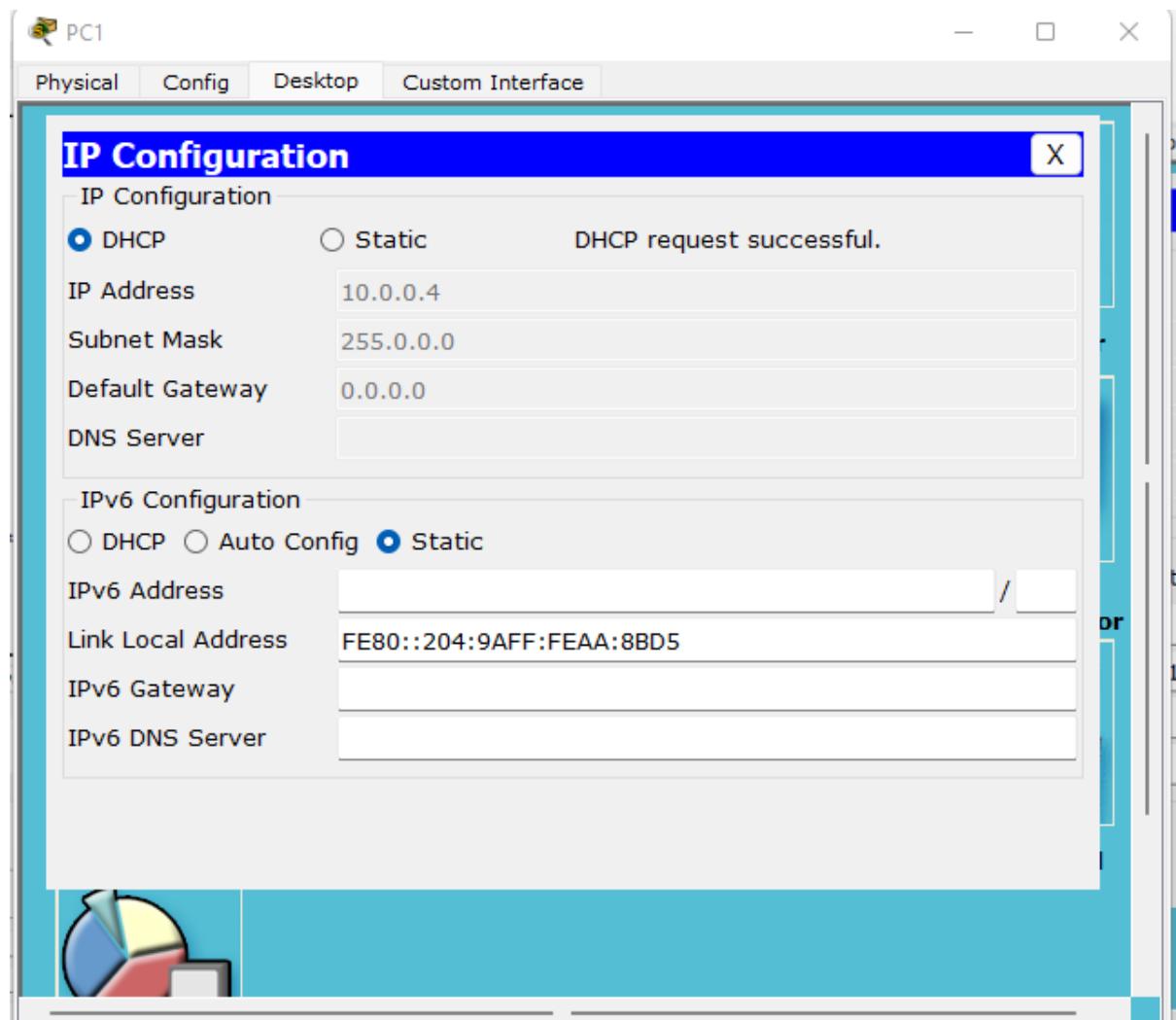
Copy Paste



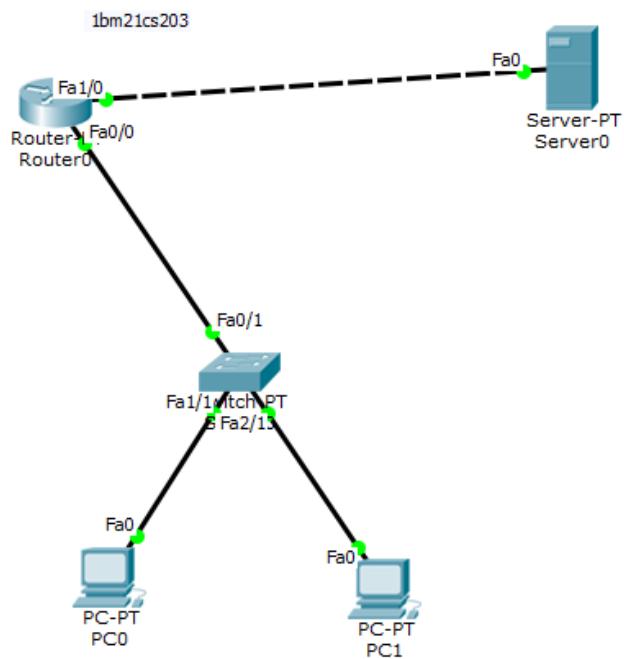
PC0:



PC 1:



Dhcp outside network:



Router cli:

Router0

Physical Config CLI

IOS Command Line Interface

```

Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastEthernet 1/0
Router(config-if)#ip address 10.0.0.10 255.0.0.0
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
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 fastEthernet 0/0
Router(config-if)#ip address 20.0.0.10 255.0.0.0
Router(config-if)#ip helper-address 10.0.0.2
Router(config-if)#no shutdown

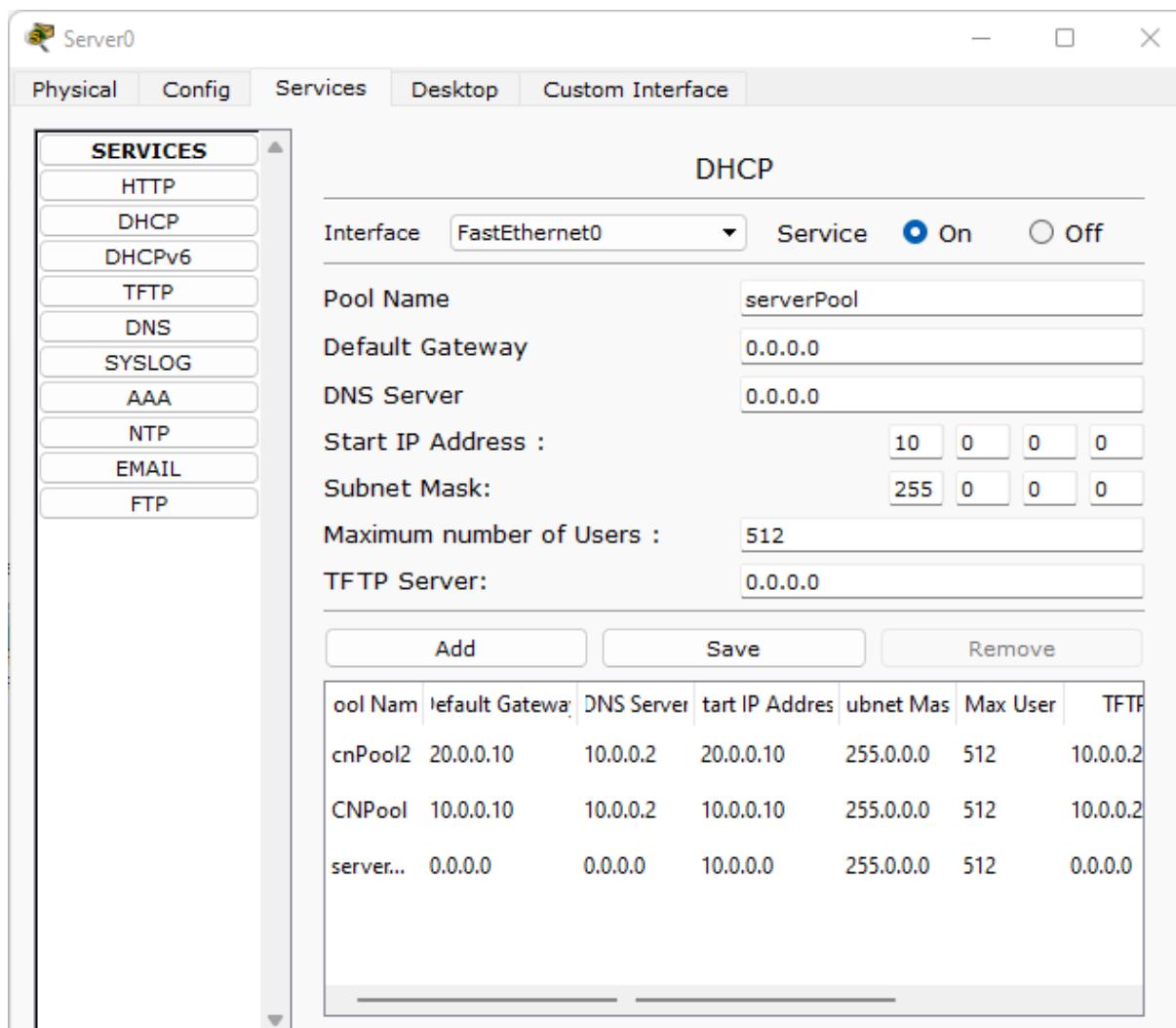
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

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

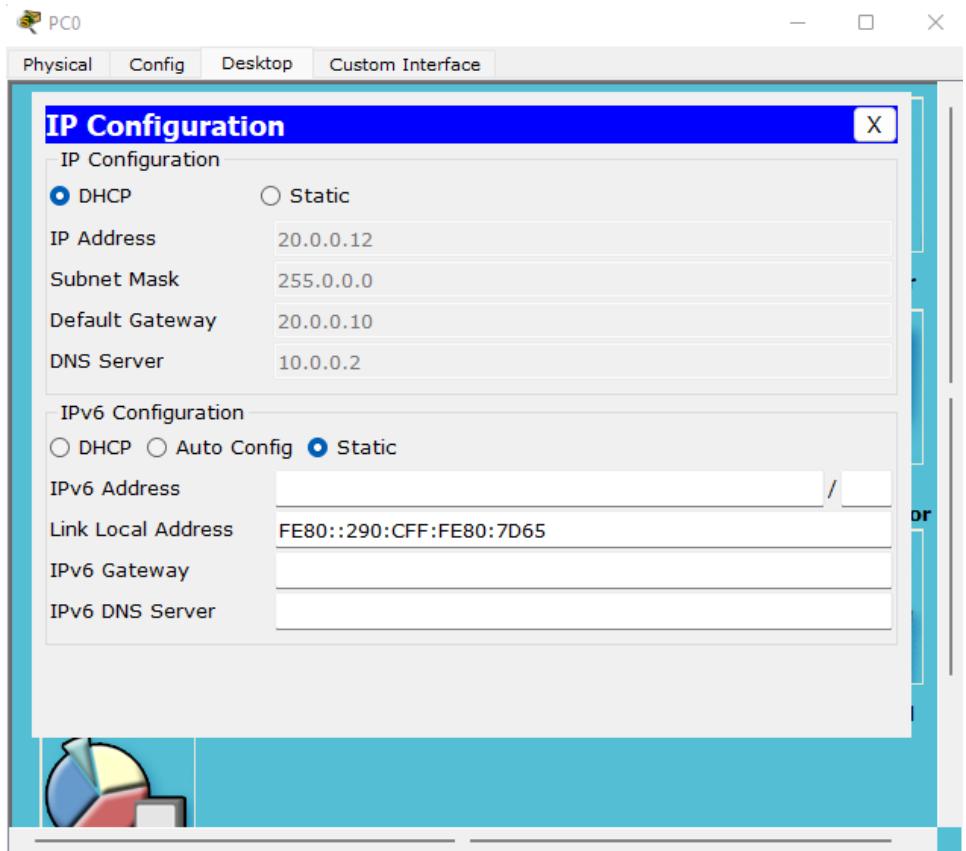
```

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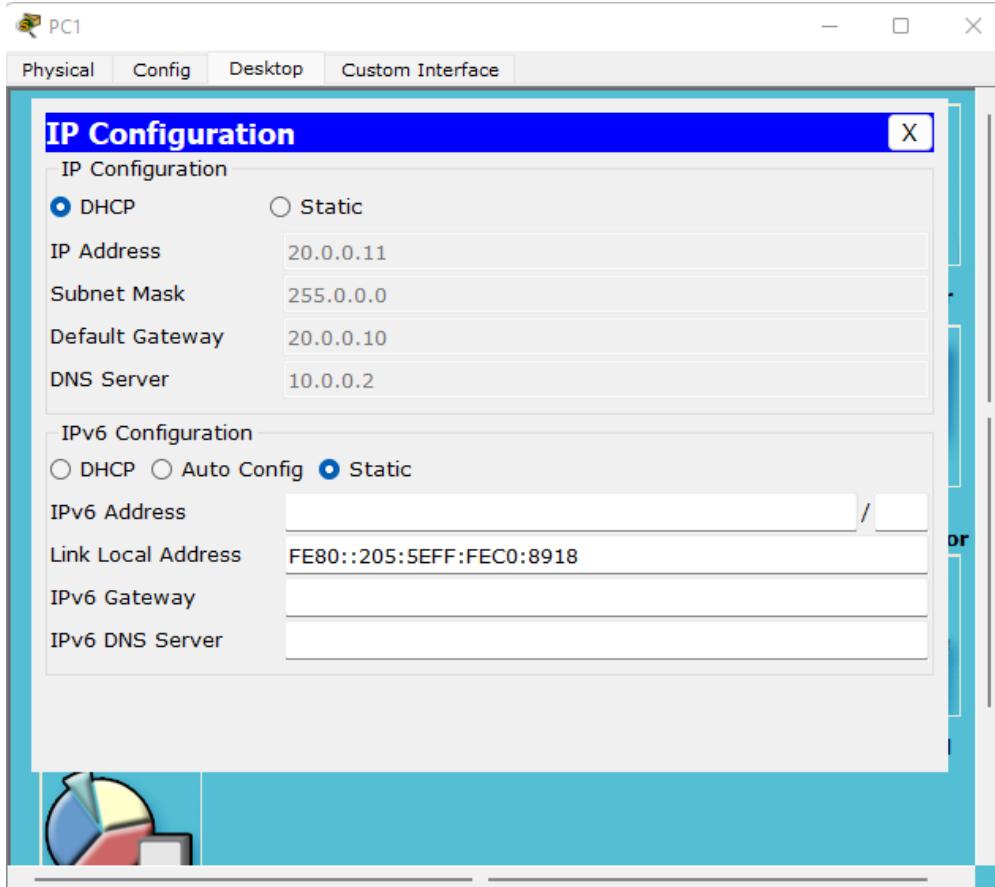
Server:



Pc-0



PC-1:

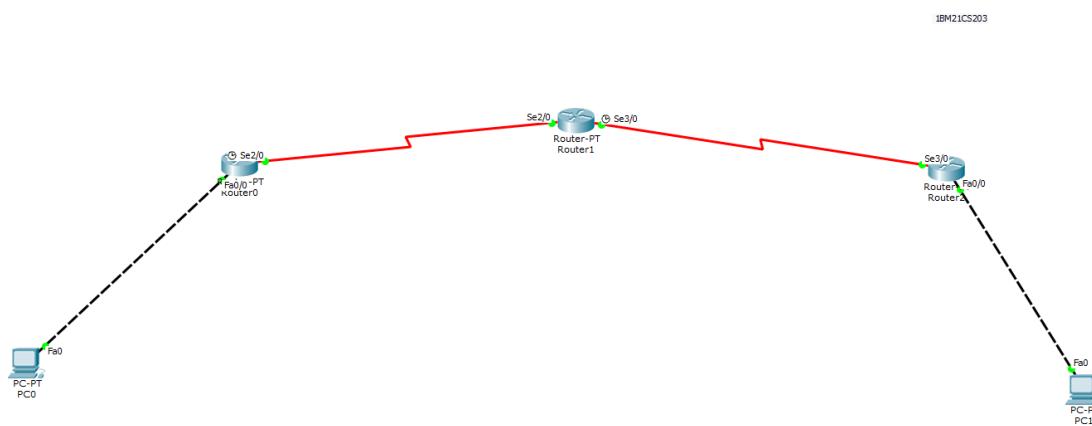


## Outcome:

Configuring http and dns server. Configuring dhcp server within same network. We have to enter default gateway and start ip address which are both the ip address of router. Enter dns server and tftp server which is ip address of server Add the new server pool. Then choosing dhcp for ip configuration of end devices, the end devices are dynamically assigned ip addresses. Configuring dhcp outside network, we have to add two server pools of the two different networks.

## CN LAB 6-1BM21CS203

### Configuring OSPF:



### Configuring routers

Router0

Physical Config CLI

### IOS Command Line Interface

```
--- System Configuration Dialog ---  
Continue with configuration dialog? [yes/no]: NO  
  
Press RETURN to get started!  
  
Router>enable  
Router#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#interface FastEthernet0/0  
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 Serial2/0  
Router(config-if)#ip address 20.0.0.1 255.0.0.0  
Router(config-if)#encapsulation ppp  
Router(config-if)#clock rate 64000  
Router(config-if)#no shutdown  
  
*LINK-5-CHANGED: Interface Serial2/0, changed state to down  
Router(config-if)#exit  
Router(config)#+
```

Copy Paste

Router1

Physical Config CLI

### IOS Command Line Interface

```
--- System Configuration Dialog ---  
Continue with configuration dialog? [yes/no]: no  
  
Press RETURN to get started!  
  
Router>enable  
Router#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#interface Serial2/0  
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  
  
Router(config-if)#ex  
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up  
it  
Router(config)#interface Serial3/0  
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)#+
```

Copy Paste

Router2

Physical Config CLI

### IOS Command Line Interface

```
--- System Configuration Dialog ---  
Continue with configuration dialog? [yes/no]: no  
  
Press RETURN to get started!  
  
Router>enable  
Router#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#interface Serial3/0  
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  
Router(config-if)#exit  
Router(config)#  
$LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up  
  
Router(config)#interface FastEthernet 0/0  
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)#
```

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Router0

Physical Config CLI

### IOS Command Line Interface

```
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
```

Router1

Physical Config CLI

### IOS Command Line Interface

```
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)#netwo  
00:09:47: *OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial2/0 from LOADING to  
FULL, Loading Done  
  
* Incomplete command.  
Router(config-router)#network 30.0.0.0 0.255.255.255 area 0  
Router(config-router)#exit
```

Router2

Physical Config CLI

### IOS Command Line Interface

```
Router(config)#router ospf 1  
Router(config-router)#router-id 3.3.3.3  
Router(config-router)#network 30.0.0.0 0.255.255.255 area 0  
Router(config-router)#  
00:11:11: *OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial3/0 from LOADING to  
FULL, Loading Done  
  
Router(config-router)#network 40.0.0.0 0.255.255.255 area 2  
Router(config-router)#exit
```

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
O  IA 30.0.0.0/8 [110/128] via 20.0.0.2, 00:01:34, Serial2/0
O  IA 40.0.0.0/8 [110/129] via 20.0.0.2, 00:00:18, Serial2/0
```

Router0

Physical Config CLI

### IOS Command Line Interface

```
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
```

Router1

Physical Config CLI

### IOS Command Line Interface

```
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
```

Router2

Physical Config CLI

### IOS Command Line Interface

```
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
```

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 20.0.0.0/8 [110/128] via 30.0.0.1, 00:05:04, 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#

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, 00:05:04, Serial3/0  
30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks  
C 30.0.0.0/8 is directly connected, Serial3/0  
C 30.0.0.1/32 is directly connected, Serial3/0  
C 40.0.0.0/8 is directly connected, FastEthernet0/0  
C 172.16.0.0/16 is directly connected, Loopback0

Router#

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Router#

Router(config)#router ospf 1

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

Router(config-router)#

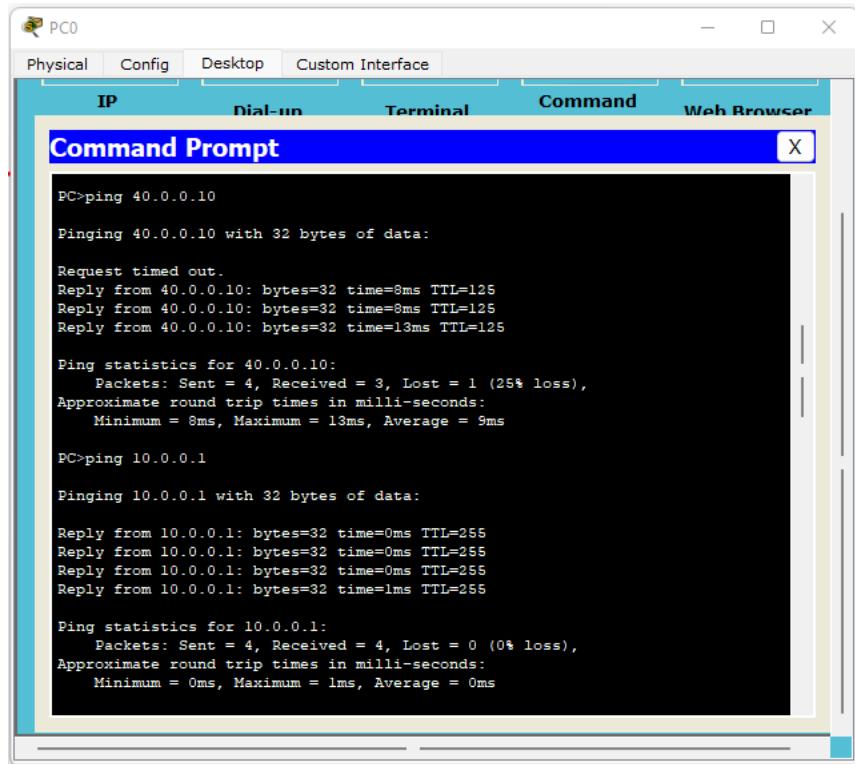
00:21:05: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on OSPF\_VL0 from LOADING to FULL,  
Loading Done

Router#

Router(config)#router ospf 1

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

## PING OUTPUT:



The screenshot shows a terminal window titled "Command Prompt" with the title bar "PC0". The window has tabs at the top: Physical, Config, Desktop, Custom Interface, IP, Dial-up, Terminal, Command, and Web Browser. The "Command" tab is selected. The terminal window displays the following command and its output:

```
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=8ms TTL=125
Reply from 40.0.0.10: bytes=32 time=8ms TTL=125
Reply from 40.0.0.10: bytes=32 time=13ms 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 = 8ms, Maximum = 13ms, Average = 9ms

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

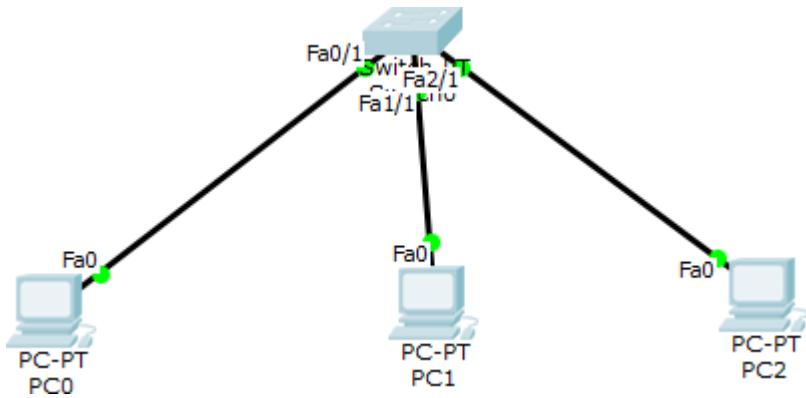
Ping statistics for 10.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

## OUTCOME:

Configuring OSPF protocol. The maximum number of hops rip will support is 15. Thus rip routing protocol can only be used for a maximum of 15 devices. This is where OSPF becomes advantageous. OSPF can be used to connect a lot more devices. It connects areas and each area can have n number of devices. Firstly, all the routers are configured similar to rip protocol, then ospf protocol is configured. Then a loopback address is added and a virtual link is establishes between router 1 and router 2 for area 3 to know about area 0. OSPF protocol is a classless protocol.

CN LAB WEEK 7-1BM21CS203

ARP-Address resolution protocol



Configure IP addresses

Go to command prompt of PC0

PC0

Physical Config Desktop Custom Interface

**Command Prompt**

```

Packet Tracer PC Command Line 1.0
PC>arp -a
No ARP Entries Found
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=7ms TTL=128
Reply from 10.0.0.3: bytes=32 time=0ms TTL=128
Reply from 10.0.0.3: bytes=32 time=1ms TTL=128
Reply from 10.0.0.3: bytes=32 time=0ms TTL=128

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 7ms, Average = 2ms

PC>arp -a
    Internet Address          Physical Address          Type
    10.0.0.3                  0002.1778.eb26      dynamic

PC>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time=1ms TTL=128
Reply from 10.0.0.2: bytes=32 time=0ms TTL=128
Reply from 10.0.0.2: bytes=32 time=0ms TTL=128

```

PC0

Physical Config Desktop Custom Interface

## Command Prompt

```
Minimum = 0ms, Maximum = 7ms, Average = 2ms

PC>arp -a
  Internet Address      Physical Address      Type
  10.0.0.3                0002.1778.eb26    dynamic

PC>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time=1ms TTL=128
Reply from 10.0.0.2: bytes=32 time=0ms TTL=128
Reply from 10.0.0.2: bytes=32 time=0ms TTL=128
Reply from 10.0.0.2: bytes=32 time=0ms TTL=128

Ping statistics for 10.0.0.2:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
  Minimum = 0ms, Maximum = 1ms, Average = 0ms

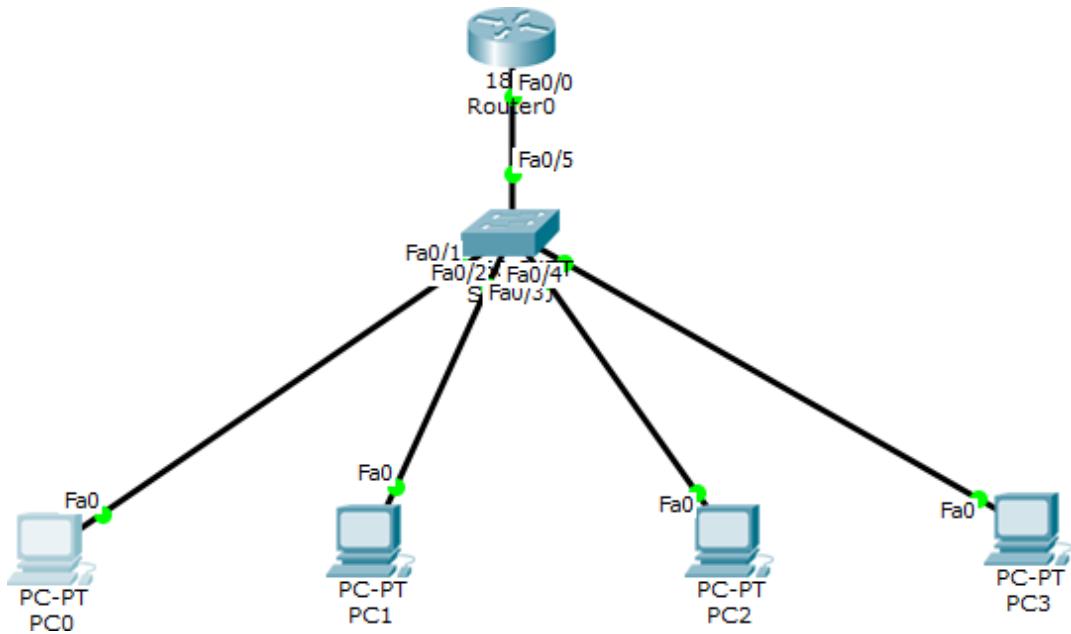
PC>arp -a
  Internet Address      Physical Address      Type
  10.0.0.2                0060.4775.706d    dynamic
  10.0.0.3                0002.1778.eb26    dynamic

PC>arp -d
PC>arp -a
No ARP Entries Found
PC>
```

## VLAN-Virtual LAN

Construct the topology as shown.

With switch -2960, router 1841



1. Configure the ip addresses and gateway tp PCs.
2. In router configure the left side network (fa 0/0)- 192.168.1.1
3. Go to switch ->config->vlan-database->set vlan name and number  
Vlan name can be anything, vlan number is based on the right side network (192.168.20.2) vlan number is 20.
4. Switch->config>fast ethernet 5->trunk(dropdown menu)
5. (For right side systems) Switch ->config->fast ethernet 3->vlan 20  
switch->fast ethernet 4-> vlan 20.
6. Go to router cli and type the following commands

```
Router(config)#
Router(config)#interface fastEthernet 0/0.1
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.1, changed state to up

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

Router(config-subif)#encapsulation dot1q 20
Router(config-subif)#ip address 192.168.20.1 255.255.255.0
Router(config-subif)#no shutdown
Router(config-subif)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

Ping the pc

```
PC>ping 192.168.20.2

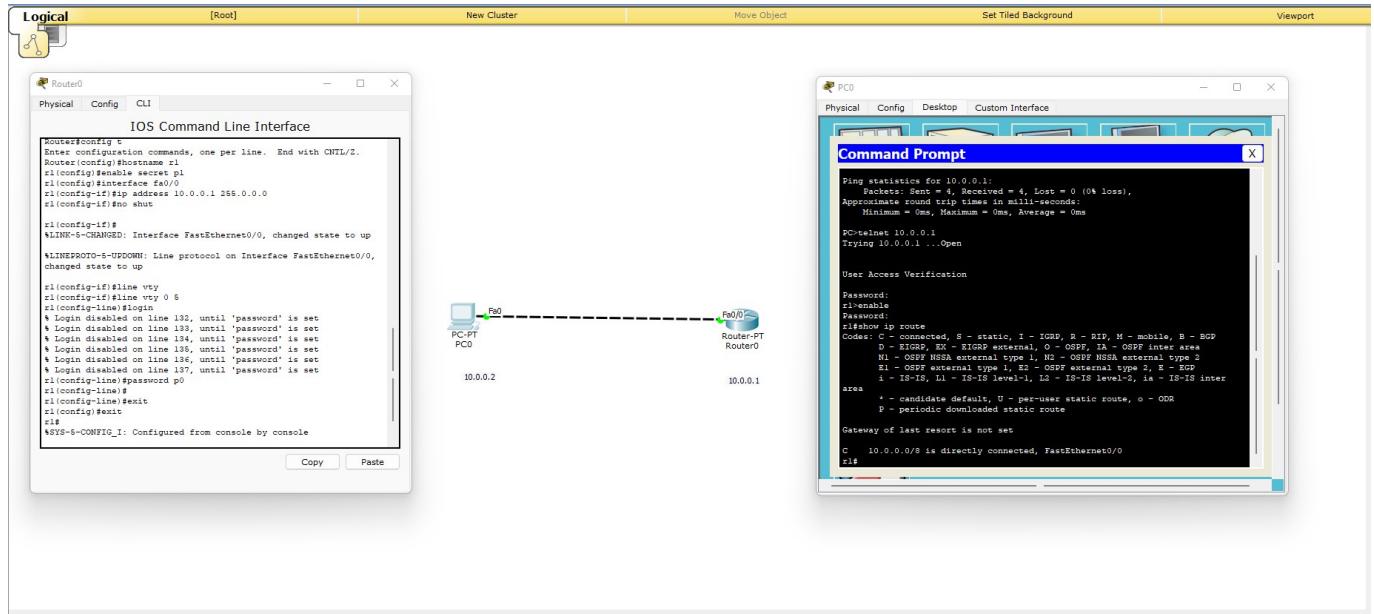
Pinging 192.168.20.2 with 32 bytes of data:

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

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

PC>
```

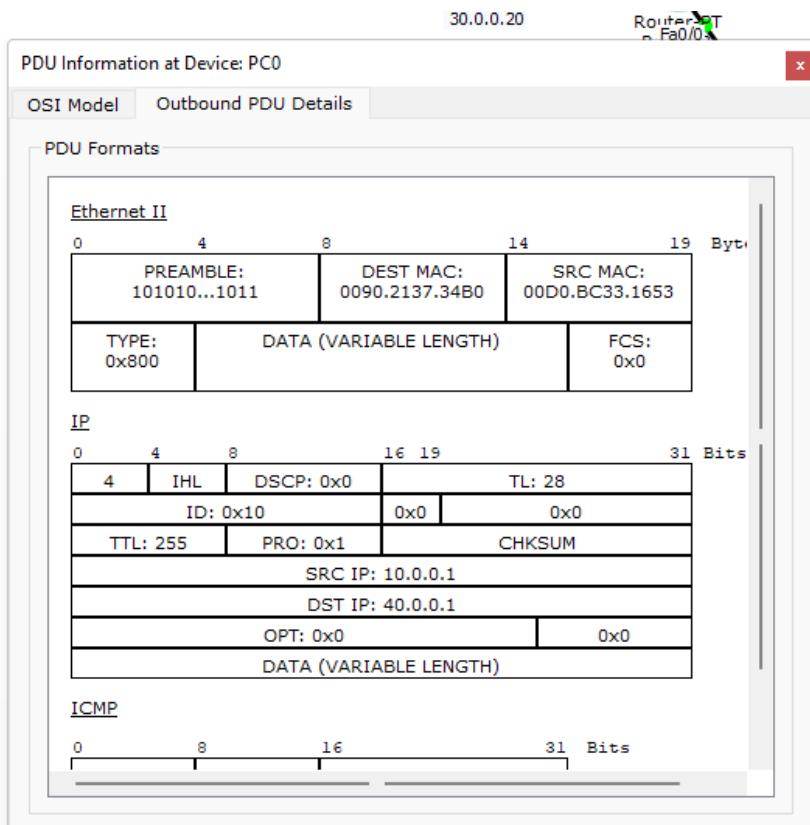
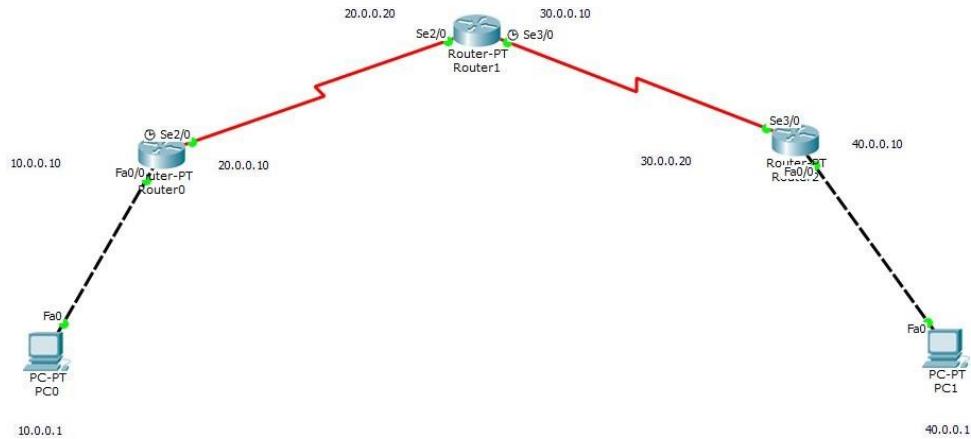
To understand the operation of TELNET by accessing the router inserver room from a PC in IT office.

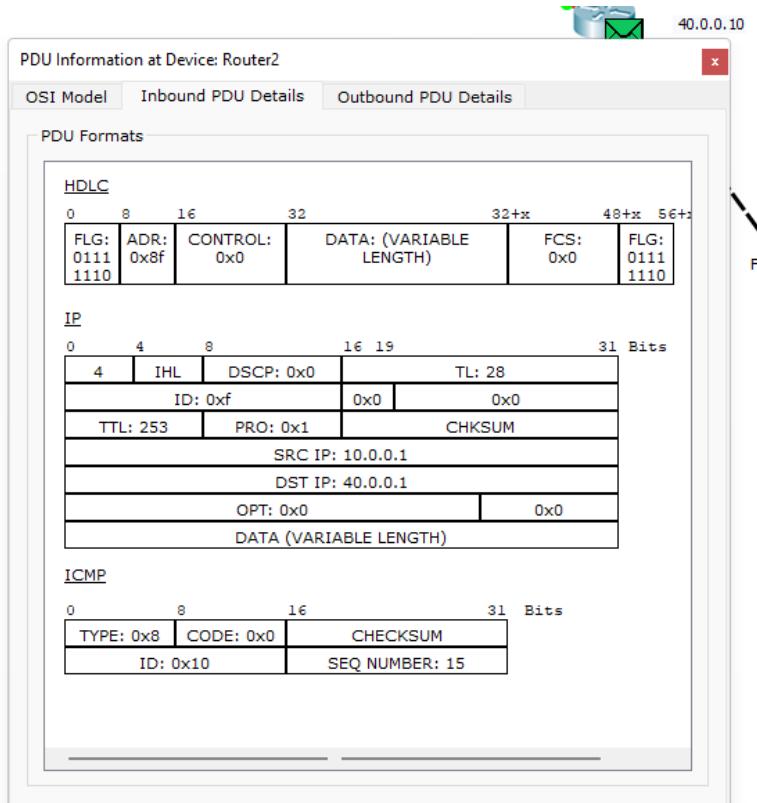
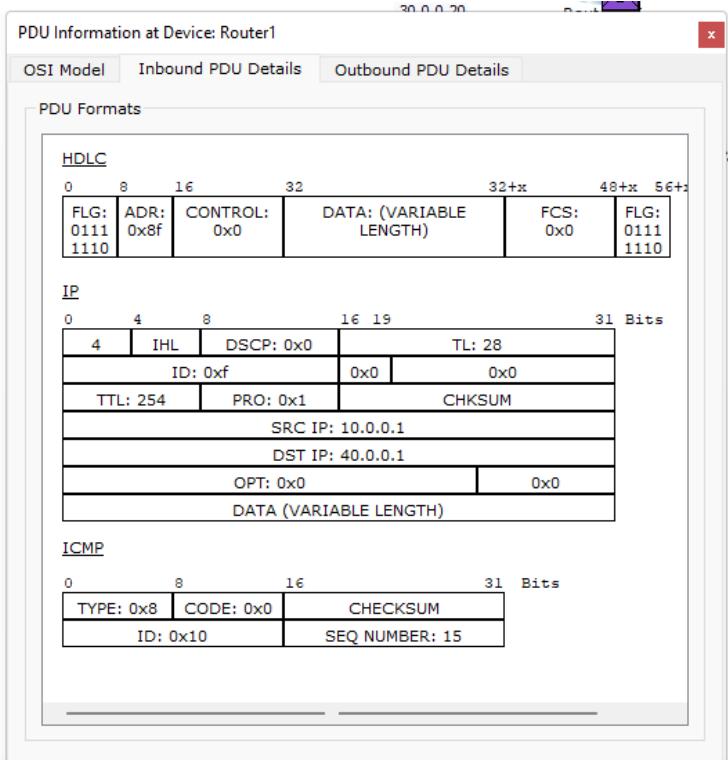


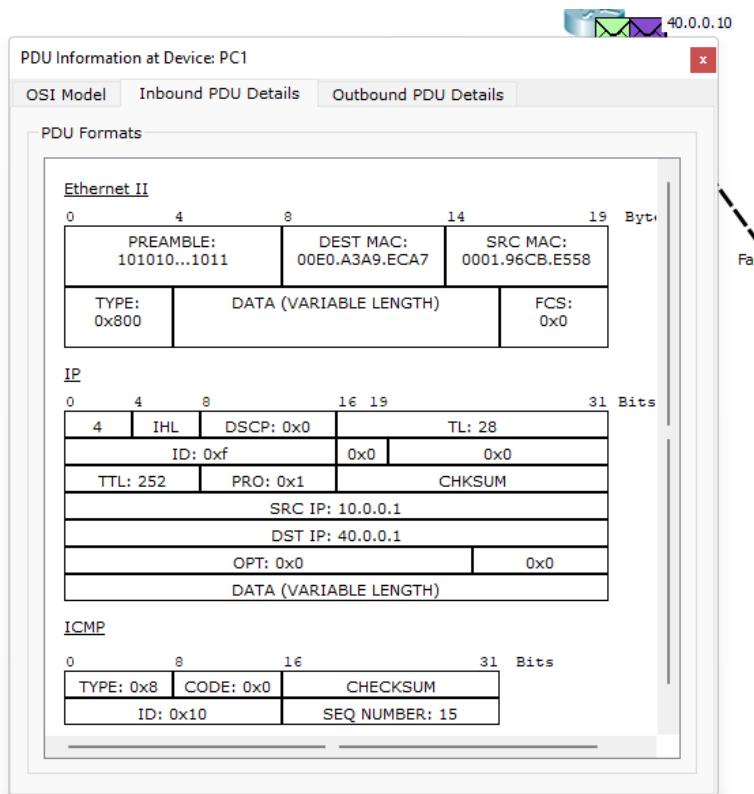
## CN LAB WEEK 8 1BM21CS203

DEMONSTRATE THE TTL / LIFE OF A PACKET

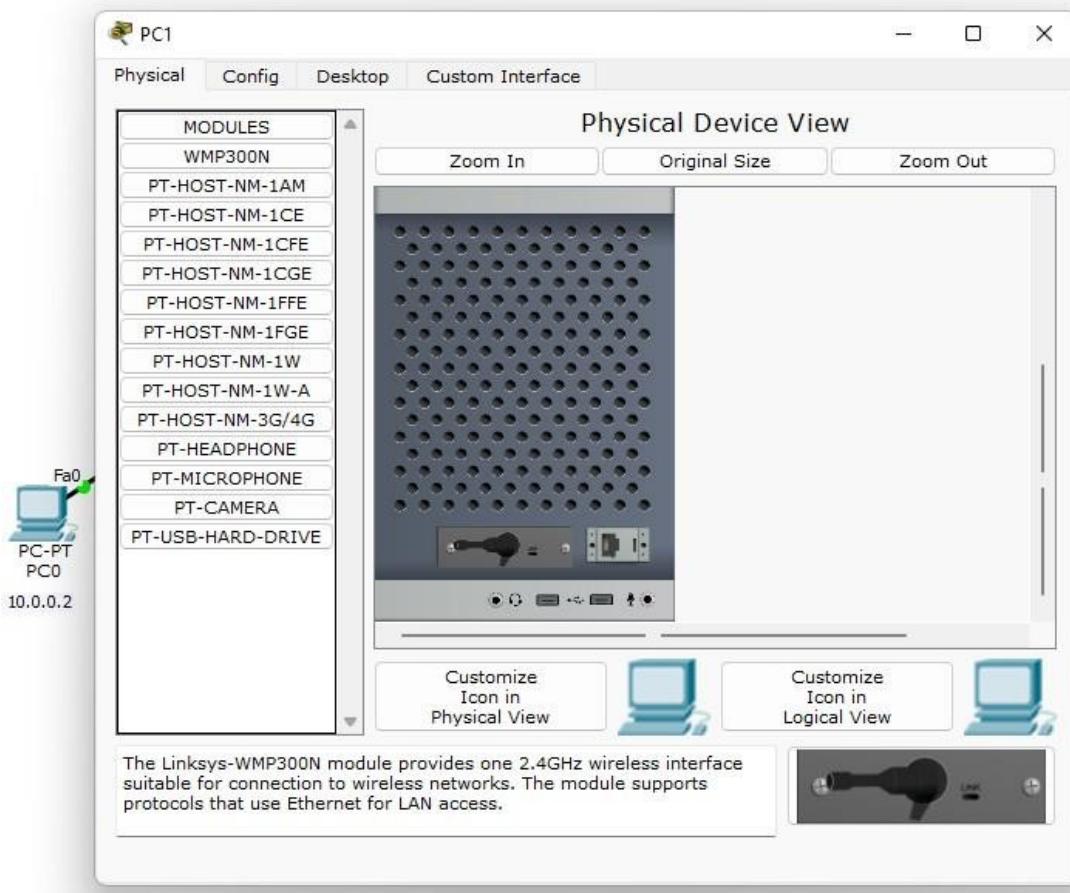
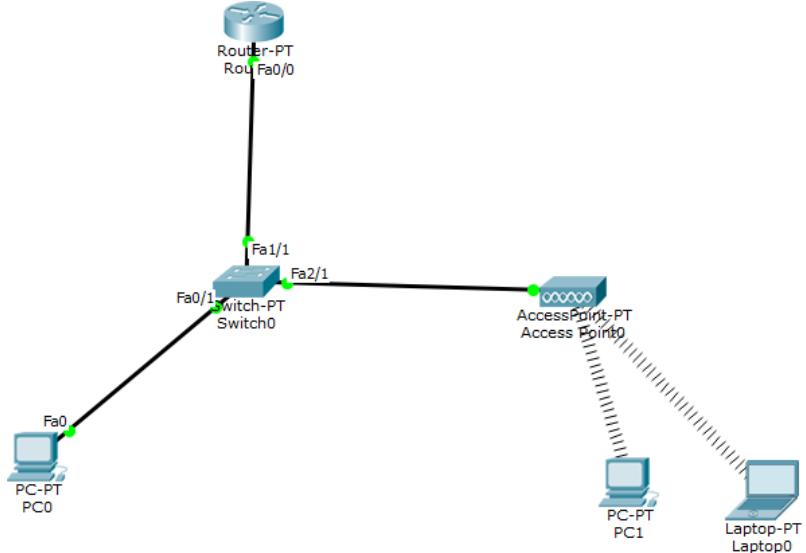
Topology:

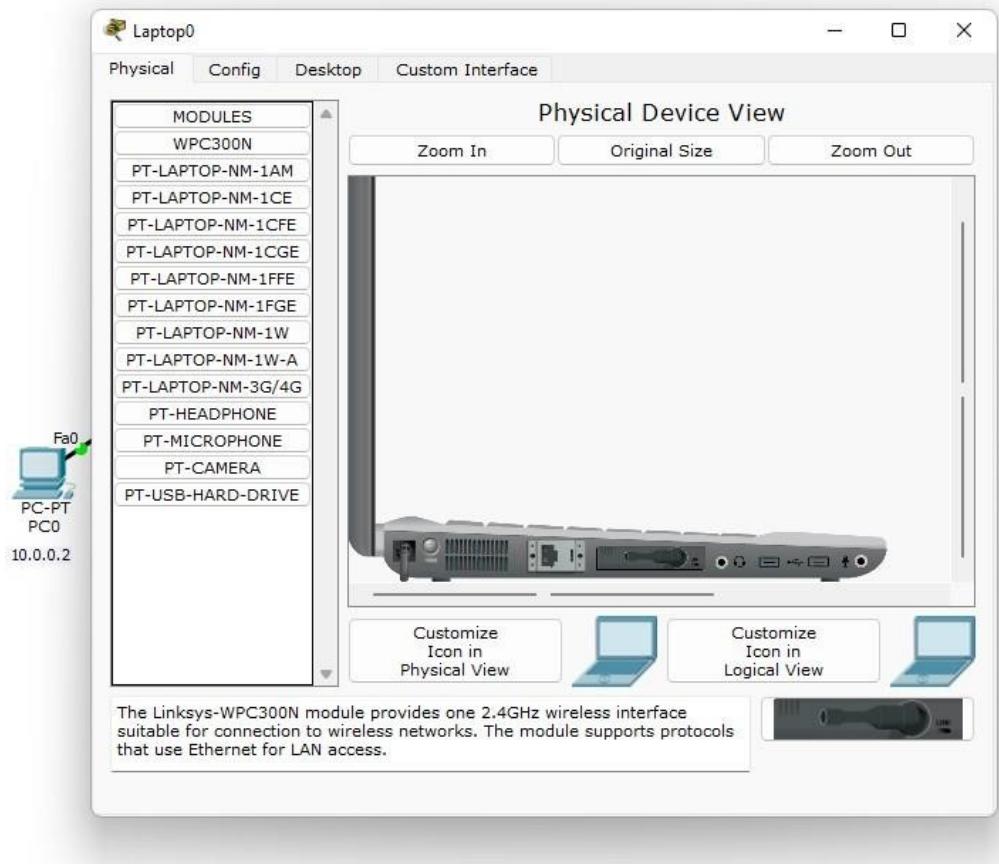


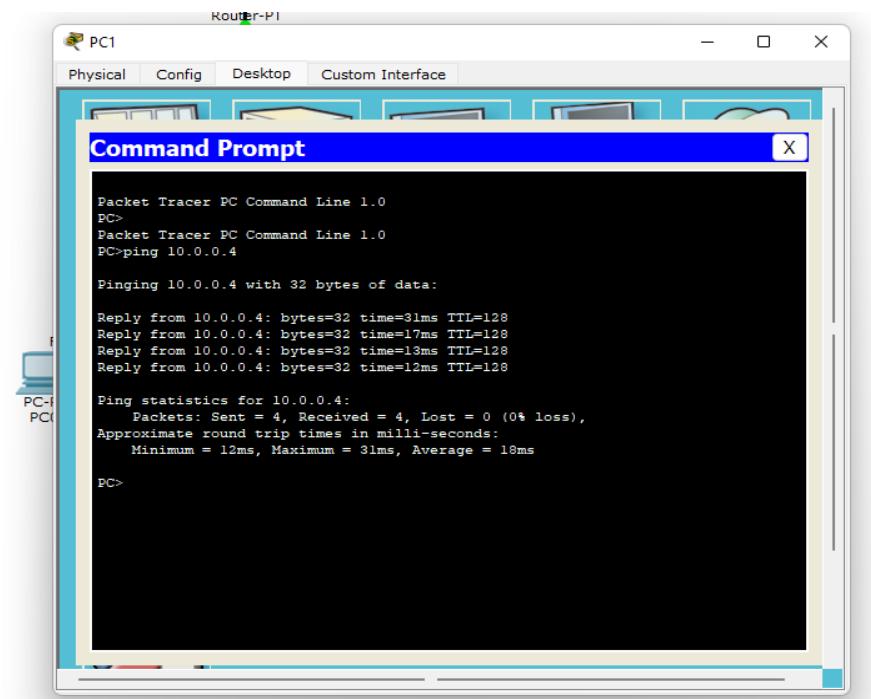




## TO CONSTRUCT A WLAN AND MAKE NODES COMMUNICATE WIRELESSLY







## **CYCLE 2-1BM21CS203**

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

Code:

```
#include<stdio.h

>int arr[17];

void xor(int x[], int y[])
{
    int k=0;
    for(int i=1;i<16;i++)
    {
        if(x[i]==y[i])
            arr[k++]=0;
        else
            arr[i]=1;
    }
}

void main()
{
    int dd[17],div[33],ze[17],i,k;

    printf("Enter the dataword \n");
}
```

```
for(i=0;i<17;i++)
    scanf("%d",&div[i])
;for(i=i;i<33;i++)
    div[i]=0;
```

```
for(i=0;i<17;i++)
    ze[i]=0;
printf("Enter dividend \n");
for(i=0;i<17;i++)
    scanf("%d",&dd[i]);
```

```
i=0;
k=0
;
for(i=i;i<17;i++)
    arr[k++]=div[i];
while(i<33)
{
    if(arr[0]==0)
        xor(arr,ze)
    ;else
        xor(arr,dd);
```

```
arr[16]=div[i++];
```

```
}
```

```
for(i=17;i<33;i++)div[i]=arr[k++];
```

```

printf("Codeword: ");

for(i=0;i<33;i++)
    printf("%d",div[i]);

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

printf("\nAt receiver end
      \n");

k=0;
for(i=i;i<17;i++)
    arr[k++]=div[i];
while(i<33)
{
    if(arr[0]==0)
        xor(arr,ze)
    ;else
        xor(arr,dd);

    arr[16]=div[i++];
}

k=0
;
for(i=17;i<33;i++)div[i]=arr[k++];
printf("Codeword: ");
for(i=0;i<33;i++)
    printf("%d",div[i]);

```

}

Output:

```
Enter the dataword
1 0 1 1 0 0 1 1 1 1 0 0 1 0 1 1 1
Enter dividend
1 0 0 0 1 0 0 0 0 0 1 0 0 0 1 1
Codeword: 101100111100101110000000000011011
At receiver end
Codeword: 10110011110010111000000000000000
Process returned 1 (0x1)   execution time : 49.507 s
Press any key to continue.
```

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

Code:

```
#include <stdio.h>
#include <stdlib.h> // Include this for the rand() function

int main()
{
    int buckets, outlets, k = 1, num, remaining;

    printf("Enter Bucket size and outstream size\n");
    scanf("%d %d", &buckets, &outlets);
    remaining = buckets;

    while (k)
    {
        num = rand() % 1000; // Generate a random number between 0 and
        999if(num < remaining)
        {
            remaining = remaining - num;
            printf("Packet of %d bytes accepted\n", num); // Added missing variable
        }
        else
        {
            printf("Packet of %d bytes is discarded\n", num);
        }
        if(buckets - remaining > outlets)
        {
            remaining += outlets; // Fixed the calculation
        }
        else
            remaining = buckets;
        printf("Remaining bytes: %d \n", remaining);
        printf("If you want to stop input, press 0, otherwise, press 1\n");
        scanf("%d", &k);
    }
}
```

```
}
```

```
while (remaining < buckets) // Fixed the condition
{
    if(buckets - remaining > outlets)
    {
        remaining += outlets; // Fixed the calculation
    }
    else
        remaining = buckets;
    printf("Remaining bytes: %d \n", remaining);
}
return 0; // Added a return statement to indicate successful completion
}
```

## Output:

```
PS D:\VS Code> cd "d:\VS Code\OS\" ; if ($?) { gcc bucket.c -o bucket } ; if (?) { .\bucket }
Enter Bucket size and upstream size
2000
100
Packet of 41 bytes accepted
Remaining bytes: 2000
If you want to stop input, press 0, otherwise, press 1
1
Packet of 467 bytes accepted
Remaining bytes: 1633
If you want to stop input, press 0, otherwise, press 1
1
Packet of 334 bytes accepted
Remaining bytes: 1399
If you want to stop input, press 0, otherwise, press 1
1
Packet of 500 bytes accepted
Remaining bytes: 999
If you want to stop input, press 0, otherwise, press 1
1
Packet of 169 bytes accepted
Remaining bytes: 930
If you want to stop input, press 0, otherwise, press 1
1
Packet of 724 bytes accepted
Remaining bytes: 306
If you want to stop input, press 0, otherwise, press 1
1
Packet of 478 bytes is discarded
Remaining bytes: 406
If you want to stop input, press 0, otherwise, press 1
1
Packet of 358 bytes accepted
Remaining bytes: 148
If you want to stop input, press 0, otherwise, press 1
1
Packet of 962 bytes is discarded
Remaining bytes: 248
If you want to stop input, press 0, otherwise, press 1
0
Remaining bytes: 348
Remaining bytes: 448
Remaining bytes: 548
Remaining bytes: 648
Remaining bytes: 748
```

```
0  
Remaining bytes: 348  
Remaining bytes: 448  
Remaining bytes: 548  
Remaining bytes: 648  
Remaining bytes: 748  
Remaining bytes: 848  
Remaining bytes: 948  
Remaining bytes: 1048  
Remaining bytes: 1148  
Remaining bytes: 1248  
Remaining bytes: 1348  
Remaining bytes: 1448  
Remaining bytes: 1548  
Remaining bytes: 1648  
Remaining bytes: 1748  
Remaining bytes: 1848  
Remaining bytes: 1948  
Remaining bytes: 2000  
PS D:\VS Code\OS> []
```

**QUESTION:**

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

Code:

Server.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()
```

Client.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: ") 64

clientSocket.send(sentence.encode())
filecontents=clientSocket.recv(1024).decode() print("\nFrom
```

```
Server:\n')
print(filecontents)
clientSocket.close()
```

```

clienttop.py C:\Users\Admin\Desktop\lBM21CS047\clienttop.py (3.10.2)
--  X
File Edit Run Options Window Help
from socket import *
serveRPort=1024
serverRName="127.0.0.1"
serverRPort=12000
serverRSocket=socket(AF_INET,SOCK_STREAM)
serverRSocket.bind((serverRName,serverRPort))
serverRSocket.listen(1)
while 1:
    connectionSocket,addr=serverRSocket.accept()
    sentence=connectionSocket.recv(1024).decode()
    file=open(sentence,'r')
    file=file.read(1024)
    connectionSocket.send(file.encode())
    connectionSocket.close()
>>> print("RESTART: C:/Users/Admin/Desktop/lBM21CS047/clienttop.py")
-----
```

```

servertop.py C:\Users\Admin\Desktop\lBM21CS047\servertop.py (3.10.2)
--  X
File Edit Run Options Window Help
from socket import *
serverRName="127.0.0.1"
serverRPort=12000
serverRSocket=socket(AF_INET,SOCK_STREAM)
serverRSocket.bind((serverRName,serverRPort))
serverRSocket.listen(1)
while 1:
    print("The Server is ready to receive")
    connectionSocket,addr=serverRSocket.accept()
    sentence=connectionSocket.recv(1024).decode()
    file=open("file1.txt","r")
    file=file.read(1024)
    connectionSocket.send(file.encode())
    connectionSocket.close()
>>> print("RESTART: C:/Users/Admin/Desktop/lBM21CS047/servertop.py")
-----
```

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

Code:

Server.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()
```

Client.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(filecontents)
```

```

clientSocket.recvfrom(2048)
print ('\nReply from Server:\n')print
(filecontents.decode('utf-
8'))clientSocket.close()
clientSocket.close()

```

```

client udp - C:/Users/Admin/Desktop/IBM1CS047/CN/clientudp.py [3.10.8]
File Edit Format Run Options Window Help
from socket import *
serverName = '127.0.0.1'

serverPort = 12000
clientSocket = socket(AF_INET, SOCK_DGRAM)
clientSocket.sendto(b'fileContents', (serverName, serverPort))
clientSocket.close()
clientSocket.close()

server udp - C:/Users/Admin/AppData/Local/Programs/Python/Python310/serverudp.py [3.10.8]
File Edit Format Run Options Window Help
from socket import *
serverPort = 12000
serverSocket = socket(AF_INET, SOCK_DGRAM)
serverSocket.bind((serverName, serverPort))
print ('The server is ready to receive')
while 1:
    sendto(fileContents, (clientAddress[0], clientAddress[1]))
    print ('Sent contents of ', end = '')
    for i in fileContents:
        print (str(i), end = '')
    file.close()
    print ('----- RESTART: C:/Users/Admin/Desktop/IBM1CS047/CN/clientu
fileContents

```

