

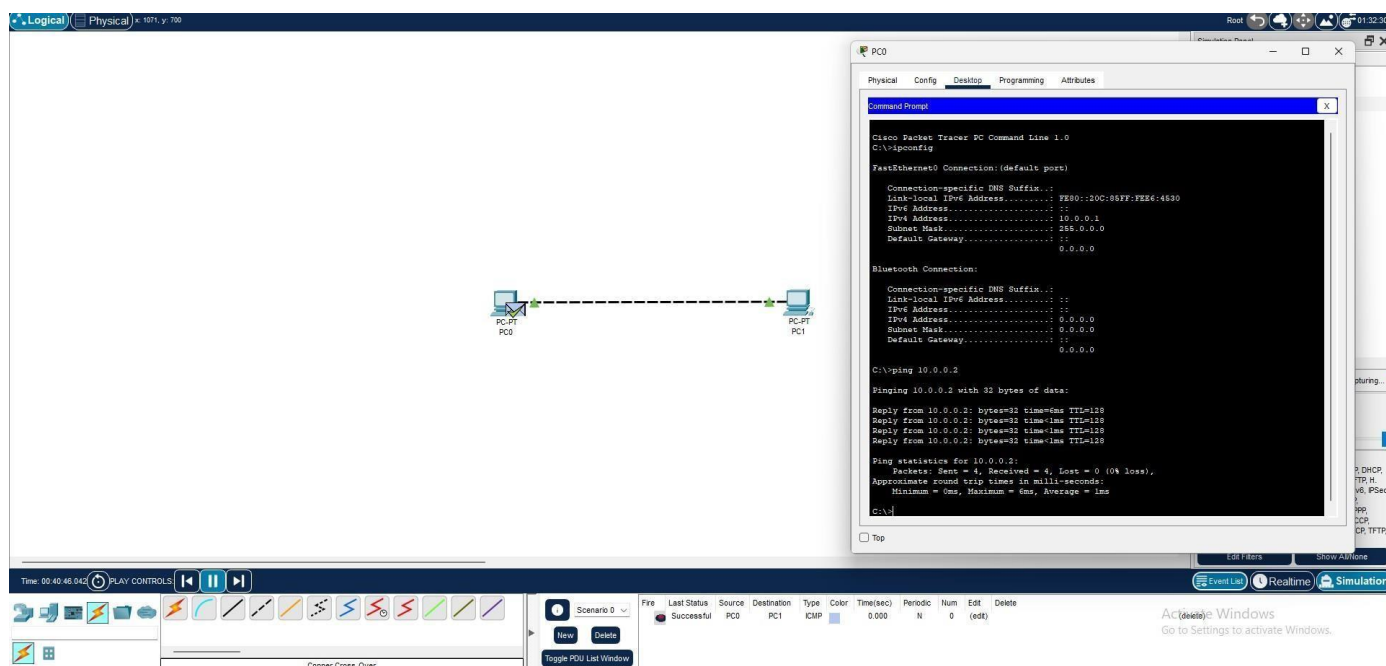
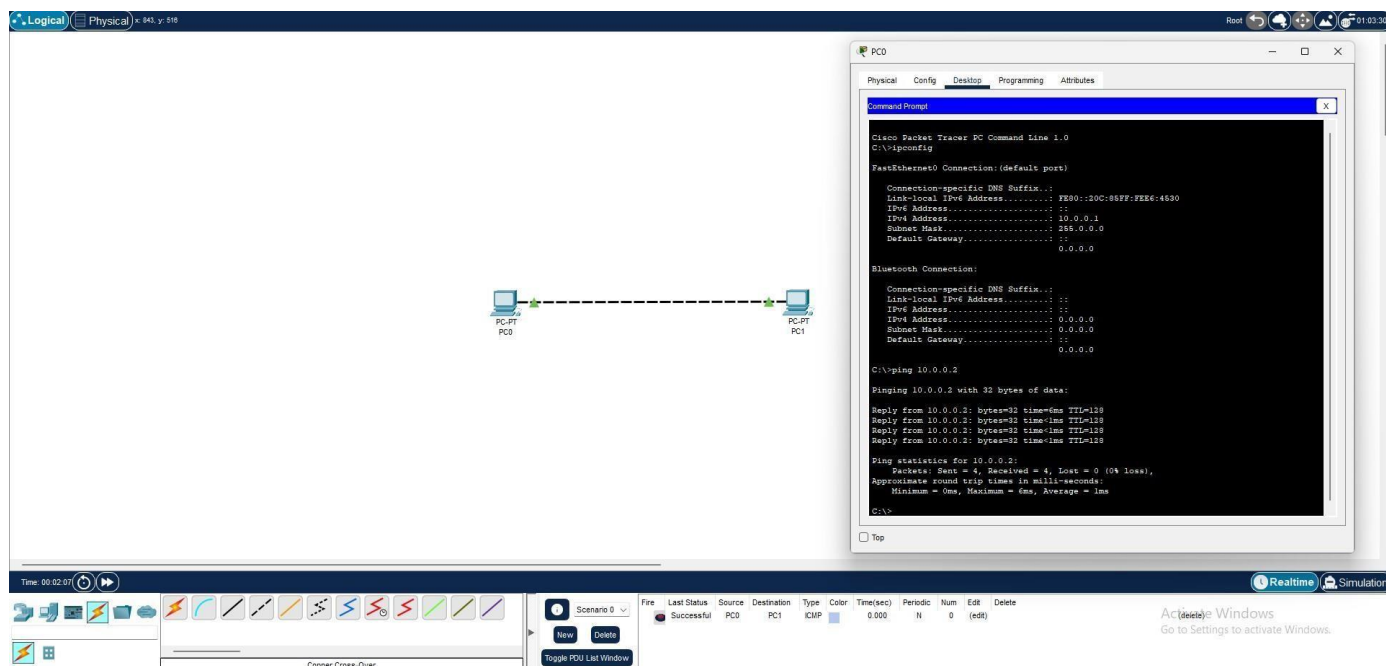
Computer Networks Lab

MOHAMED ZAYED A
RA2211003050091

Lab 1: Introduction to Packet Tracer, Peer-to-Peer Communication, Study of Cables and its Color Codes

- **Procedure:**
 1. **Open Packet Tracer:**
 - Launch Cisco Packet Tracer on your computer.
 - Familiarize yourself with the interface, including the workspace, device selection, and tools.
 2. **Create a Simple Network:**
 - Drag two computers (PC-PT) onto the workspace.
 - Drag a switch (Switch-PT) onto the workspace.
 - Connect each computer to the switch using straight-through Ethernet cables.
 3. **Configure IP Addresses:**
 - Click on the first computer, go to the Desktop tab, and select IP Configuration.
 - Assign an IP address (e.g., 192.168.1.1) and a subnet mask (e.g., 255.255.255.0).
 - Click on the second computer, go to the Desktop tab, and select IP Configuration.
 - Assign an IP address (e.g., 192.168.1.2) and a subnet mask (e.g., 255.255.255.0).
 4. **Test Peer-to-Peer Communication:**
 - On the first computer, open the Command Prompt from the Desktop tab.
 - Use the `ping` command to test connectivity to the second computer (e.g., `ping 192.168.1.2`).
 - Observe the response to ensure the computers can communicate.
 5. **Study Cables and Color Codes:**
 - Examine different types of network cables provided (Ethernet, crossover).
 - Note the color codes for each wire in the cables:
 - Straight-through cable (used to connect different devices like a computer to a switch).
 - Crossover cable (used to connect similar devices like computer to computer).

Output:



Lab 2: Implementation of Network Topologies

- **Procedure:**
 1. **Open Packet Tracer:**
 - Launch Cisco Packet Tracer on your computer.

2. Implement a Bus Topology:

- Drag three computers onto the workspace.
- Connect them using a single backbone cable (Coaxial Cable).

3. Implement a Star Topology:

- Drag three computers and a switch onto the workspace.
- Connect each computer to the switch using straight-through Ethernet cables.

4. Implement a Ring Topology:

- Drag three computers onto the workspace.
- Connect them in a circular manner using crossover cables.

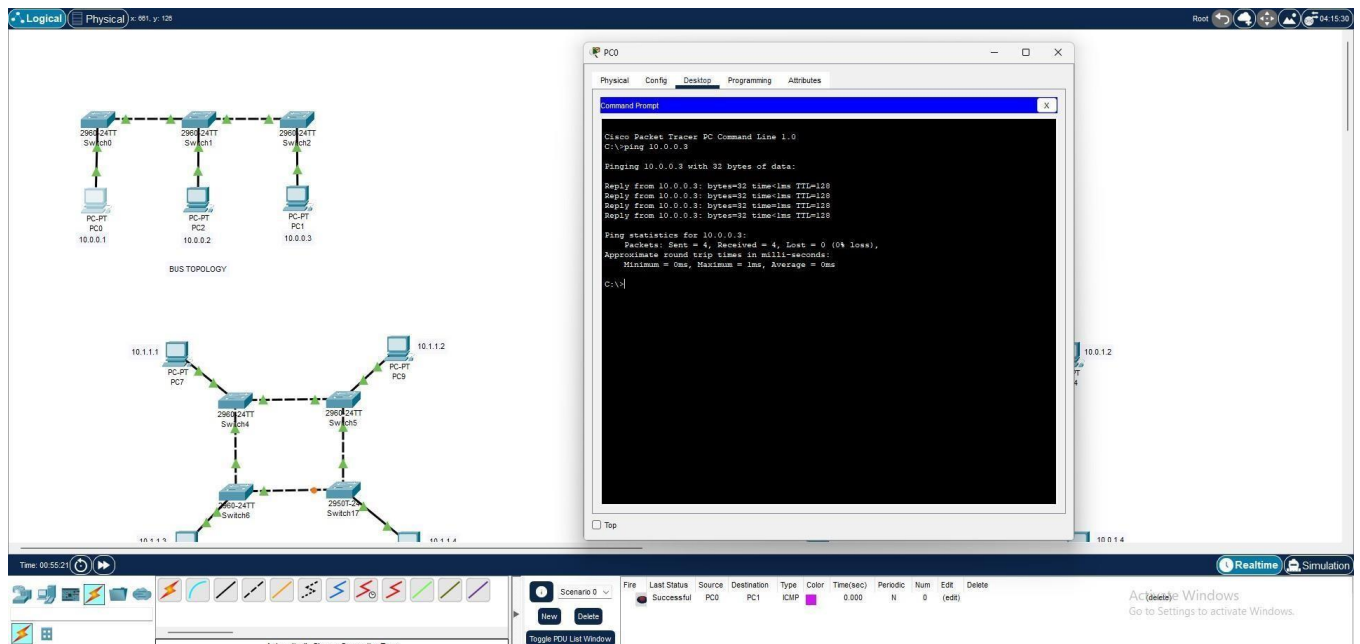
5. Implement a Mesh Topology:

- Drag three computers onto the workspace.
- Connect each computer to every other computer using crossover cables.

6. Test Connectivity:

- For each topology, assign IP addresses to the computers.
- Use the `ping` command to test connectivity between all computers.

Output:



Logical Physical = 98, y: 81 Root 04:45:00

PC3

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>IPCONFIG

FastEthernet0 Connection (default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::205:6E5F:FEDC:3DB0
    IPv4 Address. . . . .: 10.1.0.1
    Subnet Mask . . . . .: 255.0.0.0
    Default Gateway . . . . .: 0.0.0.0

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .:
    IPv4 Address. . . . .: 0.0.0.0
    Subnet Mask . . . . .: 0.0.0.0
    Default Gateway . . . . .: 0.0.0.0

C:\>PING 10.1.0.3

Pinging 10.1.0.3 with 32 bytes of data:

Reply from 10.1.0.3: bytes=32 time=1ms TTL=128
Reply from 10.1.0.3: bytes=32 time=1ms TTL=128
Reply from 10.1.0.3: bytes=32 time=1ms TTL=128
Reply from 10.1.0.3: bytes=32 time=1ms TTL=128

Ping statistics for 10.1.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 6ms, Average = 1ms

C:\>
```

STAR TOPOLOGY

10.1.0.1 PC-PT PC3
10.1.0.2 PC-PT PC4
10.1.0.3 PC-PT PC5
2950-24T Switch3

10.1.0.1 PC-PT PC12
10.1.0.2 PC-PT PC14
10.1.0.3 PC-PT PC8
10.1.0.4 PC-PT PC11
2950-24T Switch12
2950-24T Switch13
2950-24T Switch14
2950-24T Switch15

Time: 00:56:10

Scenario 0

New Delete

Toggle POI List Window

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

Successful PC0 PC1 ICMP 0.000 N 0 (eds)

Active Windows

Go to Settings to activate Windows.

Logical Physical = 94, y: 98 Root 05:39:30

PC8

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>IPCONFIG

FastEthernet0 Connection (default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::20A:41FF:FC1:D395
    IPv4 Address. . . . .: 10.1.1.3
    Subnet Mask . . . . .: 255.0.0.0
    Default Gateway . . . . .: 0.0.0.0

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .:
    IPv4 Address. . . . .: 0.0.0.0
    Subnet Mask . . . . .: 0.0.0.0
    Default Gateway . . . . .: 0.0.0.0

C:\>PING 10.1.1.2

Pinging 10.1.1.2 with 32 bytes of data:

Reply from 10.1.1.2: bytes=32 time=1ms TTL=128
Reply from 10.1.1.2: bytes=32 time=1ms TTL=128
Reply from 10.1.1.2: bytes=32 time=1ms TTL=128
Reply from 10.1.1.2: bytes=32 time=1ms TTL=128

Ping statistics for 10.1.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>PING 10.1.1.4

Pinging 10.1.1.4 with 32 bytes of data:
```

BUS TOPOLOGY

10.0.0.1 PC-PT PC0
10.0.0.2 PC-PT PC2
10.0.0.3 PC-PT PC1
10.1.1.1 PC-PT PC7
10.1.1.2 PC-PT PC9
10.1.1.3 PC-PT PC8
10.1.1.4 PC-PT PC11
2950-24T Switch4
2950-24T Switch5
2950-24T Switch6
2950-24T Switch17

RING TOPOLOGY

Time: 00:58:04

Scenario 0

New Delete

Toggle POI List Window

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

Successful PC0 PC1 ICMP 0.000 N 0 (eds)

Active Windows

Go to Settings to activate Windows.

File Edit Options View Tools Extensions Window Help

Logical Physical

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.1.2

Pinging 10.0.1.2 with 32 bytes of data:
Reply from 10.0.1.2: bytes=32 time=1ms TTL=128
Reply from 10.0.1.2: bytes=32 time=1ms TTL=128
Reply from 10.0.1.2: bytes=32 time=1ms TTL=128
Reply from 10.0.1.2: bytes=32 time=1ms TTL=128

Ping statistics for 10.0.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>
```

10.0.1.1 PC-PT PC12 10.0.1.2 PC-PT PC14 10.0.1.3 PC-PT PC13 10.0.1.4 PC-PT PC15

2960-24TT Switch12 2960-24TT Switch13 2960-24TT Switch14 2960-24TT Switch15

MESH TOPOLOGY

Time: 00:00:51

Scenario 0

Now Delete

Toggle PDU List Window

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

(Select a Device to Drag and Drop to the Workspace)

Realtime Simulate

Lab 3: Router Configuration (Creating Passwords, Configuring Interfaces)

- **Procedure:**

1. **Open Packet Tracer:**

- Launch Cisco Packet Tracer on your computer.

2. **Create a Simple Network:**

- Drag a router and two computers onto the workspace.
- Connect each computer to the router using straight-through Ethernet cables.

3. **Access Router CLI:**

- Click on the router, go to the CLI tab.

4. **Set Up Passwords:**

- Enter global configuration mode: `enable, configure terminal`.
- Set the console password: `line console 0, password cisco, login`.
- Set the enable password: `enable password cisco`.
- Set the VTY password: `line vty 0 4, password cisco, login`.

5. **Configure Router Interfaces:**

- Go to interface configuration mode for the first interface: `interface gig0/0`.

■ Assign an IP address: `ip address 192.168.1.1 255.255.255.0`. ■ Enable the interface: `no shutdown`.

- Repeat for the second interface: `interface gig0/1, ip address 192.168.2.1 255.255.255.0, no shutdown`.

6. **Configure IP Addresses on Computers:**

-
- Assign IP address 192.168.1.2 and 192.168.2.2 to the first and second computer, respectively.

7. Test Connectivity:

- Use the `ping` command to test connectivity between the computers through the router.

Output:

Logical Physical x: 1281, y: 477

Router0

IOS Command Line Interface

```
Router>en
Router>conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#enable secret cisco123
Router(config)#exit
Router#
$SYS-5-CONFIG_I: Configured from console by console
^
Building configuration...

Current configuration : 807 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Router
!
enable secret 5 $1mE2Rr5.a647q8NKK0lus1fka/
!
!
!
ip cef
no ipmrf cef
!
!
Router>conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#line vty 0 4
Router(config-line)#login
Router(config-line)#exit
Router(config)#exit
Router#
$SYS-5-CONFIG_I: Configured from console by console
Router>exit
```

Time: 00:02:16

Scenario 0

File Last Status Source Destination Type

Now

Delete

Toggle PDU List Window

(Select a Device to Drag and Drop to the Workspace)

Simulation

Activate Windows
Go to Settings to activate Windows.

Logical Physical x: 651, y: 271

Router0

IOS Command Line Interface

```
Router>con0 is now available

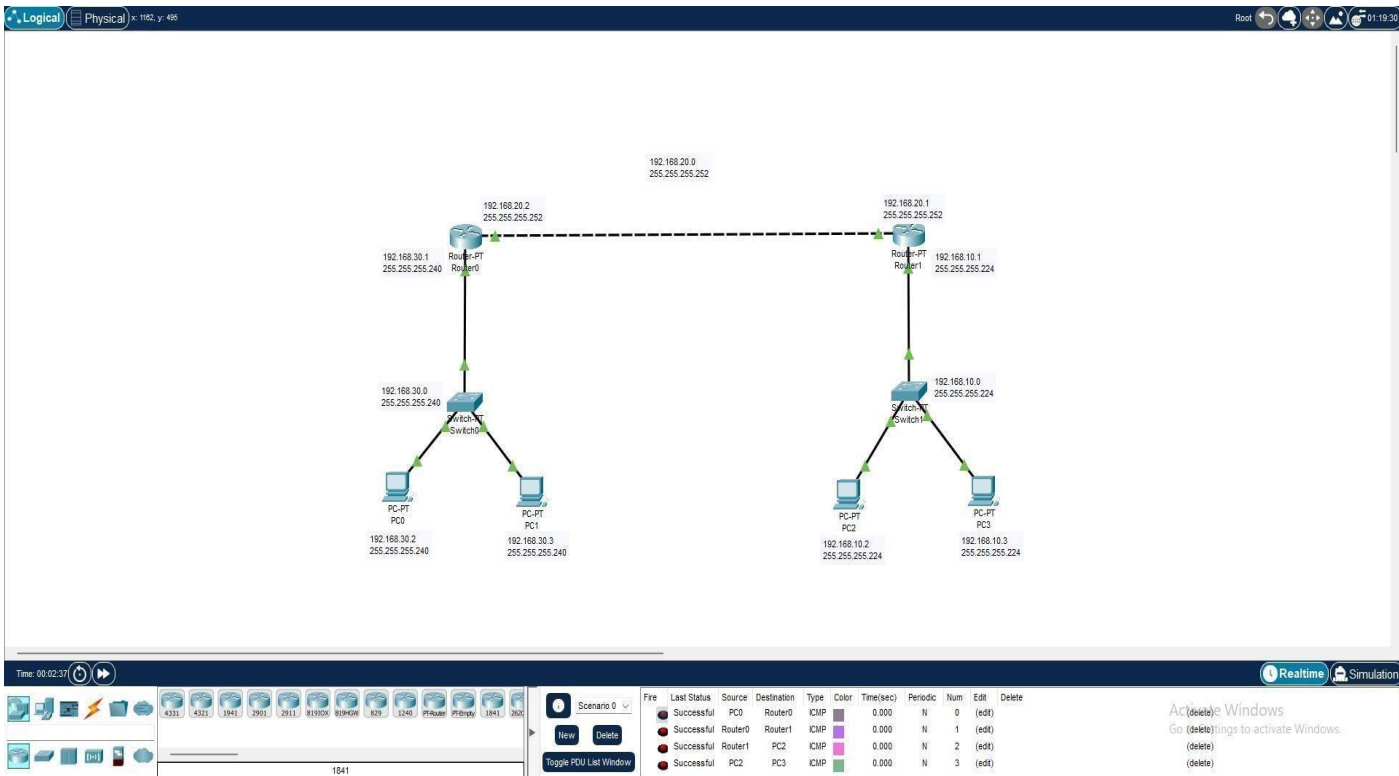
Press RETURN to get started.

Router>en
Router>conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip address 192.168.30.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#int fa0/0
Router(config-if)#ip address 192.168.20.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#^Z
Router#
$SYS-5-CONFIG_I: Configured from console by console
Router>
```

Time: 00:03:56

Realtime

Simulation



Lab 4: IP Addressing and Subnetting (VLSM)

- **Procedure:**

- 1. Open Packet Tracer:**

- Launch Cisco Packet Tracer on your computer.

- 2. Design Network Topology:**

- Create a network with three routers connected in a triangular fashion.

- 3. Calculate Subnets Using VLSM:**

- Determine the number of required subnets and host addresses.
- Divide the network into subnets using VLSM.

- 4. Assign IP Addresses:**

- Configure the interfaces of each router with the calculated IP addresses. ■

Example:

- Router 1 to Router 2: 192.168.1.0/30
- Router 1 to Router 3: 192.168.1.4/30

- Router 2 to Router 3: 192.168.1.8/30

5. Configure Interfaces:

- Access the CLI of each router.
- Configure the IP addresses on each interface.

6. Test Connectivity:

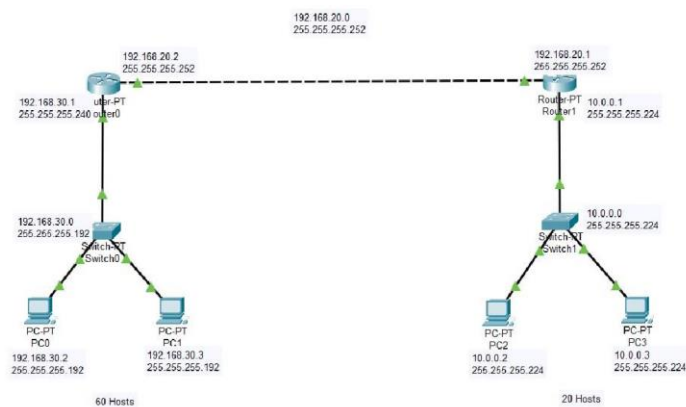
- Use the `ping` command to test connectivity between the routers.

Output:



Logical Physical x: 1170 y: 448

Ract 00:38



Time: 00:01:16

Realtime Simulate



(Select a Device to Drag and Drop to the Workspace)

Scenario 0

New Delete

Toggle PDU List Window

| Fire | Last Status | Source | Destination | Type | Color | Time(sec) | Periodic | Num | Edit | Delete |
|------|-------------|--------|-------------|------|-------|-----------|----------|-----|--------|----------|
| ... | ... | PC0 | PC2 | ICMP | ... | 0.000 | N | 0 | (edit) | (delete) |
| ... | ... | PC0 | PC3 | ICMP | ... | 0.000 | N | 1 | (edit) | (delete) |
| ... | ... | PC2 | PC1 | ICMP | ... | 0.000 | N | 2 | (edit) | (delete) |
| ... | ... | PC3 | PC1 | ICMP | ... | 0.000 | N | 3 | (edit) | (delete) |

FileEditOptionsViewToolsExtensionsWindowHelp

LogicalPhysical

1443, 1

192.168.20.2
255.255.255.252

192.168.20.1
255.255.255.224

192.168.30.1
255.255.255.240

192.168.30.0
255.255.255.192

192.168.30.2
255.255.255.192

192.168.30.3
255.255.255.192

60 Hosts

192.168.20.1
255.255.255.224

10.0.0.0
255.255.255.224

10.0.0.2
255.255.255.224

10.0.0.3
255.255.255.224

20 Hosts

Time: 00:04:37

Scenario 0

NewDelete

Toggle PDU List Window

FireLast Status

| | | | | | | | |
|-----|-----|------|-------|---|---|--------|----------|
| PC0 | PC2 | ICMP | 0.000 | N | 0 | (edit) | (delete) |
| PC0 | PC3 | ICMP | 0.000 | N | 1 | (edit) | (delete) |
| PC2 | PC1 | ICMP | 0.000 | N | 2 | (edit) | (delete) |
| PC3 | PC1 | ICMP | 0.000 | N | 3 | (edit) | (delete) |

PC0

PhysicalConfigDesktopProgrammingAttributes

Command Prompt

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Request timed out.
Reply from 10.0.0.3: bytes=32 time=4ms TTL=126
Reply from 10.0.0.3: bytes=32 time=4ms TTL=126
Reply from 10.0.0.3: bytes=32 time=4ms TTL=126

Ping statistics for 10.0.0.3:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 4ms, Average = 1ms

C:\>

Top

| | | | | | | | |
|-----|-----|------|-------|---|---|--------|----------|
| PC0 | PC2 | ICMP | 0.000 | N | 0 | (edit) | (delete) |
| PC0 | PC3 | ICMP | 0.000 | N | 1 | (edit) | (delete) |
| PC2 | PC1 | ICMP | 0.000 | N | 2 | (edit) | (delete) |
| PC3 | PC1 | ICMP | 0.000 | N | 3 | (edit) | (delete) |

Lab 5: Static and Default Routing

- **Procedure:**

1. **Open Packet Tracer:**

- Launch Cisco Packet Tracer on your computer.

2. **Create a Network:**

- Drag required routers and computers onto the workspace.
- Connect the routers using a serial connection.
- Connect each computer to a router using Ethernet cables.

3. **Configure IP Addresses:**

- Assign IP addresses to each interface on the routers and computers.

4. **Configure Static Routes:**

- Example: On Router 1: `ip route 192.168.2.0 255.255.255.0
<Router 2Serial IP>`

- Example: On Router 2: `ip route 192.168.1.0 255.255.255.0
<Router 1Serial IP>`

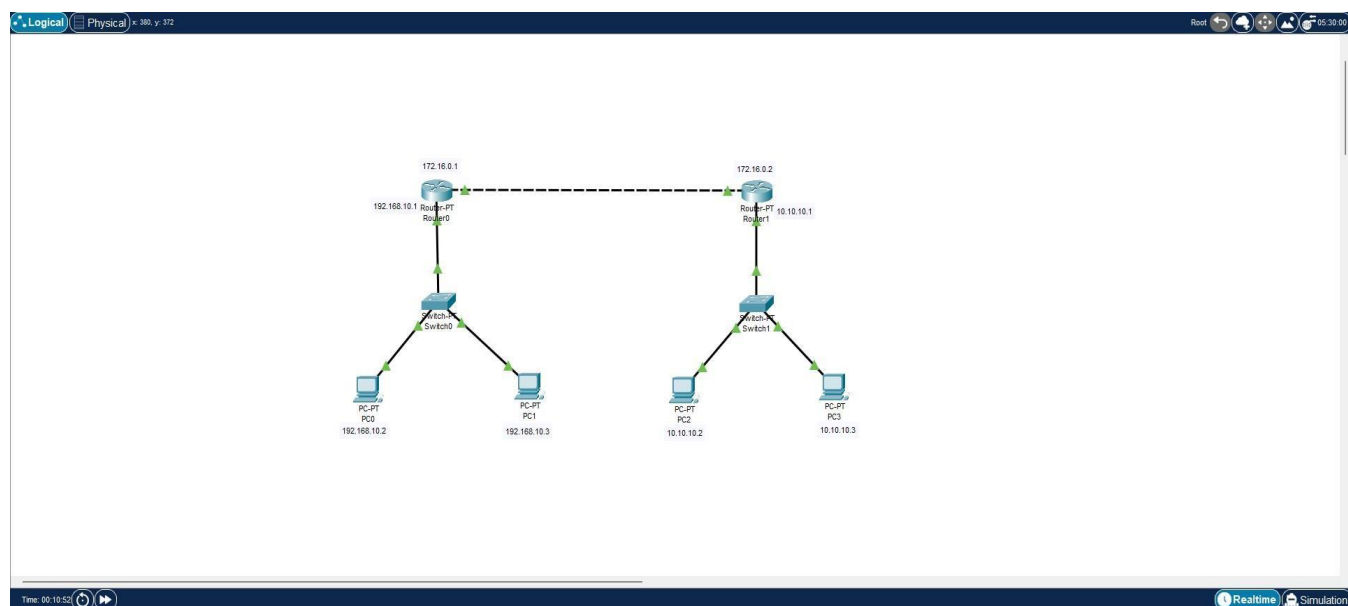
5. **Configure Default Route:**

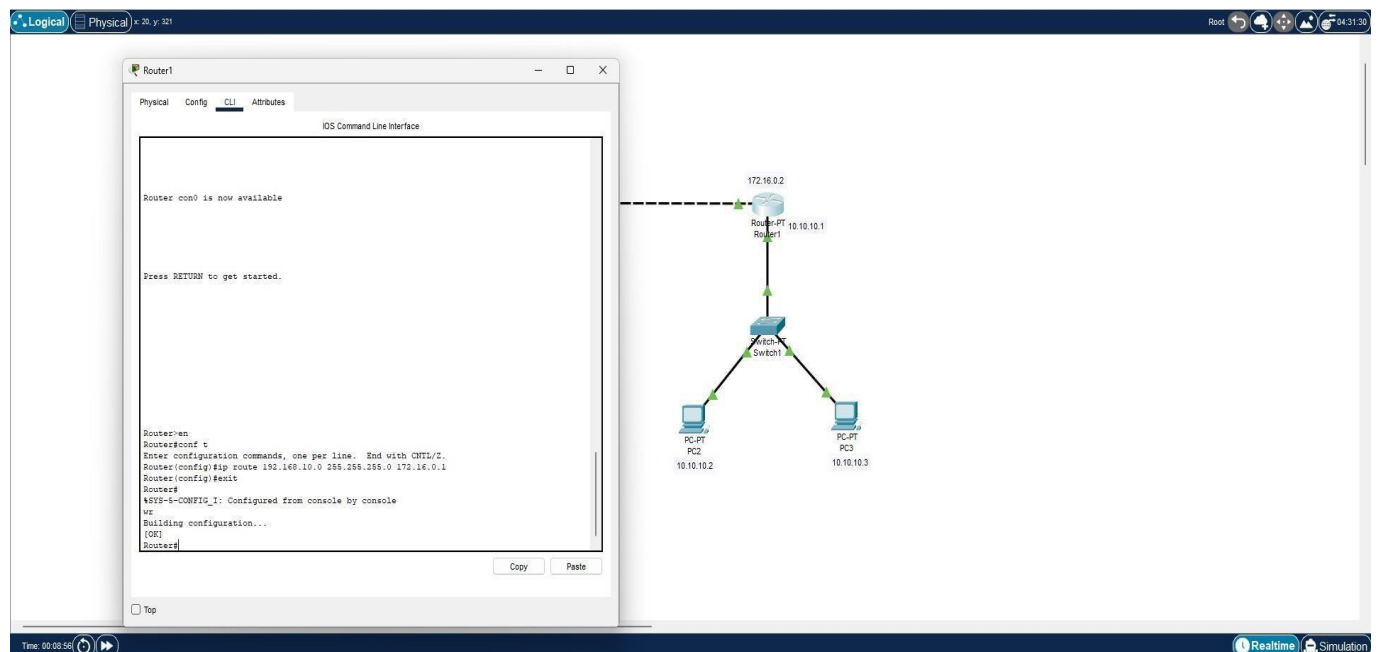
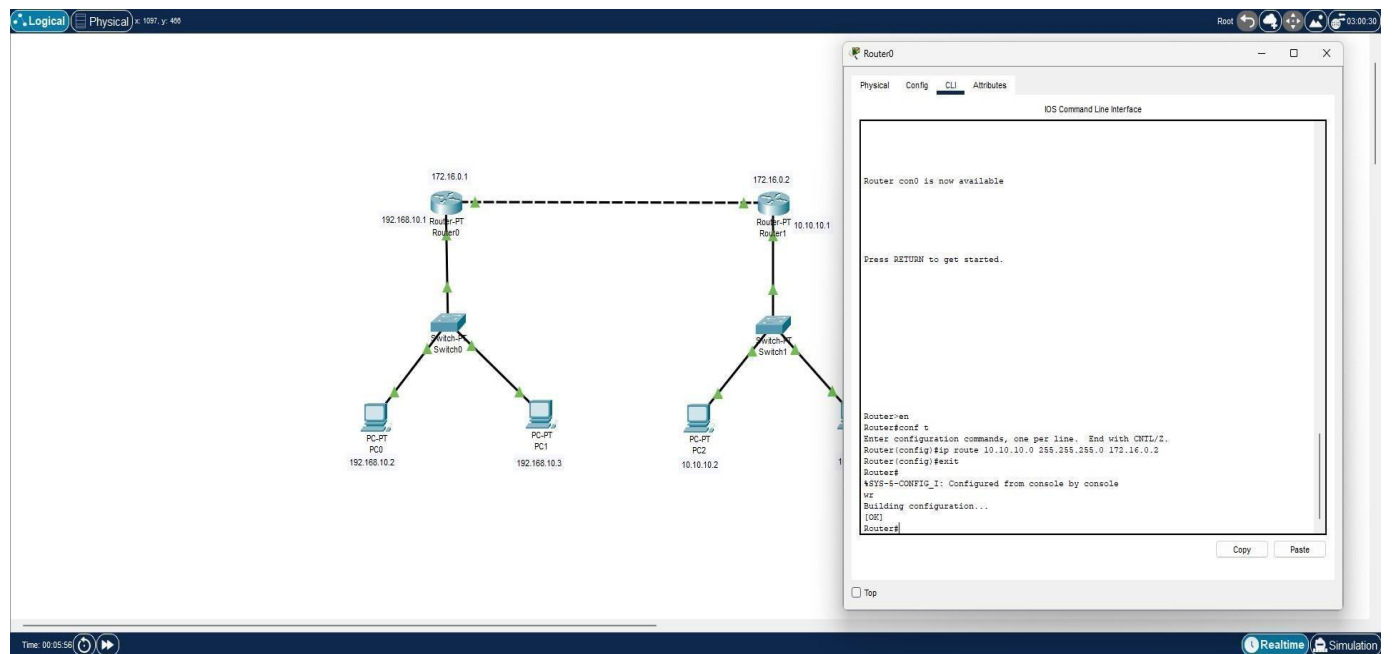
- Example: On Router 1: `ip route 0.0.0.0 0.0.0.0 <Router
2 SerialIP>`
- Example: On Router 2: `ip route 0.0.0.0 0.0.0.0 <Router
1 SerialIP>`

6. **Test Connectivity:**

- Use the `ping` command to test connectivity between the computers.

Output:





Lab 6: NAT Configuration

- **Procedure:**

1. **Open Packet Tracer:**

- Launch Cisco Packet Tracer on your computer.

2. **Create a Network:**

- Drag a router, a switch, and two computers onto the workspace. ■ Connect the computers to the switch and the switch to the router.

3. **Configure IP Addresses:**

- Assign private IP addresses to the computers.
- Assign a public IP address to the router's external interface.

4. **Configure NAT:**

- Access the router's CLI.
- Define an access list to match the private IP addresses: `access-list 1 permit 192.168.1.0 0.0.0.255.`
- Configure NAT overload: `ip nat inside source list 1 interface <external interface> overload.`
- Designate interfaces as inside or outside: `interface <internal interface>, ip nat inside; interface <external interface>, ip nat outside.`

5. **Test Connectivity:**

- Use the `ping` command to test connectivity from the internal network to an external network.

Output:

