

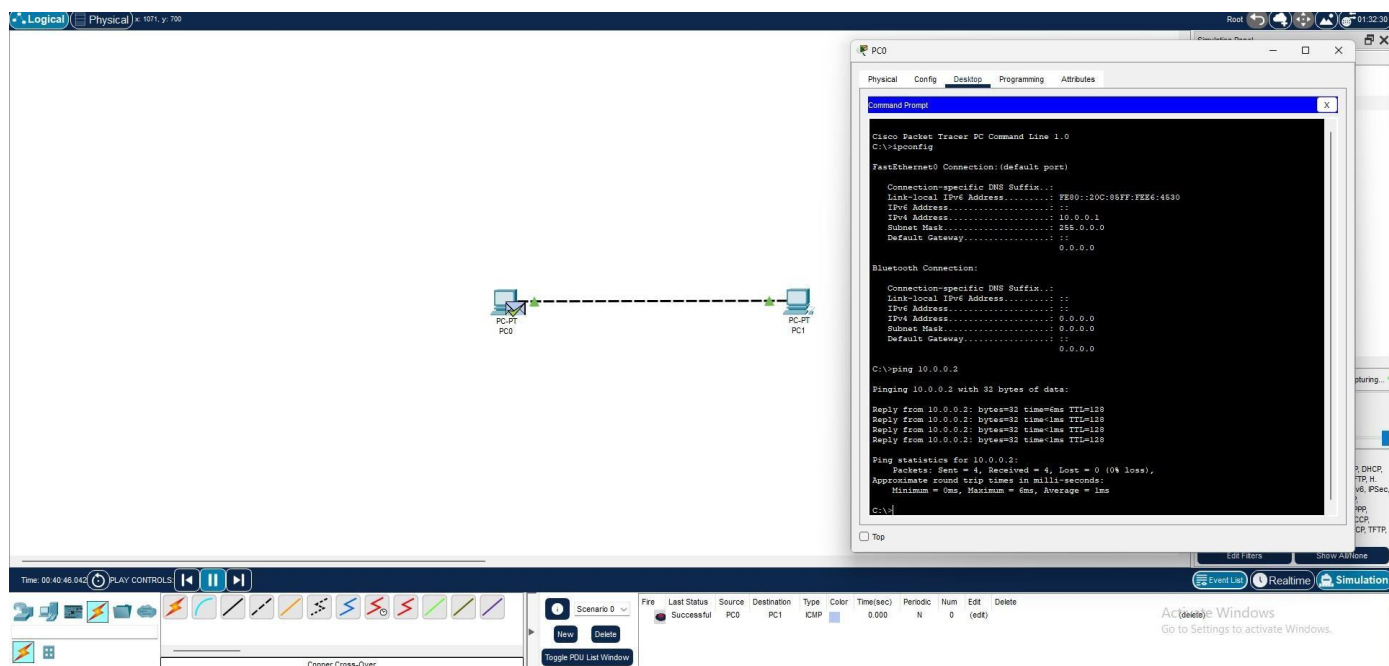
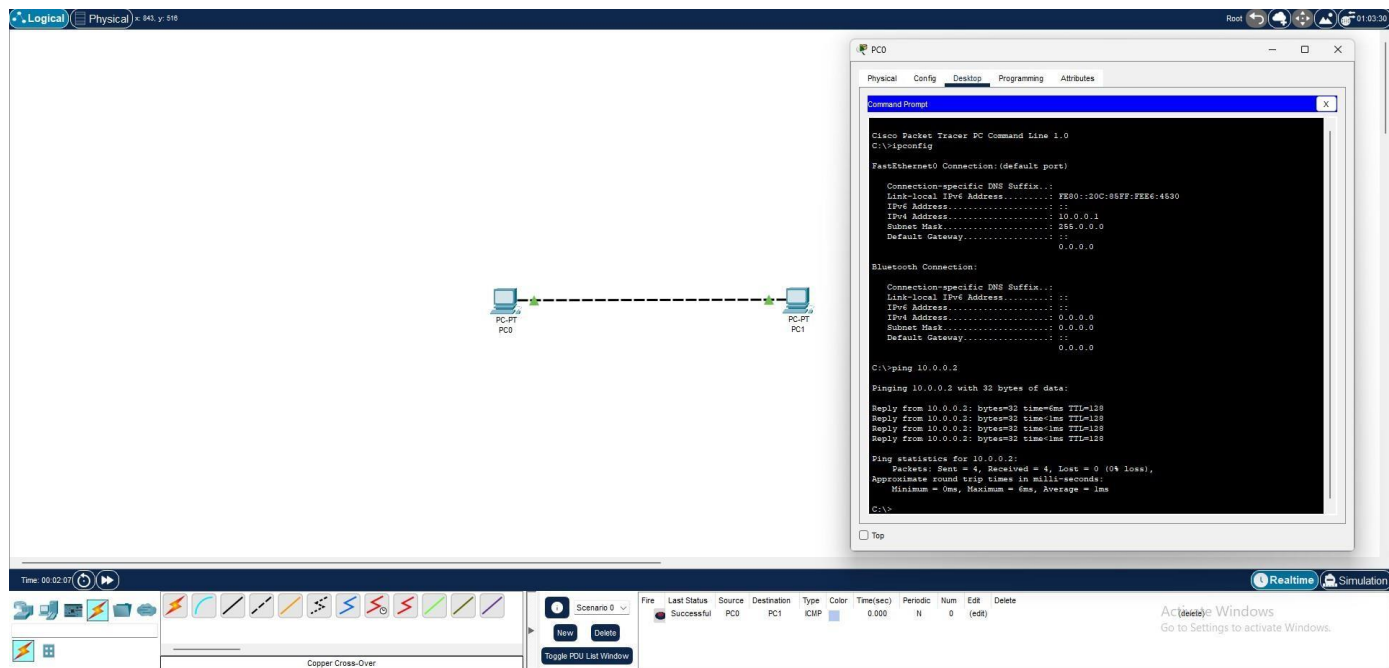
Computer Networks Lab

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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.

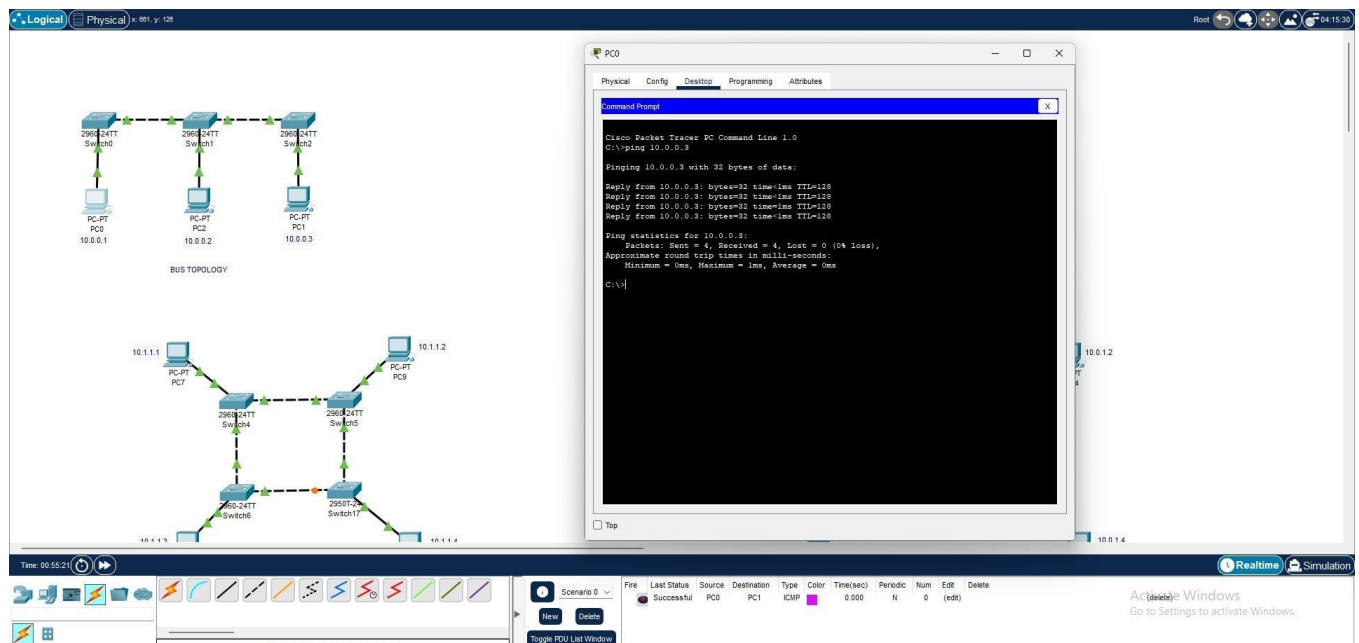
5. Implement a Mesh Topology:

- 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 c 980.y 91 Root 04:45:09

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::205:6EFF:FECD: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. . . . .: 
    Subnet Mask . . . . .: 
    Default Gateway . . . . .: 

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=4ms TTL=128
Reply from 10.1.0.3: bytes=32 time=4ms TTL=128
Reply from 10.1.0.3: bytes=32 time=4ms TTL=128
Reply from 10.1.0.3: bytes=32 time=4ms 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 = 4ms, Maximum = 4ms, Average = 4ms

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 PC13
10.1.0.4 PC-PT PC15
2950-24T Switch12
2950-24T Switch13
2950-24T Switch14
2950-24T Switch15

Time 00:56:16

Scenario 0

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

Successful PC0 PC1 ICMP 0.000 N 0 (edit)

Activate Windows
Go to Settings to activate Windows.

Logical Physical c 981.y 985 Root 05:39:30

BUS TOPOLOGY

10.1.0.1 PC-PT PC0
10.1.0.2 PC-PT PC2
10.1.0.3 PC-PT PC1

10.1.1 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 Switch7

RING TOPOLOGY

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:FE01:D936
    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. . . . .: 
    Subnet Mask . . . . .: 
    Default Gateway . . . . .: 

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=4ms TTL=128
Reply from 10.1.1.2: bytes=32 time=4ms TTL=128
Reply from 10.1.1.2: bytes=32 time=4ms TTL=128
Reply from 10.1.1.2: bytes=32 time=4ms 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 = 4ms, Maximum = 4ms, Average = 4ms

C:\>PING 10.1.1.4

Pinging 10.1.1.4 with 32 bytes of data:

Reply from 10.1.1.4: bytes=32 time=4ms TTL=128
Reply from 10.1.1.4: bytes=32 time=4ms TTL=128
Reply from 10.1.1.4: bytes=32 time=4ms TTL=128
Reply from 10.1.1.4: bytes=32 time=4ms TTL=128

Ping statistics for 10.1.1.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 4ms, Average = 4ms

C:\>
```

Time 00:58:04

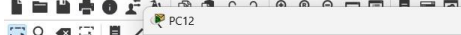
Scenario 0

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

Successful PC0 PC1 ICMP 0.000 N 0 (edit)

Activate Windows
Go to Settings to activate Windows.

File Edit Options View Tools Extensions Window Help



Logical Physical

Physical Config Desktop Programming Attributes

PC12

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:\>

Top

Time: 00:00:51

4331 4321 1941 2901 2911 819308 819309 823 1240 P250M P250M 1941 26209 26210 1

(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

Root 00:26

10.0.1.3 PC-PT PC5

10.0.1.1 PC-PT PC12

2960-24TT Switch12

2960-24TT Switch13

10.0.1.2 PC-PT PC14

2960-24TT Switch14

2960-24TT Switch15

10.0.1.3 PC-PT PC13

10.0.1.4 PC-PT PC15

MESH TOPOLOGY

Realtime Simulation

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 180 y 477

Router0

192.168.20.2
255.255.255.252

192.168.30.1
255.255.255.240

192.168.30.0
255.255.255.240

192.168.30.2
255.255.255.240

192.168.30.3
255.255.255.240

Router0

IOS Command Line Interface

```
Router>en
Router(config)#
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
#0 run
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 $1mE2r5.a6H4qN1M00Lus1fKa/
!
!
!
ip cef
no ip route cef
Router(config)#
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#line vty 0 4
Router(config-line)#
Router(config-line)#password cisco123
Router(config-line)#login
Router(config-line)#exit
Router#
$SYS-5-CONFIG_I: Configured from console by console
Router#exit
```

Time: 00:02:18

Scenario 0

File Last Status Source Destination Type

Toggle PDU List Window

Activate Windows
Go to Settings to activate Windows.

Logical Physical x 853 y 271

Router0

192.168.20.2
255.255.255.252

192.168.30.1
255.255.255.240

192.168.30.0
255.255.255.240

192.168.30.2
255.255.255.240

192.168.30.3
255.255.255.240

Router0

IOS Command Line Interface

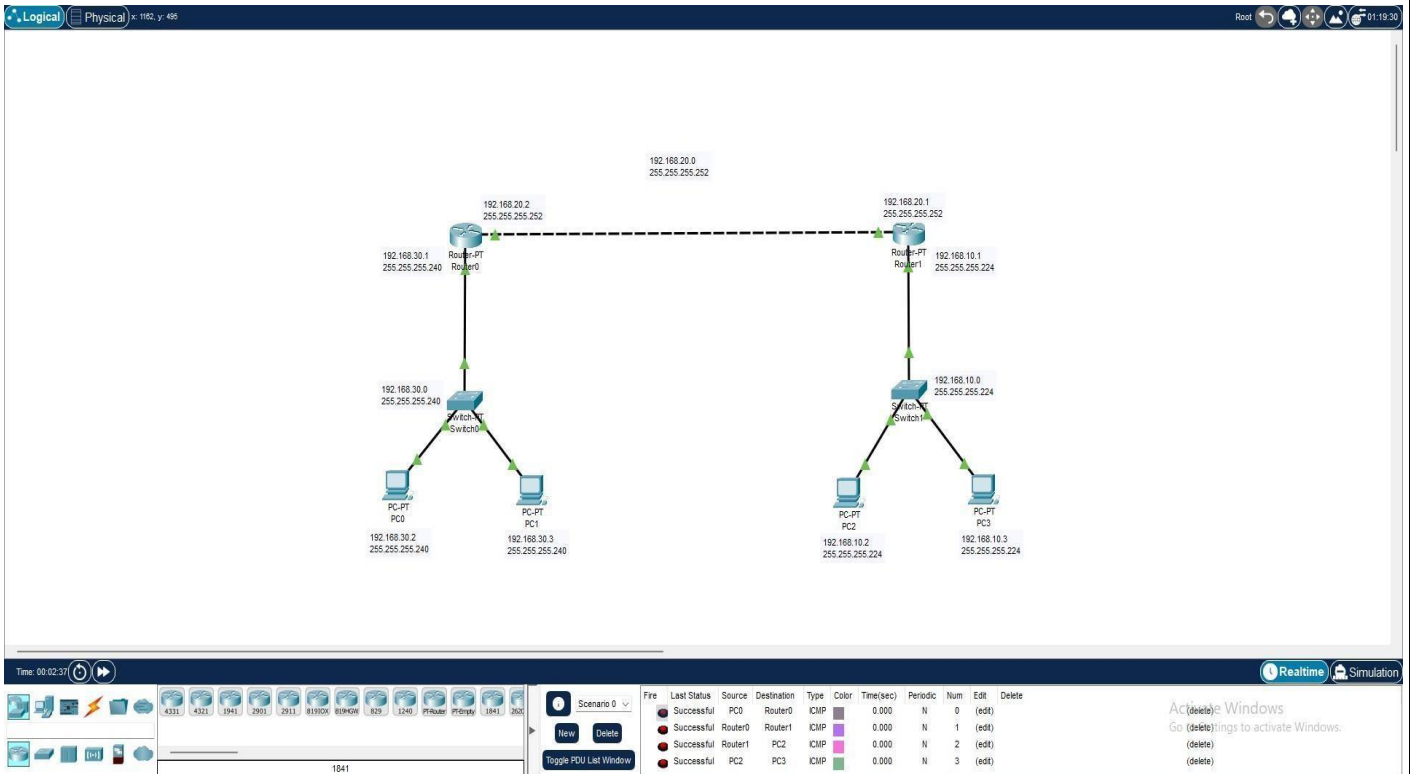
```
Router con0 is now available

Press RETURN to get started.

Router>en
Router(config)#
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 fa1/0
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: 00:03:58

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:**

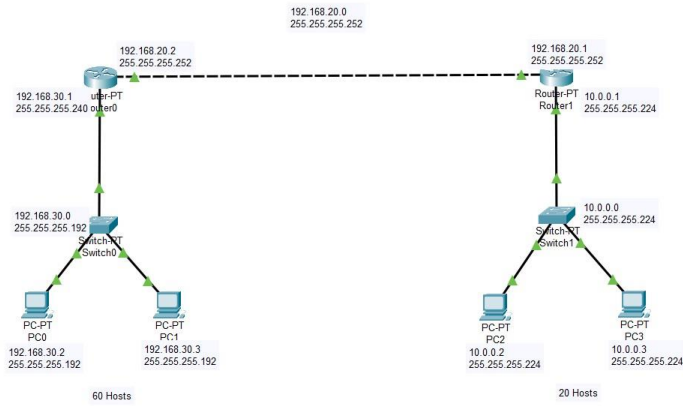
- Use the `ping` command to test connectivity between the routers.

Output:



Logical Physical x: 1170, y: 445

Root 00:00:38



Time: 00:01:16

Realtime Simulation

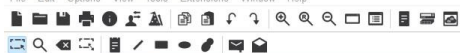
Scenario 0

New Delete

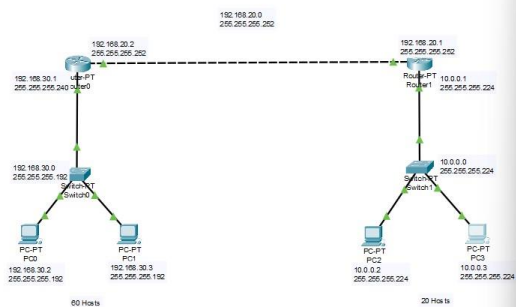
Toggle PDU List Window

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

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)



Logical Physical x72, y1



PC3

Physical Config Desktop Programming Attributes

Command Prompt

Cisco Packet Tracer PC Command Line 1.0

C:\>ping 192.168.30.2

Pinging 192.168.30.2 with 32 bytes of data:

Reply from 192.168.30.2: bytes=32 time=1ms TTL=126

Reply from 192.168.30.2: bytes=32 time=1ms TTL=126

Reply from 192.168.30.2: bytes=32 time=1ms TTL=126

Reply from 192.168.30.2: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.30.2:

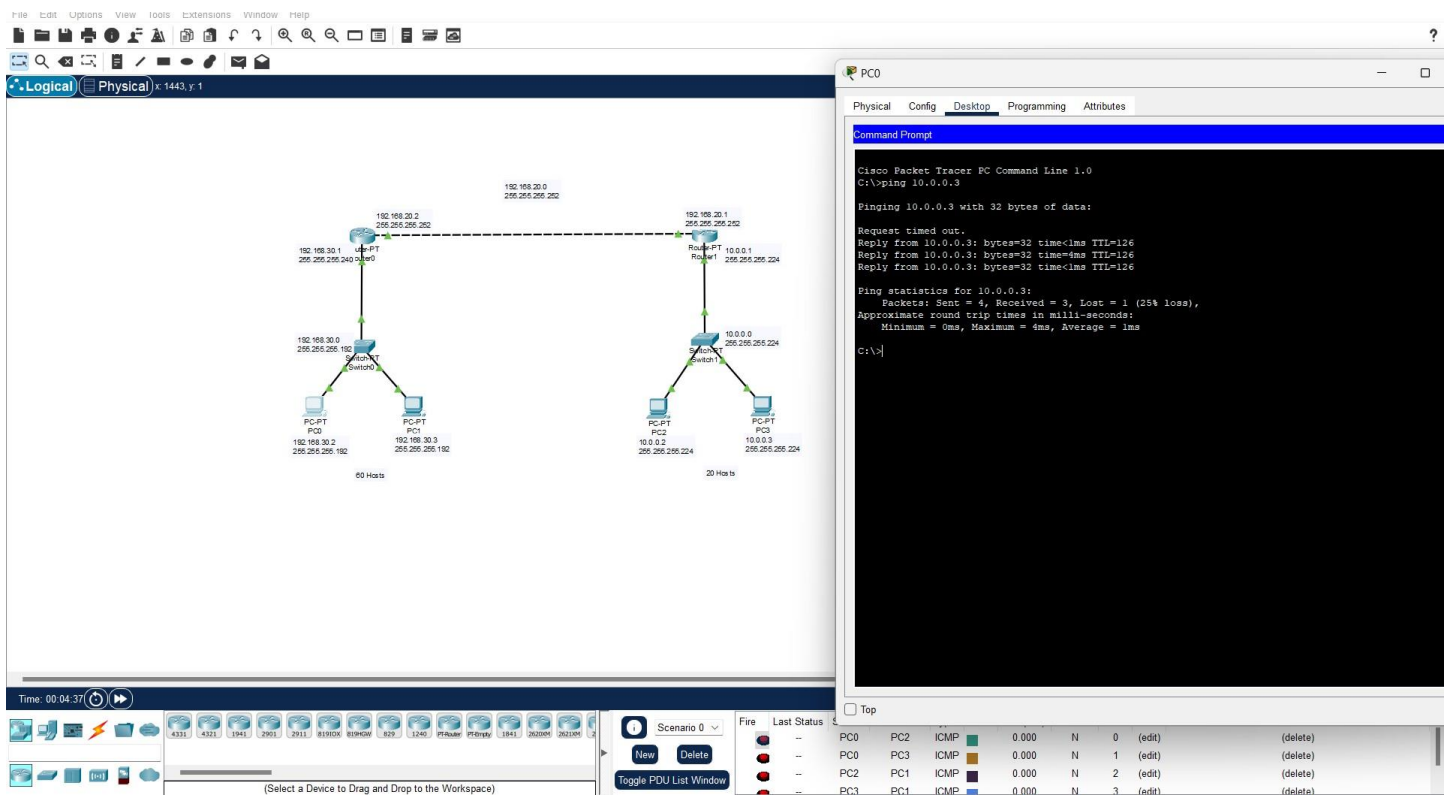
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

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

C:\>

Fire	Last St	PC0	PC2	ICMP	0.000	N	0	(edit)	(delete)
---	---	PC0 <td>PC3<td>ICMP<td>0.000<th>N</th><th>1</th><th>(edit)</th><th>(delete)</th></td></td></td>	PC3 <td>ICMP<td>0.000<th>N</th><th>1</th><th>(edit)</th><th>(delete)</th></td></td>	ICMP <td>0.000<th>N</th><th>1</th><th>(edit)</th><th>(delete)</th></td>	0.000 <th>N</th> <th>1</th> <th>(edit)</th> <th>(delete)</th>	N	1	(edit)	(delete)
---	---	PC2 <td>PC1<td>ICMP<td>0.000<th>N</th><th>2</th><th>(edit)</th><th>(delete)</th></td></td></td>	PC1 <td>ICMP<td>0.000<th>N</th><th>2</th><th>(edit)</th><th>(delete)</th></td></td>	ICMP <td>0.000<th>N</th><th>2</th><th>(edit)</th><th>(delete)</th></td>	0.000 <th>N</th> <th>2</th> <th>(edit)</th> <th>(delete)</th>	N	2	(edit)	(delete)
---	---	PC3 <td>PC1<td>ICMP<td>0.000<th>N</th><th>3</th><th>(edit)</th><th>(delete)</th></td></td></td>	PC1 <td>ICMP<td>0.000<th>N</th><th>3</th><th>(edit)</th><th>(delete)</th></td></td>	ICMP <td>0.000<th>N</th><th>3</th><th>(edit)</th><th>(delete)</th></td>	0.000 <th>N</th> <th>3</th> <th>(edit)</th> <th>(delete)</th>	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>`

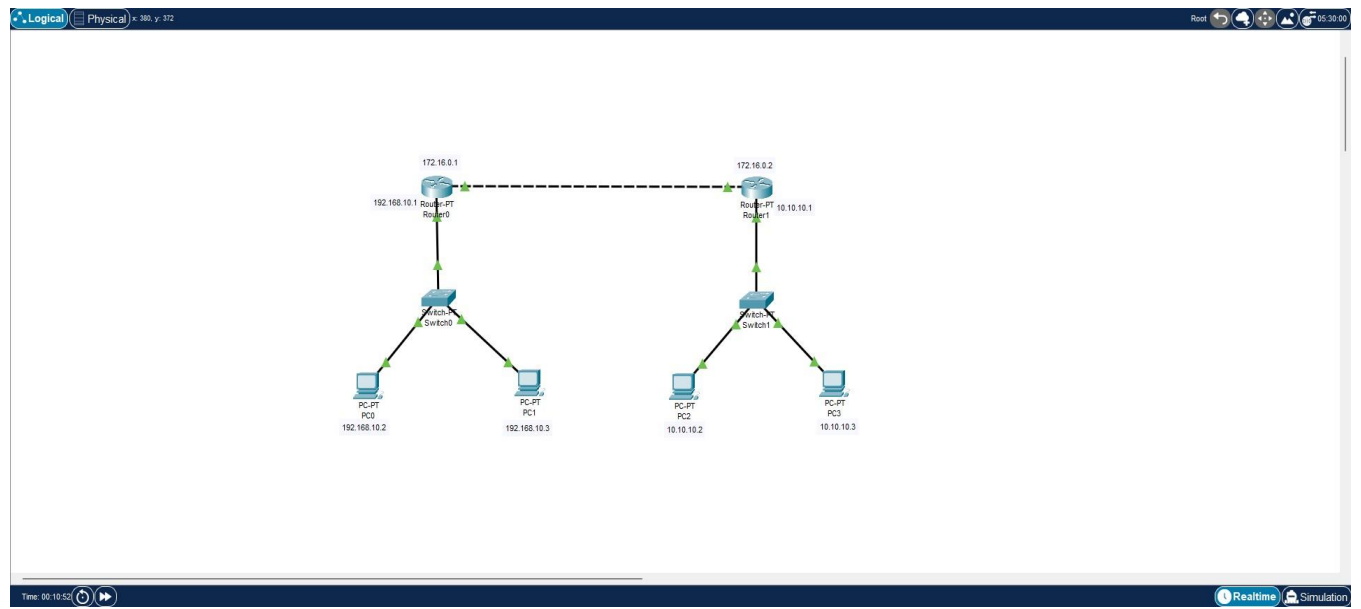
5. **Configure Default Route:**

- 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>`

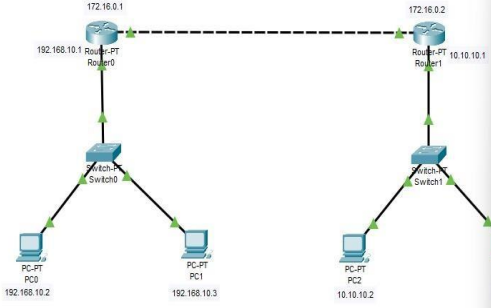
6. **Test Connectivity:**

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

Output:



Logical Physical x: 197, y: 400 Root 00:00:30



```
Router0
Router1

Router0#
Router1#
```

Router0 CLI Interface

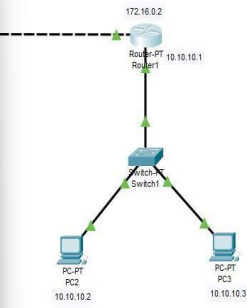
Router con0 is now available.

Press RETURN to get started.

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 10.10.10.0 255.255.255.0 172.16.0.2
Router(config)#exit
Router#
%SYS-6-CONFIG_I: Configured from console by console
vr
Building configuration...
[OK]
Router#

Time: 00:00:56 Realtime Simulation

Logical Physical x: 20, y: 321 Root 04:31:30



```
Router1

Router1#
```

Router1 CLI 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)#ip route 192.168.10.0 255.255.255.0 172.16.0.1
Router(config)#exit
Router#
%SYS-6-CONFIG_I: Configured from console by console
vr
Building configuration...
[OK]
Router#

Time: 00:08:56 Realtime Simulation

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:

