CNC Lab Manual for
Computer Network design in Cisco Packet Tracer

Experiment-1

- **Study of different Network Devices**
  - **Necessary Equipment's:**
    1. 1 Router (1841) and 1 Switch's (2960-24PT)
    2. 2 Hub's and 1 Repeater
    3. 1 Gateway and 1 Bridge
    4. 9 PCs and 1 Server
    5. 1 Light and 1 Temperature Monitor
    6. Connecting wires (Copper Straight-Through wires , Copper cross-Over)

    Here are the detailed steps for **Experiment 1: Study of Different Network Devices** in the CNC Lab Manual:

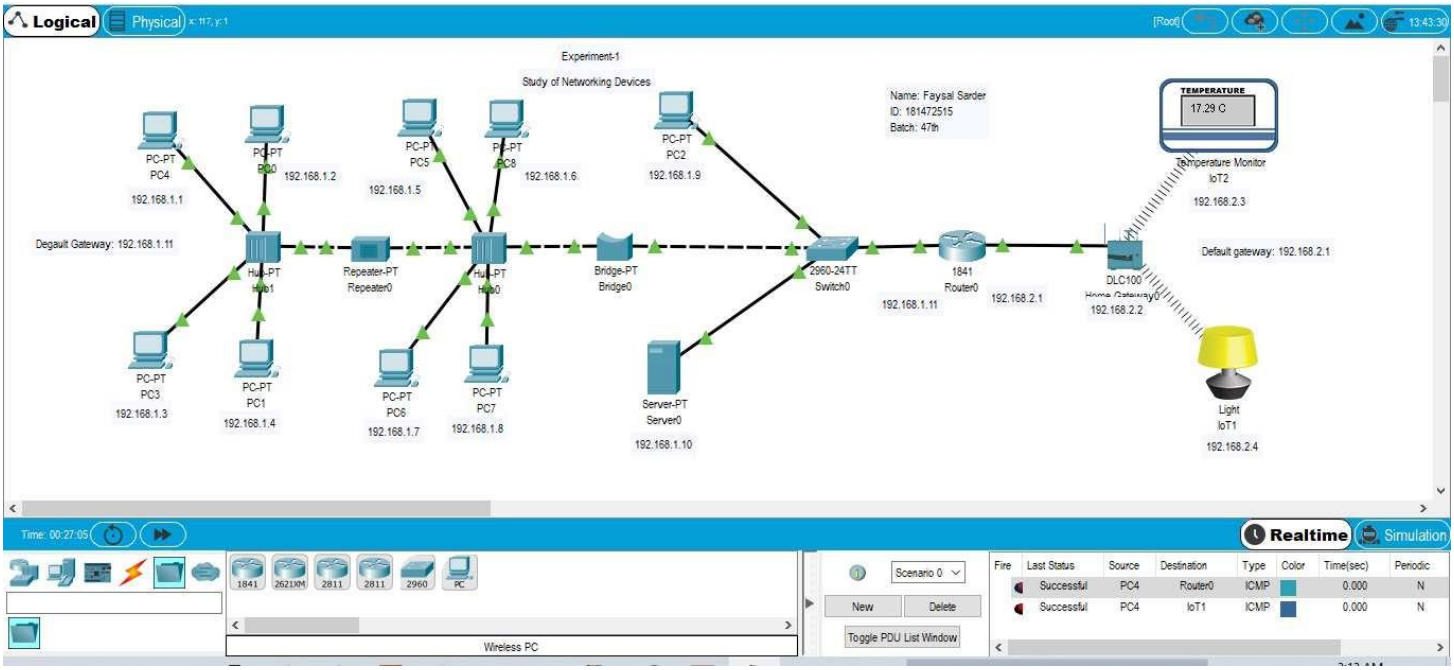
    Steps:

1. **Open Cisco Packet Tracer:**
   - Launch Cisco Packet Tracer software on your system.
2. **Place the Required Devices:**
   - Drag and drop the following devices onto the workspace:
     - 1 Router (1841)
     - 1 Switch (2960-24PT)
     - 2 Hubs
     - 1 Repeater
     - 1 Gateway
     - 1 Bridge
     - 9 PCs
     - 1 Server
     - 1 Light and 1 Temperature Monitor
3. **Connect the Devices Using Wires:**
   - Use **Copper Straight-Through Wires** to connect different devices such as PCs to switches and switches to routers.
   - Use **Copper Cross-Over Wires** where necessary (e.g., connecting two similar devices like two switches).
4. **Power On the Devices:**
   - Ensure that all network devices are powered on by checking the power indicator lights.
   - If any device is off, verify its power settings.
5. **Configure Basic Settings:**
   - Access the command-line interface (CLI) of the router and switch.
   - Set up basic configurations such as hostname and enable passwords using the following commands:
   - Router> enable
   - Router# configure terminal
   - Router(config)# hostname Router1
   - Router(config)# enable password cisco
   - Router(config)# exit
6. **Verify Device Connectivity:**

- Open a command prompt in Cisco Packet Tracer on one of the PCs.
- Use the **ping** command to test the network connectivity between devices:
- ping <IP Address of another device>
- If the ping is successful, the devices are properly connected. If not, troubleshoot the connections.

7. **Explore Device Functionalities:**
   - Access each device and examine its features using **GUI** or **CLI mode**.
   - Check the available interfaces, MAC addresses, and other settings.
8. **Save the Configuration:**
   - Save the configuration settings using the following command:
   - Router# write memory
   - This ensures that settings remain intact after a reboot.
9. **Document Your Observations:**
   - Take notes on the role of each device in the network.
   - Identify any differences in behavior between devices like hubs, switches, and routers.

Topology Diagram:



Experiment-2

- **Topology Design**
  1. Bus Topology
  2. Star Topology
  3. Ring Topology
  4. Mesh Topology
  5. Fully Connected Topology
- Necessary Equipment's:
  1. PC's, Hub, Switch, Repeater and Connecting Wire

Steps:

1. Bus Topology Setup:

1. **Open Cisco Packet Tracer** and start a new project.
2. **Place Network Devices:**
   - Drag and drop a **Bus Backbone (a series of connections to simulate a shared medium)** onto the workspace.
   - Connect **PCs to the Bus** using a Hub.
3. **Connect Devices:**
   - Use **Copper Straight-Through Wires** to connect PCs to the Hub.
   - Connect the Hub to the Bus Backbone using a **Repeater**.
4. **Assign IP Addresses:**
   - Each PC should be assigned an IP in the same subnet (e.g., 192.168.1.X).
5. **Test Connectivity:**
   - Use the **ping** command to check communication between PCs.
   - If a device disconnects, all communication will be affected, demonstrating the bus topology's limitations.

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2. Star Topology Setup:

1. **Place Network Devices:**
   - Drag and drop **one central Switch** and multiple PCs.
2. **Connect Devices:**
   - Use **Copper Straight-Through Wires** to connect each PC to the Switch.
3. **Assign IP Addresses:**
   - Configure each PC with a unique IP within the same subnet.
4. **Test Network Performance:**
   - Send pings between PCs.
   - Observe that a failure in one PC doesn't impact the rest of the network.

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3. Ring Topology Setup:

1. **Place Network Devices:**
   - Drag and drop multiple PCs.
   - Use **Switches** to form a **closed-loop** connection.

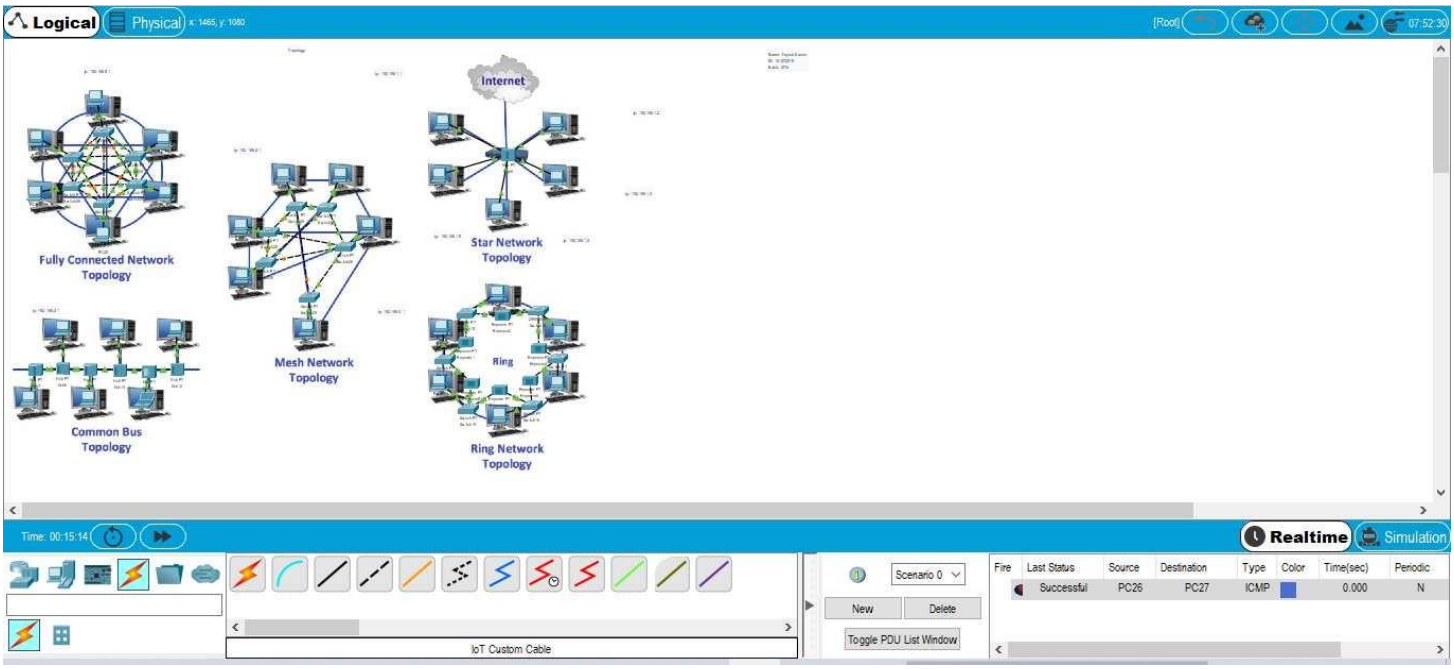
2. **Connect Devices in a Circle:**
    - Use **Copper Cross-Over Wires** to connect each PC to another via switches.
3. **Enable Redundancy Protocols (If Needed):**
    - In real networks, **STP (Spanning Tree Protocol)** is used to prevent loops.
4. **Assign IP Addresses & Test Connectivity:**
    - Check communication using the ping command.
    - If one link fails, the entire network can be disrupted.

4. Mesh Topology Setup:

1. **Place Network Devices:**
    - Drag and drop multiple PCs and switches.
2. **Create Full Connectivity:**
    - Use **Copper Cross-Over Wires** to connect each PC to every other PC.
3. **Assign IP Addresses:**
    - Ensure each PC has a unique IP.
4. **Test Network Performance:**
    - Mesh topology provides high redundancy. If one link fails, data is rerouted.

5. Fully Connected Topology Setup:

1. **Place Network Devices:**
    - Drag and drop multiple PCs and switches.
2. **Connect Each Device to Every Other Device:**
    - Use **Copper Straight-Through Wires** to establish full interconnectivity.
3. **Assign IP Addresses & Test Communication:**
    - Every device can communicate with every other device, providing full redundancy.



Experiment-3

- **Study of Network IP**
  - Necessary Equipment's:
    1. 1 Router
    2. 3 PCs & 3 Laptop's
    3. 3 Switch's (2960-24PT)
    4. Copper Straight-Through wires

In the below Network Design, here used 3 different Class's IP (Class A, Class B and Class C)

And all devices are communicates with each other.

Description:

In this experiment, we will configure and study the use of three different IP classes (Class A, Class B, and Class C). All devices will be assigned IP addresses and tested for communication.

Steps:

1. Setup the Network Topology:

1. **Open Cisco Packet Tracer** and create a new workspace.
2. **Drag and drop the required devices** into the workspace:
   - **1 Router**
   - **3 Switches**
   - **3 PCs**
   - **3 Laptops**

2. Connect the Devices:

1. **Use Copper Straight-Through Wires** to connect:
   - Each PC and Laptop to a respective Switch.
   - Each Switch to the Router.
2. Ensure that all connections are properly made and devices are turned on.

3. Assign IP Addresses (Class A, B, and C):

1. **Class A IP Address Assignment:**
   - Assign **10.0.0.X/8** addresses to one group of PCs and Laptops.
   - Example:
   - PC1: 10.0.0.2
   - Laptop1: 10.0.0.3

2. **Class B IP Address Assignment:**
    - Assign **172.16.0.X/16** addresses to the second group of PCs and Laptops.
    - Example:
    - PC2: 172.16.0.2
    - Laptop2: 172.16.0.3
3. **Class C IP Address Assignment:**
    - Assign **192.168.1.X/24** addresses to the third group of PCs and Laptops.
    - Example:
    - PC3: 192.168.1.2
    - Laptop3: 192.168.1.3

4. Configure the Router:

Open the Router's **Command-Line Interface (CLI)**.

Assign IP addresses to the router's interfaces:

```
Router> enable
Router# configure terminal
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)# interface fastEthernet 0/1
Router(config-if)# ip address 172.16.0.1 255.255.0.0
Router(config-if)# no shutdown
Router(config)# interface fastEthernet 0/2
Router(config-if)# ip address 192.168.1.1 255.255.255.0
Router(config-if)# no shutdown
Router(config)# exit
Router# write memory
```

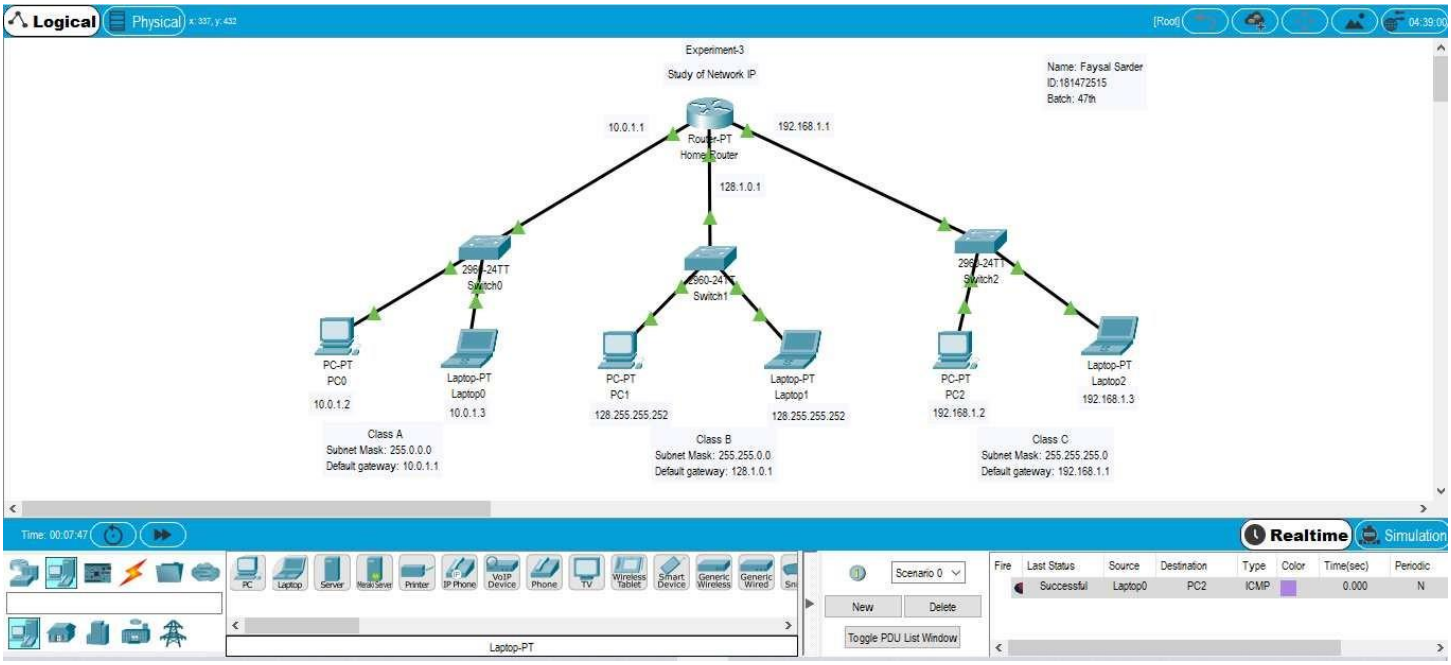
5. Verify Connectivity:

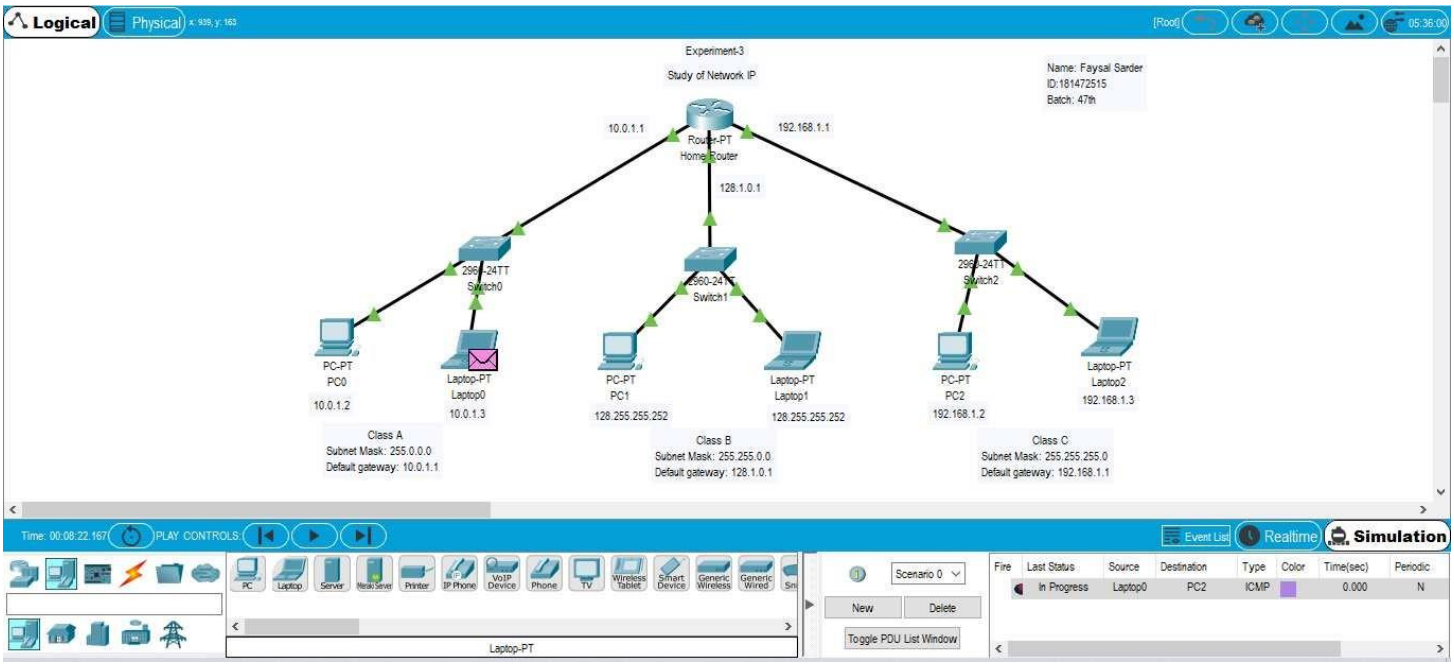
1. Open the **Command Prompt (CLI) on each PC/Laptop**.
2. Use the **ping** command to test communication between devices:
3. ping 10.0.0.1

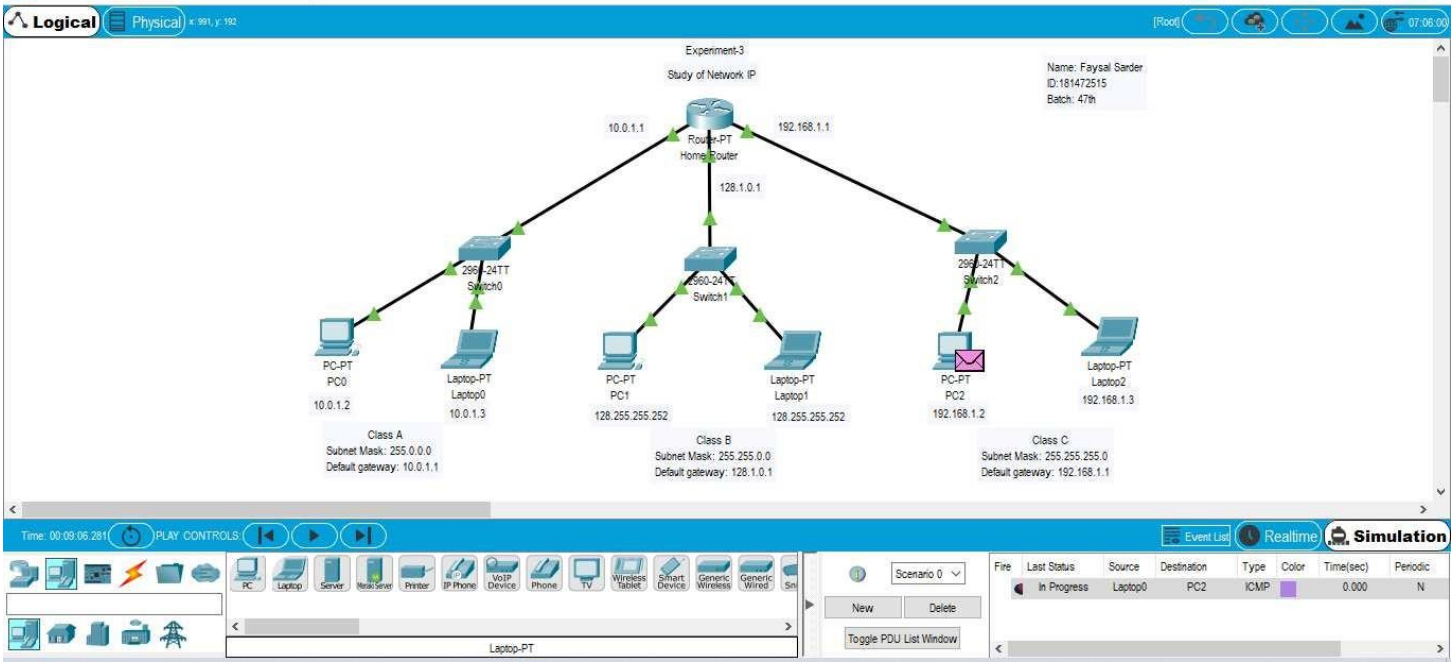
4. ping 172.16.0.1
5. ping 192.168.1.1
6. If the ping is successful, the devices are properly communicating.

6. Troubleshooting (If Needed):

- If devices fail to communicate, check:
  - **Cable connections** using the Packet Tracer connection test tool.
  - **Router configurations** to ensure proper subnetting.
  - **PC/Laptop IP settings** to verify correct address assignment.




Logical
Physical
Experiment-3
Study of Network IP
Name: Faysal Sarder
ID:181472515
Batch: 47th
10.0.1.1
192.168.1.1
Router-PT
Home Router
128.1.0.1
2960-24TT
Switch0
2960-24TT
Switch1
2960-24TT
Switch2
PC-PT
PC0
10.0.1.2
Laptop-PT
Laptop0
10.0.1.3
PC-PT
PC1
128.255.255.252
Laptop-PT
Laptop1
128.255.255.252
PC-PT
PC2
192.168.1.2
Laptop-PT
Laptop2
192.168.1.3
Class A
Subnet Mask: 255.0.0.0
Default gateway: 10.0.1.1
Class B
Subnet Mask: 255.255.0.0
Default gateway: 128.1.0.1
Class C
Subnet Mask: 255.255.255.0
Default gateway: 192.168.1.1
Time: 00:08:22.167
PLAY CONTROLS:
Realtime
Simulation
Laptop-PT
Scenario 0
New
Delete
Toggle PDU List Window
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
Periodic
In Progress
Laptop0
PC2
ICMP
0.000
N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Laptop-PT
Laptop0
10.0.1.3
PC-PT
PC1
128.255.255.252
Laptop-PT
Laptop1
128.255.255.252
PC-PT
PC2
192.168.1.2
Laptop-PT
Laptop2
192.168.1.3
Class A
Subnet Mask: 255.0.0.0
Default gateway: 10.0.1.1
Class B
Subnet Mask: 255.255.0.0
Default gateway: 128.1.0.1
Class C
Subnet Mask: 255.255.255.0
Default gateway: 192.168.1.1
Realtime
Simulation
Scenario 0
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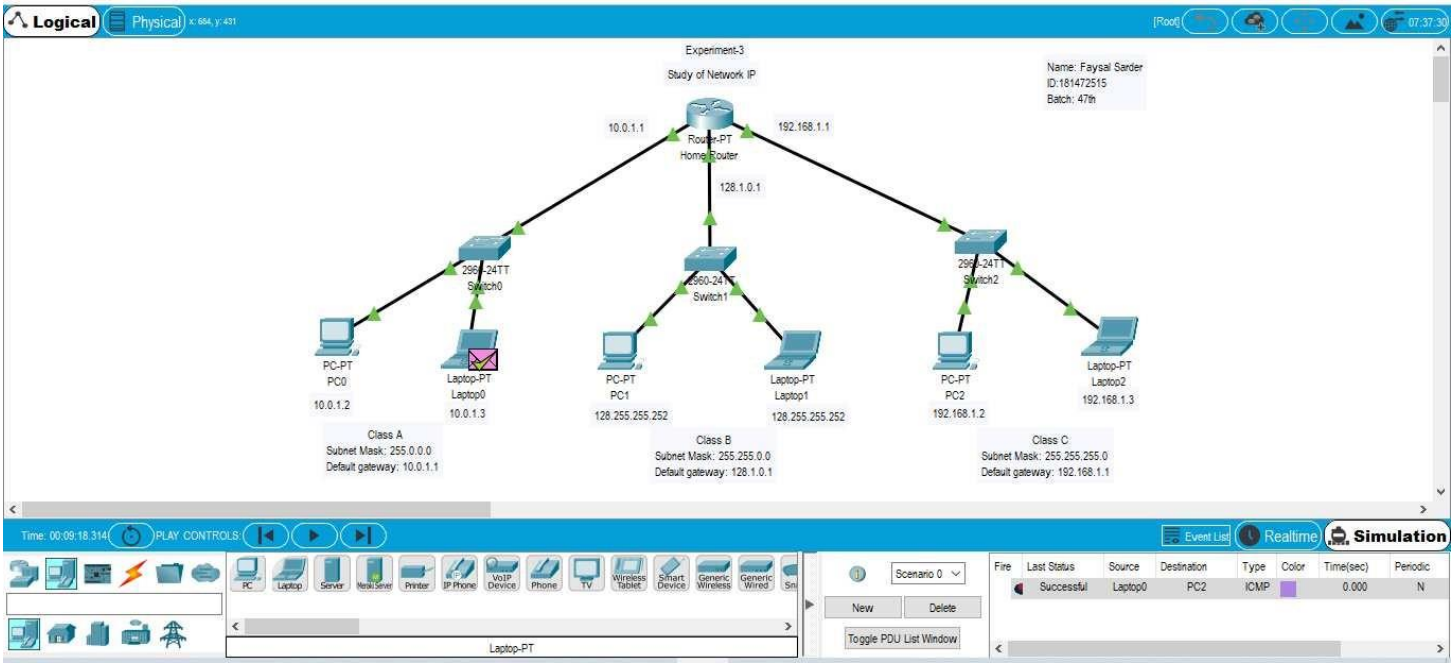
Delete
Toggle PDU List Window
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
Periodic
In Progress
Laptop0
PC2
ICMP
0.000
N
Laptop-PT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Laptop-PT
Laptop0
10.0.1.3
PC-PT
PC1
128.255.255.252
Laptop-PT
Laptop1
128.255.255.252
PC-PT
PC2
192.168.1.2
Laptop-PT
Laptop2
192.168.1.3
Class A
Subnet Mask: 255.0.0.0
Default gateway: 10.0.1.1
Class B
Subnet Mask: 255.255.0.0
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Periodic
Successful
Laptop0
PC2
ICMP
0.000
N
Laptop-PT

Experiment-4

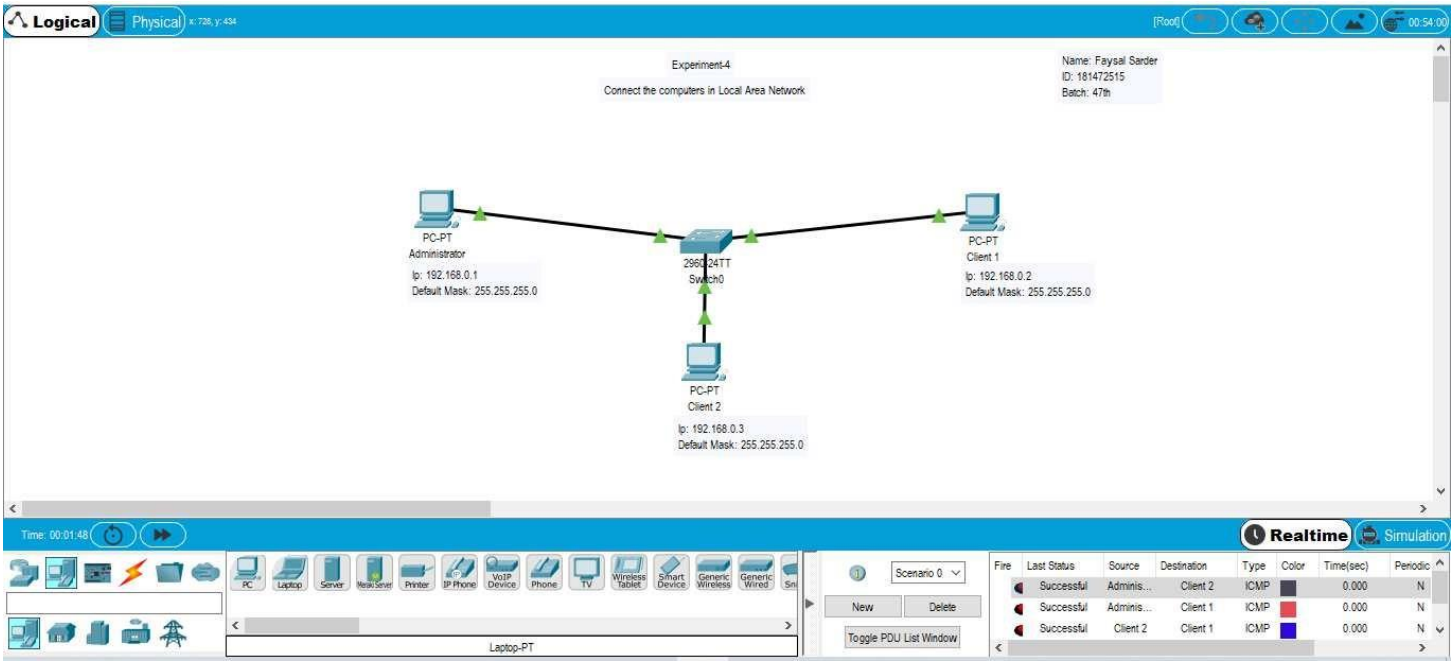
- **Connect the Computer in Local Area Network**
  - Necessary Equipment's:
    1. 1 Switch (2960-24PT)
    2. 3 PCs
    3. Copper Straight-Through wires

    In the following network design, 3 PC are connect to a Switch and they are communicate each other in Local Area Network.

Steps to Connect the Computer in Local Area Network (LAN):

1. **Open Cisco Packet Tracer** and create a new project.
2. **Drag and drop the necessary devices** into the workspace:
   - 1 Switch (2960-24PT)
   - 3 PCs
3. **Connect the PCs to the Switch** using **Copper Straight-Through Wires**.
4. **Assign IP addresses** to the PCs within the same subnet:
   - Example:
   - PC1: 192.168.1.2
   - PC2: 192.168.1.3
   - PC3: 192.168.1.4
   - Subnet Mask: 255.255.255.0
5. **Verify connectivity** by using the **ping command** from one PC to another:
6. ping 192.168.1.3
7. ping 192.168.1.4
8. **Check network status** using the **Packet Tracer Simulation Mode** if needed.
9. **Troubleshoot (if required):**
   - Ensure **all connections are correct**.
   - Verify **IP address settings**.
   - Check if the **switch is powered on**.

Topology Design:



Experiment-5

- **Study of basic network command and Network configuration commands.**

- **Necessary Equipment's:**
  - Necessary Equipment's:
    1. 1 Router (1841 Router)
    2. 2 Switch's (2960-24PT)
    3. 2 PCs and 2 Printers
    4. Copper Straight-Through wires

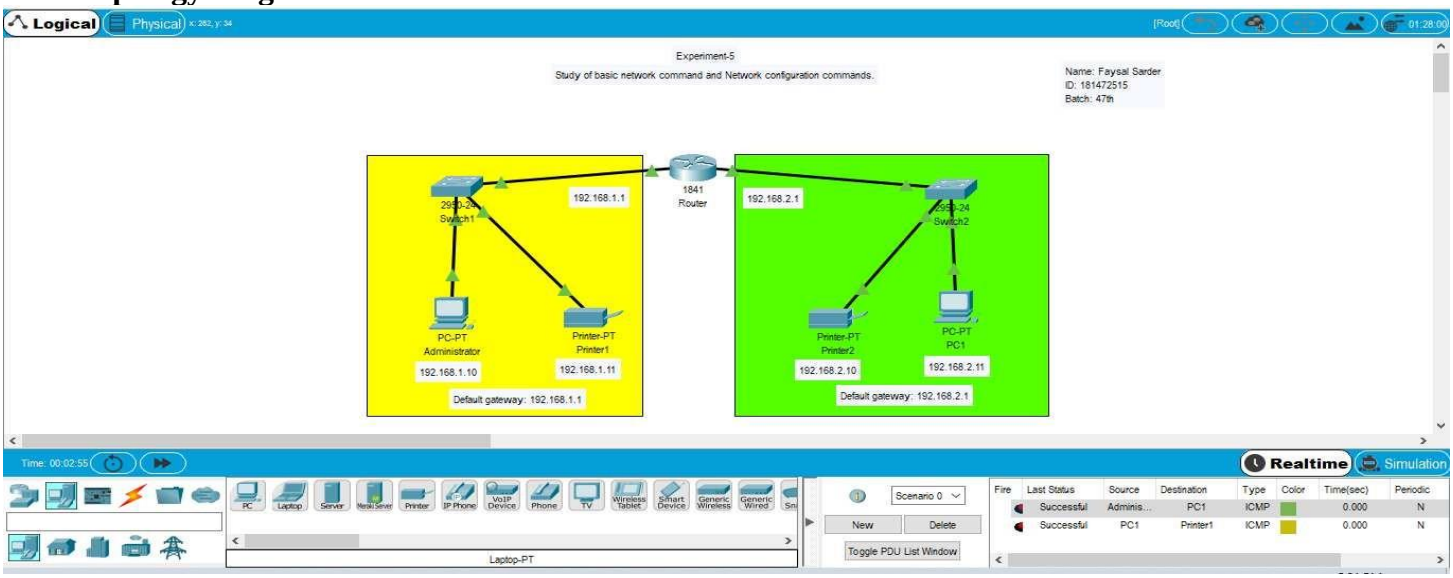
    In the following network design, we see that devices are connected in two LAN and they are communicate each other.

Steps for Study of Basic Network Commands and Network Configuration Commands

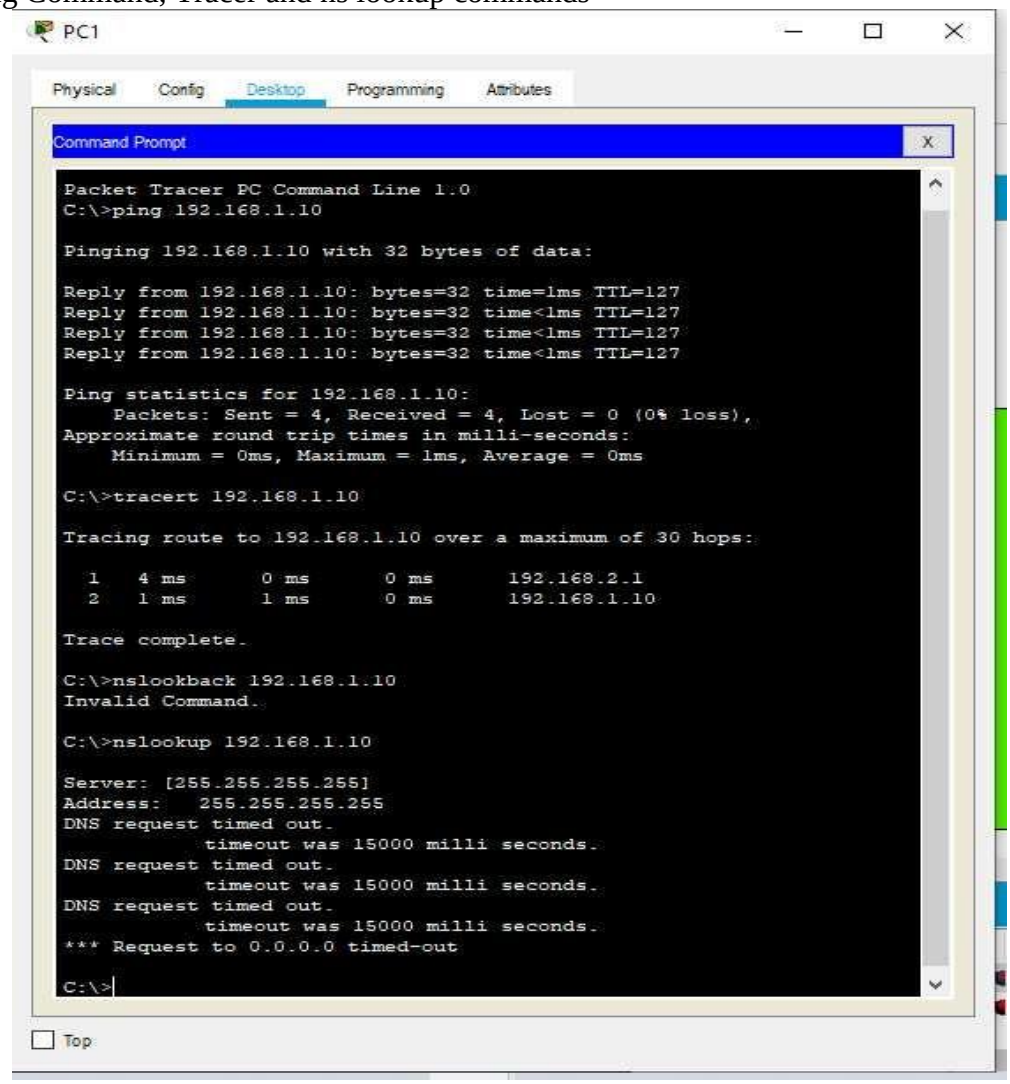
1. **Open Cisco Packet Tracer** and create a new workspace.
2. **Drag and drop the necessary devices** into the workspace:
   - 1 Router (1841)
   - 2 Switches (2960-24PT)
   - 2 PCs
   - 2 Printers
3. **Connect the devices** using **Copper Straight-Through Wires**:
   - PCs to Switches
   - Printers to Switches
   - Switches to Router
4. **Assign IP addresses** to the PCs and Printers:
   - Example:
   - PC1: 192.168.1.2
   - PC2: 192.168.1.3
   - Printer1: 192.168.1.10
   - Printer2: 192.168.1.11
   - Subnet Mask: 255.255.255.0
5. **Configure the Router** using CLI:
6. Router> enable
7. Router# configure terminal
8. Router(config)# interface fastEthernet 0/0
9. Router(config-if)# ip address 192.168.1.1 255.255.255.0

10. Router(config-if)# no shutdown
11. Router(config)# exit
12. Router# write memory
13. **Verify connectivity** between PCs, Printers, and the Router using network commands:
    - **Ping Command** (to check connectivity):
    - ping 192.168.1.3
    - ping 192.168.1.10
    - **Tracert Command** (to trace the route to a device):
    - tracert 192.168.1.11
    - **Nslookup Command** (to check domain name resolution):
    - nslookup google.com
14. **Check network status** using the **show commands** on the Router:
15. show ip interface brief
16. show running-config
17. **Troubleshoot (if required):**
    - Verify **correct cabling**.
    - Check **IP address settings**.
    - Ensure the **Router and Switch interfaces are active**.

Topology Diagram:



- Ping Command, Tracer and ns lookup commands



Experiment-6

- **Performing an Initial Switch Configuration**
  1. Necessary Equipment's
  - 2 Router's
  - 2 Switch's
  - 2 Pc's and 2 Server's

Steps for Performing an Initial Switch Configuration

1. Setup the Network Topology:

1. **Open Cisco Packet Tracer** and start a new workspace.
2. **Drag and drop the necessary devices** onto the workspace:
   - 2 **Routers**
   - 2 **Switches**
   - 2 **PCs**
   - 2 **Servers**

2. Connect the Devices:

1. **Use Copper Straight-Through Wires** to connect:
   - Each **PC and Server to a Switch**.
   - Each **Switch to a Router**.
2. Ensure that **all devices are turned on** and properly connected.

3. Access the Switch CLI for Initial Configuration:

Click on the **Switch** and go to the **CLI (Command-Line Interface)**.

Enter the privileged EXEC mode:

```
Switch> enable
Switch# configure terminal
```

Set a hostname for the switch:

```
Switch(config)# hostname Switch1
```

Assign a management IP address (on VLAN 1) to allow remote access:

```
Switch(config)# interface vlan 1
Switch(config-if)# ip address 192.168.1.2 255.255.255.0
Switch(config-if)# no shutdown
Switch(config)# exit
```

Set up a default gateway (Router IP):

```
Switch(config)# ip default-gateway 192.168.1.1
```

Configure console access and set a password:

```
Switch(config)# line console 0
Switch(config-line)# password cisco
Switch(config-line)# login
Switch(config-line)# exit
```

Enable remote access (Telnet/SSH):

```
Switch(config)# line vty 0 4
Switch(config-line)# password cisco
Switch(config-line)# login
Switch(config-line)# exit
```

Save the configuration:

```
Switch# write memory
```

4. Verify Configuration and Connectivity:

Use the show commands to check settings:

show ip interface brief

show running-config

Ping from a PC to the Switch's IP to verify connectivity:

ping 192.168.1.2

Ensure that both switches and routers are properly connected.

5. Troubleshooting (If Required):

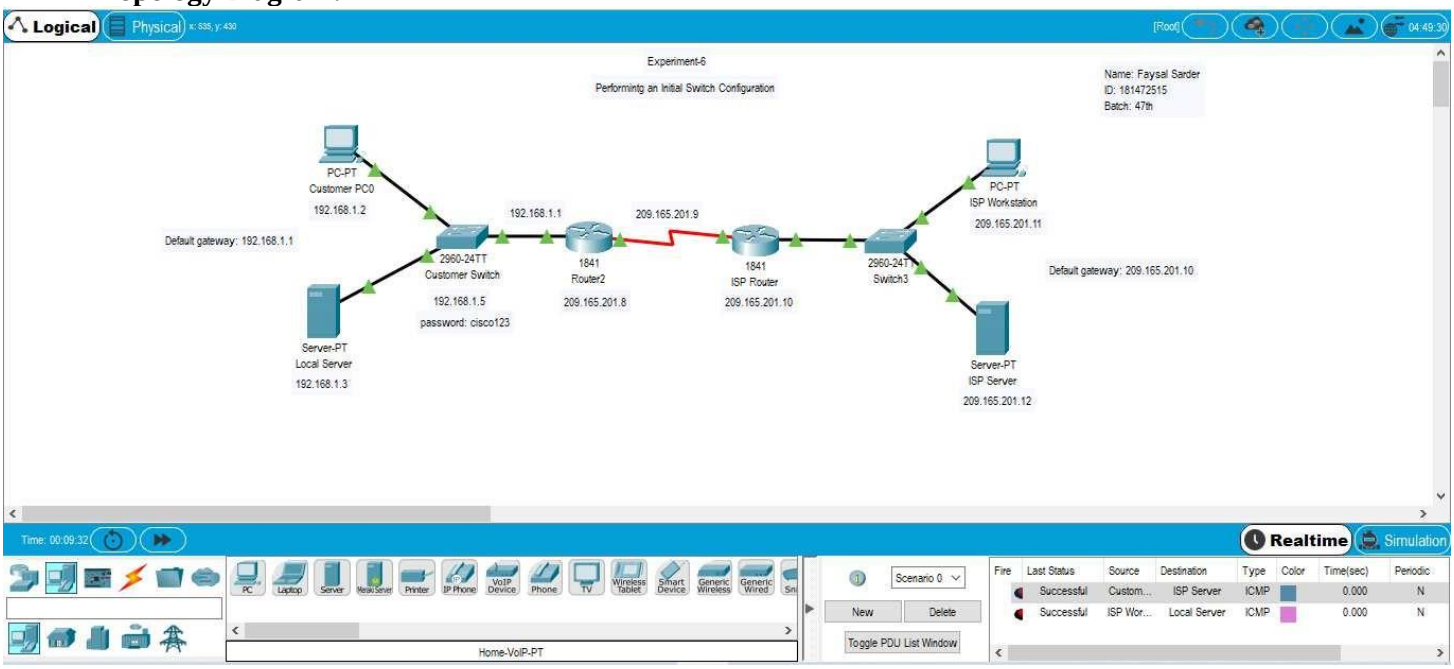
Check **cabling connections**.

Ensure **IP addresses are correctly assigned**.

Use the show interfaces command to check the switch port status:

show interfaces status

Topology Diagram:



- CustomerSwitch IP: 192.168.1.5 and Password: cisco123

Experminent-7

- **Performing an Initial Router Configuration**
  - Necessary Equipment's
    1. 2 Router's (1841)
    2. 2 Switch's (2960-24PT)
    3. 2 PC's and 2 Server (Customer and ISP Severs)
    4. Connecting Wires (Console cable, Copper Straight-Through wires and Serial DTE cable)
  - **Configuration:**

    For Customer Router:
    1. Hostname is CustomerRouter
    2. Password: Cisco123

    All the networking devices are communicates among one another.

Steps for Performing an Initial Router Configuration

1. Setup the Network Topology:

1. **Open Cisco Packet Tracer** and create a new workspace.
2. **Drag and drop the required devices** into the workspace:
   - **2 Routers (1841)**
   - **2 Switches (2960-24PT)**
   - **2 PCs**
   - **2 Servers (Customer and ISP Servers)**

2. Connect the Devices:

1. **Use Copper Straight-Through Wires** to connect:
   - Each **PC and Server to a Switch**.
   - Each **Switch to a Router**.
2. **Use Serial DTE Cable** to connect the **two routers**.
3. **Use a Console Cable** to configure the **Customer Router** via a PC.

3. Access the Router CLI for Initial Configuration:

1.Click on the **Customer Router** and go to the **CLI (Command-Line Interface)**.

2.Enter **privileged EXEC mode**:

Router> enable

3.Enter **global configuration mode**:

Router# configure terminal

4. Set the Hostname and Password:

1.Assign the hostname as **Customer Router**:

Router(config)# hostname Customer Router

2.Set a **privileged EXEC mode password**:

Customer Router(config)# enable password Cisco123

3.Secure the **console access**:

CustomerRouter(config)# line console 0

CustomerRouter(config-line)# password Cisco123

CustomerRouter(config-line)# login

CustomerRouter(config-line)# exit

4.Enable **remote access (Telnet/SSH)**:

CustomerRouter(config)# line vty 0 4

CustomerRouter(config-line)# password Cisco123

CustomerRouter(config-line)# login

CustomerRouter(config-line)# exit

5. Configure Router Interfaces:

1. Assign IP addresses to the **FastEthernet Interfaces**:

CustomerRouter(config)# interface fastEthernet 0/0

CustomerRouter(config-if)# ip address 192.168.1.1 255.255.255.0

CustomerRouter(config-if)# no shutdown

CustomerRouter(config)# interface fastEthernet 0/1

CustomerRouter(config-if)# ip address 192.168.2.1 255.255.255.0

CustomerRouter(config-if)# no shutdown

CustomerRouter(config)# exit

2. Assign IP to the **Serial Interface** (for connecting to ISP Router):

CustomerRouter(config)# interface serial 0/0/0

CustomerRouter(config-if)# ip address 10.0.0.1 255.255.255.252

CustomerRouter(config-if)# clock rate 64000

CustomerRouter(config-if)# no shutdown

CustomerRouter(config)# exit

6. Configure Default Routing (Optional):

- To allow communication between networks, configure a default route:
- CustomerRouter(config)# ip route 0.0.0.0 0.0.0.0 10.0.0.2

7. Save the Configuration:

CustomerRouter# write memory

8. Verify Configuration and Connectivity:

Check the **router interfaces**:

show ip interface brief

Ping from **PC to the router** to verify connectivity:

ping 192.168.1.1

Test connection between **Customer and ISP routers**:

ping 10.0.0.2

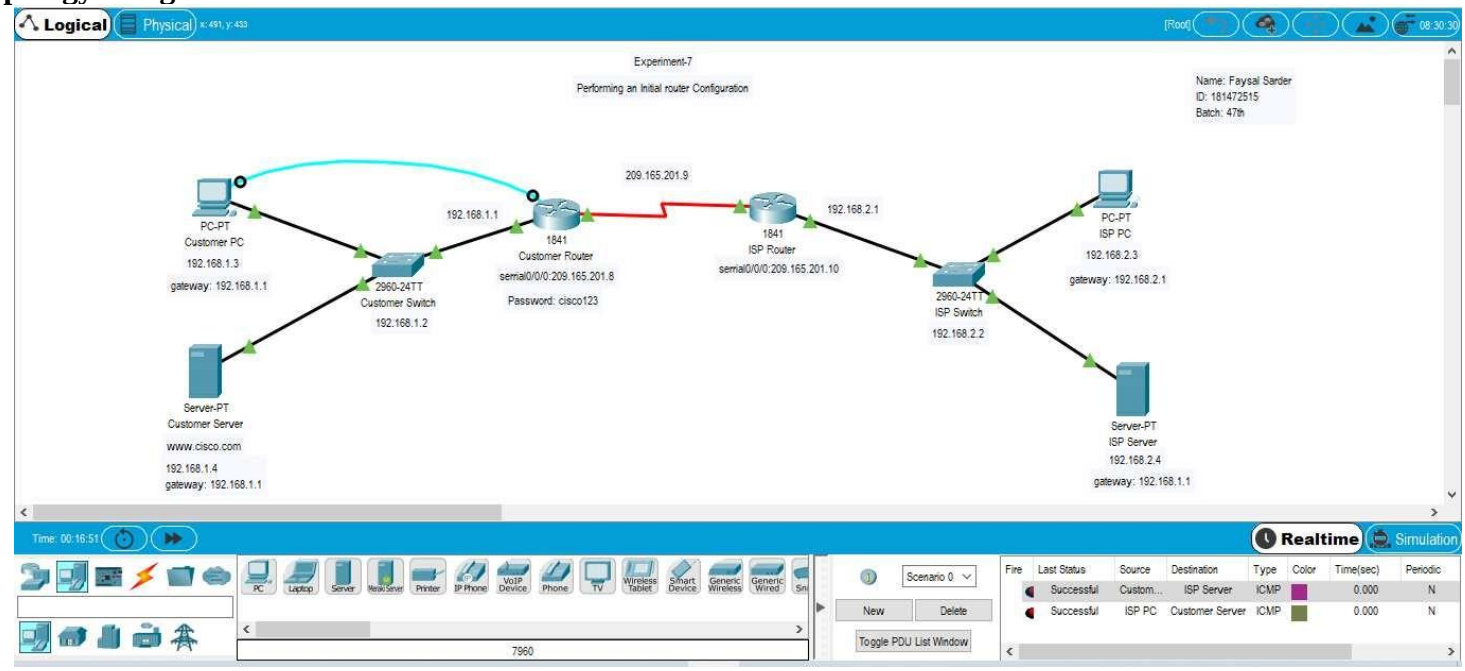
Use the **show running-config** command to review settings:

show running-config

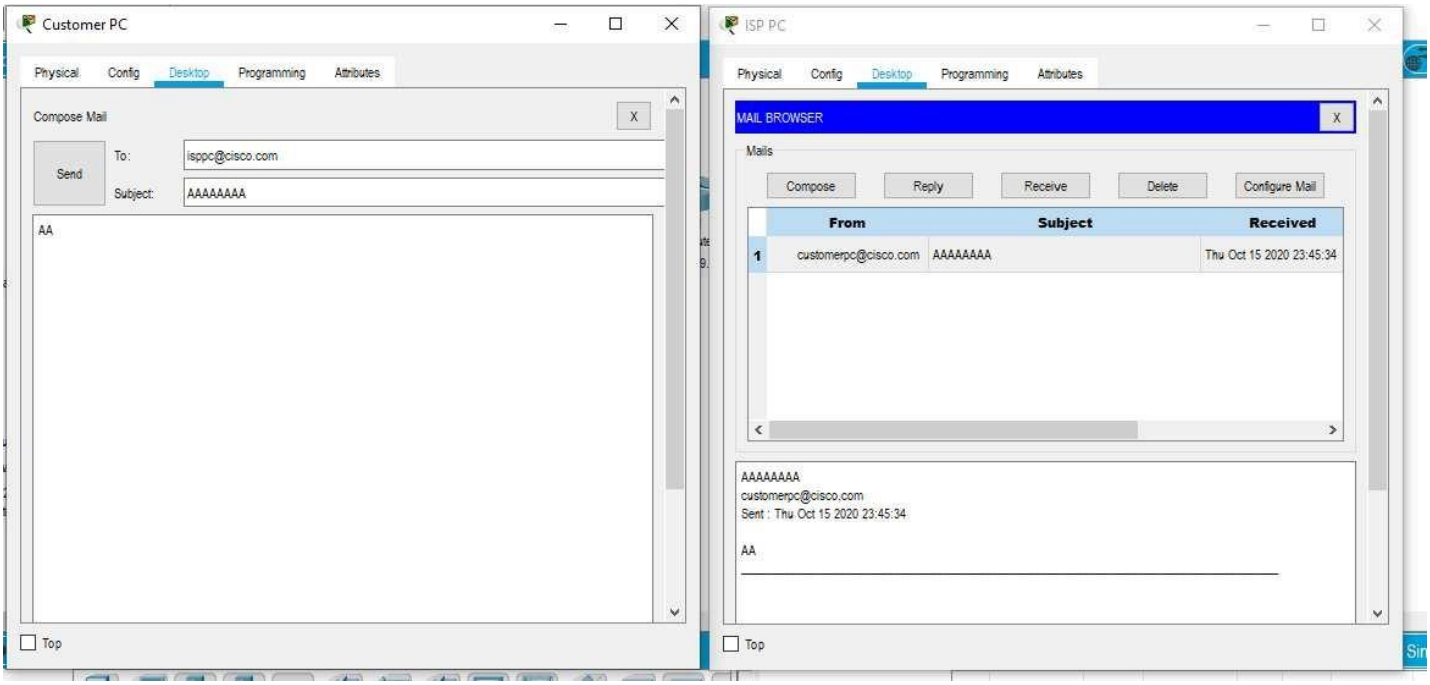
9. Troubleshooting (If Required):

- Ensure **cabling connections** are correct.
- Check **interface status** using:
- show interfaces
- Verify **IP addressing and routing**.

Topology Design:



We also sends Mail from one Customer PC to another ISP PC and vice versa.



Experminent-8

- **Configuring and Troubleshooting a Switched Network**
  - Necessary Equipment's
    1. 2 Router's (1841)
    2. 2 Switch's (2960-24PT)
    3. 2 PC's and 2 Server (Customer and ISP Severs)
    4. Connecting Wires (Console cable, Copper Straight-Through wires)

Here all the devices are passer date each other.

Steps for Configuring and Troubleshooting a Switched Network

1. Setup the Network Topology:

1. **Open Cisco Packet Tracer** and create a new workspace.
2. **Drag and drop the required devices** into the workspace:
   - **2 Routers (1841)**
   - **2 Switches (2960-24PT)**
   - **2 PCs**
   - **2 Servers (Customer and ISP Servers)**

2. Connect the Devices:

1. **Use Copper Straight-Through Wires** to connect:
   - Each **PC and Server to a Switch**.
   - Each **Switch to a Router**.
2. **Use a Console Cable** to configure the **Switches and Routers**.

3. Configure Switches for Basic Functionality:

1. Access the switch CLI by clicking on the **Switch** and selecting **CLI (Command-Line Interface)**.
2. Enter **privileged EXEC mode**:

   Switch> enable

3. Enter **global configuration mode**:

   Switch# configure terminal

4. Set the **hostname** for the switch:

   Switch(config)# hostname CustomerSwitch

5. Configure **VLAN 1 with an IP address**:

CustomerSwitch(config)# interface vlan 1

CustomerSwitch(config-if)# ip address 192.168.1.2

255.255.255.0

CustomerSwitch(config-if)# no shutdown

6.Assign ports to **VLAN 1** (for PCs and servers):

CustomerSwitch(config)# interface fastEthernet 0/1

CustomerSwitch(config-if)# switchport mode access

CustomerSwitch(config-if)# switchport access vlan 1

CustomerSwitch(config-if)# no shutdown

CustomerSwitch(config-if)# exit

7.Configure **trunking** on the switch to allow VLAN traffic between switches:

CustomerSwitch(config)# interface fastEthernet 0/24

CustomerSwitch(config-if)# switchport mode trunk

CustomerSwitch(config-if)# no shutdown

CustomerSwitch(config-if)# exit

Save the configuration:

CustomerSwitch# write memory

4. Configure the Router for Inter-Switch Communication:

Access the **Router CLI**.

Enter **privileged EXEC mode**:

Router> enable

Enter **global configuration mode**:

Router# configure terminal

Set the **hostname** for the router:

Router(config)# hostname CustomerRouter

Assign IP addresses to the **FastEthernet interfaces**:

CustomerRouter(config)# interface fastEthernet 0/0

CustomerRouter(config-if)# ip address 192.168.1.1 255.255.255.0

CustomerRouter(config-if)# no shutdown

CustomerRouter(config)# interface fastEthernet 0/1

CustomerRouter(config-if)# ip address 192.168.2.1 255.255.255.0

CustomerRouter(config-if)# no shutdown

CustomerRouter(config)# exit

Save the configuration:

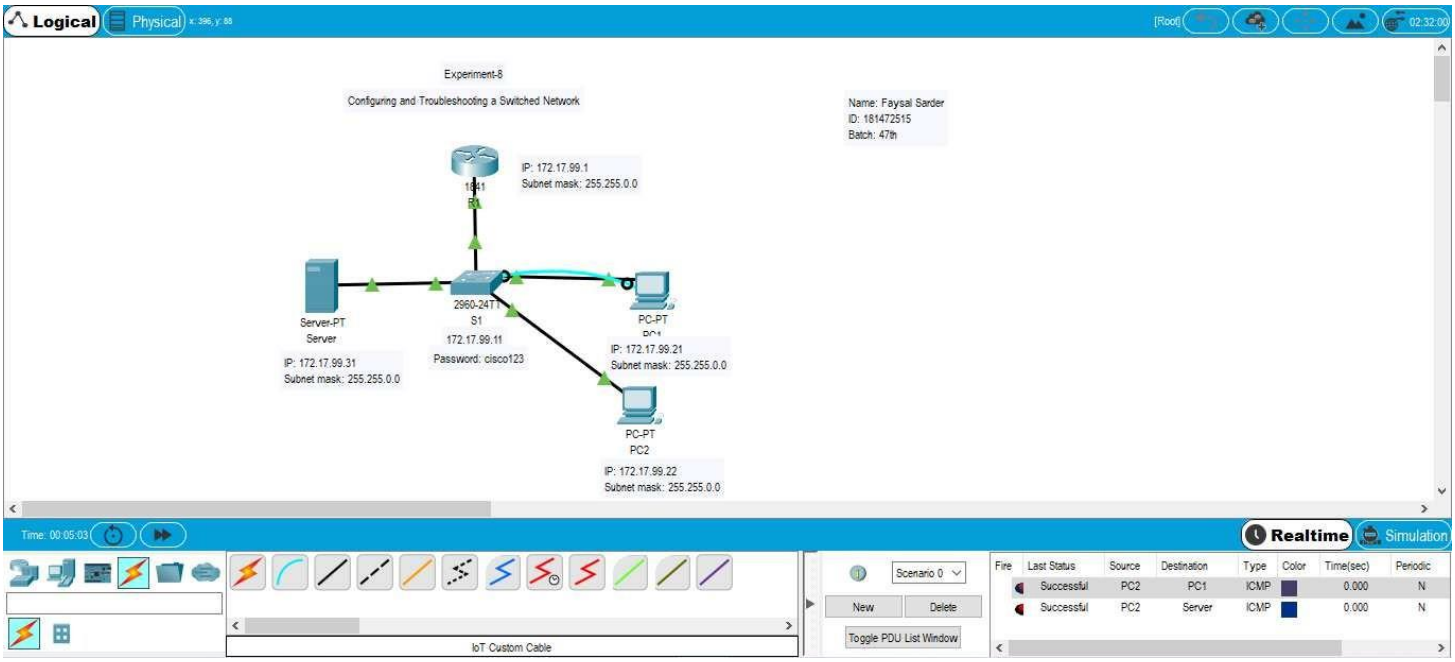
CustomerRouter# write memory

5. Verify Configuration and Troubleshoot Issues:

1. Check **interface status** on the switch:
2. show ip interface brief
3. Verify **VLAN assignments**:
4. show vlan brief
5. Test **connectivity between devices**:
    - **Ping between the PC and the switch**:
    - ping 192.168.1.2
    - **Ping between the PC and the router**:
    - ping 192.168.1.1
    - **Ping between Customer and ISP Servers**:
    - ping 192.168.2.2
6. If issues arise, check:
    - **Cable connections** (ensure correct cabling).
    - **IP configuration** (verify subnet and gateway settings).
    - **Switch and router interfaces** using:
    - show running-config
    - show interfaces

Would you like me to add these steps to your CNC Lab Manual?

Topology Design:



Experminent-9

- **Connecting a Switch**
  - **Necessary Equipment's**
    1. 2 Router's (1841)
    2. 2 Switch's (2960-24PT)
    3. 2 PC's and 2 Server (Customer and ISP Severs)
    4. Connecting Wires (Console cable, Copper Straight-Through wires and Serial DTE cable)
  - **Configuration:**

    In the below Diagram we see that 2 Router's (1841) are in MAN and all other devices are connects to these routers (That's means 2 router creates different LAN Network).

    In these design, I use a Copper Straight-Through cable, that connect the FastEthernet0/0 on Customer Router to the FirstEthernet0/1 on Customer Switch and Customer PC to the Customer Switch on port fastEthernet0/2 also with Local Server to the Customer Switch on port fastEthernet0/3.

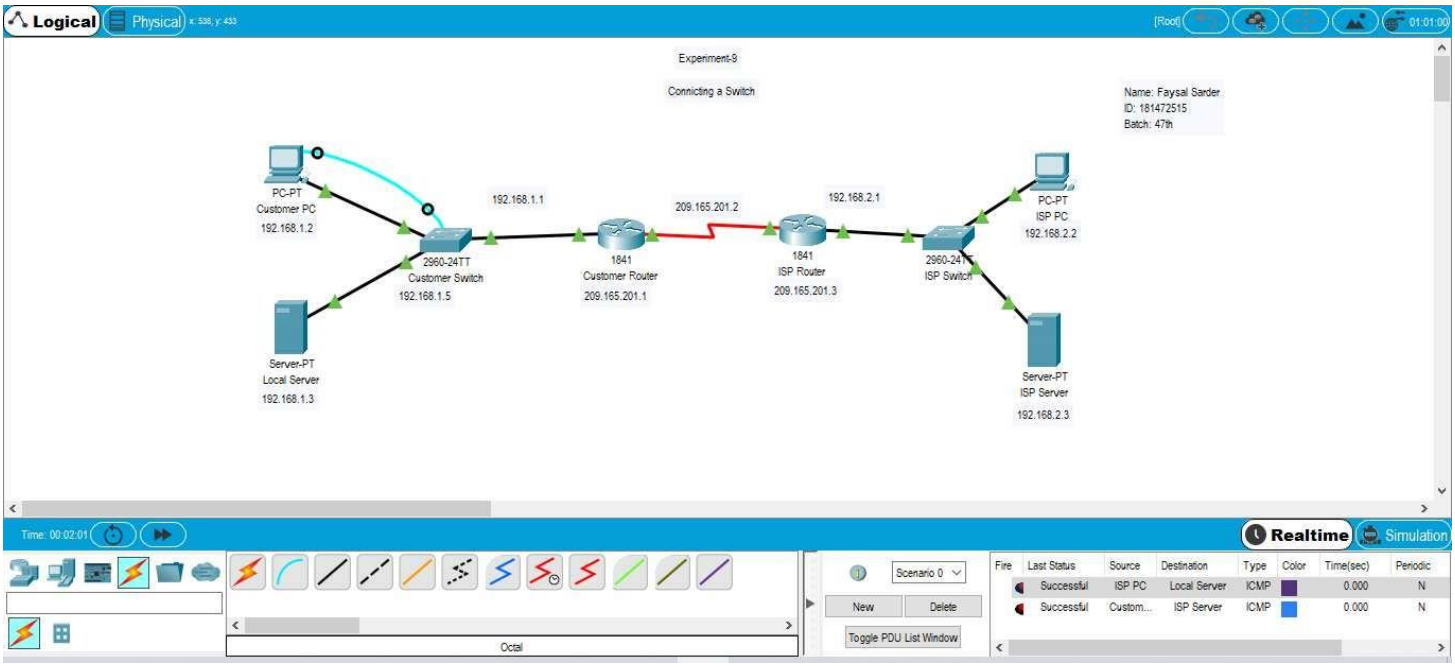
Verify the Switch configuration:

Password: cisco123

Steps for Connecting a Switch

1. **Setup Devices in Cisco Packet Tracer:**
   - Place **2 Routers (1841), 2 Switches (2960-24PT), 2 PCs, and 2 Servers** in the workspace.
2. **Connect Devices Using Appropriate Cables:**
   - **Use Copper Straight-Through Wires** to connect:
     - **FastEthernet0/0** on **Customer Router → FastEthernet0/1** on **Customer Switch**.
     - **Customer PC → Customer Switch (port FastEthernet0/2)**.
     - **Local Server → Customer Switch (port FastEthernet0/3)**.
   - **Use Serial DTE Cable** to connect the two routers.
3. **Configure the Switch:**
   - Set **hostname** and **IP address** on VLAN 1.
   - Assign **ports to VLANs** and enable trunking if needed.
4. **Verify Configuration:**
   - Use **show running-config** to check settings.
   - Test connectivity using the **ping** command.
   - Ensure the switch password is set to **cisco123**.

Topology Diagram:



Experminent-10

- **Configuring WEP on a Wireless Router**
  - **Necessary Equipment's**
    1. 3 Router's (2 Routers is 1841 and 1 is WRTN300 wireless router)
    2. 2 Switch's (2960-24PT)
    3. 3 PC's and 2 Server (Customer Server and ISP Severs)
    4. Connecting Wires (Console cable, Copper Straight-Through wires and Serial DTE cable)

Steps for Configuring WEP on a Wireless Router

1. Setup the Network in Cisco Packet Tracer

1. **Place the following devices in the workspace:**
   - **2 Routers (1841)**
   - **1 Wireless Router (WRTN300)**
   - **2 Switches (2960-24PT)**
   - **3 PCs and 2 Servers (Customer and ISP Servers)**
2. **Connect the devices** using:
   - **Copper Straight-Through Wires** for PC-to-Switch and Switch-to-Router connections.
   - **Serial DTE Cable** to link the two wired routers.

2. Configure the Wireless Router (WRTN300)

1. Click on the **Wireless Router** and go to the **GUI tab**.
2. Navigate to **Wireless Settings**.
3. Set the **SSID (Wi-Fi Network Name)** to **Customer_WiFi**.
4. Under **Security Mode**, select **WEP**.
5. Enter a **WEP Key (e.g., 1234567890)** and save the settings.

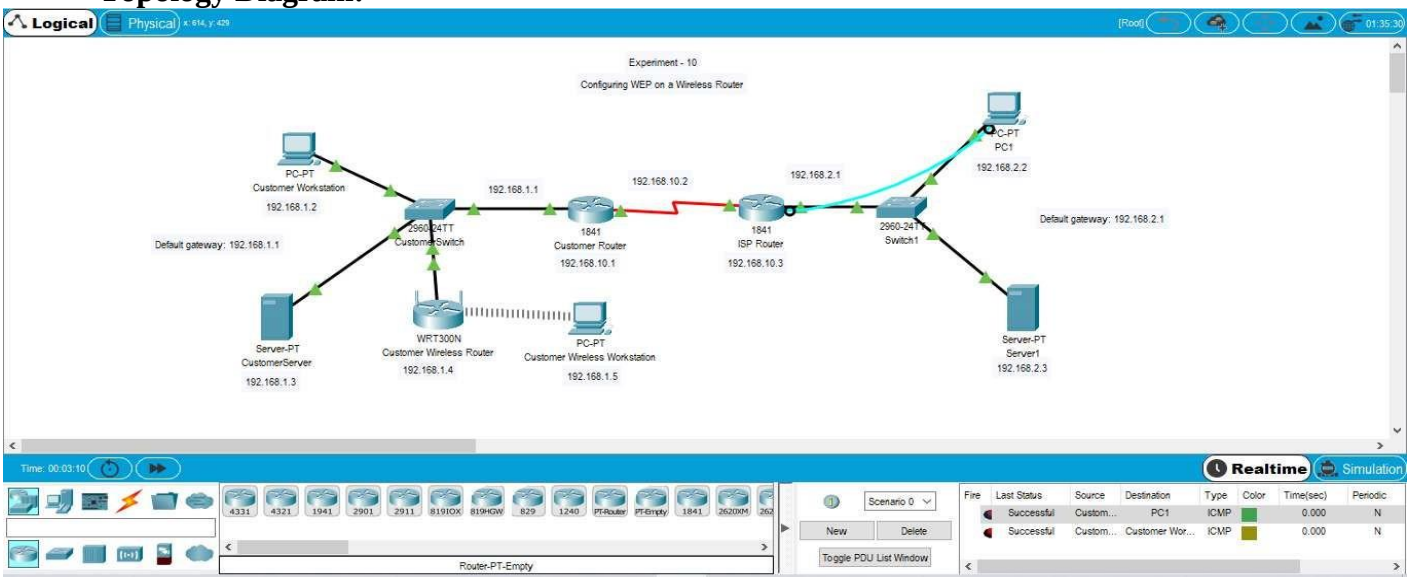
3. Connect PCs to the Wireless Network

1. Click on a **PC**, go to the **Desktop tab**, and open the **PC Wireless Settings**.
2. Select **Customer_WiFi** and enter the **WEP Key (1234567890)**.
3. Click **Connect** and verify connection.

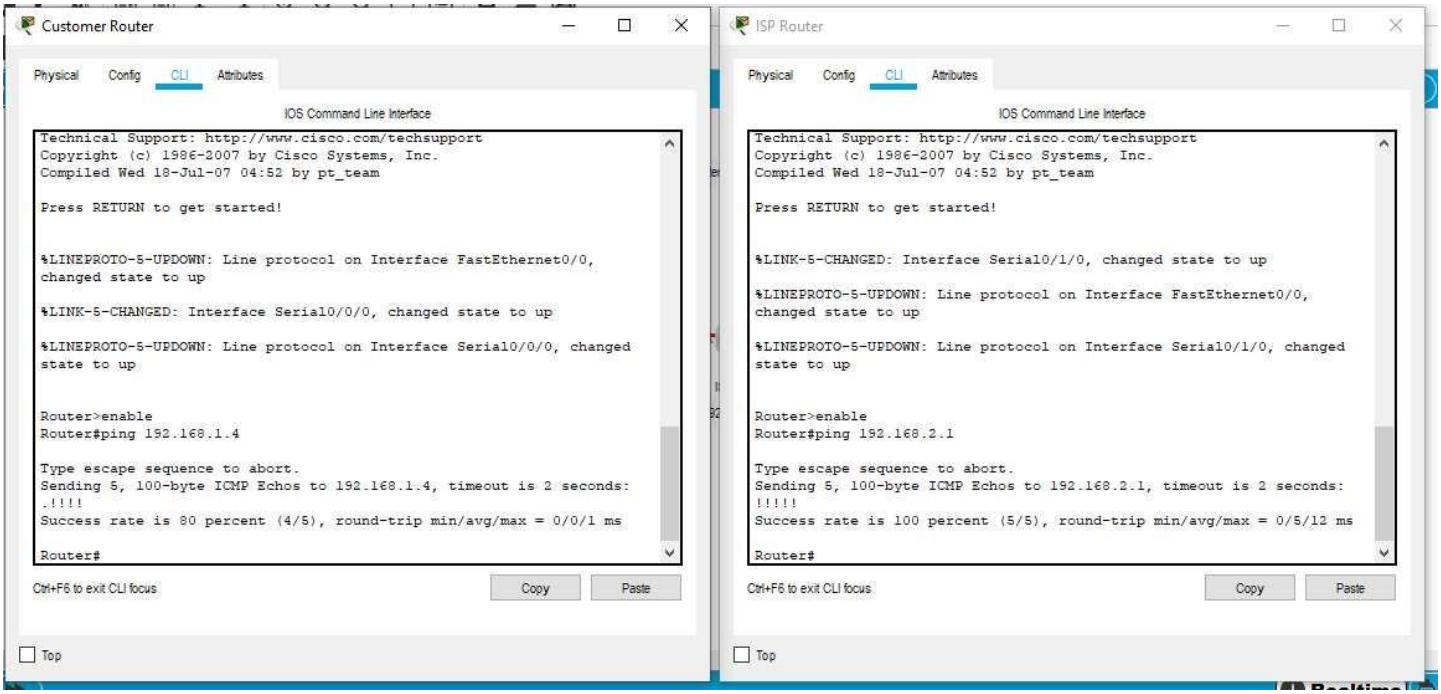
4. Verify Network Configuration

1. Assign **IP addresses** to all wired and wireless devices.
2. Test connectivity between devices using the **ping** command.
3. Use the **show running-config** command on wired routers to check settings.

Topology Diagram:



For check I used ping commend



Experminent-11

- **Using the Cisco IOS Show Commands**
  - **Necessary Equipment's**
    1. 1 Router and 1 Switch
    2. 2 PC's and 1 Server (ISP Severs)
    3. Connecting Wires (Console cable, Copper Straight-Through wires)

Steps for Using the Cisco IOS Show Commands

1. Setup the Network in Cisco Packet Tracer

1. Open Cisco Packet Tracer and create a new workspace.
2. Drag and drop **1 Router (1841), 1 Switch (2960-24PT), 2 PCs, and 1 Server (ISP Server)** into the workspace.
3. Connect the PCs and Server to the Switch using **Copper Straight-Through Wires**.
4. Connect the Switch to the Router using a **Copper Straight-Through Wire**.
5. Use a **Console Cable** to configure the router and switch from a PC.

2. Configure Basic IP Settings

1. Enter **privileged EXEC mode** using the command:
   enable
2. Enter **global configuration mode** using:
   configure terminal
3. Assign an IP address to the router's interface using:
   interface fastEthernet 0/0
   ip address 192.168.1.1 255.255.255.0
   no shutdown
   exit
4. Assign IP addresses to the **PCs and Server** in the same subnet.
5. Save the configuration using:
   write memory

3. Use Cisco IOS Show Commands

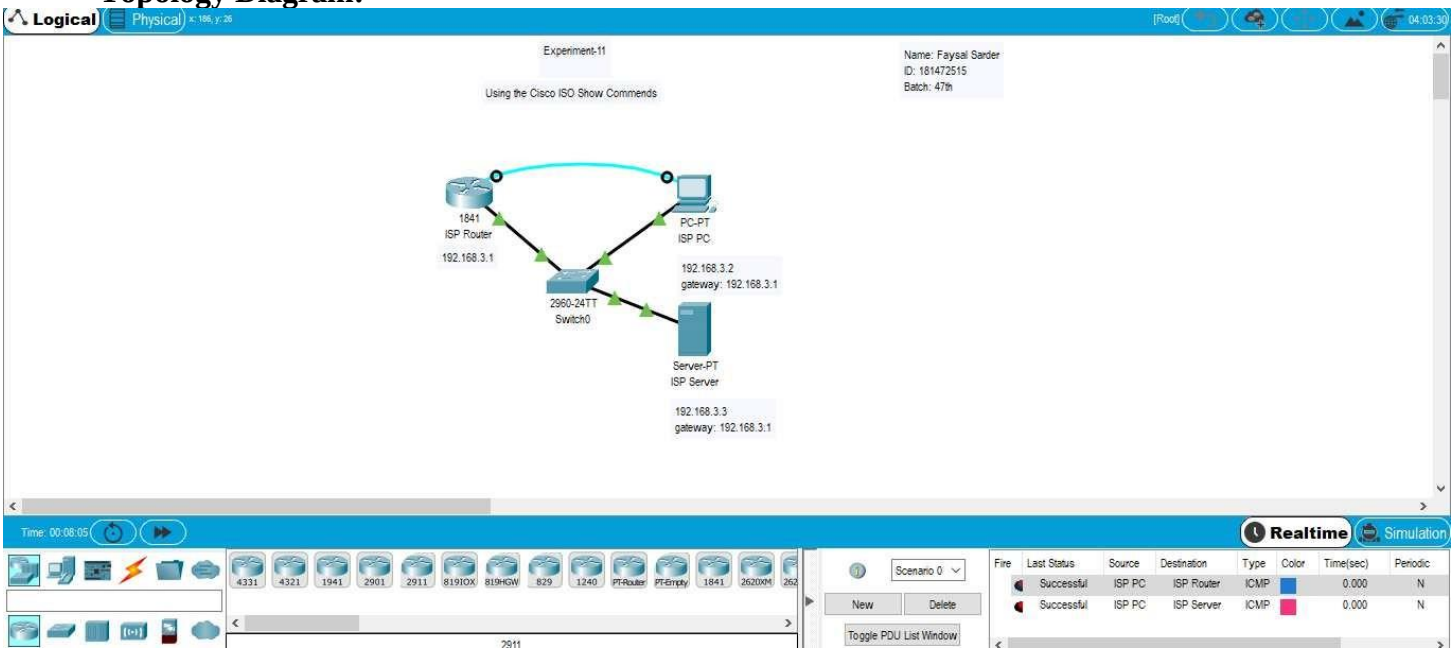
1. Check **interface status** using:
   show ip interface brief
2. Verify **router and switch configuration** using:
   show running-config
3. Display **VLAN configuration** on the switch using:
   show vlan brief
4. View **MAC addresses** learned by the switch using:
   show mac address-table
5. Check **router's routing table** using:
   show ip route
6. View **connected devices on the switch** using:
   show cdp neighbors

4. Verify Network Connectivity

1. Ping the router from a PC using:
   ping 192.168.1.1
2. Trace packet paths using:
   tracert 192.168.1.1
3. Check switch interfaces using:

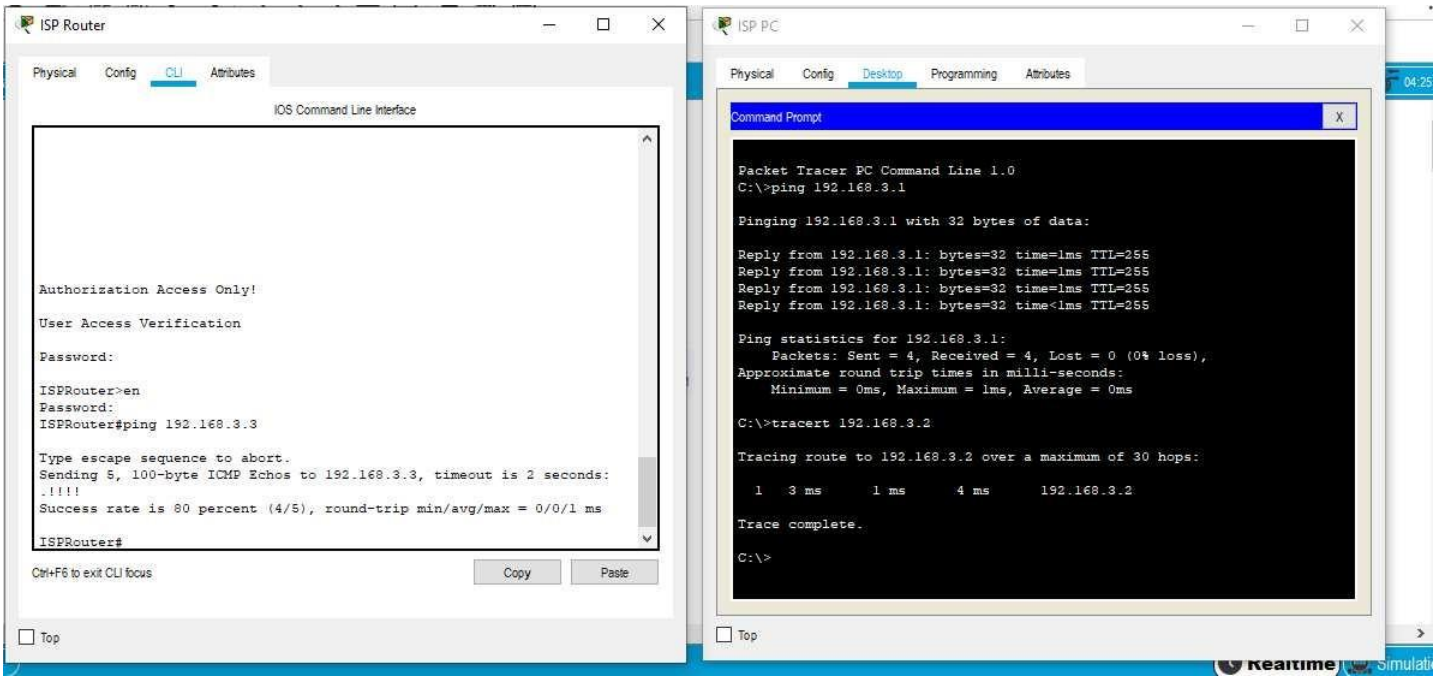
show interfaces status

Topology Diagram:



For check:

ISP Router Password is cisco123



Experminent-12

- **Examining WAN Connections**
  - **Necessary Equipment's**
    1. 1 cloud-PT (for WAN communication)
    2. 3 Router and 2 PC's
    3. Connecting Wires (Cross Copper Straight cable and Serial DTE cables)

Configuration:

All the devices are communicate with each other in these WAN Network.

Steps for Examining WAN Connections

1. Setup the Network in Cisco Packet Tracer

1. Open Cisco Packet Tracer and create a new workspace.
2. Drag and drop **1 Cloud-PT (for WAN communication), 3 Routers, and 2 PCs** into the workspace.
3. Use **Serial DTE cables** to connect the routers for WAN communication.
4. Use **Copper Straight-Through cables** to connect the PCs to the routers.

2. Configure IP Addresses on Routers

1. Enter **privileged EXEC mode**:
   enable
2. Enter **global configuration mode**:
   configure terminal
3. Assign IP addresses to the **WAN interfaces** on each router:
   interface serial 0/0/0
   ip address 10.0.0.1 255.255.255.252
   clock rate 64000
   no shutdown
   exit
4. Assign IP addresses to the **LAN interfaces**:
   interface fastEthernet 0/0
   ip address 192.168.1.1 255.255.255.0
   no shutdown
   exit
5. Repeat the above steps on all routers with different IP addresses.
6. Save the configuration:
   write memory

3. Configure Default Routing for WAN Communication

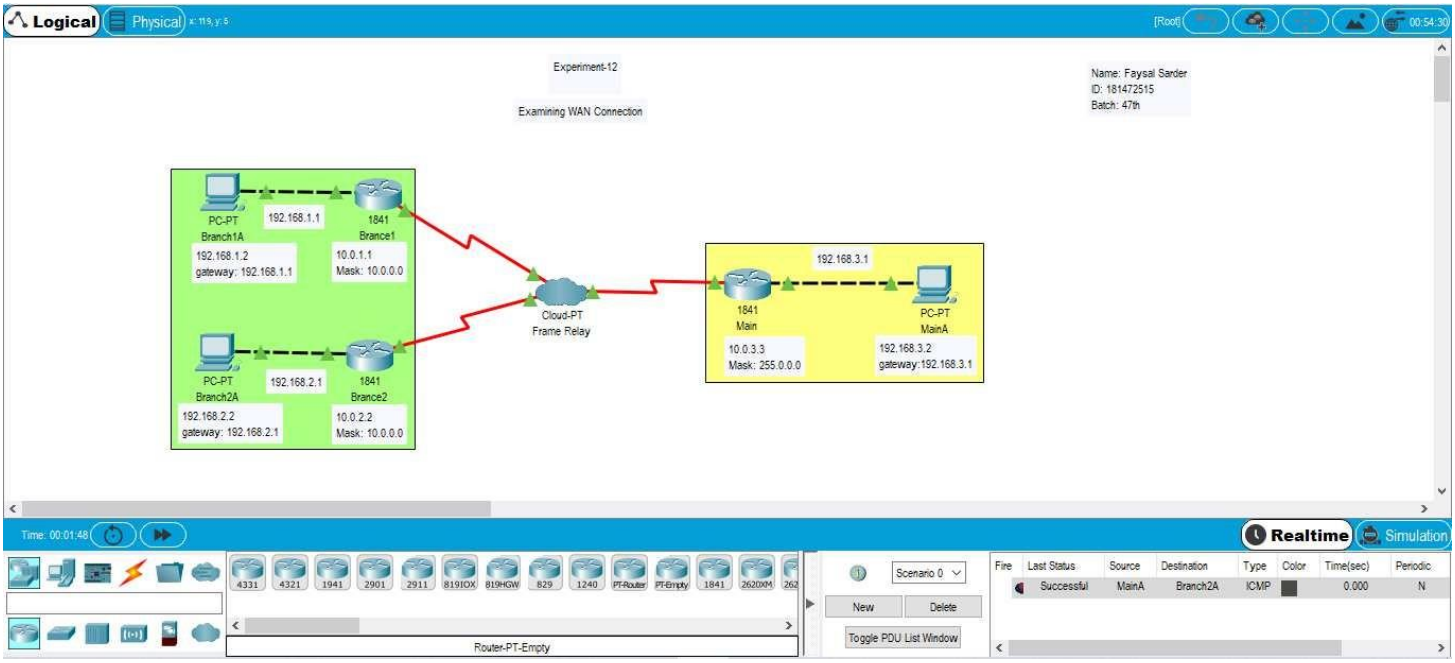
1. Set a default route on each router to forward packets to the next router:
   ip route 0.0.0.0 0.0.0.0 10.0.0.2

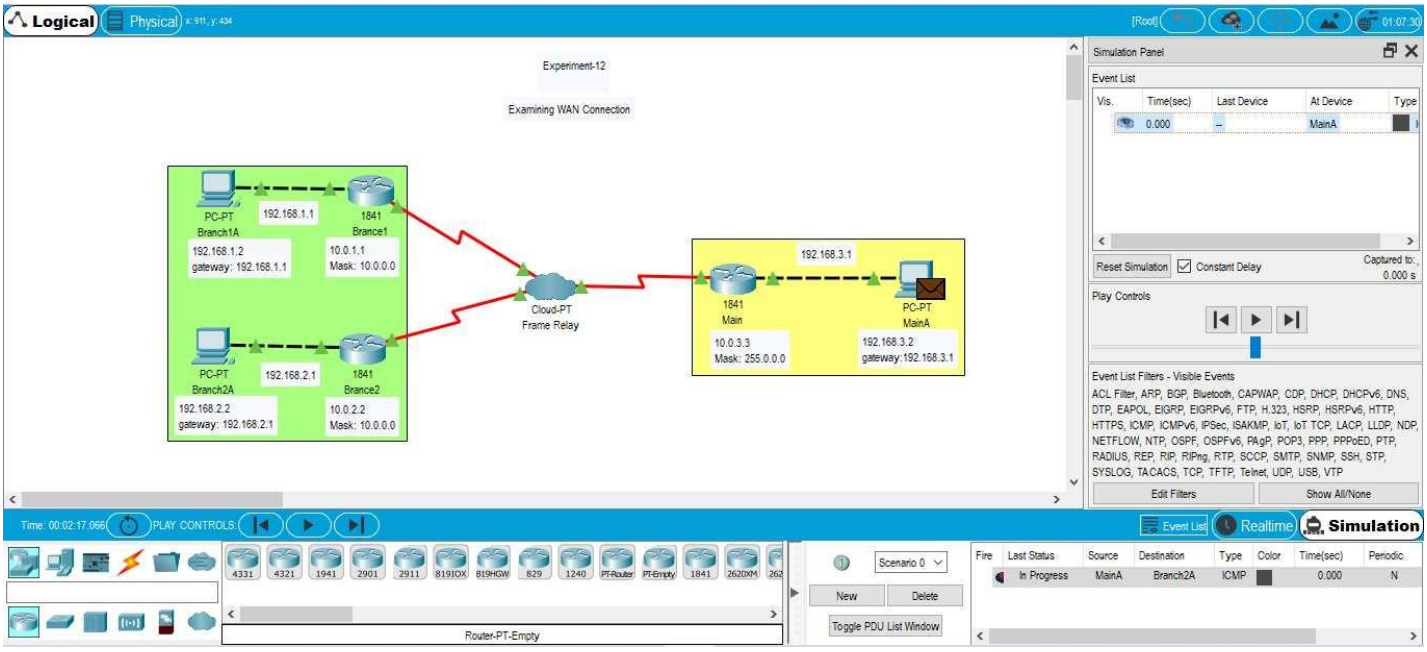
4. Verify Network Connectivity

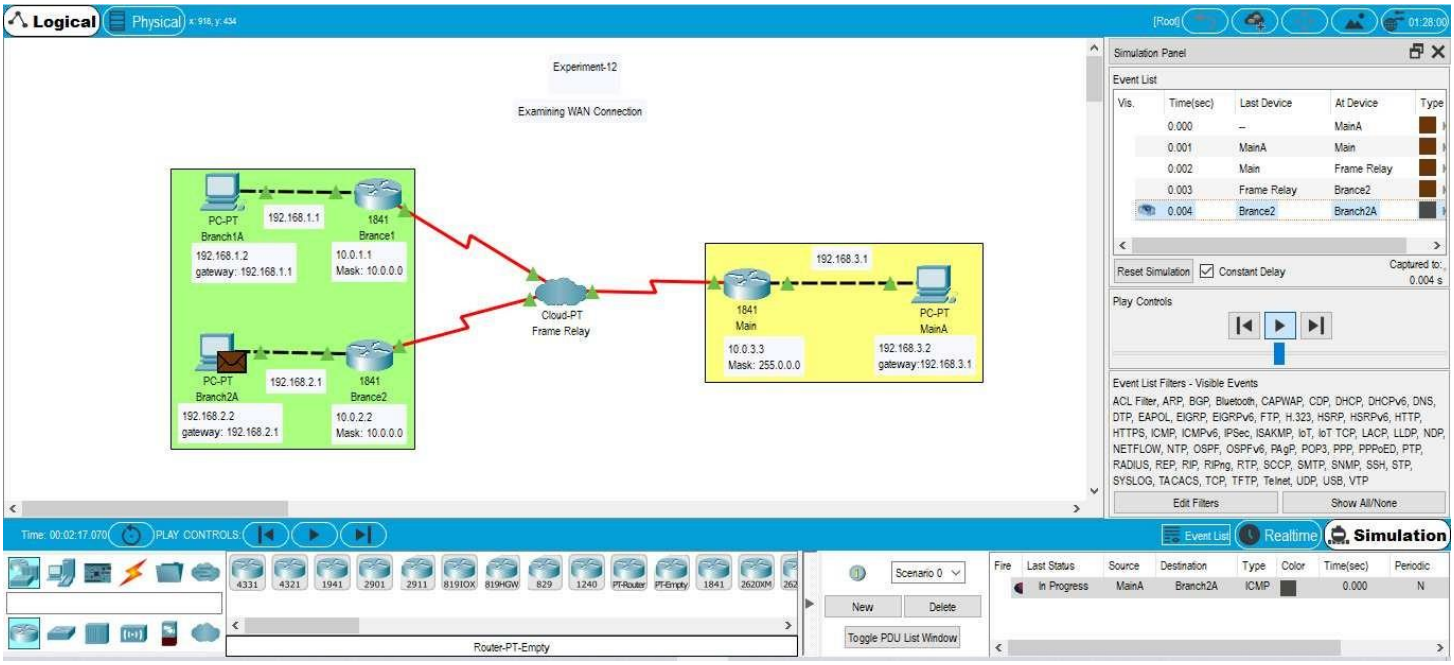
1. Ping between PCs to test connectivity:
   ping 192.168.1.2
2. Check the routing table on a router:
   show ip route

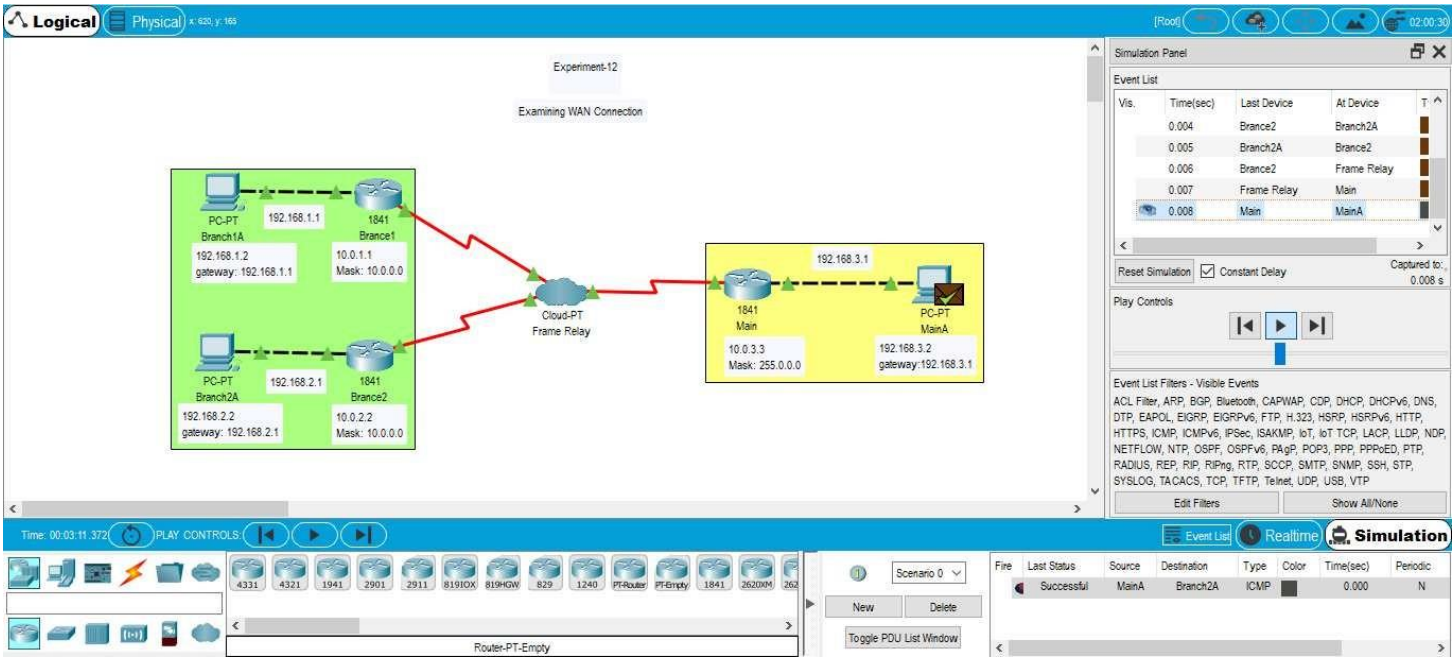
3. Verify the status of WAN interfaces:
   show interfaces serial 0/0/0

Topology Diagram:









Finally we see that messages are send and revived by the devices.

Experminent-13

- **Interpreting Ping and Traceroute Output**
  - **Necessary Equipment's**
    1. 1 ISP Network (Combined by 2 Routers)
    2. 4 Router's and 4 Switch's
    3. 4PC's and 3 Server (ISP Severs)
    4. Connecting Wires (Copper Straight-Through , Copper Cross-Over and Serial DTE cables)

Steps for Interpreting Ping and Traceroute Output

1. Setup the Network in Cisco Packet Tracer

1. Open Cisco Packet Tracer and create a new workspace.
2. Drag and drop the required devices into the workspace:
   - **1 ISP Network (2 Routers combined as ISP)**
   - **4 Routers**
   - **4 Switches**
   - **4 PCs**
   - **3 Servers (ISP Servers)**
3. Connect the devices using appropriate cables:
   - **Copper Straight-Through Wires** for PC-to-Switch and Switch-to-Router connections.
   - **Copper Cross-Over Wires** for connecting switches.
   - **Serial DTE Cables** for WAN connections between routers.

2. Configure IP Addresses on Routers

1. Enter **privileged EXEC mode**:
   enable
2. Enter **global configuration mode**:
   configure terminal
3. Assign IP addresses to **WAN interfaces**:
   interface serial 0/0/0
   ip address 10.0.0.1 255.255.255.252
   clock rate 64000
   no shutdown
   exit
4. Assign IP addresses to **LAN interfaces**:
   interface fastEthernet 0/0
   ip address 192.168.1.1 255.255.255.0
   no shutdown
   exit
5. Repeat the above steps for all routers, ensuring each network has a unique IP range.
6. Save the configuration:
   write memory

3. Verify Connectivity with Ping Command

1. Open the **Command Prompt (CLI) on a PC** and test network connectivity:
   ping 192.168.1.2

2. If the ping is **successful**, the network is properly configured.
3. If the ping **fails**, check cable connections, interface status, and IP settings.

4. Use Traceroute to Examine Network Path

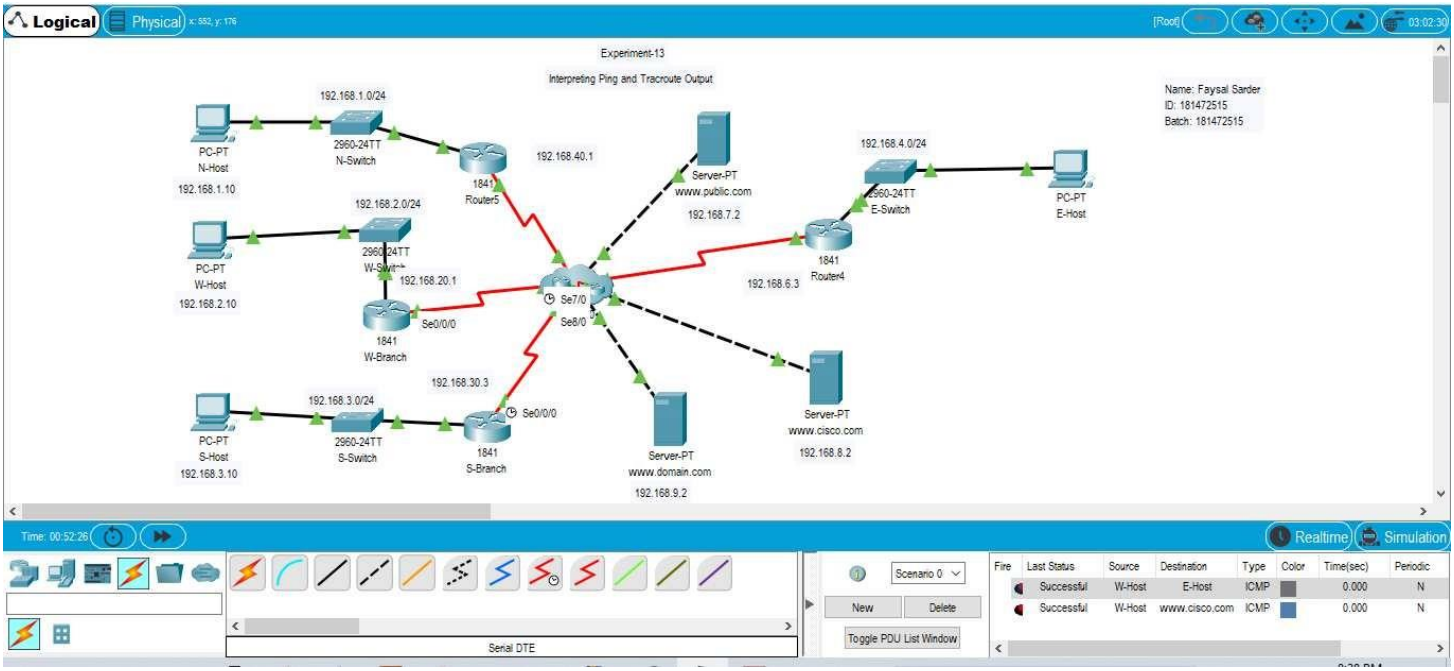
1. Open the **Command Prompt (CLI) on a PC**.
2. Use the **tracert** command to trace the path packets take through the network:
   tracert 192.168.1.3
3. Analyze the output to identify the routers in the path and detect any network issues.
4. If a device is unreachable, verify the routing table on the router:
   show ip route

5. Troubleshooting (If Required)

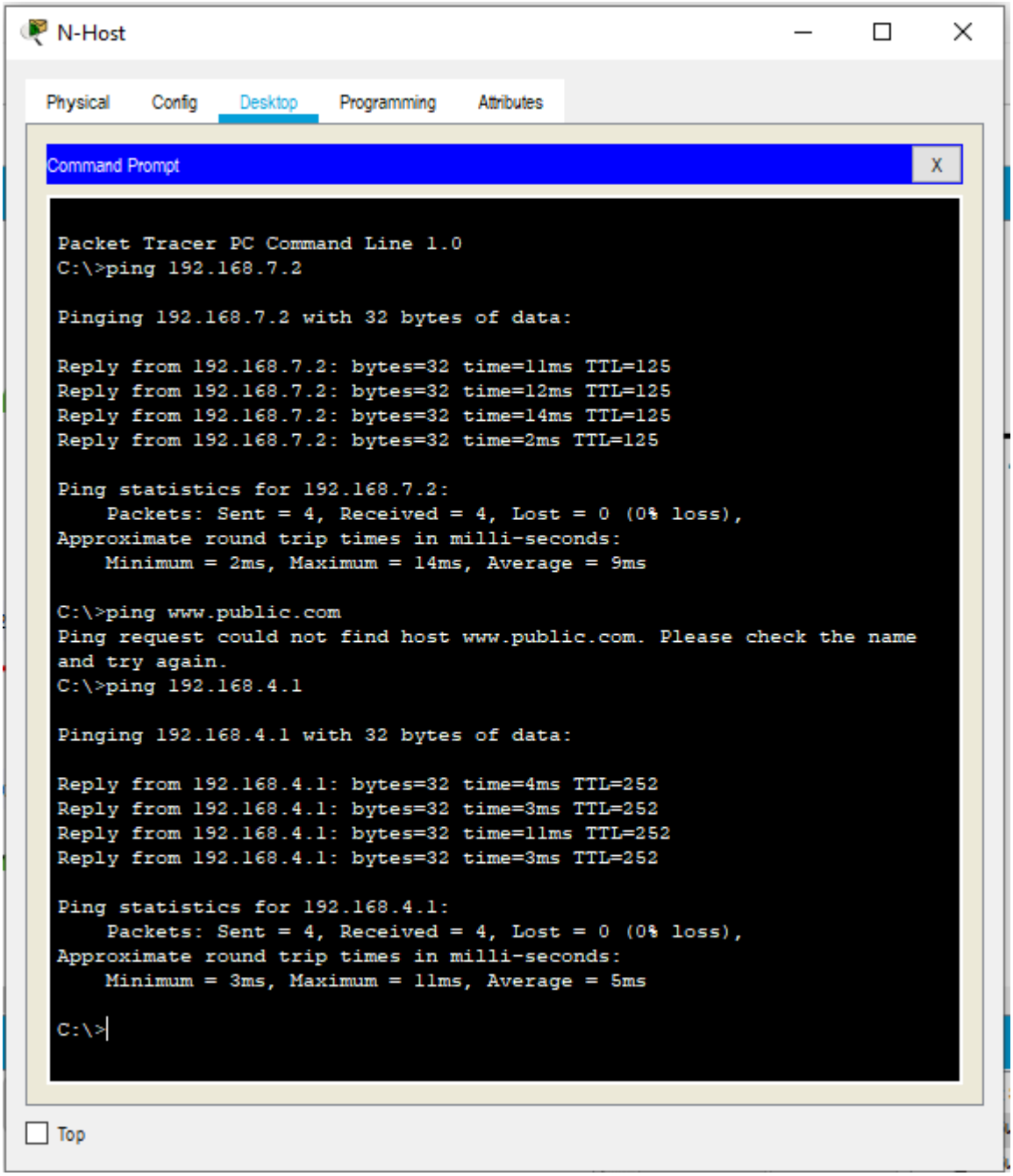
- Verify **routing configurations** using:
- show running-config
- Check interface status using:
- show ip interface brief
- Ensure **correct cabling** and IP configurations.

Would you like me to add these steps to your CNC Lab Manual?

Topology Diagram:



Ping and Tracert commands:


N-Host
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.7.2
Pinging 192.168.7.2 with 32 bytes of data:
Reply from 192.168.7.2: bytes=32 time=11ms TTL=125
Reply from 192.168.7.2: bytes=32 time=12ms TTL=125
Reply from 192.168.7.2: bytes=32 time=14ms TTL=125
Reply from 192.168.7.2: bytes=32 time=2ms TTL=125
Ping statistics for 192.168.7.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 2ms, Maximum = 14ms, Average = 9ms
C:\>ping www.public.com
Ping request could not find host www.public.com. Please check the name
and try again.
C:\>ping 192.168.4.1
Pinging 192.168.4.1 with 32 bytes of data:
Reply from 192.168.4.1: bytes=32 time=4ms TTL=252
Reply from 192.168.4.1: bytes=32 time=3ms TTL=252
Reply from 192.168.4.1: bytes=32 time=11ms TTL=252
Reply from 192.168.4.1: bytes=32 time=3ms TTL=252
Ping statistics for 192.168.4.1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 3ms, Maximum = 11ms, Average = 5ms
C:\>
Top

Experminent-14

- **Demonstrating Distribution Layer Functions**
  - **Necessary Equipment's**
    1. 4 Router's and 2 Switch's
    2. 4 PC's
    3. Connecting Wires (Copper Straight-Through , Cross Copper)

Steps for Demonstrating Distribution Layer Functions

1. Setup the Network in Cisco Packet Tracer

1. Open Cisco Packet Tracer and create a new workspace.
2. Drag and drop the required devices into the workspace:
   - **4 Routers**
   - **2 Switches**
   - **4 PCs**
3. Connect the devices using appropriate cables:
   - **Copper Straight-Through Wires** to connect PCs to switches and switches to routers.
   - **Copper Cross-Over Wires** to connect switches.

2. Configure IP Addresses on Routers

1. Enter **privileged EXEC mode**:
   enable
2. Enter **global configuration mode**:
   configure terminal
3. Assign IP addresses to **router interfaces** connected to switches:
   interface fastEthernet 0/0
   ip address 192.168.1.1 255.255.255.0
   no shutdown
   exit
4. Assign IP addresses to **router interfaces** connected to other routers:
   interface serial 0/0/0
   ip address 10.0.0.1 255.255.255.252
   clock rate 64000
   no shutdown
   exit
5. Repeat these steps for all routers, ensuring unique IP assignments.
6. Save the configuration:
   write memory

3. Configure Routing for Interconnectivity

1. Configure **static routing** (if required) to define routes:
   ip route 192.168.2.0 255.255.255.0 10.0.0.2
2. Configure **dynamic routing protocols** (such as OSPF or EIGRP) to manage routes:
   router ospf 1
   network 192.168.1.0 0.0.0.255 area 0

exit

4. Verify Connectivity

1. **Ping between PCs** to check communication:
   ping 192.168.1.2
2. **Check routing tables** on routers:
   show ip route
3. **Use traceroute** to analyze packet paths:
   tracert 192.168.1.3

5. Troubleshooting (If Required)

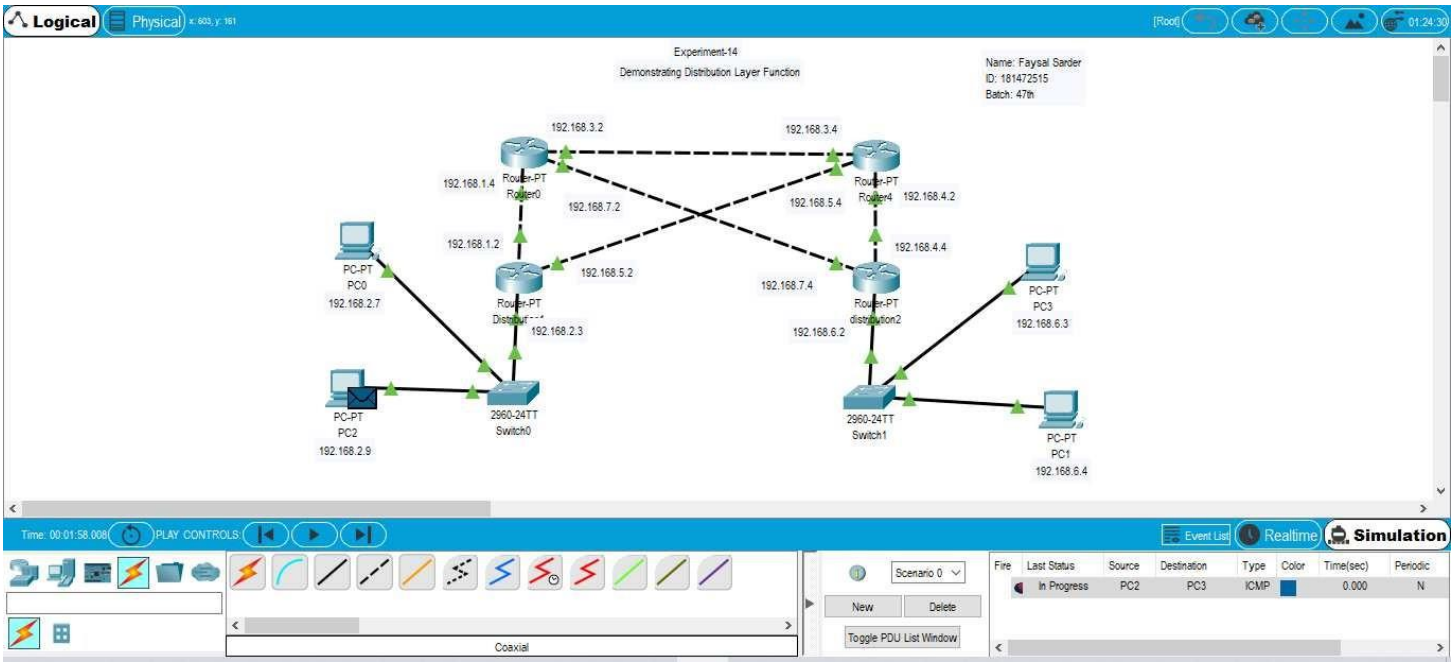
- Verify **routing configurations** using:
- show running-config
- Check **interface status** using:
- show ip interface brief
- Ensure correct **cabling and IP assignments**.

Would you like me to add these steps to your CNC Lab Manual?

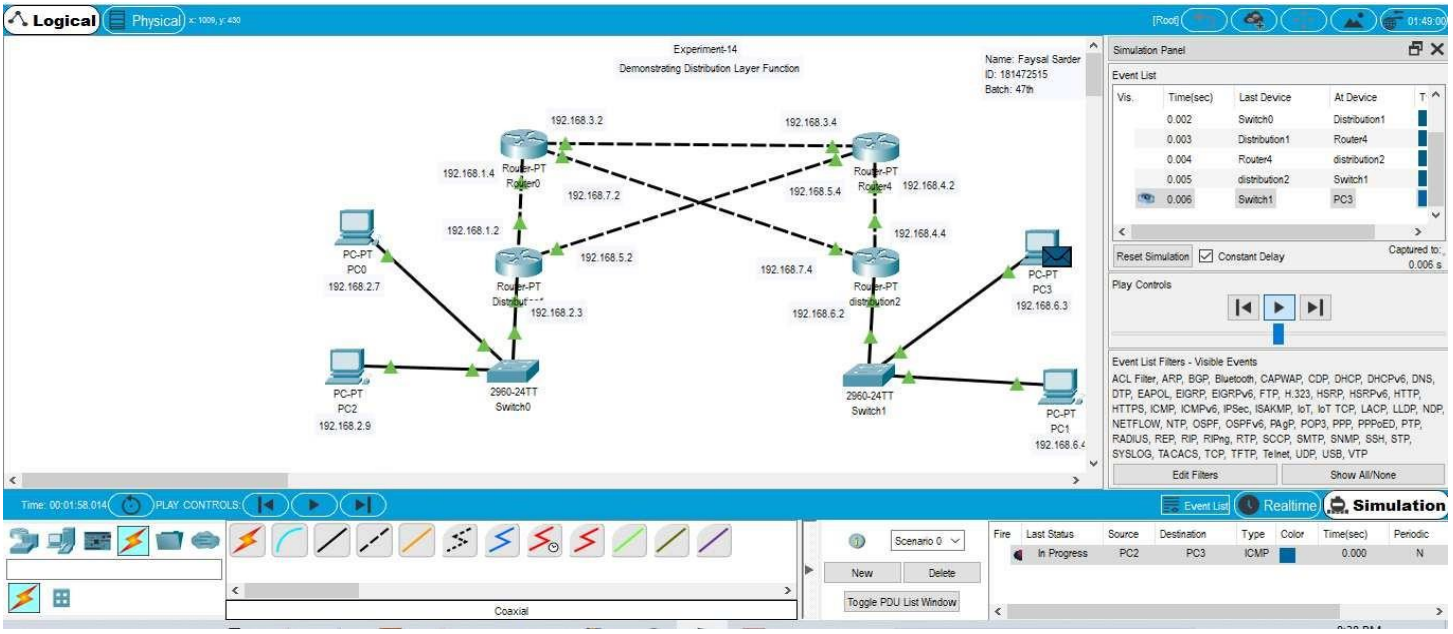
Topology Diagram:

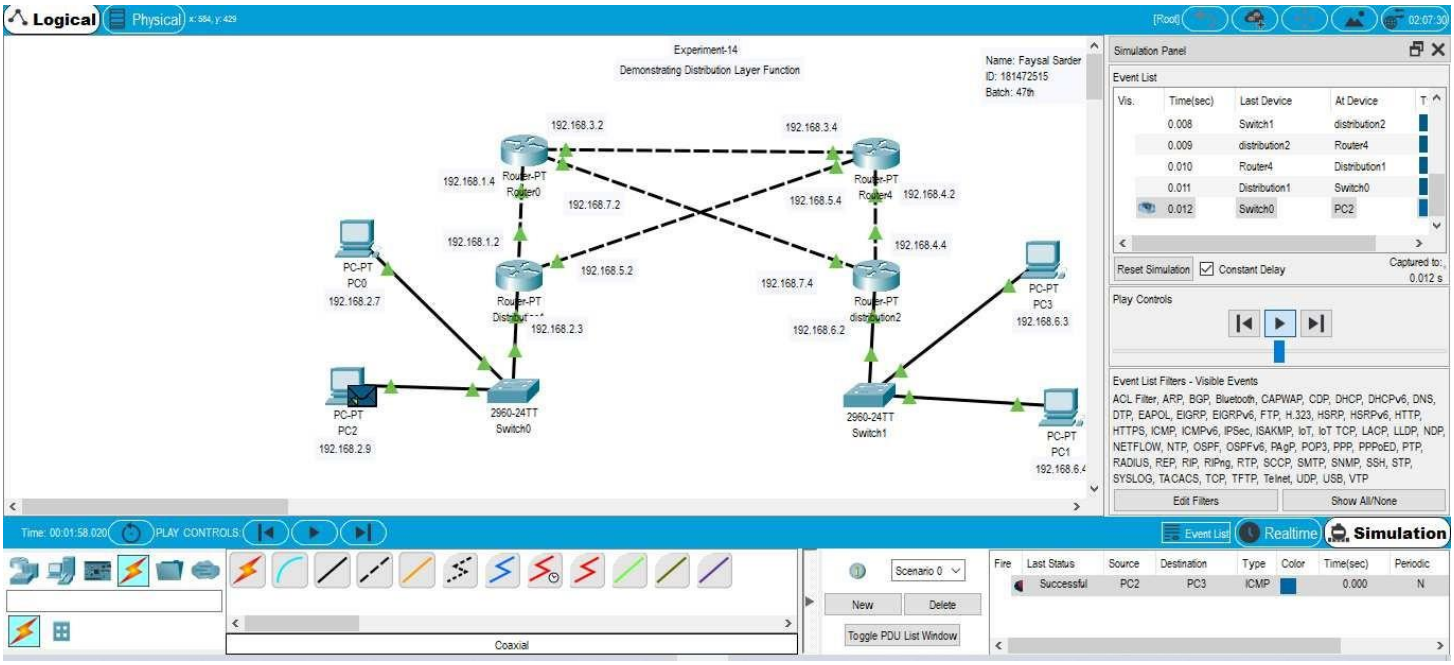
Test:

Real-time mode:



Simulation mode:


Logical
Physical
Experiment-14
Demonstrating Distribution Layer Function
Name: Faysal Sarder
ID: 181472515
Batch: 47th
Simulation Panel
Event List
Vis. Time(sec) Last Device At Device
0.002 Switch0 Distribution1
0.003 Distribution1 Router4
0.004 Router4 distribution2
0.005 distribution2 Switch1
0.006 Switch1 PC3
Reset Simulation
Constant Delay
Captured to: 0.006 s
Play Controls
Event List Filters - Visible Events
ACL Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPSec, ISAKMP, IoT, IoT TCP, LACP, LLDP, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, PPP, PPPoED, PTP, RADIUS, REP, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP
Edit Filters
Show All/None
192.168.3.2
192.168.3.4
192.168.1.4
192.168.7.2
192.168.5.4
192.168.4.2
192.168.1.2
192.168.4.4
192.168.5.2
192.168.7.4
192.168.2.3
192.168.6.2
PC-PT PC0 192.168.2.7
PC-PT PC3 192.168.6.3
PC-PT PC2 192.168.2.9
PC-PT PC1
2960-24TT Switch0
2960-24TT Switch1
Router-PT Router0
Router-PT Router4
Router-PT distribution2
Time: 00:01:58.014
PLAY CONTROLS:
Event List
Realtime
Simulation
Coaxial
Scenario 0
New
Delete
Toggle PDU List Window
Fire Last Status Source Destination Type Color Time(sec) Periodic
In Progress PC2 PC3 ICMP 0.000 N


Logical
Physical
Experiment-14
Demonstrating Distribution Layer Function
Name: Faysal Sarder
ID: 181472515
Batch: 47th
Simulation Panel
Event List
Vis. Time(sec) Last Device At Device
0.008 Switch1 distribution2
0.009 distribution2 Router4
0.010 Router4 Distribution1
0.011 Distribution1 Switch0
0.012 Switch0 PC2
Reset Simulation
Constant Delay
Captured to: 0.012 s
Play Controls
Event List Filters - Visible Events
ACL Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPSec, ISAKMP, IoT, IoT TCP, LACP, LLDP, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, PPP, PPPoED, PTP, RADIUS, REP, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP
Edit Filters
Show All/None
192.168.3.2
192.168.3.4
192.168.1.4
192.168.7.2
192.168.5.4
192.168.4.2
192.168.1.2
192.168.4.4
192.168.5.2
192.168.7.4
192.168.2.3
192.168.6.2
PC-PT PC0 192.168.2.7
PC-PT PC3 192.168.6.3
PC-PT PC2 192.168.2.9
PC-PT PC1
2960-24TT Switch0
2960-24TT Switch1
Router-PT Router0
Router-PT Router4
Router-PT distribution2
Time: 00:01:58.020
PLAY CONTROLS:
Event List
Realtime
Simulation
Coaxial
Scenario 0
New
Delete
Toggle PDU List Window
Fire Last Status Source Destination Type Color Time(sec) Periodic
Successful PC2 PC3 ICMP 0.000 N

Experminent-15

- **Placing ACLs**
  - **Necessary Equipment's**
    1. 3 Router's and 5 Switch's
    2. 1 Cluster (made by 2 Routers)
    3. 9 PC's and 4 Server's
    4. Connecting Wires (Copper Straight-Through , Copper Cross-Over and Serial DTE)

    The Effect of ACL:

    1. Internet Host should be able to ping any device in the network, except HR1 or HR server.
    2. Internet Host should be able to access Web server (192.168.0.3) using the browser.
    3. Internet Host should not be able to access either the HR server (192.168.40.1) or Sales server (192.168.10.2) using the browser.
    4. HR2 should be able to access HR server (192.168.40.1) using ping or the browser.
    5. RandD2 should not be able to access HR server (192.168.40.1) using ping or the browser.

Steps for Placing ACLs

1. Network Setup

1. **Assemble the Equipment**: Ensure you have the necessary routers, switches, PCs, servers, and connecting wires.
2. **Connect Devices**: Use the appropriate cables:
   - Copper Straight-Through for PC to Switch and Router to Switch.
   - Copper Cross-Over for Switch to Switch and Router to Router.
   - Serial DTE for Router connections where required.
3. **Assign IP Addresses**: Configure IP addresses on routers, switches, and end devices.
4. **Enable Routing**: Set up dynamic or static routing as per network topology.
5. **Verify Connectivity**: Ensure all devices can communicate before applying ACLs.

2. Configuring Access Control Lists (ACLs)

Step 1: Permit Internet Host to Ping All Devices Except HR1 and HR Server

1. Apply an ACL on the inbound interface of the router connecting to the internet.
2. Permit ICMP traffic from the Internet Host to all devices except HR1 and HR Server.
3. Deny ICMP traffic from the Internet Host to HR1 (192.168.40.X) and HR Server (192.168.40.1).
4. Implicitly allow all other ICMP traffic.

Step 2: Allow Internet Host to Access Web Server (192.168.0.3) via HTTP

1. Apply an ACL to permit TCP traffic from the Internet Host to 192.168.0.3 on port 80 (HTTP).
2. Ensure other required traffic is allowed while restricting unauthorized access.

Step 3: Block Internet Host from Accessing HR Server (192.168.40.1) and Sales Server (192.168.10.2) via HTTP

1. Apply an ACL to explicitly deny TCP traffic on port 80 from the Internet Host to 192.168.40.1 and 192.168.10.2.
2. Permit other necessary traffic.

Step 4: Allow HR2 to Access HR Server (192.168.40.1) via Ping and HTTP

1. Apply an ACL on the HR subnet router interface to permit ICMP and HTTP traffic from HR2 to 192.168.40.1.

Step 5: Deny RandD2 Access to HR Server (192.168.40.1) via Ping and HTTP

1. Apply an ACL to explicitly deny ICMP and HTTP traffic from RandD2 to HR Server (192.168.40.1).
2. Ensure necessary routing is still functional.

3. Apply and Verify ACLs

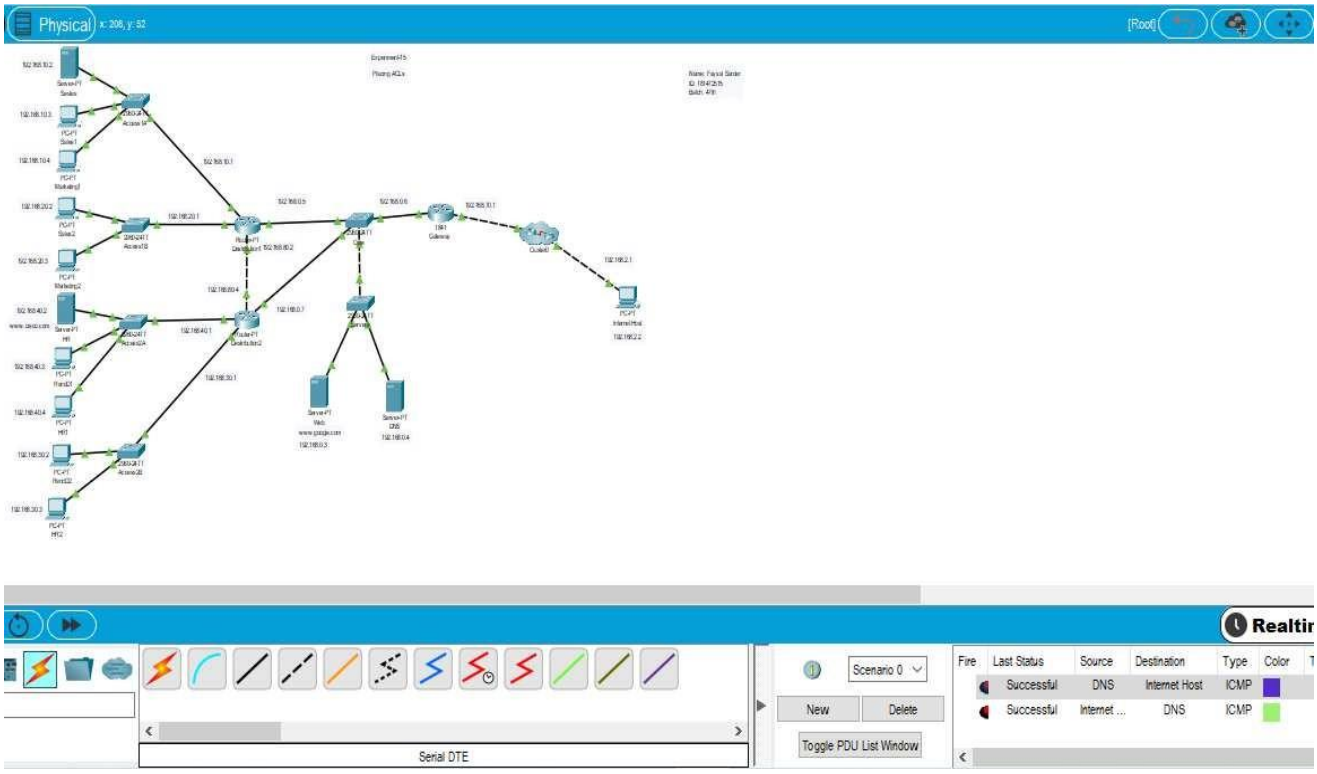
1. **Apply ACLs to the Correct Interfaces**:
    - ACLs should be applied inbound/outbound based on the network topology.
2. **Verify ACLs**:
    - Use show access-lists to check configured ACLs.
    - Use show ip interface to verify applied ACLs.
3. **Test Connectivity**:
    - Perform pings from the Internet Host and HR2 to check access.
    - Use a web browser to confirm HTTP access restrictions.

4. Maintain and Update ACLs

1. **Monitor Logs**: Regularly check logs to ensure proper access control.
2. **Modify ACLs if Required**: Update ACLs as per network changes or security policies.
3. **Document Changes**: Keep a record of modifications for future reference.

This structured approach ensures that the ACLs are applied efficiently while meeting security requirements.

Topology Diagram:



- Internet Host should be able to access Web server (192.168.0.3) using the browser that is showing in below