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

Objective:

- To introduce students to network simulation using Cisco Packet Tracer.
- To set up a basic peer-to-peer (P2P) communication network between two devices.
- To explore different types of network cables and their color coding.
- To save network configurations in a GitHub repository for documentation.

Requirements:

- **Cisco Packet Tracer** software installed on your computer.
- A **GitHub account** with a repository for network labs.
- Access to a platform like **Google Classroom** for submission.

Instructions:

Part 1: Getting Started with Cisco Packet Tracer

1. Download Cisco Packet Tracer:

- If you haven't already installed Cisco Packet Tracer, download the latest version from the official Cisco Networking Academy website.

2. Explore the User Interface:

- Open Packet Tracer and explore its various tools, including routers, switches, and endpoints.
- Familiarize yourself with basic functionalities like adding devices, connecting them, and simulating network activities.

Part 2: Setting Up Peer-to-Peer Communication

1. Create a New Network:

- Open a new workspace in Packet Tracer to begin the network design.

2. Add Devices:

- Add **two PCs** to the workspace. These will simulate the peer-to-peer communication.

3. Connecting the PCs:

- Use a **copper straight-through cable** to connect the **FastEthernet0** port of **PC0** to the **FastEthernet0** port of **PC1**.

4. Configuring IP Addresses:

- Assign the following static IP addresses:
  - **PC0**:
    - IP Address: **192.168.1.1**
    - Subnet Mask: **255.255.255.0**
  - **PC1**:
    - IP Address: **192.168.1.2**
    - Subnet Mask: **255.255.255**

5. Testing Connectivity:

- Open the **Command Prompt** on **PC0** and execute the following ping command:
  ping 192.168.1.2
- Ensure a successful ping response from **PC1**.
- Take a screenshot of the successful ping result for documentation.

Part 3: Study of Network Cables and Color Codes

1. Explore Cable Types:

- Familiarize yourself with the types of network cables available in Packet Tracer, such as:
  - **Copper Straight-Through**: For connecting different devices (e.g., PC to switch).
  - **Copper Cross-Over**: For connecting similar devices (e.g., PC to PC).

2. Cable Color Coding:

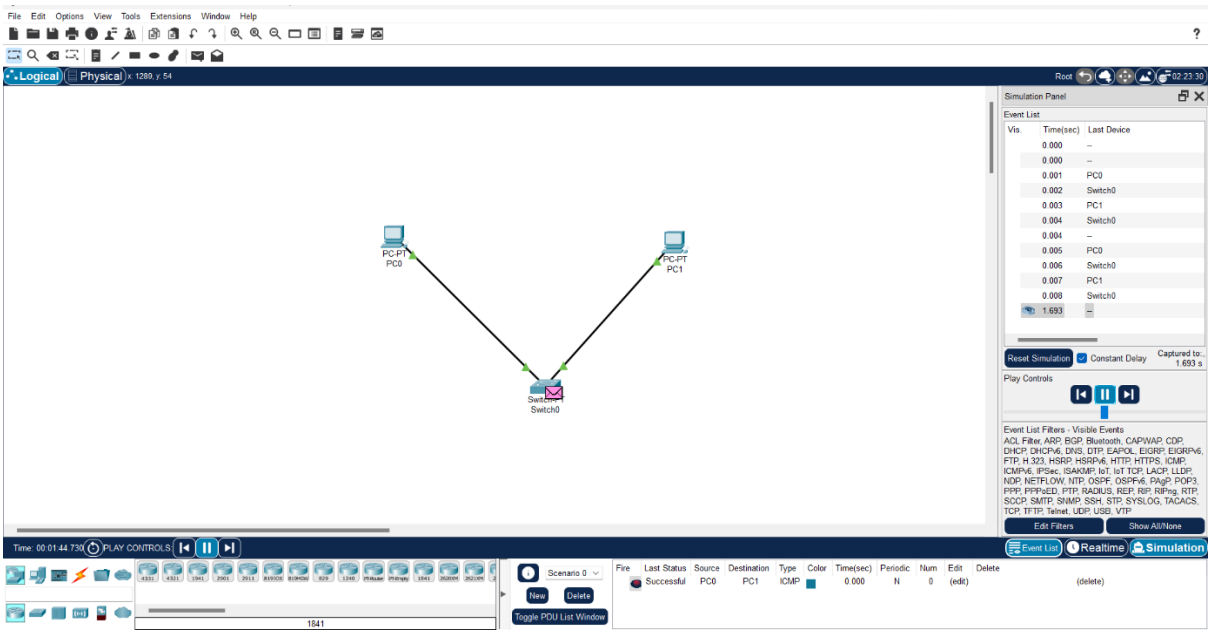
- Research and document the standard color codes used in Ethernet cables:

        - **T568A**: Green-White, Green, Orange-White, Blue, Blue-White, Orange, Brown-White, Brown.
        - **T568B**: Orange-White, Orange, Green-White, Blue, Blue-White, Green, Brown-White, Brown.
    - Create a summary of your findings.

Part 4: Documentation and Submission

1. **Document Your Observations:**
    - Write down your observations from the simulation, including the success of the ping test, and insights gained from exploring different cables and their color coding.
2. **Save Configuration:**
    - Save your Packet Tracer project (.pkt file) and ensure it contains all configurations for the network setup.
3. **Upload to GitHub:**
    - Create a new repository in your GitHub account.
    - Upload the .pkt file along with the screenshots and the documentation in a structured folder.
4. **Submission:**
    - Share the link to your GitHub repository in **Google Classroom** for submission.
    - Ensure your submission is well-organized with clear labels and descriptions.

Results:



Study of Network Cables and Color Codes

Types of Network Cables in Computer Networking

1. Copper-Based Network Cables

a. Straight-Through Cable

- Function: Primarily used to connect different types of network devices, such as connecting a computer to a switch or a router to a switch.
- Wiring Structure: The same wiring pattern is used on both ends, with each corresponding pin (Pin 1 to Pin 1, Pin 2 to Pin 2, etc.).
- Common Application: This cable is ideal for linking a computer to networking devices like hubs, switches, or routers.

b. Crossover Cable

- Function: Designed for direct connections between similar devices, such as two computers or two switches, without needing an intermediary device like a hub or switch.
- Wiring Structure: The wiring is crossed; for instance, Pin 1 on one end connects to Pin 3 on the other, and Pin 2 connects to Pin 6.
- Common Application: Often used for direct PC-to-PC connections or for connecting switches directly to each other.

c. Shielded Twisted Pair (STP) Cable

- Function: Provides additional protection against electromagnetic interference (EMI) and prevents crosstalk between adjacent cables.

- Wiring Structure: Similar to unshielded twisted pair (UTP) cables but includes a shielding layer around the pairs of wires.
- Common Application: Used in industrial environments or locations with a high level of EMI, such as near heavy machinery or areas with many electronic devices.

d. Unshielded Twisted Pair (UTP) Cable

- Function: The most commonly used type of copper cabling in networking, featuring no additional shielding.
- Wiring Structure: Composed of pairs of wires twisted together to reduce interference.
- Common Application: Used for general networking purposes, including both straight-through and crossover cable setups. UTP cables are typically found in office or home networks.

Standard Ethernet Cable Color Codes

Ethernet cables follow two primary wiring standards for pin assignments, known as T568A and T568B. These standards dictate the order of the colored wires inside the cable.

- **T568A Standard:**
  - Pin 1: White/Green
  - Pin 2: Green
  - Pin 3: White/Orange
  - Pin 4: Blue
  - Pin 5: White/Blue
  - Pin 6: Orange
  - Pin 7: White/Brown
  - Pin 8: Brown

- **T568B Standard:**
  - Pin 1: White/Orange
  - Pin 2: Orange
  - Pin 3: White/Green
  - Pin 4: Blue
  - Pin 5: White/Blue
  - Pin 6: Green
  - Pin 7: White/Brown
  - Pin 8: Brown

Both standards are used widely, but T568B tends to be more common in modern commercial installatio

LAB 2: Implementation of Network Topologies

Objective:

- To explore and implement different network topologies using Cisco Packet Tracer.
- To learn how to use various types of network cables and connect devices appropriately.
- To configure IP addresses for devices in each topology and verify their connectivity.
- To document the network setups and store the Packet Tracer files for future reference.

Requirements:

- Cisco Packet Tracer software installed.
- A GitHub account with a dedicated repository for storing network configurations.
- Access to Google Classroom or any other platform for assignment submission.

Procedure:

Step 1: Launch Cisco Packet Tracer

- Open the Software: Start Cisco Packet Tracer on your computer and create a new workspace for the network setups.

Step 2: Set Up a Bus Topology

1. Add Devices:
   - Drag three computers onto the workspace.

2. Create Connections:
   - Use a Coaxial Cable to connect all the computers to a single backbone cable, simulating a bus topology.

3. Assign IP Addresses:
   - Assign unique IP addresses to each computer. For example:
     - Computer 1: 192.168.1.1 / 255.255.255.0
     - Computer 2: 192.168.1.2 / 255.255.255.0
     - Computer 3: 192.168.1.3 / 255.255.255.0

4. Test Connectivity:
   - Use the command prompt to ping each computer and verify communication within the network.

Step 3: Set Up a Star Topology

1. Add Devices:
   - Drag three computers and one switch onto the workspace.
2. Create Connections:
   - Connect each computer to the switch using straight-through Ethernet cables to form a star topology.

3. Assign IP Addresses:
   - Assign IPs to each computer:
     - Computer 1: 192.168.2.1 / 255.255.255.0
     - Computer 2: 192.168.2.2 / 255.255.255.0
     - Computer 3: 192.168.2.3 / 255.255.255.0

4. Test Connectivity:
   - Use the `ping` command to verify communication between all computers through the switch.

Step 4: Set Up a Ring Topology

1. Add Devices:
   - Drag three computers onto the workspace.

2. Create Connections:
   - Connect the computers in a circular arrangement using crossover cables, creating a ring topology.

3. Assign IP Addresses:
   - Assign IPs:
     - Computer 1: 192.168.3.1 / 255.255.255.0
     - Computer 2: 192.168.3.2 / 255.255.255.0
     - Computer 3: 192.168.3.3 / 255.255.255.0

4. Test Connectivity:
   - Verify communication by using the `ping` command between all computers.

Step 5: Set Up a Mesh Topology

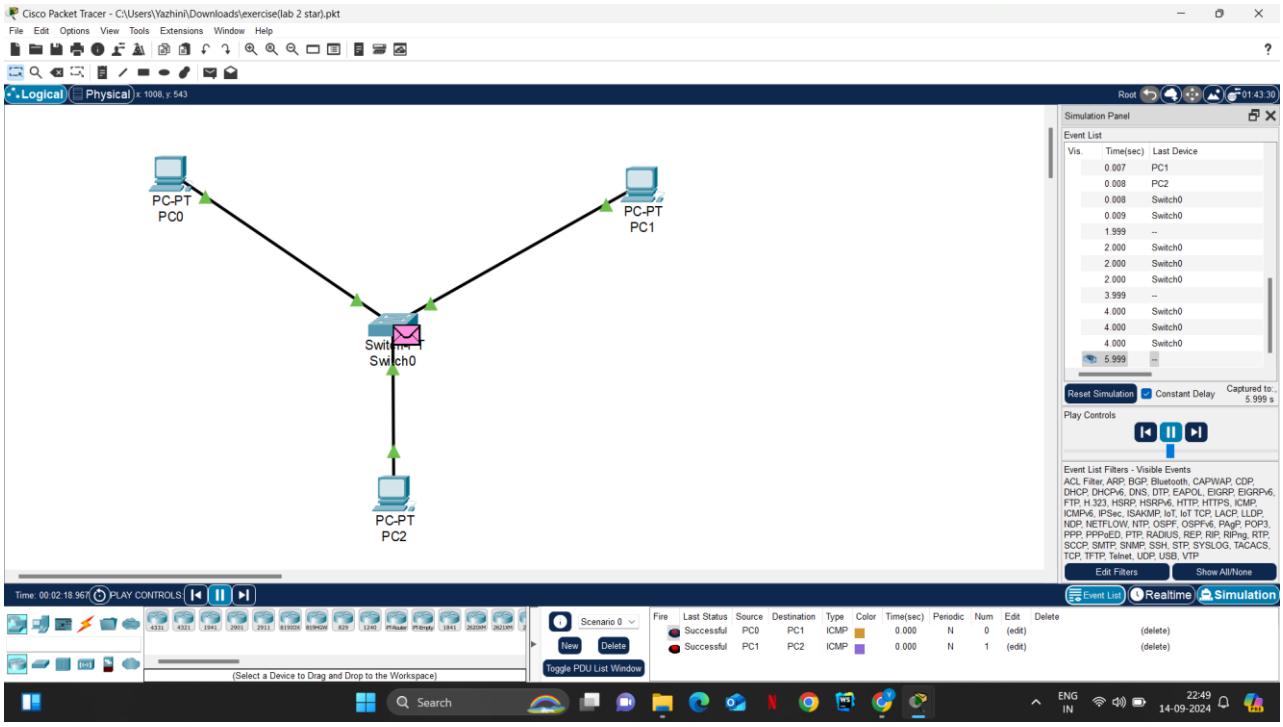
1. Add Devices:
   - Drag three computers onto the workspace.

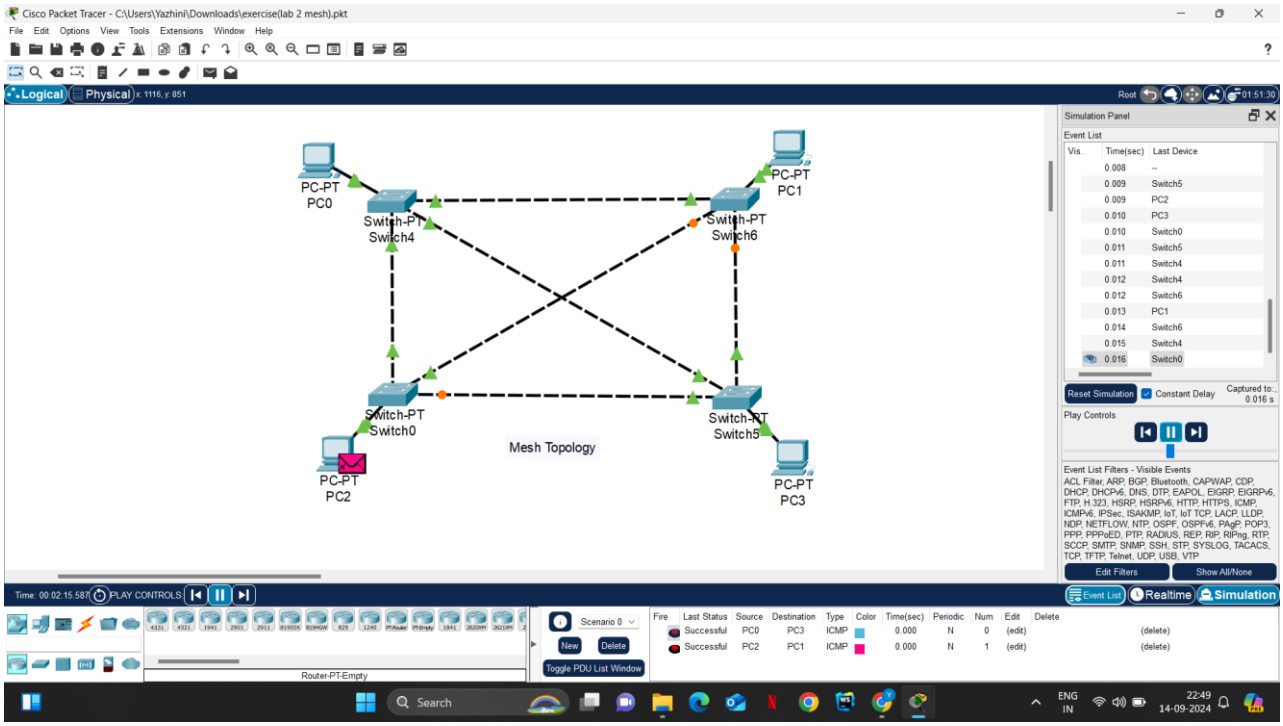
2. Create Connections:
   - Connect each computer to every other computer using crossover cables, forming a mesh topology.

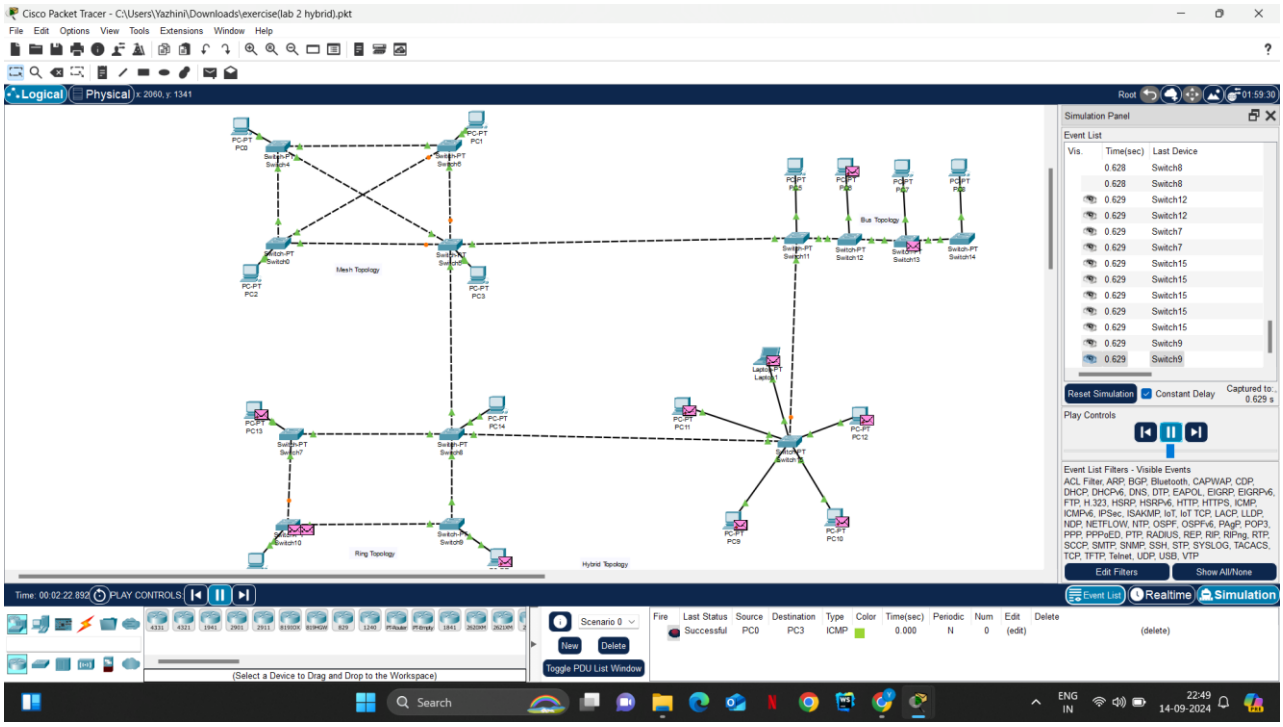
3. Assign IP Addresses:
   - Assign IPs:
     - Computer 1: 192.168.4.1 / 255.255.255.0
     - Computer 2: 192.168.4.2 / 255.255.255.0
     - Computer 3: 192.168.4.3 / 255.255.255.0

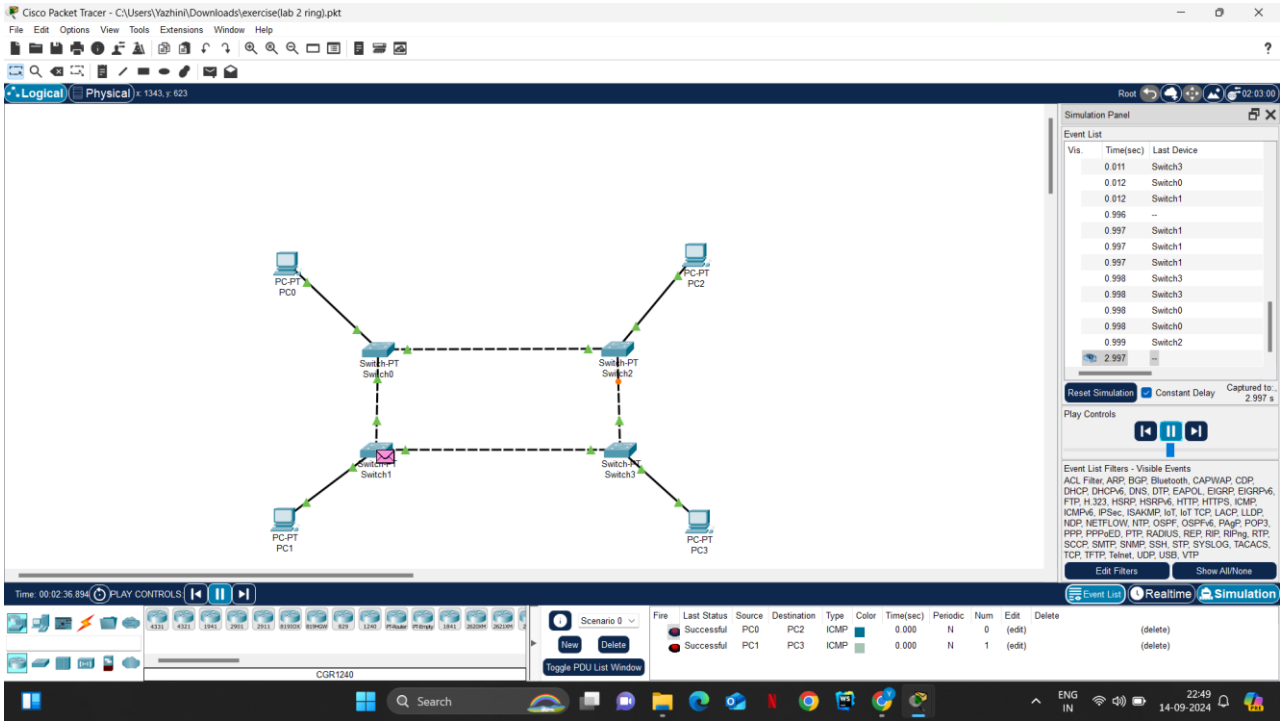
4. Test Connectivity:
   - Use the `ping` command to check connectivity between all computers in the mesh.

Results:




Cisco Packet Tracer - C:\Users\Yazhini\Downloads\exercise(lab 2 mesh).pkt
File Edit Options View Tools Extensions Window Help
Logical Physical
PC-PT PC0
PC-PT PC1
Switch-PT Switch4
Switch-PT Switch6
Switch-PT Switch0
Switch-PT Switch5
PC-PT PC2
PC-PT PC3
Mesh Topology
Simulation Panel
Event List
Vis. Time(sec) Last Device
0.008 --
0.009 Switch5
0.009 PC2
0.010 PC3
0.010 Switch0
0.011 Switch5
0.011 Switch4
0.012 Switch4
0.012 Switch6
0.013 PC1
0.014 Switch6
0.015 Switch4
0.016 Switch0
Reset Simulation
Constant Delay
Captured to: 0.016 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
Time: 00:02:15.587
PLAY CONTROLS:
Event List
Realtime
Simulation
Scenario 0
New
Delete
Toggle PDU List Window
Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit Delete
Successful PC0 PC3 ICMP 0.000 N 0 (edit) (delete)
Successful PC2 PC1 ICMP 0.000 N 1 (edit) (delete)
Router-PT-Empty
Search
ENG IN
22:49 14-09-2024


Cisco Packet Tracer - C:\Users\Yazhini\Downloads\exercise(lab 2 hybrid).pkt
File Edit Options View Tools Extensions Window Help
Logical Physical
Mesh Topology
Bus Topology
Ring Topology
Hybrid Topology
Simulation Panel
Event List
Vis. Time(sec) Last Device
0.628 Switch8
0.628 Switch8
0.629 Switch12
0.629 Switch12
0.629 Switch7
0.629 Switch7
0.629 Switch15
0.629 Switch15
0.629 Switch15
0.629 Switch15
0.629 Switch15
0.629 Switch9
0.629 Switch9
Reset Simulation
Constant Delay
Captured to: 0.629 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
Time: 00:02:22.892
PLAY CONTROLS:
Event List
Realtime
Simulation
Scenario 0
New
Delete
Toggle PDU List Window
Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit Delete
Successful PC0 PC3 ICMP 0.000 N 0 (edit) (delete)
(Select a Device to Drag and Drop to the Workspace)
Search
ENG IN
22:49 14-09-2024


Cisco Packet Tracer - C:\Users\Yazhini\Downloads\exercise(lab 2 ring).pkt
File Edit Options View Tools Extensions Window Help
Logical Physical x: 1343, y: 623
Root 02:03:00
PC-PT PC0
PC-PT PC2
Switch-PT Switch0
Switch-PT Switch2
Switch-PT Switch1
Switch-PT Switch3
PC-PT PC1
PC-PT PC3
Simulation Panel
Event List
Vis. Time(sec) Last Device
0.011 Switch3
0.012 Switch0
0.012 Switch1
0.996 --
0.997 Switch1
0.997 Switch1
0.997 Switch1
0.998 Switch3
0.998 Switch3
0.998 Switch0
0.998 Switch0
0.999 Switch2
2.997 --
Reset Simulation
Constant Delay
Captured to: 2.997 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
Time: 00:02:36.894
PLAY CONTROLS
Event List
Realtime
Simulation
Scenario 0
New
Delete
Toggle PDU List Window
Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit Delete
Successful PC0 PC2 ICMP 0.000 N 0 (edit) (delete)
Successful PC1 PC3 ICMP 0.000 N 1 (edit) (delete)
CGR1240
Search
ENG IN
22:49 14-09-2024

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

Objective:

- To configure a router and PCs using Cisco Packet Tracer.
- To establish network connectivity between two PCs via a router.
- To assign appropriate IP addresses and configure router interfaces for communication.
- To simulate data transfer between the two PCs and verify the connectivity in Cisco Packet Tracer.

Requirements:

- Cisco Packet Tracer software.
- A GitHub repository for storing network configuration files.
- Access to Google Classroom (or another platform) for assignment submission.

Procedure:

Step 1: Configuring Router1

1. Open the Router CLI:
   - Click on Router1 in Packet Tracer and open the CLI (Command Line Interface).
   - Press ENTER to begin the configuration process.

2. Activate Privileged Mode:
   - Type `enable` to enter privileged EXEC mode.

3. Access Global Configuration Mode:
   - Type `config t` to enter global configuration mode (configure terminal).

4. Configure Router1 Interfaces:
   - Configure the two FastEthernet interfaces with IP addresses to connect the PCs.

   - For FastEthernet0/0:
     - Type `interface FastEthernet0/0`
     - Assign the IP address:
       `ip address 192.168.10.1 255.255.255.0`
     - Enable the interface:
       `no shutdown`

- For FastEthernet0/1:
  - Type `interface FastEthernet0/1`
  - Assign the IP address:
    `ip address 192.168.20.1 255.255.255.0`
  - Enable the interface:
    `no shutdown`

5. Exit Configuration Mode:
   - Type `exit` to return to privileged mode after configuring the interfaces.

Step 2: Configuring PCs

1. PC0 Configuration:
   - Click on PC0 and go to the Desktop tab.
   - Open the IP Configuration tool and assign the following settings:
     - IP Address: 192.168.10.2
     - Subnet Mask: 255.255.255.0
     - Default Gateway: 192.168.10.1

2. PC1 Configuration:
   - Click on PC1 and go to the Desktop tab.
   - Open the IP Configuration tool and assign the following settings:
     - IP Address: 192.168.20.2
     - Subnet Mask: 255.255.255.0
     - Default Gateway: 192.168.20.1

Step 3: Connecting PCs with the Router

1. Connect PC0 to Router1:
   - Use a copper straight-through cable to connect the FastEthernet0 port of PC0 to the FastEthernet0/0 port of Router1.

2. Connect PC1 to Router1:
   - Use a copper straight-through cable to connect the FastEthernet0 port of PC1 to the FastEthernet0/1 port of Router1.

Step 4: Verifying Connectivity

1. Testing the Network:
   - Open the Command Prompt on PC0 and type `ping 192.168.20.2` to test communication between PC0 and PC1 through the router.

- Similarly, open the Command Prompt on PC1 and ping `192.168.10.2` to ensure connectivity back to PC0.

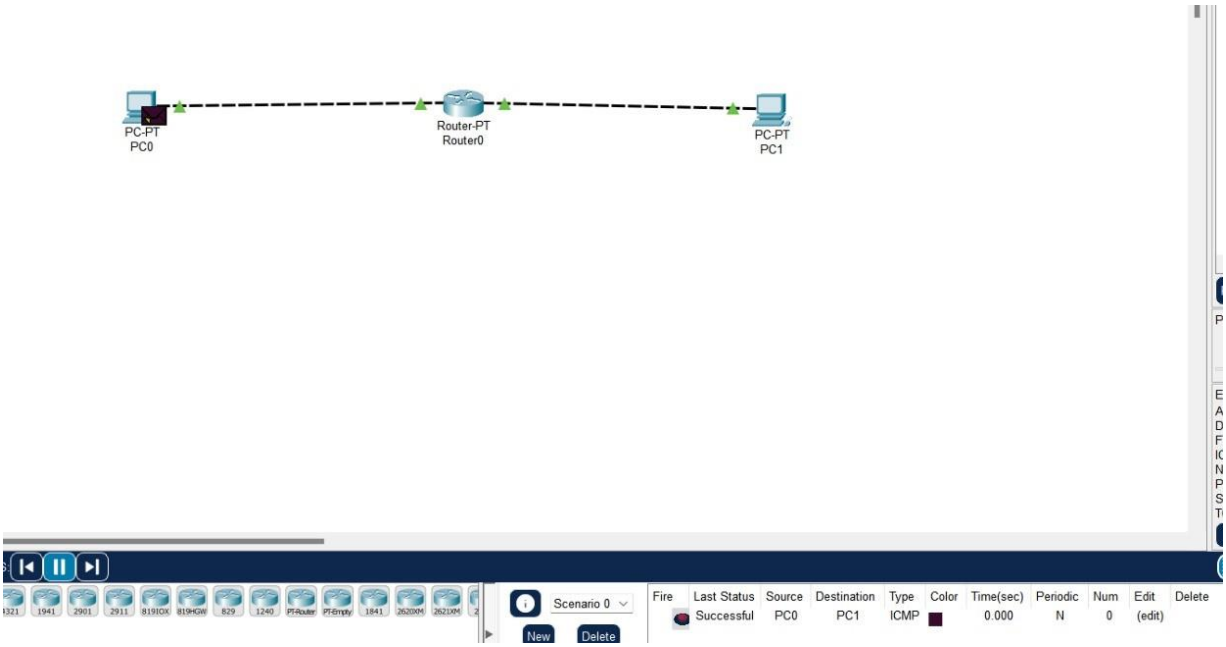
Step 5: Simulating Data Transfer in Packet Tracer

1. Enable Simulation Mode:
   - Switch to Simulation Mode in Packet Tracer to visualize the packet flow.

2. Send a PDU (Protocol Data Unit):
   - From PC0, send a PDU to PC1 by selecting the appropriate tools in simulation mode.
   - Observe the packet traveling from PC0 to Router1 and then to PC1.

3. Analyze Results:
   - Track the packet as it traverses through the router to ensure that communication between PC0 and PC1 is properly established.

Results:



LAB 4: Addressing and Subnetting (VLSM) with Cisco Packet Trace

Objective:

- To configure a network using Variable Length Subnet Masking (VLSM) for optimal IP address utilization.
- To design subnets of varying sizes based on network requirements.
- To configure routers and PCs with appropriate IP addresses and subnet masks.
- To simulate and verify connectivity across the network using Cisco Packet Tracer.

Requirements:

- Cisco Packet Tracer software.
- GitHub repository for storing lab files and configurations.
- Access to Google Classroom (or similar platform) for submission.

Procedure:

Network Design and Subnetting:

1. **Design the Network Topology:**
    - Identify the number of devices and the IP address requirements for each subnet.
    - Use VLSM to efficiently allocate IP addresses based on the number of hosts needed in each subnet.

Step 1: Subnetting the Network

1. **Identify the Major Network Address**:
    - Example: **192.168.0.0/24**

2. **Determine Subnet Requirements**:
    - **Subnet 1** (e.g., for 50 hosts):
        - **Network Address**: 192.168.0.0/26
        - **Subnet Mask**: 255.255.255.192
        - **IP Range**: 192.168.0.1 – 192.168.0.62
    - **Subnet 2** (e.g., for 30 hosts):
        - **Network Address**: 192.168.0.64/27
        - **Subnet Mask**: 255.255.255.224
        - **IP Range**: 192.168.0.65 – 192.168.0.94
    - **Subnet 3** (e.g., for 10 hosts):

        - **Network Address**: 192.168.0.96/28
        - **Subnet Mask**: 255.255.255.240
        - **IP Range**: 192.168.0.97 – 192.168.0.110
    - **Subnet 4** (e.g., for 5 hosts):
        - **Network Address**: 192.168.0.112/29
        - **Subnet Mask**: 255.255.255.248
        - **IP Range**: 192.168.0.113 – 192.168.0.118

Step 2: Configuring Router1

1. **Access Router1 CLI**:
    - Click on **Router1** in Packet Tracer and open the **CLI**.
    - Press **ENTER** to start configuration.
2. **Activate Privileged Mode**:
    - Type enable to enter privileged EXEC mode.
3. **Enter Global Configuration Mode**:
    - Type config t (configure terminal) to access global configuration.
4. **Configure the Router1 Interfaces**:
    - **For FastEthernet0/0** (connected to PC0 in Subnet 1):
        - Type interface FastEthernet0/0
        - Assign the IP address:

ip address 192.168.0.1 255.255.255.192

        - Enable the interface:

no shutdown

    - **For Serial0/0/0** (connected to Router2):
        - Type interface Serial0/0/0
        - Assign the IP address:

ip address 192.168.1.1 255.255.255.252

        - Enable the interface:

no shutdown

5. **Exit Configuration Mode**:
    - Type exit to return to privileged mode after configuring the interfaces.

Step 3: Configuring Router2

1. **Access Router2 CLI**:
    - Click on **Router2** in Packet Tracer and open the **CLI**.
    - Press **ENTER** to start configuration.
2. **Activate Privileged Mode**:
    - Type enable to enter privileged EXEC mode.
3. **Enter Global Configuration Mode**:
    - Type config t (configure terminal) to access global configuration.
4. **Configure the Router2 Interfaces**:
    - **For FastEthernet0/0** (connected to PC1 in Subnet 2):
        - Type interface FastEthernet0/0
        - Assign the IP address:

ip address 192.168.0.65 255.255.255.224

        - Enable the interface:

no shutdown

    - **For Serial0/0/0** (connected to Router1):
        - Type interface Serial0/0/0
        - Assign the IP address:

ip address 192.168.1.2 255.255.255.252

        - Enable the interface:

no shutdown

5. **Exit Configuration Mode**:
    - Type exit to return to privileged mode after configuring the interfaces.

Step 4: Configuring PCs

1. **PC0 Configuration** (in Subnet 1):
    - Go to **PC0**, open the **Desktop** tab, and select **IP Configuration**.
    - Assign the following:
        - **IP Address**: 192.168.0.2
        - **Subnet Mask**: 255.255.255.192
        - **Default Gateway**: 192.168.0.1

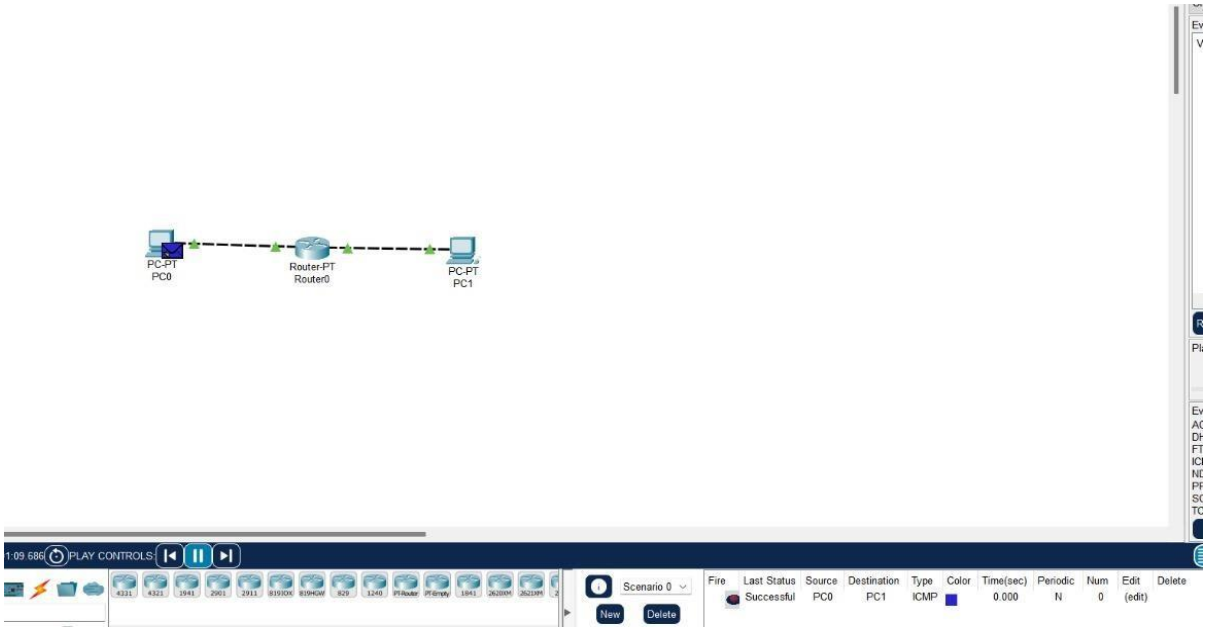
2. **PC1 Configuration** (in Subnet 2):

- Go to **PC1**, open the **Desktop** tab, and select **IP Configuration**.
- Assign the following:
  - **IP Address**: 192.168.0.66
  - **Subnet Mask**: 255.255.255.224
  - **Default Gateway**: 192.168.0.65

Step 5: Connecting PCs with Router

1. Connect the devices using copper straight-through cables:
   - Connect FastEthernet0 port of PC0 to FastEthernet0/0 port of Router1
   - Connect FastEthernet0 port of PC1 to FastEthernet0/1 port of Router1

Result :



LAB 5: Static and Default Routing

Objective:

- To configure static and default routing on routers using **Cisco Packet Tracer**.
- To establish communication between different network segments through appropriate routing configurations.
- To test and verify successful data transfer and connectivity between PCs in different subnets using the configured routes.

Requirements:

- **Cisco Packet Tracer** software.
- **GitHub** account and a repository for lab assignments.
- Access to **Google Classroom** for submission

Procedure:

Network Design:

- **Router1** connected to **Router2**.
- **PC0** connected to **Router1**.
- **PC1** connected to **Router2**.

Step 1: Configure Network Addresses

1. **Determine the IP Address Scheme**:
    - **Router1 to Router2 link**: 192.168.1.0/30
    - **PC0 Network**: 192.168.10.0/24
    - **PC1 Network**: 192.168.20.0/24

Step 2: Configuring Router1

1. Select Router1 and open CLI.
2. Press **ENTER** to start configuring **Router1**.
3. **Activate privileged mode**:
    - Type: enable
4. **Access the configuration menu**:
    - Type: config t (configure terminal)
5. **Configure the interfaces of Router1**:
    - **FastEthernet0/0 (connected to PC0)**:
        - Type: interface FastEthernet0/0
        - Configure with the IP address: 192.168.10.1 and Subnet mask 255.255.255.0
    - **Serial0/0/0 (connected to Router2)**:
        - Type: interface Serial0/0/0
        - Configure with the IP address: 192.168.1.1 and Subnet mask 255.255.255.252
6. **Activate interfaces**:
    - Type: no shutdown

Step 3: Configuring Router2

1. Select Router2 and open CLI.
2. Press **ENTER** to start configuring **Router2**.
3. **Activate privileged mode**:

- Type: enable

4. **Access the configuration menu**:
   - Type: config t (configure terminal)
5. **Configure the interfaces of Router2**:
   - **FastEthernet0/0 (connected to PC1)**:
     - Type: interface FastEthernet0/0
     - Configure with the IP address: 192.168.20.1 and Subnet mask 255.255.255.0
   - **Serial0/0/0 (connected to Router1)**:
     - Type: interface Serial0/0/0
     - Configure with the IP address: 192.168.1.2 and Subnet mask 255.255.255.252
6. **Activate interfaces**:
   - Type: no shutdown

Step 4: Configuring PCs

1. **Assign IP Addresses to Each PC**:
   - **PC0**:
     - Go to the **desktop**, select **IP Configuration**, and assign the following:
       - **IP address**: 192.168.10.2
       - **Subnet Mask**: 255.255.255.0
       - **Default Gateway**: 192.168.10.1
   - **PC1**:
     - Go to the **desktop**, select **IP Configuration**, and assign the following:
       - **IP address**: 192.168.20.2
       - **Subnet Mask**: 255.255.255.0
       - **Default Gateway**: 192.168.20.1

Step 5: Static Routing Configuration

1. **Configure static routes on Router1**:
   - Access **Router1 CLI** and type the following command to add a route to **PC1's network**:
     - ip route 192.168.20.0 255.255.255.0 192.168.1.2
2. **Configure static routes on Router2**:
   - Access **Router2 CLI** and type the following command to add a route to **PC0's network**:
     - ip route 192.168.10.0 255.255.255.0 192.168.1.1

Step 6: Default Routing Configuration

1. **Configure default route on Router1** (if **Router1** needs to send packets to networks outside of the configured subnets):
    - ip route 0.0.0.0 0.0.0.0 192.168.1.2
2. **Configure default route on Router2** (if **Router2** needs to send packets to unknown networks):
    - ip route 0.0.0.0 0.0.0.0 192.168.1.1

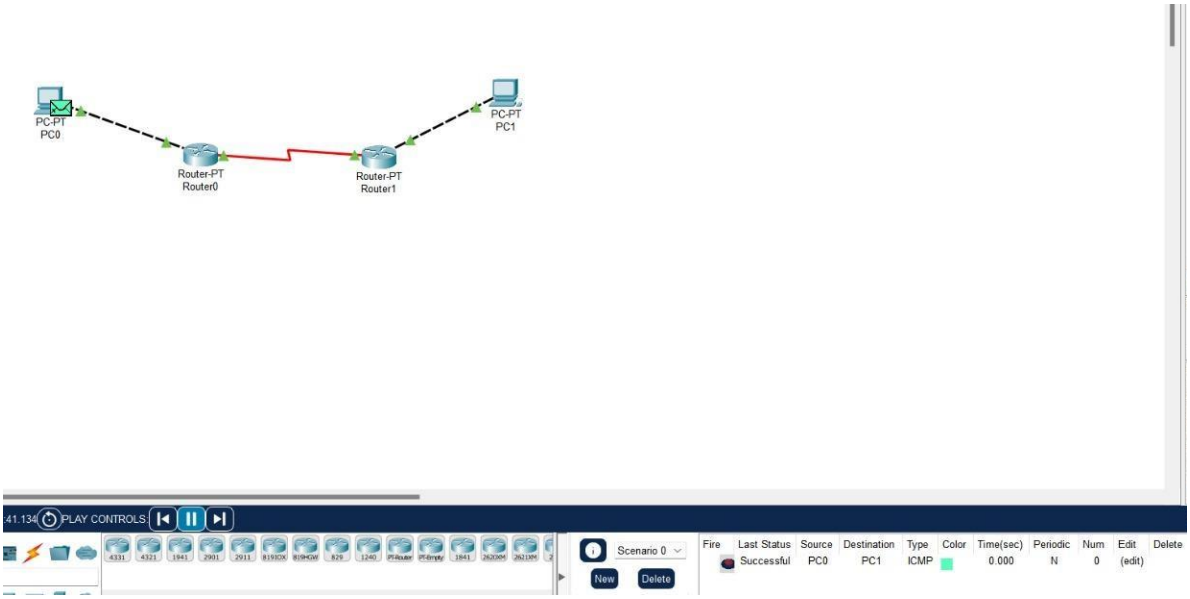
Step 7: Verifying Connectivity

1. **Test Connectivity by Pinging from PC0 to PC1**:
    - On **PC0**, open the **Command Prompt** and type: ping 192.168.20.2
    - Observe the response to confirm that **PC0** can reach **PC1** through the routers.
2. **Test Connectivity by Pinging from PC1 to PC0**:
    - On **PC1**, open the **Command Prompt** and type: ping 192.168.10.2
    - Observe the response to confirm that **PC1** can reach **PC0**.

Simulation of Designed Network Topology

1. **Sending a PDU from PC0 to PC1**:
    - Open the **simulation mode** in **Packet Tracer**.
    - Send a **PDU** from **PC0** to **PC1** and observe the packet as it travels:
        - From **PC0** to **Router1**,
        - Then through the **serial link** to **Router2**,
        - And finally to **PC1**.
2. **Acknowledgment from PC1 to PC0**:
    - Observe the acknowledgment packet that travels back:
        - From **PC1** to **Router2**,
        - Then back through the serial link to **Router1**,
        - And finally to **PC0**, confirming successful two-way communication

Results:


PC-PT
PC0
Router-PT
Router0
Router-PT
Router1
PC-PT
PC1
PLAY CONTROLS
Scenario 0
New
Delete
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
Periodic
Num
Edit
Delete
Successful
PC0
PC1
ICMP
0.000
N
0
(edit)

LAB 6: NAT Configuration

Objective:

- To configure **Network Address Translation (NAT)** on a router using **Cisco Packet Tracer**.
- To enable internal network devices with private IP addresses to communicate with external networks using a public IP address.
- To verify successful NAT configuration by testing connectivity between internal PCs and an external network.

Requirements:

- **Cisco Packet Tracer** software.
- **GitHub** account and a repository for lab assignments.
- Access to **Google Classroom** for submission.

Procedure:

Network Design:

- **Router1** connected to the **ISP Router**.
- **PC0** and **PC1** connected to **Router1**.

Step 1: Configure Network Addresses

1.Determine IP Address Scheme:

- Inside network (**LAN**): 192.168.10.0/24

- Outside network (**ISP**): 200.0.0.0/30

Step 2: Configuring Router1

1. Select Router1 and open CLI.
2. Press **ENTER** to start configuring **Router1**.
3. **Activate privileged mode**:
    - Type: enable
4. **Access the configuration menu**:
    - Type: config t (configure terminal)
5. **Configure the interfaces of Router1**:
    - **FastEthernet0/0 (connected to LAN)**:
        - Type: interface FastEthernet0/0
        - Configure with the IP address: 192.168.10.1 and Subnet mask 255.255.255.0
    - **Serial0/0/0 (connected to ISP Router)**:
        - Type: interface Serial0/0/0
        - Configure with the IP address: 200.0.0.1 and Subnet mask 255.255.255.252
6. **Activate interfaces**:
    - Type: no shutdown

Step 3: Configuring ISP Router

1. Select the ISP Router and open CLI.
2. Press **ENTER** to start configuring the **ISP Router**.
3. **Activate privileged mode**:
    - Type: enable
4. **Access the configuration menu**:
    - Type: config t (configure terminal)
5. **Configure the interfaces of the ISP Router**:
    - **Serial0/0/0 (connected to Router1)**:
        - Type: interface Serial0/0/0
        - Configure with the IP address: 200.0.0.2 and Subnet mask 255.255.255.252
6. **Activate interfaces**:
    - Type: no shutdown

Step 4: Configuring PCs

1. **Assign IP addresses to each PC**:
    - **PC0**:

        - Go to the **desktop**, select **IP Configuration**, and assign the following:
            - **IP address**: 192.168.10.2
            - **Subnet Mask**: 255.255.255.0
            - **Default Gateway**: 192.168.10.1
    - **PC1**:
        - Go to the **desktop**, select **IP Configuration**, and assign the following:
            - **IP address**: 192.168.10.3
            - **Subnet Mask**: 255.255.255.0
            - **Default Gateway**: 192.168.10.1

Step 5: Configuring NAT on Router1

1. **Define the inside and outside interfaces**:
    - Access **Router1 CLI** and type the following commands:
        - interface FastEthernet0/0
        - ip nat inside
        - exit
        - interface Serial0/0/0
        - ip nat outside
        - exit
2. **Configure a standard access list to permit the internal network**:
    - access-list 1 permit 192.168.10.0 0.0.0.255
3. **Configure NAT overload (PAT) for the internal network**:
    - ip nat inside source list 1 interface Serial0/0/0 overload

Step 6: Verify NAT Configuration

1. **Test the connectivity by pinging from PC0 to the ISP Router**:
    - Open the **Command Prompt** on **PC0**.
    - Type: ping 200.0.0.2 and observe the response to verify that **PC0** can reach the ISP Router.
2. **Check the NAT translation table on Router1**:
    - On **Router1 CLI**, type: show ip nat translations to see the active NAT entries.

Step 7: Verify External Connectivity

1. **Test external connectivity by pinging a public IP (simulated)**:
    - On **PC0**, open the **Command Prompt** and type: ping 8.8.8.8 (replace with an actual reachable IP in Packet Tracer).
    - On **PC1**, open the **Command Prompt** and type: ping 8.8.8.8.
    - Observe the responses to verify successful external communication via NAT.

Simulation of Designed Network Topology

Sending a PDU from PC0 to an External Network

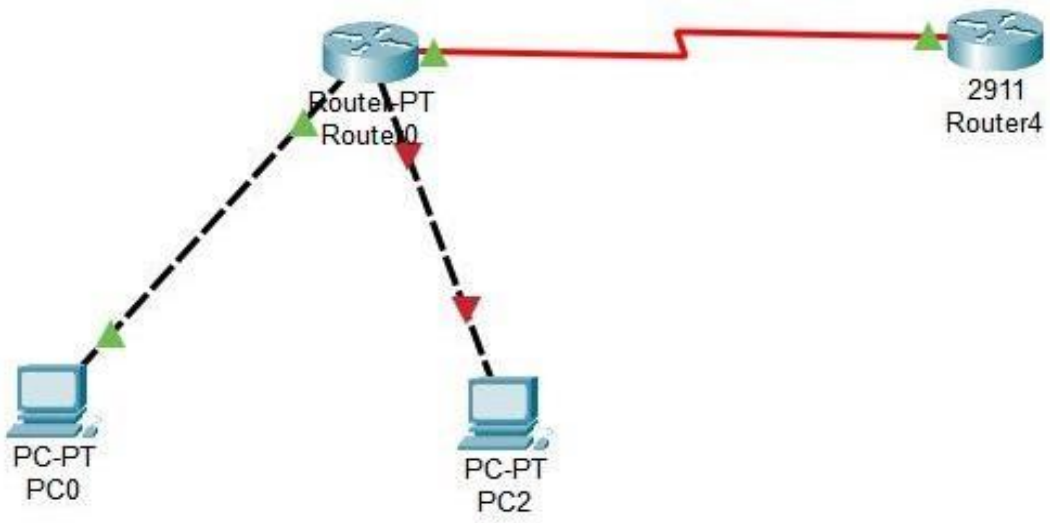
1. Open the **simulation mode** in **Packet Tracer**.
2. **Send a PDU** from **PC0** to a simulated external IP (e.g., 8.8.8.8):
    - Observe the packet traveling:
        - From **PC0** to **Router1**,
        - NAT translation occurring,
        - Then to the **ISP Router** and out to the external network.

Acknowledgment from External Network to PC0

1.Observe the acknowledgment packet:

- Ensure that the acknowledgment packet travels back:
    - From the external network to the **ISP Router**,
    - Through **Router1** and the NAT translation process,
    - Finally back to **PC0**, confirming successful NAT configuration and communication.

Results:



Github Repository link: https://github.com/Yazhu27/Network-Lab-Assignment