COMPUTER NETWORKS LAB 7 TO 15 REPORT

Lab 7: Implementation of RIP Version 1

OBJECTIVE:

The objective of this lab is to implement and configure Routing Information Protocol (RIP) Version 1 in a small network using Cisco Packet Tracer. This involves configuring IP addresses, enabling RIP routing on the routers, advertising the connected networks, and testing network connectivity between devices.

REQUIREMENTS:

- Cisco Packet Tracer software
- Three routers
- Three computers (one connected to each router)
- Ethernet cables to connect computers to routers
- Basic understanding of router configuration and RIP Version 1

INSTRUCTIONS:

1. Open Cisco Packet Tracer:

- Launch the Cisco Packet Tracer software on your computer to begin the network setup.

2. Create the Network Topology:

- Drag three routers onto the workspace.
- Arrange the routers in a linear topology (i.e., connect Router1 to Router2, and Router2 to Router3).
- Connect a computer to each router using Ethernet cables.

3. Configure IP Addresses:

- Access the **CLI** (Command Line Interface) of each router and computer.

- Assign IP addresses to each interface of the routers and the computers. Ensure that the IP addresses are in the same subnet for directly connected devices.

Example IP Scheme:

- Router1 (Interface to Router2): 192.168.1.1
- Router2 (Interface to Router1): 192.168.1.2, (Interface to Router3): 192.168.2.1
- Router3 (Interface to Router2): 192.168.2.2
- PCs connected to routers can be assigned static IPs in their respective router subnets.

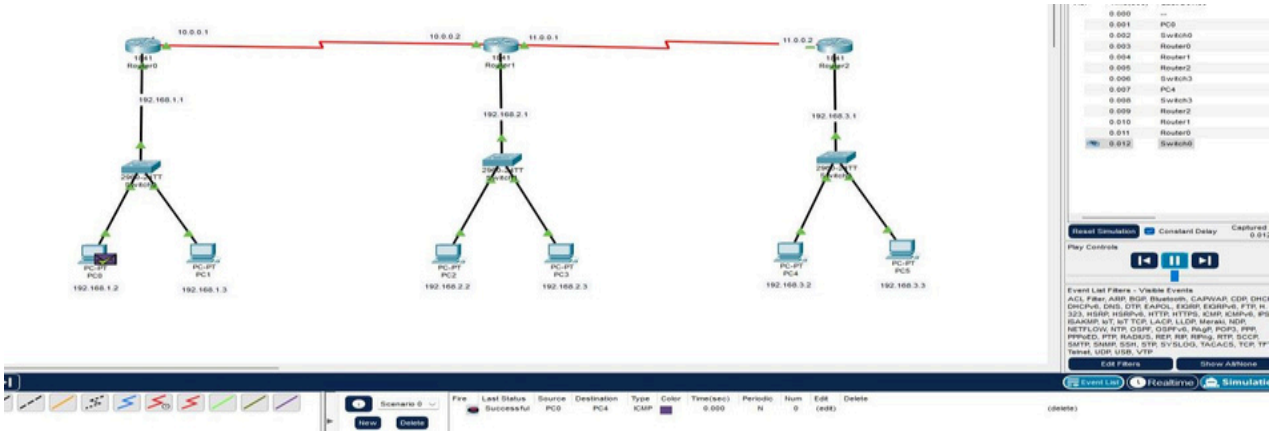
4. Enable RIP Version 1 on the Routers:

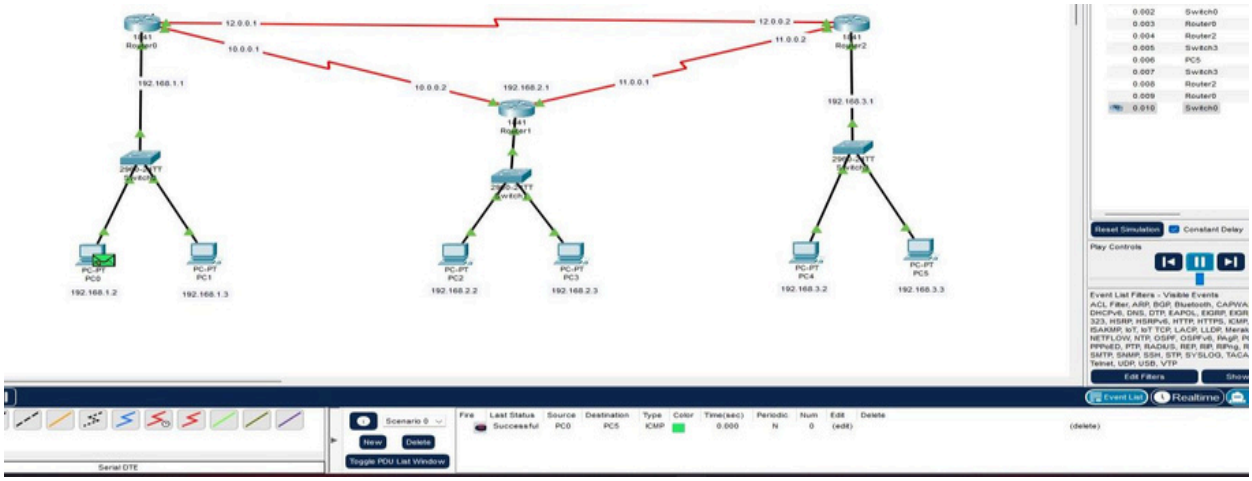
- Access the **CLI** of each router.
- Enter configuration mode using the enable and configure terminal commands.
- Add the appropriate network addresses that are directly connected to each router.

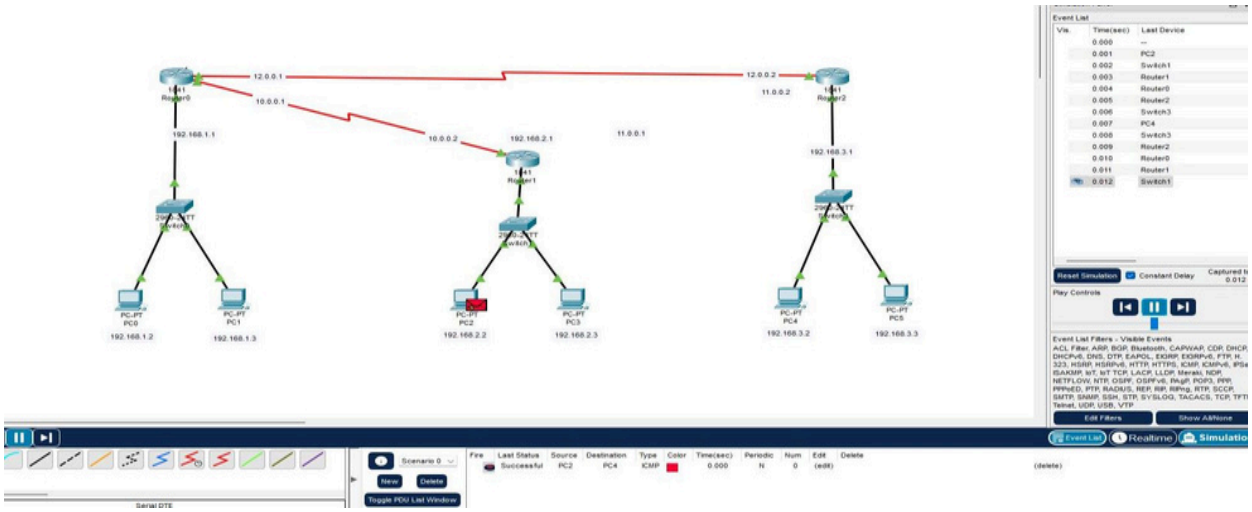
5. Test Connectivity:

- Use the **ping** command from one computer to test connectivity with the computers connected to the other routers.
- Verify that the network routes have been learned through RIP by using the show ip route command on each router.

RESULT:







Lab 8: Implementation of RIP Version 2

OBJECTIVE:

The objective of this lab is to implement and configure Routing Information Protocol (RIP) Version 2 in a small network using Cisco Packet Tracer. This includes configuring IP addresses, enabling RIP routing on the routers, advertising connected networks, and testing connectivity between devices.

REQUIREMENTS:

- Cisco Packet Tracer software
- Three routers
- Three computers (one connected to each router)

- Ethernet cables to connect computers to routers
- Basic knowledge of router configuration and RIP Version 2

INSTRUCTIONS:

1. Open Cisco Packet Tracer:

- Launch the Cisco Packet Tracer software on your computer to begin the lab.

2. Create the Network Topology:

- Drag three routers into the workspace.
- Arrange the routers in a linear topology (Router1 to Router2, Router2 to Router3).
- Connect each router to a computer using Ethernet cables.

3. Configure IP Addresses:

- Access the **CLI** of each router and computer.
- Assign IP addresses to the routers' interfaces and computers. Ensure that IPs are properly set for each subnet.

Example IP Scheme:

- Router1 (Interface to Router2): 192.168.1.1
- Router2 (Interface to Router1): 192.168.1.2, (Interface to Router3): 192.168.2.1
- Router3 (Interface to Router2): 192.168.2.2
- Assign static IP addresses to the PCs in the respective subnets.

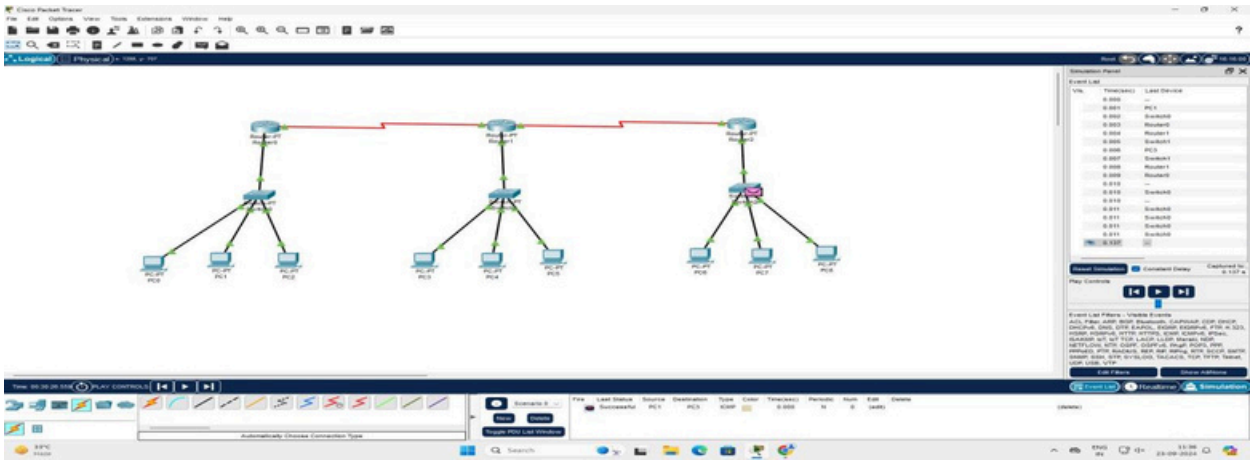
4. Enable RIP Version 2 on the Routers:

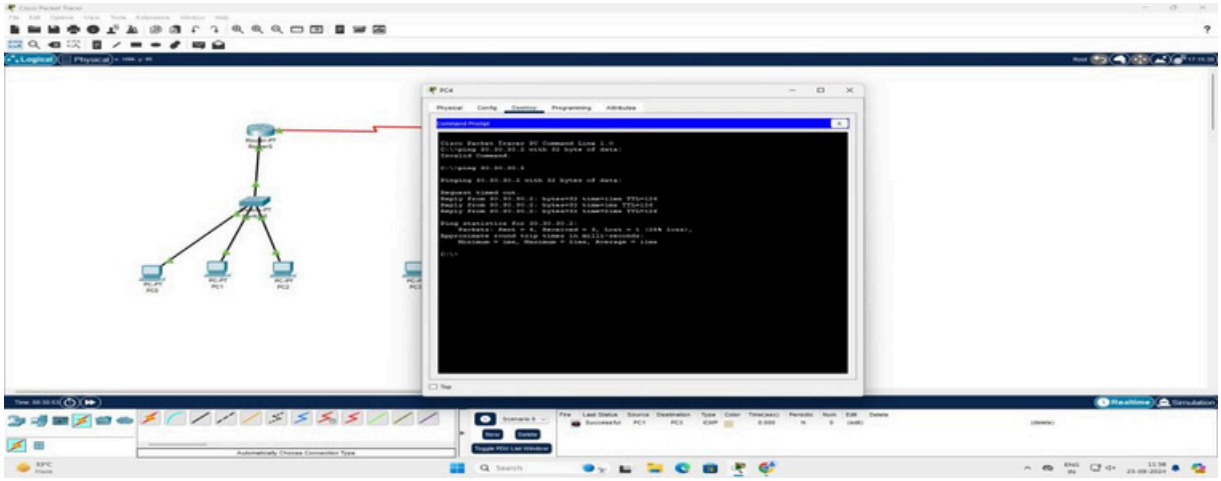
- Access the CLI of each router.
- Enter configuration mode using the enable and configure terminal commands.
- Add the appropriate network addresses for each router.

5. Test Connectivity:

- Use the **ping** command to test connectivity between the computers connected to different routers.
- Use the show ip route command on each router to verify that network routes have been propagated through RIP Version 2.

RESULT:





Lab 9: Implementation of Single Area OSPF

OBJECTIVE:

The objective of this lab is to implement and configure Open Shortest Path First (OSPF) routing protocol in a single area using Cisco Packet Tracer. This includes configuring IP addresses, enabling OSPF routing, advertising connected networks, and verifying network connectivity.

REQUIREMENTS:

- Cisco Packet Tracer software
- Three routers
- Three computers (one connected to each router)
- Ethernet cables to connect computers to routers
- Basic understanding of router configuration and OSPF

INSTRUCTIONS:

1. Open Cisco Packet Tracer:

- Launch the Cisco Packet Tracer software on your computer.

2. Create the Network Topology:

- Drag three routers onto the workspace.
- Arrange the routers in a **triangular topology** (connect Router1 to Router2, Router2 to Router3, and Router3 to Router1).
- Connect a computer to each router using Ethernet cables.

3. Configure IP Addresses:

- Access the **CLI** (Command Line Interface) of each router and computer.
- Assign IP addresses to each interface of the routers and computers. Ensure that the IP addresses are in the same subnet for directly connected devices.

Example IP Scheme:

- Router1 (Interface to Router2): 192.168.1.1

- Router2 (Interface to Router1): 192.168.1.2, (Interface to Router3): 192.168.2.1
- Router3 (Interface to Router2): 192.168.2.2, (Interface to Router1): 192.168.3.1
- Assign IP addresses to PCs in their respective subnets.

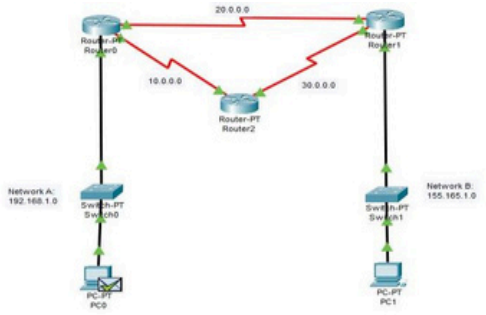
4. Enable OSPF on the Routers:

- Access the **CLI** of each router.
- Enter configuration mode using the enable and configure terminal commands.
- Advertise the connected networks by replacing <network address> with the appropriate addresses for each router.

5. Test Connectivity:

- Use the **ping** command from one computer to test connectivity with the computers connected to the other routers.
- Verify that the OSPF routes have been learned by using the show ip route command on each router.

RESULT:



Lab 10: Implementation of Multi Area OSPF

OBJECTIVE:

The objective of this lab is to implement and configure OSPF in a multi-area environment using Cisco Packet Tracer. This involves creating a network with two OSPF areas (Area 0 backbone and Area 1), configuring IP addresses, enabling OSPF routing, and testing connectivity between devices.

REQUIREMENTS:

- Cisco Packet Tracer software
- Four routers
- Four computers (one connected to each router)
- Ethernet cables to connect computers to routers
- Basic understanding of OSPF routing, particularly multi-area configurations

INSTRUCTIONS:

1. Open Cisco Packet Tracer:

- Launch the Cisco Packet Tracer software on your computer.

2. Create the Network Topology:

- Drag four routers onto the workspace.
- Form two OSPF areas:
  - Area 0 (backbone area): Connect two routers that will serve as the backbone.
  - Area 1: Connect the remaining two routers and link them to the Area 0 routers.
- Connect a computer to each router using Ethernet cables.

3. Configure IP Addresses:

- Access the CLI (Command Line Interface) of each router and computer.
- Assign IP addresses to each interface of the routers and computers. Ensure that devices on the same network are within the same subnet.

Example IP Scheme:

- Area 0 Routers:
  - Router1 (Interface to Router2): 192.168.1.1
  - Router2 (Interface to R1, Port 1): 192.168.1.2
- Area 1 Routers:
  - Router3 (Interface to Router4): 192.168.2.1
  - Router4 (Interface to Router3): 192.168.2.2
- Assign appropriate IP addresses to PCs in their respective subnets.

4. Enable OSPF on the Routers:

For Area 0 Routers:

- Access the CLI of each Area 0 router.
- Enter configuration mode using the enable and configure terminal commands.
- Advertise the networks connected to the routers in Area 0.

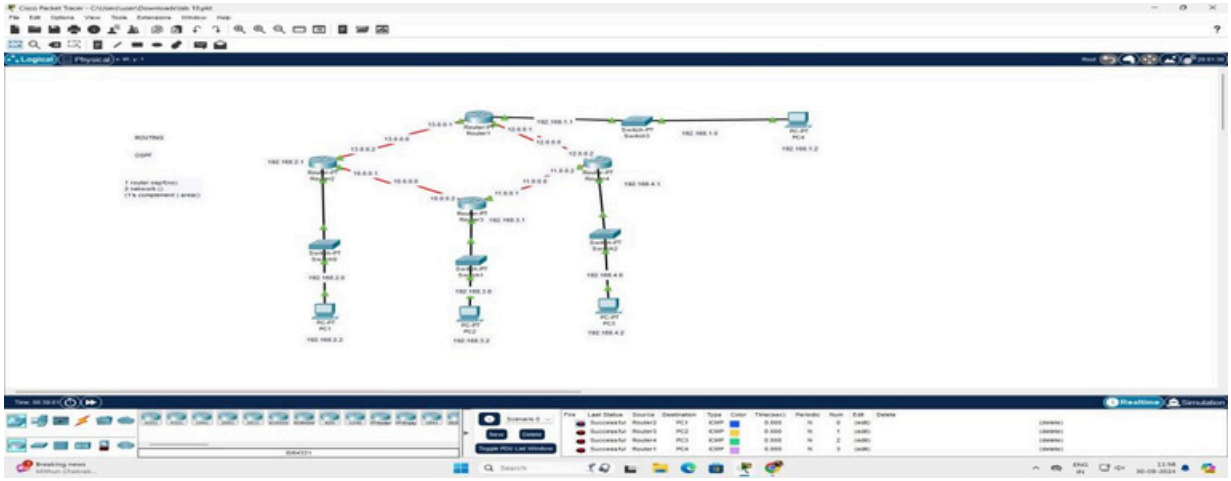
For Area 1 Routers:

- Access the **CLI** of each Area 1 router.
- Enter configuration mode.
- Advertise the networks connected to the routers in Area 0.

5. Test Connectivity:

- Use the **ping** command from one computer to test connectivity with the computers connected to the other routers.
- Verify that the OSPF routes have been learned by using the show ip route command on each router.

RESULT:



Lab 11: PPP Configuration

OBJECTIVE:

The objective of this lab is to configure Point-to-Point Protocol (PPP) on a serial link between two routers using Cisco Packet Tracer. This involves creating a network with two routers, configuring IP addresses, setting up PPP encapsulation, and testing connectivity between devices.

REQUIREMENTS:

- Cisco Packet Tracer software
- Two routers
- Two computers (one connected to each router)
- Ethernet cables to connect computers to routers
- Serial connection between the routers
- Basic understanding of router configuration and PPP encapsulation

INSTRUCTIONS:

1. Open Cisco Packet Tracer:

● Launch the Cisco Packet Tracer software on your computer.

2. Create the Network Topology:

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

3. Configure IP Addresses:

- Access the CLI (Command Line Interface) of each router and computer.
- Assign IP addresses to each interface on the routers and the computers.

Example IP Scheme:

- Router1 (Serial Interface 0/0/0): 192.168.1.1
- Router2 (Serial Interface 0/0/0): 192.168.1.2
- Assign IP addresses to PCs in their respective subnets.

4. Configure PPP on the Serial Interface:

- Access the CLI of each router.
- Enter interface configuration mode for the serial interface:

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

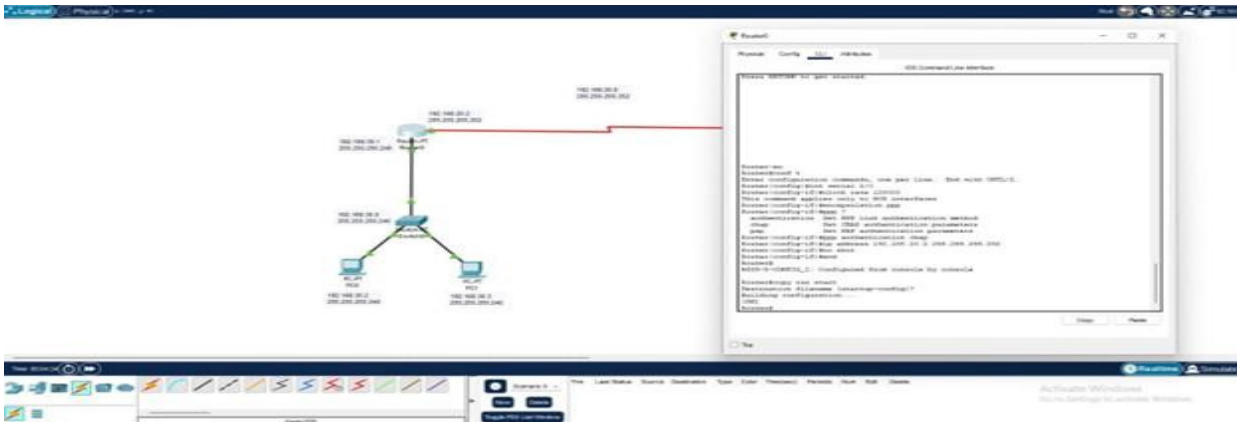
- Enable **PPP encapsulation** with the following command:

```
Router(config-if)# encapsulation ppp
```

5. Test Connectivity:

- Use the **ping** command from one computer to test connectivity with the other computer.
- Ensure that the serial link between the routers is working correctly, and that devices can communicate over the network.

RESULT:



Lab 12: HDLC Configuration

OBJECTIVE:

The objective of this lab is to configure High-Level Data Link Control (HDLC) encapsulation on a serial link between two routers using Cisco Packet Tracer. This includes setting up a network with two routers, configuring IP addresses, enabling HDLC encapsulation, and testing connectivity between devices.

REQUIREMENTS:

- Cisco Packet Tracer software
- Two routers
- Two computers (one connected to each router)
- Ethernet cables to connect computers to routers
- Serial connection between the routers
- Basic understanding of router configuration and HDLC encapsulation

INSTRUCTIONS:

1. Open Cisco Packet Tracer:

● Launch the Cisco Packet Tracer software on your computer.

2. Create the Network Topology:

● Drag two routers onto the workspace.

- Connect the routers using a serial connection.
- Connect a computer to each router using Ethernet cables.

3. Configure IP Addresses:

- Access the CLI (Command Line Interface) of each router and computer.
- Assign IP addresses to each interface on the routers and the computers.

Example IP Scheme:

- Router1 (Serial Interface 0/0/0): 192.168.1.1
- Router2 (Serial Interface 0/0/0): 192.168.1.2
- Assign IP addresses to PCs in their respective subnets.

4. Configure HDLC on the Serial Interface:

- Access the CLI of each router.
- Enter interface configuration mode for the serial interface:

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

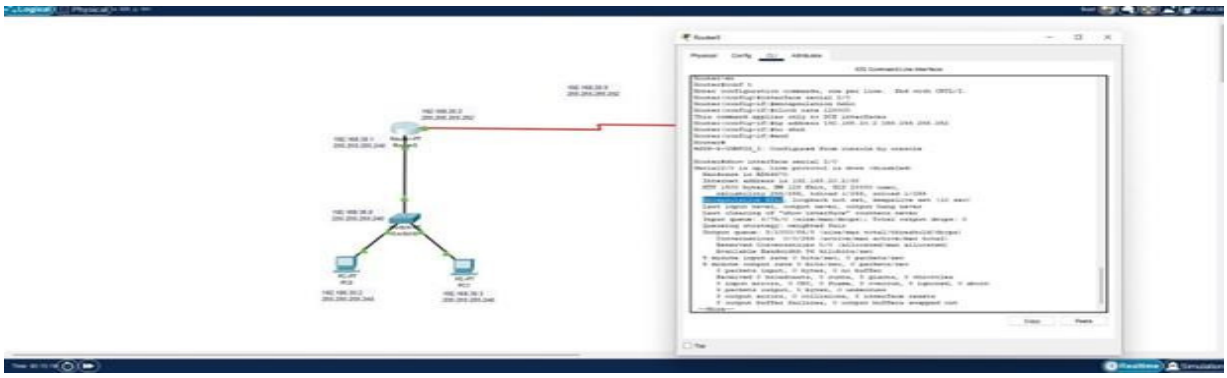
- Enable **HDLC encapsulation** (this is the default on Cisco routers) using the following command:

  ```
  Router(config-if)# encapsulation hdlc
  ```

5. Test Connectivity:

- Use the **ping** command from one computer to test connectivity with the other computer.
- Ensure that the serial link between the routers is functioning, and that network devices can communicate over the connection.

RESULT:



Lab 13: Implementation of BGP

OBJECTIVE:

The objective of this lab is to implement and configure Border Gateway Protocol (BGP) between two routers in separate autonomous systems (AS) using Cisco Packet Tracer. This involves configuring IP addresses, establishing BGP peering between the routers, advertising networks, and testing network connectivity.

REQUIREMENTS:

- Cisco Packet Tracer software
- Two routers
- Two computers (one connected to each router)
- Ethernet cables to connect computers to routers
- Basic understanding of router configuration and BGP

INSTRUCTIONS:

1. Open Cisco Packet Tracer:

● Launch the Cisco Packet Tracer software on your computer.

2. Create the Network Topology:

● Drag two routers onto the workspace.
● Configure the routers to be part of two separate autonomous systems (AS) by connecting them using a serial or Ethernet connection.
● Connect a computer to each router using Ethernet cables.

3. Configure IP Addresses:

● Access the CLI (Command Line Interface) of each router and computer.
● Assign IP addresses to each interface on the routers and the computers**.**

Example IP Scheme:

- Router1 (AS 100): Serial/Ethernet Interface 0/0/0:
- 192.168.1.1 Router2 (AS 200): Serial/Ethernet Interface
- 0/0/0: 192.168.1.2 Assign IP addresses to PCs in their respective subnets.

4. Enable BGP on the Routers:

For Router1 (AS 100):

- Access the **CLI** of Router1.
- Enter configuration mode using the enable and configure terminal commands.
- Enable BGP on Router1 using the following command:
  Router(config)# router bgp 100
- Establish BGP peering with Router2 by configuring the neighbor command:
  Router(config-router)# neighbor 192.168.1.2 remote-as 200
- Advertise the connected networks:
  Router(config-router)# network <network address>

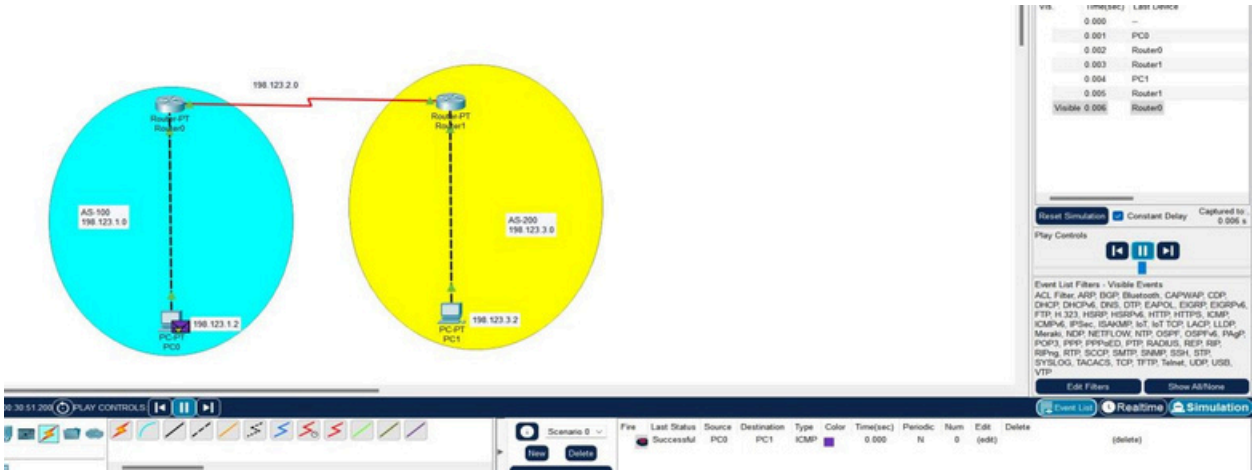
For Router2 (AS 200):

- Access the **CLI** of Router2.
- Enable BGP on Router2:
  Router(config)# router bgp 200
- Establish BGP peering with Router1:
  Router(config-router)# neighbor 192.168.1.1 remote-as 100
- Advertise the connected networks:
  Router(config-router)# network <network address>

5. Test Connectivity:

- Use the **ping** command from one computer to test connectivity with the other computer.
- Verify BGP routes on each router using the show ip bgp command to ensure routes are learned.

RESULT:



Lab 14: Implementation of EIGRP

OBJECTIVE:

The objective of this lab is to implement and configure Enhanced Interior Gateway Routing Protocol (EIGRP) between three routers in a triangular topology using Cisco Packet Tracer. This includes configuring IP addresses, enabling EIGRP on each router, advertising connected networks, and testing network connectivity.

REQUIREMENTS:

- Cisco Packet Tracer software
- Three routers
- Three computers (one connected to each router)
- Ethernet cables to connect computers to routers
- Basic understanding of router configuration and EIGRP

INSTRUCTIONS:

1. Open Cisco Packet Tracer:

- Launch the Cisco Packet Tracer software on your computer.

2. Create the Network Topology:

- Drag three routers onto the workspace.

- Arrange the routers in a triangular topology, where each router is connected to the other two.
- Connect a computer to each router using Ethernet cables.

3. Configure IP Addresses:

- Access the CLI (Command Line Interface) of each router and computer.
- Assign IP addresses to each interface on the routers and the computers. Ensure that devices on the same network are within the same subnet.

Example IP Scheme:

- Router1 (Interface to Router2): 192.168.1.1
- Router2 (Interface to Router1 and Router3): 192.168.1.2, 192.168.2.1
- Router3 (Interface to Router2): 192.168.2.2, (Interface to Router1): 192.168.3.1
- Assign appropriate IP addresses to PCs in their respective subnets.

4. Enable EIGRP on the Routers:

- Access the CLI of each router.
- Enter configuration mode using the `enable` and `configure terminal` commands.
- Enable EIGRP on each router with the following command:
  `Router(config)# router eigrp 1`
- Advertise the connected networks using the following command:
  `Router(config-router)# network <network address>`
  - Replace `<network address>` with the appropriate network addresses for each router.

5. Test Connectivity:

- Use the ping command from one computer to test connectivity with the other computers.
- Verify that EIGRP routes have been learned by using the `show ip route` command on each router.

RESULT:

Lab 15: Telnet Configuration

Objective
Configure Telnet on a router to allow remote access from a computer using Cisco Packet Tracer.

Requirements

- Cisco Packet Tracer software
- One router
- One computer
- Ethernet cable to connect the computer to the router
- Basic understanding of router configuration and Telnet

Instructions

1. Open Cisco Packet Tracer

- Launch the Cisco Packet Tracer software on your computer.

2. Create the Network Topology

- Add Devices:
- Drag a router (e.g., 2911) and a compute onto the workspace.

-Connect Devices:

- Use the Ethernet cabl to connect the computer to the router.
- Click on the Connections icon (lightning bolt) in the bottom-left corner.

- Select the Copper Straight-Through cable.
- Click on the computer, select the FastEthernet port (usually FastEthernet0).
- Click on the router, and select any Ethernet interface (e.g., GigabitEthernet0/0).

3. Configure IP Addresses

- Access the Router CLI:
- Click on the router, then select the **CLI** tab.

- Assign IP Address to Router

- Enter the following commands in the router's CLI:

```
bash
Router> enable
Router# configure terminal
Router(config)# interface GigabitEthernet0/0
Router(config-if)# ip address 192.168.1.1 255.255.255.0
Router(config-if)# no shutdown
Router(config-if)# exit
```

- Configure Computer's IP Address:

- Click on the computer, go to the Desktop tab, then select IP Configuration
- Enter the following information:
- IP Address: `192.168.1.2`
-Subnet Mask: `255.255.255.0`
- Leave Default Gateway empty for now, as the router will act as the gateway.

4. Enable Telnet on the Router

-Configure VTY Lines:
- Back in the router's CLI, enter the following commands:

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

- Optionally Configure Hostname and Logging:

- Set the hostname and enable logging:

```
bash
Router(config)# hostname Router1
Router1(config)# logging synchronous
```

5. Test Telnet Connectivity

- Open Command Prompt:
- On the computer, go to the Desktop tab and click on Command Prompt.

- Use Telnet Command:

- Type the following command to connect to the router:
bash
telnet 192.168.1.1

- Enter Password:

- When prompted, enter the password `cisco`.

- Verify Access:

- You should now be able to access the router's CLI remotely. You can verify by typing commands like `show ip interface brief` to check the interface status.

Troubleshooting Tips

- Ensure both devices (router and computer) are connected properly with the correct IP addresses in the same subnet.
- Make sure Telnet is enabled on the VTY lines of the router.
- If you cannot connect, check firewall settings on the computer.