REPORT

EXPERIMENT 7
Implementation of RIP Version 1

GITHUB LINK:

https://github.com/DharunKumar706/Network-Lab-Assignments-2.git

Objective:

The objective of this lab is to implement Routing Information Protocol (RIP) Version 1 on a network with three routers connected in a linear topology. We will configure IP addresses for routers and end devices, enable RIP Version 1, and ensure the routers share routing information. The connectivity between computers in the network will be tested using the ping command.

Requirements

- **Hardware/Software:**
  - Cisco Packet Tracer (software for network simulation)
  - 3 Routers
  - 3 Computers (PCs)
  - Ethernet cables to connect the devices
- **IP Addressing Scheme:**
  - Assign IP addresses to routers and computers based on the topology and subnets used.
- **Routing Protocol:**
  - Routing Information Protocol (RIP) Version 1

Procedure

1. Launch Packet Tracer

- Open the Cisco Packet Tracer application on your computer. Ensure all devices are available in the components library.

2. Create a Network

- **Step 1:** Drag three routers onto the workspace. You can find them in the “Network Devices” section under “Routers.”

- **Step 2:** Arrange the routers in a linear topology. The routers should be directly connected to each other with Ethernet cables.
  Router Connections:

    - Router 1 to Router 2
    - Router 2 to Router 3
- **Step 3:** Connect a computer to each router using Ethernet cables.
  PC Connections:
    - PC1 to Router 1
    - PC2 to Router 2
    - PC3 to Router 3
- Make sure the Ethernet interfaces are connected correctly between routers and computers.

3. Configure IP Addresses

- **Step 1:** Assign IP addresses to each interface on the routers and computers.
    - Open the CLI (Command Line Interface) for each router and computer to assign IP addresses.

Router 1 Configuration:

```
enable
configure terminal
interface GigabitEthernet0/0
ip address 192.168.1.1 255.255.255.0
no shutdown
exit
interface GigabitEthernet0/1
ip address 192.168.2.1 255.255.255.0
no shutdown
Exit
```

Router 2 Configuration:

```
enable
configure terminal
interface GigabitEthernet0/0
ip address 192.168.2.2 255.255.255.0
no shutdown
exit
interface GigabitEthernet0/1
```

```
ip address 192.168.3.1 255.255.255.0
no shutdown
exit
```

Router 3 Configuration:

```
enable
configure terminal
interface GigabitEthernet0/0
ip address 192.168.3.2 255.255.255.0
no shutdown
exit
interface GigabitEthernet0/1
ip address 192.168.4.1 255.255.255.0
no shutdown
exit
```

- **PCs Configuration:**
  - PC1: IP - 192.168.1.2, Subnet - 255.255.255.0, Gateway - 192.168.1.1
  - PC2: IP - 192.168.3.2, Subnet - 255.255.255.0, Gateway - 192.168.3.1
  - PC3: IP - 192.168.4.2, Subnet - 255.255.255.0, Gateway - 192.168.4.1

4. Enable RIP Version 1

Access the CLI of each router to enable RIP routing.

Router 1 RIP Configuration:

```
enable
configure terminal
router rip
version 1
network 192.168.1.0
network 192.168.2.0
Exit
```

Router 2 RIP Configuration:

```
enable
configure terminal
router rip
```

version 1
network 192.168.2.0
network 192.168.3.0
Exit

Router 3 RIP Configuration:

enable
configure terminal
router rip
version 1
network 192.168.3.0
network 192.168.4.0
exit

5. Test Connectivity

- Once RIP has been enabled and networks have been advertised, test the network connectivity using the ping command from the computers.
  Step 1: Open the command prompt on PC1, PC2, and PC3.
  Step 2: Ping each computer from another to verify if the routing information has been shared successfully.

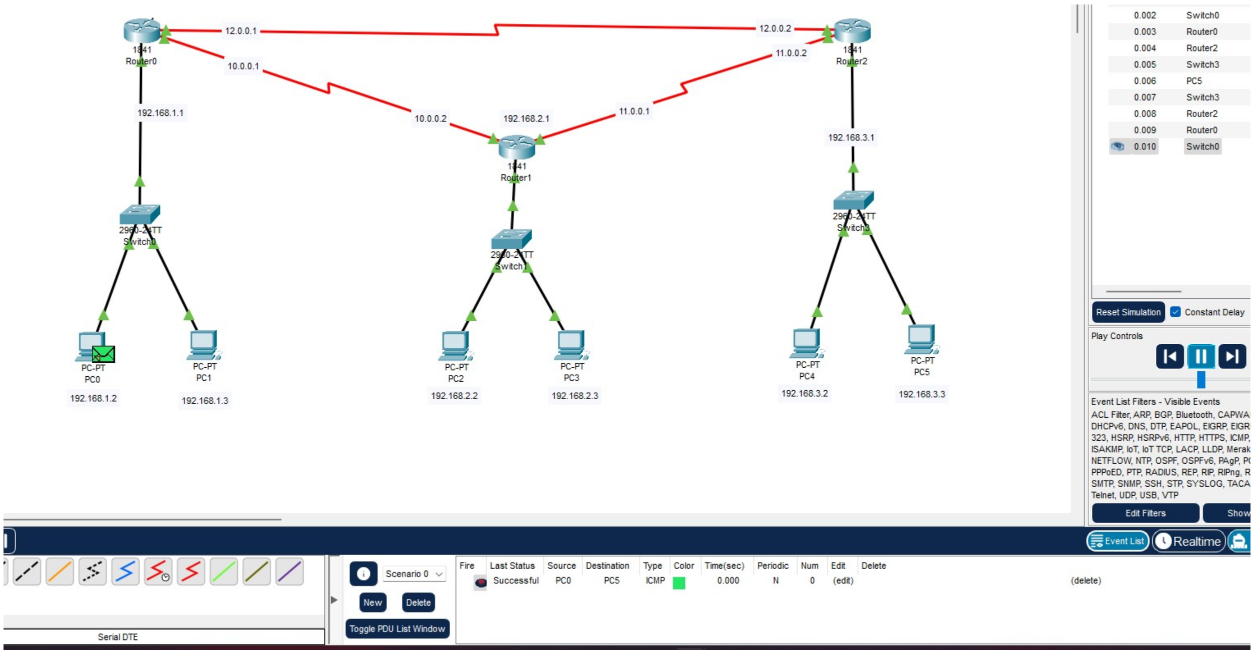
From PC1:
ping 192.168.3.2
ping 192.168.4.2

From PC2:
ping 192.168.1.2
ping 192.168.4.2

From PC3:
ping 192.168.1.2
ping 192.168.3.2

- If all ping commands are successful, the RIP Version 1 configuration is working as expected.

Results:



Conclusion:

In this lab, we successfully implemented RIP Version 1 on a network consisting of three routers and computers. We configured IP addresses, enabled RIP on the routers, and tested the connectivity between the computers using the ping command. RIP Version 1 allowed the routers to share routing information, and the connectivity was verified through successful pings.

LAB-8 Implementation of RIP Version 2

Objective

The objective of this lab is to implement Routing Information Protocol (RIP) Version 2 on a network consisting of three routers connected in a linear topology. We will configure IP addresses for routers and computers, enable RIP Version 2 on the routers, and ensure the routers share routing information. Finally, the connectivity between the computers will be verified using the ping command.

Requirements

- **Hardware/Software:**
  - Cisco Packet Tracer (network simulation software)
  - 3 Routers
  - 3 Computers (PCs)
  - Ethernet cables for connectivity
- **IP Addressing Scheme:**
  - Assign IP addresses to routers and computers based on the topology and subnets.
- **Routing Protocol:**
  - Routing Information Protocol (RIP) Version 2

Procedure

1. Launch Packet Tracer

- Open the Cisco Packet Tracer application on your computer. Ensure that all necessary devices are accessible from the components library.

2. Create a Network

- **Step 1:** Drag and drop three routers from the “Network Devices” section under “Routers” onto the workspace.

- **Step 2:** Arrange the routers in a linear topology, connecting Router 1 to Router 2, and Router 2 to Router 3 using Ethernet cables.
  Router Connections:
  - Router 1 ↔ Router 2
  - Router 2 ↔ Router 3
- **Step 3:** Connect a computer to each router using Ethernet cables.
  PC Connections:
  - PC1 ↔ Router 1
  - PC2 ↔ Router 2
  - PC3 ↔ Router 3

3. Configure IP Addresses

- **Step 1:** Assign IP addresses to the router interfaces and computers.
  - Open the CLI (Command Line Interface) for each router and computer to configure IP addresses.

Router 1 Configuration:

```
enable

configure terminal

interface GigabitEthernet0/0

ip address 192.168.1.1 255.255.255.0

no shutdown

exit

interface GigabitEthernet0/1

ip address 192.168.2.1 255.255.255.0

no shutdown

exit
```

Router 2 Configuration:

enable

configure terminal

interface GigabitEthernet0/0

ip address 192.168.2.2 255.255.255.0

no shutdown

exit

interface GigabitEthernet0/1

ip address 192.168.3.1 255.255.255.0

no shutdown

exit

Router 3 Configuration:

enable

configure terminal

interface GigabitEthernet0/0

ip address 192.168.3.2 255.255.255.0

no shutdown

exit

interface GigabitEthernet0/1

ip address 192.168.4.1 255.255.255.0

no shutdown

```
exit
```

- **PCs Configuration:**
    - **PC1:** IP - 192.168.1.2, Subnet - 255.255.255.0, Gateway - 192.168.1.1
    - **PC2:** IP - 192.168.3.2, Subnet - 255.255.255.0, Gateway - 192.168.3.1
    - **PC3:** IP - 192.168.4.2, Subnet - 255.255.255.0, Gateway - 192.168.4.1

4. Enable RIP Version 2

Access the CLI of each router to enable RIP routing.

Router 1 RIP Configuration:

```
enable

configure terminal

router rip

version 2

network 192.168.1.0

network 192.168.2.0

no auto-summary

exit
```

Router 2 RIP Configuration:

```
enable

configure terminal

router rip

version 2
```

network 192.168.2.0

network 192.168.3.0

no auto-summary

exit

Router 3 RIP Configuration:

enable

configure terminal

router rip

version 2

network 192.168.3.0

network 192.168.4.0

no auto-summary

exit

- **Note:** RIP Version 2 supports CIDR (Classless Inter-Domain Routing), so the no auto-summary command is used to disable automatic network summarization.

5. Test Connectivity

- After enabling RIP Version 2 and advertising the connected networks, test the connectivity between the computers using the ping command.
  Step 1: Open the command prompt on PC1, PC2, and PC3.
  Step 2: Use the ping command from one PC to ping the others to verify successful routing.

From PC1:
ping 192.168.3.2

ping 192.168.4.2

From PC2:
ping 192.168.1.2

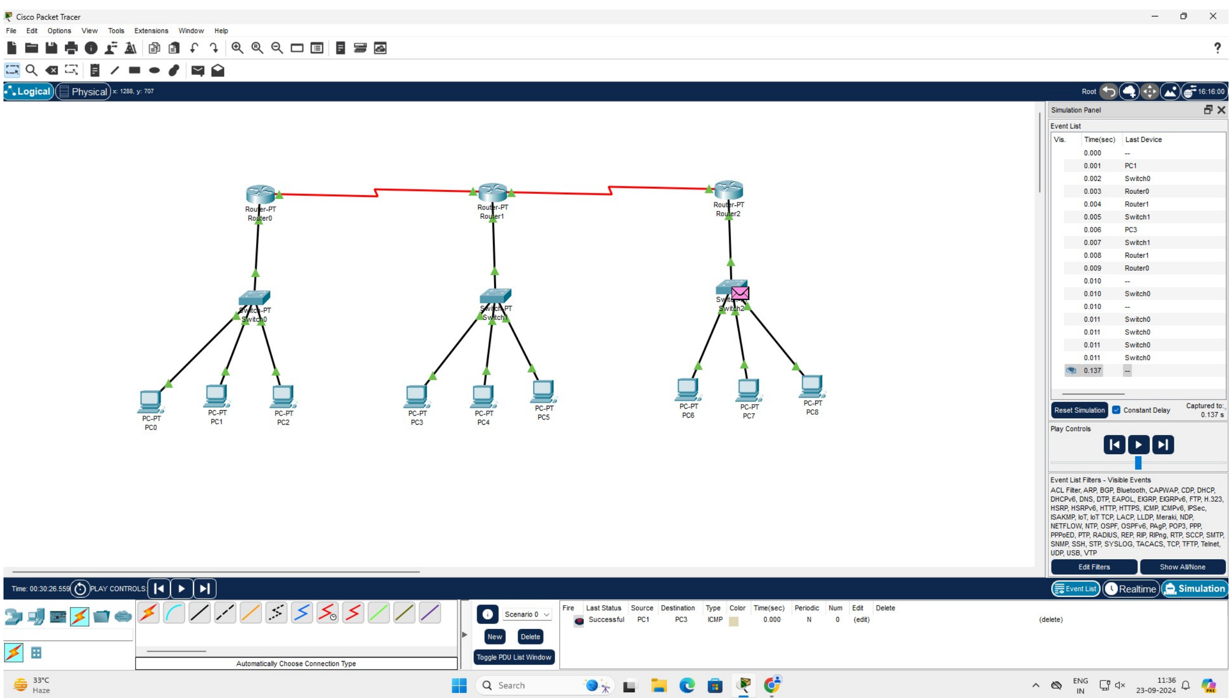
ping 192.168.4.2

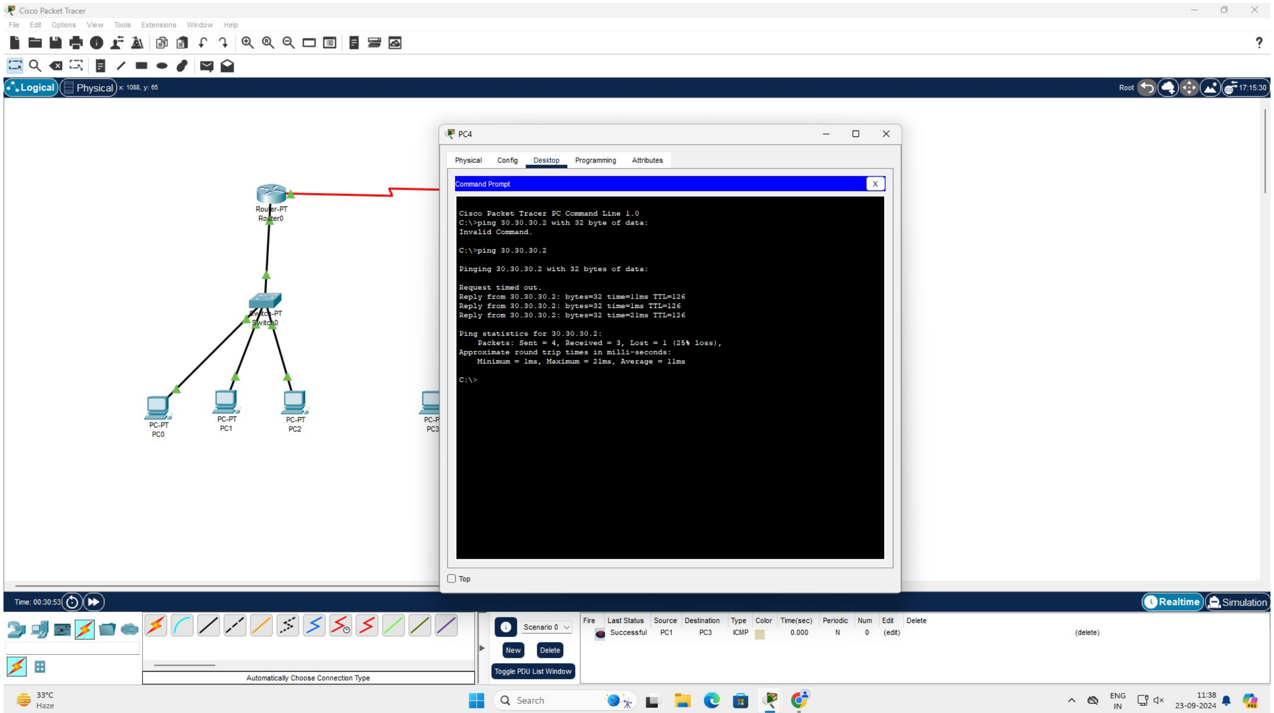
From PC3:
ping 192.168.1.2

ping 192.168.3.2

- If all ping commands are successful, RIP Version 2 is functioning correctly, allowing routing between the computers.

Results:





Conclusion:

In this lab, we successfully implemented RIP Version 2 on a network comprising three routers and computers. We configured IP addresses, enabled RIP Version 2, and verified the connectivity between computers using the ping command. RIP Version 2's support for CIDR allowed us to disable auto-summary and ensure precise network routing. The configuration was successful, as verified through successful pings across the network.

Lab 9: Implementation of Single Area OSPF

Objective

The objective of this lab is to implement Single Area Open Shortest Path First (OSPF) routing on a network consisting of three routers connected in a triangular topology. We will configure IP addresses for the routers and computers, enable OSPF in a single area (area 0), and verify the connectivity between the computers using the ping command.

Requirements

- **Hardware/Software:**
  - Cisco Packet Tracer (network simulation software)
  - 3 Routers
  - 3 Computers (PCs)
  - Ethernet cables to connect devices
- **IP Addressing Scheme:**
  - Assign IP addresses to routers and computers based on the topology and subnetting.
- **Routing Protocol:**
  - Open Shortest Path First (OSPF) in Single Area (Area 0)

Procedure

1. Launch Packet Tracer

- Open the Cisco Packet Tracer application on your computer and make sure all necessary devices are available in the components library.

2. Create a Network

- **Step 1:** Drag three routers from the “Network Devices” section under “Routers” onto the workspace.
- **Step 2:** Connect the routers in a triangular topology using Ethernet cables.
  Router Connections:
  - Router 1 ↔ Router 2
  - Router 2 ↔ Router 3
  - Router 3 ↔ Router 1
- **Step 3:** Connect a computer to each router using Ethernet cables.
  PC Connections:

- PC1 ↔ Router 1
- PC2 ↔ Router 2
- PC3 ↔ Router 3

3. Configure IP Addresses

- **Step 1:** Assign IP addresses to the interfaces on the routers and computers.
  - Open the CLI (Command Line Interface) of each router and computer to configure IP addresses.

Router 1 Configuration:

enable

configure terminal

interface GigabitEthernet0/0

ip address 192.168.1.1 255.255.255.0

no shutdown

exit

interface GigabitEthernet0/1

ip address 192.168.2.1 255.255.255.0

no shutdown

exit

interface GigabitEthernet0/2

ip address 192.168.3.1 255.255.255.0

no shutdown

exit

Router 2 Configuration:

enable

configure terminal

interface GigabitEthernet0/0

ip address 192.168.2.2 255.255.255.0

no shutdown

exit

interface GigabitEthernet0/1

ip address 192.168.4.1 255.255.255.0

no shutdown

exit

interface GigabitEthernet0/2

ip address 192.168.5.1 255.255.255.0

no shutdown

exit

Router 3 Configuration:

enable

configure terminal

interface GigabitEthernet0/0

ip address 192.168.3.2 255.255.255.0

no shutdown

exit

```
interface GigabitEthernet0/1

ip address 192.168.5.2 255.255.255.0

no shutdown

exit

interface GigabitEthernet0/2

ip address 192.168.6.1 255.255.255.0

no shutdown

exit
```

- **PCs Configuration:**
    - **PC1:** IP - 192.168.1.2, Subnet - 255.255.255.0, Gateway - 192.168.1.1
    - **PC2:** IP - 192.168.4.2, Subnet - 255.255.255.0, Gateway - 192.168.4.1
    - **PC3:** IP - 192.168.6.2, Subnet - 255.255.255.0, Gateway - 192.168.6.1

4. Enable OSPF

Access the CLI of each router to enable OSPF in a single area (Area 0).
Router 1 OSPF Configuration:

```
enable

configure terminal

router ospf 1

network 192.168.1.0 0.0.0.255 area 0

network 192.168.2.0 0.0.0.255 area 0

network 192.168.3.0 0.0.0.255 area 0

exit
```

Router 2 OSPF Configuration:

enable

configure terminal

router ospf 1

network 192.168.2.0 0.0.0.255 area 0

network 192.168.4.0 0.0.0.255 area 0

network 192.168.5.0 0.0.0.255 area 0

exit

Router 3 OSPF Configuration:

enable

configure terminal

router ospf 1

network 192.168.3.0 0.0.0.255 area 0

network 192.168.5.0 0.0.0.255 area 0

network 192.168.6.0 0.0.0.255 area 0

exit

-
- **Note:** In OSPF, the network command is followed by a wildcard mask (in this case, 0.0.0.255), which indicates the range of the network.

5. Test Connectivity

- Once OSPF has been enabled and networks have been advertised, use the ping command from the computers to test connectivity across the network.
  Step 1: Open the command prompt on PC1, PC2, and PC3.
  Step 2: Test the connectivity between the PCs by using the ping command.

From PC1:
ping 192.168.4.2

ping 192.168.6.2

From PC2:
ping 192.168.1.2

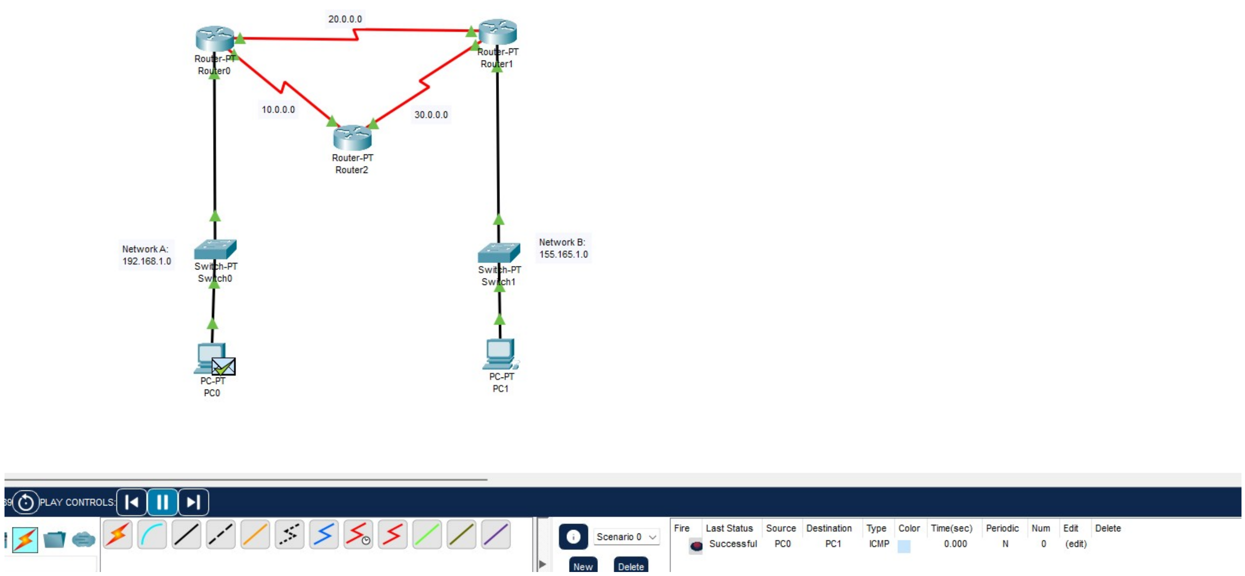
ping 192.168.6.2

From PC3:
ping 192.168.1.2

ping 192.168.4.2

- If all ping commands return successful replies, the OSPF configuration is working correctly, and the routers have exchanged routing information within Area 0.

Results:



Conclusion

In this lab, we successfully implemented Single Area OSPF on a network consisting of three routers connected in a triangular topology. We configured the IP addresses, enabled OSPF in Area 0, and verified the connectivity between computers using the ping command. The successful pings across the network confirmed that OSPF was correctly configured, allowing for proper routing between all connected networks.

LAB-10 Implementation of multi area OSPF

Objective

The objective of this lab is to implement Multi-Area Open Shortest Path First (OSPF) routing in a network that consists of four routers, organized into two separate OSPF areas with Area 0 as the backbone. We will configure IP addresses for routers and computers, enable OSPF in both areas, and verify the connectivity between the computers using the ping command.

Requirements

- **Hardware/Software:**
  - Cisco Packet Tracer (network simulation software)
  - 4 Routers
  - 4 Computers (PCs)
  - Ethernet cables for connectivity
- **IP Addressing Scheme:**
  - Assign IP addresses to routers and computers according to the topology.
- **Routing Protocol:**
  - Open Shortest Path First (OSPF) with multiple areas (Area 0 and Area 1)

Procedure

1. Launch Packet Tracer

- Open Cisco Packet Tracer on your computer and ensure that all necessary devices are available in the components library.

2. Create a Network

- **Step 1:** Drag four routers from the "Network Devices" section onto the workspace.
- **Step 2:** Create two separate OSPF areas:
  - **Area 0 (Backbone Area):** Routers 1 and 2
  - **Area 1:** Routers 3 and 4
- **Router Connections:**
  - Router 1 ↔ Router 2 (Area 0)
  - Router 2 ↔ Router 3 (Area 0 to Area 1 boundary)

- Router 3 ↔ Router 4 (Area 1)
- **Step 3:** Connect a computer to each router using Ethernet cables.
  PC Connections:
  - PC1 ↔ Router 1
  - PC2 ↔ Router 2
  - PC3 ↔ Router 3
  - PC4 ↔ Router 4

3. Configure IP Addresses

Step 1: Assign IP addresses to the router interfaces and computers. Access the CLI of each router to configure the interfaces.

Router 1 Configuration:

```
enable
configure terminal
interface GigabitEthernet0/0
ip address 192.168.1.1 255.255.255.0
no shutdown
exit
interface GigabitEthernet0/1
ip address 192.168.2.1 255.255.255.0
no shutdown
Exit
```

Router 2 Configuration:

```
enable
configure terminal
interface GigabitEthernet0/0
ip address 192.168.2.2 255.255.255.0
no shutdown
exit
interface GigabitEthernet0/1
ip address 192.168.3.1 255.255.255.0
no shutdown
exit
```

Router 3 Configuration:

```
enable
configure terminal
interface GigabitEthernet0/0
ip address 192.168.3.2 255.255.255.0
no shutdown
exit
interface GigabitEthernet0/1
ip address 192.168.4.1 255.255.255.0
no shutdown
exit
```

Router 4 Configuration:

```
enable
configure terminal
interface GigabitEthernet0/0
ip address 192.168.4.2 255.255.255.0
no shutdown
exit
```

- **PCs Configuration:**
  - **PC1:** IP - 192.168.1.2, Subnet - 255.255.255.0, Gateway - 192.168.1.1
  - **PC2:** IP - 192.168.2.2, Subnet - 255.255.255.0, Gateway - 192.168.2.1
  - **PC3:** IP - 192.168.3.2, Subnet - 255.255.255.0, Gateway - 192.168.3.1
  - **PC4:** IP - 192.168.4.2, Subnet - 255.255.255.0, Gateway - 192.168.4.1

4. Enable OSPF

- **Step 1:** Access the CLI of each router and configure OSPF.
  - **Router 1 and Router 2** will be in **Area 0** (Backbone area).
  - **Router 3 and Router 4** will be in **Area 1**.

Router 1 OSPF Configuration:

```
enable
configure terminal
router ospf 1
network 192.168.1.0 0.0.0.255 area 0
network 192.168.2.0 0.0.0.255 area 0
```

Exit

Router 2 OSPF Configuration:

enable
configure terminal
router ospf 1
network 192.168.2.0 0.0.0.255 area 0
network 192.168.3.0 0.0.0.255 area 0
exit

Router 3 OSPF Configuration:

enable
configure terminal
router ospf 1
network 192.168.3.0 0.0.0.255 area 1
network 192.168.4.0 0.0.0.255 area 1
exit

Router 4 OSPF Configuration:

enable
configure terminal
router ospf 1
network 192.168.4.0 0.0.0.255 area 1
exit

5. Test Connectivity

- After enabling OSPF and configuring the networks in each area, test the connectivity between the computers.
  Step 1: Open the command prompt on PC1, PC2, PC3, and PC4.
  Step 2: Use the ping command to verify network connectivity.

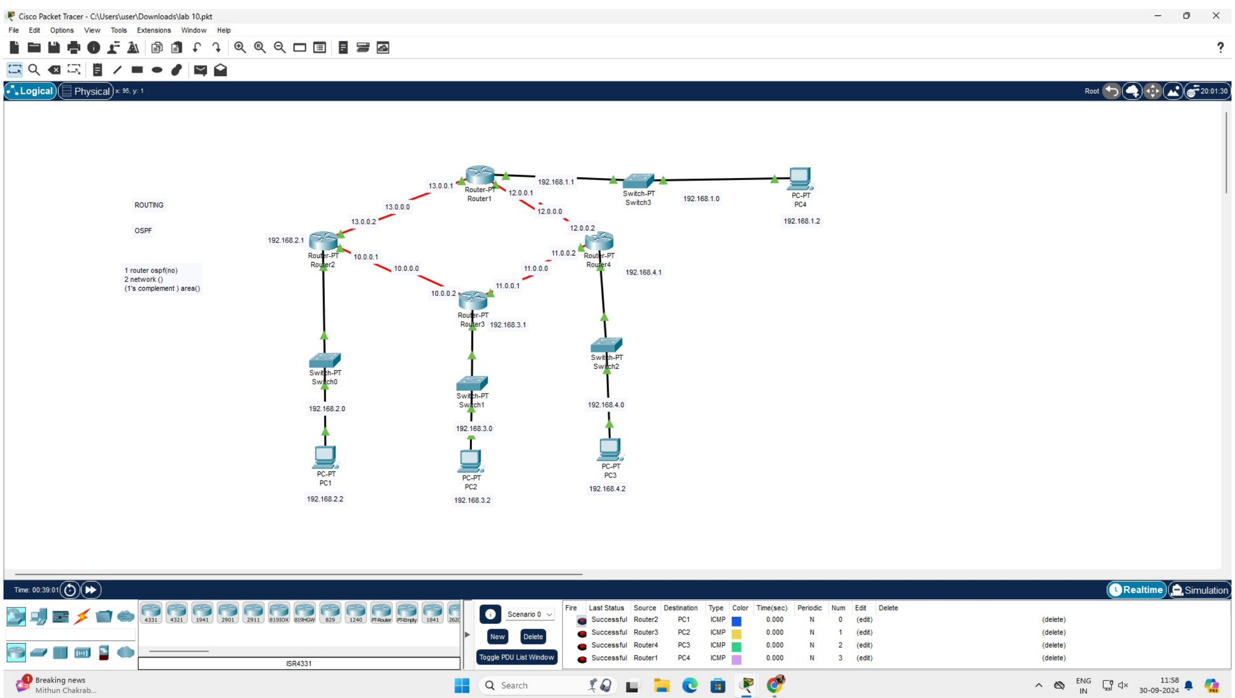
From **PC1** (in Area 0):
ping 192.168.2.2
ping 192.168.3.2
ping 192.168.4.2

From **PC3** (in Area 1):
ping 192.168.1.2
ping 192.168.4.2

From **PC4** (in Area 1):
ping 192.168.1.2
ping 192.168.3.2

- If all ping commands return successful replies, the OSPF configuration is functioning properly, allowing routing between the two OSPF areas (Area 0 and Area 1).

Result:



Conclusion

In this lab, we successfully implemented Multi-Area OSPF routing in a network with two OSPF areas and a backbone (Area 0). We configured the IP addresses, enabled OSPF in both Area 0 and Area 1, and verified connectivity using the ping command. The successful pings across the network confirmed that OSPF was correctly configured, enabling communication between computers located in different OSPF areas.

Lab 11: PPP Configuration

Objective

The objective of this lab is to configure a Point-to-Point Protocol (PPP) connection between two routers over a serial link. PPP is a data link layer protocol used to establish a direct connection between two networking nodes. After setting up the network and configuring IP addresses, we will verify connectivity between the computers connected to the routers using the ping command.

Requirements

- **Hardware/Software:**
  - Cisco Packet Tracer (network simulation software)
  - 2 Routers
  - 2 Computers (PCs)
  - Serial DCE cables for router-to-router connectivity
  - Ethernet cables for PC-to-router connectivity
- **IP Addressing Scheme:**
  - Assign IP addresses to router interfaces and computers.
- **Data Link Protocol:**
  - Point-to-Point Protocol (PPP) encapsulation

Procedure

1. Launch Packet Tracer

- Open Cisco Packet Tracer on your computer and ensure all necessary devices are available in the components library.

2. Create a Network

- **Step 1:** Drag two routers from the "Network Devices" section onto the workspace.
- **Step 2:** Use a **Serial DCE cable** to connect the serial interfaces of both routers:
  - Router 1 (Serial 0/0/0) ↔ Router 2 (Serial 0/0/0)
- **Step 3:** Use **Ethernet cables** to connect each router to a computer:
  - Router 1 (GigabitEthernet 0/0) ↔ PC1
  - Router 2 (GigabitEthernet 0/0) ↔ PC2

3. Configure IP Addresses

Step 1: Assign IP addresses to the router interfaces and the computers.

Router 1 Configuration:

```
enable
configure terminal
interface GigabitEthernet0/0
ip address 192.168.1.1 255.255.255.0
no shutdown
exit
interface Serial0/0/0
ip address 10.1.1.1 255.255.255.252
clock rate 64000  # Set the clock rate for the DCE end
no shutdown
exit
```

Router 2 Configuration:

```
enable
configure terminal
interface GigabitEthernet0/0
ip address 192.168.2.1 255.255.255.0
no shutdown
exit
interface Serial0/0/0
ip address 10.1.1.2 255.255.255.252
no shutdown
exit
```

- **PCs Configuration:**
  - **PC1:** IP - 192.168.1.2, Subnet - 255.255.255.0, Gateway - 192.168.1.1
  - **PC2:** IP - 192.168.2.2, Subnet - 255.255.255.0, Gateway - 192.168.2.1

4. Configure PPP

Step 1: Access the CLI of each router and configure PPP encapsulation on the serial interface.

Router 1 PPP Configuration:

```
enable
```

```
configure terminal
interface Serial0/0/0
encapsulation ppp
exit
```

Router 2 PPP Configuration:

```
enable
configure terminal
interface Serial0/0/0
encapsulation ppp
exit
```

5. Test Connectivity

- **Step 1:** After configuring the routers and enabling PPP on the serial link, open the command prompt on PC1 and PC2.

Step 2: Use the ping command to verify network connectivity.
From PC1:

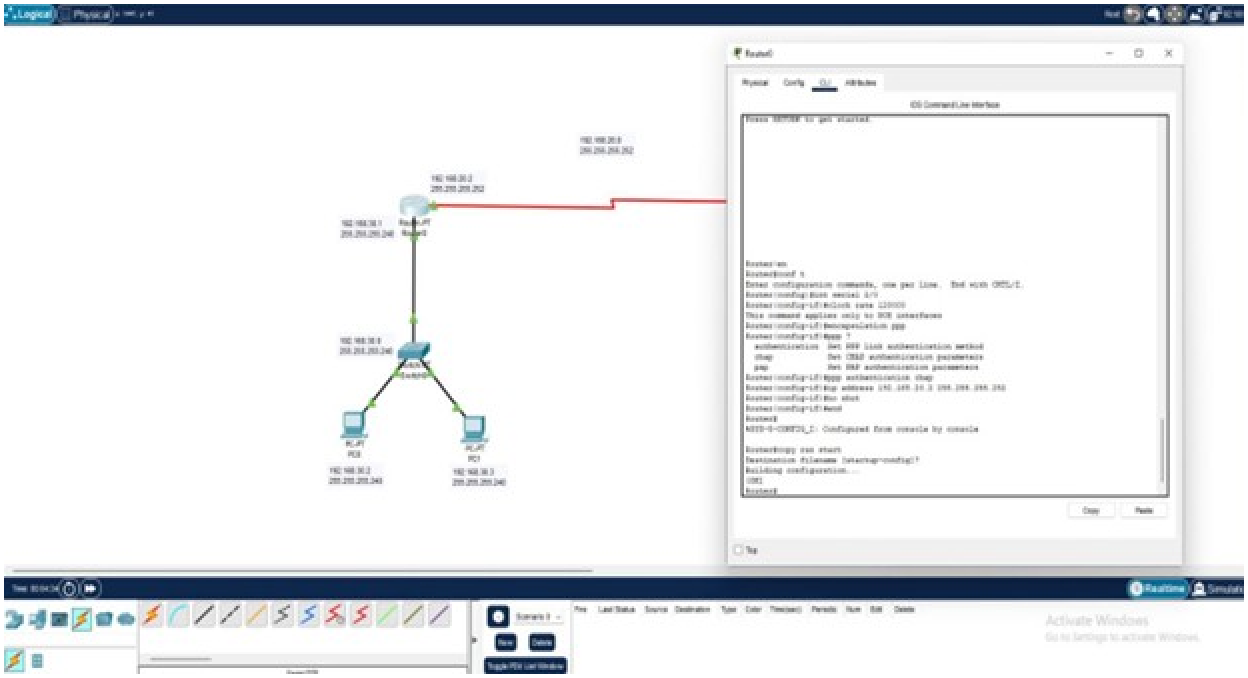
```
ping 192.168.2.2
```

From PC2:

```
ping 192.168.1.2
```

- If both ping commands return successful replies, the PPP configuration has been successfully established and communication between the computers is verified.

Results:



Conclusion

In this lab, we successfully configured a Point-to-Point Protocol (PPP) connection between two routers using a serial link. We assigned IP addresses to the router interfaces and connected PCs, configured PPP encapsulation on the serial interfaces, and verified connectivity using the ping command. The successful ping results demonstrate that the PPP connection is functioning properly and the routers are able to route traffic between the connected computers.

Lab 12: HDLC Configuration

Objective

The objective of this lab is to configure High-Level Data Link Control (HDLC) encapsulation between two routers over a serial connection. HDLC is a default encapsulation method for synchronous data links used between two routers. We will set up a network, assign IP addresses, configure HDLC on the serial link, and verify connectivity between the computers connected to the routers using the ping command.

Requirements

- **Hardware/Software:**
  - Cisco Packet Tracer (network simulation software)
  - 2 Routers
  - 2 Computers (PCs)
  - Serial DCE cables for router-to-router connectivity
  - Ethernet cables for PC-to-router connectivity
- **IP Addressing Scheme:**
  - Assign IP addresses to the router interfaces and computers.
- **Data Link Protocol:**
  - High-Level Data Link Control (HDLC) encapsulation

Procedure

1. Launch Packet Tracer

- Open Cisco Packet Tracer on your computer and ensure all necessary devices are available in the components library.

2. Create a Network

- **Step 1:** Drag two routers from the “Network Devices” section onto the workspace.
- **Step 2:** Use a **Serial DCE cable** to connect the serial interfaces of both routers:
  - Router 1 (Serial 0/0/0) ↔ Router 2 (Serial 0/0/0)
- **Step 3:** Use **Ethernet cables** to connect each router to a computer:
  - Router 1 (GigabitEthernet 0/0) ↔ PC1
  - Router 2 (GigabitEthernet 0/0) ↔ PC2

3. Configure IP Addresses

Step 1: Assign IP addresses to the router interfaces and the computers.
Router 1 Configuration:

enable

configure terminal

interface GigabitEthernet0/0

ip address 192.168.1.1 255.255.255.0

no shutdown

exit

interface Serial0/0/0

ip address 10.1.1.1 255.255.255.252

clock rate 64000 # Set clock rate for DCE end

no shutdown

exit

Router 2 Configuration:

enable

configure terminal

interface GigabitEthernet0/0

ip address 192.168.2.1 255.255.255.0

no shutdown

exit

interface Serial0/0/0

ip address 10.1.1.2 255.255.255.252

```
no shutdown

exit
```

- **PCs Configuration:**
    - **PC1:** IP - 192.168.1.2, Subnet - 255.255.255.0, Gateway - 192.168.1.1
    - **PC2:** IP - 192.168.2.2, Subnet - 255.255.255.0, Gateway - 192.168.2.1

4. Configure HDLC

Step 1: Access the CLI of each router and configure HDLC encapsulation on the serial interface. HDLC is the default encapsulation on Cisco routers, but we explicitly configure it for clarity.
Router 1 HDLC Configuration:

```
enable

configure terminal

interface Serial0/0/0

encapsulation hdlc

exit
```

Router 2 HDLC Configuration:

```
enable

configure terminal

interface Serial0/0/0

encapsulation hdlc

exit
```

5. Test Connectivity

- **Step 1:** After configuring HDLC on the routers, open the command prompt on PC1 and PC2.

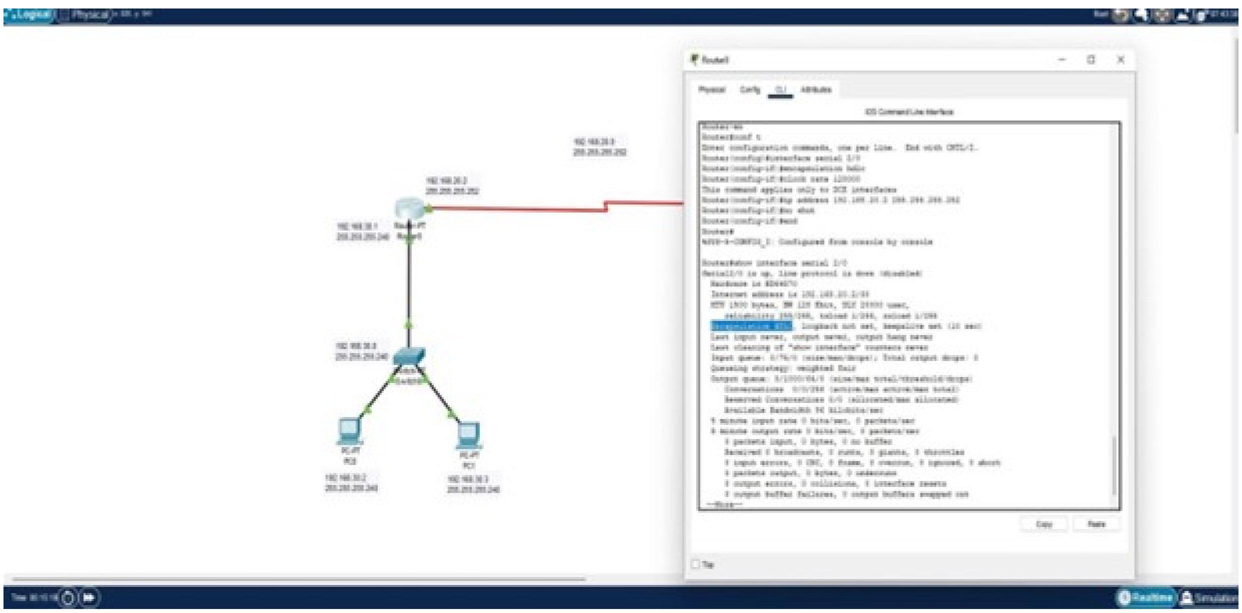
Step 2: Use the ping command to verify network connectivity.
From PC1:
ping 192.168.2.2

From PC2:

ping 192.168.1.2

- If both ping commands return successful replies, the HDLC configuration has been successfully established and communication between the computers is verified.

Results:



Conclusion

In this lab, we successfully configured High-Level Data Link Control (HDLC) encapsulation between two routers over a serial link. We assigned IP addresses to the router interfaces and connected PCs, configured HDLC encapsulation on the serial interfaces, and verified connectivity using the ping command. The successful ping results confirm that the HDLC link is operational and the routers are able to route traffic between the connected computers.

Lab 13: Implementation of BGP

Objective

The objective of this lab is to configure Border Gateway Protocol (BGP) between two routers that belong to different Autonomous Systems (AS). BGP is an inter-domain routing protocol used for exchanging routing information between different networks (autonomous systems). After setting up the network and establishing BGP peering, we will verify connectivity between the computers connected to the routers using the ping command.

Requirements

- **Hardware/Software:**
  - Cisco Packet Tracer (network simulation software)
  - 2 Routers
  - 2 Computers (PCs)
  - Ethernet cables for PC-to-router connectivity
- **IP Addressing Scheme:**
  - Assign IP addresses to the router interfaces and computers.
- **Routing Protocol:**
  - Border Gateway Protocol (BGP)

Procedure

1. Launch Packet Tracer

- Open Cisco Packet Tracer on your computer and ensure that all necessary devices are available in the components library.

2. Create a Network

- **Step 1:** Drag two routers from the "Network Devices" section onto the workspace.
- **Step 2:** Use **Ethernet cables** to connect each router to a computer:
  - Router 1 (GigabitEthernet 0/0) ↔ PC1
  - Router 2 (GigabitEthernet 0/0) ↔ PC2
- **Step 3:** Configure the routers to form two different autonomous systems (AS). The routers will establish a BGP peering connection between the two AS.

3. Configure IP Addresses

Step 1: Assign IP addresses to the router interfaces and the computers.

Router 1 Configuration (AS 100):

```
enable
configure terminal
interface GigabitEthernet0/0
ip address 192.168.1.1 255.255.255.0
no shutdown
exit
```

Router 2 Configuration (AS 200):

```
enable
configure terminal
interface GigabitEthernet0/0
ip address 192.168.2.1 255.255.255.0
no shutdown
exit
```

- **PCs Configuration:**
  - **PC1:** IP - 192.168.1.2, Subnet - 255.255.255.0, Gateway - 192.168.1.1
  - **PC2:** IP - 192.168.2.2, Subnet - 255.255.255.0, Gateway - 192.168.2.1

4. Enable BGP

Step 1: Access the CLI of each router and configure BGP for each router's respectiveAS.

Router 1 BGP Configuration (AS 100):

```
enable
configure terminal
router bgp 100
neighbor 10.1.1.2 remote-as 200 # Peering with Router 2 (AS 200)
network 192.168.1.0 mask 255.255.255.0  # Advertise network in AS 100
exit
```

Router 2 BGP Configuration (AS 200):

```
enable
configure terminal
```

router bgp 200
neighbor 10.1.1.1 remote-as 100 # Peering with Router 1 (AS 100)
network 192.168.2.0 mask 255.255.255.0 # Advertise network in AS 200
exit

5. Test Connectivity

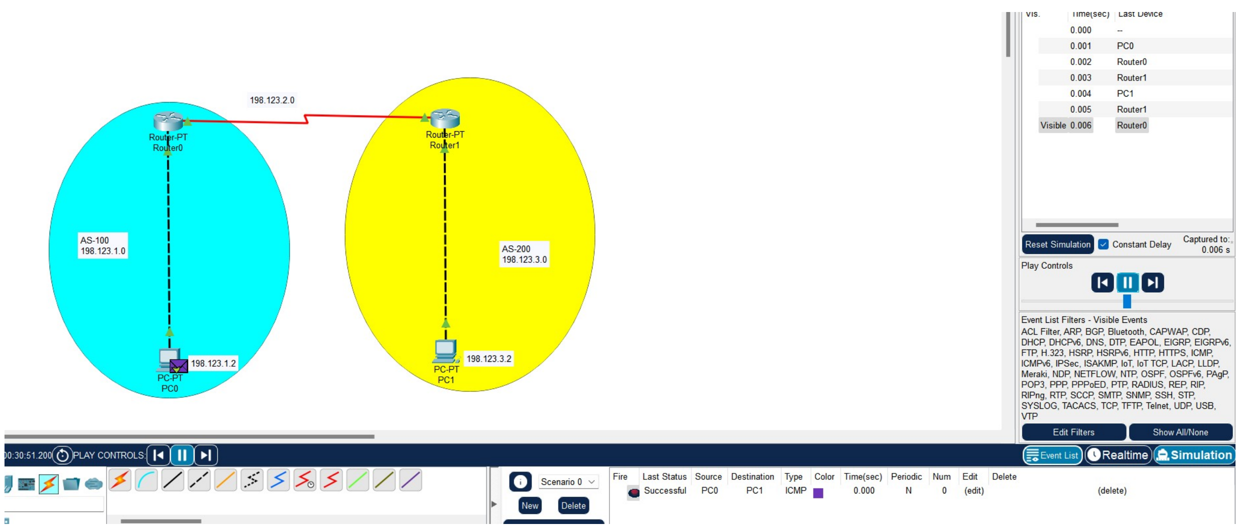
- **Step 1:** Once BGP is configured on both routers and the peering is established, test the network connectivity using the ping command.

Step 2: Open the command prompt on PC1 and PC2.
From PC1:
ping 192.168.2.2

From PC2:
ping 192.168.1.2

- If both ping commands return successful replies, BGP is successfully routing traffic between the two autonomous systems.

Results:



Conclusion

In this lab, we successfully implemented Border Gateway Protocol (BGP) to establish a connection between two routers in separate autonomous systems (AS 100 and AS 200). We assigned IP addresses to the router interfaces and connected PCs, established BGP peering between the two routers, and advertised their respective networks. Finally, we verified the setup using the ping command to check connectivity between the computers in different autonomous systems. The successful ping results demonstrate that the BGP configuration is working, and routing between the autonomous systems is operational.

Lab 14: Implementation of EIGRP

Objective

The objective of this lab is to configure Enhanced Interior Gateway Routing Protocol (EIGRP) on three routers in a triangular topology. EIGRP is an advanced distance-vector routing protocol that provides fast convergence and efficient network resource utilization. After setting up the network and enabling EIGRP, we will test connectivity between computers connected to the routers using the ping command.

Requirements

- **Hardware/Software:**
  - Cisco Packet Tracer (network simulation software)
  - 3 Routers
  - 3 Computers (PCs)
  - Ethernet cables for PC-to-router connectivity
- **IP Addressing Scheme:**
  - Assign IP addresses to router interfaces and computers.
- **Routing Protocol:**
  - Enhanced Interior Gateway Routing Protocol (EIGRP)

Procedure

1. Launch Packet Tracer

- Open Cisco Packet Tracer on your computer and ensure that all necessary devices are available in the components library.

2. Create a Network

- **Step 1:** Drag three routers from the “Network Devices” section onto the workspace.
- **Step 2:** Connect the routers using **Serial cables** to form a triangular topology. The connections between the routers are as follows:
  - Router 1 (Serial 0/0/0) ↔ Router 2 (Serial 0/0/0)
  - Router 2 (Serial 0/0/1) ↔ Router 3 (Serial 0/0/1)
  - Router 3 (Serial 0/0/0) ↔ Router 1 (Serial 0/0/1)

- **Step 3:** Connect each router to a computer using **Ethernet cables**:
  - Router 1 (GigabitEthernet 0/0) ↔ PC1
  - Router 2 (GigabitEthernet 0/0) ↔ PC2
  - Router 3 (GigabitEthernet 0/0) ↔ PC3

3. Configure IP Addresses

Step 1: Assign IP addresses to the router interfaces and the computers.

Router 1 Configuration:

```
enable
configure terminal
interface GigabitEthernet0/0
ip address 192.168.1.1 255.255.255.0
no shutdown
exit
interface Serial0/0/0
ip address 10.1.1.1 255.255.255.252
clock rate 64000  # Set clock rate for DCE end
no shutdown
exit
interface Serial0/0/1
ip address 10.1.2.1 255.255.255.252
no shutdown
exit
```

Router 2 Configuration:

```
enable
configure terminal
interface GigabitEthernet0/0
ip address 192.168.2.1 255.255.255.0
no shutdown
exit
interface Serial0/0/0
ip address 10.1.1.2 255.255.255.252
no shutdown
exit
interface Serial0/0/1
```

```
ip address 10.1.3.1 255.255.255.252
no shutdown
exit
```

Router 3 Configuration:

```
enable
configure terminal
interface GigabitEthernet0/0
ip address 192.168.3.1 255.255.255.0
no shutdown
exit
interface Serial0/0/0
ip address 10.1.2.2 255.255.255.252
no shutdown
exit
interface Serial0/0/1
ip address 10.1.3.2 255.255.255.252
no shutdown
exit
```

- **PCs Configuration:**
  - **PC1:** IP - 192.168.1.2, Subnet - 255.255.255.0, Gateway - 192.168.1.1
  - **PC2:** IP - 192.168.2.2, Subnet - 255.255.255.0, Gateway - 192.168.2.1
  - **PC3:** IP - 192.168.3.2, Subnet - 255.255.255.0, Gateway - 192.168.3.1

4. Enable EIGRP

Step 1: Access the CLI of each router and configure EIGRP with the same Autonomous System (AS) number on all routers. We use AS number 1 for this lab.

Router 1 EIGRP Configuration:

```
enable
configure terminal
router eigrp 1
network 192.168.1.0 # Advertise the network connected to Router 1
network 10.1.1.0  # Advertise the network between Router 1 and Router 2
network 10.1.2.0  # Advertise the network between Router 1 and Router 3
exit
```

Router 2 EIGRP Configuration:

```
enable
configure terminal
router eigrp 1
network 192.168.2.0 # Advertise the network connected to Router 2
network 10.1.1.0  # Advertise the network between Router 1 and Router 2
network 10.1.3.0  # Advertise the network between Router 2 and Router 3
exit
```

Router 3 EIGRP Configuration:

```
enable
configure terminal
router eigrp 1
network 192.168.3.0 # Advertise the network connected to Router 3
network 10.1.2.0  # Advertise the network between Router 1 and Router 3
network 10.1.3.0  # Advertise the network between Router 2 and Router 3
exit
```

5. Test Connectivity

Step 1: After configuring EIGRP on all routers, test the network connectivity by using the ping command from each PC.

From PC1:

```
ping 192.168.2.2  # Ping PC2
ping 192.168.3.2  # Ping PC3
```

From PC2:

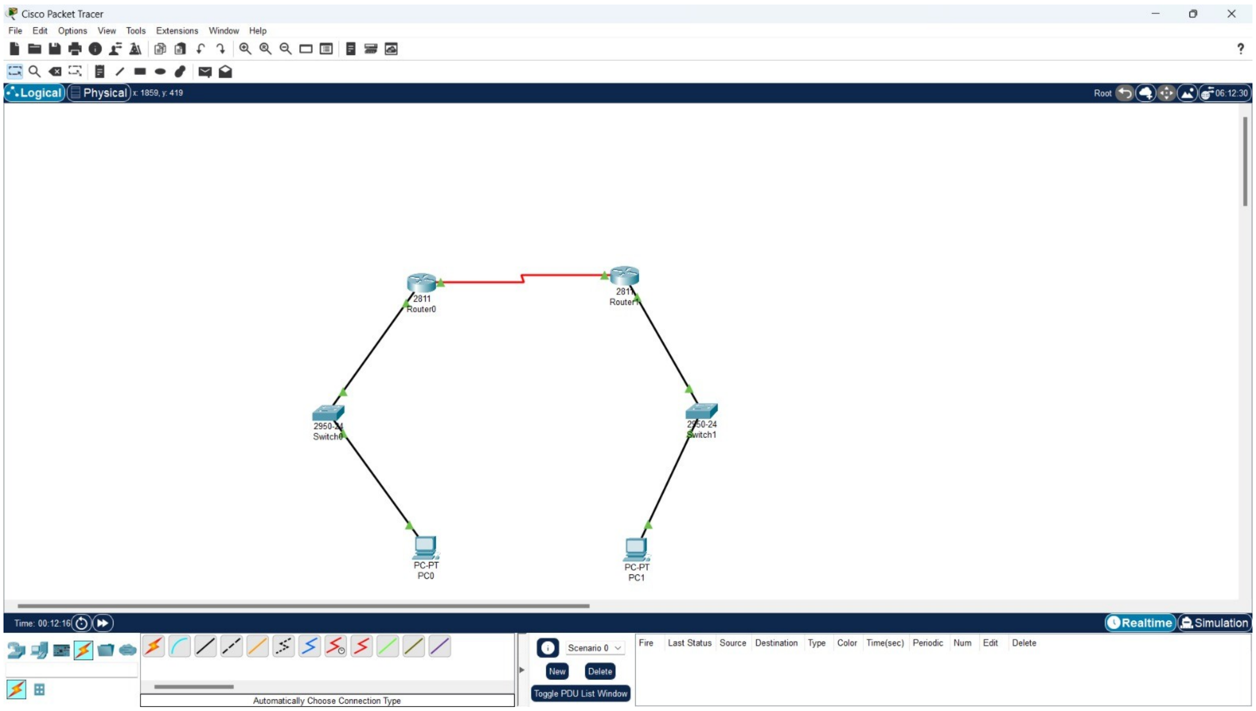
```
ping 192.168.1.2  # Ping PC1
ping 192.168.3.2  # Ping PC3
```

From PC3:

```
ping 192.168.1.2  # Ping PC1
ping 192.168.2.2  # Ping PC2
```

- If all ping commands return successful replies, the EIGRP configuration is working correctly and connectivity between the PCs is established.

Results:



Conclusion

In this lab, we successfully implemented Enhanced Interior Gateway Routing Protocol (EIGRP) on three routers in a triangular topology. We assigned IP addresses to the routers and connected PCs, configured EIGRP with the same Autonomous System (AS) number on all routers, and advertised their respective networks. Finally, we tested connectivity between the computers connected to the routers using the ping command. The successful ping results demonstrate that the EIGRP configuration is working, and the routers are routing traffic between their respective networks.

Lab 15: Telnet Configuration

Objective

The objective of this lab is to configure Telnet on a router and allow remote access to the router through a computer in a simple network. Telnet is a protocol that enables command-line access to devices remotely, and this lab will walk through setting up Telnet and testing connectivity.

Requirements

- **Hardware/Software:**
  - Cisco Packet Tracer (network simulation software)
  - 1 Router
  - 1 Computer (PC)
  - Ethernet cable for PC-to-router connectivity
- **IP Addressing Scheme:**
  - Assign IP addresses to the router and computer for network communication.
- **Services:**
  - Telnet for remote access.

Procedure

1. Launch Packet Tracer

- **Step 1:** Open Cisco Packet Tracer on your computer and ensure the necessary devices (router and PC) are available in the components library.

2. Create a Network

- **Step 1:** Drag a **router** from the “Network Devices” section onto the workspace.
- **Step 2:** Drag a **PC** from the “End Devices” section onto the workspace.
- **Step 3:** Connect the PC to the router using an **Ethernet cable**:

    - Connect the Ethernet interface on the PC to the **GigabitEthernet0/0** interface of the router.

3. Configure IP Addresses

Step 1: Assign an IP address to the router interface connected to the PC.
Router Configuration:

```
enable
configure terminal
interface GigabitEthernet0/0
ip address 192.168.1.1 255.255.255.0  # Assign an IP address to the router's
interface
no shutdown  # Enable the interface
exit
```

- **Step 2:** Assign an IP address to the PC:
    - **PC IP Address:** 192.168.1.2
    - **Subnet Mask:** 255.255.255.0
    - **Default Gateway:** 192.168.1.1 (router IP)
- To configure the IP address on the PC:
    - Click on the PC → Go to the **Desktop** tab → Select **IP Configuration**.
    - Enter the IP address, subnet mask, and default gateway.

4. Enable Telnet

Step 1: Access the **CLI** of the router and enter global configuration mode to enable Telnet.
Router Configuration:

```
enable
configure terminal
line vty 0 4 # Configure Virtual Terminal (vty) lines for Telnet
password cisco  # Set the password for Telnet access
login  # Enable login for Telnet
exit
```

Step 2: Set the router's **enable password** to control access to privileged EXEC mode:
enable secret cisco

5. Test Telnet Connectivity

- **Step 1:** From the **PC**, open the **Command Prompt** on the **Desktop** tab.

Step 2: Use the Telnet command to remotely connect to the router.
Telnet Command:
telnet 192.168.1.1

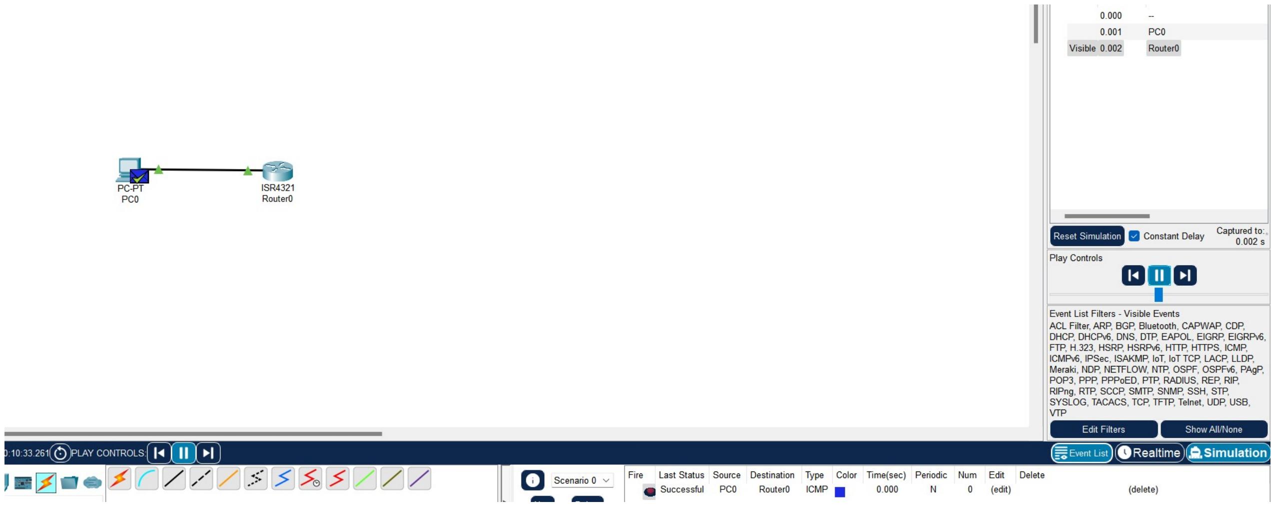
  - When prompted, enter the Telnet password (cisco).
  - After successful login, you should have access to the router's command-line interface from the PC.

Step 3: Verify that you can access the router's privileged EXEC mode by entering the enable command and entering the enable password (cisco):
enable

- After entering the password, you should have full access to the router's configuration.

Testing Telnet Connectivity
To ensure Telnet connectivity, you can test other commands within the router CLI from the PC, such as viewing the router's running configuration using the following command:
show running-config

Results:



Conclusion

In this lab, we successfully configured Telnet on a Cisco router and connected a PC to remotely access the router's command-line interface. After assigning IP addresses to both devices and enabling Telnet on the router, we were able to establish a Telnet session using the PC. The successful Telnet login confirms that the router can be managed remotely, which is useful for network administrators managing devices from different locations.

Github Repository link :

https://github.com/Harshini-s-u/Network_Lab_Assignments-2-