## AIM:

To design and configure a network topology in Cisco Packet Tracer that includes a **Hub, Switch, Bridge, Router, and multiple PCs**, and to demonstrate **both Unicast and Multicast communication**, while enabling proper routing between networks using static routes and validating end-to-end connectivity.

## Components Used:

1. **2 Routers** – For inter-network communication using static routing
2. **1 Switch** – To connect multiple devices in the same network segment
3. **1 Hub** – To demonstrate broadcast/unicast behavior in a legacy network
4. **1 Bridge** – To connect and filter traffic between different LAN segments
5. **4 PCs** – End-user devices to simulate sending and receiving data
6. **Copper Straight-through Cables** – To connect different types of devices (e.g., PC to Switch, Switch to Router)
7. **Copper Crossover Cable** – (if required, e.g., switch-to-switch or router-to-router in some cases)
8. **Multicast-capable software/tools (optional)** – For testing multicast behavior

## Topology Overview:

- **PC0** is connected to a **Hub**, which connects to a **Bridge**.
- The **Bridge** is connected to a **Switch**.
- **PC1** is also connected to the **Switch**.
- The **Switch** is further connected to a **Router (G0/0)**, which in turn is connected to **PC2** via its **G0/1** port.

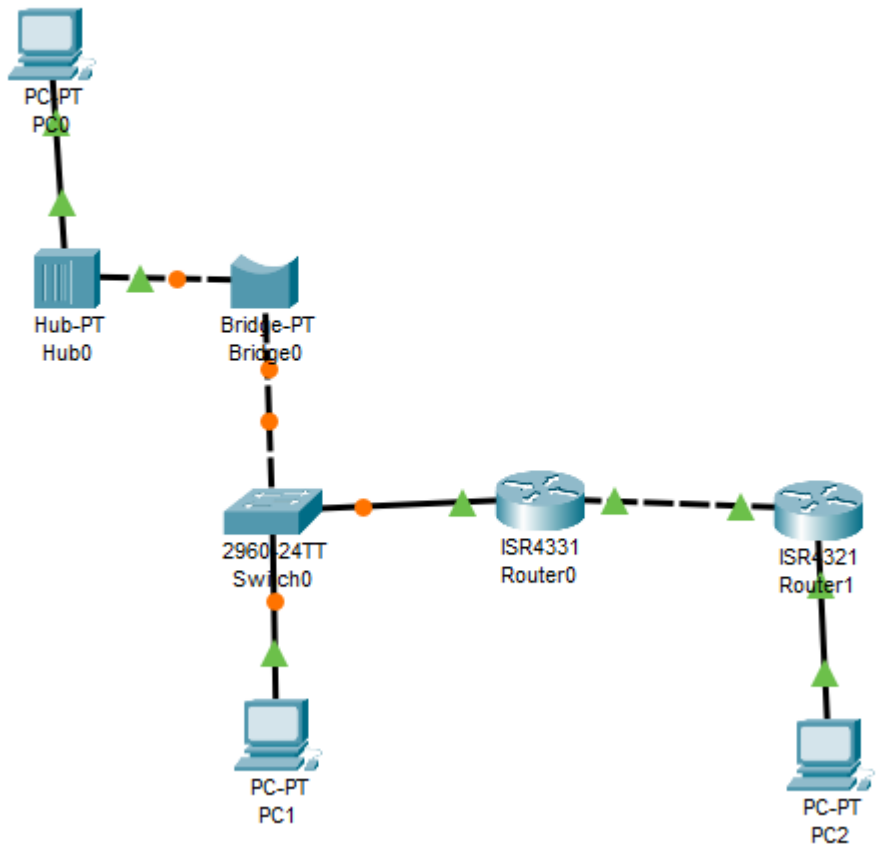
## Unicast Communication:

- **PC0 to PC1**: This is **unicast** — PC0 sends data specifically to PC1 (e.g., ping to 192.168.1.11).
- **PC0 to PC2**: This is also **unicast** — PC0 sends data directly to PC2 using the router (e.g., ping to 192.168.2.10).

## Multicast Communication:

- If **PC0 sends data to a multicast IP address**, such as **224.1.1.1**, and **both PC1 and PC2 have joined that multicast group**, then:
- **PC1 and PC2 will both receive the data**.
- This makes the communication **multicast**.

## Topology :




## PC0 Configuration

1. Click **PC0** → Desktop → IP Configuration.
2. Set:
    a. IP Address: `192.168.1.10`

b. Subnet Mask: `255.255.255.0`
c. Default Gateway: `192.168.1.1`

## PC1 Configuration

1. Click **PC1** → Desktop → IP Configuration.
2. Set:
    a. IP Address: `192.168.1.11`
    b. Subnet Mask: `255.255.255.0`
    c. Default Gateway: `192.168.1.1`

## PC2 Configuration

1. Click **PC2** → Desktop → IP Configuration.
2. Set:
    a. IP Address: `192.168.2.10`
    b. Subnet Mask: `255.255.255.0`
    c. Default Gateway: `192.168.2.1`

## Hub Configuration

- No configuration required (Layer 1 device).
- Just connect:
    - **PC0** → Hub Port 0
    - **Hub Port 1** → Bridge Port 0

## Bridge Configuration

1. Click **Bridge** → Config tab.
2. Connect:
    a. **Port 0** → Hub

b. **Port 1** → Switch (FastEthernet0/1)

*No IP needed (operates at Layer 2, forwards by MAC)*

## Switch Configuration

**Switch (FastEthernet0/3) ⟶ Router0 (GigabitEthernet0/0)**

```
Switch> enable
Switch# configure terminal
Switch(config)# hostname Switch1
Switch(config)# interface FastEthernet0/1
Switch(config-if)# description Connected to Bridge
Switch(config-if)# exit
Switch(config)# interface FastEthernet0/2
Switch(config-if)# description Connected to PC1
Switch(config-if)# exit
Switch(config)# interface FastEthernet0/24
Switch(config-if)# description Connected to Router G0/0
Switch(config-if)# exit
Switch(config)# exit
Switch# write
```

## Router0

**Steps:**

Router0 (GigabitEthernet0/1) ⟶ Router1 (GigabitEthernet0/0)

**Configuration:**

```
Router0> enable
Router0# configure terminal

! LAN Interface to Switch
Router0(config)# interface gigabitEthernet0/0
Router0(config-if)# ip address 192.168.1.1 255.255.255.0
Router0(config-if)# no shutdown
Router0(config-if)# exit

! WAN Interface to Router1
```

```
Router0(config)# interface gigabitEthernet0/1
Router0(config-if)# ip address 192.168.2.1 255.255.255.252
Router0(config-if)# no shutdown
Router0(config-if)# exit

! Add Static Route to reach PC2 network
Router0(config)# ip route 192.168.3.0 255.255.255.0 192.168.2.2
```

### 7. Router1

- **Router1 (GigabitEthernet0/1) ⟶ PC2 (FastEthernet0)**

## ROUTER1 CONFIGURATION

```
bash
CopyEdit
Router1> enable
Router1# configure terminal

! WAN Interface to Router0
Router1(config)# interface gigabitEthernet0/0
Router1(config-if)# ip address 192.168.2.2 255.255.255.252
Router1(config-if)# no shutdown
Router1(config-if)# exit

! LAN Interface to PC2
Router1(config)# interface gigabitEthernet0/1
Router1(config-if)# ip address 192.168.3.1 255.255.255.0
Router1(config-if)# no shutdown
Router1(config-if)# exit

! Add Static Route to reach PC0 & PC1 networks
Router1(config)# ip route 192.168.1.0 255.255.255.0 192.168.2.1
```