Objective:

To configure a DHCP server on a router and observe dynamic IP address allocation in a network using Cisco Packet Tracer.

Equipment Required:

1. **Cisco Packet Tracer Software**
2. **Router** (Configurable as a DHCP server)
3. **Switch**
4. Minimum of 3 **PCs** (as clients)
5. Ethernet cables

Theory:

1. **Dynamic Host Configuration Protocol (DHCP):** DHCP is a network protocol that enables servers to automatically assign IP addresses and other network configurations to devices on the network, allowing them to communicate properly. DHCP eliminates the need to manually assign static IP addresses to each device.

Network Diagram:

Steps for DHCP Configuration:

Step 1: Network Setup

1. **Add devices:**
   - Drag and drop one **Router**, one **Switch**, and three **PCs** into the workspace in Cisco Packet Tracer.
   - Connect the devices using **straight-through Ethernet cables**:
     - **Router** (GigabitEthernet0/0) to **Switch** (FastEthernet0/1)
     - **Switch** (FastEthernet0/2, FastEthernet0/3, FastEthernet0/4) to each **PC** (PC1, PC2, PC3)
2. **Check connectivity:**
   - Ensure that all devices are powered on and cables are properly connected.

Step 2: Router DHCP Configuration

1. **Configure the Router as a DHCP Server:**
   - Click on the router and go to the **CLI** (Command Line Interface) tab.
   - Execute the following commands to enable the DHCP service on the router.

Step 3: Configure PCs to Obtain IP Automatically

1. **Configure PC1:**
   - Click on **PC1** → Go to the **Desktop** tab → Open **IP Configuration**.
   - Select the **DHCP** option to automatically obtain an IP address.

    - Verify that the PC has received an IP address, subnet mask, default gateway, and DNS server from the DHCP server (Router).
2. **Configure PC2 and PC3**:
    - Repeat the same process for PC2 and PC3, ensuring they also receive IP addresses dynamically from the DHCP server.

Step 4: Verify DHCP Configuration

1. **Check IP Assignment:**
    - On each PC, go to the **Command Prompt** (Desktop tab) and type the following command to check the IP configuration:

Test Network Connectivity:

- From **PC1**, open the **Command Prompt** and try to ping the router's IP address
- **Conclusion:**
- In this experiment, we successfully configured a DHCP server on a router using Cisco Packet Tracer. DHCP allows for the automatic assignment of IP addresses to devices in a network, eliminating the need for manual configuration. Each PC was able to receive a unique IP address dynamically and communicate with the router and each other.