

**PROGRAM -4:**

**Aim:** To configure Dynamic Host Configuration Protocol (DHCP) on a network device (such as a router) to dynamically assign IP addresses to devices connected to the network and verify the correct configuration.

**Theoretical Description:**

DHCP (Dynamic Host Configuration Protocol) is a network management protocol used to dynamically assign IP addresses and other related network configuration information (like subnet mask, gateway, DNS) to devices in a network. This eliminates the need for manually configuring each device with an IP address.

A DHCP server assigns IP addresses from a predefined range or pool of IP addresses to devices (clients) requesting an address. This system ensures efficient and automated distribution of IP addresses, reducing the risk of IP conflicts.

The basic process of DHCP includes four steps:

1. DHCP Discover: The client broadcasts a request to find a DHCP server.
2. DHCP Offer: The server responds with an IP address offer.
3. DHCP Request: The client requests the offered IP address.
4. DHCP Acknowledgment (ACK): The server confirms and assigns the IP address to the client.

**Algorithm:**

1. Network Setup:
  - a. In Packet Tracer (or physical setup), place a router (or DHCP server), a switch, and several end devices (PCs, laptops).
  - b. Connect the router to the switch, and connect the end devices to the switch using straight-through cables.
2. DHCP Configuration on the Router:
  - a. Access the router's CLI.
  - b. Enter global configuration mode and configure a DHCP pool with a range of IP addresses.



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**3. Exclude Specific IP Addresses (Optional):**

- a. If certain IPs (like the router itself) should not be assigned dynamically

**4. IP Configuration on End Devices:**

- a. On the PCs connected to the network, go to the Desktop tab in Packet Tracer, open IP Configuration, and select DHCP.
- b. The PCs should automatically obtain an IP address from the DHCP server.

**5. Verification:**

- a. On the router, use the following command to verify the leased IP addresses:
  - i. Router# show ip dhcp binding

**Output:**

**1. PC IP Configuration (Automatically Assigned):**

- a. IP Address: 192.168.1.11
- b. Subnet Mask: 255.255.255.0
- c. Default Gateway: 192.168.1.1
- d. DNS Server: 8.8.8.8

**2. DHCP Binding Output (On Router):**

- |    |              |                            |           |
|----|--------------|----------------------------|-----------|
| a. | IP address   | Client-ID/Lease expiration | Type      |
| b. | 192.168.1.11 | 0001.4a55.a3b7             | Automatic |
| c. | 192.168.1.12 | 0002.4b67.fad9             | Automatic |

**3. DHCP Show Command Output:**

- a. Router# show ip dhcp binding
- b. Router# show ip dhcp pool
- c. Pool MY\_POOL :



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d. Utilization: 2 addresses in use, 246 available

e. Subnet size: 256

**Conclusion:** In conclusion, DHCP is a technology that simplifies network setup by automatically assigning IP addresses and network configurations to devices. While DHCP offers convenience, it's important to manage its security carefully. Issues such as IP address exhaustion, and potential data access through DNS settings highlight the need for robust security measures like firewalls and VPNs to protect networks from unauthorized access and disruptions. DHCP remains essential for efficiently managing network connections while ensuring security against potential risks.

**Viva Questions:**

1. What is the role of a DHCP server in a network?
2. Explain the DHCP Discover and DHCP Offer processes.
3. What is the significance of the default-router command in DHCP configuration?
4. Why would you use the `ip dhcp excluded-address` command in DHCP configuration?