LAB 4

DHCP

In this lab, for the first task, we will configure the DHCP server and set DHCP assigned network settings. DHCP (Dynamic Host Configuration Protocol) is a client/server network protocol that is used to automatically assign IP addresses and other network configuration parameters to devices (clients) on a network. This eliminates the need for manual IP address configuration for each device, which simplifies network management. With DHCP, this entire process is automated and managed centrally. The DHCP server maintains a pool of IP addresses and leases an address to any DHCP-enabled client when it starts up on the network. Because the IP addresses are dynamic (leased) rather than static (permanently assigned), addresses no longer in use are automatically returned to the pool for reallocation.

How DHCP Works

The client device sends out a **Discover** broadcast message to the network to locate a DHCP server. If the DHCP server is not on the same network as the client, a DHCP relay agent on the network forwards the message to the DHCP server. The DHCP server, which is configured with a DHCP pool, receives the DHCP Discover message. The server selects an available IP address from its DHCP pool and prepares a DHCP **Offer** message that includes the assigned IP address, subnet mask, default gateway, DNS servers, and lease time. The client receives the offer and sends a **Request** to the selected DHCP server to accept the offered IP address. The DHCP server confirms the assignment, and sends **Acknowledgement** to the client with the IP address, lease time, and other configuration details.

What is DHCP pool?

A DHCP pool is a range of IP addresses that a DHCP server can allocate to clients on a network. When a device connects to the network, it requests an IP address from the DHCP server. The server then assigns an IP address from the pool to the device, allowing it to communicate on the network.

What is DHCP relay?

DHCP relay, also known as DHCP forwarding, is a mechanism used to enable DHCP clients and servers to communicate across different networks. This is particularly useful when a DHCP server is not located on the same local network as the DHCP clients.

We can configure a DHCP server on a router using its CLI or a dedicated server.

DHCP Server Configuration and Management using a router

1. **Excluding Addresses**:
    - **Purpose**: Excluding addresses in a DHCP server prevents the server from assigning specific IP addresses to clients, ensuring those addresses are reserved for static devices or

network services. This avoids IP conflicts and ensures reliable assignments for critical devices.
    - **Command**: ***ip dhcp excluded-address [Start IP address] [End IP address]***
2. **Creating a DHCP Pool**:
    - **Command**: ***ip dhcp pool [Pool name]***
3. **Configuring Pool Network Settings**:
    - **Network**: Defines the IP address range and subnet mask.
        - **Command**: ***network [Network address] [Subnet mask]***
    - **DNS Server**: Specifies the DNS server addresses for clients.
        - **Command**: ***dns-server [DNS address]***
    - **Default Router**: Sets the default gateway for clients.
        - **Command**: ***default-router [Default gateway]***
4. **Setting Up a DHCP Relay Agent**:
    - **Enter the Interface**: Access the interface to configure the relay agent.
        - **Command**: ***interface [Interface name]***
    - **Configure Relay Agent**: Specifies the IP address of the DHCP server to forward requests to.
        - **Command**: ***ip helper-address [DHCP server IP address]***
5. **Assigning IP Address via DHCP**:
    - **Command**: ***ip address dhcp***
6. **Viewing DHCP Bindings**:
    - **Purpose**: Provides details about current DHCP leases, including allocated IP addresses, lease expiration times, and associated MAC addresses.
    - **Command**: ***show ip dhcp bindings***