

## **Experiment No. 5**

**Title:** Configure a Cisco Router as a DHCP Server

**Problem Statement:**

Configuring a Cisco Router as a DHCP Server.

**Objectives:**

- What is a DORA Process
- Benefits of DHCP
- How it works?

**Outcome:**

Deploy Client-Server architectures and prototypes by the means of correct standards and technology to assign IP address.

**Software Requirements:**

Open-source Linux operating system, Cisco Packet Tracer.

**THEORY:**

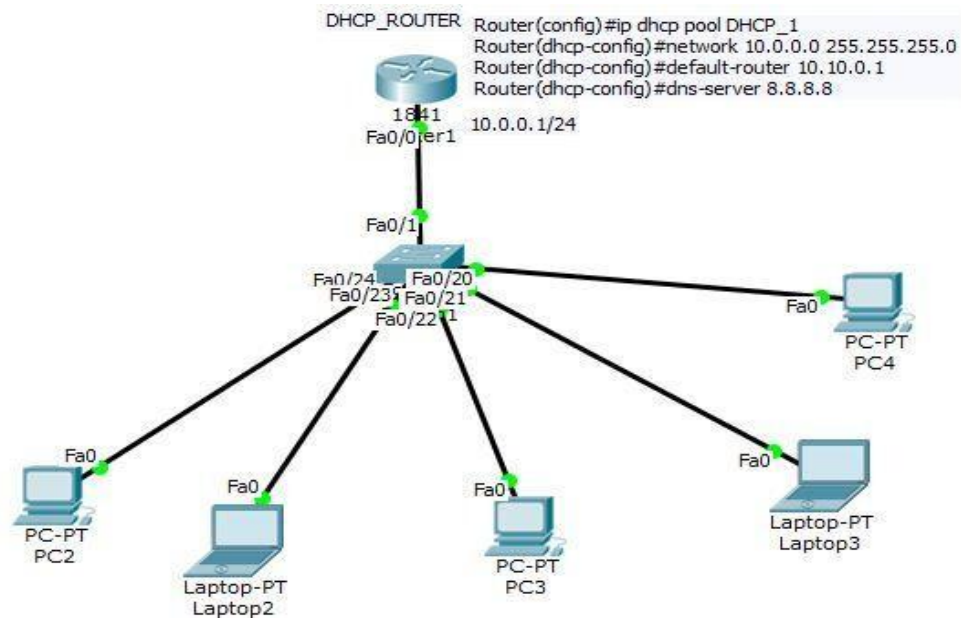
Dynamic Host Configuration Protocol (DHCP) is a standardized client/server network protocol that dynamically assigns IP addresses and other related configuration information to network devices. Every device on a TCP/IP-based network must have a unique unicast IP address to access the network and its resources. Without DHCP, IP addresses for new computers or computers that are moved from one subnet to another must be configured manually.

## **Configuring the DHCP server**

The DHCP server uses address pools when responding to DHCP client requests. Address pools contain specific IP configuration details that the DHCP server can allocate to a client. You can configure multiple address pools on the device for different networks.

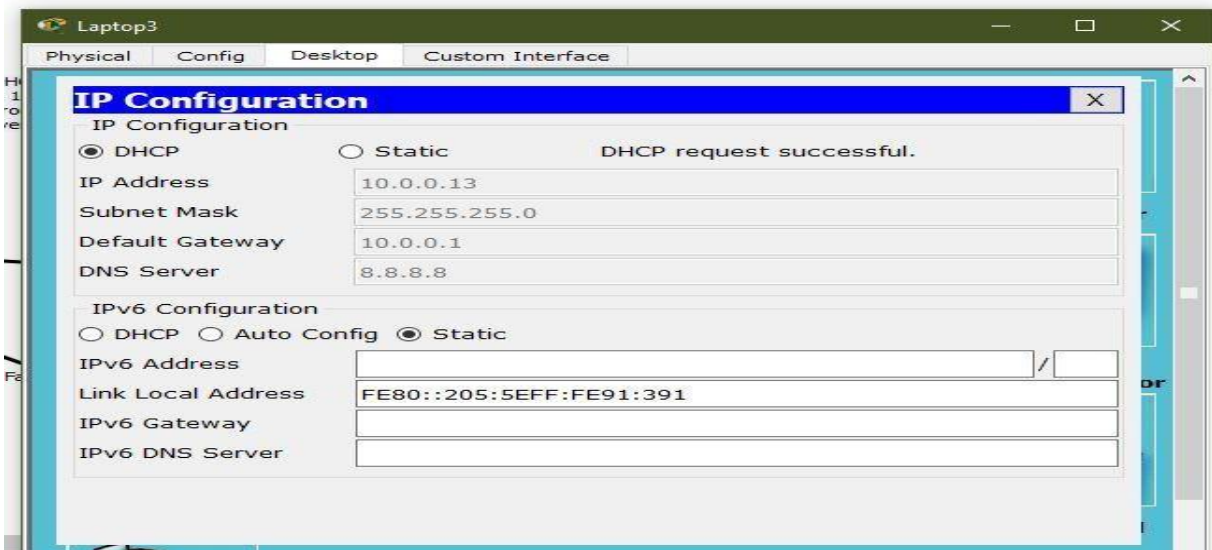
To configure an address pool, you must:

1. Create the pool and enter its configuration mode.
2. Define the network the pool applies to.
3. Define the range of IP addresses that the server can allocate to clients. You can specify multiple address ranges for each pool.
4. Set the lease for the clients. This defines whether the clients receive a dynamic, permanent, or static IP address.
5. Set the options (standard and user-defined) that the clients of a pool require when configuring their IP details.
6. After configuring the address pools, enable the DHCP server by using the command:



### On Client Side:

Select IP allocation as a Dynamic allocation.



### DORA Process

The following diagram shows the changing port numbers and the source and destination addresses used during the DHCP transaction. UDP port 68 is reserved for DHCP clients, and UDP port 67 is reserved for DHCP servers.

## Step 1

### DHCP Discover

Sent by the client looking for the IP address. The source IP is 0.0.0.0 because the client doesn't have an IP address. The destination is 255.255.255.255, which is the broadcast address, as the client doesn't know where the DHCP server is located, so it broadcasts to all devices on the network.



## Step 2 DHCP Offer

Sent by the DHCP server offering an IP address to the client. The source address is the DHCP server address. The DHCP server doesn't know the client address yet, so it broadcasts the offer to all devices on the network.



## Step 3 DHCP Request

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Sent by the client to the DHCP server to say "I will take that IP address, thanks." The client IP address is still 0.0.0.0 and it is again broadcast to all so that any other servers on the network that may have offered an IP address will know to stop communicating with the client for now.



#### Step 4 DHCP Acknowledgment



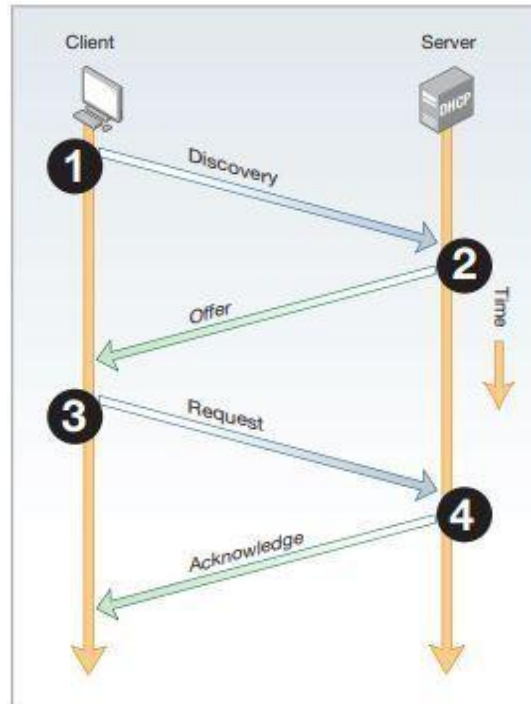
Sent by the DHCP server to the client. It confirms the IP address and other details such as subnet mask, default gateway, and lease time with the client. The source address is the DHCP server and the destination is still the broadcast address.



#### The DHCP process

There are four basic steps the DHCP process follows when a client connects to the network:

1. The client broadcasts a DHCP Discover message to say "I need an IP address, are there any DHCP servers out there?"
2. Multiple DHCP servers may respond (via broadcast) with an OFFER for a leased IP address back to the client.
3. The client will choose a DHCP server offer and then broadcast a DHCP REQUEST back to the DHCP server(s) to say "Thanks, I have selected an offer from this DHCP server." All servers will see which offer the client selected.
4. Finally, the selected DHCP server will send (broadcast) an ACKNOWLEDGEMENT back to the client to confirm the IP address, lease time, and other details.



**Conclusion:**

**Frequently asked questions: -**

- 1] Explain DORA Process?
- 2] What are benefits of DHCP Process?
- 3] Why DORA works on UDP..?