DHCP
(Dynamic Host Configuration Protocol)

Introduction

- The Dynamic Host Configuration Protocol (DHCP) allows devices to dynamically acquire their addressing information.
- It is a service which is responsible to provide **automatic TCP/IP Configuration** to the network hosts. TCP/IP Configuration includes, **IP address, Subnet Mask, Default Gateway, DNS addresses** etc….
- It has two components, DHCP **Server** and DHCP **Client**. If DHCP client requests for the IP configuration, then DHCP server responds to it by providing the TCP/IP configuration to that particular client.
- DHCP uses **UDP** as its transmission protocol.
- DHCP Port Numbers:

  DHCP Sever - **67**

  DHCP Client - **68**

Advantages-

- It reduces the amount of configuration on network devices.
- It reduces likelihood of configuration errors.
- It gives you more control by centralizing IP addressing information.

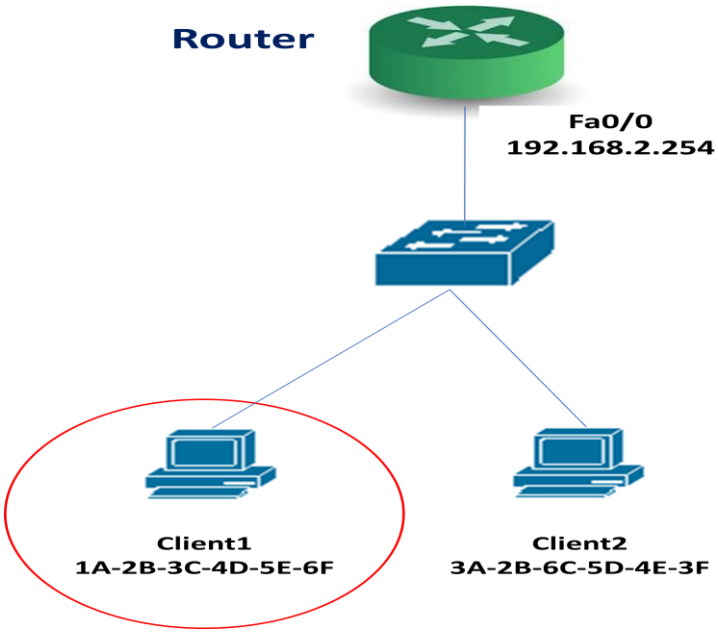
DHCP Operation

When acquiring addressing information, a DHCP Client goes through four steps:

DHCP server & client goes through **DORA** process to exchange IP information between them.

Steps	Description
Step1	A client generates a **DHCPDISCOVER** broadcast to discover who the DHCP servers on the LAN segment.
Step2	All DHCP servers on the segment can respond to the client with a **DHCPOFFER** unicast message, which offers IP addressing information to the client. If a client receives messages from multiple servers, then it chooses one (typically the first one).
Step3	Upon choosing one of the offers, the client responds to the corresponding server with a **DHCPREQUEST** message, telling the server that it wants to use the addressing information the server sent. If there is only one server and server's information conflicts with the client's configuration, the client will respond with a **DHCPDECLINE** message.
Step4	The DHCP server responds with a **DHCPACK**, which is an acknowledgement to the client indicating that it received the **DHCPREQUEST** message and that the client accepted the addressing information. The server can also respond with a **DHCPNACK**, which tells the client the offer is no longer valid and the client should request for addressing information again. This can happen if the client is tardy in responding with a **DHCPREQUEST** message after the server generated the **DHCPOFFER** message.

DHCP on Router



- DHCP Service has been configured on Router.
- Client1 wants IP Configuration from DHCP Server running on Router.
- Client1 generates the request packet:

Source IP address	**0.0.0.0**
Destination IP address	**255.255.255.255**
Source MAC address	**1A-2B-3C-4D-5E-6F**
Destination MAC address	**FF-FF-FF-FF-FF-FF**
Source Port	**68**
Destination Port	**67**

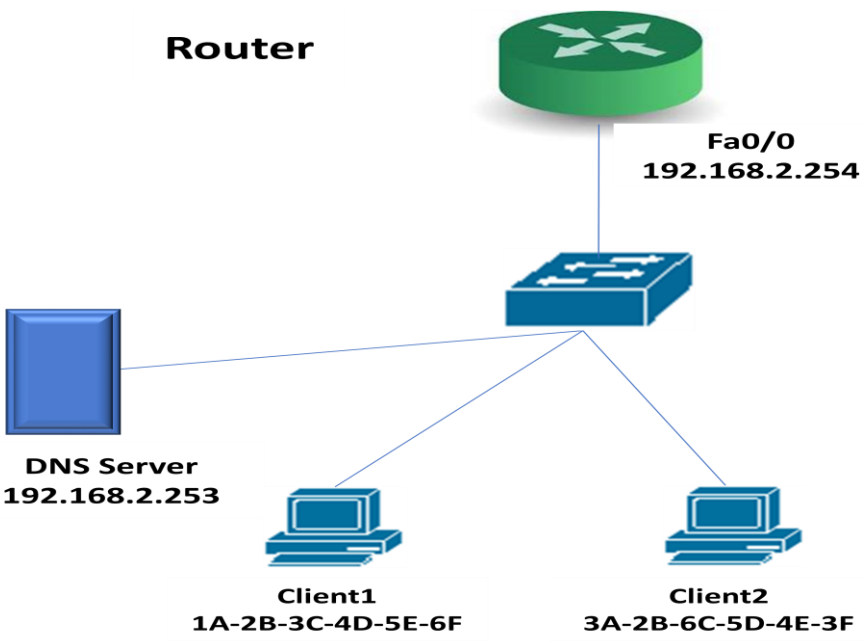
- Then Router (DHCP server) responds to the Client1 request and then provides the IP configuration.

Note: DHCP server can provide the entire TCP/IP configuration which includes:

- **A Unicast IP address**
- **Subnet Mask**
- **IP address of Default Gateway**
- **DNS Addresses**

and more……

Configuring DHCP on Router



Configure DHCP with the following options:

DHCP Pool Name	**Cisco**
DHCP IP Range	**192.168.2.1-252**
Network Address Subnet Mask	**192.168.2.0** **255.255.255.0**
Domain Name	**Cisco.com**
Default Gateway	**192.168.2.254**
DNS Server	**192.168.2.253**
DHCP Lease	**10 days**
Exclusion	**192.168.2.1 to 192.168.2.10**

Configuration Commands
Router(config) ip dhcp pool Cisco
Router(dhcp-config)# ip dhcp pool 192.168.2.1-252
Router(dhcp-config)# network 192.168.2.0 255.255.255.0
Router(dhcp-config)# domain-name Cisco.com
Router(dhcp-config)# default-router 192.168.2.254
Router(dhcp-config)# dns-server 192.168.2.253
Router(dhcp-config)# lease 10
Router(config)# ip dhcp excluded-address 192.168.2.1 192.168.2.10

Listing Obtained IP Addresses from Client from DHCP

Router#show ip dhcp binding