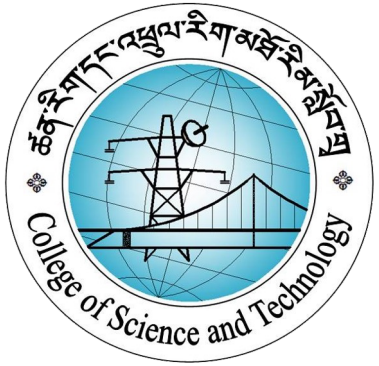


Royal University of Bhutan

LESSON – 19

DHCP (DYNAMIC HOST CONTROL PROTOCOL)

LEARNING OUTCOMES

- DHCP Basics
- Configure DHCP and testing

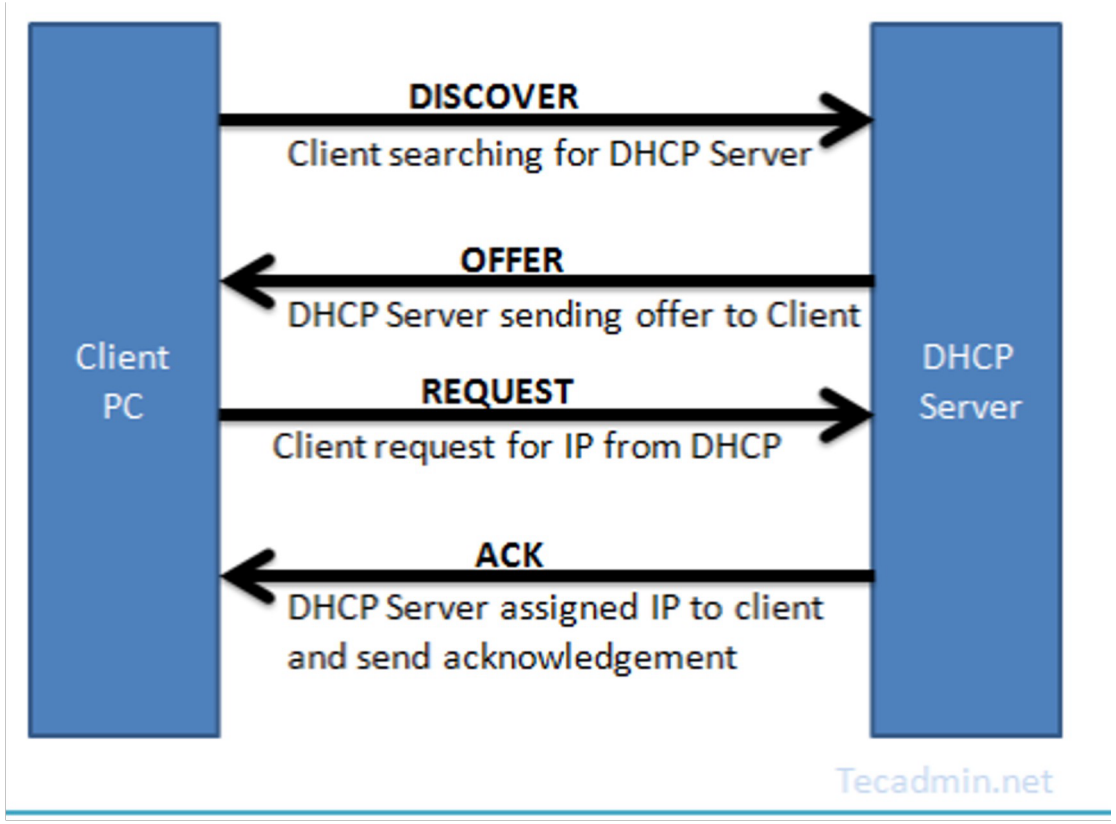
Dynamic Assignment of IP addresses

- Dynamic assignment of IP addresses is desirable for several reasons:
  - IP addresses are assigned on-demand
  - Avoid manual IP configuration
  - Support mobility of laptops and other devices

- Security Concerns and Mitigation -. Eg.: rogue DHCP servers and DHCP starvation attacks
  - Mitigation:
    - DHCP Snooping
    - IP Source Guard
    - MAC address filtering

What is DHCP Server?

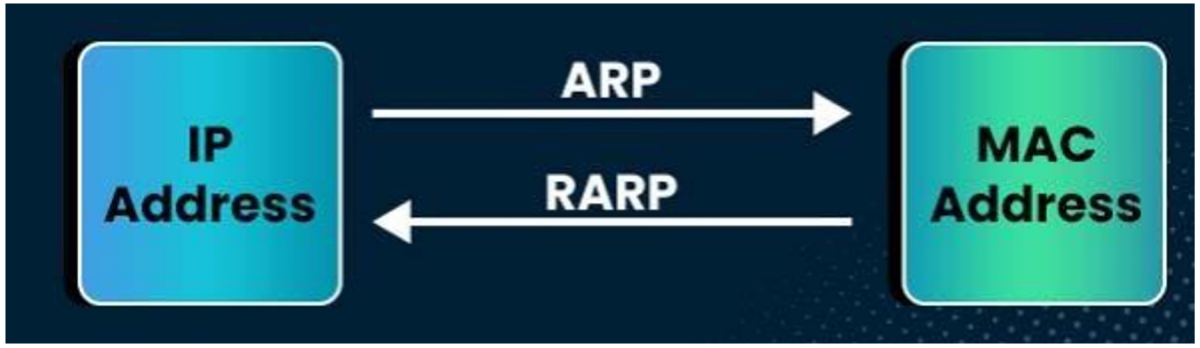
- DHCP (Dynamic Host Configuration Protocol) is a network protocol used for assigning IP addresses on-demand dynamically from predefined IP pool.
- It works on the concept of “leased”
- Processes based on DORA (Discovery Offer Request Acknowledge)
- DHCP processes the IP assignment in following ways:



Source: http://tecadmin.net/what-is-dhcp-server/

Solutions for dynamic assignment of IP addresses

- Reverse Address Resolution Protocol (RARP)
  - Works similar to ARP
  - Broadcast a request for the IP address associated with a given MAC address
  - RARP server responds with an IP address
  - Only assigns IP address (not the default router and subnetmask)



BOOTP

- BOOTstrap Protocol (BOOTP)
  - From 1985
  - Host can configure its IP parameters at boot time.
  - 3 services.
    - IP address assignment.
    - Detection of the IP address for a serving machine.
    - The name of a file to be loaded and executed by the client machine (boot file name)
  - Not only assign IP address, but also default router, network mask, etc.
  - Sent as UDP messages (UDP Port 60(PxEClient) 67 (server) and 68 (host))
  - Use limited broadcast address (255.255.255.255):
    - These addresses are never forwarded

Pre-installation setup

- Before you install DHCP server in server, you have to assign static IP address to one of the Ethernet port (because it is “internal networking” type).
- Configure Static IP address into the ethernet and restart the service

DHCP Server

- Installation
  - To install dhcp server, enter the following command at a terminal prompt:

    $ sudo apt update
    $ sudo apt install isc-dhcp-server -y

  - If there is more than one network card(s) in your server, then you have to select the network card on which your server will be listen for dhcp request
  - It's always a good practice to make a backup copy of the config files

DHCP Configuration

- Configuring port (DHCP Listen)
  - Edit /etc/default/isc-dhcp-server file and mention the interface on which DHCP would be running.
    - $ sudo vi /etc/default/isc-dhcp-server

      ---- INTERFACESv4="YOUR PORT NAME" ----

DHCP Configuration

- Configuring main DHCP conf file
  - Edit /etc/dhcp/dhcpd.conf
  - Add all the network information to the main DHCP configuration and save the changes

DHCP Configuration Sample (config file)

- Parameter Configuration Basic options which is common to all supported networks:

```
option domain-name “example.com";
option domain-name-servers 1.1.1.1, 8.8.8.8;
default-lease-time 600;
max-lease-time 7200;
authoritative;

# LAB 3
subnet 192.168.56.0 netmask 255.255.255.0 {
        option routers 192.168.56.1;
        option subnet-mask 255.255.255.0;
        range 192.168.56.10 192.168.56.254;
        }
```

DHCP Configuration

- Start and enable dhcp server service:
  $ sudo systemctl start isc-dhcp-server
  $ sudo systemctl enable isc-dhcp-server

- Verify the status
  $ sudo systemctl status isc-dhcp-server

- Check the DHCP Lease
  $ cd /etc/dhcp/
  $ dhcp-lease-list ** watch -n 1 dhcp-lease-list*

Activity

- Configure DHCP server to lease static IP addresses to certain machines (hint: MAC Address)

Configure DHCP server to lease static IP addresses to certain machines (hint:MAC Address)

```
#Static IP assignments based on MAC addresses

    host webserver {
        hardware ethernet 08:00:27:aa:bb:cc;
        fixed-address 192.168.56.50;
}
```

Creating static IP address using netplan

- Locate Netplan Configuration File

  ls /etc/netplan

- Create/Edit Netplan Configuration

  vim /etc/netplan/filename.yaml

- Test and Apply

  sudo netplan try
  sudo netplan apply

- Verify Configuration

  ip a
  ip route

```
# yaml file example

network:
  version: 2
  renderer: networkd
  ethernets:
    enp0s3:
      dhcp4: no
      addresses: [192.168.1.100/24]
      routes:
        - to: default
          via: 192.168.1.1
      nameservers:
        addresses: [8.8.8.8, 8.8.4.4 ]
```

SUMMARY

- In this lesson, you have learnt that:

  - DHCP concepts
  - Configuration