CNL Assignment 4 (DHCP) (31139-Durvesh)

//Write-up

Assignment No. 04

- Problem Statement: Installing and configure DHCP server & write a program to install the software on remote machine.
- Objective : To understand the concept of DHCP and its working.
- Outcome : We'll learn to assign IP to a client by ourselves using DHCP.
- S/W & H/W Requirements :
  Fedora 20 / Windows 10, Eclipse IDE, 1 GB RAM, Cisco Packet tracer.
- Theory :

  * DHCP :—

DHCP stands for Dynamic Host Configuration Protocol. DHCP is a standardized network protocol used on Internet Protocol networks for dynamically distributing network configuration parameters, such as IP addresses for interfaces and services. DHCP Server can be any server (Linux or Windows) that is used to distribute IP addresses automatically to the clients in the network. Since, DHCP Server assigns IP addresses automatically to all systems, a system or Network administrator need

not to assign IP addresses manually to every single machine in the network. DHCP is opt for system or Network administrator who is managing thousands of system.

The Dynamic Host Configuration Protocol (DHCP) is a network service that enables host computers to be automatically assigned settings from a server as opposed to manually configuring each network host. Computers configured to be DHCP clients have no control over the settings they receive from the DHCP server, and the configuration is transparent to the computer's user.

The most common settings provided by a DHCP server to DHCP clients include:

- IP address and netmask
- IP address of the default-gateway to use
- IP address of the DNS server to use
- However, a DHCP server can also supply configuration properties such as:
  - Host Name
  - Domain Name
  - Time Server
  - Print Server

The advantage of using DHCP is that changes to the network, for example a change in the address of the DNS server, need only be changed at the DHCP server, and all network hosts will be reconfigured the next time their DHCP clients poll the DHCP server. As an added advantage, it is also easier to integrate new computers into the network, as there is no need to check for the availability of an IP address. Conflicts in IP address allocation are also reduced.

A DHCP server can provide configuration settings using the following methods:

- Manual allocation (MAC address)

This method entails using DHCP to identify the unique hardware address of each network card connected to the network and then continually supplying a constant configuration each time the DHCP client makes a request to the DHCP server using that network device. This ensures that a particular address is assigned automatically to the network card, based on it's MAC address.

- Dynamic allocation (address pool)

In this method, DHCP server will assign an IP address from a pool of addresses (sometimes also called a range or scope) for a period of time or lease, that is configured on the server or until the client informs the server that it doesn't need the address anymore. This way, the clients will be receiving their configuration properties dynamically and on a "first come, first served"

basis. When a DHCP client is no longer on the network for a specified period, the configuration is expired and released back to the address pool for use by other DHCP clients. This way, an address can be leased or used for a period of time. After this period, the client has to renegotiate the lease with the server to maintain use of the address.

- Automatic allocation

Using this method, the DHCP automatically assigns an IP address permanently to a device, selecting it from a pool of available address. Usually DHCP is used to assign a temporary address to a client, but a DHCP server can allow an infinite lease time.

The last two methods can be considered "automatic" because in each case the DHCP server assigns an address with no extra intervention needed. The only difference between them is in how long the IP address is leased, in another words whether a client's address varies over time. Ubuntu is shipped with both DHCP server and client. The server is dhcpd (dynamic host configuration protocol daemon). The client provided with Ubuntu is dhclient & should be installed on all computers required to be automatically configured. Both programs are easy to install and configure and will be automatically started at system boot.

- Install DHCP Server in Ubuntu
To install DHCP server on Ubuntu 15.04, enter the following command.

Sudo apt-get install isc-dhcp-server

- Configuration
DHCP server config^ is not that difficult. First, we have to assign on what interfaces should the DHCP server (dhcpd) serve DHCP requests. In my case, I have only one interface on my system (eth0) so, I assigned eth0.

To do that, edit file /etc/default/isc-dhcp-server.

Sudo vi /etc/default
Assign the network interface:
[...]
INTERFACES = "eth0"
Save and close the file.
Now, edit the dhcpd.conf file,
sudo vi /etc/dhcp/dhcpd.conf
Make the changes as shown below.

Set the domain name and domain-name servers:
[...]
option definitions common to all supported networks..
option domain-name "unixmen.local";
option domain-name-servers server.unixmen.local;
[...]
If this DHCP server is the official DHCP server for the local network, you should uncomment the following line:

[...]
authoritative;
[...]
Define the subnet, range of ip addresses, domain and domain and domain name servers like below:
[...]
# A slightly different configuration for an internal subnet.
subnet 192.168.1.0 netmask 255.255.255.0 {
range 192.168.1.20 192.168.1.30;
option domain-name-servers server.unixmen.local;
option domain-name "unixmen.local";
option routers 192.168.1.1;
option broadcast-address 192.168.1.255;
default-lease-time 600;
max-lease-time 7200;
}
[...]
If you want to assign a fixed IP address to your client, you should enter its MAC id and the IP address in the following directive. For example, I want to assign a fixed IP address 192.168.1.15 to my Ubuntu client, therefore I modified the following directive as shown below.
[...]
host ubuntu-client {
hardware ethernet 00:22:64:5f:e9:3a;
fixed-address 192.168.1.15;
}
[...]

After making the changes you want, save and close the file. Be mindful that if you have unused entries on the dhcpd.conf file, comment all of them. Otherwise, you'll get issues while starting dhcp service.

Now, restart dhcp service.

In Ubuntu 15.04;
sudo systemctl restart isc-dhcp-server
In Ubuntu 14.04 & older systems:
sudo service isc-dhcp-server restart

Likewise, you can start/stop ~~ser~~ dhcp service as shown below

15.04 :-
sudo systemctl start isc-dhcp-server
sudo systemctl stop isc-dhcp-server
14.04 & older:-
sudo service isc-dhcp-server start
sudo service isc-dhcp-server stop

3. Configure DHCP Clients
Now, go to the client configuration network settings & change the IP settings to Automatic (DHCP).

Restart the network or reboot the client systems to get IP address automatically from DHCP server. Now, you should see the IP address has been automatically assigned to the clients from the DHCP server.
- Run the following command from client terminal.
sudo ifconfig

Conclusion :- We successfully learnt and implemented DHCP on a network.