AIM:

Installing and configure DHCP server and write a program to install the software on remote machine.

Theory:

DHCP stands for **D**ynamic **H**ost **C**onfiguration **P**rotocol. 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 systems.

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 adresses of the DNS servers 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 that network card, based on it's MAC address.

Dynamic allocation (address pool)
In this method, the 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 renegociate 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 addresses. 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 other 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* and 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 configuration 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/isc-dhcp-server

Assign the network interface:

[...]

INTERFACES="eth0"

Save and close the file.

Now, edit **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 sunbet, range of ip addresses, 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 it's 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 00:22:64:4f:e9:3a;

 fixed-address 192.168.1.15;

 }

[...]

After making all 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 and older systems:

sudo service isc-dhcp-server restart

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

In Ubuntu 15.04 systems:

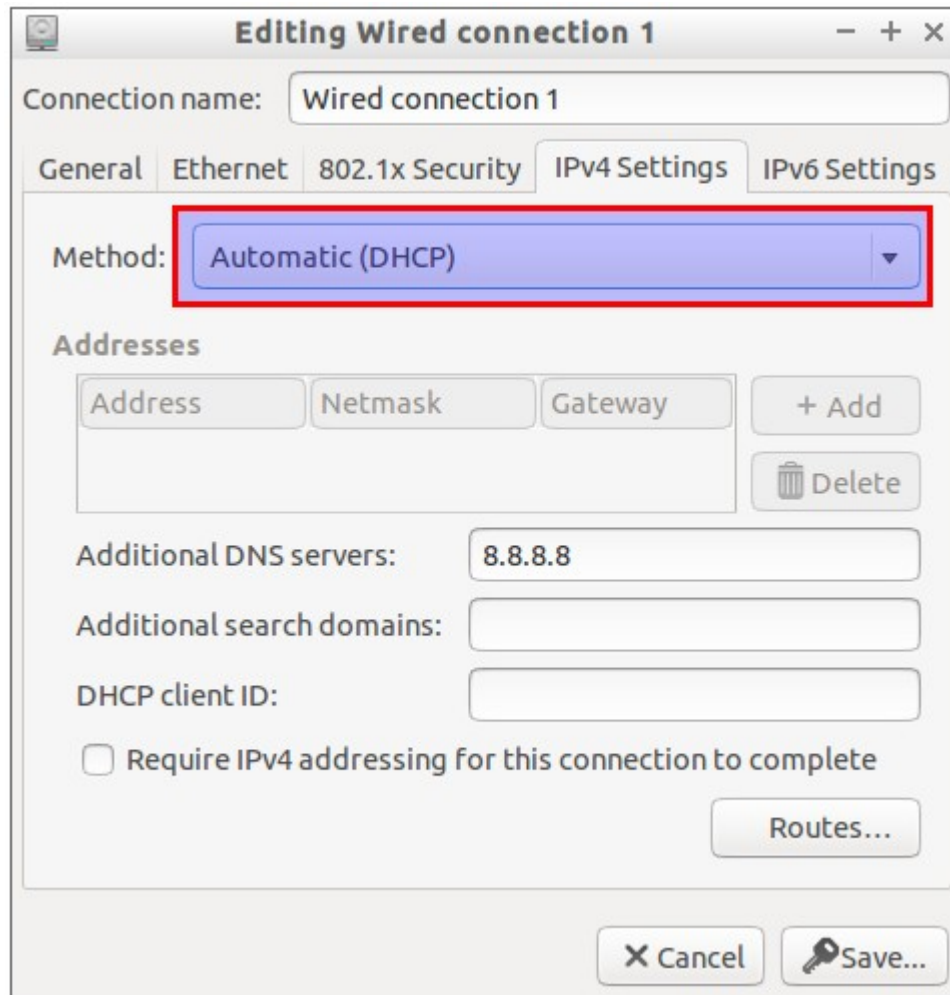sudo systemctl start isc-dhcp-server

sudo systemctl stop isc-dhcp-server

In Ubuntu 14.04 and older systems:

sudo service isc-dhcp-server start

sudo service isc-dhcp-server stop

3. Configure DHCP Clients

Now, go to the client configuration network settings and change the IP settings to **Automatic (DHCP)**.

Restart the network or reboot the client system to get IP address automatically from the 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 the client system Terminal:

sudo ifconfig

Sample output:

```
File  Edit  Tabs  Help

  root@server:~  ✕    sk@sk: ~        ✕

sk@sk:~$ sudo ifconfig
eth0      Link encap:Ethernet  HWaddr 00:22:64:4f:e9:3a
          inet addr:192.168.1.15  Bcast:192.168.1.255  Mask:255.255.255.0
          inet6 addr: fe80::222:64ff:fe4f:e93a/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:92345 errors:0 dropped:87 overruns:0 frame:0
          TX packets:88278 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:82209599 (82.2 MB)  TX bytes:13746123 (13.7 MB)
          Interrupt:22 Memory:e4600000-e4620000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:15617 errors:0 dropped:0 overruns:0 frame:0
          TX packets:15617 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:1554601 (1.5 MB)  TX bytes:1554601 (1.5 MB)

sk@sk:~$ █
```

As you see in the above picture, Ubuntu 14.04 desktop system which has MAC id **00:22:64:4f:e9:3a** got a fixed IP address (**192.168.1.15**) from the DHCP server.

Oral Questions

1. what is mean by DHCP and how does DHCP do?

2. What is configuration of DHCP server?

3. How to install the software on remote machine.?

4. What is uses of DHCP server?