

# Lab - Configuring a DHCP Server in Linux

## Overview

In this lab, you will learn how to install and configure the Dynamic Host Configuration Protocol (DHCP) in Linux. The Dynamic Host Configuration Protocol (DHCP) is a network protocol that enables a server to automatically assign an IP address to a computer from a defined range of numbers (i.e., a scope) configured for a given network.

## Hardware Requirements

- One virtual install of a Linux Server. For this lab, we will be using Fedora Server v35.
- One virtual install of a Windows or Linux workstation client for testing. (Optional).

## To begin the lab:

- Logon to the operating system as root.
- Open a terminal shell
- Ensure your server has the latest updates: `sudo dnf upgrade`
- Type the following command to install DHCP

```
dnf -y install dhcp-server
```

```
[root@fedora ~]# dnf -y install dhcp-server
```

## dhcpd.conf

The `dhcpd.conf` file contains configuration information for `dhcpd`, the Internet Systems Consortium DHCP Server. The `dhcpd.conf` file is a free-form ASCII text file. It is parsed by the recursive-descent parser built into `dhcpd`. This is the main file used by the DHCP server service and is critical to whether the service will work or even start. **Any file with the extension of `.conf` is the main configuration file for that service or application.**

Once the DHCP service is installed, the `dhcpd.conf` located in the main directory for DHCP at:

```
/etc/dhcp/dhcpd.conf
```

To check the location of this file, we can use the **cat** command along with the path to the file.

```
cat /etc/dhcp/dhcpd.conf
```

```
root@localhost:~
File Edit View Search Terminal Help
[root@Server2 ~]# cat /etc/dhcp/dhcpd.conf
#
# DHCP Server Configuration file.
#   see /usr/share/doc/dhcp-server/dhcpd.conf.example
#   see dhcpd.conf(5) man page
#
[root@Server2 ~]#
```

An example of the dhcpd.conf file is located the docs directory. We can view this file to see how the file is configured.

To view this example file, we first need to change to the directory location where the file is located. To do we use the following command:

```
cd /usr/share/doc/dhcp-server/
```

Notice your prompt changes to let you know you are now in the dhcp-server directory.

```
root@localhost:/usr/share/doc/dhcp-server
File Edit View Search Terminal Help
[root@Server2 dhcp-server]# cd /usr/share/doc/dhcp-server/
```

To view the contents of the example file, we can use any text editor. For this demonstration, I will use nano with the -c switch. The -c shows which numbered line my cursor is at inside the text file. Very useful for troubleshooting syntax errors.

The open the example file, use the following command:

```
nano -c dhcpd.conf.example
```

```
root@localhost:/usr/share/doc/dhcp-server
File Edit View Search Terminal Help
[root@Server2 dhcp-server]# nano -c dhcpd.conf.example
```

The contents of the file are opened.

```
root@localhost:/usr/share/doc/dhcp-server
File Edit View Search Terminal Help
GNU nano 2.8.4 File: dhcpd.conf.example

dhcpd.conf
#
# Sample configuration file for ISC dhcpd
#
# option definitions common to all supported networks...
option domain-name "example.org";
option domain-name-servers ns1.example.org, ns2.example.org;

default-lease-time 600;
max-lease-time 7200;

# Use this to enable / disable dynamic dns updates globally.
#ddns-update-style none;

# If this DHCP server is the official DHCP server for the local
# network, the authoritative directive should be uncommented.
#authoritative;
```

Once you're ready to exit the example file, press the **ctrl+x** key to close the file. We next need to rename the `dhcpd.conf` file in the main DHCP directory to `dhcpd.1234`. To do this, we can use the `move` command which can also be used to rename files.

```
mv /etc/dhcp/dhcpd.conf /etc/dhcp/dhcpd.1234
```

The next step is to copy the `dhcpd.conf.example` file over to the main directory for the DHCP service and at the same time rename it to `dhcpd.conf`. To do this, we will use the following command:

```
cp /usr/share/doc/dhcp-server/dhcpd.conf.example
/etc/dhcp/dhcpd.conf
```

```
root@localhost:/usr/share/doc/dhcp-server
File Edit View Search Terminal Help
[root@Server2 dhcp-server]# cp /usr/share/doc/dhcp-server/dhcpd.conf.example /etc/dhcp/dhcpd.conf
[root@Server2 dhcp-server]#
```

We are now ready to confirm the renaming, and the copying of the files has taken place. To do this, we can change directory over to the main directory for the `dhcpd.conf` file and use the `ls` command to check the contents of the directory.

Use the following command to change directory location:

```
cd /etc/dhcp/
```

Use `ls` to view the directory contents.

```
root@localhost:/etc/dhcp
File Edit View Search Terminal Help
[root@Server2 dhcp-server]# cd /etc/dhcp/
[root@Server2 dhcp]# ls
dhclient.d  dhcpd.1234  dhcpd6.conf  dhcpd.conf
[root@Server2 dhcp]#
```

For this next step of the lab, we are going to get our DHCP server up and running as quickly as possible by modifying the dhcpd.conf file for the DHCP service.

For this step of the lab, I'll be using the nano text editor again with the -c switch. Type the following command into your terminal window:

```
nano -c /etc/dhcp/dhcpd.conf
```

The easiest and fastest way to get a Linux DHCP server up and running is to reduce the risk of syntax errors by using an existing dhcpd.conf file.

Anything that is commented out using a shebang (#) is ignored by the server. Even though the white text is not commented out, because the authoritative directive is commented out, this too is ignored.

Begin by removing the shebang (#) in front of the authoritative directive. Use your arrow keys to move the cursor using nano.

```
# Use this to enable / disable dynamic dns updates globally.
#ddns-update-style none;

# If this DHCP server is the official DHCP server for the local
# network, the authoritative directive should be uncommented.
authoritative; Remove the shebang from in front of authoritative.
```

We next need to remove the remaining white text except for the example text under the commented line that says # **A slightly different configuration for an internal subnet.**

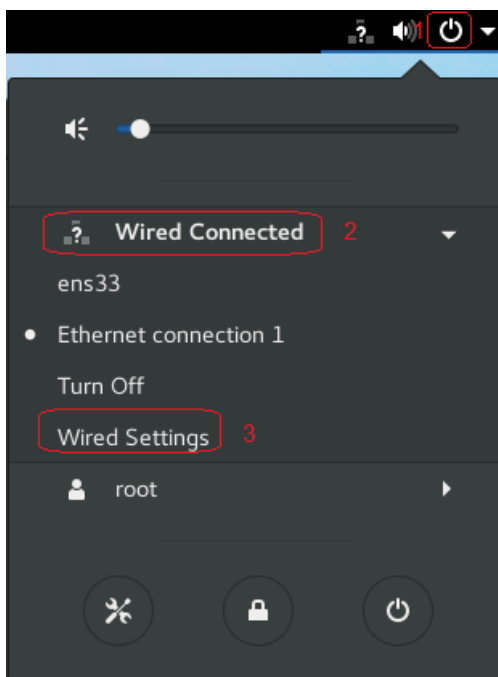
```
# A slightly different configuration for an internal subnet.
subnet 192.168.145.0 netmask 255.255.255.0 {
    range 192.168.145.100 192.168.145.220;
    option domain-name-servers server1.syberoffense.local;
    option domain-name "syberoffense.local";
    option routers 192.168.145.2;
    option broadcast-address 192.168.145.255;
    default-lease-time 600;
    max-lease-time 7200;
}
```

This is the scope example for a DHCP server. Using network information, you can modify the IP information, the domain-name server, the domain-name, the IP address of the router (DFGW) and the broadcast address for the network.

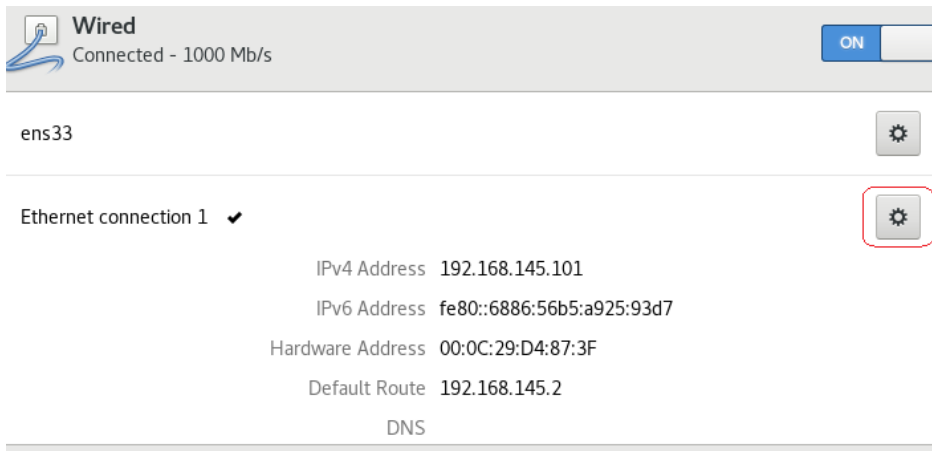
Make sure you do not modify any of the syntax surrounding any of the white text such as the brackets ({ }) or the semicolons (;). Once you have built and confirmed your new DHCP scope, you can save the changes to the file. (Type Ctrl+x, types 'y' for yes and hit the enter key.)

The next step is to configure the network adapter with a static IP from our DHCP scope. I used the first available IP address from within my IP range (x.x.x.101).

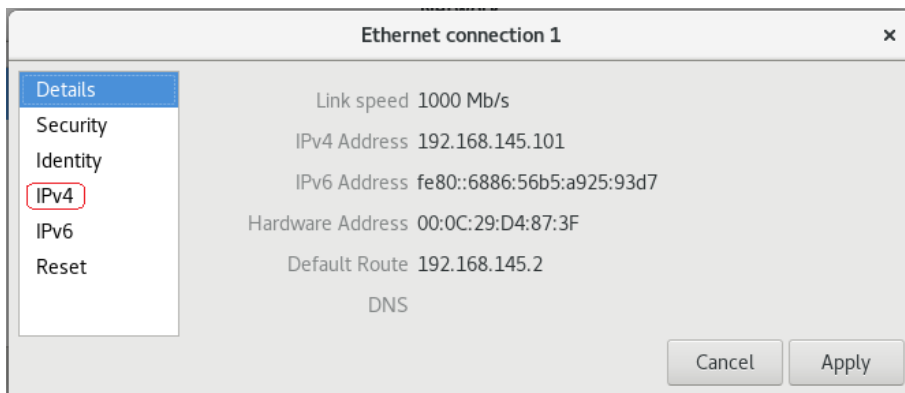
Click on the power button in the upper right corner, click on wired Connected and then click on wired settings.



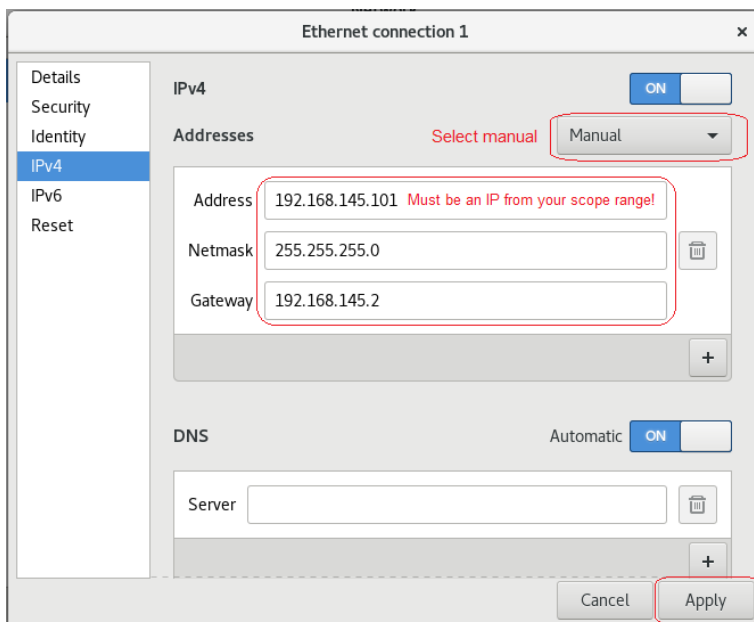
In the right window pane, click on the gear to open the properties for your network adapter.



On the next window, click on IPv4.



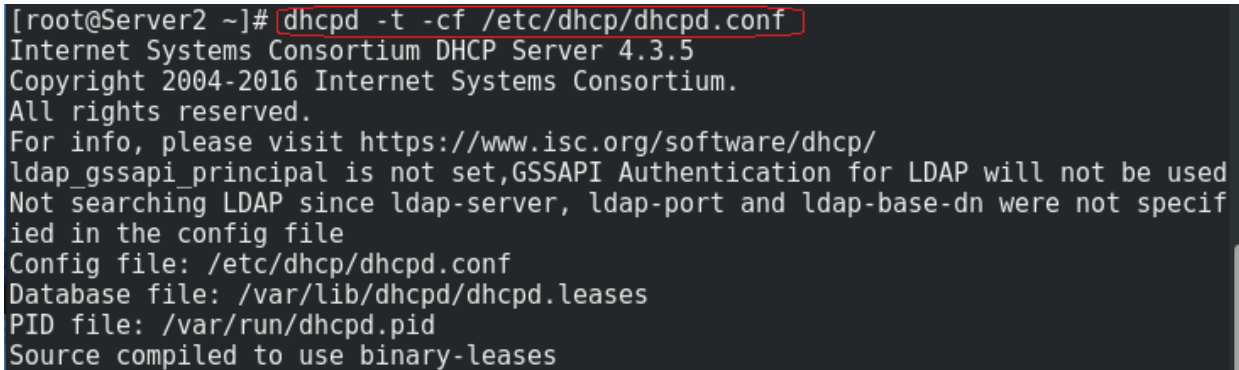
Configure your adapter with the IP information from your scope.



Click apply.

We next need to check the dhcpd.conf for any syntax issues using the following command:

```
dhcpd -t -cf /etc/dhcp/dhcpd.conf
```

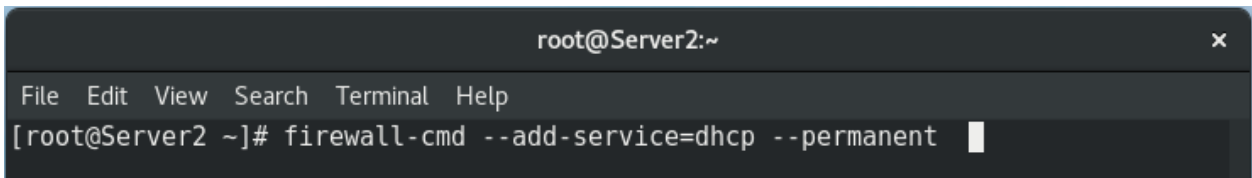


```
[root@Server2 ~]# dhcpd -t -cf /etc/dhcp/dhcpd.conf
Internet Systems Consortium DHCP Server 4.3.5
Copyright 2004-2016 Internet Systems Consortium.
All rights reserved.
For info, please visit https://www.isc.org/software/dhcp/
ldap_gssapi_principal is not set,GSSAPI Authentication for LDAP will not be used
Not searching LDAP since ldap-server, ldap-port and ldap-base-dn were not specified in the config file
Config file: /etc/dhcp/dhcpd.conf
Database file: /var/lib/dhcpd/dhcpd.leases
PID file: /var/run/dhcpd.pid
Source compiled to use binary-leases
```

If you find any errors, read the output carefully. The output will tell you where to find the syntax error and what needs to be corrected.

The next step is to allow an exception for DHCP through the firewall and make it permanent.

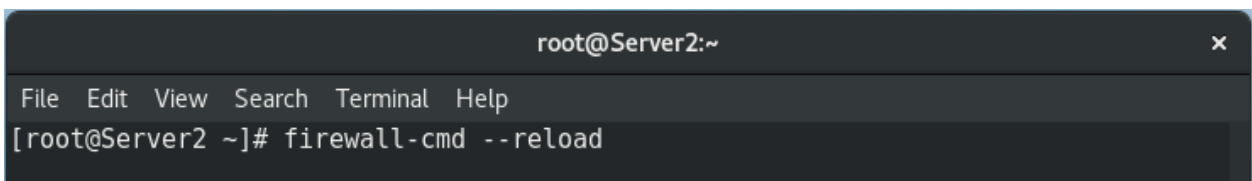
```
firewall-cmd --add-service=dhcp --permanent
```



```
root@Server2:~
File Edit View Search Terminal Help
[root@Server2 ~]# firewall-cmd --add-service=dhcp --permanent
```

We next need to reload the firewall.

```
firewall-cmd -reload
```



```
root@Server2:~
File Edit View Search Terminal Help
[root@Server2 ~]# firewall-cmd --reload
```

The next step is to restart the dhcpd service.

```
service dhcpd restart
```

```
root@Server2:~
File Edit View Search Terminal Help
[root@Server2 ~]# service dhcpd restart
```

The last nest is to check the status of your dhcpd server.

```
service dhcpd status
```

```
root@Server2:~
File Edit View Search Terminal Help
[root@Server2 ~]# service dhcpd status
Redirecting to /bin/systemctl status dhcpd.service
● dhcpd.service - DHCPv4 Server Daemon
   Loaded: loaded (/usr/lib/systemd/system/dhcpd.service; disabled; vendor prese
   Active: active (running) since Fri 2017-09-15 00:52:25 PDT; 4h 31min ago
     Docs: man:dhcpd(8)
           man:dhcpd.conf(5)
  Main PID: 2704 (dhcpd)
    Status: "Dispatching packets..."
     Tasks: 1 (limit: 19660)
    CGroup: /system.slice/dhcpd.service
            └─2704 /usr/sbin/dhcpd -f -cf /etc/dhcp/dhcpd.conf -user dhcpd -group
```

## Summary

You can test the DHCP server by using wither Window or Linux client and configuring the network adapter of the client for dynamic or automatic IP addressing. For this to work in a virtual network built using VMWare VirtualBox, you first disable the emulator's firewall in the services of the host machine. Restart the client and check to see if you are now pulling down the correct IP configuration from the client.

End of the lab!