Introduction and/or Background

When you set up a Local Area Network (LAN), a client needs to have certain information, such as the IP-address of its interface, the IP-address of at least one domain name server, and the IP-address of a server in the LAN that serves as a router to the internet.

In the manual setup you have to type in this information for each client anew. With the Dynamic Host Configuration Protocol (DHCP) the computers can do that automatically for you.

Objectives

In this project/lab the student will:

- Gain familiarity with the DHCP protocol

Equipment/Supplies Needed

- As specified in Lab 0.0.1.
- Virtual Machines: VMPC1, VMPC2, and VMSVR1 connected with Private virtual LAN configured within VMWare, with DHCP internal service off.

Procedure

Perform the steps in this lab in the order they are presented to you. Answer all questions and record the requested information. Use the Linux Virtual Machine to perform lab activities as directed. Unless otherwise stated, all tasks done as a non-root user. If root access is needed use the sudo command.

Assignment

Security Note: We do not want a rogue DHCP server (yours) leaking into other networks. That is the reason for the need for the private LAN configuration. In this exercise you will be required to disconnect from the network. Proceed with installation of VMPC1, VMPC2 and VMSVR1 as you have from previous sessions. Be sure that VMSVR1 has an internet connection either via a bridged or NAT VMWare network setup.

Installation

1 Open a terminal session on VMSVR1. Execute:

sudo apt-get update
sudo aptitude search isc-dhcp
sudo aptitude install isc-dhcp-server
sudo systemctl enable isc-dhcp-server

If there are no errors in the install process DHCP services should be loaded but in a underline failed state.

If on a campus LAN please disconnect the host PC from the network by removing the ethernet cable for the balance of the lab.

2 It is now necessary to reconfigure a manual ip interface.

    2.a   Promote to root user using su command.
    2.b   Identify your network adapter name using ip ad.
    2.c   Perform the following:

        cd /etc/network
        cp interfaces /root/
        nano interfaces

    2.d   Add the following at the bottom of your file.

        auto <you adapter name>
        iface <you adapter name> inet static
        address 192.168.10.0
        netmask 255.255.255.0

    2.e   Save the file. Perform another ip ad to validate the IP change.

Validate

1 Test that DHCP services are present,

systemctl | grep dhcp

If successful you should receive a read out. You may receive an indication that underline load failed. At this point disconnect from the network. The easiest method is just unplug the Ethernet cable of your host PC. Take a screenshot of (1) above and add this to your Word of Writer file.

Configuration

1 It is wise to first save a copy of your current DHCP configuration,

   ```
   cd /etc/dhcp
   sudo cp dhcpd.conf dhcp.conf.bak
   ```

   Now open the file:

   ```
   sudo nano dhcpd.conf
   ```

   What you see is a default configuration file with examples of particular setups. We will replace this file with one of our own. Close the file. Create a file with nano with the following contents and save it as dhcpd.conf.

   ```
   # dhcpd.conf
   #
   # Sample configuration file for ISC dhcpd
   #


   # This is a very basic subnet declaration.

   subnet 192.168.10.0 netmask 255.255.255.0 {
     authoritative;
     default-lease-time 600;
     max-lease-time 7200;
     range 192.168.10.50 192.168.10.115;
     option subnet-mask 255.255.255.0;
     option broadcast-address 192.168.10.255;
   }
   ```

2 Be sure your syntax is correct. A missing '}' or ';' will result in failure to operate. Stop the server

   ```
   systemctl stop isc-dhcp-server
   ```

   Now switch to the isc-dhcp-server file

   ```
   cd /etc/default
   ls
   ```

You should see an entry for isc-dhcp-server. Open it with nano or vim, your choice.
Look for the line INTERFACESv4="".
Change it to

INTERFACESv4="xxxx"

Where xxxx is the name of the interface that the interface name the VM is on.
Example, 'eth0', 'vmbr0', etc. To find that information do a ip ad at the command
line. Make the substitution.

Save the file.

Restart the server.
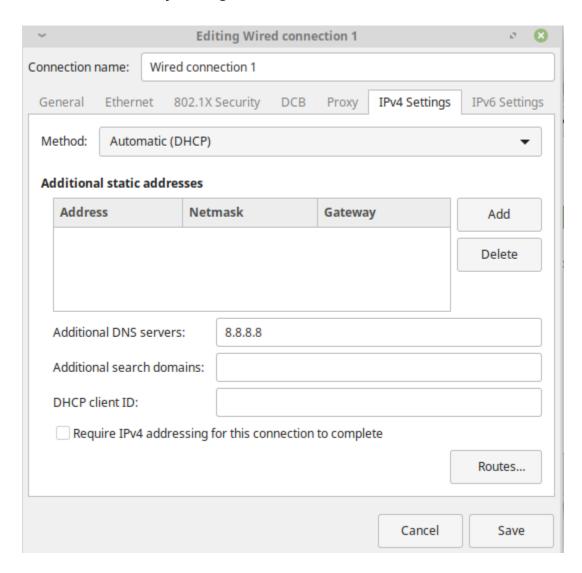
systemctl restart isc-dhcp-server

Check that the server is running

systemctl status isc-dhcp-server

Proceed with the balance of the lab upon a successful status for the server.

Client Test

1 Turn on either VMPC1 or VMPC2. Validate that the systems are on the same lan segment as the server. (e.g.: check the network settings and adjust if necessary.) In Advanced Network Manager, make sure that DHCP is selected. If not set to DHCP, make the necessary changes to do so.

2 Permit the VM to settle down for a moment then open a terminal window and execute:

ip address

You should see a 192.168.10.X address assigned to the PC. Success! Repeat the same steps for VMPC2. See if you can now ping the VMSVR1 server

address and the individual VMPCs as well. <mark>Take screenshots of successful pings proving you have connectivity and dynamic addresses have been assigned.</mark>

In the event of failure retrace your steps in setting up DHCP services. Also consider restarting the VMPC client to force the issue of getting an address assigned.

Closure

1 Open VMSVR1 terminal and promote to root user. Perform the following tasks:

```
cd /etc/network
cp /root/interfaces .
systemctl stop isc-dhcp-server.service
systemctl disable isc-dhcp-server.service
aptitude remove isc-dhcp-server
aptitude purge isc-dhcp-server
```

2 Shutdown the VMSVR1 server. Shutdown the VMPCs. Reconnect the Ethernet cable if you disconnected it. Remember your VMs are configured on a private LAN segment that may need to be changed for future labs.

Lab Submissions Proof: Provide screenshots as indicated in the lab; upload your proof to Canvas for grading.

Rubric
Checklist/Single Point Mastery

Concerns Working Towards Proficiency	Criteria Standards for This Competency	Accomplished Evidence of Mastering Competency
	Criteria #1:'systemctl | grep dhcp' readout (34 points)	
	Criteria #2: Screenshots of successful ping on VMPC1 (33 points)	
	Criteria #3: Screenshots of successful ping on VMPC2 (33 points)	