

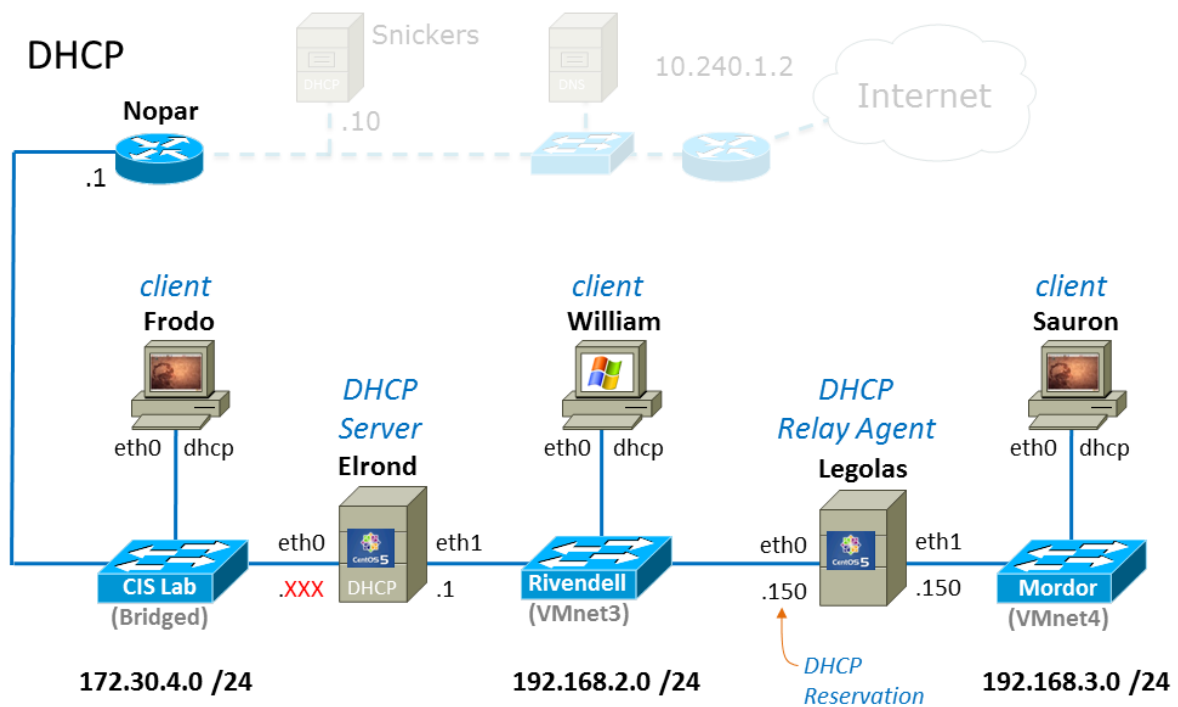
CIS 192 Linux Lab Exercise

Lab 6: Dynamic Host Configuration Protocol

Fall 2011

Lab 6: Dynamic Host Configuration Protocol

The purpose of this lab is to configure a DHCP server for multiple subnets. You will configure additional options along with an IP address and netmask, and you will configure a host reservation to guarantee that a particular host will always get a specific IP address. You will also configure a relay agent for relaying IP addresses from your server to clients in Mordor, the 192.168.2.0 network.



50

.XXX is based on your station number

Forum

Use the forum to ask and answer questions, collaborate, and report any equipment issues. Post tips and any lessons learned when you have finished. Forum is at:

<http://opus.cabrillo.edu/forum/viewforum.php?f=39>

Supplies

- Virtualization: VMware ESXi/vSphere (for VLab) or Workstation (for CIS Lab PCs)
- Centos VMs: Elrond and Legolas
- Ubuntu VMs: Frodo and Sauron
- Windows VM: William
- Virtual networks: Rivendell/VMnet3 and Mordor/VMnet4

Preparation

- Revert to the “Pristine” snapshot on all four VMs.
- On Opus, make a copy of the lab6 report template file in /home/cis192/depot in your home directory. Edit the header of this file with your own information and record all the information requested.

Procedure

Read through the entire lab before proceeding with the individual steps so that you know what your objective is. You may decide which VMnets to use for this lab. Draw a picture of the network.

The new commands/daemons we will be using for this lab are:

- dhcpcd
- dhclient
- dhcrelay

The configuration of the DHCP service will require root access.

Setup

1. Permanently join Elrond to the CIS Lab network using a static IP address based on your station number from the [Static IP Address Table](#). This includes IP address, netmask, gateway and DNS settings.
2. Install the dhcp package on Elrond with: **yum install dhcp**
3. Temporarily join Legolas to the CIS Lab network and install dhcp as you did with Elrond.
4. After the DHCP service has been installed on Elrond and Legolas, cable the VMs according to the diagram above.
5. Configure Legolas eth0 for DHCP and eth1 as shown in the diagram.
6. Frodo, Sauron, and William should be configured for DHCP. You can power them back down for now. They will be used to test getting addresses from the DHCP server.

Part I

Choose Elrond as your DHCP server and router between the Rivendell and CIS Lab networks.

1. Configure Elrond to permanently forward packets between the CIS Lab and Rivendell networks.
2. Choose Legolas as your reservation client. Legolas will be configured as the router/relay agent into Mordor in Part III.
3. Now, use the **ifconfig** command to obtain Legolas' eth0 hardware (MAC) address. Record this address for use in a DHCP reservation.

7. On Elrond, verify that the dhcp package is installed:
rpm -qi dhcp
 You should see that dhcp-4.1.1-12.P1.el6_0.4 or later is installed.
8. Now copy the contents of the `/usr/share/doc/dhcp-*/dhcpd.conf.sample` file to the `/etc/dhcp/dhcpd.conf` file.
9. Edit this configuration file according to the specifications in the following table:

Global		
default-lease-time	60 minutes (3600 seconds)	
maximum-lease time	120 minutes (7200 seconds)	
option domain-name-servers	10.240.1.2	
ddns-update-style	none	
Scopes		
	CIS Lab	Rivendell
subnet	172.30.4.0/24	192.168.2.0/24
range	See: Static IP Address Table	.50-.99
option domain-name	cisvlab.net	Rivendell
option routers	172.30.4.1	192.168.2.1
Authoritative	no	yes
Reservations		
host	legolas	na
hardware ethernet	00:0c:29:xx:xx:xx	na
fixed-address	192.168.2.150	na

Be careful not to lose any of the terminating semicolons. To see a complete example see the DHCP lesson slides.

10. Comment out or remove unused options.
11. Check for the existence of the DHCP Server's database `dhcpd.leases` file in the `/var/lib/dhcpd` directory. If not present, create it with:
touch /var/lib/dhcpd/dhcpd.leases
12. Open port 67 on Elrond's default CentOS firewall with:
iptables -I INPUT 1 -p udp -m udp --dport 67 -j ACCEPT
13. Review your firewall with **iptables -nL**

Part II

You are now ready to start your DHCP server.

1. Start the DHCP service with
/etc/init.d/dhcpd start
 or **service dhcpd start**
2. If this command FAILS, then review the `/var/log/messages` file. You must re-edit `/etc/dhcp/dhcpd.conf`, fix any mistakes, and try again.
3. If the DHCP daemon starts up successfully, you are ready to test the service.
4. Power on Frodo, what IP address did you get? Note: there is another DHCP server on the 172.30.4.0 subnet, so Frodo may obtain an address from the other DHCP server. How will

you know? (Hint: the other DHCP server's pool of addresses ranges from 25-49 and 150-199).

5. On Frodo, release the current DHCP address with **dhclient -v -r**, then request again with **dhclient -v**.
6. On Frodo, use **ifconfig**, **route -n** and **cat /etc/resolv.conf** to verify IP settings, default gateway and DNS have been set up properly.
7. Power on William, use **ipconfig /all** to see the IP address you got. Use **ipconfig /release** and **ipconfig /renew** to release and then request a new DHCP address.
8. On William, use **ipconfig /all** to verify IP settings, default gateway and DNS have been set up properly.
9. On Legolas, do a **service network restart**. Does Legolas get its reserved IP address?
10. On Legolas, do a **dhclient -v -r eth0** followed by a **dhclient -v eth0** to release then request a new DHCP address.
11. On Legolas, use **ifconfig**, **route -n** and **cat /etc/resolv.conf** to verify IP settings, default gateway and DNS have been set up properly.
12. On the clients, the lease and reservation will be recorded in the client database file:
Frodo (Ubuntu 10.04): */var/lib/dhcp/dhclient.leases*
Legolas (CentOS 5.4) */var/lib/dhclient/dhclient.leases*
Note that this information records the address of the DHCP server that handed them out.
13. You should also look at the DHCP Server's database file, */var/lib/dhcpd/dhcpd.leases*, for a recording of the leases and their expiration dates.

Part III

Add a third subnet to your DHCP Server and configure Legolas as a DHCP Relay agent allowing the clients on the Mordor network to obtain IP addresses from your DHCP Server. Note: a Relay agent is a router service and cannot also be the DHCP server.

1. Add a third scope for the Mordor network to your *dhcpd.conf* file:

	Mordor
subnet	192.168.3.0/24
range	.50 to .99
option domain-name	Mordor
option routers	192.168.3.150
Authoritative	yes

2. Before restarting your DHCP server, add a static route for the Mordor network to Elrond's routing table. Your relay agent will be your gateway into Mordor.
3. Restart your DHCP server.
4. Setup Legolas to be the Rivendell-Mordor router. Use 192.168.3.150 as its eth1 address to Mordor. (It already has its reservation for eth0.)
Don't forget to turn on IP forwarding and allow forwarded packets through the firewall.
5. Before starting your DHCP Relay server, you will need to edit the configuration file:
/etc/sysconfig/dhcrelay
assign the two shell variables in this file as follows:
INTERFACES="eth0 eth1"
DHCPSEVER=192.168.2.1

The DHCP Relay agent needs to listen on the interface with which it will talk to the DHCP server as well as the interface on which it will listen for client requests.

6. Open port 67 in the firewall on Legolas with:
iptables -I INPUT 1 -p udp -m udp --dport 67 -j ACCEPT
7. Review your firewall with **iptables -L -n**
8. Start the dhcrelay service:
service dhcrelay start
9. Power on the Mordor client Sauron and verify it got a correct address.

To turn in

Record the following in your lab06 report:

1. From Elrond:
 - Output from **cat /etc/dhcp/dhcpd.conf**
 - *Snipped* output of **cat /var/lib/dhcpd/dhcpd.leases** showing:
 - one William lease
 - one Sauron lease
 - one Frodo lease
 - For a single lease, include the word "lease" through to the ending "}"
 - Output from **grep dhcpd /var/log/messages | tail -50**
2. From Legolas:
 - Output from **cat /etc/sysconfig/dhcrelay**
 - *Snipped* output from **cat /var/lib/dhclient/dhclient.leases** showing a lease for Legolas
 - Output from **grep dhclient /var/log/messages | tail -50**
 - Output from **grep dhcrelay /var/log/messages | tail -50**

Having done the lab, can you answer the following questions?

1. Is a reservation the same as a lease, that is, does it expire?
(Hint: check the DHCP server's database file, *dhcpd.leases* for the reservation.)
2. Why did you have to add the static route to Mordor in the DHCP server's routing table?

Check your work for completeness then submit as many times as you wish up until the due date deadline. Remember, **late work is not accepted**, so start early, plan ahead for things to go wrong and use the forum to ask questions.

cp lab06 /home/rsimms/turnin/lab06.\$LOGNAME

Grading rubric (30 points)

- 1 point for complete submittal to the turnin directory
- 1 point for complete header including time spent and station info
- 2 points for unique IP addresses for Elrond's eth0 interface

- 2 points for unique CIS Lab DHCP pool of IP addresses
- 2 points for correctly configuring the DHCP server globals
- 2 points for correctly configuring the DHCP server CIS Lab scope
- 2 points for correctly configuring the DHCP server Rivendell scope
- 2 points for correctly configuring the DHCP server Mordor scope
- 2 points for correctly configuring the DHCP relay agent

- 2 points for a single William lease
- 2 points for a single Frodo lease
- 2 points for a single Sauron lease
- 2 points for a single Legolas eth0 lease (reservation)

- 2 points for dhcpd log entries on Elrond
- 2 points for dhcrelay log entries on Legolas
- 2 points for dhclient log entries on Legolas