Lab 12: Routing, DHCP and Securing the SOHO router

What you will do:

1. Complete the basic requirements for connecting to a SOHO/Home router, or similar device.
2. Configure and confirm the proper operation of basic router services.
3. Assign permanent IP to device via DHCP reservation.
4. Perform basic subnet calculations.
5. Create and test a static route.
6. Capture DHCP message exchange.
7. Configure basic security features of the router.

Things that you will need to know or learn:

1. What are the minimum configuration items for providing basic security for a router
2. How to make DHCP reservations
3. How to find first and last IP address in a subnet
4. How to troubleshoot and fix network connectivity issues

What you need to submit and when:

1. Complete the pre-lab prior to starting the lab.
2. Complete all parts of Lab 12 (**before** the end of your lab period).
3. Upload a copy of the router’s configuration file to Blackboard
4. Complete the Post-Lab quiz before its due date

Required Equipment:

* SOHO/home router, Linksys E2500 running Linksys firmware
* Network cables to connect both WAN (Internet) and LAN ports (Ethernet)
* Laptop or other computer with Ethernet adapter

Marks:

Each of the lab part identified above is weighted equally, even though they may have a different number of points assigned to them.

20% of your final mark is for labs done during the course of the semester.

References and Resources:

* Google, Wikipedia, and other resources to help with terms & definitions  
  eg: <https://en.wikipedia.org/wiki/Wi-Fi_Protected_Access>   
   <http://www.dd-wrt.com/wiki/index.php/Setuserpasswd_command>   
   <http://www.dd-wrt.com/wiki/index.php/Wireless-N_Configuration>

# Overview

1. In this lab you will configure a Linksys SOHO router to connect to a simulated Internet using a static Internet IP. You will have two internal (LAN) clients. One of these clients will get its IP via DHCP via the SOHO router’s DHCP server and the other will be assigned an IP using a DHCP reservation.
2. In this LAB NAT will **NOT** be used. You will configure a static route to reach another group.
3. You will also capture and analyze a DHCP message exchange and secure access to the router.
4. **This lab is to be completed in groups of two (groups of three not permitted)**

# Task 0: Initial Setup

1. Once your group ready, see the instructor for your assigned LAN and simulated Internet network addresses.
2. Reset the router to factory defaults (refer to previous labs on how to do this)
3. Complete your subnetting and have it checked before proceeding

**Checkpoint 1: Have your instructor verify your subnetting calculations.**

1. Determine which computer in your group will be PC1 and which will be PC2.
2. Download the Web Server from Blackboard (Lab10) to both PCs (you may already have this installed).
3. Turn off Firewalls and Wireless adapters
4. Using the appropriate cable, connect PC1 into any of the Ethernet ports on the router
5. Do not connect PC2 until instructed to do so!

# Task 1: Initial Connection

1. Task 1 is performed from PC1. All router configuration tasks are performed AS A TEAM. Do NOT just let your partner do it, in a couple of weeks you will need to perform similar tasks on your own without assistance.
2. Verify that PC1 has been assigned an address from the 192.168.1.0/24 subnet.
3. Open a web browser and enter <http://192.168.1.1> in the address bar to connect to the router’s configuration page.
4. Many of the tasks you will perform today have been done in previous labs. Refer to those labs or your notes if you need extra information.

# Task 2: Initial network configuration (from PC1)

1. From PC1, access the router’s configuration page to implement the following configuration changes.
   1. Set the Internet IP Address, Subnet Mask, Default Gateway and DNS 1 server to that assigned by your instructor.
   2. Set the router’s Host Name to your Algonquin’s Username (ex smit0678)
   3. Set the router’s Router Address (LAN) to the first address in your subnet, assign the correct subnet mask.
   4. Enable the DHCP Server, leave the “Maximum Number of Users and the Start IP address at the default settings

Set the timezone to (GMT -5) Eastern Time (USA & Canada)

Save the Settings.

* 1. At this point, PC1’s connectivity to the router will be lost. You may need to issue the appropriate ipconfig commands to release and renew PC1’s IP address in order to reconnect to the router.

1. Using ipconfig, ensure that PC1 has been assigned an IP address from your assigned subnet. Have you partner confirm the subnet mask and the gateway addresses are correct.
2. Before proceeding, confirm that you can ping the router’s address as configured in step 1C above.
3. From the router’s configuration, locate and select the “Advanced Routing” menu item. Disable “NAT” and save the settings.
4. Confirm you can open the web page <http://eagle-server.example.com> from PC1.
5. Do not continue until you are certain that Task 2 configuration changes have been successfully implemented.

# Task 3: Capture a DHCP message exchange

On PC2, set the your Ethernet adapter to use DHCP (obtain an IP address automatically)

Start a Wireshark capture filter by (arp || bootp)

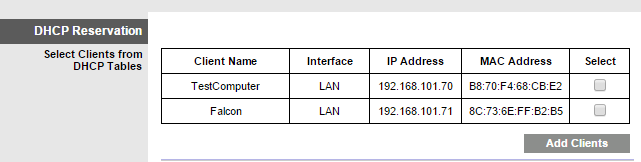
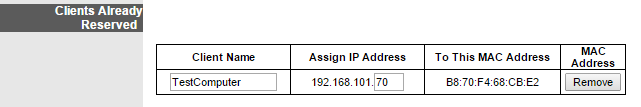
Plug your PC2 computer into one of the Ethernet ports on the router

When you have an IP address stop the capture and save it for the post lab. **You should have 4 DHCP packets followed by a few ARP request with no replies.** You will need to share it with your partner.

Confirm you can open the web page <http://eagle-server.example.com> from PC2

**Checkpoint 2: Show eagle-server web page and the capture to the instructor. You should have 4 DHCP packets followed by a few ARP request with no replies.**

# Task 3: DHCP Reservation

1. From PC2 access the router’s configuration page.
2. Under Basic Setup, locate the DHCP Reservation button, click the button
3. You should now see a list like the one below. Check the “Select” box next to PC1’s IP address and click “Add Clients”
4. PC1 name should now appear in the list on the bottom of the screen. Change the “Assign IP Address” to the last usable IP in your subnet 
5. Have PC1 do a release and renew on its IP address to confirm that the reservation worked. PC1 should now have the last usable IP address in your subnet

# Task 4: Routing to another group

1. Start the “Web Server” on both PC1 and PC2.
2. From PC2, access the routers configuration menu, locate and select the Advanced Routing menu item (under Setup).
3. Click on the “Show Routing Table” button, record the settings ( Screen capture will do)
4. Find another group ready to create a route to. What information do you need to obtain from them?
5. Complete the routing table entry (1) to reach the other groups PCs. Any name for the entry will work. Set the “Interface” to “Internet (WAN)”
6. From PC1 and PC2 confirm you can reach **their** Web Server. If things aren’t working use ping and tracert to determine where the problem might lie. When done show the instructor you have opened the web page

**Checkpoint 3: Show the web page from the other group**

# Task 5: Securing the router

1. You are now going to improve the security of the router.
2. Locate the “Administration” menu
   1. Change the router password to *P@55w0rd* (Not very secure but better than the default)
   2. Set “Local Management Access” to HTTPS only. Note you will get warnings from you browser when you attempt to reconnect to the router.
   3. Disable “Access via wireless”
   4. Make sure Remote Management and Remote Upgrade are both Disabled
   5. Save the settings
3. Although we are not using wireless in this lab, a very important wireless security feature is available (Wireless MAC Filter) and should be used when wireless connectivity to the network is enabled.
4. From the router’s configuration page, locate the Wireless Menu item and find the “Wireless MAC Filter”. Enable the Wireless MAC Filter. What pop-up message did you receive? (possible post lab question)
5. Normally it’s best to set the list to allow specific addresses rather than block specific address.
6. Add PC2’s MAC address to the table and save the settings.
7. Backup your configuration and upload it to Blackboard

**Check Point #4**: Uploaded file is marked in bulk after all groups have finished the lab

# Task 6: Clean Up and extras

1. Can you determine the IP addresses of the routers between your PC and the Eagle-Server?
2. If time permits have someone from another group (or the instructor) put errors in your configuration and then you can try to fix them
3. Return you cables and routers to their proper locations
4. Restore you PC settings to their pre-lab values
5. Complete the post lab before the start of your next lab period