Lab 5: Basic SOHO Router Configuration + Explore ARP Protocol and Ethernet Frames

What you will do:

- Using the skills and knowledge acquired in previous labs, you will build, configure and test a Wired (Ethernet) network that you will connect to the lab's existing Eagle Network.
- Capture/explore/analyse ARP request/responses.
- Capture/explore/analyse Ethernet frames.
- Calculate the size of various Ethernet frame fields. • Reset a Linksys router to factory settings
- Implement basic router configuration:
  - Connect to router's management web page
  - Configure a dynamic IP on Internet interface
  - Modify the router's IP address
  - Modify router's name
  - Set time zone

Things that you will need to know or learn:

- Everything that you learned in lab 01, 02, 03 and 04 you will need to complete this lab.
- Identify and understand the different layers of addressing necessary to a successful communication.
- The general purpose and format of an ARP message.
- The format and purpose of Ethernet frame header and trailer fields.
- Writing simple Wireshark expressions to filter frames
- Understand the information provided in the Wireshark Details Pane for the purpose of extracting addressing information as well as being able to map protocols to their OSI or TCP/IP network model layers.
- How to read Ethernet II header information from a Wireshark capture including the Ethertype values.
- The Ethertype values for Ethernet II frames encapsulating IPv4 and ARP.
- Extracting ARP request message details from Wireshark.
- Determining your network adapter's MAC address.
- Determining your default gateway's IP and MAC address.
- How to look up the manufacturer of a network interface based on the OUI of the assigned MAC address.

What you need to submit and when:

- Part 1, InLab Activities, including instructor signoffs before the end of your lab period (refer to the instructions below).
- Part 2, Postlab quiz, before the due time.

Required Equipment:

- Equipment requirements:
  - Network cables: one straight-through and one crossover
  - One Linksys router
  - Wireshark installed and working on your laptop (done in Lab 01) o Lab 05 documents downloaded to your laptop
  - One laptop
  - Access to the Eagle Network (red network jack)

References and Resources:

- Lab 01, 02, 03 and 04
- Cisco Chapter 3, 4, 5

Task 0: Preparations

0.1 This lab is to be completed individually

0.2 Confirm you have downloaded the following from BB "Labs - > Lab 05" to your computer:

    0.2.1   "Lab 05 – In-Lab Activies.pdf" (this document)

0.3 Disable the Wireless Network Interface of your Laptop computer. Your only connection to the network must be via the Ethernet (wired) interface. If done correctly, **ipconfig** should only list <u>one interface</u> (Ethernet).

0.4 Do not start until you have completed ALL steps in this task.

Task 1: Build, Configure and Test Local Network

**Do not start task 1 until you have completed all Task 0 steps.**

In this task you will build, configure and verify proper operation of the network topology shown in "Lab 05 – Network Topology". The network you are building consists of your LAN network which you will connect to the lab's Eagle Network. Note that your LAN network simulates a small home/office network whereas the Eagle Network simulates an Internet Service Provider (ISP).
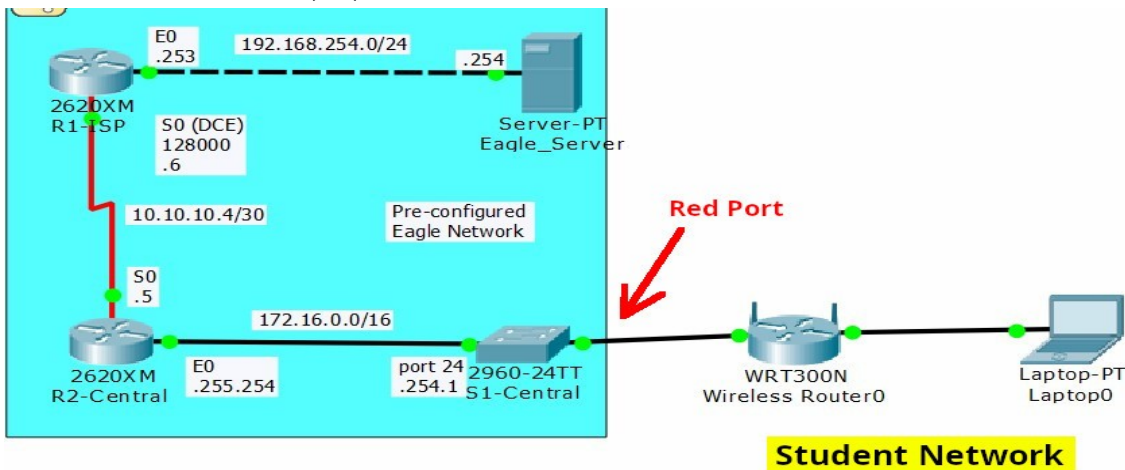
1. Power up your router and wait for the power light to be **steady on**
2. Reset the Linksys Router to the factor defaults, as done in previous labs.
3. Connect your laptop to any of your Linksys Router's switch ports (1-4) using the appropriate cable
4. Connect your Linksys router's <u>Internet</u> port to the "Red" jack located on your desk. This is your connection to S1-Central and the Eagle Network. Make note of the jack number you are using. This will be used to create your IP addresses.
5. Confirm basic connectivity by making sure you can successfully ping your default gateway.
6. Open a web browser and enter http://A.B.C.D in the address bar to connect to the router's configuration page (A.B.C.D is the address of your default gateway. The address should be 192.168.1.1. If it is not, make sure you have correctly reset your router. If you have, try **ipconfig/release** followed by **ipconfig/renew** and try again).
7. You should see a page like the one shown below. Click "Continue with an open and unsecured network"
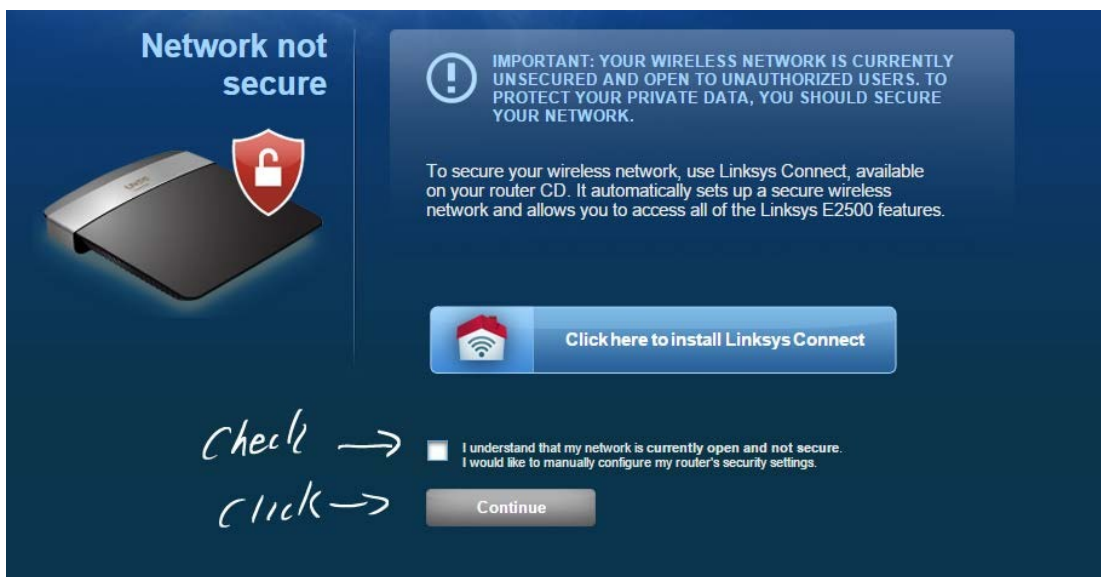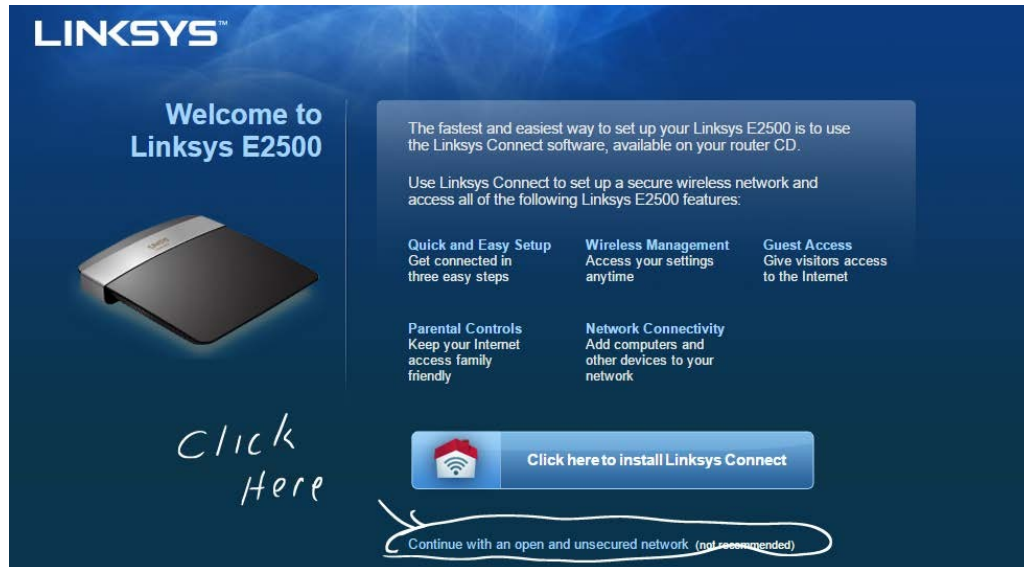
8. You will now get another warning screen. Just check the box that says you understand and click continue
9. Login into the router using the username/password of *admin/admin*
10. You will now get another warning, check the "Do not show me this again" box and click OK
11. If the OK button doesn't work just close the dialog box.
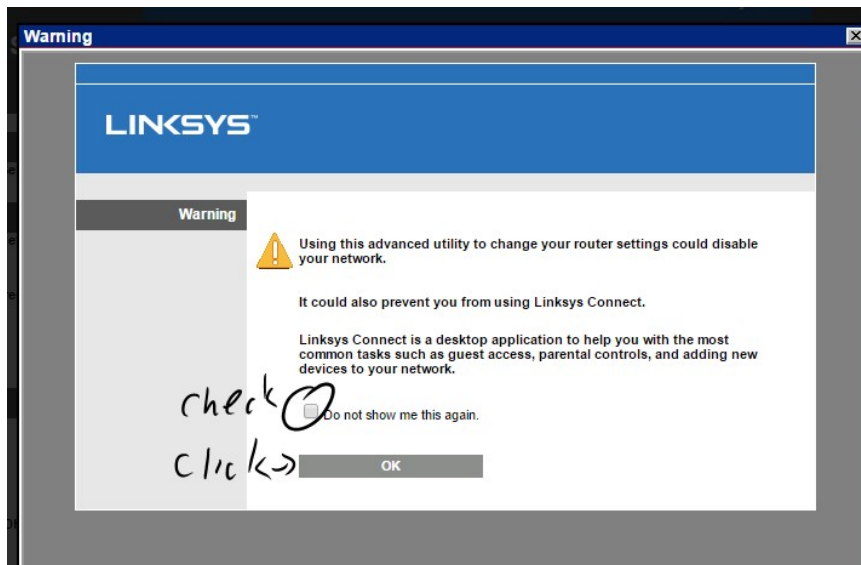
12. You should see a page that looks like

13. You will now perform some simple configuration tasks.
    a. Confirm the Language is set to English
    b. Under "Internet Setup", set the Internet Connection Type to "Automatic DHCP"
    c. Under "Network Setup",

ⅰ. Set the Router Address to 192.168.**NN**.1, where **NN = 100 + Your Red jack number** you are using. (e.g. **123** if your red jack number is **23**). This will be your router's IP address on your LAN.

ⅱ. Set the Subnet Mask to 255.255.255.0

ⅲ. Set the "Router Name" to your Algonquin User ID ex: **abcd1234**

d. Under Time Settings, set the Time zone to (GMT -05:00 Eastern Time (USA and Canada). Make sure you select "Automatically adjust the clock for daylight savings changes"

e. Leave everything else at the defaults

f. Take a screenshot for your settings before you save, save it as <mark>**task1.png**</mark>

g. Now click "Save" your settings.   Your router will now reboot.

14. Once the router has rebooted (will take about 60 to 90 seconds to reboot), check your laptop's IP address. Your default gateway should be the same as the IP you set in set step 13c, if it's not release and renew your IP address (ipconfig/release followed by ipconfig/renew).

15. Do not proceed until you can ping your default gateway at 192.168.**NN**.1

Task 2: Capture/Analyse ARP Request

In this task you will capture the traffic resulting from sending a message to a remote network. In particular you will focus on the ARP request/replies that were generated as a result of this remote communication.

Read the following steps before starting them so you know what to do

1. Start a Wireshark capture on your laptop.
2. Filter Wireshark capture by arp
3. Open a Command Prompt window as Administrator (**Run as Administrator**) and type in the commands below one at a time:

a. **arp –d ***

The command clears any entries you have in your ARP cache, thus forcing ARP requests to be generated.

There must be no error messages shown after running it.

Note: some Windows versions do not recognize the command above and require you to instead use: **netsh interface IP delete arpcache**

b. **ping 192.168.254.254**

The ping must be successful.

4. Stop the capture.
5. You will now examine the capture to ensure that the desired traffic has been captured.
6. First, you are looking for an ARP request message having the following characteristics:

a. Source MAC: your laptop's Ethernet interface MAC address

b. Destination MAC: **Broadcast** (ff:ff:ff:ff:ff:ff)

c. Info Column

ⅰ. Who has h.i.j.k? Tell w.x.y.z

1. where w.x.y.z is your laptops IP address
2. h.i.j.k is IP address of your default gateway

7. Second, you are looking for the <u>ARP response</u> to the ARP request of step 6. It will have the following characteristics:
    a. Source MAC: your gateway's Ethernet interface MAC address
    b. Destination MAC: your laptop's Ethernet interface MAC address
    c. Info Column
        i. **h.i.j.k** is at **0a:1b:2c:3d:4e:5f**
            1. where **0a:1b:2c:3d:4e:5f** is your default gateway MAC address
            2. **h.i.j.k** is IP address of your default gateway
8. Using snipping, take a screen capture of Wireshark's summary pane highlighting OR including only the the arp request and reply identified in 6 and 7. Save the screen capture as <mark>task2.png</mark>
Screen captures without the 2 frames above highlighted (or cropped to include only these 2 frames) will not receive marks.

Task 3: Capture and examine an HTTP session to the Eagle Server

1. You are now going to open a web page on the Eagle Server
2. First let's make sure we can reach the Eagle Server. Open a command prompt and ping 192.168.254.254. Make sure the ping is successful before proceeding. If not ask you Instructor for help.
3. <u>Read the following steps before starting them so you know what to do</u>
    a. Close all web browser tabs.
    b. Start a Wireshark capture using your Ethernet Adapter
    c. Clear you ARP cache (as done in Task 2 Step 3a)
    d. Open your web browser in Private Browsing/Incognito and enter the URL http://192.168.254.254
    e. Once the page has loaded, stop your Wireshark Capture
4. Use the <mark>arp || http</mark> filter and examine your Wireshark capture to ensure it has the following frames
    a. ARP request and reply for 192.168.NN.1
    b. HTTP Get request with the destination IP 192.168.254.254
    c. HTTP Response from the IP 192.168.254.254
    d. If it does, then take a screenshot and highlight/mark the four frames above. save it as <mark>task3.png</mark>
    Screen captures without the 4 frames above highlighted (or cropped to include only these 4 frames) will not receive marks.
    e. If it doesn't include these 4 frames, return to step 3
5. Make sure you can answer the following questions (You will need to demo them to your professor)
    a. Why did your laptop ARP for the MAC address of 192.168.NN.1 when you were trying to reach 192.168.254.254?
    b. Examine the destination MAC address in the HTTP Get request. To what device does this address belong?

Task 4: Backup your router's configuration

1. Use your browser to connect to your router's configuration page.
2. Click on the Administration Tab

3. Click the "Back up Configuration"

4. Your configuration should download to you laptop in your default downloads folder.
   (**Note**: Some web-browsers block downloading of **.cfg** files, you need to open the downloads dialogue and allow it manually)
5. Locate the file and rename it to **task4.cfg**

Task 5: Demo, Cleanup and Other Tasks

1. Perform a Demo to your lab instructor.
2. Re-enable your firewall
3. Re-enable your Wireless Network and confirm you are able to access the College network.
4. **Verify that you have the 3 screen captures as instructed and .cfg file in your computer before proceeding**
5. Carefully pack and return the borrowed equipment.

Files to submit (4 files):
- task1.png
- task2.png
- task3.png
- task4.cfg

Complete the Lab05 Post-Lab BrightSpace Quiz before the due date.