

Lab 5: Basic SOHO Router Configuration Plus 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)
- Lab 05 documents downloaded to your laptop
- One laptop
- Access to the Eagle Network (red network jack)

References and Resources:

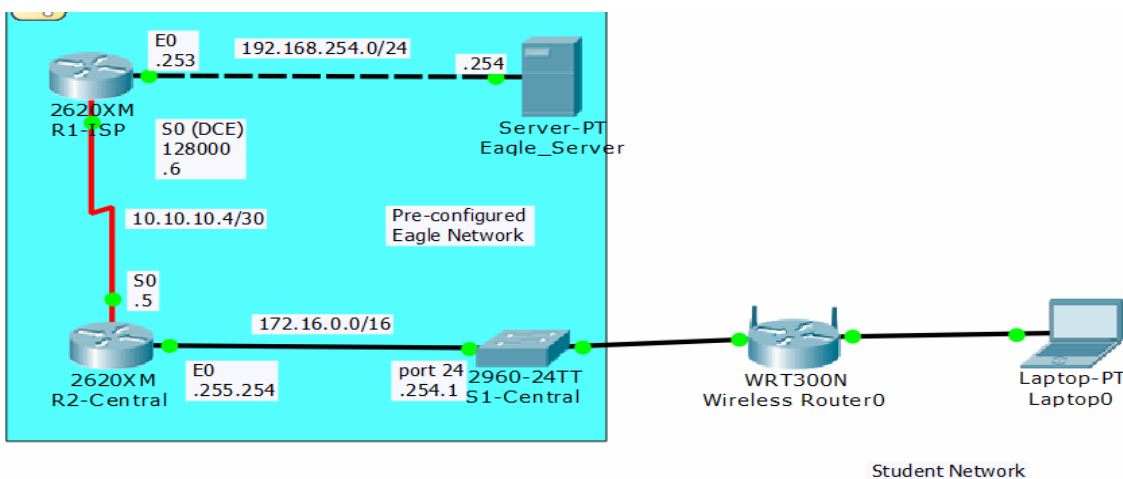
- Lab 01, 02, 03 and 04
- Cisco Chapter 3, 4, 5

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

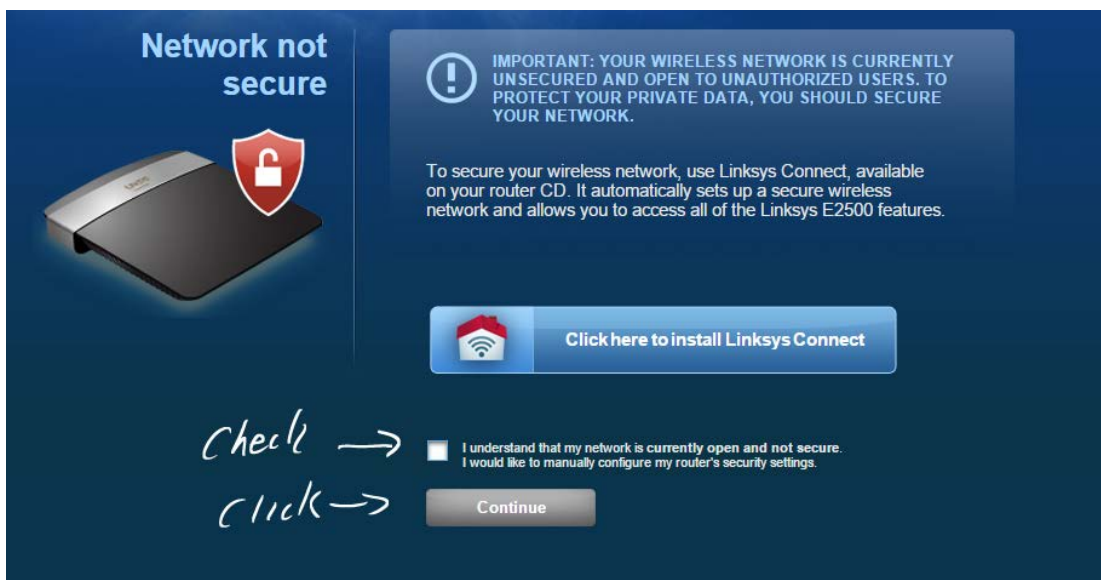
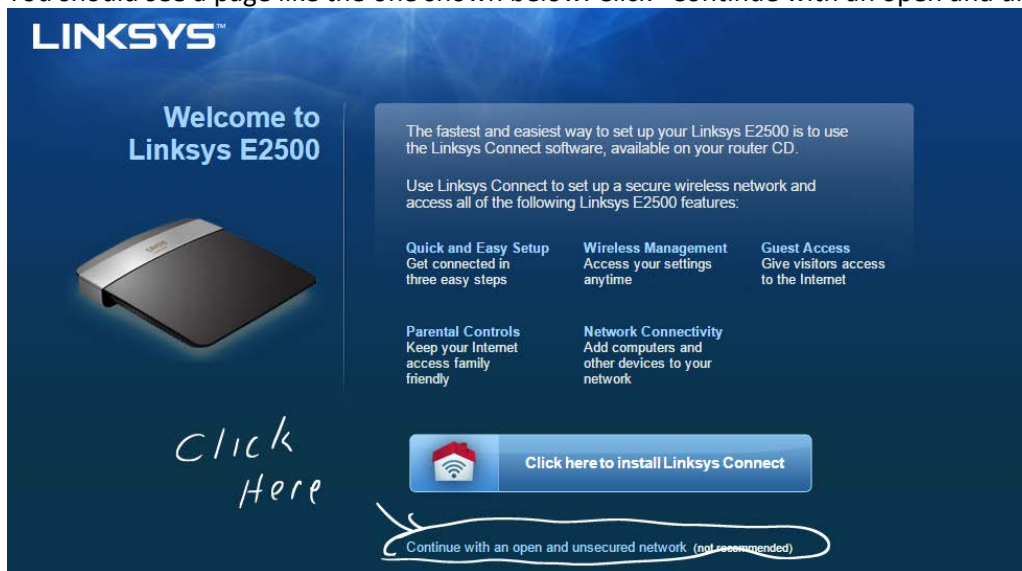
Task 1: Build, Configure and Test Local Network

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).

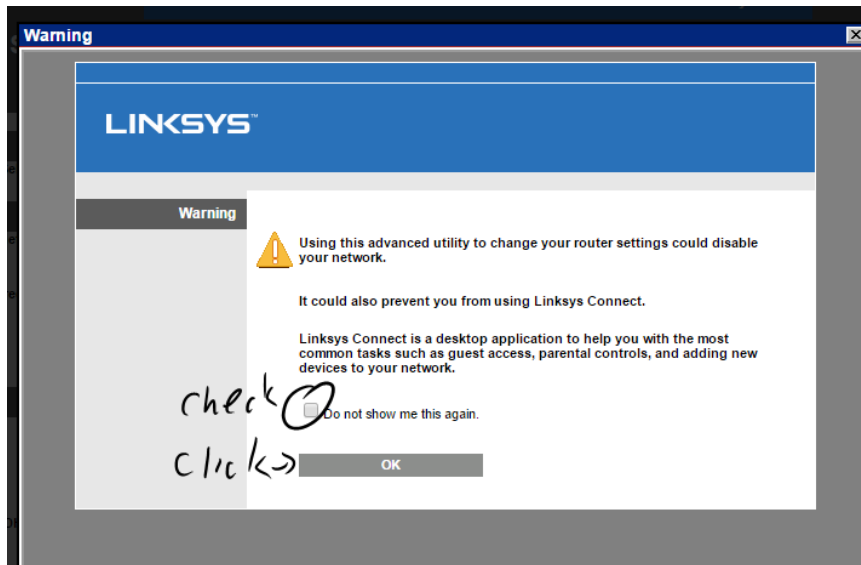


Do not start task 1 until you have completed all Task 0 steps.

1. Power up your router and wait for the power light to be **steady on**
2. Reset to factory defaults by pressing (using a pen) the reset switch located **at the bottom** (NOT THE BACK) of the router.
 - a. Keep the reset button **depressed until the power light flashes**
3. Connect your laptop to any of your Linksys' switch port (blue port!) using the appropriate cable
4. Connect your Linksys router's Internet port (yellow 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. Do an ipconfig to determine your default gateway address.
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. Make sure you have correctly reset your router or do an ipconfig/release followed by ipconfig/renew if it is not 192.168.1.1).
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

A screenshot of the Linksys Setup web interface. The left sidebar shows a navigation menu with sections: Language, Internet Setup, Network Setup, Time Settings, and Reboot. The main content area is titled "Setup" and has tabs for Basic Setup, Wireless, Security, Storage, Access Policy, Applications & Gaming, Administration, and Status. The "Basic Setup" tab is active. Under "Internet Setup", "Internet Connection Type" is set to "Automatic Configuration - DHCP". Under "Network Setup", "Router Address" shows IP Address: 192.168.1.1, Subnet Mask: 255.255.255.0, and Router Name: Linksys00011. Under "DHCP Server Setting", the DHCP Server is "Enabled", Start IP Address is 192.168.1.100, Maximum Number of Users is 50, and IP Address Range is 192.168.1.100 to 149. Under "Time Settings", the Time Zone is "(GMT-08:00) Pacific Time (USA & Canada)" and "Automatically adjust clock for daylight saving changes" is checked. At the bottom, there are "Reboot", "Save Settings", and "Cancel Changes" buttons. A blue "Help..." link is on the right. Several yellow circles and rectangles highlight specific fields and buttons as per the instructions.

See step 13 for the custom numbers and name you need to use here

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, NN= Red jack number you are using. 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: smit0099
 - 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 setting before you click save. (save as task1)**
 - 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.

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 ERRORS AS A RESULT OF RUNNING THE COMMAND!

- 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 ARP response 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. 2 marks - Using snipping, take a screen capture of Wireshark's summary pane highlighting the arp request and reply identified in 6 and 7. Save the screen capture as task2.

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 your Instructor for help.
3. Read the following steps before starting them so you know what to do
 - a. Start a Wireshark capture using your Ethernet Adapter
 - b. Clear your ARP cache (Task2 Step 3a)
 - c. Open your web browser and enter the URL http://192.168.254.254
 - d. Once the page has loaded, stop your Wireshark Capture
4. 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 save it as task3
 - e. If it doesn't repeat Step 3
5. Answer the following questions (Do not submit these answers on brightspace. Demo them to your instructors)
 - 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”

The screenshot shows the Linksys E2500 router's administration interface. The top navigation bar includes tabs for Setup, Wireless, Security, Access Policy, Applications & Gaming, Administration (highlighted in green and circled in red), and Status. Below this is a sub-navigation bar with links for Management, Log, Diagnostics, Factory Defaults, and Firmware Upgrade. The left sidebar contains a 'Management' section with links for Router Access, Local Management Access, Remote Management Access, Advanced features, UPnP, and Back Up and Restore. The main content area is divided into sections: Router Access (with password fields), Local Management Access (with access via HTTP/HTTPS and wireless access options), Remote Management Access (with remote management, access via HTTP/HTTPS, remote upgrade, and allowed remote IP address options), and Advanced features (with SIP ALG, UPnP, and user configuration options). At the bottom, there are two buttons: 'Back Up Configuration' (highlighted in yellow) and 'Restore Configuration'.

4. Your configuration should download to you laptop in your default downloads folder.
5. Locate the file and rename it to “task4.cfg”

Task 5: Demo, Cleanup and Other Tasks

1. Demo your screen capture and saved files 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. Complete the Lab05 Post-Lab BrightSpace Quiz before the due time.
5. Return the borrowed equipment and cables to your instructor.

Files to submit (4 files):

- Screenshots for task 1, 2 and 3. (These are images!)
- The server configuration file from task 4.