Lab #3
Due: Thursday, March 10th

For this lab (and just like Lab #2), you are asked to use a computer with Windows. For the reason that not everyone in the class has a computer running Windows, I suggest you work in groups of two or three. Make sure when you turn in your individual answers, that you indicate who was in your group. If you have trouble finding someone with whom you can work, please use our webforum to coordinate. If you have a computer that runs Windows, please help out those who do not. We apologize that you need these things for the lab, but there is no easy alternative that we could find for OSX users. Also, if you get stuck on a problem, try asking your questions in the webforum.

This lab will be longer than the previous labs, so therefore it will also be worth more points. It will also do less hand-holding than the last lab, so again, the webforum is a good resource, along with the PacketTracer additional information document which can be found on the course webpage.

1. Due to your company (InternetsLOL!) bringing in outside consultants (The Benevolent Operations Business Specialists – The BOBs for short) to review your company’s operations, your previous project of getting network connectivity for Milton has been de-prioritized. You decide to take the day off, but of course your day of relaxing with friends turns into a new business idea. In an effort to start a side project with your friends Michael and Samir, you three come up with a great money-making idea: a Laundry business. You have heard that laundering is what people with lots of money do, so it must be a foolproof idea. You realize that your new Laundromat, Chotchkie’s, will need network connectivity, so you turn to your trusty PacketTracer tool to do some preliminary simulations (check out Lab #2 for download/setting up PacketTracer).

   (a) Each of these new washers and dryers generate Thermal Protection Sensor (TPS) Reports which let you know if they overheat. You want to be able to view and print these TPS Reports in the Laundromat, so to simulate this, you should first download the laundromatSetup.pkt file from the course webpage. The file contains a few washers and dryers, a PC, a printer, and a router.

      a. Your first task is to appropriately connect the devices together. You will soon notice that some of the devices have Ethernet ports while some do not. For the ones that do not have Ethernet ports, you will want to connect them by setting appropriate wireless card settings on the router and the devices.

         i. Use Authentication for your Wireless network. I suggest WPA2-PSK as this is more recent and more user-friendly.

         ii. You may use Static IP Addresses or DHCP – DHCP would be configured in the GUI portion of the router’s info if you choose to use it.

         iii. When your network is configured properly, all of the wired connections will have green dots, and the wireless connections appear as dashed lines.
b. Now that your simulated network is set up, let’s gather some information about it:
   i. What are the IP Addresses and MAC Addresses of all the devices with IPs? (Note that the MAC Addresses might look like AABB.CCDD.EEFF in PacketTracer. In this lab, format those MAC Addresses to look like this: AA:BB:CC:DD:EE:FF)

   1. Wireless Router
      a. IP Address: ______.______.______.______

   b. MAC Address: ______:______:______:______:______:______

   2. Chotchkie’s PC
      a. IP Address: ______.______.______.______

   b. MAC Address: ______:______:______:______:______:______

   3. TPS Report Printer
      a. IP Address: ______.______.______.______

   b. MAC Address: ______:______:______:______:______:______

   4. Washer1
      a. IP Address: ______.______.______.______

   b. MAC Address: ______:______:______:______:______:______

   5. Washer2
      a. IP Address: ______.______.______.______

   b. MAC Address: ______:______:______:______:______:______

   6. Dryer1
      a. IP Address: ______.______.______.______

   b. MAC Address: ______:______:______:______:______:______

   7. Dryer2
      a. IP Address: ______.______.______.______

   b. MAC Address: ______:______:______:______:______:______

   ii. What is the Subnet Mask of your network?

   1. Subnet Mask: ______.______.______.______

   iii. What is the Wireless Authentication Key (WEP Key or WPA Passphrase)?

   1. Wireless Key: ______________________________________

   iv. From the wired PC (Chotchkie’s PC), ping the other devices and record the average ping times. Try pinging a few times to see if the time varies much.

   1. Wired Average Ping Time: ____________

   2. Wireless Average Ping Time: ____________
c. Suppose you wanted to transmit data from the PC (Chotchkie’s PC) to the printer (TPS Report Printer), and the ARP cache in each device was empty (think of it as if all of the devices were just powered on). Also only consider the first ARP Request and the first ARP Reply that are sent.

   i. Which device(s) send the ARP Request?

   1. Device Name(s): __________________________

   ii. Which device(s) receive the ARP Request?

   1. Device Name(s): __________________________

   iii. Which device(s) send the ARP Reply?

   1. Device Name(s): __________________________

   iv. Which device(s) receive the ARP Reply?

   1. Device Name(s): __________________________

d. Take a screenshot of your network and print it on a single page (crop to just the workspace if you can), or otherwise create a labeled sketch and attach it to this lab.

2. Weeks later after giving up on opening a Laundromat since you have realized that Laundromats aren’t what people do to launder money (although with your simulations, the business surely would have succeeded!), you find out that The BOBs have given you a promotion! You have been appointed to manage a team of junior-level Network Engineers, and you find that this team has been trying to solve a problem with the Munich, Germany branch of InternetsLOL! They have lost network connectivity to the local branch, and this needs to be fixed ASAP.

   (a) To simulate this issue, first download the internetsLOL-International.pkt file from the course webpage. The file contains the network setup for your local branch, the Munich branch, and the connection between the two branches.

   (b) Since you should be familiar with PacketTracer now, record the PC name and IP Address for two PCs (one in your local branch, and one in the Munich branch)

   1. Local Branch PC
   a. PC Name: __________________________
   b. IP Address: ______.______.______.______

   2. Munich Branch PC
   a. PC Name: __________________________
   b. IP Address: ______.______.______.______

   3. Now try pinging the Munich PC from your Local Branch PC (it should not work yet). Try using tracert to see where the route ends.

   (c) Now we’ll investigate the routers (they are named SantaCruz and Munich). Each router connects to a Branch Local Area Network (either the Santa Cruz Branch, or the Munich Branch), and they also connect to each other. These connections are, as you should expect, part of different subnets. Since they are on different subnets, each router has two IP Address (one for
each subnet). You can find these IP Addresses by clicking on each router icon and opening up the **Config** tab. The information can be found under **FastEthernet4/0**, and **FastEthernet5/0** (these are fiber connections whereas **FasthEthernet0/0** and **FastEthernet1/0** are copper wire).

1. What is the Subnet Address of the network shared by the two routers? If you aren’t sure just by looking at the numbers, try taking into account the IP Addresses you found above for the Branch PCs.

   a. Shared Subnet Address: ______._____._____.______

(d) Without closing the current window (SantaCruz), select the **Static** window, under the **ROUTING** header. It is the router’s job to route traffic from one subnet to the next, so you need to input the information needed for the router to do its routing. In its current state, SantaCruz doesn’t automatically know about the Munich branch, so it doesn’t know what to do with the Munich Branch IP Addresses. With some more information, the routers can help the two branches connect to each other.

1. In the **Network** box, type in the Subnet Address that the Munich PC is on, and below it include the Subnet Mask (in the **Mask** box). In the **Next Hop** box is where the IP Address of the Munich router should go (hint – this IP should be on the 100.0.0.0 network!), and then click **Add**. If all goes well, you should see an entry underneath **Network Address**.

2. Make the same changes on the Munich router as you just did to SantaCruz, except the information should be about the Santa Cruz network instead.

3. Now open up the command prompt window on the Santa Cruz PC you chose earlier, and try to ping the Munich PC. Does it work? (It should). If it doesn’t work, try running **tracert** again to trace the route between the Santa Cruz PC and the Munich PC.

4. How many hops are there from a Santa Cruz PC to a Munich PC? (Look at the number that tracert gives you)

   a. Number of hops: ______________

5. How long is the delay between hops?

   a. Delay between hops: ______________

6. What Device’s MAC Address will the Santa Cruz PC have in its ARP table for sending data to the Munich PC you have been testing? (Just give the device name, don’t worry about the actual MAC Address)

   a. Device Name: ______________________

7. Consider your pings from the Santa Cruz PC to the Munich PC. For the **IP Header** sent, what are the values for **Type**, **Source IP**, and **Destination IP**?

   a. Type: __________________
b. Source IP: ______.______.______._____

c. Destination IP: ______.______.______._____

8. Now considering the **Source Address** and **Destination Address** in the Ethernet Header contained in the packet from the Santa Cruz PC to the SantaCruz Router, what are the device names that would be the source and destinations for this packet? (Again, don’t worry about the actual MAC addresses, just give the device names)

   a. Source Address Device Name: __________________________

   b. Destination Address Device Name: __________________________

Great job! You have figured out the network problems just in time to hear the fire alarm go off. You better follow Milton’s lead and head out the door – I don’t think this is a drill...