

## CS 485/ECE 440/CS 585 Fall 2012 Lab 1 setup

This is the lab setup, the assignment and due date will be announced in late September. You should try to have your virtual machines set up and be routing packets between groups with BGP before I get back on September 25th.

These instructions and the instructions about the basic VirtualBox setup are deliberately vague. The intention is for you to figure out how to configure the network based on your understanding of networking and the various layers of the OSI stack. Please ask the TAs lots of questions, email me lots of questions, and discuss your questions with your classmates as much as possible. Please be helpful to your classmates, if you're finished and have BGP routing working and everything, help the TAs by helping others. If the whole class is "done" and has BGP working and everything, double-check each other's networks and try to test each other on your knowledge of networking, BGP, and whatever you think will help with lab 1. When the \$#!\* hits the fan, so to speak, for lab 1 you'll be counting on your classmates because you'll need to route through them. Make sure they understand what's going on.

Just a reminder, lab 1 is an individual assignment. You have a partner that you'll share a computer with and peer with using static routing rules, but the assignment for lab 1 will be an individual assignment. When you're logged into your account on the lab machine, nobody other than you (not the TAs, not your partner, not your other classmates, not a friend, not me, nobody) should touch the mouse or keyboard to configure your virtual machines or network. Nor should you be just typing configuration information into a file based on someone else's configuration, stop and make sure you know what you're doing and why because every detail of the configuration and how the network works will become relevant later.

Use the lab machines to create your network, don't create it on, *e.g.*, a laptop or computer at home. Share a single computer with your partner and work together. You can use "Switch User" to both be on the machine at the same time, just be sure to remember to log both of you out before you leave the room at the end of class because George and Jeff suspend accounts that are left logged into lab machines. You can use ssh and "kill -9 -1" if you forget to log yourself out of a lab machine.

Each student will have three virtual machines. Two will be endpoints, and one will be a router.

The endpoints each should have no NAT or Internet connectivity on their own. They should not be connected to each other directly. They should each have two NICs configured, one that is plugged into the same "switch" as one of the router's NICs on a intnet internal interface, and one that is reserved for BGP and not yet configured (until you get to the BGP part, maybe just make it a separate intnet for now until the TAs give you further instructions on the BGP part).

The router should have four interfaces: two intnets to connect to each of the two endpoints (so they can talk to each other through the router and also get to the Internet), one NAT to get to the Internet, and

one on vboxnet0 to connect to your groupmate. You should be able to route to not only your two endpoints but the endpoints of your groupmate. You need to confirm that this is not happening through the NAT. You should be talking to your groupmate's endpoint machines through the vboxnet0 interface. This means you'll need to add static routing rules to your configuration. I recommend doing this in /etc/network/interfaces with “up route add ...”

For the BGP configuration, the TAs will give you instructions. Just be aware that you may be guinea pigs until we get the ability to connect different groups of students together virtually (using something like proxy ARP) debugged. You should help the TAs with this debugging process and let us know if you have other suggestions about how to connect virtual machines on different physical machines so that they can talk to each other at layer 2.

To get BGP routing up and running, try “sudo apt-get install quagga; man quagga”.

Some other commands you should read the man pages for, because they'll help you debug your network: arping, ping, tcpdump, traceroute, tcptraceroute, route, arp

Don't give your groupmate an account on your machine, you can test network connectivity just by getting to the password prompt of SSH. You can also install a web server and web client, if you like, like Apache or lighttpd and lynx or w3c.