1 Goals

- Reinforce your computer interface configuration skills
- Practice your lab monitoring/debugging skills
- Learn to think about routing
- Learn how to configure routing on Cisco routers

2 Method

Each table will build, configure, and test a medium-sized Internet. If you come to lab well prepared and having filled out some of the details of the machine diagrams, this is a challenging but very reasonable amount of work for a 3-hour lab. If you aren't prepared, it will prove to be very frustrating.

At the end of this lab writeup, you'll find both a full lab diagram and a diagram that better shows the pieces that you'll need to deal with.

3 Final Goal

If you have followed the instructions, the paths should be as follows:

	to Win2008	to Linux	to Mac OS
from Win2008	-	Bu-FDDI-RA	Bu-FDDI-RA-FDDI-RB
from Linux	RA-FDDI-Bu	-	RB
from Mac OS	RB-FDDI-Bu	RB	-

RA: "RouterA" RB: "RouterB" Bu: "Buell"

Be sure that your lab instructor has initialed that all of the above tests work before leaving the lab. Note: to get full credit, all tests must work, along the same paths, all at the same time (without changing any configuration during the test).

4 Per-Table Configuration

The exact details of the lab will depend on which table you're working at. This table shows the details that you will need to know for your particular table:

Item	Table 1	Table 2	Table 3	Table 4
Router A Router B	Harley Davidson	Harley Davidson	Davidson Harley	Davidson Harley
Win2008: Buell Eth Iface	0/0	0/1	0/2	0/3
Linux: Harley/Davidson Eth Iface	0/0	0/1	0/2	0/3
Mac OS: Switch Mac OS: Router Eth Iface	1 0/4	1 0/4	2 0/4	2 0/4
Mac OS Host	10.0.1.1/24	10.0.1.2/24	10.0.2.1/24	10.0.2.2/24
Linux Net	132.235.201.128/28	132.235.201.160/28	132.235.201.192/28	132.235.201.224/28
Win2008 Net	132.235.201.144/28	132.235.201.176/28	132.235.201.208/28	132.235.201.240/28

5 Step-by-Step Instructions

1. We have already done the following to get your started:
   (a) Buell has access to the outside world (i.e. has a default route installed)
   (b) All 3 Cisco 7000s have been set up so that Ethernet interface 5 is assigned the IP address that goes with their name (buell.itl.ohiou.edu). We'll call this its "admin" address.
   (c) The Win2008 machine has its primary interface configured so that you can talk to all of the routers over their interface 5 address. This is their "admin" address.
2. Get together with everyone in the lab and decide on an appropriate network and addresses for the FDDI interfaces on the three 7000 routers based on question 2 in the prelab. Tables 1 and 2 should bring up the FDDI interface on Harley (132.235.201.50) using the chosen address and mask, and then add a default route on Harley to Buell across the FDDI network (i.e. using the FDDI interface address on Buell as the next hop address). Tables 3 and 4 should do the same for Davidson (132.235.201.60). The first group of tables to finish should bring up the FDDI interface on Buell with the appropriate address. The default route on Buell has already been configured.
   (a) Use ping/traceroute to verify the path from Harley/Davidson to:
      i. Each other router's FDDI address
      ii. Each other router's admin address

      Note that there is no equivalent to traceroute -n *from the routers* so there may sometime be long delays for DNS timeouts; you can always open another console window.
3. Configure your Win2008 machine's second interface and patch it into Buell; to get the appropriate cable crossover, **GO THROUGH A SWITCH** that you'll share with another table (as on the network diagram). The address range to use is on the first page. Configure the appropriate interface on Buell (132.235.201.40) to act as the Win2008 machine's gateway. **LAST: Disable the Win2008 admin interface**. Use ping and tracert to verify your path from Win2008 to:

(a) Each router's FDDI interface

(b) Each router's "admin" interface

(c) The Internet

4. Patch your Linux machine into an unused hub.

   (a) Configure its Ethernet interface.

   (b) Patch your hub into the appropriate interface on your RouterA.

   (c) Install a default route in Linux through RouterA

   (d) Configure RouterA's Ethernet interface.

   (e) Insert a route on Buell sending traffic for your Linux subnet through RouterA's FDDI address

   (f) Use ping and traceroute to verify your path from Linux to:

      i. RouterA

      ii. The Internet

      iii. Each router's FDDI interface

      iv. Each router's "admin" interface

5. Install the patch between your Linux hub and RouterB.

   (a) Configure RouterB's hub/Ethernet interface

   (b) Verify that you can ping that interface on RouterB from the Linux machine

6. Configure your Mac OS machine's interface and patch it in to the specified switch. Use ping to verify that you can reach the other Mac OS machine on your switch (if it's up yet).

7. Synchronize with the other table sharing your switch for their Mac machine. The first of the two tables reaching this step should do steps A and B below. All tables must do step C.

   (a) patch the Mac OS switch into the appropriate router port (RouterB).

   (b) Set up RouterB's interface with the switch to get to the 2 Mac OS machines

   (c) Because of the private address, we'll need to add the following **host-specific** routes to your Mac OS machine to the network:

      i. Install a host-specific route on Buell that directs it to send your Mac OS machine's traffic through RouterA's FDDI interface

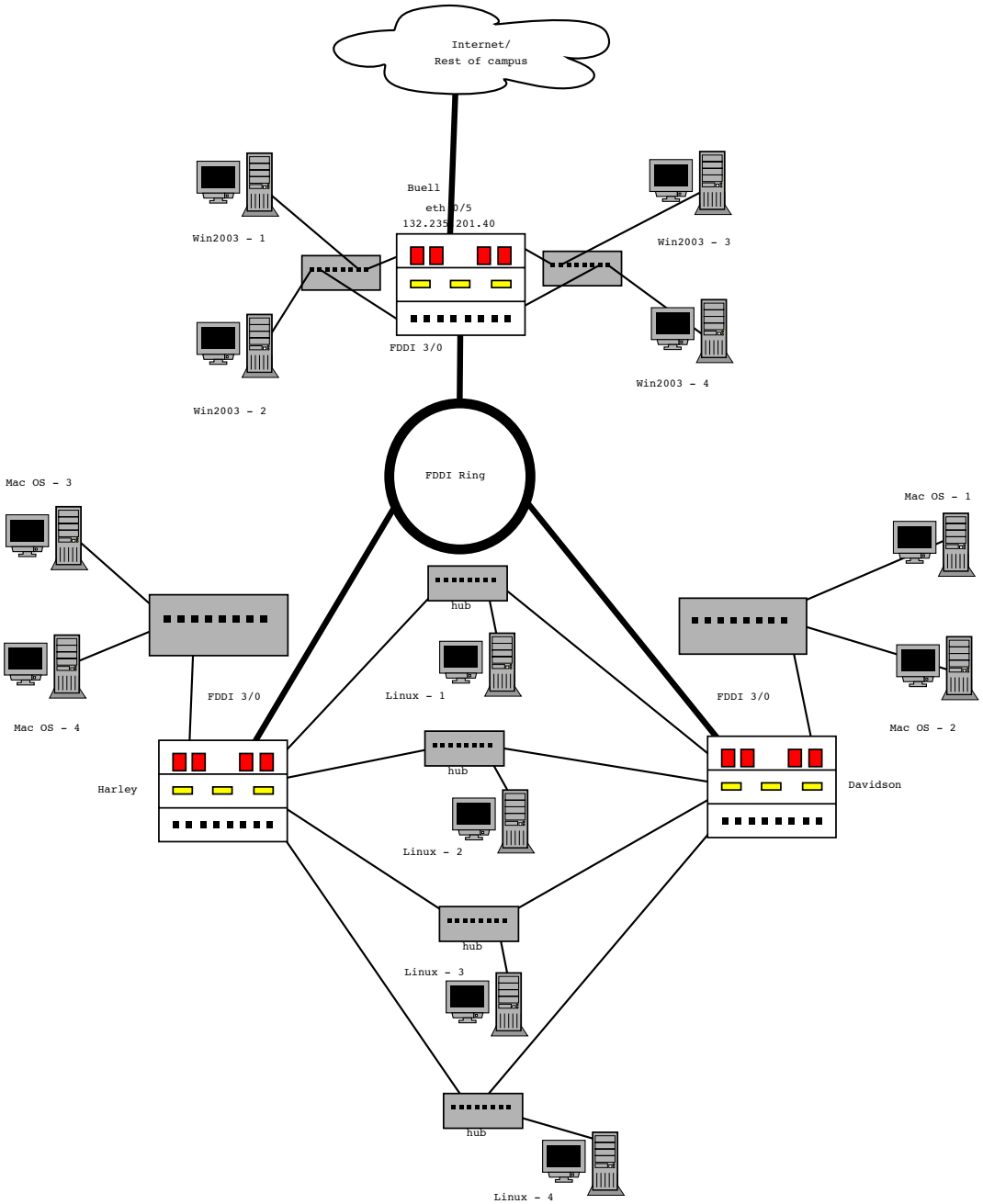
      ii. Install a host-specific route on RouterA that forces traffic through RouterB (across FDDI link) to get to your Mac OS machine

      iii. Install a host-specific route on Linux to get to your Mac OS machine by going through RouterB

8. Verify all paths on the chart on the first page!

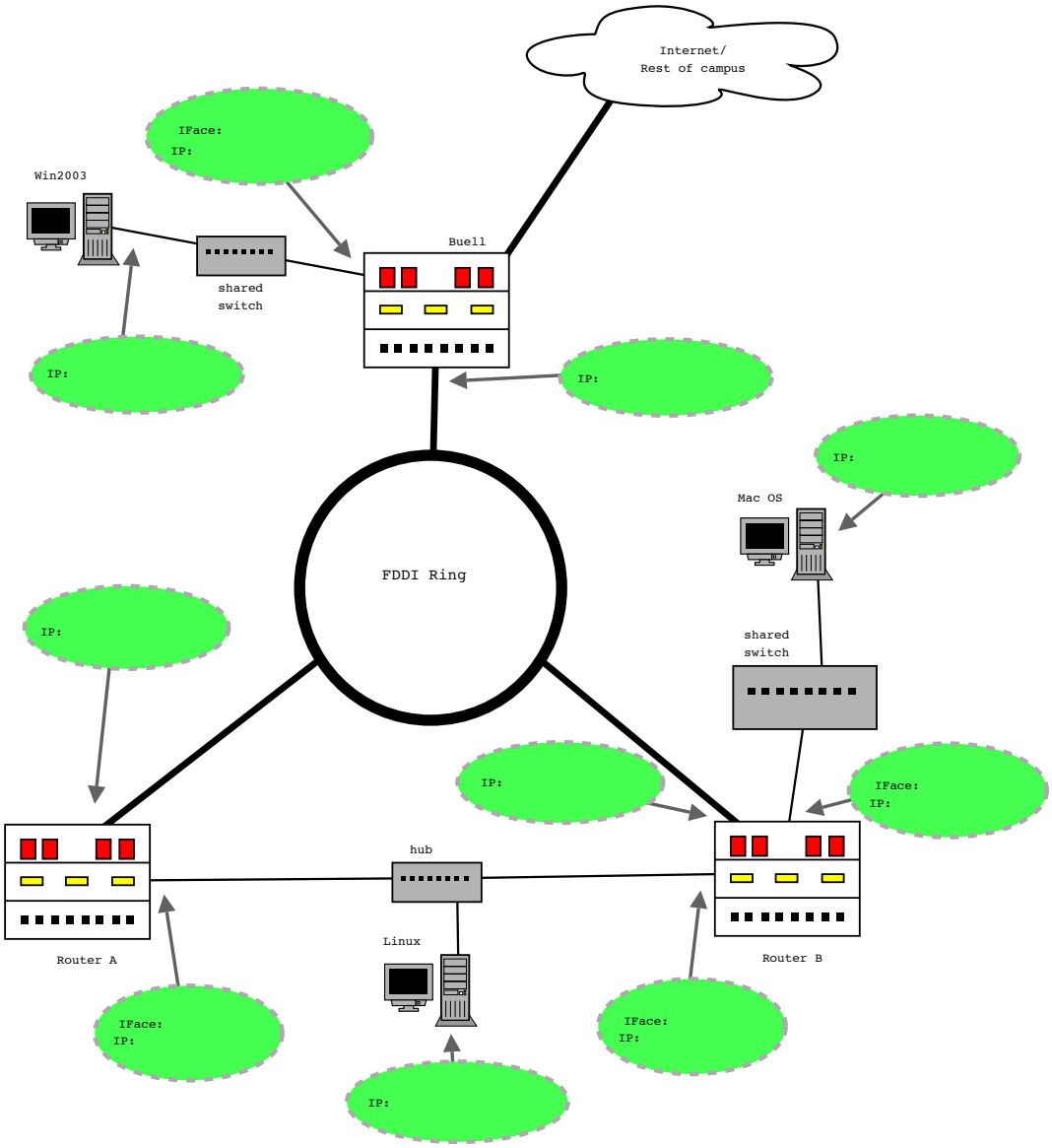
6 Physical Lab Setup

The figure below show all of the lab connections that you will need to deal with.



7 Virtual Lab Setup

This figure only shows the details that you need to deal with for the beginning of the lab.



Lab Report

General Guidelines

Each report is to be written individually, although the data for the lab will be collected during the lab with your partner/group. They should be typed/word processed and brought to class in printed form.

Lab writeups are due **in class** on the Monday following the lab. The written part doesn't generally need to be more than a couple of pages at most. Officially, they need to be "long enough to answer the questions". Each lab writeup **must** include

1. Your name
2. The lab section that you attended
3. Your affiliation (CS ugrad, CS grad, COMT)
4. Your lab partner's name
5. Your lab partner's affiliation
6. **THE TABLE NUMBER THAT YOU WORKED AT**

Include in your report

1. Patch panel chart, prelab signed by instructor
2. Ping/traceroute matrix from page one with instructor's signature indicating that you got everything working (or telling what didn't work)
3. Virtual network picture with details added *in red*:
   (a) Show the address/mask for all 3 computers
   (b) Show the address/mask/interface for all router interfaces that you used

Include a copy of the routing table for the 3 main routers and your Linux box.

Explain why the path between Mac OS and Win2008 is "asymmetric" (the packets take a different path in the two directions).

Explain "how far" your Mac OS machine can get. What machines can and can't it talk to. Attach ping/traceroute output to support your explanation.

Required Graduate Students (extra credit for undergrads). Do a traceroute from your Linux machine to the other Mac machine address that shares your switch. Explain why the traceroutes between this address and your Mac address differ in the number of hops.

Required Graduate Students (extra credit for undergrads). Research and write up a concise description of the original class-based IP addressing and the CIDR (classless inter-domain routing) IP addressing currently in use on the Internet today. Include the CIDR format address for an example network in each of the original network classes.

8 Prelab

Before you come to lab this week, answer the following questions (which will be graded at the beginning of lab):

1. Give the Cisco config-mode command to do each of the following:

   (a) Make a route to the 16-host subnetwork that starts at 132.235.3.0 with next hop being router 1.2.3.4

   (b) Make a route to the 64-host subnetwork that starts at 132.235.4.128 with next hop being router 5.6.7.8

2. In this lab the FDDI interfaces will use addresses in a private address range. Propose an appropriately-sized subnet of 192.168.0.0/16 for use on the FDDI ring interfaces and write it here.

3. For each of the 4 tables, give an appropriate IP address and (dotted-decimal) subnet mask for each of the interfaces in the table below based on the information for each table on page 1. Then make 4 copies of the virtual lab diagram on page 5 and fill one out for each table.

	Table1	Table2	Table3	Table4
Win2008 Host				
Buell (on Win2008 network)				
Linux Host				
RouterA (on Linux network)				
RouterB (on Linux network)				
Mac OS Host				
RouterB (on Mac OS network)				