

# REMOTE LAB

Practical Exercise 39

## Cisco Router Configuration

V1.0

Hardware List:			
Router	Cisco Router 1721		
Software List:			
Protocol Analyzer	Wireshark	Version	Latest
Remote Lab PC:	RL4	Remote Lab Type:	A

Remote Lab Type: A - EIT PC with hardware  
Remote Lab Type: B - EIT PC with Simulation Software  
Remote Lab Type: C - Cloud PC with software  
Remote Lab Type: D - Student/Home PC

Created By:	Deon	Date:	18/11/13
Checked By:	Edwin W	Date:	18/11/13
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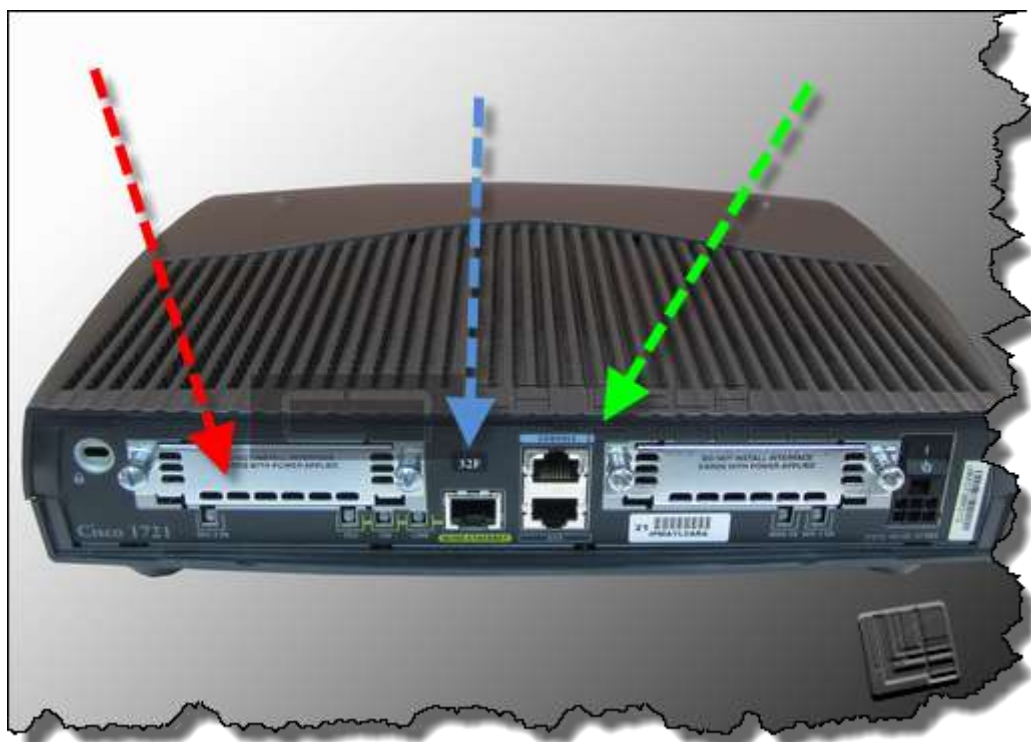
## 1. Objective

The objective of this exercise is to perform basic configuration and diagnostics on a Cisco 1721 router via Telnet. We will do the following:

- Log into the router as an administrator ('priveleged exec' mode)
- Configure one of the ports
- Enable routing and configure RIP
- View the IP configuration as well as the running configuration
- Ping/trace across and from within the router
- Perform simple packet analysis to observe IP and MAC addresses for packets in transit

## 2. Background

The Cisco 1721 is an older modular-style access router. The picture below is a generic one, and the two cover plates can be removed in order to insert specific modules.



The 1721 that we are using for this exercise has a plug-in module in the left bay (red arrow) with:

- (a) One 100 Mbps ('Fast') Ethernet port, referred to as 'fastethernet 0/0' or 'fa 0/0'.
- (b) One serial port, referred to as 'serial 0/0' or 's 0/0'.

In addition there is a fixed 10 Mbps Ethernet port (blue arrow) referred to as 'ethernet 1/0' or

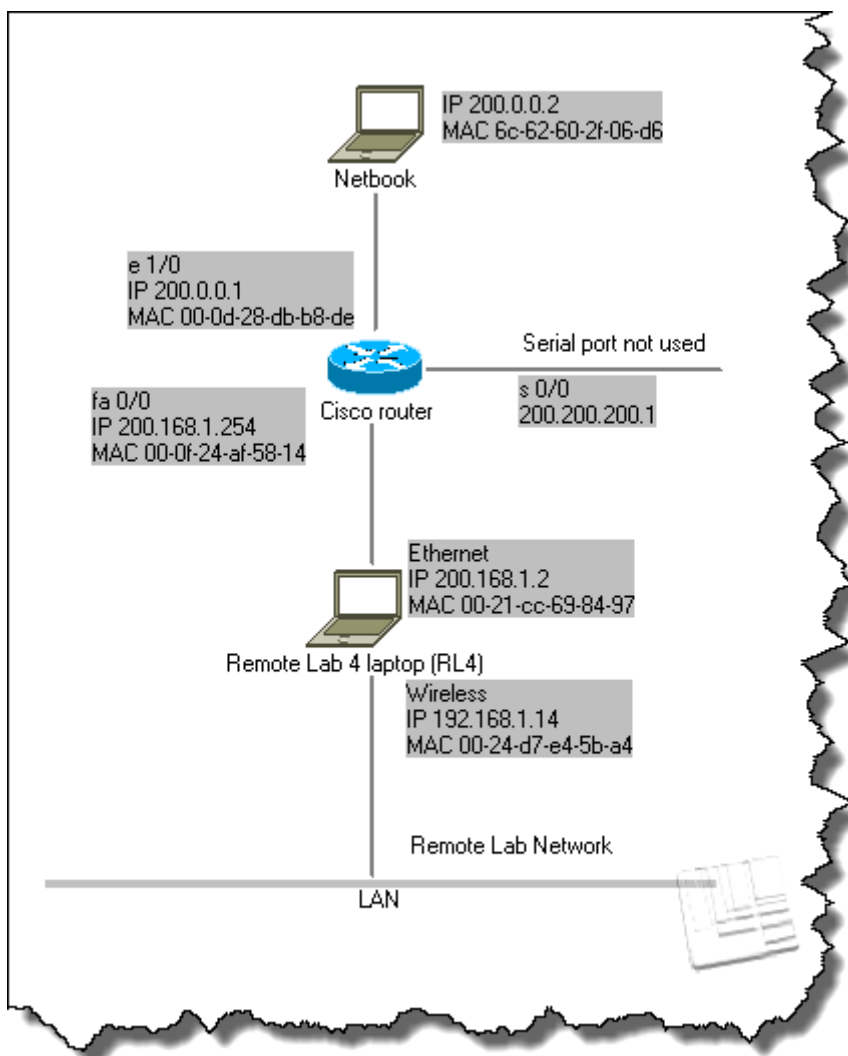
'e 1/0'.

The Console port (green arrow) is an RS-232 port used for configuration purposes. In its 'out-of-the-box' state the router has not been configured with any IP addresses, hence Telnet access via an Ethernet port is not feasible. In this situation one has to access the router via the console port, using a program such as Hyperterminal, PuTTY or Mxterm to access the router. Once an Ethernet port has been assigned an IP address, one can put the router on the network and then access it via Telnet. Note that we are only using Telnet for demonstration purposes and, in the real world, its use is not recommended because it transmits characters (login credentials) in plaintext.

In the x/y notation (e.f. fa x/y) the x refers to the module and the y refers to the interface. For example if the left bay (red arrow) had a second Fast Ethernet port, that would have been referred to as fa 0/1.

For the purpose of this exercise we connected the 100 Mbps port to the Remote Lab 4 (RL4) computer. For testing purposes a second computer (netbook) has been attached to the 10 Mbps port (blue arrow) port.

The lab setup is as follows.



### 3. Instructions

#### **VERY IMPORTANT**

- **THROUGHOUT THIS EXERCISE, PLEASE REFRAIN FROM SAVING ANYTHING, EVEN IF YOU KNOW HOW TO DO SO.**

#### 3.1 Logging into the router

Log into Electromeeet, and open Remote Lab 4.



Open up the Command (DOS) prompt. You do not have to be at the root (C:\) as shown in screenshots on the next page. It has only been done here (by typing `cd..<enter>` twice) to remove the 'clutter'.

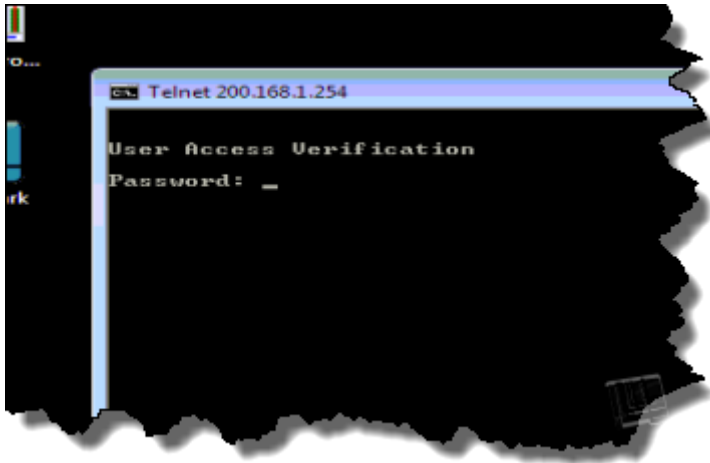


For clarity we will include the prompts, but you obviously do not have to type them. The characters to be typed will be highlighted in grey.

Telnet into the router by typing:

```
C:\> telnet 200.168.1.254.
```

You will be asked for a Telnet password (see below). **The characters that you type will not show up.**



Enter the Telnet password `eit` and you will be logged in. You can, however, not make changes to the router configuration yet. Notice the prompt; it is in the form of an arrow pointing to the right.



To get into the 'priveleged exec' mode where you can make configuration changes, you need to type `en` (short for 'enable') at the `Router>` prompt.

```
Router> en
```

You will be asked for the administrator password ('enable secret'). Type `cisco` at the `Password:` prompt. **The characters that you type will not show up.**

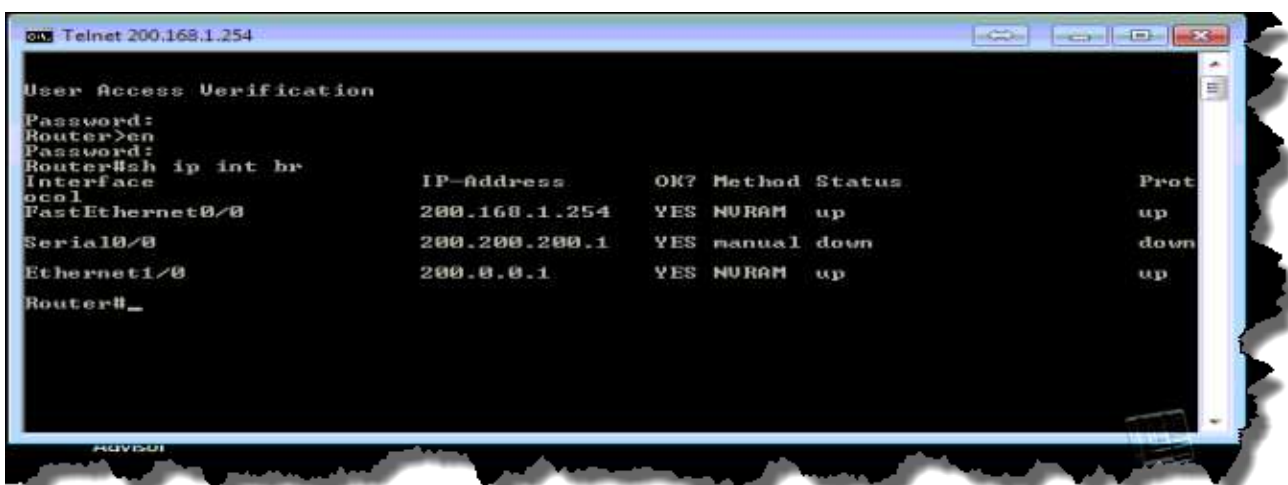
You will now be in the 'priveleged exec mode'.

Notice the changed prompt (`#`).



Type `show ip interface brief` (or `sh ip int br` for short) to see the current port configuration. Ports can be administratively up or down (i.e. enabled or disabled by the administrator), and they can be physically up or down. They can only be physically 'up' if they are connected to external equipment such as switches and modems.

**TAKE A SCREENSHOT OF THE 'SHOW IP INTERFACE BRIEF' RESULTS ON YOUR COMPUTER SCREEN. We will refer to it as Figure 39.1.**



### 3.2 Configuring ports

We are now going to look at port configuration issues.

As you can see from the previous screenshot, there are three ports to configure namely fa 0/0 (100 Mbps Ethernet), e 1/0 (10 Mbps Ethernet) and s 0/0 (serial).

We are not going to touch the Ethernet ports, especially fa 0/0, as changing the latter will break your Telnet connection. We will therefore play around with the serial port, as it is not connected to anything.

The procedure is the same for all three ports, the only major difference being the identifier i.e. fa 0/0, e 1/0 and s 0/0.

Start off by typing 'config t' at the Router# prompt.

```
Router#config t
```

The router is now in the global configuration mode and the prompt changes to Router (config) #.

Some of the commands such as no shut will generate a delayed response in the form of a message. If this catches you unaware and interferes with the next command you are typing, just hit 'enter' after the message and repeat the instruction.

Now we will specify the interface to be changed. Type:

```
Router (config) #interface s0/0 (or #int s 0/0 for short)
```

The router is now in the interface configuration mode and the prompt changes to router (config-if) #.

Type the IP address plus subnet mask as follows:

```
Router (config-if) #ip address 200.200.200.1 255.255.255.0
```

Follow with a 'no shutdown' command, to ensure that the port is administratively 'up' i.e. enabled.

```
Router (config-if) #no shutdown (or #no shut for short)
```

We now have to get back to the router# prompt. The standard way to do this is by holding the Control key down and hitting 'Z' (CTRL-Z):

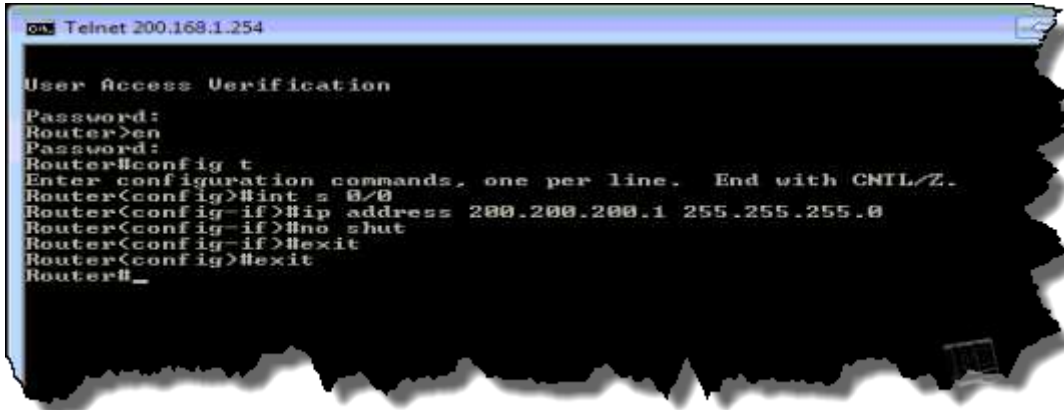
```
Router (config-if) # CTRL-Z
```



If CTRL-Z does not work, you can get the same result by typing `exit` (followed by `Enter`) twice.

That concludes the setup for s 0/0.

**TAKE A SCREENSHOT OF THE SERIAL PORT (S 0/0) CONFIGURATION STEPS ON YOUR COMPUTER SCREEN. We will refer to it as Figure 39.2.**



**Note:**

When two routers are interconnected via their serial ports, one of them needs to be the DTE and the other needs to be the DCE. The DCE dictates the clock rate, hence it needs an additional instruction in addition to the IP address of the serial port as in the following example where the clock rate is to be 64 kbps.

```
Router#config t
Router(config)#int 0/0
Router(config-if)#ip address 200.200.200.1 255.255.255.0
Router(config-if)#clockrate 64000
Router(config-if)#no shut
Router(config-if)# CTRL-Z
```

In our case we are assuming that we are setting up a DTE, hence this instruction is unnecessary.

### 3.3 Routing

At this point in time we are assuming that IP routing has not yet been enabled. We will do this and then enable RIP.

```
Router#config t
Router(config)#ip routing
Router(config)#router rip
```

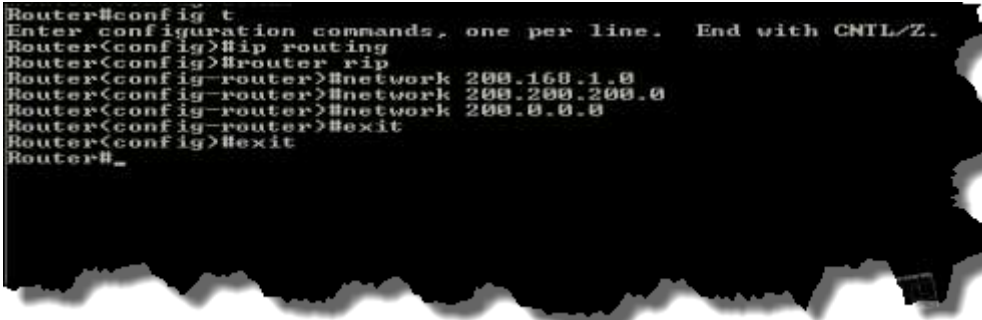
The prompt changes to Router(config-router)#

Now enter the names of the NETWORKS (not hosts) attached to this router:

```
Router(config-router)#network 200.168.0.0
```

```
Router(config-router)#network 200.200.200.0
Router(config-router)#network 200.0.0.0
Router(config-router)#CTRL-Z
```

**TAKE A SCREENSHOT OF THE ROUTING CONFIGURATION STEPS ON YOUR COMPUTER SCREEN. We will refer to it as Figure 39.3.**



```
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router<config>#ip routing
Router<config>#router rip
Router<config-router>#network 200.168.1.0
Router<config-router>#network 200.200.200.0
Router<config-router>#network 200.0.0.0
Router<config-router>#exit
Router<config>#exit
Router#_
```

If you find a redundant entry there that does not apply to any current network (say network 100.168.0.0) you can remove it with `no network 100.168.0.0.`

Now let's look at the running configuration by typing `show run` at the # prompt.

```
Router#show run
```

You will have to hit 'enter' several times to scroll through the display. Scroll down until you can see the interface and RIP parameters.

**TAKE A SCREENSHOT OF THE RUNNING CONFIG DISPLAY ON YOUR COMPUTER SCREEN. We will refer to it as Figure 39.4.**



```

router#ping 200.168.1.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.168.1.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
router#ping 200.0.0.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.0.0.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
router#exit

Connection to host lost.
C:\>ping 200.0.0.2

Pinging 200.0.0.2 with 32 bytes of data:
Reply from 200.0.0.2: bytes=32 time=1ms TTL=127
Reply from 200.0.0.2: bytes=32 time=1ms TTL=127
Reply from 200.0.0.2: bytes=32 time=1ms TTL=127
Reply from 200.0.0.2: bytes=32 time=1ms TTL=127

Ping statistics for 200.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\>tracert 200.0.0.2

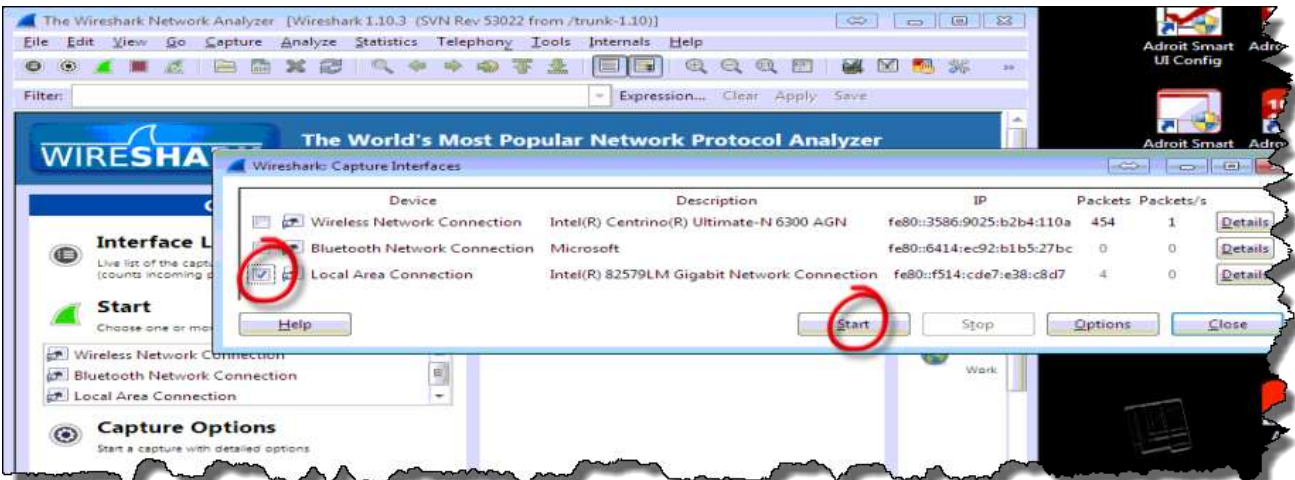
Tracing route to 200.0.0.2 over a maximum of 30 hops:
  0  0 ms    0 ms    0 ms   200.168.1.254
  1  1 ms    1 ms    1 ms   200-168-1-254.speedyterra.com.br [200.168.1.254]
  2  1 ms    <1 ms  1 ms   200.0.0.2

Trace complete.

C:\>
    
```

### 3.5 Packet analysis

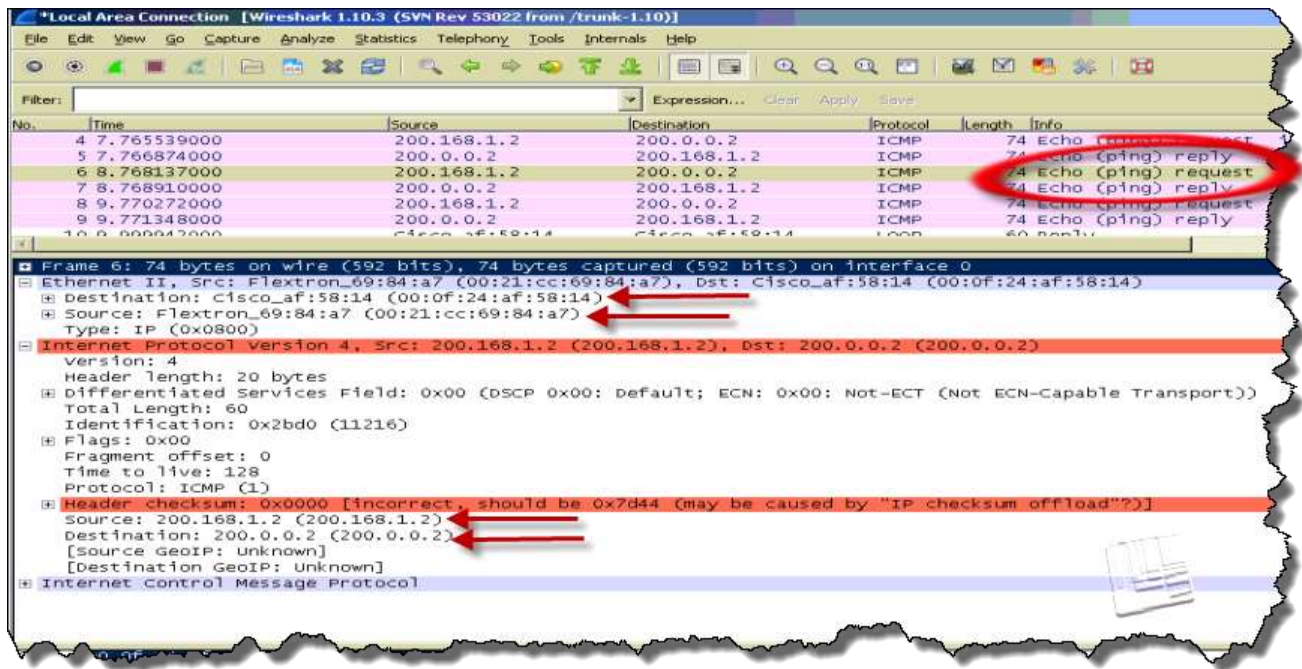
Run Wireshark, hit Capture->Interfaces, and select the Ethernet interface. Then hit Start.



Ping the Netbook (200.0.0.2 from the Command Prompt on RL4 and capture the packets with Wireshark. Stop Wireshark and select one of the *ICMP Echo Request* messages.

Now expand the Ethernet and IP headers so that *the MAC addresses as well as the IP addresses* are visible.

**TAKE A SCREENSHOT OF THE ETHERNET AND IP HEADERS ON YOUR COMPUTER SCREEN. We will refer to it as Figure 39.6.**



End of Exercise.

4.