



CompTIA Security+® Lab Series

Lab 1: Network Devices and Technologies - Capturing Network Traffic

CompTIA Security+® Domain 1 - Network Security

**Objective 1.1: Explain the security function and purpose of
network devices and technologies**

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Introduction

This lab is part of a series of lab exercises designed through a grant initiative by the Center for Systems Security and Information Assurance (CSSIA) and the Network Development Group (NDG), funded by the National Science Foundation's (NSF) Advanced Technological Education (ATE) program Department of Undergraduate Education (DUE) Award No. 0702872 and 1002746. This work has been adapted by The Department of Labor (DOL) Trade Adjustment Assistance Community College and Career Training (TAACCCT) Grant No. TC-22525-11-60-A-48. This series of lab exercises is intended to support courseware for CompTIA Security+® certification.

By performing this lab, students will learn the process of capturing network traffic using three different methods; the tcpdump command, Wireshark, and NetworkMiner. The tcpdump command has no Graphical User Interface (GUI) and is only utilized within a Linux terminal. Wireshark shows you the raw output of network traffic captures and allows you to analyze them. Network Miner will allow you to capture data, and it will also pull out items like clear text messages and pictures.

This lab includes the following tasks:

- 1- Using tcpdump to capture Network Traffic
- 2 - Capturing and Analyzing Traffic with Wireshark
- 3 - Capturing and Analyzing Traffic with Network Miner

Objective: Explain the security function and purpose of network devices and technologies

An essential part of network administration is the ability to capture and analyze network traffic. This can be important in order to identify the cause of bottlenecks, determining who is responsible for certain download activity, or analyzing an intrusion.

Wireshark – A protocol analyzer that allows you to capture network traffic and read binary capture files. Wireshark runs on Windows, Linux, and on Mac OS X.

Network Miner – Network Miner allows you to capture and analyze network traffic. It is an NFAT, or Network Forensic Analysis Tool, that runs on the Windows operating system.

tcpdump – A Linux/UNIX program that allows you to capture network traffic.

Sniffer – A sniffer is used to capture network traffic on a network. Software programs like tcpdump, Wireshark, and Network Miner can be used to sniff traffic.

PCAP File – Programs that can sniff network traffic such as tcpdump, Wireshark, and Network Miner allow you to save the network capture to a PCAP file format. In order to read the PCAP format, you need a tool like Wireshark or Network Miner.

Pod Topology

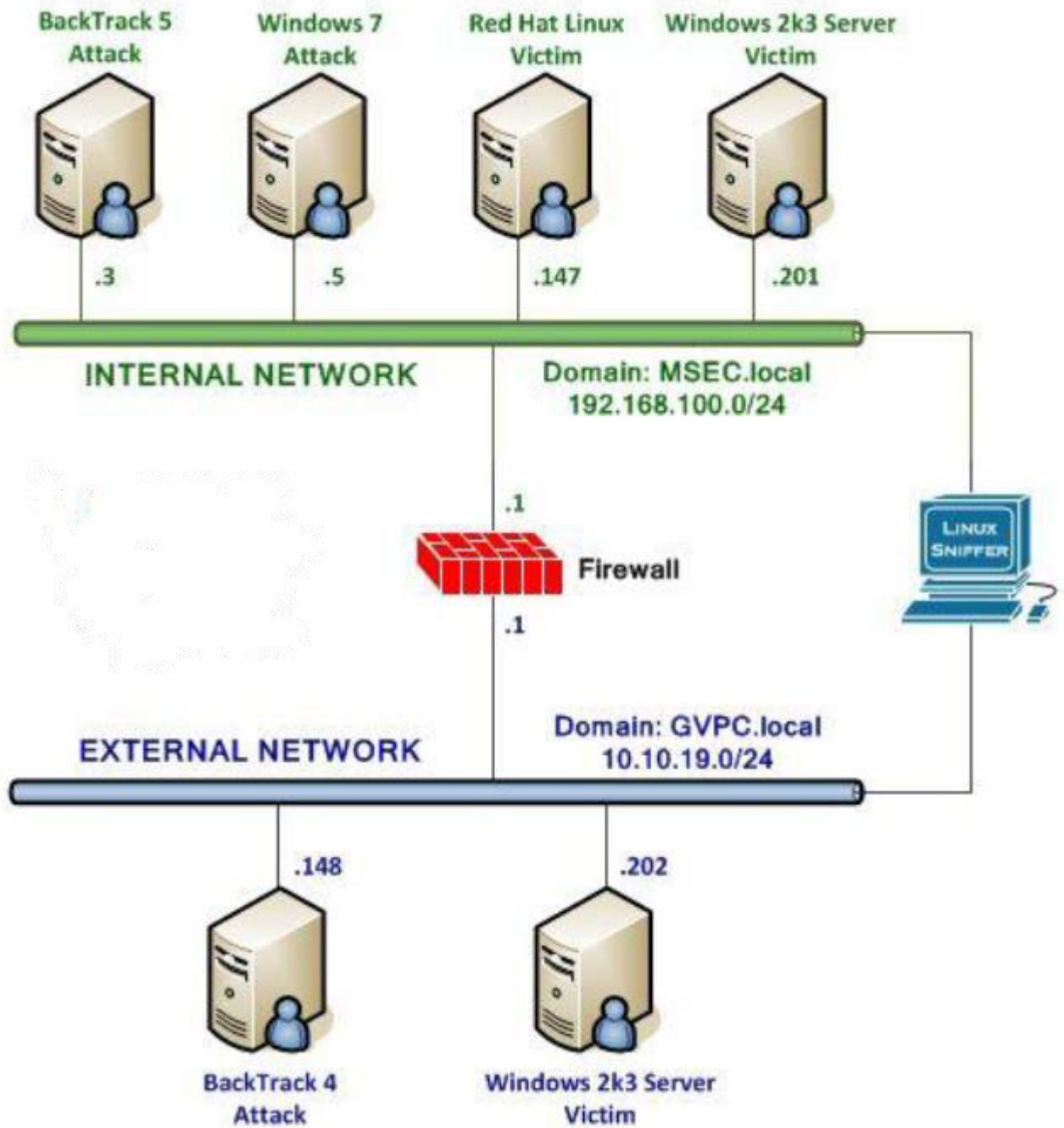


Figure 1: Topology

Lab Settings

The information in the table below will be needed in order to complete the lab. The task sections below provide details on the use of this information.

Required Virtual Machines and Applications

Log in to the following virtual machines before starting the tasks in this lab:

Windows 7 Internal Attack Machine	192.168.100.5
Windows 7 student password	password
BackTrack 5 Internal Attack Machine	192.168.100.3
BackTrack 5 root password	password
Windows 2k3 Server Internal Victim Machine	192.168.100.201
Windows 2k3 Server administrator password	password
Linux Sniffer	No IP addresses
Linux Sniffer root password	toor
BackTrack 4 External Attack Machine	10.10.19.148
BackTrack 4 External root password	password
Windows 2k3 Server External Victim Machine	10.10.19.202
Windows 2k3 Server administrator password	password

Windows 7 Internal Attack Login:

1. Click on the **Windows 7 Internal Attack** icon on the topology.
2. If required, enter the username, **student** (verify the username with your instructor).
3. Type in the password, **password**, and press **enter** to log in (verify the password with your instructor).



Figure 2: Windows 7 login

Linux Sniffer Login:

1. Click on the **Linux Sniffer** icon on the topology.
2. Type **root** at the **bt login:** username prompt and press enter.
3. At the password prompt, type **toor** and press enter.

For security purposes, the password will not be displayed.

4. To start the GUI, type **startx** at the **root@bt:~#** prompt and press **enter**.

```
bt login: root
Password:
Last login: Sun Feb  8 18:33:44 EST 2009 on tty1
Linux bt 2.6.28.1 #2 SMP Wed Feb  4 21:50:02 EST 2009 i686
++ WELCOME TO THE BACKTRACK LIVE CD ++

[*] To start Networking - "/etc/init.d/networking start"
[*] To start KDE - "startx"
[*] To start FVWM - "bt4-crystal"

[*] http://www.remote-exploit.org/
root@bt:~# startx
```

Figure 3: Linux Sniffer login

BackTrack 5 Internal Attack Login:

1. Click on the **BackTrack 5 Internal Attack** icon on the topology.
2. Type **root** at the **bt login:** username prompt and press enter.
3. At the password prompt, type **password** and press **enter**.

```
BackTrack 5 R1 - Code Name
bt login: root
Password: _
```

Figure 4: BackTrack 5 login

For security purposes, the password will not be displayed.

4. To start the GUI, type **startx** at the **root@bt:~#** prompt and press **enter**.

```
[*] To start a graphical interface, type "startx".  
[*] The default root password is "toor".  
  
root@bt:~# startx_
```

Figure 5: BackTrack 5 GUI start up

Windows 2003 Server Login: (internal and external victim machines):

1. Click on the **Windows2k3 Server Internal Victim** icon on the topology
2. Use the PC menu in the NETLAB+ Remote PC Viewer to send a **Ctrl-Alt-Del** (version 2 viewer), or click the **Send Ctrl-Alt-Del** link in the bottom right corner of the viewer window (version 1 viewer).
3. Enter the User name, **Administrator** (verify the username with your instructor).
4. Type in the password, **password**, and click the **OK** button (verify the password with your instructor).
5. **Repeat** these steps to log into the **Windows 2k3 Server External Victim**.



Figure 6: Windows 2k3 login

BackTrack 4 External Attack Login:

1. Click on the **BackTrack 4 External Attack** icon on the topology.
2. Type **root** at the **bt login:** username prompt and press enter.
3. At the password prompt, type **toor** and press **enter**.

For security purposes, the password will not be displayed.

4. To start the GUI, type **startx** at the **stroot@bt:~#** prompt and press **enter**.

```
BackTrack 4 Beta bt tty1

bt login: root
Password:
Last login: Sat Jun 16 12:07:06 EDT
Linux bt 2.6.28.1 #2 SMP Wed Feb 4 2
++ WELCOME TO THE BACKTRACK LIVE CD

[*] To start Networking - "/etc/init
[*] To start KDE - "startx"
[*] To start FVWM - "bt4-crystal"

[*] http://www.remote-exploit.org/
stroot@bt:~# startx
```

Figure 7: BackTrack 4 login

1 Using tcpdump to Capture Network Traffic

Part of a network administrator's job can be to capture and analyze network traffic. This is done for a variety of reasons, including the identification of the cause of bottlenecks, determining who is responsible for certain download activity, or analyzing an intrusion. There are many tools that can be utilized to capture network traffic, including tcpdump.

Keep in mind that **Linux commands are case sensitive**. The commands below must be entered exactly as shown.

1.1 Using tcpdump

The Linux distribution BackTrack is installed on the sniffer. BackTrack is a distribution used by security professionals for penetration testing and forensics.

Log on to the Linux Sniffer

If you have already logged into the Linux Sniffer as described in the Lab Settings section, skip this first step and begin this task at Step 2.

1. Log into the **Linux Sniffer** with the username of **root** with the password of **toor**.

For security purposes, the password will not be displayed.

Type the following command to initialize the GUI (Graphical User Interface):
 root@bt:~#startx

```

bt login: root
Password:
Last login: Sun Feb  8 18:33:44 EST 2009 on tty1
Linux bt 2.6.28.1 #2 SMP Wed Feb  4 21:50:02 EST 2009 i686
++ WELCOME TO THE BACKTRACK LIVE CD ++

[*] To start Networking - "/etc/init.d/networking start"
[*] To start KDE - "startx"
[*] To start FVWM - "bt4-crystal"

[*] http://www.remote-exploit.org/
root@bt:~# startx
  
```

Figure 8: Logging on to the Sniffer

2. Open a terminal on the Linux Sniffer system by clicking on the image to the left of Firefox in the task bar, in the bottom of the screen.

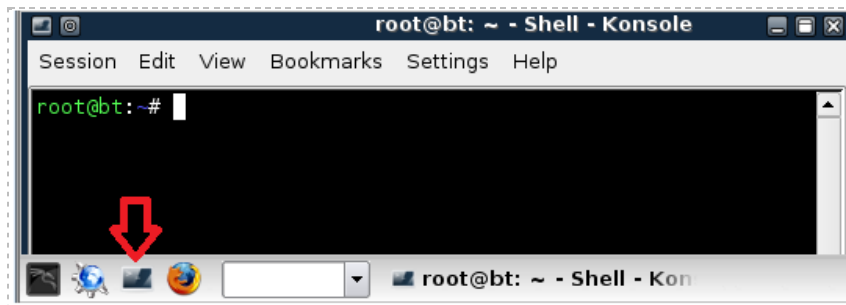


Figure 9: The Terminal Windows within BackTrack

One of the nice features of some versions of BackTrack is that they are not automatically assigned IP addresses through the use of DHCP, or Dynamic Host Configuration Protocol. This is because the interfaces are not active – they must be manually enabled. The idea is to come on the network quietly without being detected.

3. Only the loopback address, 127.0.0.1, is displayed when you type:
`root@bt:~#ifconfig`

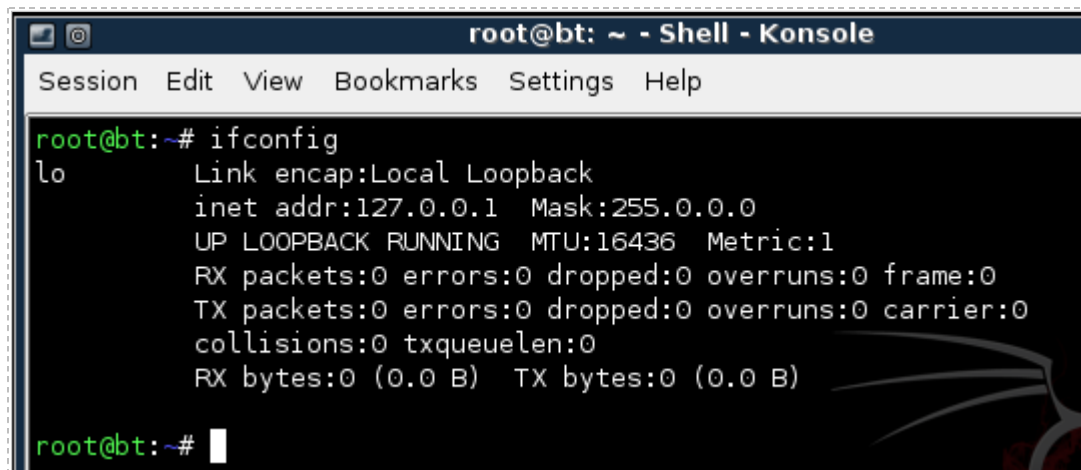


Figure 10: No IP address, other than the Loopback Address of 127.0.0.1, is Displayed

4. Type the following command to view all available interfaces on the system:
`root@bt:~#ifconfig -a`

```

root@bt:~# ifconfig -a
eth0      Link encap:Ethernet  HWaddr 00:0c:29:31:4f:f2
          BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
          Interrupt:19 Base address:0x2000

eth1      Link encap:Ethernet  HWaddr 00:0c:29:31:4f:fc
          BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
          Interrupt:19 Base address:0x2080

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:16436  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0

```

Figure 11: All Available Interfaces on the System

Neither of the interfaces, eth0 or eth1, are assigned IP addresses on their respective networks. The reason the sniffer has two interfaces is that it is located on two networks.

The pfSense Firewall also has 2 interfaces and is also connected to both networks.

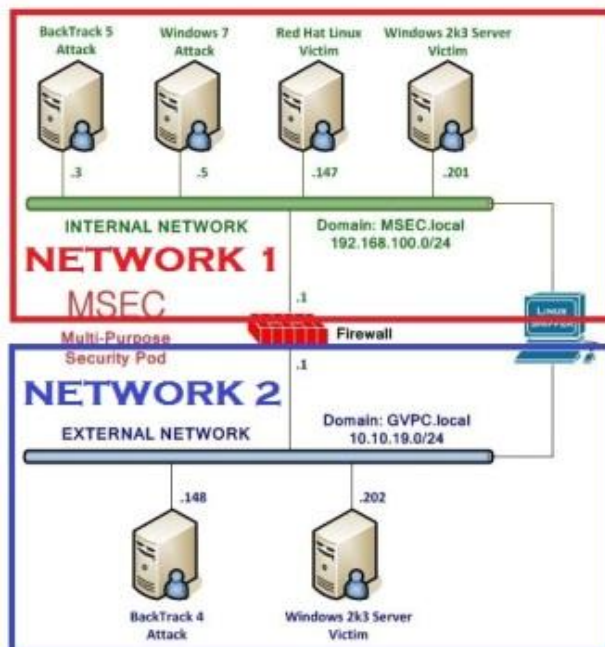


Figure 12: The Sniffer is Connected to Two Networks

A sniffer should be operating in promiscuous mode so it can see all network traffic. To put the interfaces into promiscuous mode, type the following commands:

```
root@bt:~# ifconfig eth0 -promisc
root@bt:~# ifconfig eth1 -promisc
```

Two ways to ensure that a sniffer will capture all traffic on a network segment are:

- Connect the sniffer and other devices on the network to a hub
- Connect the sniffer to a switch's SPAN (Switched Port Analyzer) port

5. To activate the first interface, type the following command:

```
root@bt:~# ifconfig eth0 up
```

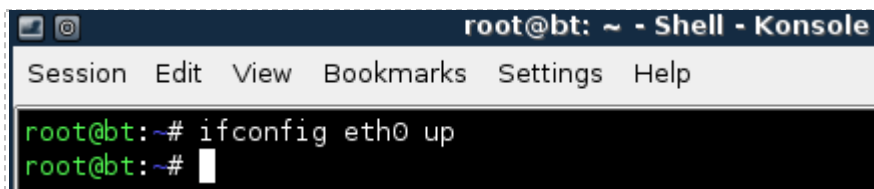


Figure 13: Activating the First Interface

To verify the first interface, type the following command:

```
root@bt:~# ifconfig eth0
```

Verify that the status of "UP" is shown on the second line of output.

```
root@bt:~# ifconfig eth0
eth0      Link encap:Ethernet  Hwaddr 00:0c:29:31:4f:f2
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
          Interrupt:19 Base address:0x2000

root@bt:~#
```

Figure 14: The Interface is activated without an IP address

6. To activate the second interface, type the following command:

```
root@bt:~# ifconfig eth1 up
```

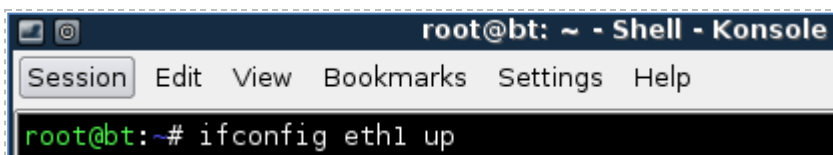


Figure 15: Activating the Second Interface

7. To verify the second interface, type the following command:
root@bt:~#**ifconfig eth1**

Verify that the status of “UP” is shown on the second line of output.

```
root@bt:~# ifconfig eth1
eth1      Link encap:Ethernet  HWaddr 00:0c:29:31:4f:fc
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
          Interrupt:19 Base address:0x2080

root@bt:~#
```

Figure 16: The Interface is activated without an IP address

The Linux/UNIX utility, tcpdump, is commonly used by network administrators to capture network traffic on a sniffer. Many sniffer machines do not have GUI, or Graphical User Interfaces, so running GUI-based tools like Wireshark or Network Miner is not possible. Another benefit to using tcpdump is that it handles very large capture files well.

8. Type the following command to view several available switches for tcpdump:
root@bt:~#**tcpdump --help**

```
root@bt:~# tcpdump --help
tcpdump version 3.9.8
libpcap version 0.9.8
Usage: tcpdump [-aAdDeflLnNOpqRStuUvxx] [-c count] [ -C file_size ]
               [ -E algo:secret ] [ -F file ] [ -i interface ] [ -M secret ]
               [ -r file ] [ -s snaplen ] [ -T type ] [ -w file ]
               [ -W filecount ] [ -y datalinktype ] [ -Z user ]
               [ expression ]
```

Figure 17: The Available Options for tcpdump

9. To run tcpdump on the network segment interface eth0 is connected to, type:
`root@bt:~#tcpdump -i eth0`

Wait until at least one packet is displayed before stopping the capture.

```
root@bt:~# tcpdump -i eth0
tcpdump: WARNING: eth0: no IPv4 address assigned
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on eth0, link-type EN10MB (Ethernet), capture size 96 bytes
18:10:47.797078 IP 192.168.100.5.netbios-dgm > 192.168.100.255.netbios-dgm: NBT UDP PACKET(138)
```

Figure 18: The output of tcpdump on the network segment interface eth0 is connected

After one packet or more is displayed, press **CTRL+C** to stop the network capture. If the network 192.168.100.0/24 is displayed, eth0 is located on the first (internal) network. If the network 10.10.19.0/24 is displayed, eth0 is located on the second (external) network. Also, notice that the default for tcpdump is to capture only the first 96 bytes.

10. To run tcpdump on the network segment interface eth1 is connected to, type:
`root@bt:~#tcpdump -i eth1`

Wait until at least one packet is displayed before stopping the capture.

```
root@bt:~# tcpdump -i eth1
tcpdump: WARNING: eth1: no IPv4 address assigned
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on eth1, link-type EN10MB (Ethernet), capture size 96 bytes
18:33:25.983374 IP 10.10.19.202.netbios-dgm > 10.10.19.255.netbios-dgm: NBT UDP PACKET(138)
```

Figure 19: The output of tcpdump on the network segment interface eth1 is connected

After one packet or more is displayed, press **CTR+C** to stop the network capture. If the network 192.168.100.0/24 is displayed, eth1 is located on the first (internal) network. If the network 10.10.19.0/24 is displayed, eth1 is located on the second (external) network.

11. To capture traffic on the 192.168.100.0/24 network and send it to a file, type:
`root@bt:~#tcpdump -i eth0 -nnnttt -s 0 -w capnet1.pcap -C 100`

Be sure to enter the appropriate interface in the command syntax!

```
root@bt:~# tcpdump -i eth0 -nnnttt -s 0 -w capnet1.pcap -C 100
tcpdump: WARNING: eth0: no IPv4 address assigned
tcpdump: listening on eth0, link-type EN10MB (Ethernet), capture size 65535 bytes
```

Figure 20: tcpdump syntax

The following table lists details of the switches used with the tcpdump command:

Be aware that **Linux commands are case sensitive**. The commands below must be entered exactly as shown.

-i eth0	Use interface zero
-nntttt	Disable DNS resolution, date and time format
-s 0	Disables default packet size of 96 bytes, full packet size
-w	Write to a capture file, instead of displaying to the screen
-C	Split the captures into files of this size



Figure 21: Detailed tcpdump Syntax Explained

Wait about 5 minutes so that your capture file will have some generated traffic.
Press **CTRL-C** to stop tcpdump from running and discontinue the network capture.

12. To view the capture file, type the following command at the BackTrack terminal:
root@bt:~#wireshark capnet1.pcap

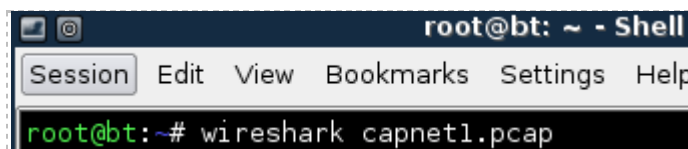


Figure 22: Opening the tcpdump capture with Wireshark

13. Check the **Don't show the message again** box and click the **OK** button.



Figure 23: Opening the tcpdump capture with Wireshark

Wireshark will open and the capture file will appear, similar to the one seen below:
Notice that the traffic listed takes place on the 192.168.100.0/24 network.

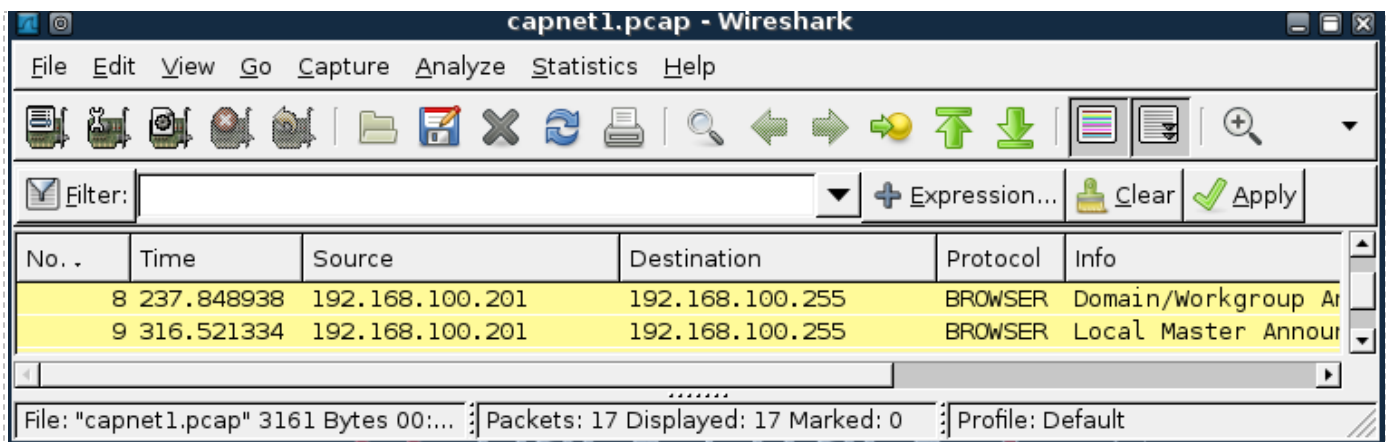


Figure 24: The tcpdump Capture is Displayed within Wireshark

14. Close Wireshark.

15. To capture traffic on the 10.10.19.0/24 network and send it to a file, type:
root@bt:~#tcpdump -i eth1 -nntttt -s 0 -w capnet2.pcap -C 100

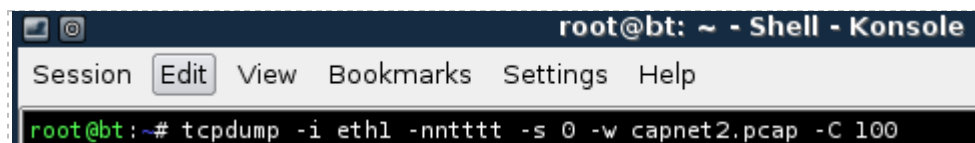


Figure 25: tcpdump syntax

Wait about 5 minutes so that your capture file will have some generated traffic.
Press **CTRL+C** to stop tcpdump from running and discontinue the network capture.

16. To view the capture file, type the following command at the BackTrack terminal:
 root@bt:~#wireshark capnet2.pcap

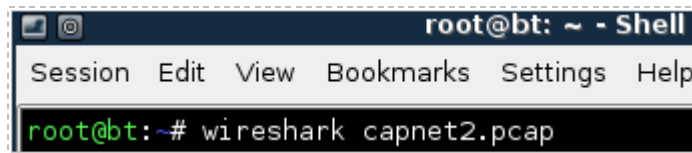


Figure 26: Opening the tcpdump capture with Wireshark

Wireshark will open and the capture file will appear similar to the one seen below:
 Notice that the traffic listed takes place on the 10.10.19.0/24 network. Exit Wireshark when finished by clicking the “X” in the upper right corner of the screen..

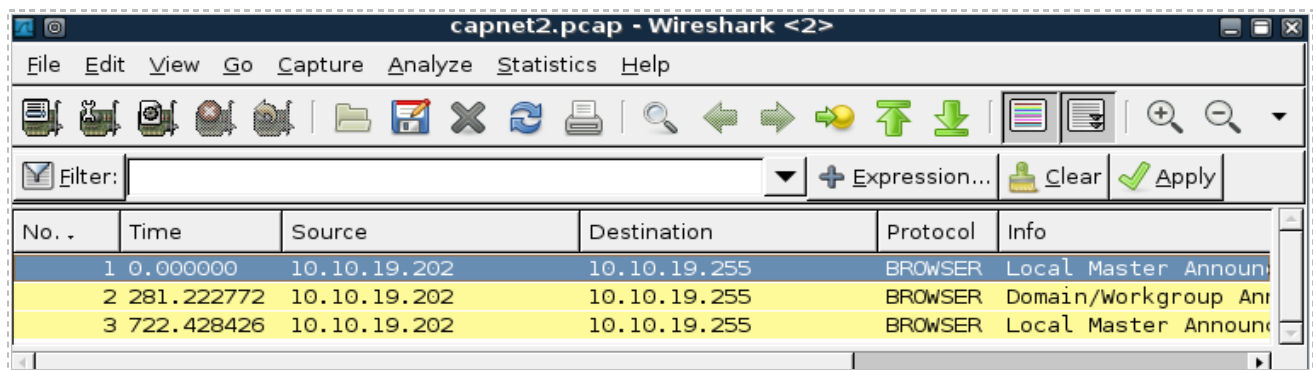


Figure 27: The tcpdump Capture is Displayed within Wireshark

You can also filter which type of traffic you want to see with tcpdump. For example, if you just want to see ICMP traffic, you can filter tcpdump for that type of traffic.

If you have already logged into the machine, as described in the Lab Settings section, you may skip this step.

17. Log on to the **Windows 2k3 Server Internal Victim Machine**. Use the PC menu in the NETLAB+ Remote PC Viewer to send a **Ctrl-Alt-Del** (version 2 viewer), or click the **Send Ctrl-Alt-Del** link in the bottom right corner of the viewer window (version 1 viewer). Log on with the username of **Administrator** and the password of **password**.



Figure 28: Send Ctrl-Alt-Del to the Windows 2003 Server

18. Double-click the shortcut to the command prompt icon on the Windows 2003 Desktop.



Figure 29: Windows 2003 Command Prompt

19. Type the following command to initiate a continuous ping of the gateway:
C:\ping 192.168.100.1 -t

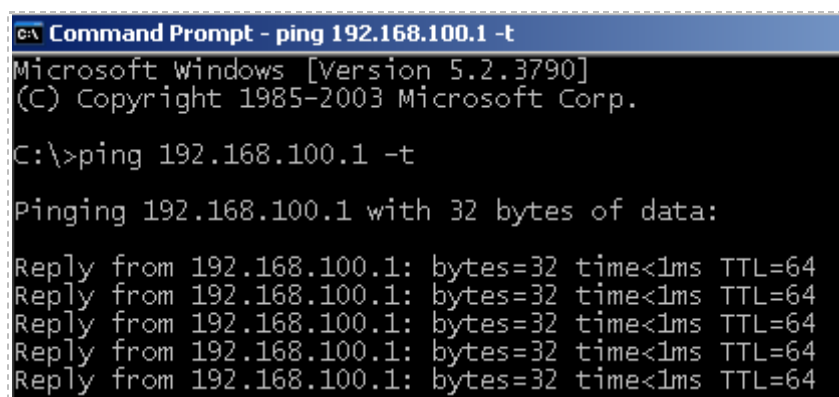


Figure 30: Pinging the Gateway

20. On the Linux Sniffer, type the following to capture ICMP traffic on the first (Internal) network:

```
root@bt:~#tcpdump -i eth0 icmp
```

```
root@bt:~# tcpdump -i eth0 icmp
tcpdump: WARNING: eth0: no IPv4 address assigned
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on eth0, link-type EN10MB (Ethernet), capture size 96 bytes
19:36:43.440828 IP 192.168.100.201 > 192.168.100.1: ICMP echo request, id 512, seq 56576, length 40
19:36:43.443998 IP 192.168.100.1 > 192.168.100.201: ICMP echo reply, id 512, seq 56576, length 40
19:36:44.440599 IP 192.168.100.201 > 192.168.100.1: ICMP echo request, id 512, seq 56832, length 40
19:36:44.440617 IP 192.168.100.1 > 192.168.100.201: ICMP echo reply, id 512, seq 56832, length 40
19:36:45.440482 IP 192.168.100.201 > 192.168.100.1: ICMP echo request, id 512, seq 57088, length 40
19:36:45.440743 IP 192.168.100.1 > 192.168.100.201: ICMP echo reply, id 512, seq 57088, length 40
19:36:46.440444 IP 192.168.100.201 > 192.168.100.1: ICMP echo request, id 512, seq 57344, length 40
19:36:46.440709 IP 192.168.100.1 > 192.168.100.201: ICMP echo reply, id 512, seq 57344, length 40
```

Figure 31: Capturing ICMP Traffic with tcpdump

Notice, in the figure above, that the output of the traffic includes the source address followed by the destination address. For each echo request, there is a reply.

Press **CTRL-C** to stop tcpdump from running and discontinue the network capture. On the Windows 2003 Server system, type **CTRL-C** to stop the continuous ping.

If you have already logged into the machine, as described in the Lab Settings section, you may skip this step.

21. On the **Windows 2k3 Server Internal Victim Machine**, type the following command to continuously ping the BackTrack 4 External Attack VM:

```
C:\>ping 10.10.19.148 -t
```

```
C:\> Command Prompt - ping 10.10.19.148 -t
Microsoft Windows [Version 5.2.3790]
(C) Copyright 1985-2003 Microsoft Corp.

C:\>ping 10.10.19.148 -t

Pinging 10.10.19.148 with 32 bytes of data:

Reply from 10.10.19.148: bytes=32 time<1ms TTL=64
Reply from 10.10.19.148: bytes=32 time<1ms TTL=64
Reply from 10.10.19.148: bytes=32 time<1ms TTL=64
Reply from 10.10.19.148: bytes=32 time<1ms TTL=64
Reply from 10.10.19.148: bytes=32 time<1ms TTL=64
```

Figure 32: Pinging the External BackTrack Machine

22. On the **Linux Sniffer**, type the following to capture ICMP traffic on Network 2:

root@bt:~#tcpdump -i eth1 icmp

```
root@bt:~# tcpdump -i eth1 icmp
tcpdump: WARNING: eth1: no IPv4 address assigned
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on eth1, link-type EN10MB (Ethernet), capture size 96 bytes
19:53:43.231657 IP 10.10.19.202 > 10.10.19.148: ICMP echo request, id 512, seq 38144, length 40
19:53:43.233400 IP 10.10.19.148 > 10.10.19.202: ICMP echo reply, id 512, seq 38144, length 40
19:53:44.231331 IP 10.10.19.202 > 10.10.19.148: ICMP echo request, id 512, seq 38400, length 40
19:53:44.231593 IP 10.10.19.148 > 10.10.19.202: ICMP echo reply, id 512, seq 38400, length 40
19:53:45.231149 IP 10.10.19.202 > 10.10.19.148: ICMP echo request, id 512, seq 38656, length 40
19:53:45.231413 IP 10.10.19.148 > 10.10.19.202: ICMP echo reply, id 512, seq 38656, length 40
19:53:46.231294 IP 10.10.19.202 > 10.10.19.148: ICMP echo request, id 512, seq 38912, length 40
19:53:46.231575 IP 10.10.19.148 > 10.10.19.202: ICMP echo reply, id 512, seq 38912, length 40
19:53:47.231192 IP 10.10.19.202 > 10.10.19.148: ICMP echo request, id 512, seq 39168, length 40
```

Figure 33: Capturing ICMP Traffic with tcpdump

23. Press **CTRL-C** to stop tcpdump from running and discontinue the network capture.

24. In the Windows 2003 Server system, press **CTRL-C** to stop the continuous ping.

1.2 Conclusion

The tcpdump command is built into the Linux and Unix operating systems. It can be used to capture network traffic. The benefits of using tcpdump include the fact that many sniffer machines do not have GUIs, or Graphical User Interfaces, so running GUI based tools like Wireshark is not possible. Another benefit to using tcpdump is that it handles very large capture files with no problem, and it allows you to filter for specific traffic.

1.3 Discussion Questions

1. Does a network interface on a sniffer machine require an IP address?
2. In what mode does a sniffer's network interface operate?
3. How do you determine available switches for tcpdump?
4. How can you display all of the network interfaces in Linux?

2 Capturing and Analyzing Traffic with Wireshark

Wireshark is a GUI, or Graphical User Interface, tool that will allow you to capture and analyze network traffic. Wireshark runs on Windows, Linux, and Mac OS X. Wireshark can be downloaded from the following link: <http://www.wireshark.org/download.html>.

2.1 Using Wireshark

Before using Wireshark, it is important to bring the sniffer interfaces up. Even though this was done in Task 1, it is a good idea to start over to practice all of the required steps.

1. On the Linux Sniffer system, bring both of the sniffer interfaces up by typing the following two commands:

```
root@bt:~#ifconfig eth0 up
root@bt:~#ifconfig eth1 up
```

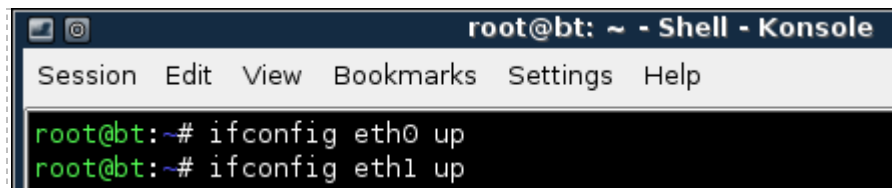


Figure 34: Turning both Sniffer Interfaces on

2. Type the following to verify that no IP address has been set for either interface:
root@bt:~#ifconfig

Verify that the status of “UP” is shown on the second line of output.

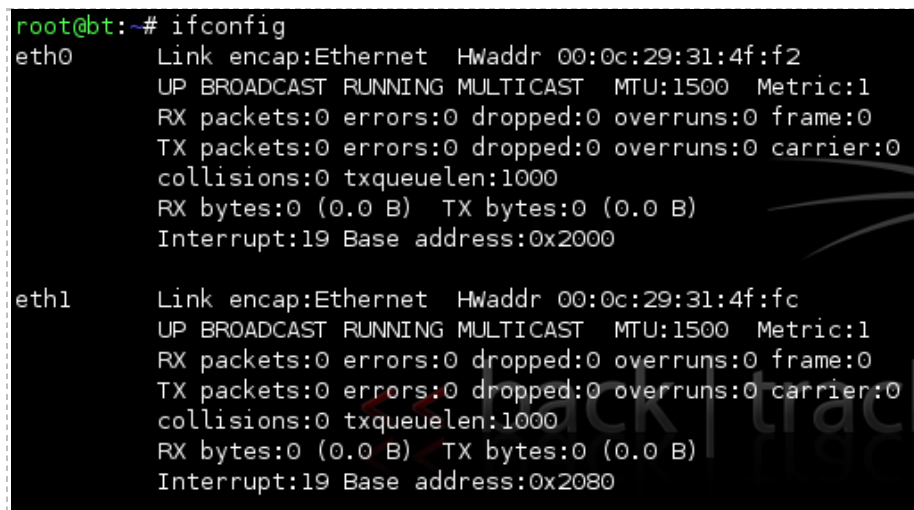


Figure 35: Verifying that the Sniffer Interfaces do not have IP addresses

3. In the Linux Sniffer terminal, type the following command to start Wireshark:
root@bt:~#wireshark

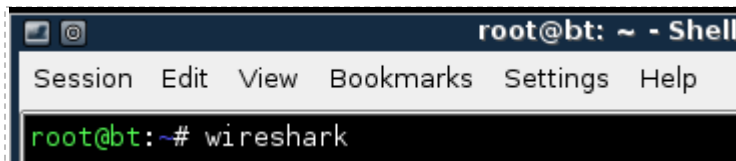


Figure 36: Opening Wireshark

4. To view the available interfaces, select **Capture** then go down to **Interfaces**.

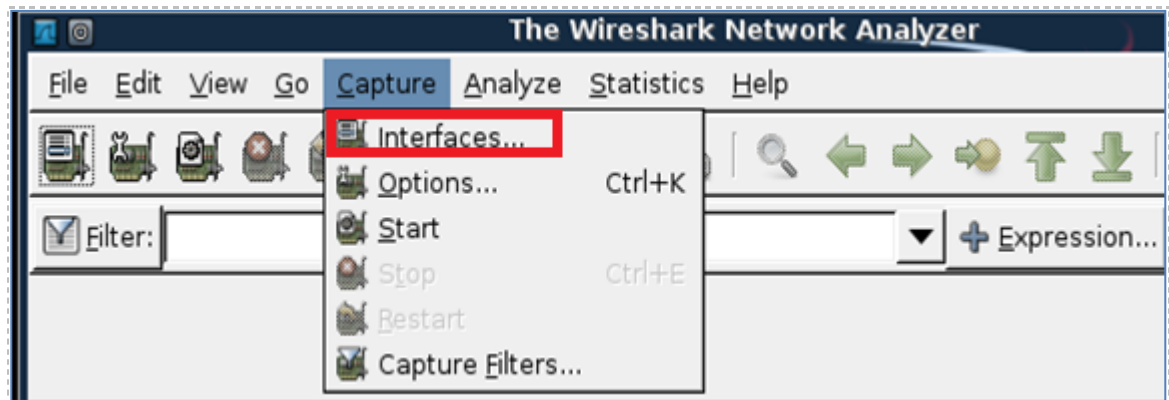


Figure 37: Selecting Interfaces from the Capture Menu

The **Wireshark: Capture Interfaces** pop-up box will be displayed on the sniffer.

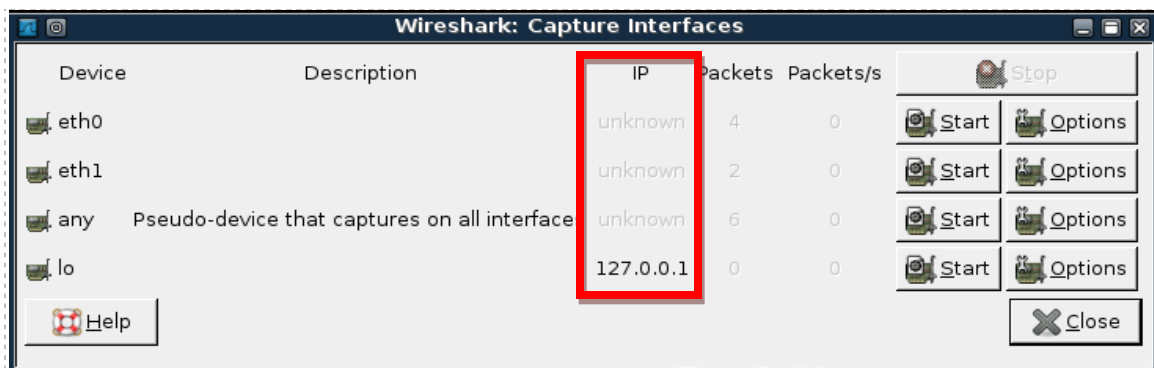


Figure 38: The Devices eth0 and eth1 do not have IP addresses listed

Notice that eth0 and eth1 do not have IP addresses listed under the IP column.

5. Within the **Capture Interfaces** menu, click **Start** for the eth0 network device.

Use the interface receiving traffic from the 192.168.100.0 network, as shown in Task 1.



Figure 39: Starting a Capture on the Network using Interface eth0

During this exercise, we will be capturing plain text FTP, or File Transfer Protocol, traffic from the Windows 7 Internal Attack Machine to the Windows 2k3 Sever Internal Victim Machine.

6. Open a command prompt on the Windows 7 Machine by double-clicking on the **cmd** shortcut on the desktop.



Figure 40: Opening a Command Prompt on Windows 7

7. Type the following command to connect to the FTP Server located on the Windows 2k3 Server Internal Victim Machine:

C:\ftp 192.168.100.201

```
C:\>ftp 192.168.100.201
Connected to 192.168.100.201.
220 Microsoft FTP Service
User (192.168.100.201:(none)):
```

Figure 41: Connecting to the FTP Server 192.168.100.201

You should receive the message, *connected to 192.168.100.201*.

8. For the username, type **ftp** and press enter. For the password, type **mysecurepass** and press enter.

For security purposes, the password will not be displayed when you type it

```
User (192.168.100.201:(none)): ftp
331 Anonymous access allowed, send identity (e-mail name) as password.
Password:
230 Anonymous user logged in.
ftp>
```

Figure 42: Logging in to the FTP Server

You should receive the message, *230 Anonymous user logged in.*

9. On the Linux Sniffer, click the **stop** button on Wireshark to stop the capture.

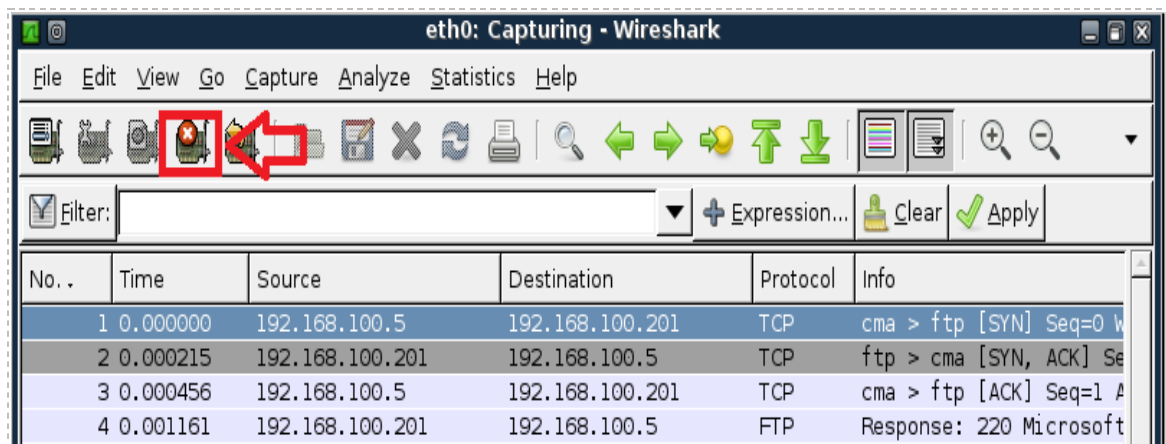


Figure 43: Stopping the Wireshark capture

10. On the Linux Sniffer, type **ftp** in the filter pane and click **Apply**.

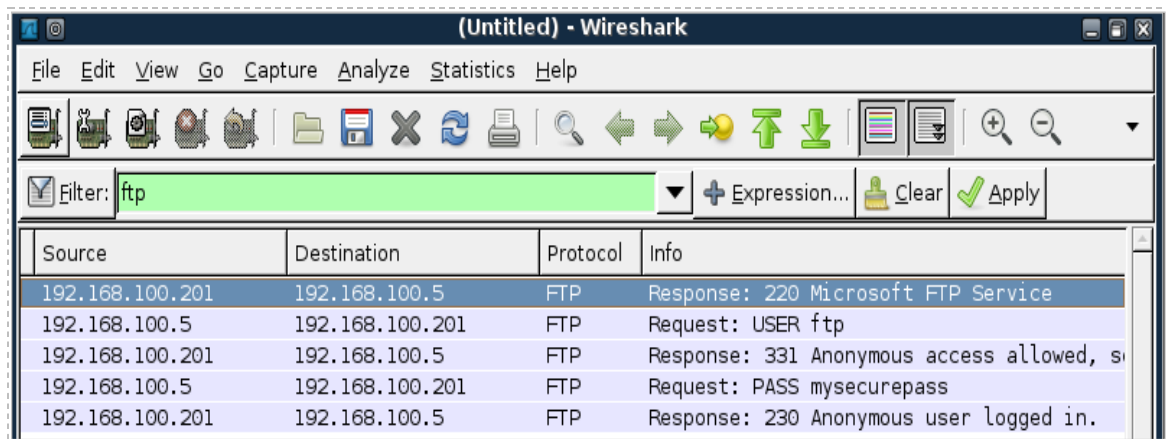


Figure 44: Typing ftp in the Wireshark filter pane

If you scroll over, you can see the username of **ftp** and the password of **mysecurepass**.

FTP	Request: USER ftp
FTP	Response: 331 Anonymous access allowed
FTP	Request: PASS mysecurepass

Figure 45: The FTP username and password appear in clear text.

Now, we will capture FTP traffic on the external network using interface eth1.

11. To view the available interfaces, select **Capture** then go down to **Interfaces**.

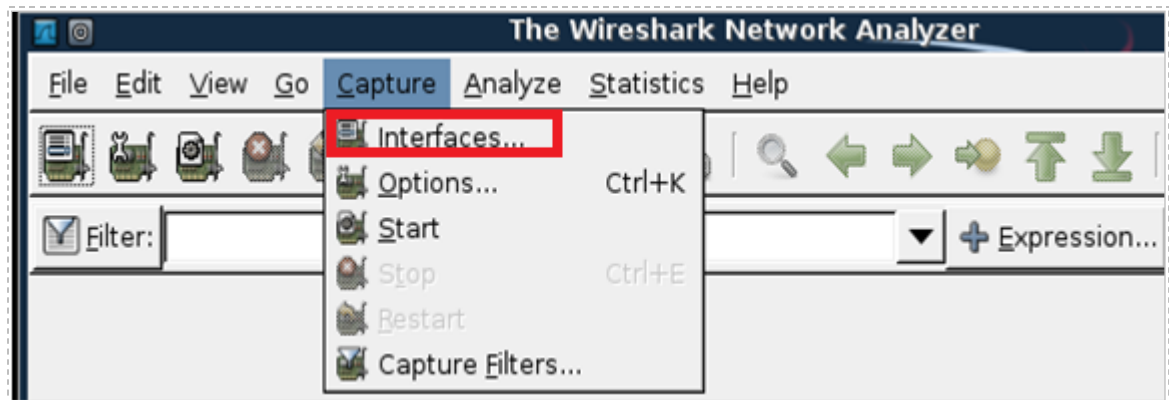


Figure 46: Selecting Interfaces from the Capture Menu

The **Wireshark: Capture Interfaces** pop-up box will be displayed on the sniffer.

Device	Description	IP	Packets	Packets/s	Stop	
eth0		unknown	4	0	Start	Options
eth1		unknown	2	0	Start	Options
any	Pseudo-device that captures on all interfaces	unknown	6	0	Start	Options
lo		127.0.0.1	0	0	Start	Options
Help						Close

Figure 47: The Devices eth0 and eth1 do not have IP addresses listed

Notice that eth0 and eth1 do not have IP addresses listed under the IP column.

12. Within the **Capture Interfaces** menu, click Start for the eth1 network device.

Use the interface receiving traffic from the 192.168.100.0 network, as shown in Task 1.



Figure 48: Starting a Capture on the Network using Interface eth1

During this exercise, we will be capturing plain text FTP, or File Transfer Protocol, traffic from the BackTrack 4 External Attack Machine to the Windows 2k3 Server External Victim Machine.

13. Click **Continue without Saving** if you receive a warning message.

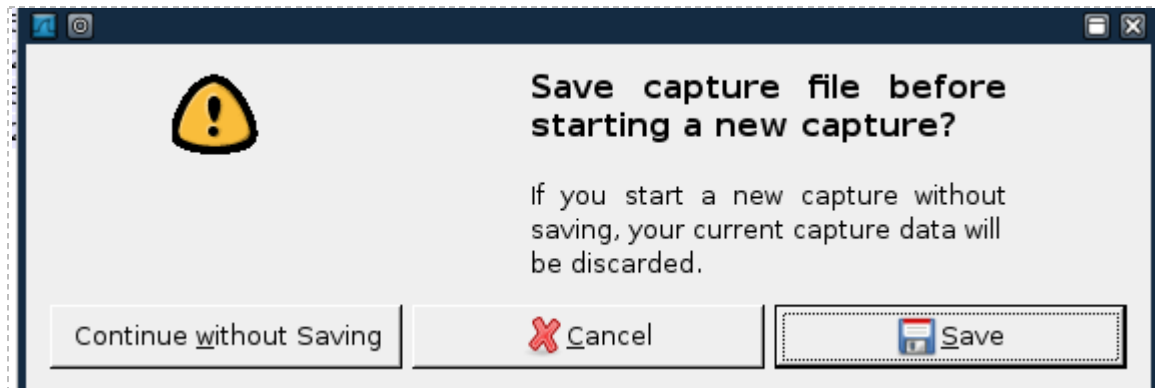


Figure 49: Continue Without Saving

14. In the Windows 7 Internal Attack Machine's command prompt window, type the command **bye** to exit the ftp connection.
15. Log into the BackTrack 4 External Attack Machine with the username of **root** and the password of **password**. For security purposes, the password won't be displayed.

16. Type the following command to initialize the GUI, Graphical User Interface:
root@bt:~#startx

```

bt login: root
Password:
Last login: Sun Feb  8 18:33:44 EST 2009 on tty1
Linux bt 2.6.28.1 #2 SMP Wed Feb  4 21:50:02 EST 2009 i686
++ WELCOME TO THE BACKTRACK LIVE CD ++

[*] To start Networking - "/etc/init.d/networking start"
[*] To start KDE - "startx"
[*] To start FVWM - "bt4-crystal"

[*] http://www.remote-exploit.org/
root@bt:~# startx
  
```

Figure 50: Logging on to the External BackTrack Machine

17. Open a terminal on the Backtrack 4 External Attack system by clicking on the image to the left of Firefox in the task bar, in the bottom of the screen.

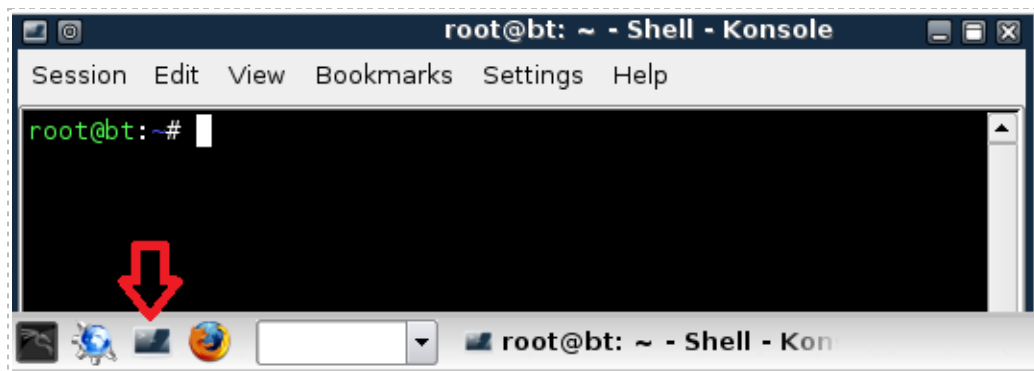


Figure 51: The BackTrack Terminal

18. Type the following command to connect to the FTP Server located on the Windows 2k3 Server External Victim Machine:
root@bt:~#ftp 10.10.19.202

```

root@bt:~# ftp 10.10.19.202
Connected to 10.10.19.202.
220 Microsoft FTP Service
Name (10.10.19.202:root):
  
```

Figure 52: Connecting to the FTP Server 192.168.100.201

You should receive the message, *Connected to 10.10.19.202.*

19. For the username, type **ftp** and hit enter. For the password, type **supersecure**.

For security purposes, the password will not be displayed when you type it.

```
Name (10.10.19.202:root): ftp
331 Anonymous access allowed, send identity (e-mail name) as password.
Password:
230 Anonymous user logged in.
Remote system type is Windows_NT.
ftp> 
```

Figure 53: Logging in to the FTP Server

You should receive the message, *230 Anonymous user logged in.*

20. On the Linux Sniffer, click the stop button on Wireshark to stop the capture.

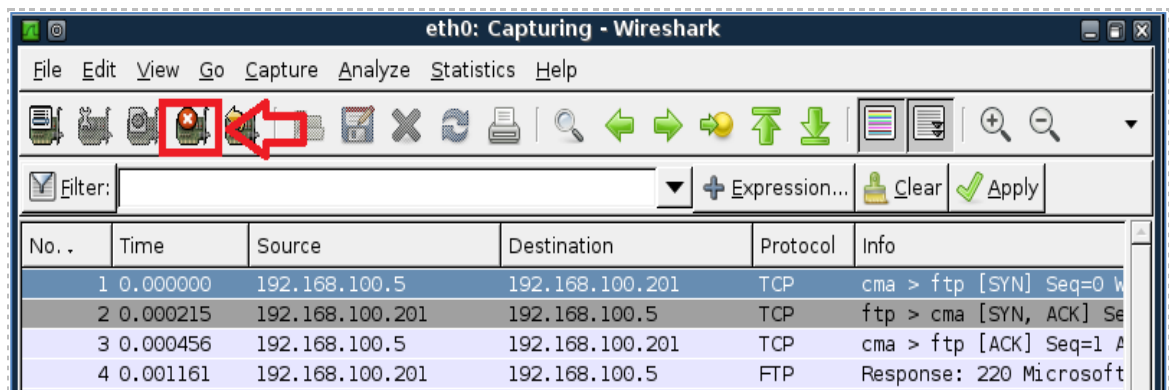


Figure 54: Stopping the Wireshark capture

21. On the Linux Sniffer, the **ftp** filter has been applied previously, during this lab. If you have cleared the filter, type **ftp** in the filter pane and click to re-apply.

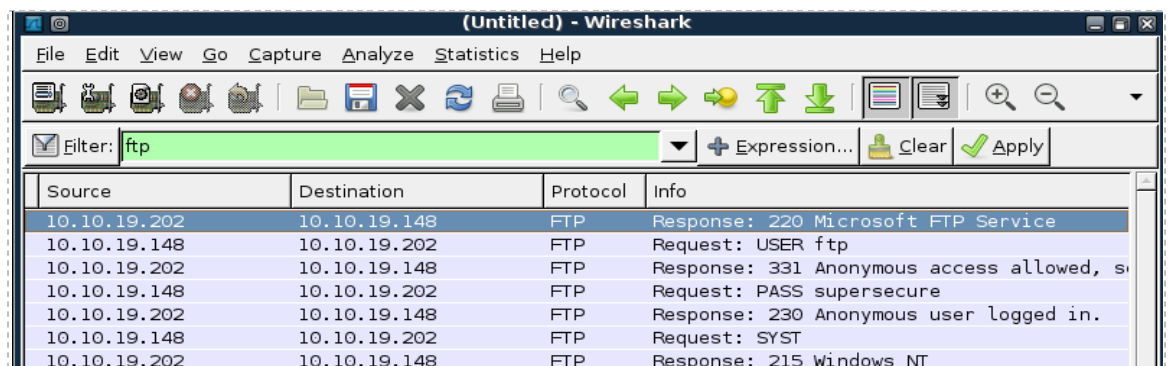
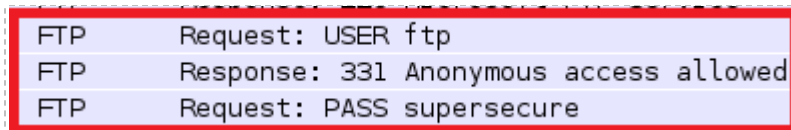


Figure 55: Typing ftp in the Wireshark filter pane

If you scroll over, you will see the username of **ftp** and the password of **supersecure**.



The image shows a screenshot of a Wireshark packet capture. A red rectangular box highlights three packets of type FTP. The first packet is a 'Request: USER ftp', the second is a 'Response: 331 Anonymous access allowed', and the third is a 'Request: PASS supersecure'. The text is displayed in clear, unencrypted format.

FTP	Request: USER ftp
FTP	Response: 331 Anonymous access allowed
FTP	Request: PASS supersecure

Figure 56: The FTP username and password appear in clear text.

22. Exit Wireshark. In the BackTrack 4 External Attack terminal, type the command **bye** to exit the ftp connection.

2.2 Conclusion

Wireshark is a GUI, or Graphical User Interface, tool that will allow you to capture and analyze network traffic. Wireshark runs on Windows, Linux, and Mac OS X. Wireshark can be used to capture network traffic on an interface on the sniffer without an IP address. The Wireshark filter pane can be used to filter for various types of traffic.

2.3 Discussion Questions

1. Do FTP usernames and passwords appear in clear text?
2. How do you choose the interface to capture on within Wireshark?
3. How do you filter for a certain protocol within the Wireshark program?
4. How do you open the Wireshark program from the terminal in Linux?

3 Capturing and Analyzing Traffic with Network Miner

Network Miner is an NFAT, or Network Forensics Analysis Tool, that runs on Windows operating systems. The tcpdump command has no Graphical User Interface and is only utilized within a Linux terminal. Wireshark shows you the raw output of network traffic captures and allows you to analyze them. Network Miner will allow you to capture data, and it will also pull out items like clear text messages and pictures.

3.1 Using Network Miner

Open Network Miner

1. Open Network Miner on the Windows 7 Internal Attack Machine by double-clicking on the desktop shortcut.

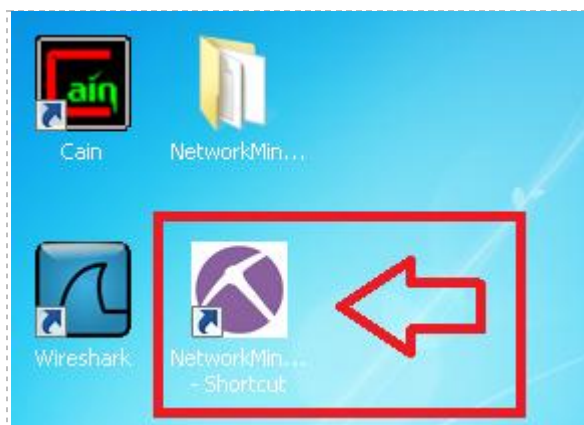


Figure 57: Opening Network Miner

2. Click the arrow to the right of the words **Select a network adapter in the list** and select: **Socket: Intel® PRO/1000MT Network Connection(192.168.100.5)**

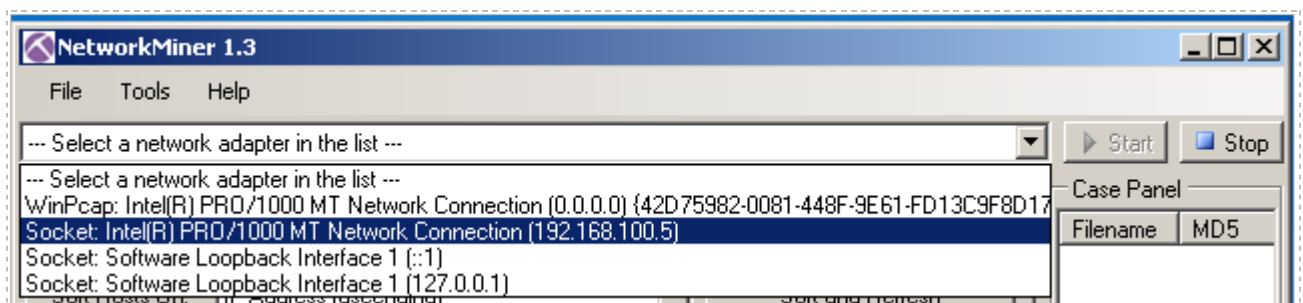


Figure 58: Selecting the Appropriate Interface

Verify that the correct Interface has now been selected within Network Miner.



Figure 59: The Correct Interface has been selected within Network Miner

3. Click the **Start** button, located on the right, to start a network capture.



Figure 60: Starting the Capture

4. Click on the **Internet Explorer Icon** in the Windows Taskbar.



Figure 61: Opening Internet Explorer

Internet Explorer should open to a Blank Page with **about:blank** in the URL bar.

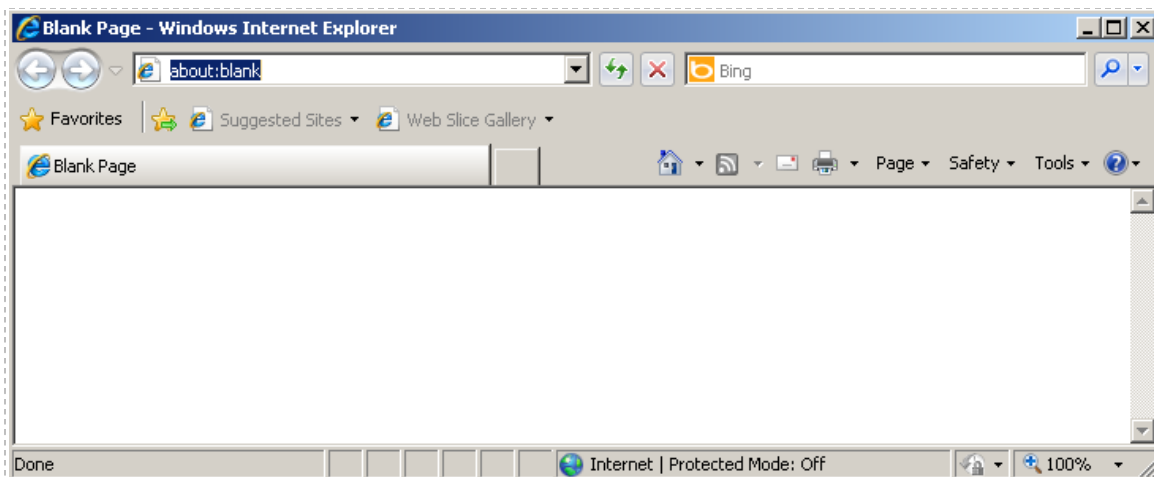


Figure 62: A Blank Page in Internet Explorer

5. In the URL bar, type the following to connect to the Windows 2k3 Server Internal Victim Machine's Web Page:<http://192.168.100.201/>

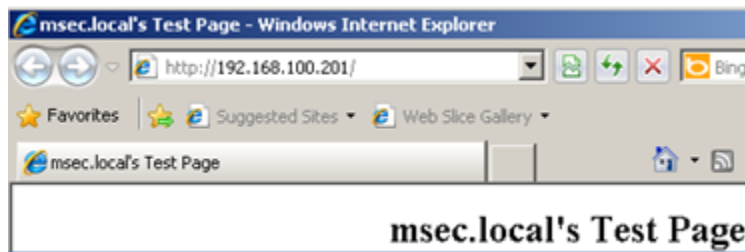


Figure 63: The Windows 2003 Web Page

You should see the **msec.local's Test Page**.

6. In the URL bar, type the following to connect to the Red Hat Enterprise Linux (RHEL) Web Page:
<http://192.168.100.147/>



Figure 64: The RHEL Web Site

You should see the **Red Had Enterprise Linux Test Page**.

7. Click on the **Stop** button to end the Network Miner capture.

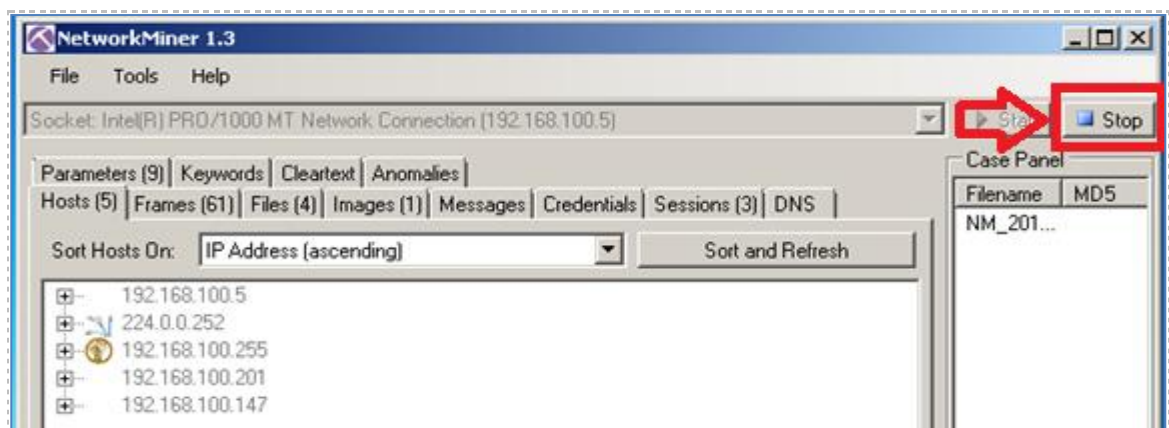


Figure 65: Files within the Network Capture

- Click on the **Files** tab within the Network Miner Program.

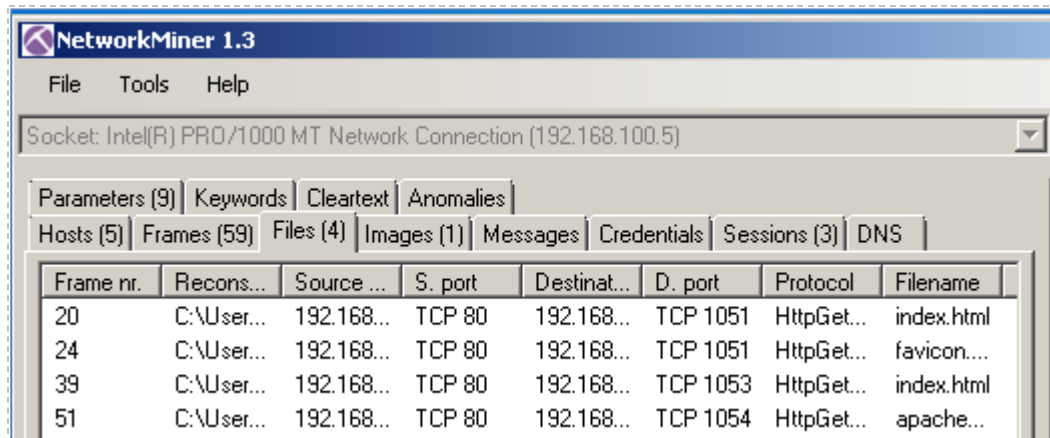


Figure 66: Files within the Network Capture

- Right click on the first **index.html** file and select open file.

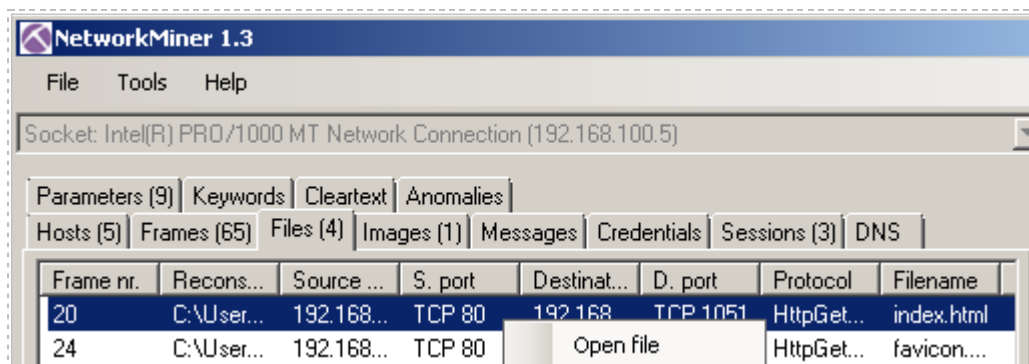


Figure 67: The index.html file saved within the Network Capture

You should see **msec.local's Test Page**.

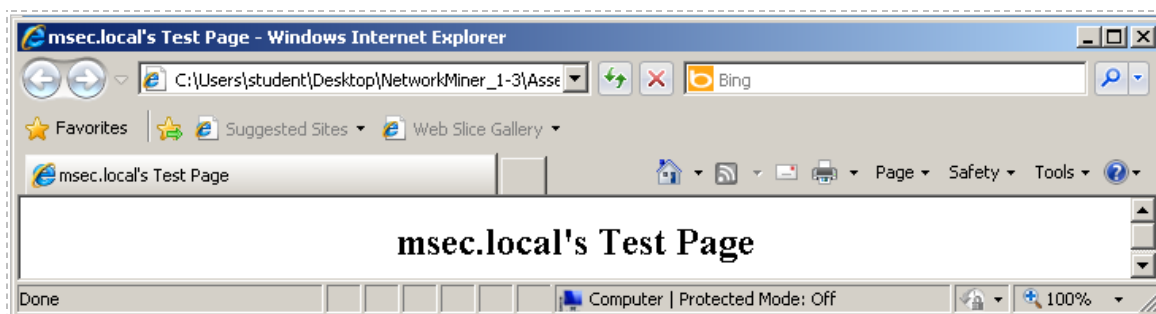


Figure 68: Opening a Local Copy of the Index.html file

10. Right click on the second **index.html** file and select open file.

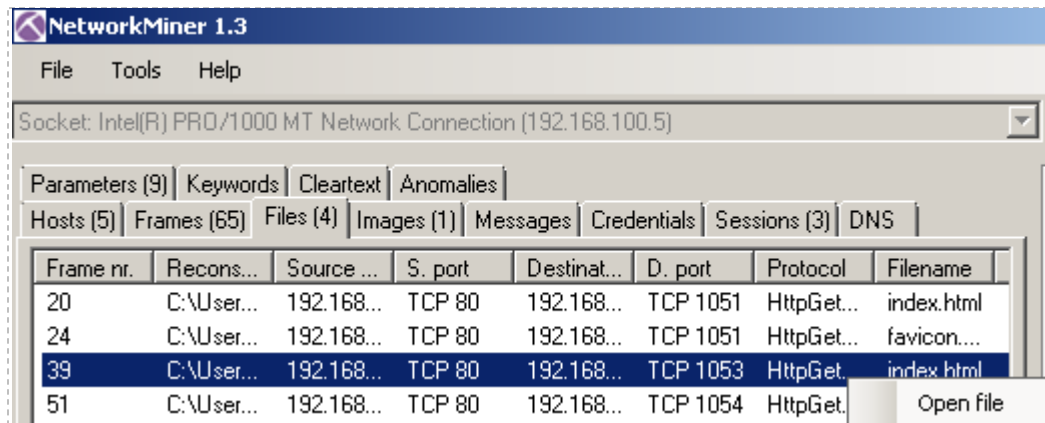


Figure 69: The index.html file saved within the Network Capture

You should see the **Red Hat Enterprise Linux Test Page**.



Figure 70: Opening a Local Copy of the Index.html file

11. Click on the **Images** tab within the Network Miner Program.

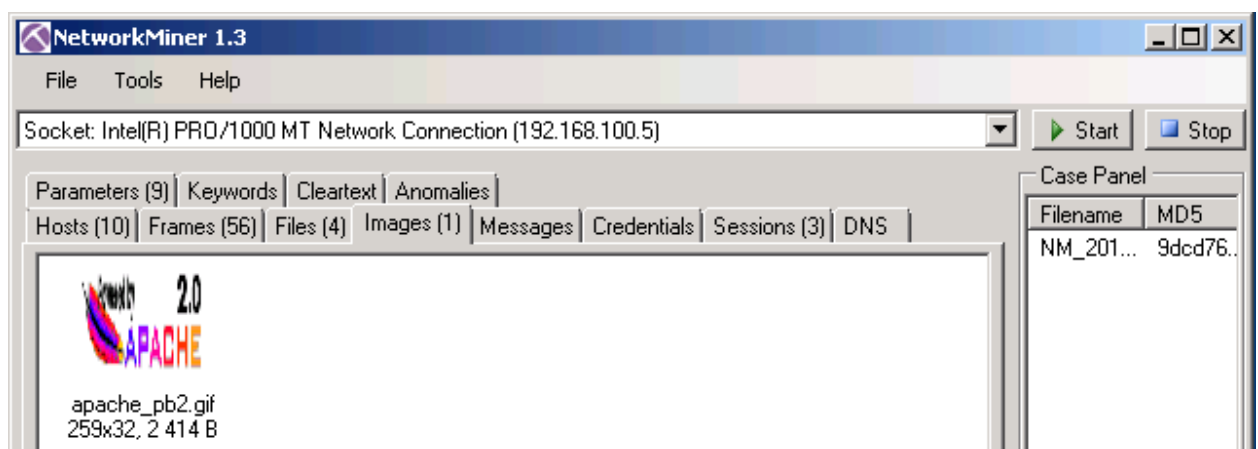


Figure 74: Images within the Network Capture

You should see the images captured from the web pages visited during the capture.

3.2 Conclusion

Network Miner is an NFAT, or Network Forensics Analysis Tool, that runs on Windows operating systems. Network Miner will allow you to capture data and will also pull out items like clear text messages, pictures, and web pages from visited sites.

3.3 Discussion Questions

1. What kind of tool is Network Miner?
2. On what operating systems will the Network Miner program run?
3. How do you parse out web pages of visited sites in Network Miner?
4. What needs to be configured within Network Miner prior to capturing data?

References

1. Wireshark:
<http://www.wireshark.org/>
2. Network Miner:
<http://www.netresec.com/?page=NetworkMiner>
3. Man Page of tcpdump:
http://www.tcpdump.org/tcpdump_man.html
4. Wireshark Download:
<http://www.wireshark.org/download.html>
5. Network Miner Download:
<http://sourceforge.net/projects/networkminer/files/latest/download>