ETHICAL HACKING LAB SERIES

Lab 1: Using Active and Passive Techniques to Enumerate Network Hosts

Certified Ethical Hacking Domains: Introduction to Ethical Hacking, Scanning Networks, Enumeration, Sniffers

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Introduction

In this lab, students will enumerate hosts on the network using various tools.

This lab includes the following tasks:

1. Discovering Hosts with Nmap and Zenmap
2. Discovering Hosts with Windows Command Line Tools
3. Discovering Hosts with Metasploit and Cain

Domains: Introduction to Ethical Hacking, Scanning Networks, Enumeration, Sniffers

Hackers will use various tools to find hosts on the network. After hosts are discovered and detailed information is gathered, the next step usually involves attacking systems.

Nmap – Nmap is a program that can be used in Linux, Mac, or Windows to locate machines on a network. After Nmap is used to discover machines on a network, it can also be utilized to determine which Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) ports the machine has open. Nmap will give an indication of the operating system the remote machine is using. Zenmap is a GUI frontend for Nmap.

Metasploit – Metasploit is an exploitation framework. Version 3 of Metasploit is written in Ruby and has exploits for Microsoft Windows, Mac OS X, Linux, and UNIX. Some exploits are for the operating systems themselves, and others are for application software like Adobe Reader and Internet Explorer. There is a detailed description of each exploit, which explains which version of the operating system, or application software is vulnerable.

tcpdump – A Linux/UNIX program that captures network traffic. The tcpdump program comes installed on many Linux distributions by default.

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

Cain – A password cracking suite that will allow an attacker to crack passwords through a dictionary attack, the use of brute force, or a rainbow table. Cain, which is available from the website www.oxid.it, will not run on most computers that have anti-virus software installed, without being explicitly allowed within the anti-virus program Cain does not run on Linux or Mac OS X systems.

Pod Topology

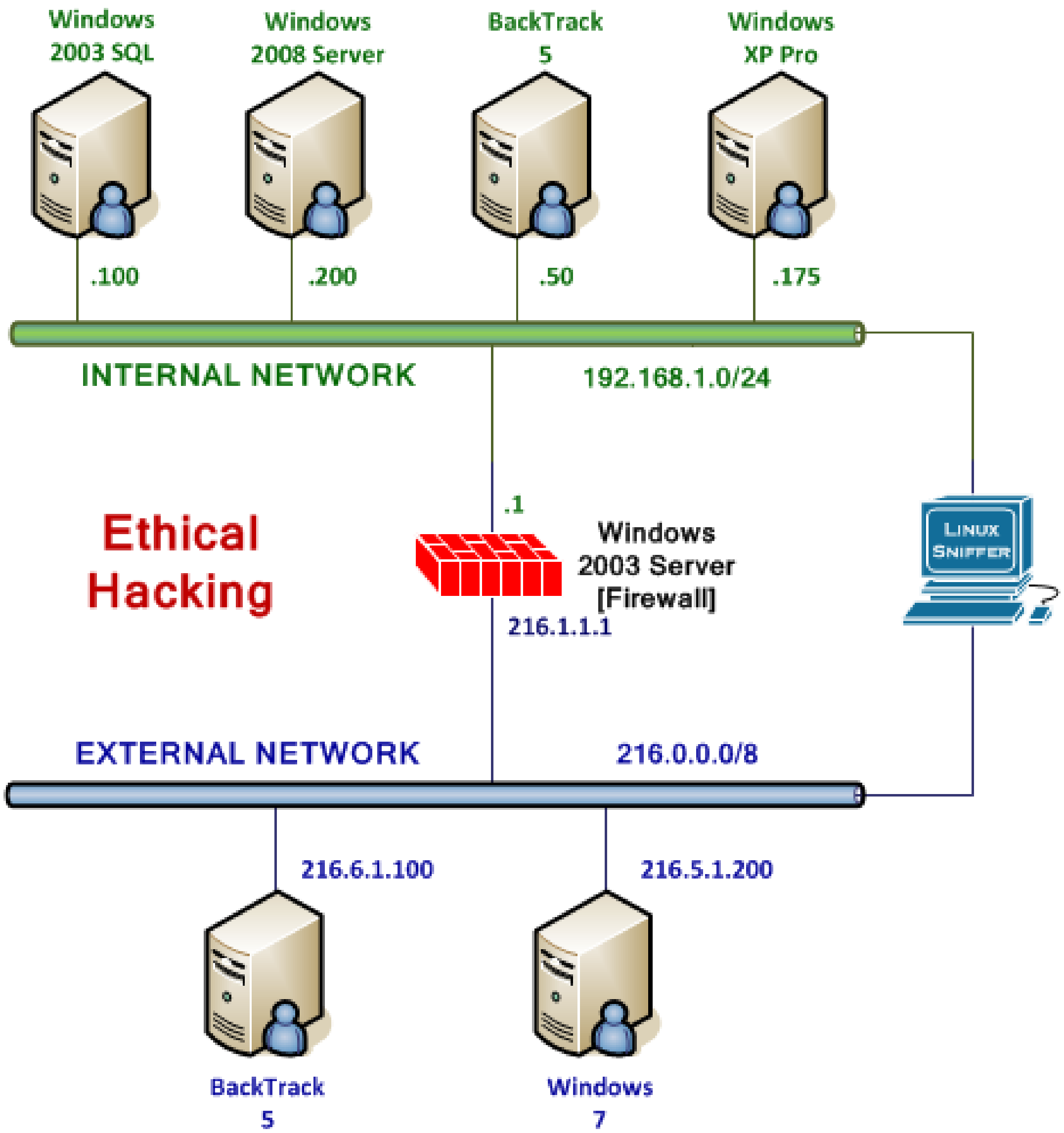


Figure 1: Lab Topology

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.

Virtual Machine	IP Address	Account (if needed)	Password (if needed)
Firewall (Windows 2003 Server)	192.168.1.1	Administrator	ethical
Windows 2003 Exchange SQL	192.168.1.100	Administrator	P@ssw0rd
Windows 2008 Server	192.168.1.200	Admin	NO PASSWORD
Internal Backtrack 5	192.168.1.50	root	toor
Windows XP Pro	192.168.1.175	hacker	toor
Linux Sniffer	NO IP ADDRESS	root	toor

1 Discovering Hosts

Nmap, or network mapper, is free and runs on multiple platforms including Microsoft Windows, Mac, and Linux. It can be used to determine which hosts are up on the network and can then determine which Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) ports a remote system has running.

Zenmap is a GUI frontend for Nmap, which provides the user with detailed information about the machines they are scanning. Zenmap provides details including banner messages, which are greetings made to machines connecting to a port. Using the information gathered during the scan, Zenmap will provide you with a determination of what the remote machine's operating system is. Once an attacker determines the version of the operating system and corresponding service pack level, they can search for an exploit.

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

1.1 Passive and Active Host Enumeration

1. Open the *Internal* **BackTrack 5** Linux system Login with the username **root** and password **toor**.
2. Type the **startx** command to initialize the Graphical User Environment (GUI).
   root@bt:~# **startx**
3. Open a terminal window by clicking on the picture to the right of the word **System** in the taskbar in the top of the screen in BackTrack version 5 R3.

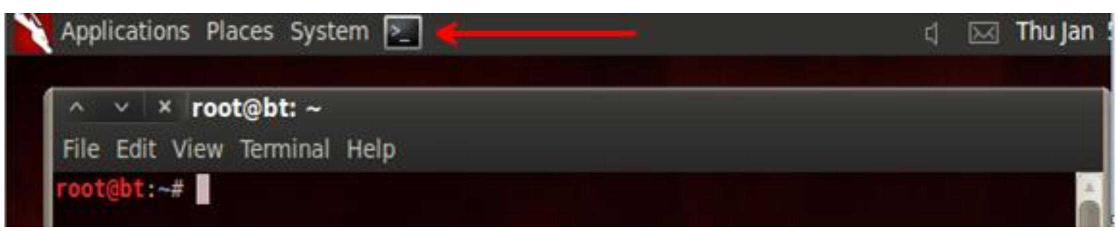
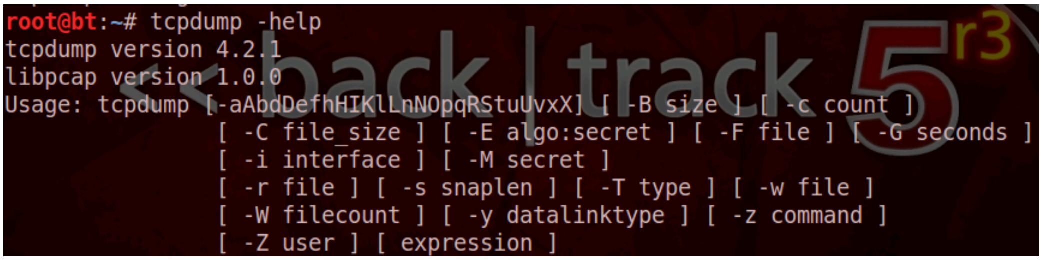


Figure 2: The Terminal Windows within BackTrack

Before scanning the network with tools that will be detected by network sensors, we can passively listen for broadcast packets that are sent to all machines on the network.

4. Type the following to view the various switches for the tcpdump utility:
   root@bt:~# **tcpdump -help**



```
root@bt:~# tcpdump -help
tcpdump version 4.2.1
libpcap version 1.0.0
Usage: tcpdump [-aAbdDefhHIKlLnNOpqRStuUvxX] [ -B size ] [ -c count ]
                [ -C file_size ] [ -E algo:secret ] [ -F file ] [ -G seconds ]
                [ -i interface ] [ -M secret ]
                [ -r file ] [ -s snaplen ] [ -T type ] [ -w file ]
                [ -W filecount ] [ -y datalinktype ] [ -z command ]
                [ -Z user ] [ expression ]
```

Figure 3: The tcpdump command

On the internal 192.168.1.0/24 network, broadcasts are sent to the broadcast address 192.168.1.255.

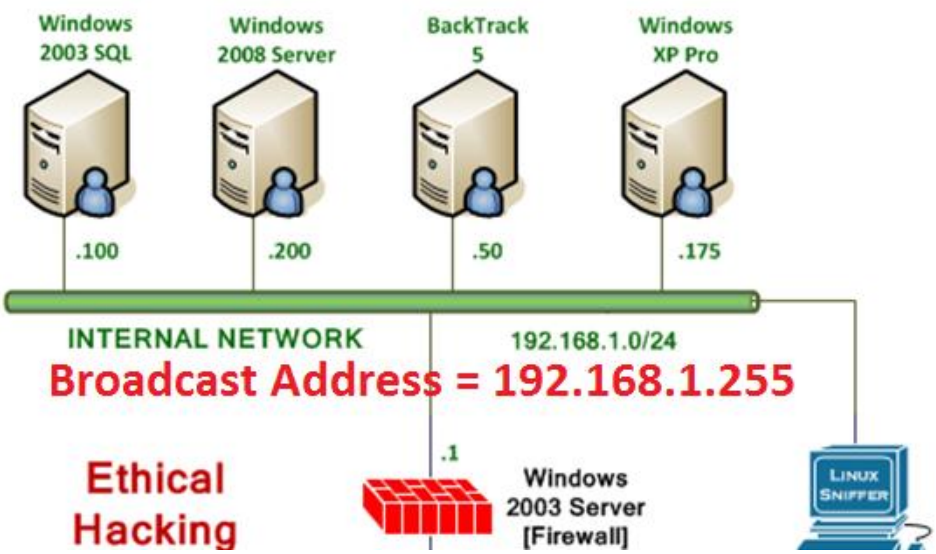
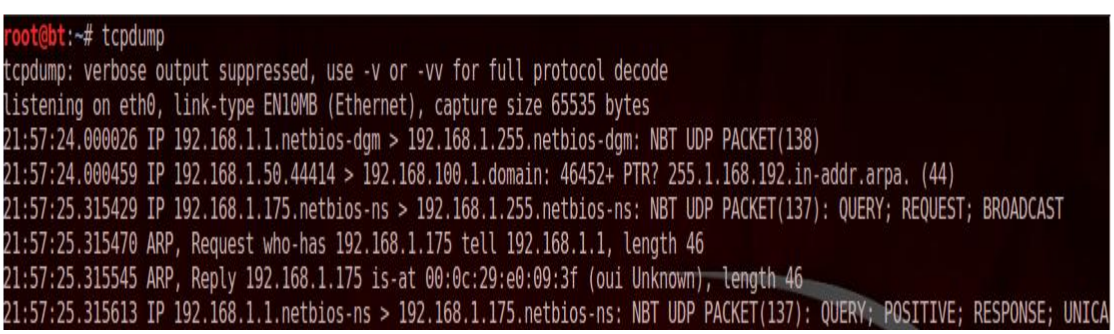


Figure 4: The Broadcast Address is 192.168.1.255.

5. Type the following command to passively sniff traffic on interface eth0:
   root@bt:~# **tcpdump**



```
root@bt:~# tcpdump
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on eth0, link-type EN10MB (Ethernet), capture size 65535 bytes
21:57:24.000026 IP 192.168.1.1.netbios-dgm > 192.168.1.255.netbios-dgm: NBT UDP PACKET(138)
21:57:24.000459 IP 192.168.1.50.44414 > 192.168.100.1.domain: 46452+ PTR? 255.1.168.192.in-addr.arpa. (44)
21:57:25.315429 IP 192.168.1.175.netbios-ns > 192.168.1.255.netbios-ns: NBT UDP PACKET(137): QUERY; REQUEST; BROADCAST
21:57:25.315470 ARP, Request who-has 192.168.1.175 tell 192.168.1.1, length 46
21:57:25.315545 ARP, Reply 192.168.1.175 is-at 00:0c:29:e0:09:3f (oui Unknown), length 46
21:57:25.315613 IP 192.168.1.1.netbios-ns > 192.168.1.175.netbios-ns: NBT UDP PACKET(137): QUERY; POSITIVE; RESPONSE; UNICA
```

Figure 5: Passive Sniffing

Most of the IP addresses announce themselves on the network without doing any type of scan. User Datagram Protocol (UDP) NetBIOS Datagrams are sent to the network broadcast address of 192.168.1.255. Address Resolution Protocol (ARP) uses the broadcast MAC address of FF:FF:FF:FF:FF:FF. These broadcasts are sent to all machines within a single broadcast domain; meaning ARP broadcasts are not forwarded off a LAN segment.

6. **Close** the terminal window.

We will start the sniffer to examine what traffic is generated, using Nmap and Zenmap scans.

7. Log into the Linux Sniffer machine in the topology diagram with the username of **root** with the password of **toor**.

For security purposes, the password will not be displayed.

8. Type the following command to initialize the Graphical User Environment:
   root@bt:~# **startx**

Figure 6: Logging on to the Sniffer

9. Open a terminal window by clicking on the picture to the right of Firefox in the taskbar in the bottom of the screen in BackTrack.

Figure 7: The Terminal Window Icon within BackTrack

10. After opening the terminal, you may want adjust the size of the font. To increase the font size within the terminal, click **Settings** from the terminal menu bar, select **Font**, then select **Enlarge Font**.

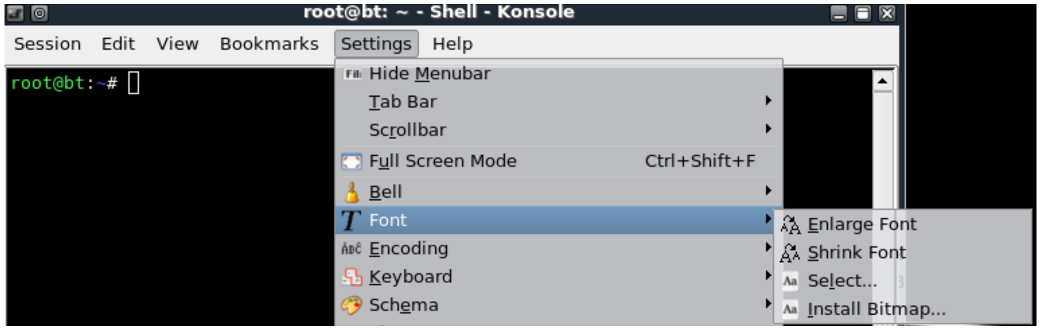


Figure 8: Increase the Font Size within the Terminal Window

One of the nice features about some versions of BackTrack is they are not automatically assigned IP addresses through the use of DHCP, or Dynamic Host Configuration Protocol. The idea is to come on the network quietly, without being detected.

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

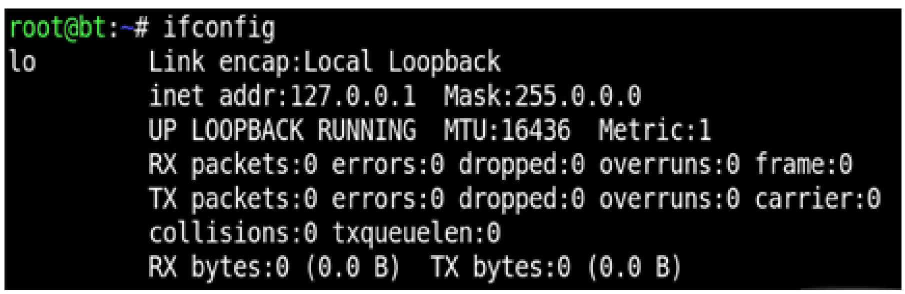


Figure 9: No IP addresses, other than the Loopback Address of 127.0.0.1, are Displayed

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

Figure 10: All Available Interfaces on the System

In this lab, we will capture internal traffic from Nmap and Zenmap scans with Wireshark.

10. To activate the first interface, type the following command:
    root@bt:~# **ifconfig eth0 up**

Figure 11: Activating the First Interface

11. To verify the first interface, type the following command:
    root@bt:~# **ifconfig eth0**

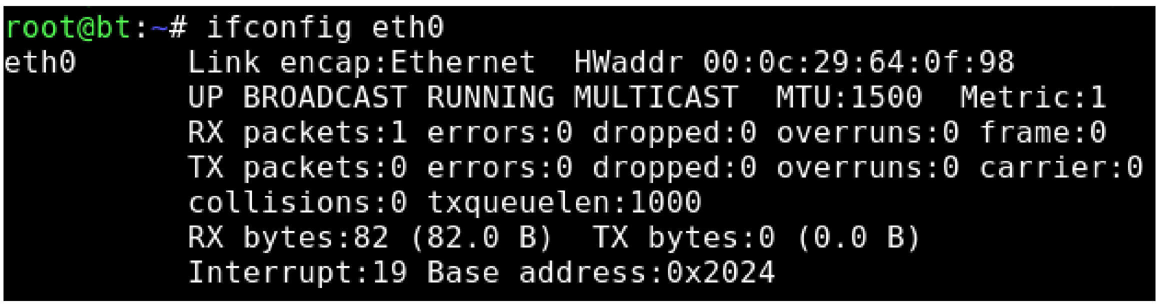


Figure 12: The First Interface is activated without an IP address

12. On the sniffer machine, type the following command to launch Wireshark:
    root@bt:~# **wireshark**

Figure 13: Typing Wireshark

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

Figure 14: Wireshark Message

Before sniffing network traffic, we want to designate the internal interface. Designating the internal interface tells Wireshark which network interface we want to see traffic from.

14. Select Capture from the Wireshark menu bar, and choose **Interfaces**.

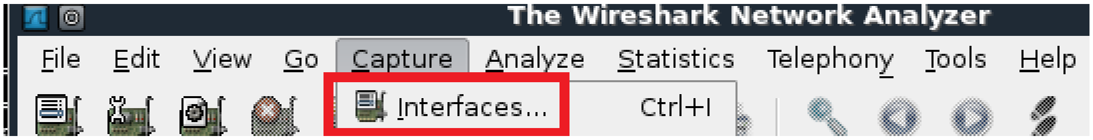


Figure 15: Capture Sub-Menu

15. Locate **eth0** on the left side. Click the **Start** button on the right across from it. The scan begins; leave the scan running.

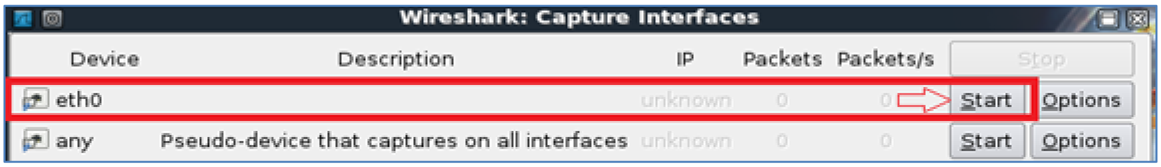


Figure 16: Starting Wireshark on the Internal Interface

16. Open the **BackTrack 5** machine on the *internal* network in the lab topology. In a terminal window, type the following command to conduct a ping scan to find hosts on the 192.168.1.0/24 network: root@bt:~# **nmap –sP 192.168.1.***

Linux is case sensitive; use lowercase "s" and capital "P".

```
root@bt:~# nmap -sP 192.168.1.*

Starting Nmap 6.01 ( http://nmap.org ) at 2013-02-20 22:25 EST
Nmap scan report for 192.168.1.1
Host is up (0.00035s latency).
MAC Address: 00:0C:29:31:57:1E (VMware)
Nmap scan report for 192.168.1.50
Host is up.
Nmap scan report for 192.168.1.100
Host is up (0.00011s latency).
MAC Address: 00:0C:29:43:C9:0D (VMware)
Nmap scan report for 192.168.1.175
Host is up (0.00017s latency).
MAC Address: 00:0C:29:E0:09:3F (VMware)
Nmap scan report for 192.168.1.200
Host is up (0.00013s latency).
MAC Address: 00:0C:29:C4:99:4B (VMware)
Nmap done: 256 IP addresses (5 hosts up) scanned in 41.99 seconds
```

Figure 17: The Results of a Ping Scan using nmap with the –sP option

The results of the ping scan indicate five hosts on the 192.168.1.0/24 network.

17. For the next task, return to the **Linux Sniffer** machine from the lab topology. In the Wireshark window, type **arp** in the filter pane and click **Apply**. This filters displayed packets from the scan to only show packets using the Address Resolution Protocol (ARP). Your screen should resemble figure 16 below; notice the ARP packets. **Note: Wireshark is continuing to capture frames- Do not stop this process.**

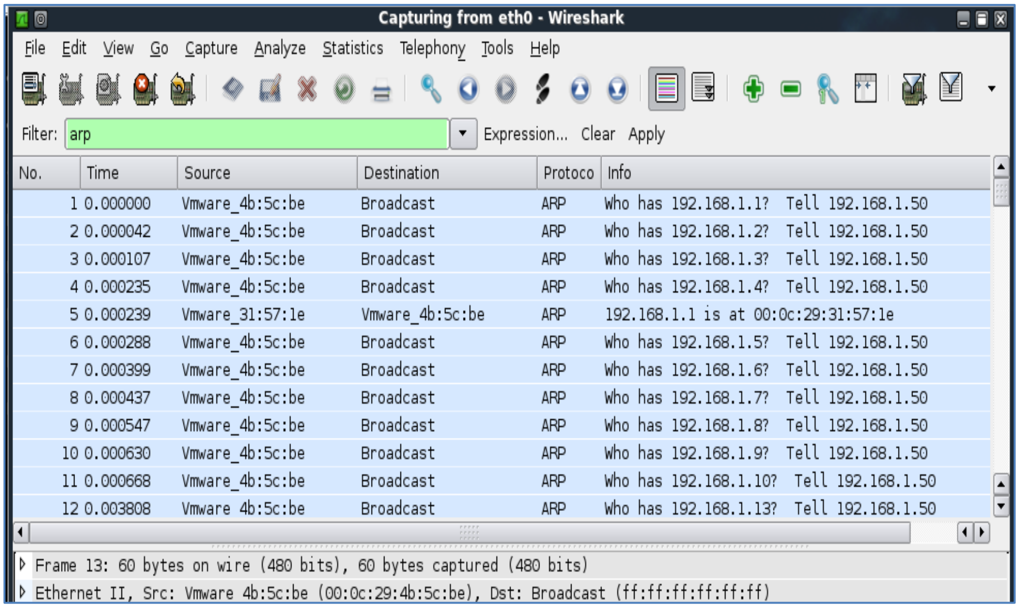


Figure 18: The ARP Packets

Remember, all local area network (LAN) traffic uses MAC addresses to communicate. Address Resolution Protocol (ARP) is responsible for determining the MAC address of a machine by broadcasting an inquiry containing the machine's IP address. Before we can ping a machine on the LAN using its IP address, ARP must first determine the MAC address so that a layer 2 frame can be constructed. A ping scan using Nmap, therefore, will display a large number of ARP requests and replies as Nmap attempts to locate and ping each machine on the network.

18. For our next task, we will use *Zenmap*, the GUI frontend to Nmap. Open the **BackTrack 5** machine on the Internal Network in the lab topology. To start Zenmap, type zenmap in the terminal window.
root@bt:~# **zenmap**

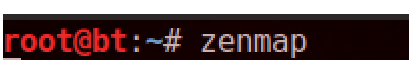


Figure 19: Typing zenmap

19. In the target box, type the network ID of 192.168.1.0/24, and click **Scan**.

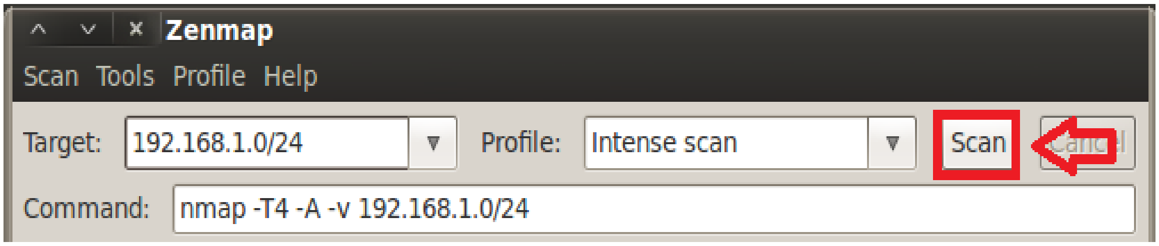


Figure 20: The Zenmap Target

After some time elapses, Zenmap will display the IP addresses and OS type detected. Please be patient, as this process may take several minutes (approx. 5 minutes). Upon completion, the list of discovered hosts and their detected operating systems will be automatically displayed on the left within the Zenmap window.

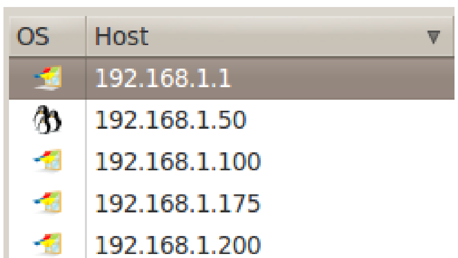


Figure 21: The List of Discovered IP addresses

20. Return to the **Linux Sniffer** machine from the lab topology. Type **tcp.flags.reset==1** in the Wireshark filter pane and click **Apply**.

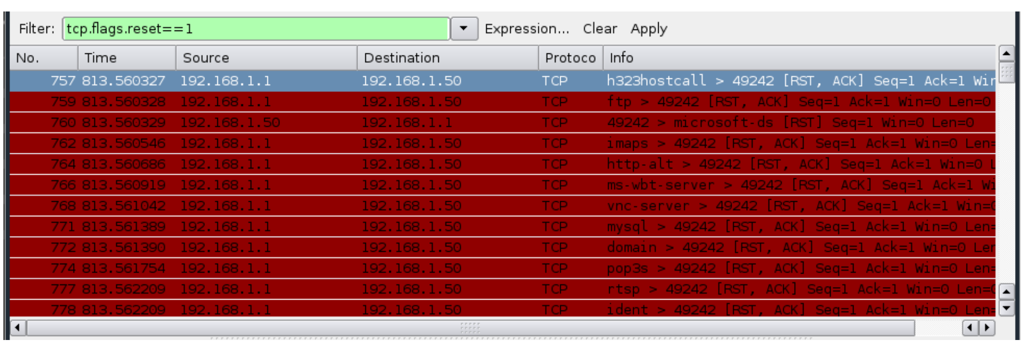


Figure 22: TCP Reset Packets

1.2 Conclusion

There are two options for detecting other hosts on the network:

- Passively listening for devices to "announce" their presence on the wire.
- Actively scanning for hosts using a tool like *Nmap* or *Zenmap*.

2 Discovering Hosts with Windows Command Line Tools

While tools like Nmap, Zenmap, tcpdump, and Wireshark will allow you to enumerate hosts; you can also enumerate hosts with some of the built-in Windows commands. In this exercise, we will use Wireshark to capture the network traffic, and then analyze the amount of traffic sent to the broadcast address by the Windows machines.

2.1 Capture Network Traffic and then Analyze the Amount of Traffic Sent

1. On the **Linux Sniffer** machine, stop the Wireshark capture by clicking the stop icon (below go).

Figure 23: Stopping Wireshark

2. Select Capture from the Wireshark Menu bar, and choose **Interfaces.**

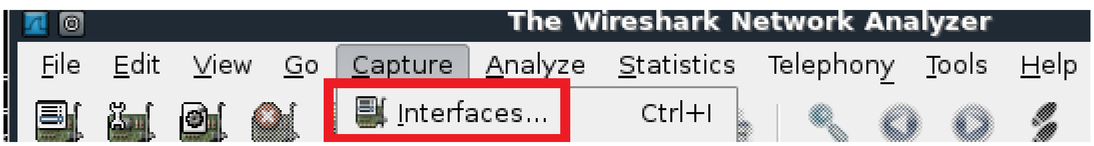


Figure 24: Capture Sub-Menu

3. Locate **eth0** on the left side. Click the **Start** button on the right across from it.

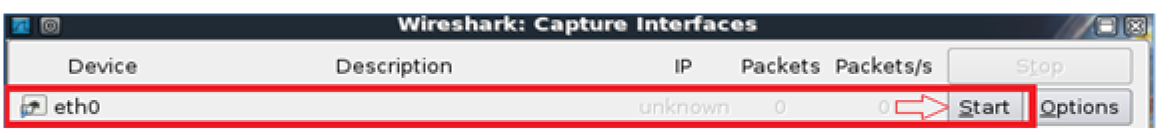


Figure 25: Starting the Capture

4. Click **Continue without Saving** when you receive the warning message.

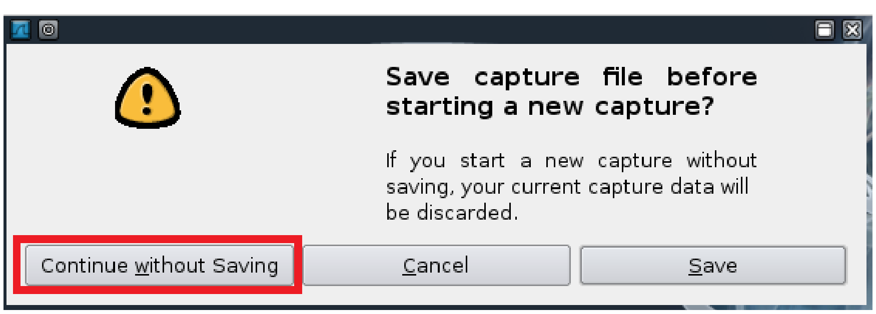


Figure 26: Continue Without Saving

5. In the Wireshark filter pane, type **ip.addr == 192.168.1.255** and click **Apply**:

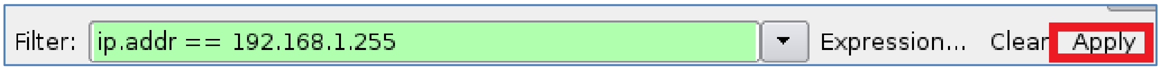


Figure 27: IP address Filter

After a short while, you will see Windows broadcast packets appear in the network traffic.

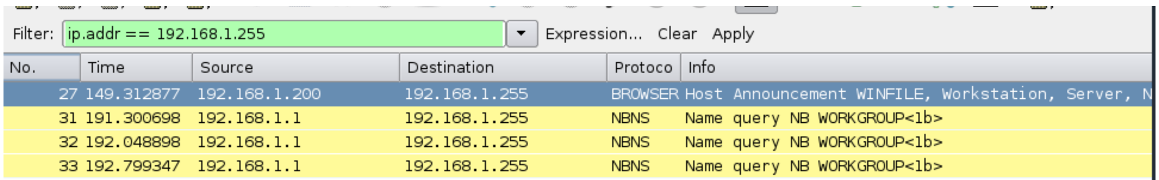


Figure 28: Broadcast Traffic

6. Log into the **Windows XP Pro** system using the **hacker** account with the password of **toor**.

Figure 29: Logging in as hacker

7. Open the command prompt on the Windows XP machine by double-clicking the desktop shortcut.

Figure 30: A Shortcut to the Command Prompt

8. Type the following to enumerate the other computers in your workgroup:
   C:\>**net view**

```
Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\>net view
Server Name            Remark

-------------------------------------------
\\FW
\\WINFILE
\\WINXP
The command completed successfully.
```

Figure 31: The net view command

9. Type the following command to enumerate the domain list:
   C:\>**net view /domain**

```
C:\>net view /domain
Domain

-------------------------------------------
WORKGROUP
XYZCOMPANY
The command completed successfully.
```

Figure 32: Net View with Options

10. Type the following command to view the computer's in XYZCompany's domain:
    C:\>**net view /domain:XYZcompany**

```
C:\>net view /domain:XYZCOMPANY
Server Name            Remark

---------------------------------------
\\SERVER
The command completed successfully.
```

Figure 33: Viewing computers in a Different Workgroup

11. Type the following to view the computers in the domain WORKGROUP.
    C:\>**net view /domain:WORKGROUP**

```
C:\>net view /domain:WORKGROUP
Server Name            Remark

-------------------------------------
\\FW
\\WINFILE
\\WINXP
The command completed successfully.
```

Figure 34: Viewing Workgroup Computers

Return to the **Linux Sniffer** machine. You can look at all of the browser traffic to see all of the computer and domain names.

12. To view computers and domains, type **browser** in the filter pane and click **Apply**:

You may have less output than what is displayed below. Wireshark is continuing to capture packets, so the list may continue to grow.

Filter: browser Expression... Clear Apply

No.	Time	Source	Destination	Protoco	Info
27	149.312877	192.168.1.200	192.168.1.255	BROWSER	Host Announcement WINFILE, Workstation,
65	262.426242	192.168.1.175	192.168.1.255	BROWSER	Host Announcement WINXP, Workstation, Se
66	296.758315	192.168.1.100	192.168.1.255	BROWSER	Local Master Announcement SERVER, Workst
89	683.547898	192.168.1.1	192.168.1.255	BROWSER	Local Master Announcement FW, Workstatio
135	765.476962	192.168.1.100	192.168.1.255	BROWSER	Domain/Workgroup Announcement XYZCOMPANY
136	785.176002	192.168.1.1	192.168.1.255	BROWSER	Domain/Workgroup Announcement WORKGROUP,
142	867.959047	192.168.1.200	192.168.1.255	BROWSER	Host Announcement WINFILE, Workstation,
177	982.785752	192.168.1.175	192.168.1.255	BROWSER	Host Announcement WINXP, Workstation, Se
204	1015.554138	192.168.1.100	192.168.1.255	BROWSER	Local Master Announcement SERVER, Workst
231	1406.533825	192.168.1.1	192.168.1.255	BROWSER	Local Master Announcement FW, Workstatio
282	1585.665086	192.168.1.200	192.168.1.255	BROWSER	Host Announcement WINFILE, Workstation,
298	1665.475386	192.168.1.100	192.168.1.255	BROWSER	Domain/Workgroup Announcement XYZCOMPANY
299	1685.174454	192.168.1.1	192.168.1.255	BROWSER	Domain/Workgroup Announcement WORKGROUP,

Figure 35: Browser Packets

We have determined the following information by using the net view command:

Work Group Name	Members
WORKGROUP	WINFILE, XP, FW
XYZCOMPANY	SERVER

Now that we have names, we can also determine the IP address of each machine.

13. Return to the **Windows XP Pro** machine. Type the following command to identity the IP address of the **fw** machine:
    C:\>**ping fw**

```
C:\>ping fw

Pinging fw [192.168.1.1] with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time<1ms TTL=128
Reply from 192.168.1.1: bytes=32 time<1ms TTL=128
Reply from 192.168.1.1: bytes=32 time<1ms TTL=128
Reply from 192.168.1.1: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Figure 36: Pinging FW

The IP address for the machine named fw is identified as 192.168.1.1.

14. Type the following command to identity the IP address of the **winfile** machine:
    C:\>**ping winfile**

```
C:\>ping winfile

Pinging winfile [192.168.1.200] with 32 bytes of data:

Reply from 192.168.1.200: bytes=32 time<1ms TTL=128
Reply from 192.168.1.200: bytes=32 time<1ms TTL=128
Reply from 192.168.1.200: bytes=32 time<1ms TTL=128
Reply from 192.168.1.200: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.200:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Figure 37: Pinging WINFILE

The IP address for the machine named *winfile* is identified as 192.168.1.200.

15. Type the following command to identity the IP address of the **server** machine:
    C:**ping server**

```
C:\>ping server

Pinging server [192.168.1.100] with 32 bytes of data:

Reply from 192.168.1.100: bytes=32 time<1ms TTL=128
Reply from 192.168.1.100: bytes=32 time<1ms TTL=128
Reply from 192.168.1.100: bytes=32 time<1ms TTL=128
Reply from 192.168.1.100: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Figure 38: Pinging Server

The IP address for the machine named server is identified as 192.168.1.100.
We will not need to identify the IP address for our own machine named XP.

Computer Name	IP address
FW	192.168.1.1
SERVER	192.168.1.100
XP	192.168.1.175
WINFILE	192.168.1.200

16. Return to the **Linux Sniffer** machine. You can view the Address Resolution Protocol (ARP) traffic involved in the IP address discovery by typing **arp** in the Wireshark filter pane and clicking **Apply**.

Filter: arp   Expression... Clear Apply

No.	Time	Source	Destination	Protoco	Info
181	1002.602370	Vmware_e0:09:3f	Broadcast	ARP	Who has 192.168.1.1? Tell 192.168.1.175
182	1002.602479	Vmware_31:57:1e	Vmware_e0:09:3f	ARP	192.168.1.1 is at 00:0c:29:31:57:1e
233	1414.270608	Vmware_31:57:1e	Broadcast	ARP	Who has 192.168.1.175? Tell 192.168.1.1
234	1414.270612	Vmware_e0:09:3f	Vmware_31:57:1e	ARP	192.168.1.175 is at 00:0c:29:e0:09:3f
307	1778.824173	Vmware_e0:09:3f	Broadcast	ARP	Who has 192.168.1.1? Tell 192.168.1.175
308	1778.824227	Vmware_31:57:1e	Vmware_e0:09:3f	ARP	192.168.1.1 is at 00:0c:29:31:57:1e
338	1912.642831	Vmware_e0:09:3f	Broadcast	ARP	Who has 192.168.1.1? Tell 192.168.1.175
339	1912.642887	Vmware_31:57:1e	Vmware_e0:09:3f	ARP	192.168.1.1 is at 00:0c:29:31:57:1e
363	1919.461139	Vmware_43:c9:0d	Broadcast	ARP	Who has 192.168.1.175? Tell 192.168.1.100
364	1919.461202	Vmware_e0:09:3f	Vmware_43:c9:0d	ARP	192.168.1.175 is at 00:0c:29:e0:09:3f
417	1950.794836	Vmware_c4:99:4b	Broadcast	ARP	Who has 192.168.1.100? Tell 192.168.1.200
418	1950.794958	Vmware_43:c9:0d	Vmware_c4:99:4b	ARP	192.168.1.100 is at 00:0c:29:43:c9:0d
420	1950.795310	Vmware_43:c9:0d	Broadcast	ARP	Who has 192.168.1.1? Tell 192.168.1.100

Figure 39: ARP Packets

17. On the **Linux Sniffer** machine, stop the Wireshark capture by clicking the stop icon (below Go).

Figure 40: Stopping Wireshark

18. **Close** all windows on the *Internal* BackTrack 5 machine.

Here is a list of the commands that were used during this task to enumerate Windows hosts.

Command	Result
net view	Enumerates the machines within the same workgroup
net view /domain	Enumerates all workgroups and domains
net view /domain:workgroup	Enumerates the machines in the workgroup WORKGROUP
net view /domain:XYZcompany	Enumerates the machines in the domain XYZcompany

2.2 Conclusion

While there are scanning tools available like Nmap and Zenmap that will scan a network, there are also built-in tools that will allow a user to enumerate hosts on a network, even if they do not have administrative rights. There are situations where hackers need to find out information about other hosts on the network, but cannot install programs. Using built-in commands like net view will allow for the enumeration of hosts.

3 Discovering Hosts with Metasploit and Cain

You can enumerate hosts with third party tools like Nmap, Zenmap, tcpdump, and Wireshark or by using built-in Windows commands. There are also sophisticated attack tools, like Metasploit and Cain, which will allow you to view hosts on the network.

3.1 Using Metasploit to Enumerate Hosts on the Network

1. On the *Internal* **BackTrack 5** machine, type the following to launch Metasploit: root@bt:~# **msfconsole**

Figure 41: Launching Metasploit

A random Metasploit banner message will appear and the current version number will be displayed.

It may take a few moments for Metasploit to run and for the banner message to appear.

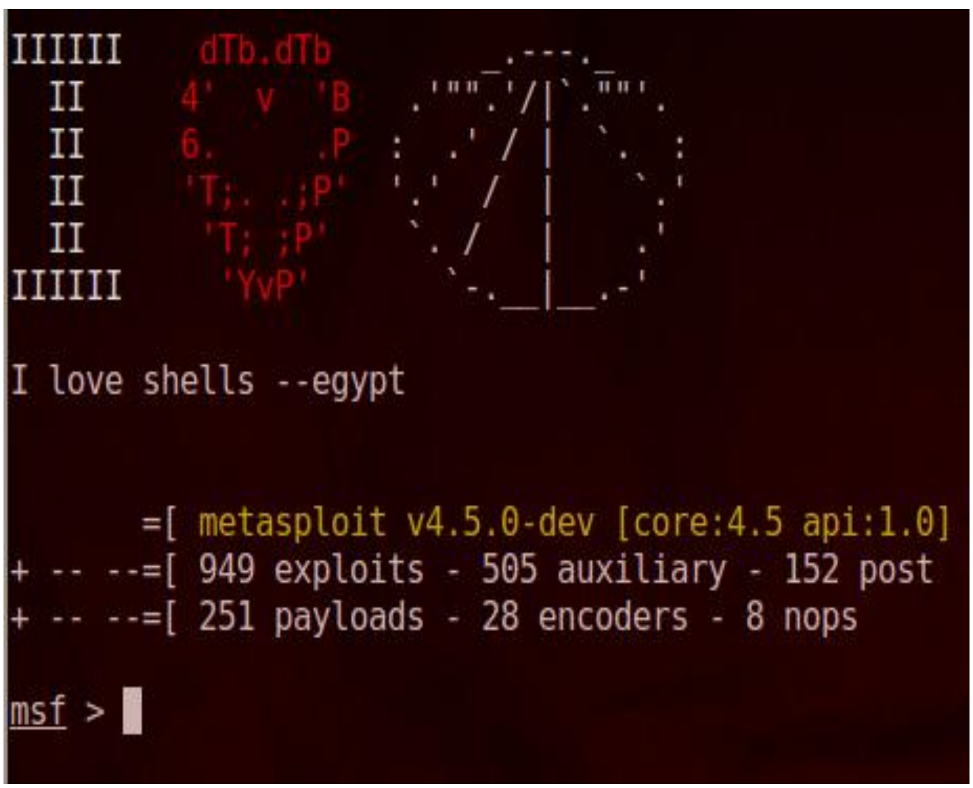


Figure 42: Metasploit Banner

You can type the **banner** command at msf > to display a different banner.

We will now search for the scanner modules that exist within Metasploit.

2. To search for all of the available scanners within Metasploit, type the following:
   msf > **search scanner**

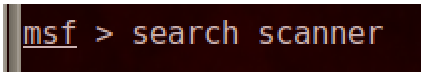


Figure 43: Searching for Scanners

There are a large number of scanners within Metasploit, including IPv6 scanners.

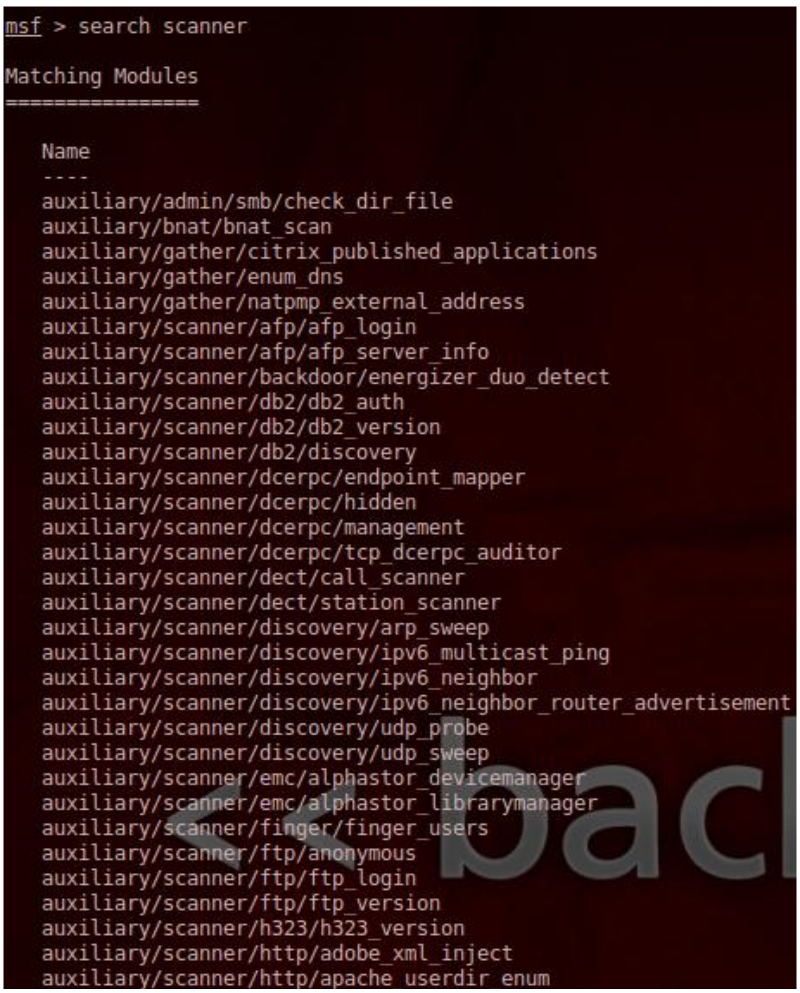


Figure 44: A Partial List of Metasploit Scanners

3. To select the Metasploit scanner that will perform an arp sweep, type:
   msf > **use auxiliary/scanner/discovery/arp_sweep**

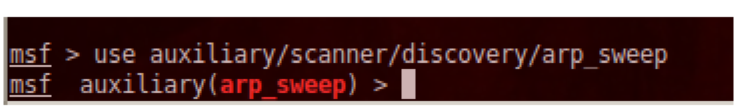


Figure 45: Using the arp Sweep Scanner

4. Type the following command to see the available options for the arp scanner:
   msf auxiliary(arp_sweep) > **show options**

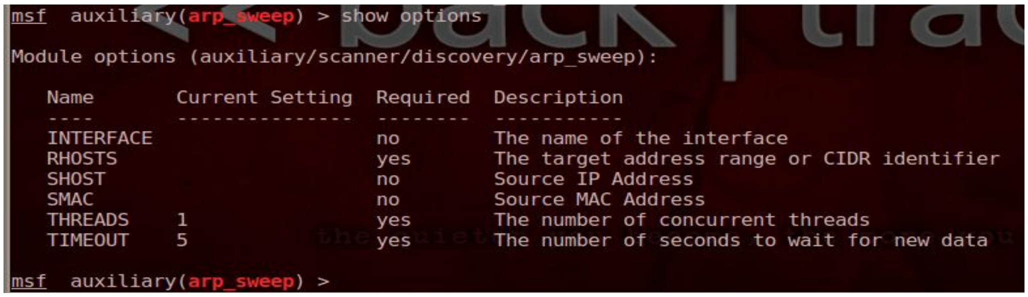


Figure 46: The Options for the Scanner

5. Type the following command to set 192.168.1.0/24 as the target network:
   msf auxiliary(arp_sweep) > **set RHOSTS 192.168.1.0/24**

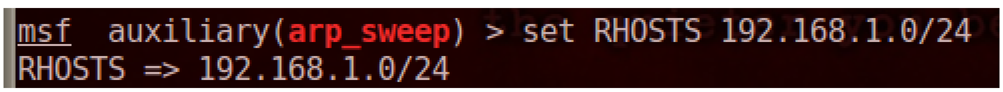


Figure 47: Setting the Target Network

6. Type the following command to verify that the network range is correct:
   msf auxiliary(arp_sweep) > **show options**

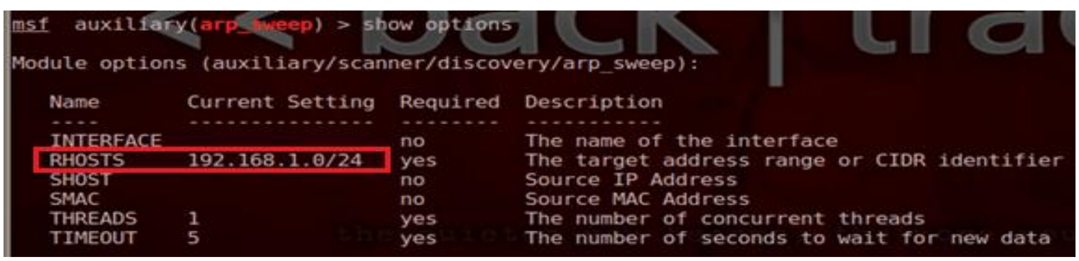


Figure 48: Verifying the Network Range

Before running the scan, we will start capturing on the **Linux Sniffer** machine again.

7. Select **Capture** from the Wireshark menu bar, and choose **Interfaces**.

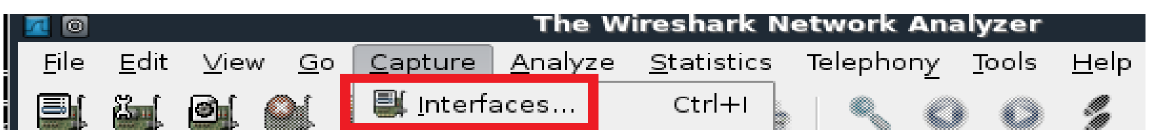


Figure 49: Capture Sub-Menu

8. Locate **eth0** on the left side. Click the **Start** button on the right across from it.

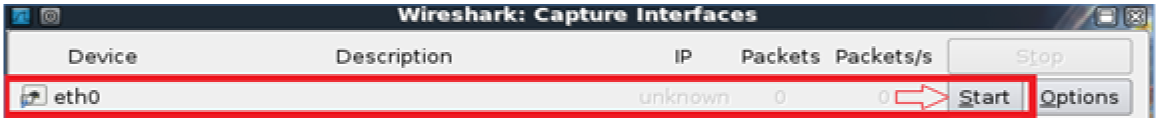


Figure 50: Starting the Capture

9. Click **Continue without Saving** when you receive the warning message.

Figure 51: Continuing without Saving

10. Return to the *Internal* **BackTrack 5** machine. Type the following command to initiate the arp sweep process:
msf auxiliary(arp_sweep) > **run**

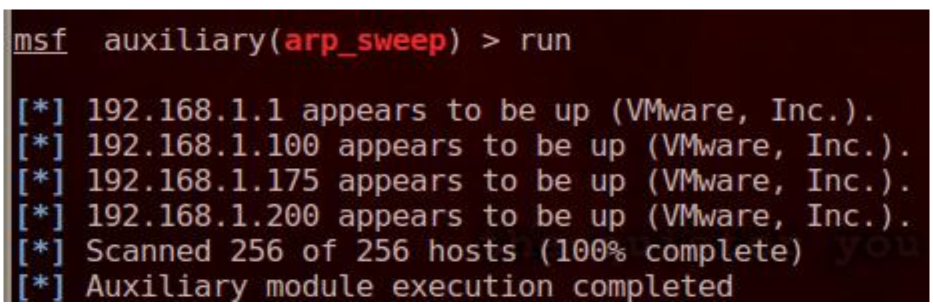
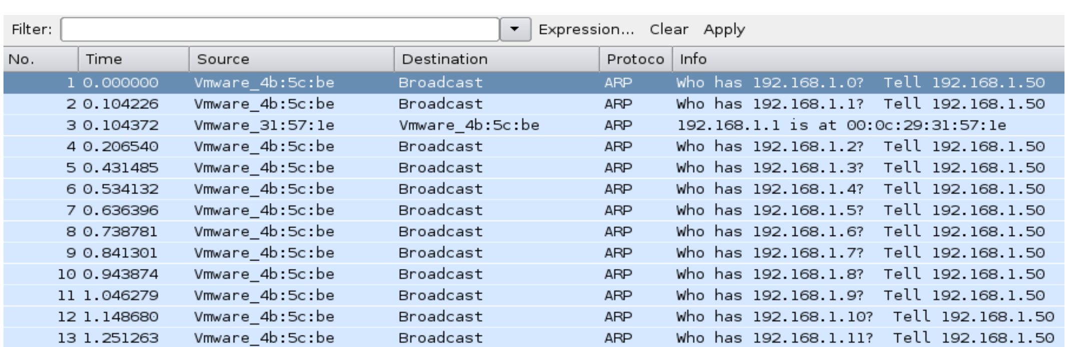


Figure 52: ARP Sweep is completed

On the **Linux Sniffer** machine, you will notice a large number of ARP packets in Wireshark.



No.	Time	Source	Destination	Protoco	Info
1	0.000000	Vmware_4b:5c:be	Broadcast	ARP	Who has 192.168.1.0? Tell 192.168.1.50
2	0.104226	Vmware_4b:5c:be	Broadcast	ARP	Who has 192.168.1.1? Tell 192.168.1.50
3	0.104372	Vmware_31:57:1e	Vmware_4b:5c:be	ARP	192.168.1.1 is at 00:0c:29:31:57:1e
4	0.206540	Vmware_4b:5c:be	Broadcast	ARP	Who has 192.168.1.2? Tell 192.168.1.50
5	0.431485	Vmware_4b:5c:be	Broadcast	ARP	Who has 192.168.1.3? Tell 192.168.1.50
6	0.534132	Vmware_4b:5c:be	Broadcast	ARP	Who has 192.168.1.4? Tell 192.168.1.50
7	0.636396	Vmware_4b:5c:be	Broadcast	ARP	Who has 192.168.1.5? Tell 192.168.1.50
8	0.738781	Vmware_4b:5c:be	Broadcast	ARP	Who has 192.168.1.6? Tell 192.168.1.50
9	0.841301	Vmware_4b:5c:be	Broadcast	ARP	Who has 192.168.1.7? Tell 192.168.1.50
10	0.943874	Vmware_4b:5c:be	Broadcast	ARP	Who has 192.168.1.8? Tell 192.168.1.50
11	1.046279	Vmware_4b:5c:be	Broadcast	ARP	Who has 192.168.1.9? Tell 192.168.1.50
12	1.148680	Vmware_4b:5c:be	Broadcast	ARP	Who has 192.168.1.10? Tell 192.168.1.50
13	1.251263	Vmware_4b:5c:be	Broadcast	ARP	Who has 192.168.1.11? Tell 192.168.1.50

Figure 53: ARP Packets Generated from ARP Sweep

11. To go back one level to the msf prompt and exit the arp_sweep scanner, type the following command:
msf auxiliary(arp_sweep) > **back**

```
msf  auxiliary(arp_sweep) > back
```

Figure 54: Moving Back One Level

12. To use the NetBIOS name scanner, type the following command:
msf > **use auxiliary/scanner/netbios/nbname**

```
msf > use auxiliary/scanner/netbios/nbname
```

Figure 55: The NetBIOS Scanner

13. Type the following command to display the module options:
msf auxiliary(nbname) > **show options**

```
msf  auxiliary(nbname) > show options

Module options (auxiliary/scanner/netbios/nbname):

   Name       Current Setting  Required  Description
   ----       ---------------  --------  -----------
   BATCHSIZE  256              yes       The number of hosts to probe in each set
   CHOST                       no        The local client address
   RHOSTS                      yes       The target address range or CIDR identifier
   RPORT      137              yes       The target port
   THREADS    1                yes       The number of concurrent threads
```

Figure 56: Showing Options

14. Type the following command to set 192.168.1.0/24 as the target network:
msf auxiliary(nbname) > **set RHOSTS 192.168.1.0/24**

```
msf  auxiliary(nbname) > set RHOSTS 192.168.1.0/24
RHOSTS => 192.168.1.0/24
```

Figure 57: Setting the Network

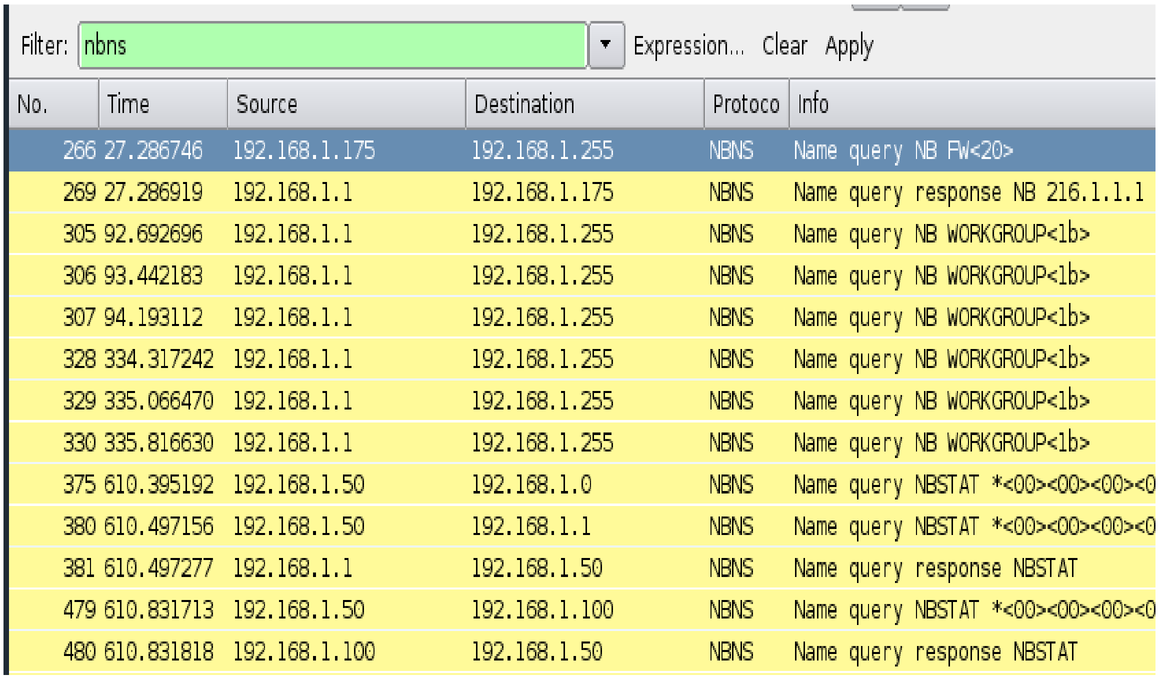
15. Type the following command to enumerate the netbios names of the computers:
msf auxiliary(nbname) > **run**

```
msf  auxiliary(nbname) > run

[*] Sending NetBIOS status requests to 192.168.1.0->192.168.1.255 (256 hosts)
[*] 192.168.1.1 [FW] OS:Windows Names:(FW, WORKGROUP, ▯▯▯ MSBROWSE ▯ Addresses:(216.1.1.1, 192.168.1.1)
[*] 192.168.1.100 [SERVER] OS:Windows Names:(SERVER, XYZCOMPANY, ▯▯▯ MSBROWSE ▯ Addresses:(192.168.1.100
[*] 192.168.1.175 [WINXP] OS:Windows Names:(WINXP, WORKGROUP) Addresses:(192.168.1.175) Mac:00:0c:29:e0:09
[*] 192.168.1.200 [WINFILE] OS:Windows Names:(WINFILE, WORKGROUP) Addresses:(192.168.1.200) Mac:00:0c:29:c
[*] Scanned 256 of 256 hosts (100% complete)
[*] Auxiliary module execution completed
```

Figure 58: The List of Computer Names

16. On the **Linux Sniffer** machine, type **nbns** in the Wireshark filter pane and click **Apply**.



No.	Time	Source	Destination	Protoco	Info
266	27.286746	192.168.1.175	192.168.1.255	NBNS	Name query NB FW<20>
269	27.286919	192.168.1.1	192.168.1.175	NBNS	Name query response NB 216.1.1.1
305	92.692696	192.168.1.1	192.168.1.255	NBNS	Name query NB WORKGROUP<1b>
306	93.442183	192.168.1.1	192.168.1.255	NBNS	Name query NB WORKGROUP<1b>
307	94.193112	192.168.1.1	192.168.1.255	NBNS	Name query NB WORKGROUP<1b>
328	334.317242	192.168.1.1	192.168.1.255	NBNS	Name query NB WORKGROUP<1b>
329	335.066470	192.168.1.1	192.168.1.255	NBNS	Name query NB WORKGROUP<1b>
330	335.816630	192.168.1.1	192.168.1.255	NBNS	Name query NB WORKGROUP<1b>
375	610.395192	192.168.1.50	192.168.1.0	NBNS	Name query NBSTAT *<00><00><00><0
380	610.497156	192.168.1.50	192.168.1.1	NBNS	Name query NBSTAT *<00><00><00><0
381	610.497277	192.168.1.1	192.168.1.50	NBNS	Name query response NBSTAT
479	610.831713	192.168.1.50	192.168.1.100	NBNS	Name query NBSTAT *<00><00><00><0
480	610.831818	192.168.1.100	192.168.1.50	NBNS	Name query response NBSTAT

Figure 59: NetBIOS Name Service Packets

Next, we will enumerate hosts on Windows XP, using the attack tool Cain.

17. On the **Windows XP Pro** machine, double-click the shortcut to Cain on the desktop.

Figure 60: The shortcut to Cain

18. Click **OK** to the warning from Cain that the Windows Firewall is enabled.

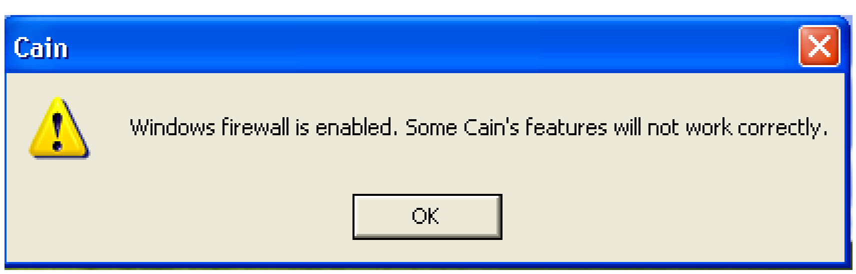


Figure 61: Cain Warning

19. To use the scanning and enumeration features of Cain, Click on the Sniffer tab.

Figure 62: Cain sniffer Tab

20. Click the **Start/Stop Sniffer** icon, which is a picture of a Network Interface Card (NIC).

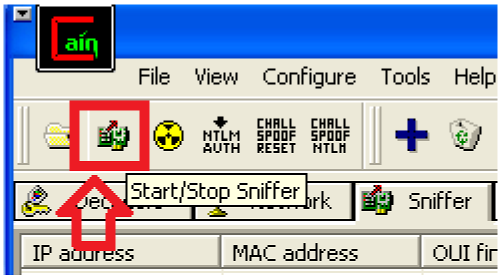


Figure 63: Starting the Sniffer

21. Click **OK** when the configuration dialogue box appears.

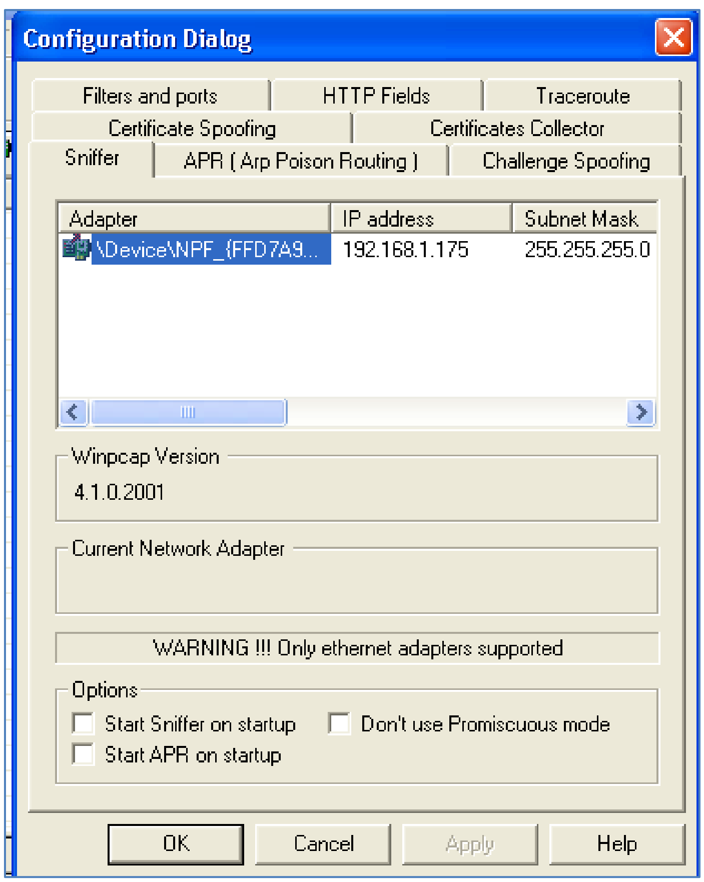


Figure 64: Configuration Dialog Box

22. After clicking **OK** to the Configuration Dialog, click the **Start/Stop Sniffer** icon.

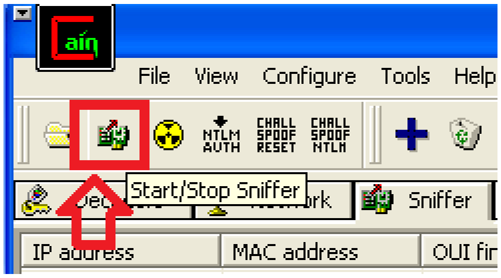


Figure 65: Starting the Sniffer

23. Right-click in the white space and select **Scan MAC Addresses**.

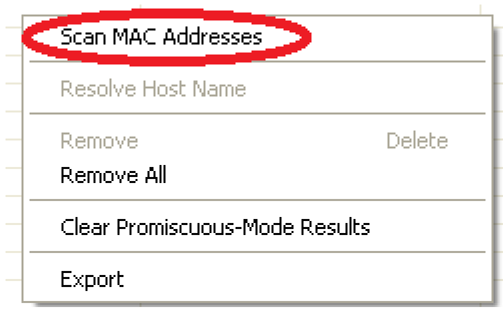


Figure 66: Scan MAC Addresses

24. Scan all hosts in the Subnet by clicking **OK** in the MAC Address Scanner dialog window.

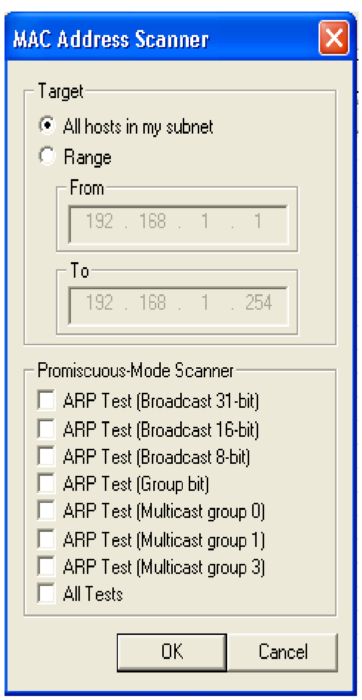


Figure 67: MAC Address Scanner Dialog Window

IP addresses and corresponding MAC addresses will be displayed in the sniffer pane.

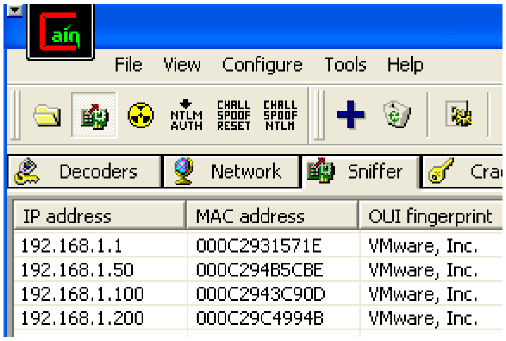


Figure 68: Results of the Scan

25. Right-click on 192.168.1.1 and select **Resolve Host Name**.

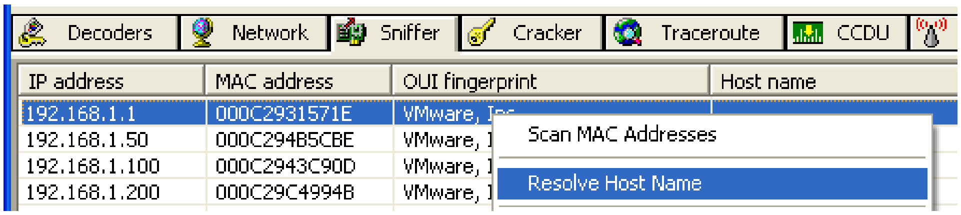


Figure 69: Resolving the Host Name

The Host Name of FW will be displayed in the hostname column.

Figure 70: Host Name of FW

26. Right-click on 192.168.1.100 and select **Resolve Host Name**.

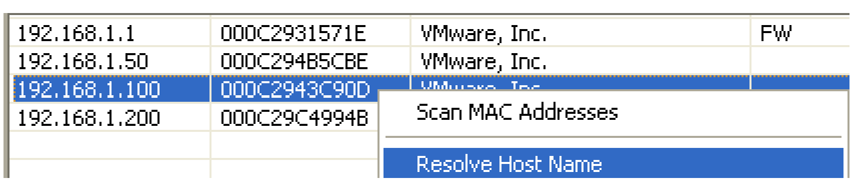


Figure 71: Resolving the Host Name

The Host Name of server.xyzcompany.com will be displayed in the hostname column.

Figure 72: Host Name of server.xyzcompany.com

27. Right-click on 192.168.1.200 and select **Resolve Host Name**.

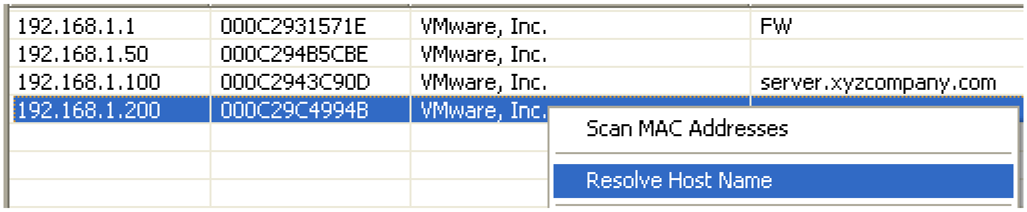


Figure 73: Resolving the Host Name

The Host Name of WINFILE will be displayed in the hostname column.

IP address	MAC address	OUI fingerprint	Host name
192.168.1.1	000C2931571E	VMware, Inc.	FW
192.168.1.50	000C294B5CBE	VMware, Inc.	
192.168.1.100	000C2943C90D	VMware, Inc.	server.xyzcompany.com
192.168.1.200	000C29C4994B	VMware, Inc.	WINFILE

Figure 74: Host Name of WINFILE

3.2 Conclusion

Tools such as Cain and Metasploit can be used to enumerate hosts on a network. They can provide information about IP addresses and hostnames of machines on the network. ARP or broadcast packets are generated when hosts are enumerated.

References

1. Wireshark:
   www.wireshark.org

2. tcpdump:
   http://www.tcpdump.org/

3. Cain:
   http://www.oxid.it/cain.html

4. Security Through Penetration Testing: Internet Penetration:
   http://www.informit.com/articles/article.aspx?p=25916

5. Metasploit:
   www.metasploit.com