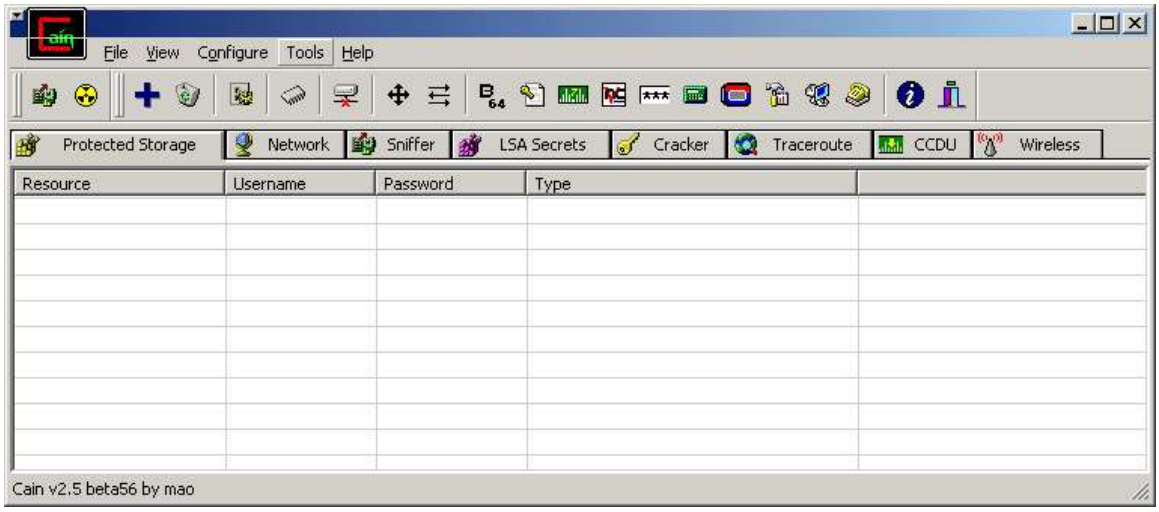
Cain & Abel v 2.5

Password Cracking
Via
ARP Cache Poisoning Attacks

v.1



2004

Objective:

At the end of this lab students will be able to use the password auditing and ARP Poison Routing (APR) features of Cain & Abel.

Background Information:

The Cain & Abel password recovery tool for Microsoft Operating Systems allows recovery of various kind of passwords by sniffing the network, cracking encrypted passwords using Dictionary, Brute-Force, Cryptanalysis attacks, decoding scrambled passwords, revealing password boxes, uncovering cached passwords and analyzing routing protocols. There is a version for Windows 98 and a NT2000/XP version with more features that will be used in this lab.

Where Cain is the main analysis tool, the Abel NT service provides a remote console on the target machine, which can dump user hashes from the remote SAM even if it was encrypted using the "Syskey" utility and other features like the LSA Secrets dumper, the route table manager and the TCP/UDP Table Viewer.

An interesting feature of Cain & Abel is APR (ARP Poison Routing) which enables sniffing on switched LANs by hijacking IP traffic of multiple hosts at the same time. The sniffer can also analyze encrypted protocols such as SSH-1 and HTTPS if used with APR and a Man-in-the-middle situation. Cain also comes with routing protocol authentication monitors, route extractors, crackers for all common hashing algorithms and for other various specific authentications, password calculators (Cisco PIX Hashes, RSA SecurID Tokens), decoders (Access Databases, Base64, Cisco Type-7, Enterprise Manager, Dialup, Remote Desktop) Cisco Config Downloader/Uploader, SiD-Scanner, LSA Secrets Dumper, Protected Storage Passwords Viewer, NT Hash-Dumper, Abel Remote Console, MAC Scanner, Promiscuous-Mode Scanner, Wireless Scanner, and TCP/UDP/ICMP Traceroute + DNS Resolver + Netmask Discovery + WHOIS resolver.

The current version of Cain & Abel is limited to use on the same physical network segment. Switched segments work fine, however remote sniffing is not enabled at this time. It will work on wireless networks as well with select supported NIC's. WEP cracking is in progress but not completed as of 8/15/04.

Network administrators as well as hackers will find uses for this software. A network administrator might use the password cracking feature to audit a

system for weak or non-existent passwords. By the same token, a hacker could gain illicit entry into a system this way. The remote control features of Cain & Abel allow for activities such as these to be carried out from a different location on the network. APR could be used to examine traffic to and from a remote computer on a switched network for auditing or nefarious purposes. Other features are available, but these are but a few of the possible good and bad uses of Cain & Abel. At the least, security personal should have a working knowledge of what this package does and how it can be used.

Oxid.it is the website for Massimiliano Montoro (mao@oxid.it) http://www.oxid.it. He has many free software tools available, including Cain & Abel.

For this lab, you will install Cain & Abel and the packet capture driver WinPcap, utilize the Windows password cracking feature of Cain & Abel, utilize MAC address discovery feature, and implement APR on a selected MAC address that was discovered on the network. Lastly, you will examine traffic from the target machine with Ethereal, a protocol analyzer.

Student Preparation:

The student will have completed required reading. The student will require paper for notes and should be prepared to discuss the exercises upon completion.

Instructor Preparation:

Before class, the instructor or a lab assistant will ensure that Cain & Abel 2.5 or newer, WinPcap, Ethereal .10.5a or newer, and tcpdump are installed and operational on the Windows 2000 or higher workstations and targets. Each student will need a workstation and target machine on the same switched LAN. Students will need administrator rights on both machines.

During class the instructor will discuss the function of Cain & Abel utility for password analysis and APR via ARP cache poisioning. Students will then demonstrate use of both features individually.

Warnings:

Use of the APR capability could cause Denial of Service on some networks, so as such this feature should be used on non-production networks only! Also, care must be exercised when auditing passwords as some may view this as

illegal activity and frown on its use. As such, these are powerful, professional tools and such be used as a professional.

Estimated Completion Time

90 minutes

Password auditing and recovery and ARP Poison Routing lab

Cain & Abel 2.5

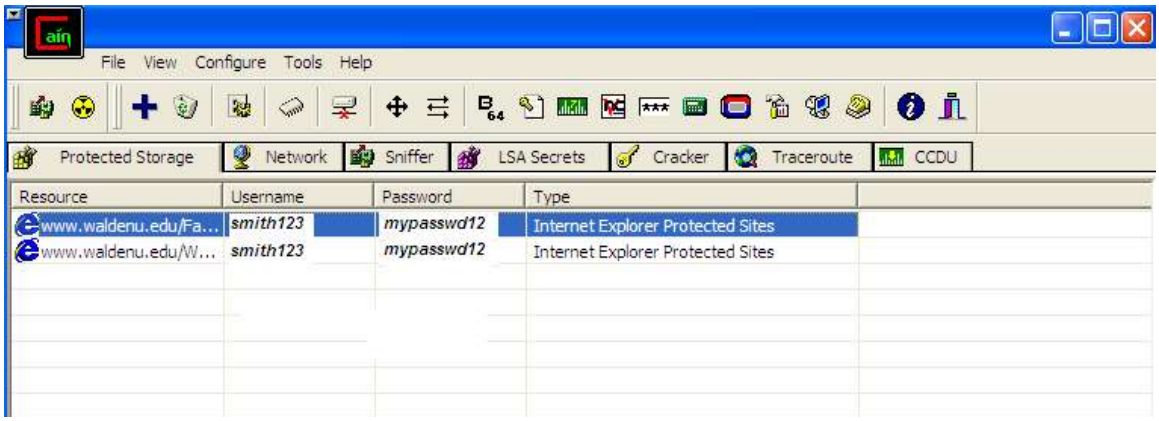
Cain & Abel is a password auditing and recovery tool that offers ease of installation and use. It is also very powerful and as such is a tool any IT professional would want in there repertoire.

To install:

1) Download and install Cain & Abel from http://www.oxid.it/cain.html
2) Install software and WinPcap packet capture driver
3) Reboot computer.
4) Download and install Ethereal from http://www.ethereal.com/
5) Reboot computer.

Use: ***To find protected storage information/passwords that have been saved in the system registry such as from Outlook, Outlook Express, MSN, Internet Explorer (IE), autocomplete and form information, ebay username and password, etc. Note: autocomplete must be enabled and passwords must be saved via IE.***
Starting with version 4.0, Microsoft's Internet Explorer may save everything that you ever type into a form. When you use a similarly named field on another form, it automatically provides you with a selection of previous data. This is stored in the registry and is based on a unique security identifier (SID).

1) Start Cain
2) Click blue + icon on the upper left, note username (ID) and Password and URL of resource it was saved for on the Protected Storage tab.



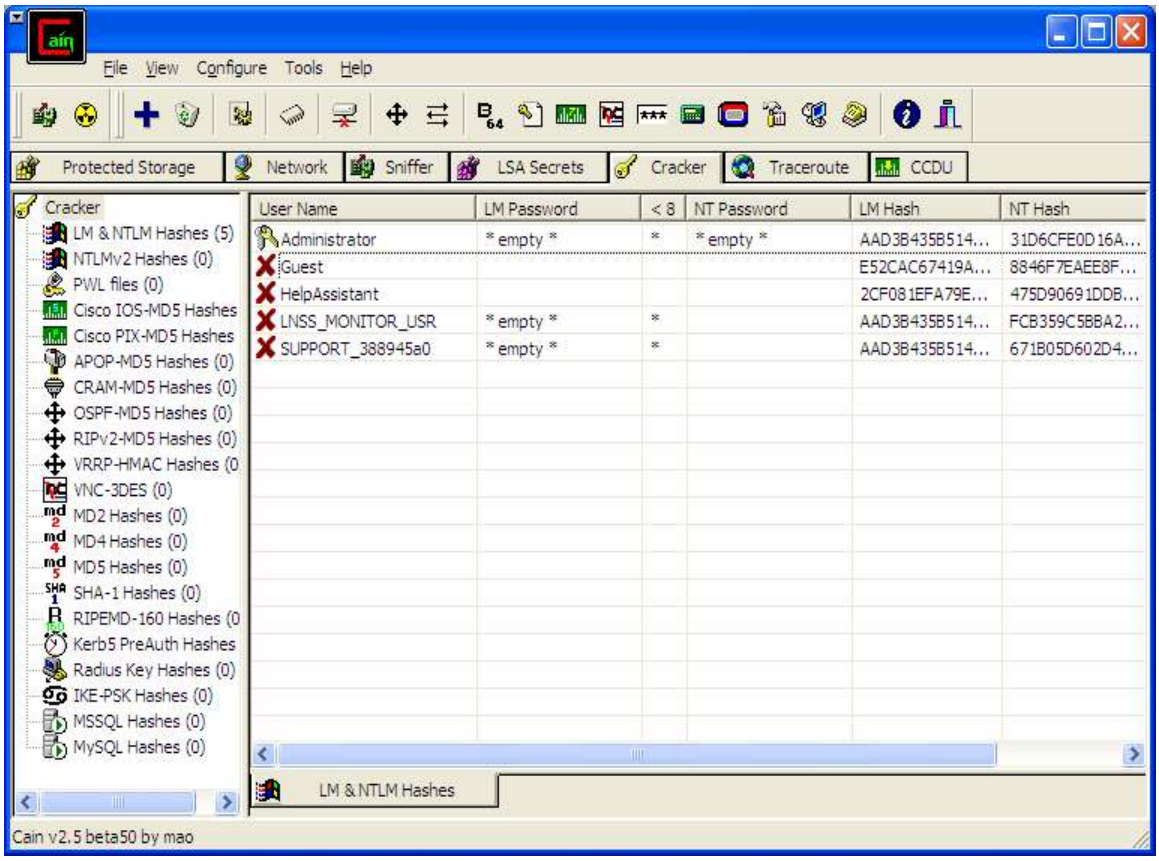
3) To save information from any of the Protected Storage sites:
   a. Click on one of the resources
   b. Right click and select Export
   c. Key in name such as resc1.txt
   d. Now, open file using notepad or similar text editor

4) To delete entry, left click on item, select either Remove or Remove All.

To find Windows login ID and passwords on a local machine.

- ***Create three users on your local machine. Make the accounts as follows: user1 with password of password, user2 with password of 1password1, and user 2 with password of 123xyz321. Now proceed to #1 below. With the different passwords selected, you will be able to examine how password difficulty affects auditing and cracking techniques.***

1) Click on Cracker tab
2) Click on LM & NTLM Hashes
3) Click on + sign icon on toolbar then Dump NT Hashes from Local machine. * Note, if you have a SAM file from an NT/win2k/XP machine you can also use the import option to import from that. **See bottom of lab on remote installation of Abel to see how you might gain access to a SAM file from a remote PC.*
4) Click Next
5) On Guest id, right click and select dictionary attack NTLM. Select Add, then browse to where cain is installed (possibly in c:\program\files\cain) Then select wordlists folder and wordlist.txt. Then click Start.
6) Note options such as As is Password, etc. Also note that you could use a Brute force attack if you had no luck on a dictionary word from a list file. However, this would take much longer.



Using APR – ARP Poison Routing.

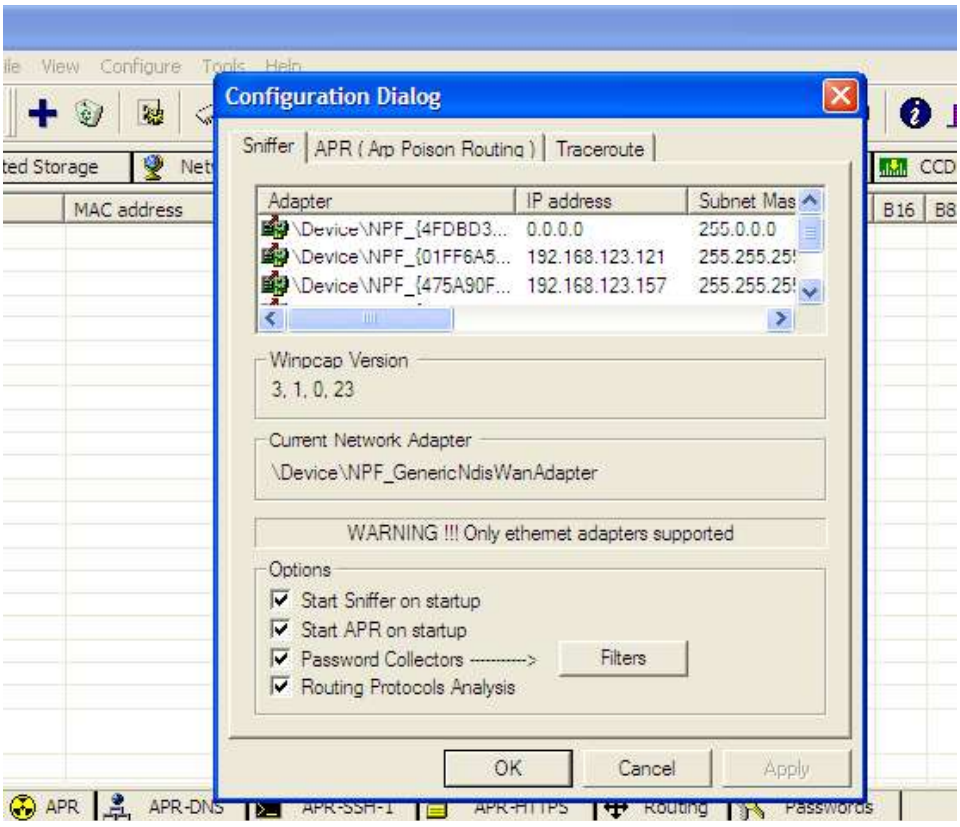
Theory -- On an Ethernet/IP network, when host A wants to send a packet to host B, it must know the MAC or physical address of the machine and IP address. It also needs to know the application layer protocol (IP) address, but the physical MAC is required for construction of the Ethernet frame. Review the OSI model if you are unclear on these concepts. In short we have to have both.

Once it knows the MAC's of the machines on the network, it keeps them stored in an ARP cache table. However, before it can "know" it has to query the network to find out the addresses. A host does this by sending out an ARP request on broadcast to FFFFFFFFFFFF. Only the station with the specified IP will reply in unicast with an ARP reply packet to the requesting station with it's MAC. Now host A has an updated table entry for host B and it will communicate now in unicast directly to it by using the MAC of B in the Ethernet frame. ARP request and reply packets are only sent if the host doesn't know the destination machines MAC. Again, once it is learned the cache is used....this is a key point to why APR works.

How APR works – ARP Poison Routing uses the stored cache as a way to re-route or re-direct packets from a target, to an intermediary machine, then forward to the host, thus the middle machine "sees" all traffic between target and host, even if on a switched LAN. First the target MAC address must be established, then the APR feature "poisons" the cache of the target by forcing a cache update with the path re-routed so that the middle machine forwards traffic to and from host and target. The middle machine can now examine packets with a sniffer such as Ethereal, Nmap, or others.

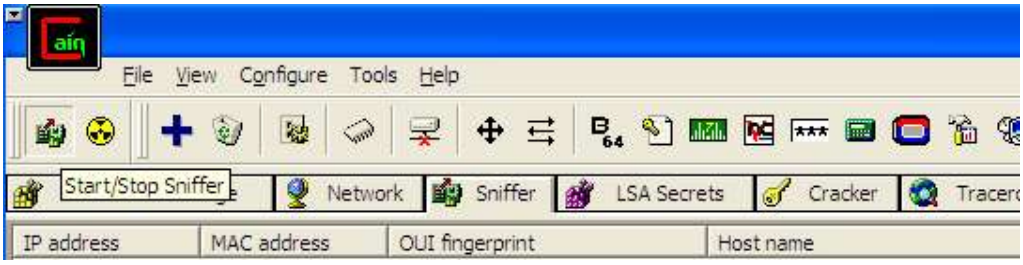
Instructions to use APR:

** Before you try this, you must make sure that WinPcap is properly bound to your NIC. Select Configure and make sure you see your adapter(s) listed. See illustration *c1*.



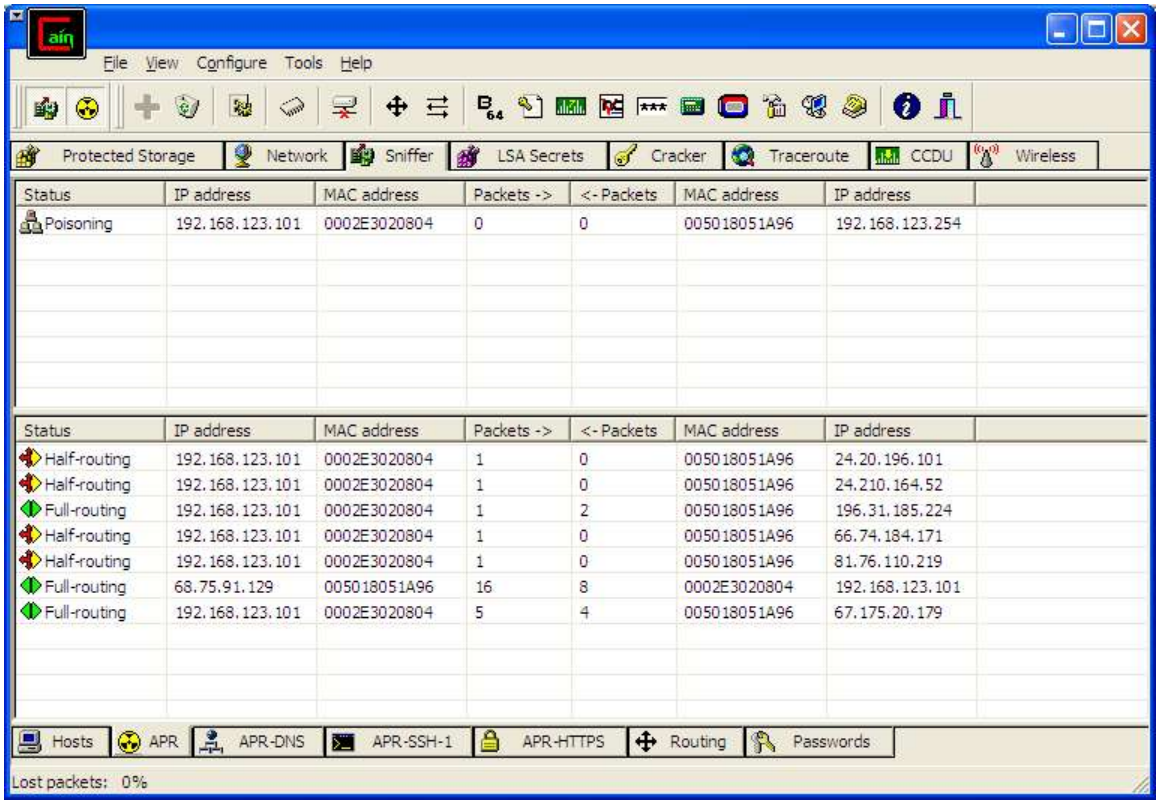
C1.
At main screen, select Configure, then click your your network adapter, then Apply and Ok.

1) Click to enable both Sniffer and APR (Left of the +). See Illustration c2.



C2.

3) Click on +, then Range. Range for your network (based on adapter you chose) is displayed. Click OK to start scanning.
4) After 100% you will see IP address, MAC, and OUI fingerprint of devices in range.
5) Now click on APR icon to enable it.
6) Click on + and select IP address to poison, then OK
7) Now you should see it change from Idle to Poisoning. See C3.



C3.

8) IP connections should appear from target and spoofing computer(your computer).
9) So, what we have now, looking at C3, is the target IP on the left, where they were going on the right. All of this passing harmlessly through the middle PC.
10) For better analysis of this traffic, and perhaps text strings that have been sent from the target, etc. (e.g. They connected to Google, but what did they search for?) We will run a sniffer on the middle computer.
11) Start Ethereal, select Capture, then select the same interface adapter you selected in Cain. Then select OK. You are trying to capture the packets being forwarded to and from your machine via ARP session.
12) Stop the capture after connecting to google and searching for items such as "vacation villas", or "cheap air fare". Your machine is now analyzing the traffic from a target as all of its traffic is rerouted through yours. Note in Figure C4 we see all traffic listed in the top window of Ethereal (examine that we see our connection to Google).

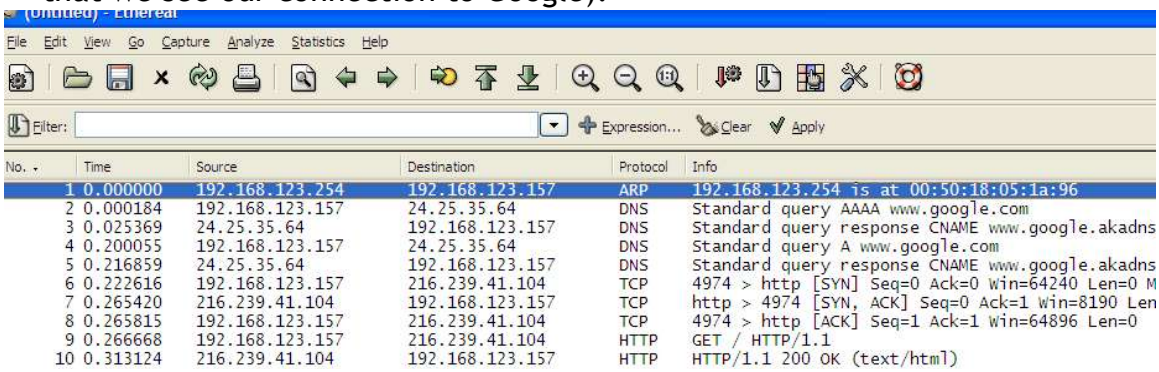


Figure C4.

13)Click the Protocol field to organize the list, then scroll down to HTTP and look for GET /search? Here we see in Figure C5 that the user was searching on vacation villas (vacation+villa).

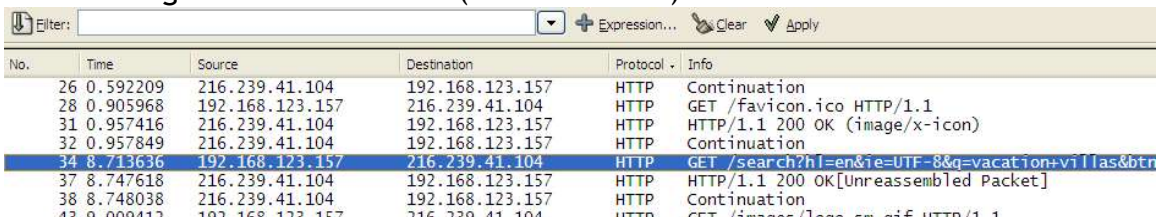


Figure C5.

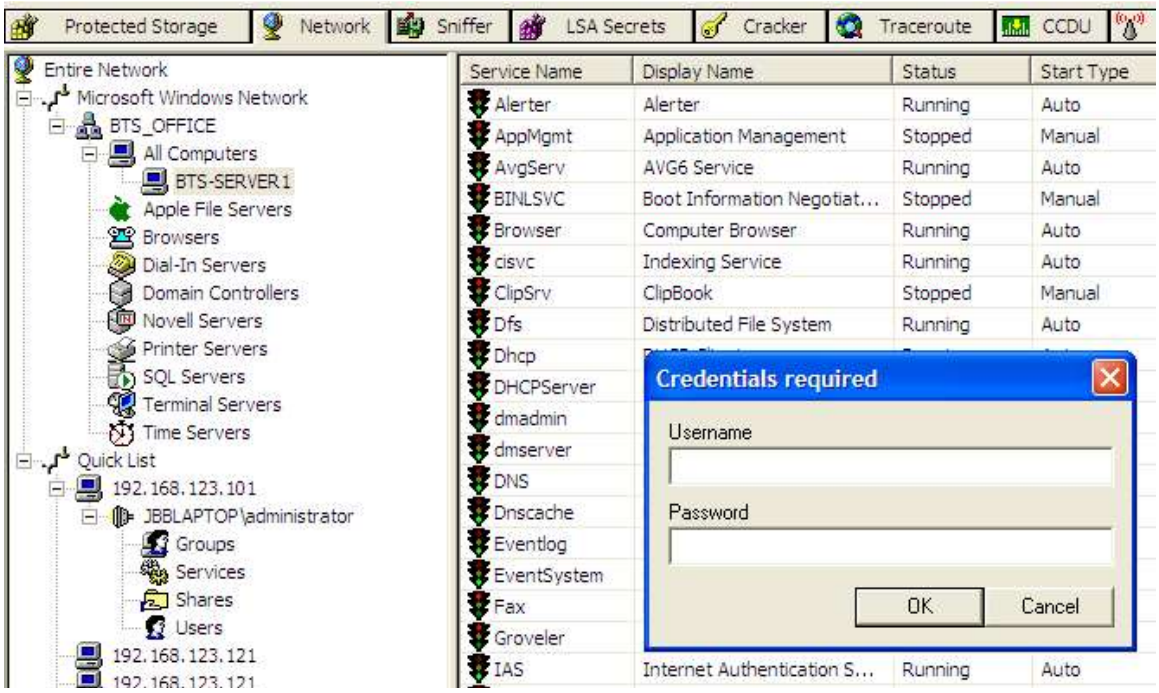
14)When finished select Tools, Disconnect, Disconnect All.

What is Abel? How can I install it ?

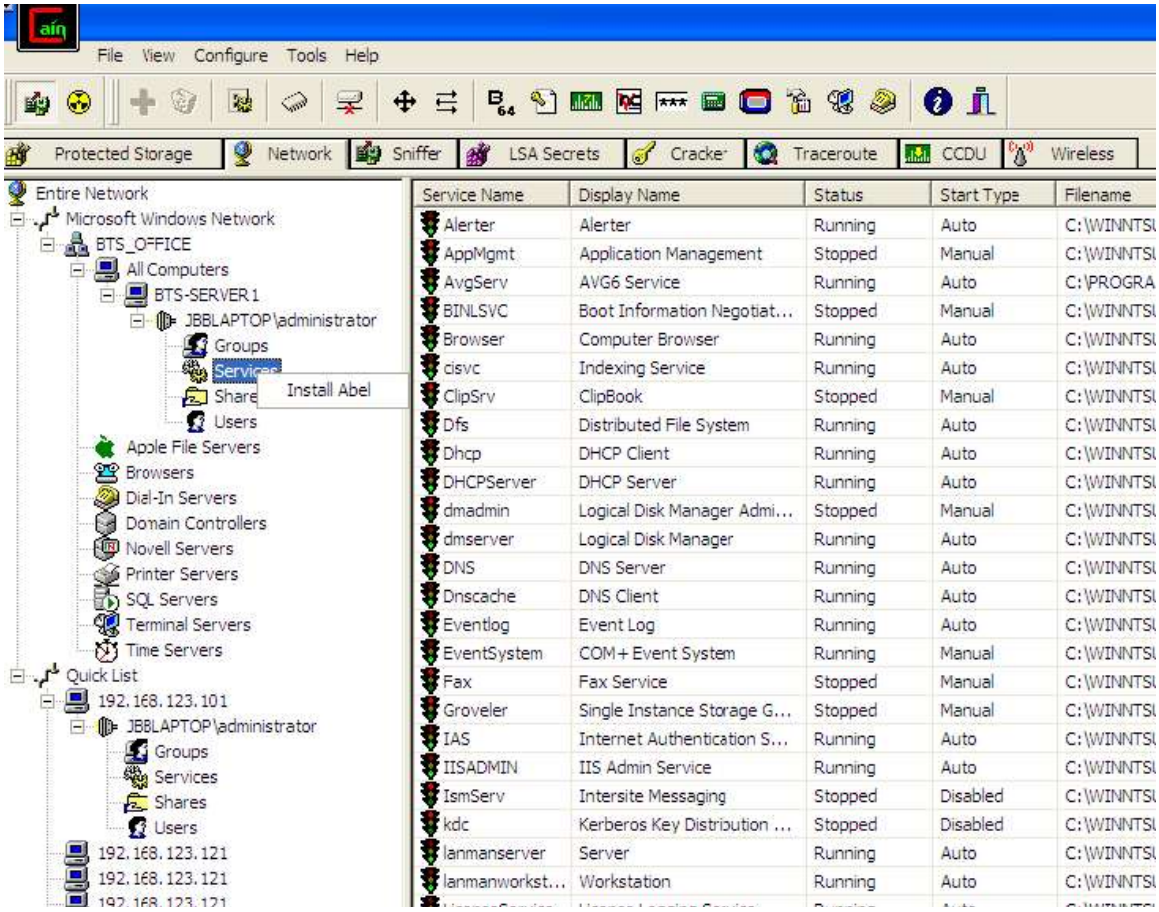
Abel is an NT service composed by two files: "Abel.exe" and "Abel.dll". These files are copied by the installation package into the program's directory but the service IS NOT automatically installed. Abel can be installed locally or remotely (using Cain), anyway you need Administrator privileges to do that.

LOCAL INSTALLATION:
1) Copy the files Abel.exe and Abel.dll into the %WINNT% directory (ES: C:\WINNT)
2) Launch Abel.exe to install the service (not automatically started)
3) Start the service using the Service Manager

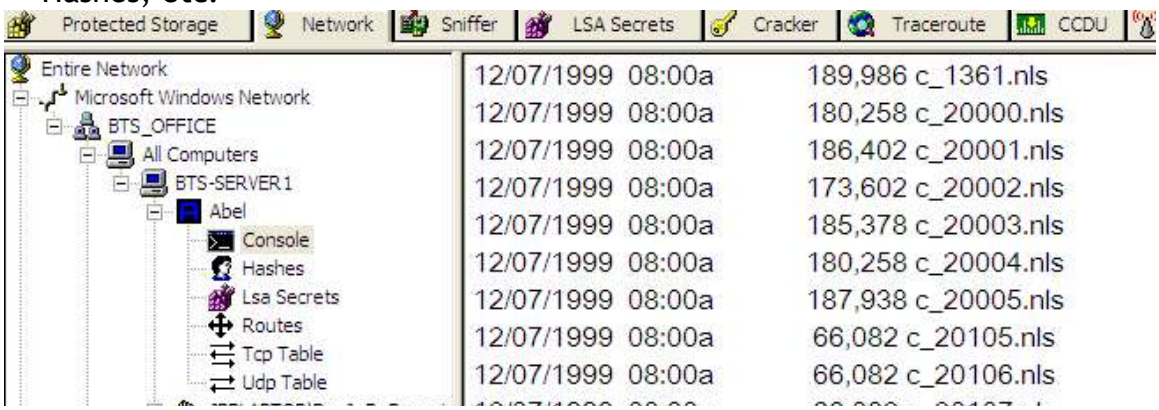
REMOTE INSTALLATION (most reliable on wired network):
1) Use the "Network TAB" in Cain and choose the remote computer where Abel will be installed
2) Right click on the computer icon in the tree and select "Connect As"



4) Provide Administrator credentials for the remote machine.
5) Once connected right click on the "Services" icon and select "Install Abel"



5) The two files "Abel.exe" and "Abel.dll" will be copied into the remote machine, the service will be installed
and started automatically.
6) Once installed on the remote computer, note that among other things, you can bring up a console prompt on the remote machine, examine password Hashes, etc.



Analysis

1) APR could be used by network administrators for what purpose?

2) After working with these utilities, what about Cain & Abel do you feel you should study further? Why?

3) How can network administrators protect against APR?

4) Why would someone (not with criminal intent) want to crack passwords on a system?

5) Putting on a criminal hat, what are the best bad uses of Cain & Abel?

6) How might someone design a system to passively record data from a target machine, then have it easily searchable via a database such as MySQL?

Summary Discussion

A classroom discussion should follow the lab. Review the lab questions and your analysis as a group. Share your experiences and knowledge with the class.

If You Want To Learn More:

Ethereal is a great sniffer. Try http://www.insecure.org/ which is home of NMAP, another great network sniffer.

Visit: http://nirsoft.mirrorz.com/ and examine the utilities that are available. Are any different or similar? Would some of these tools be helpful?

MySQL is available for free at http://www.mysql.org

Look on google or another search engine for: *how to detect ARP poison routing*.

Read *Intro to ARP Spoofing* (attached) by Sean Whalen. Also available by searching the web.

Appendix

This lab was testing with cain 2.5b Download and install from http://www.oxid.it You will also need to install WinPcap with is part of the Cain install. Then reboot.

Install Ethereal .10.5a from http://www.ethereal.com

These labs were tested on wired and wireless networks.

Wired: 100baseT with 3Com 4 port switched

Wireless: 802.11b Netgear PCMCIA card, 3Com router/switch

Testing on XP Professional with current service packs from Microsoft as of 8/15/04 Windows 2000 Server with service packs as of 8/15/04. It was not tested with Windows 9x nor XP Home.

Tested with M.S. Internet Explorer and Mozilla Firefox 0.9.1