

“VawTrak” Malware

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Executive Summary:

“Vawtrak” is a banking Trojan –malware that attempts to steal credentials from banks.

The Banker gains access to bank accounts via custom key logging, utilizing the access of a wide range of login credentials, such as passwords stored in browsers, FTP client private keys, or information stored within remote desktop settings.

To communicate, the Banker utilizes SOCKS connection and exfiltrates information such as screenshots and video captures.

Technical Analysis:

Unpacking Process:

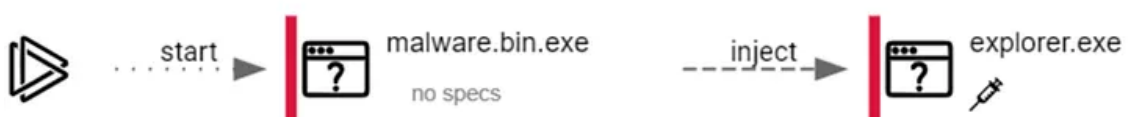
From analyzing the malware in IDA, I see suspicious API such **CreateToolhelp32Snapshot** call that retrieves running processes, I guess that the malware will use it to get snapshot of them until it finds a legitimate process to inject his malicious code.

```
call cs:CreateToolhelp32Snapshot
mov rdi, rax
```

using CreateToolhelp32Snapshot

In addition, I have checked on online sandboxes such as Any.run & Hybrid Analysis to see additional info about the injection and I find that it tries to inject into the **explorer.exe process**.

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Process Tree from Any.run

After the conclusions, I choose to put my BP on **WriteProcessMemory** because the malware try to inject her code into other process so this call is perfect to use.

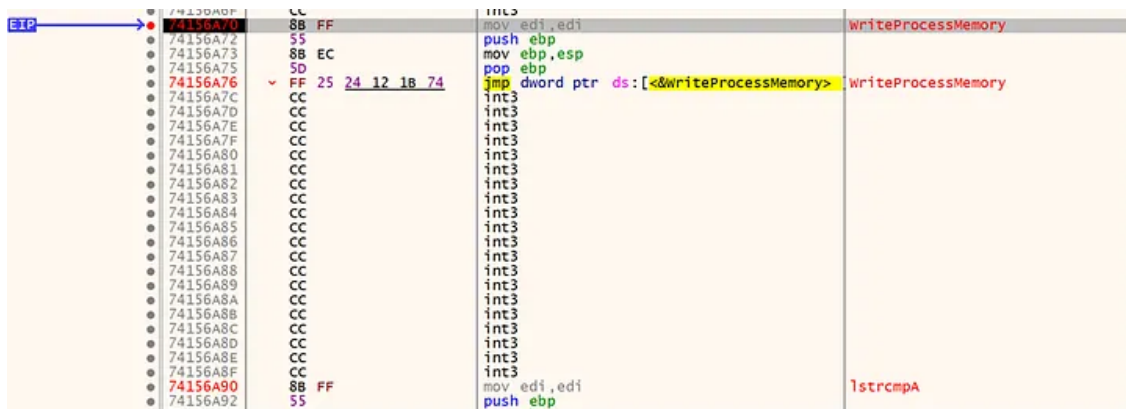
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After placing a breakpoint on **WriteProcessMemory**, in order to catch the injection of the malware, and checking the functionality of the API calls within the code in MSDN, the parameter to dump the MZ header is clearly shown.

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The parameter required to dump the packed information is the third parameter, according to MSDN. The parameter is “lpBuffer” — A pointer to the buffer that contains data to be written in the address space of the specified process or in other words **“holds our unpacking file data”**.

Syntax

C++

```

BOOL WriteProcessMemory(
    [in] HANDLE hProcess,
    [in] LPVOID lpBaseAddress,
    [in] LPCVOID lpBuffer,
    [in] SIZE_T nSize,
    [out] SIZE_T *lpNumberOfBytesWritten
  )

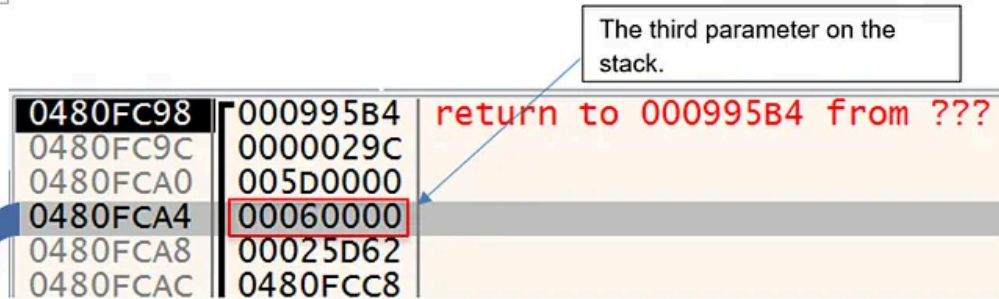
```

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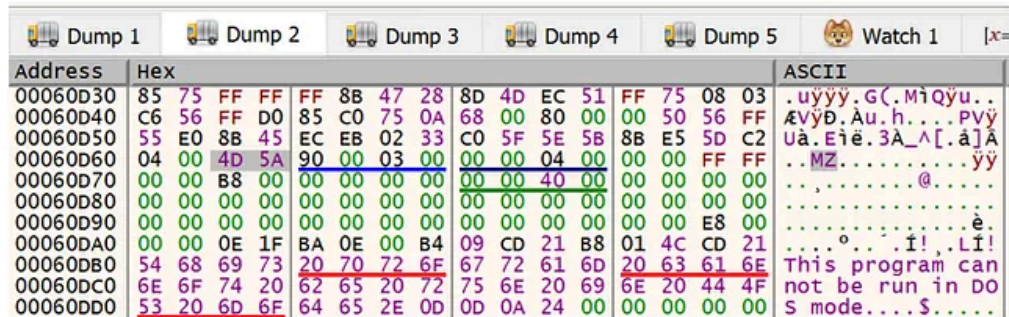
[in] lpBuffer

A pointer to the buffer that contains data to be written in the address space of the specified process.

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Scroll down a little bit and we actually see the MZ Header (4D 5A).



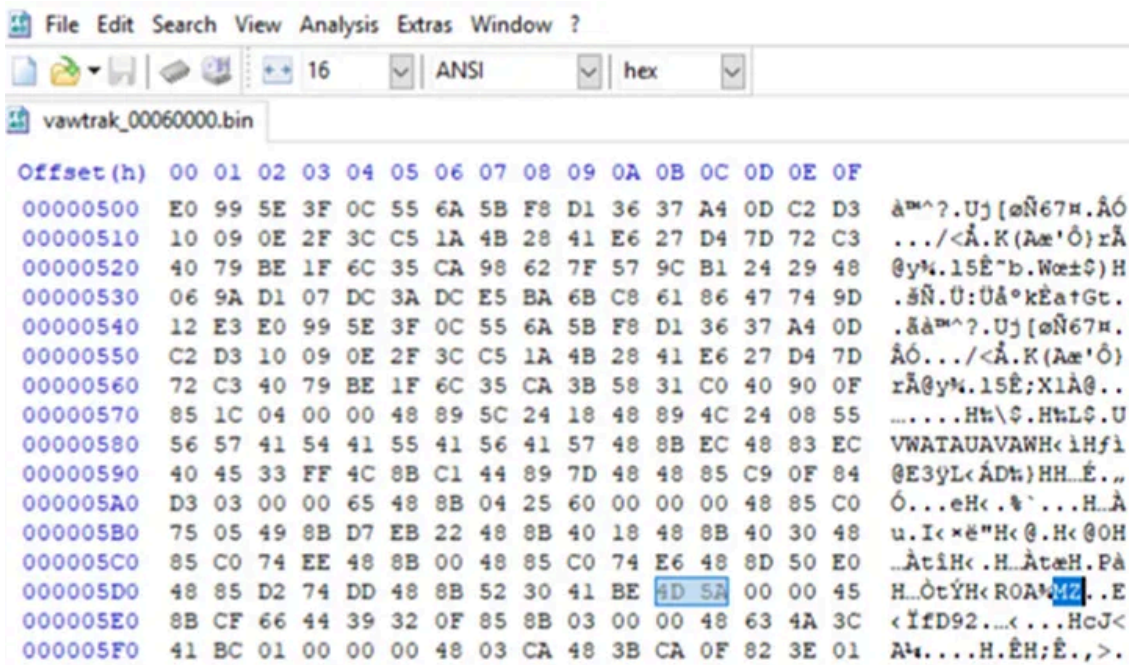
** if we don't find the header in the two first Dumps in the stack, we keep Run (F9) until the next WriteProcessMemory BP and do the same operations.

to check the header, we press "Follow in Memory Map" to check the file permissions. You can see that he has ERW permissions which means Execute, Read, Write in memory.]

Address	Size	Info	Content	Type	Protection
00010000	00001000	Reserved		PRV	
00011000	00001000			PRV	-RW--
00020000	00010000			MAP	-RW--
00030000	00007000			PRV	ERW--
00040000	00019000			MAP	-R---
00060000	00026000			PRV	ERW--

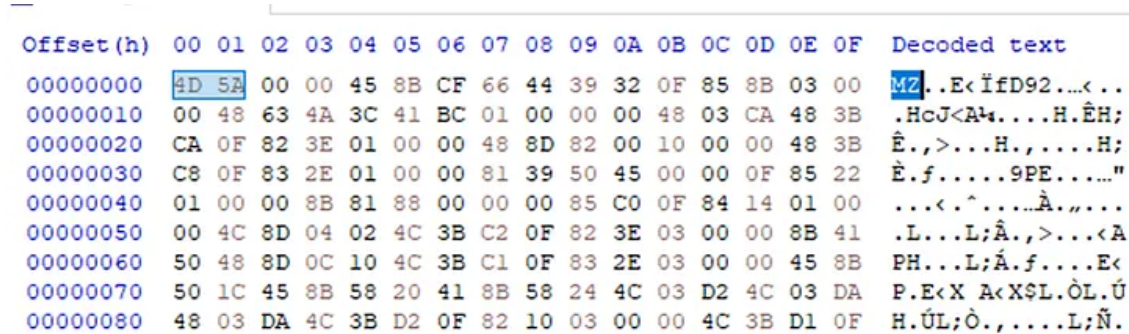
Memory Map permissions

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The dumped memory file:

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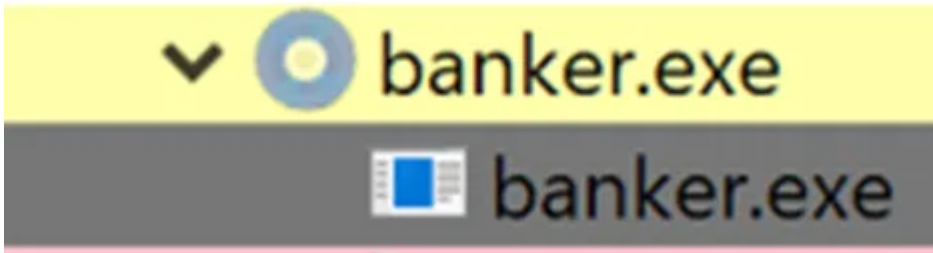
After cleaning the junk code:

the malware immediately writes itself into the autoruns paths, in order to have a foothold on the host upon startup or restart.

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After running, "Vawtrak" creates a child process with same name as the original running process. 30 seconds into the run, the original malware process terminates itself, and removes itself from the original running path and copies itself into APPDATA\LOCAL\TEMP, in order to elevate privileges (because of existence Writing privileges at this path).



After establishing itself, the malware, through the injected process drops additional PE files, which contain **DLL** and an executable.

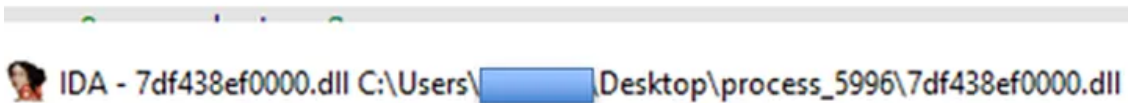
Press enter or click to view image in full size

```
Scanning workingset: 2352 memory regions.
[*] Workingset scanned in 93 ms
[+] Report dumped to: process_5996
[*] Dumped module to: C:\Users\ILANDU\Desktop\process_5996\7ffa65d00000.KERNELBASE.dll
[*] Dumped module to: C:\Users\ILANDU\Desktop\process_5996\12a0000.shc as VIRTUAL
[*] Dumped module to: C:\Users\ILANDU\Desktop\process_5996\7df438ea1000.shc as VIRTUAL
[*] Dumped module to: C:\Users\ILANDU\Desktop\process_5996\7df438eb1000.shc as VIRTUAL
[*] Dumped module to: C:\Users\ILANDU\Desktop\process_5996\7df438ec1000.shc as VIRTUAL
[*] Dumped module to: C:\Users\ILANDU\Desktop\process_5996\7df438ed1000.shc as VIRTUAL
[*] Dumped module to: C:\Users\ILANDU\Desktop\process_5996\7df438ee1000.shc as VIRTUAL
[*] Dumped module to: C:\Users\ILANDU\Desktop\process_5996\7df438ef0000.dll as REALIGN
[*] Dumped module to: C:\Users\ILANDU\Desktop\process_5996\7df438f11000.shc as VIRTUAL
[*] Dumped module to: C:\Users\ILANDU\Desktop\process_5996\7df438f21000.shc as VIRTUAL
[*] Dumped module to: C:\Users\ILANDU\Desktop\process_5996\7df438f31000.shc as VIRTUAL
[*] Dumped module to: C:\Users\ILANDU\Desktop\process_5996\7df438f41000.shc as VIRTUAL
[+] Dumped modified to: process_5996
[+] Report dumped to: process_5996
---
PID: 5996
---
SUMMARY:
Total scanned:      286
Skipped:            0
Hooked:             1
Replaced:           0
Hdrs Modified:     0
IAT Hooks:         0
Implanted:          11
Implanted PE:       2
Implanted shc:      9
Unreachable files: 0
```

Drop the dll from pe-sieve after I dumped the implemented files into the folder to get more information. IDA also verify us that it is a dll file.

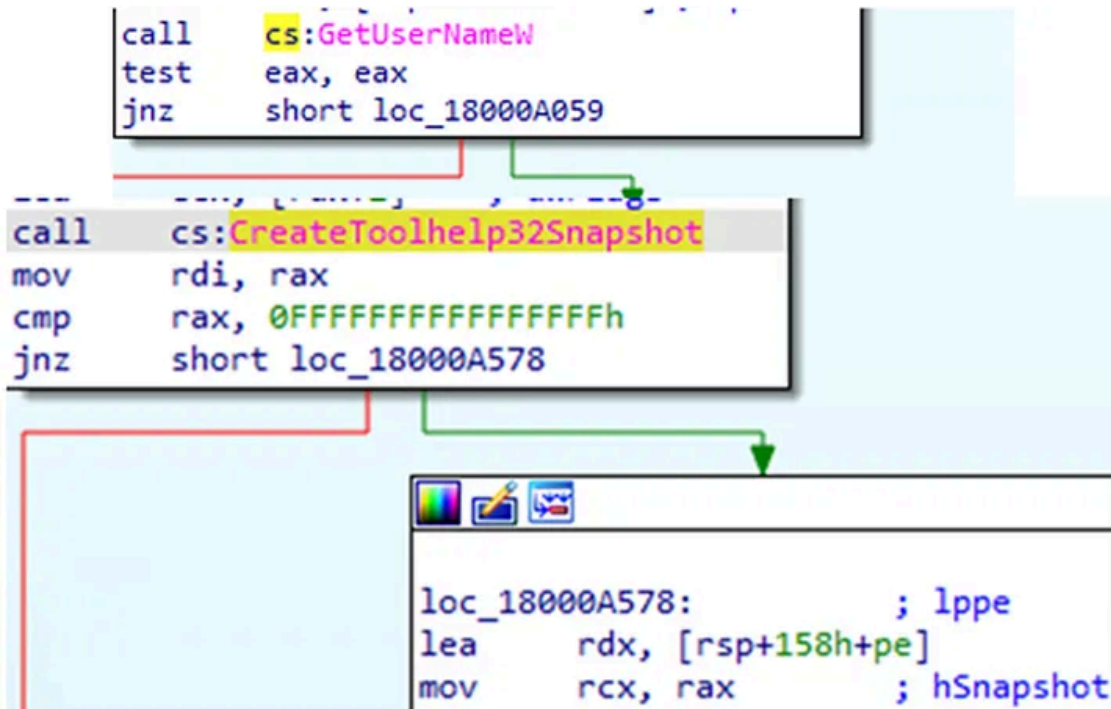
Press enter or click to view image in full size

```
; BOOL __stdcall DllEntryPoint(HINSTANCE hinstDLL, DWORD fdwReason, void *lpReserved)
public DllEntryPoint
DllEntryPoint proc near
```



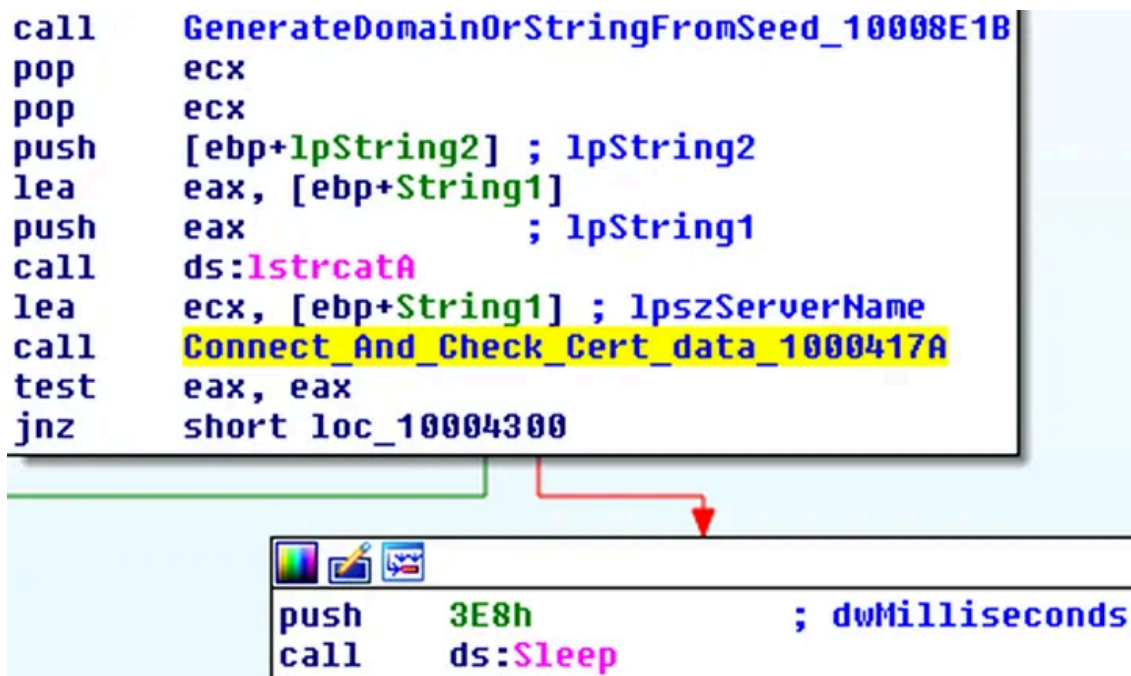
the DLL contains is creating a snapshot and list of all the currently running processes (as we mentioned earlier), this is usually done by reconnaissance malwares in order to target specific artifacts within the host.

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When reconnaissance is complete, the malware extracts its C2 server from a seed that the malware file contains — hard coded. It will perform certificate validation in order to check if the server is still available, if not, the malware goes to sleep for a random amount of time.

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In addition to certificate validation, the Banker checks if any reconnaissance information has been retrieved. If not, the malware does not initiate communication methods.

```

push    offset szVerb      ; "GET"
push    ebp                ; hConnect
mov     [esp+38h+var_4], eax
call    ds:HttpOpenRequestA
    
```

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```

push    ebx                ; lpszPassword
push    ebx                ; lpszUserName
push    1BBh              ; nServerPort
push    edi                ; lpszServerName
push    esi                ; hInternet
call    ds:InternetConnectA
    
```

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```

5C 1C 20 00      Seed dd 201C5Ch      ; Seed value
D4 5D 53 2E      dd 2E535DD4h      ; Encrypted data starts
    
```

Encrypted data start with the C2 server:

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```

DNS      78 Standard query 0x7cfb A cookingwithme.date
DNS      78 Standard query 0x7cfb A cookingwithme.date
DNS      78 Standard query 0x7cfb A cookingwithme.date
DNS      78 Standard query 0x7cfb A cookingwithme.date
    
```

DNS query to C2 server

Following all these steps, “VawTrak” will attempt to spread through the network utilizing SMB — a legitimate Windows file-sharing protocol.

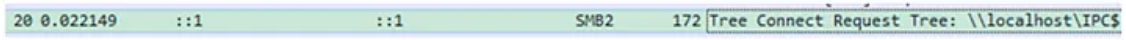
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```

SMB2    188 Ioctl Request FSCTL_SRV_ENUMERATE_SNAPSHOTS File: Users\
TCP     64 445 -> 49674 [ACK] Seq=3277 Ack=3156 Min=2615808 Len=0
SMB2    196 Ioctl Response FSCTL_SRV_ENUMERATE_SNAPSHOTS File: Users\
TCP     64 49674 -> 445 [ACK] Seq=3156 Ack=3409 Min=2615552 Len=0
SMB2    156 Close Request File: Users\
    
```

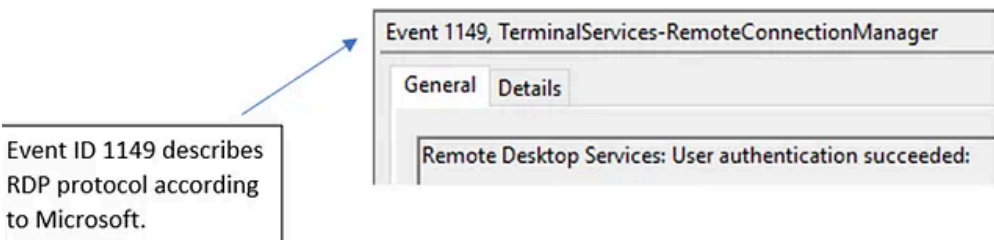
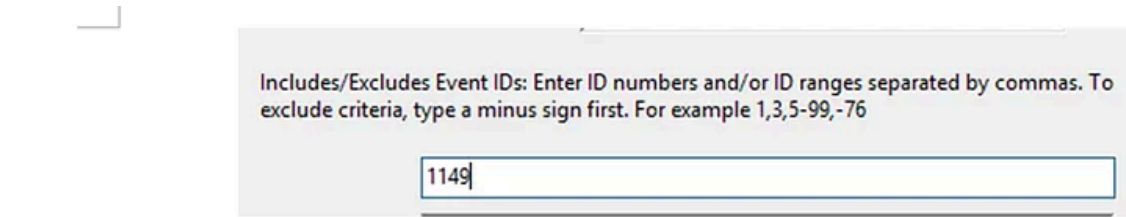
After completing all activities within the host and attempting to preform lateral movement, the malware wipes itself off the host and terminates its process.

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Tries to do lateral movement to another computers via SMB protocol.

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looking for RDP sessions:

reg add HKLM\SYSTEM\CurrentControlSet\Control\SecurityProviders\WDigest \UseLogonCredential / — auth of http protocol, stored in plaintext user credentials.

• **By default the key isn't shows in registry.**

Press enter or click to view image in full size



Source: <https://medium.com/@Ilandu/vawtrak-malware-824818c1837>