[RE027] China-based APT Mustang Panda might still have continued their attack activities against organizations in Vietnam

blog.vincss.net/2022/05/re027-china-based-apt-mustang-panda-might-have-still-continued-their-attack-activities-against-organizations-in-Vietnam.html

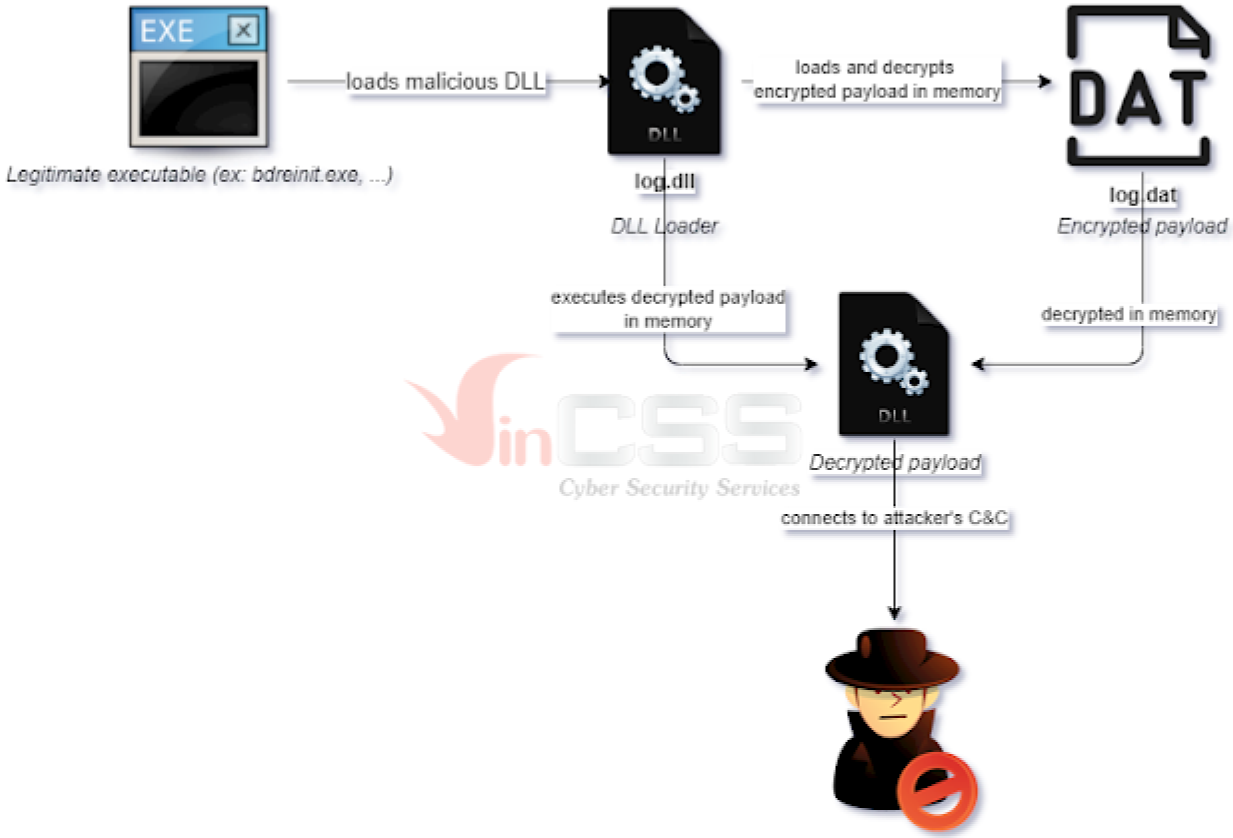
1. Executive Summary

At VinCSS, through continuous cyber security monitoring, hunting malware samples and evaluating them to determine the potential risks, especially malware samples targeting Vietnam. Recently, during hunting on VirusTotal's platform and performing scan for specific byte patterns related to the **Mustang Panda (PlugX)**, we discovered a series of malware samples, suspected to be relevant to APT Mustang Panda, that was uploaded from Vietnam.

All of these samples share the same name as "**log.dll**" and have a rather low detection rate.

Based on the above information, we infer that there is a possibility that malware has been infected in certain orgs in Vietnam, so we decided to analyze these malware samples. During analysis, based on the detected indicators, we continue to investigate and set the scenario of the attack campaign.

A general overview of the execution flow demonstrated as follow:



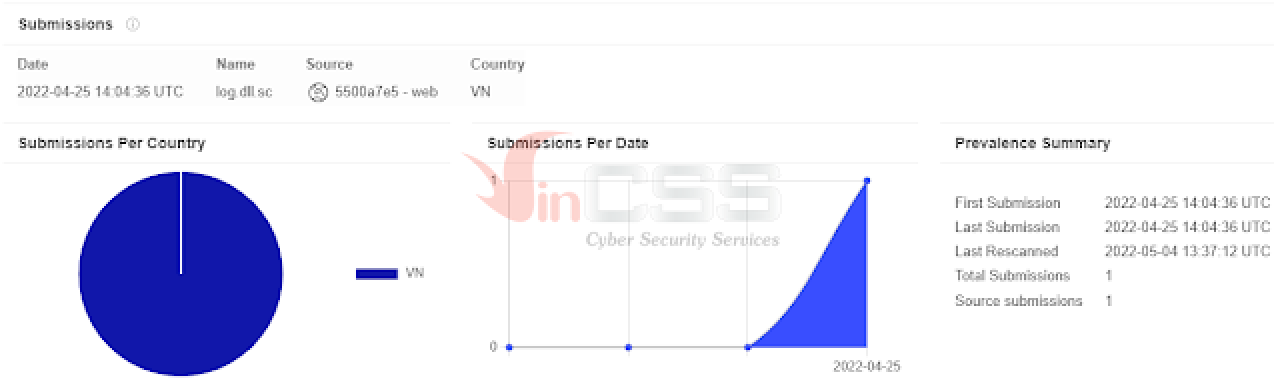
Our blog includes:

- Technical analysis of the **log.dll** file.
- Technical analysis of shellcode decrypted from **log.dat**.
- Analyze **PlugX Dll** as well as decrypt PlugX configuration information.

2. Analyze the log.dll

In the list of hunted samples above, we choose the one with hash: 3171285c4a846368937968bf53bc48ae5c980fe32b0de10cf0226b9122576f4e

This sample was submitted to VirusTotal from **Vietnam** on **2022-04-25 14:04:36 UTC**



The information from the Rich Header suggests that it is likely compiled with **Visual Studio 2012/2013**:

product-id (8)	build-id (4)
Implib1100	Visual Studio 2012 - 11.0
Import	Visual Studio
Utc1800_CPP	Visual Studio 2013 - 12.0
Masm1200	Visual Studio 2013 - 12.0
Utc1800_C	Visual Studio 2013 - 12.0
Import (old)	Visual Studio
Export1200	Visual Studio 2013 - 12.0 RTM
Linker1200	Visual Studio 2013 - 12.0 RTM

By checking the sections information, we can see that it is packed or the code is obfuscated:

Nr	Virtual offset	Virtual size	RAW Data offset	RAW size	Flags	Name	First bytes (hex)	First Ascii 20h bytes	sect. Stats
01 ep	00001000	000577C6	00000400	00057800	60000020	.text	55 53 57 56 83 ...	USWV 0 □□1 D...	Strong Packed - 2.2743 % ZERO
02 im	00059000	000046F4	00057C00	00004800	40000040	.rdata	20 D2 05 00 34 ...	□ 4 □ F □ T □ ...	Very not packed - 43.6306 % ZERO
03	0005E000	00002FA0	0005C400	00001200	C0000040	.data	4E E6 40 BB B1 ...	N @ □ D ...	Very not packed - 64.3012 % ZERO
04	00061000	00000ED4	0005D600	00001000	42000040	.reloc	00 10 00 00 0C ...	□ ♣ □0□0 ...	Not packed - 16.6992 % ZERO

Sample has the original name **IjAt.dll**, and it exports two functions **LogFree** and **LogInit**:

5d7db86620f99cdb2002d8f7884761a2_log_dll.bin

Offset	Name	Value	Meaning
5BC90	Characteristics	0	
5BC94	TimeDateStamp	622DA6ED	Sunday, 13.03.2022 08:10:21 UTC
5BC98	MajorVersion	0	
5BC9A	MinorVersion	0	
5BC9C	Name	5D0CC	ljAt.dll
5BCA0	Base	1	
5BCA4	NumberOfFunctions	2	
5BCA8	NumberOfNames	2	
5BCAC	AddressOfFunctions	5D0B8	
5BCB0	AddressOfNames	5D0C0	
5BCB4	AddressOfNameOrdinals	5D0C8	

Exported Functions [2 entries]

Offset	Ordinal	Function RVA	Name RVA	Name	Forwarder
5BCB8	1	1000	5D0D5	LogFree	
5BCBC	2	4E5E0	5D0DD	LogInit	

Load sample into IDA, analyze the code of the two functions above:

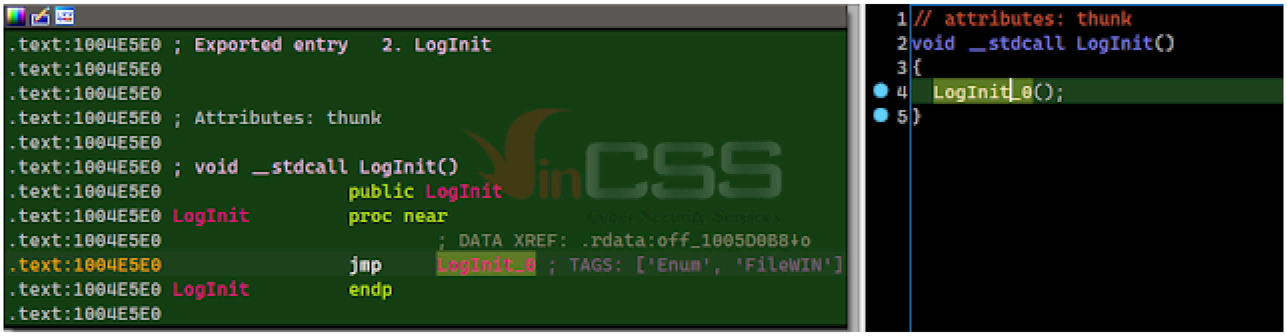
LogFree function:

Looking at this function, it can be seen that its code has been completely obfuscated by Obfuscator-LLVM, using the Control Flow Flattening technique:

After further analysis, I found that this function has no special task.

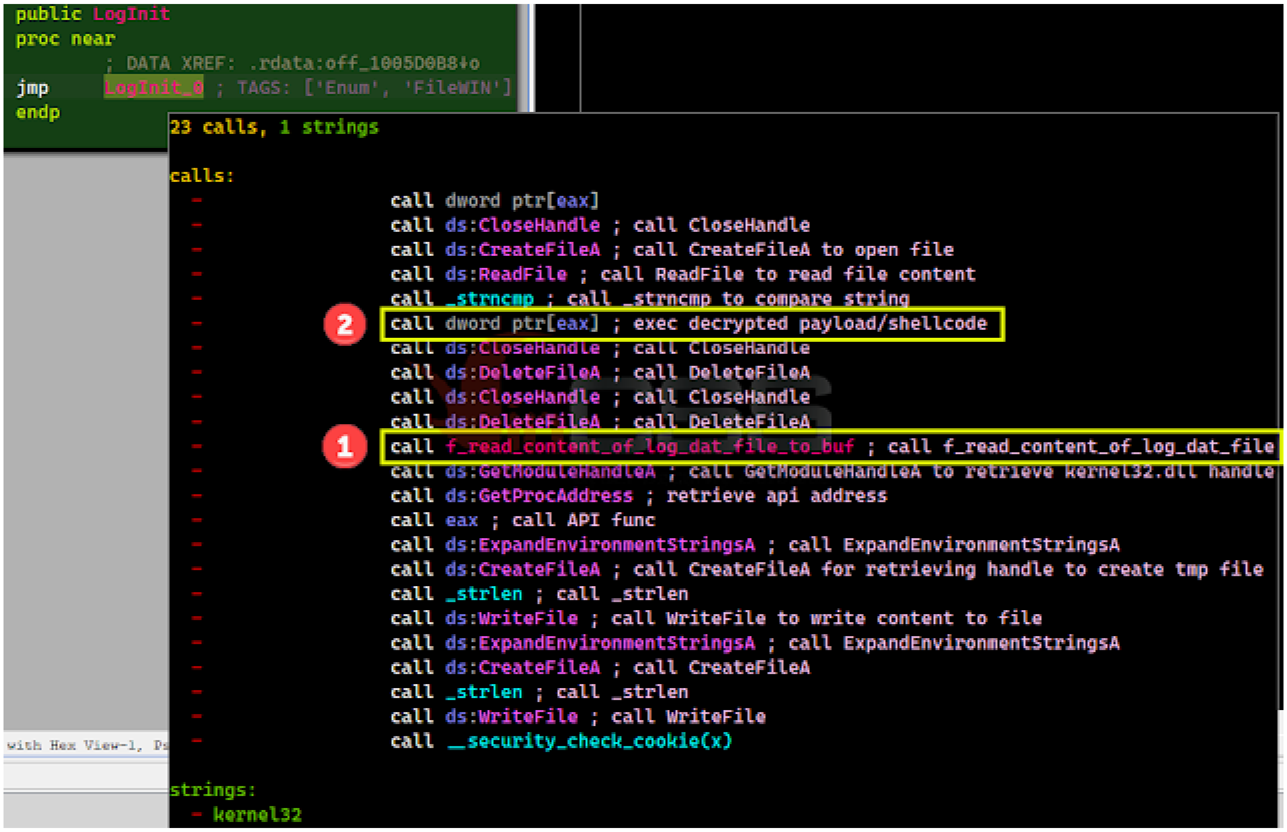
LogInit function:

This function will call the **LogInit_0** function:

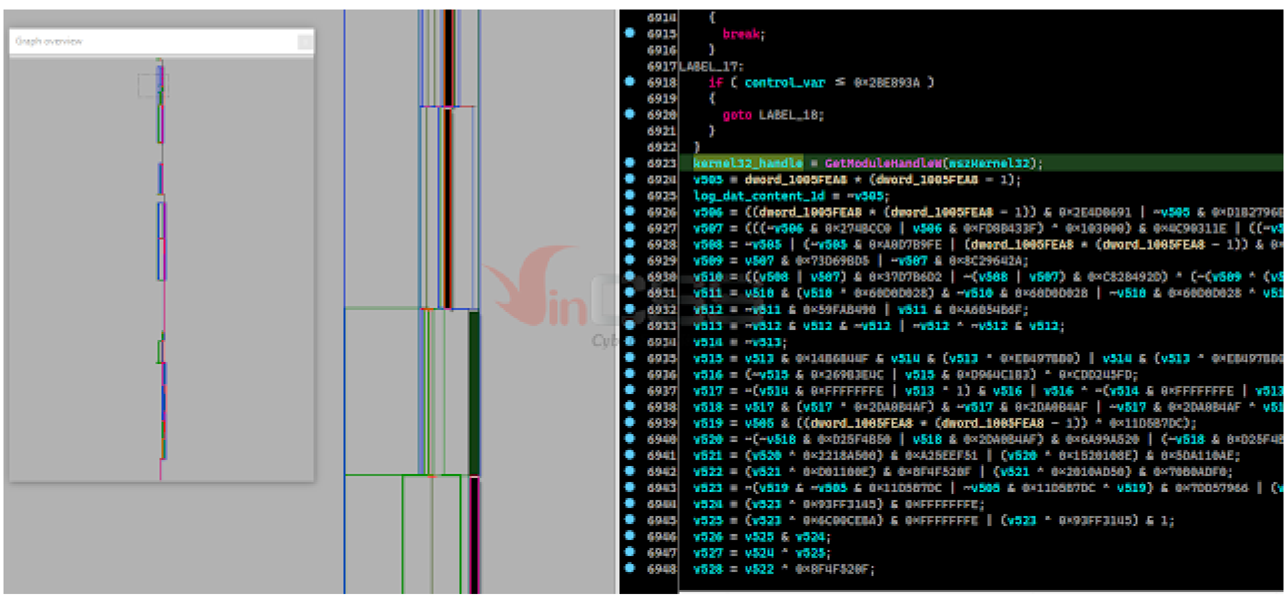


Similar to the above, the code at the **LogInit_0** function has also been completely obfuscated, it takes a long time for IDA to decompile the code of this function:

The primary task of the **LogInit_0** function is to call the function **f_read_content_of_log_dat_file_to_buf** for reading the content of **log.dat** file and execute the decrypted shellcode:

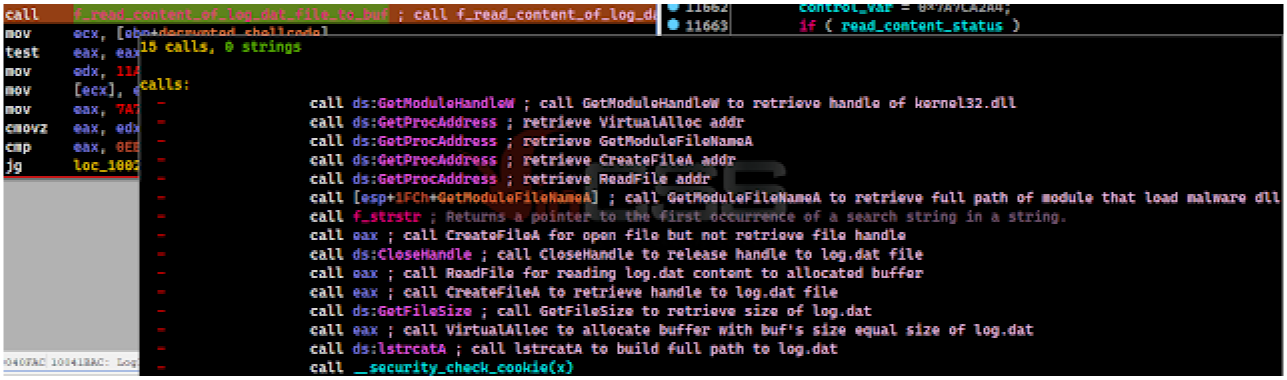


f_read_content_of_log_dat_file_to_buf'scode is also completely obfuscated:

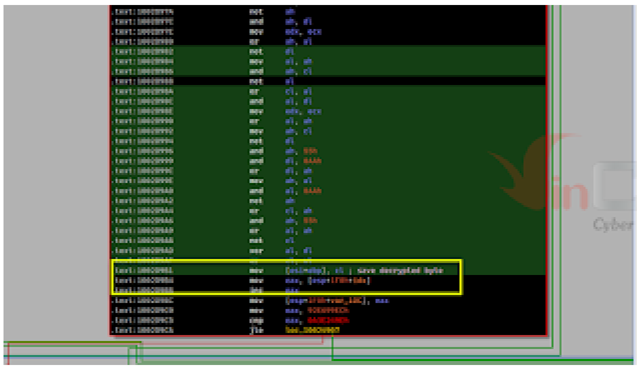


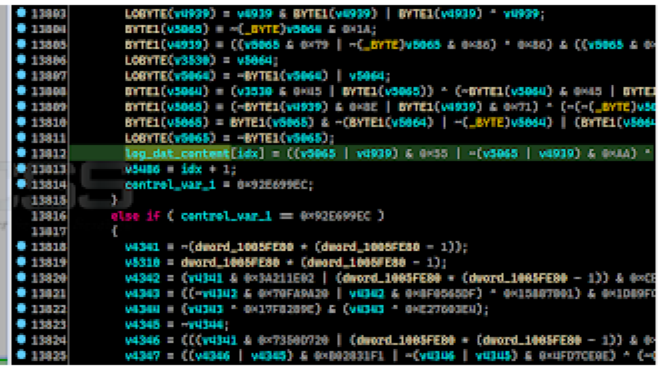
The major task of this function as the following:

- Call the **GetModuleHandleW** function to retrieve the handle of **kernel32.dll**.
- Call the **GetProcAddress** function to get the addresses of the APIs: **VirtualAlloc**, **GetModuleFileNameA**, **CreateFileA**, **ReadFile**.
- Use the above APIs to retrieve the path to the **log.dat** file and read the contents of this file into the allocated memory.



Decode the contents of **log.dat** into shellcode so that this shellcode is then executed by the call from the **LogInit_0** function.



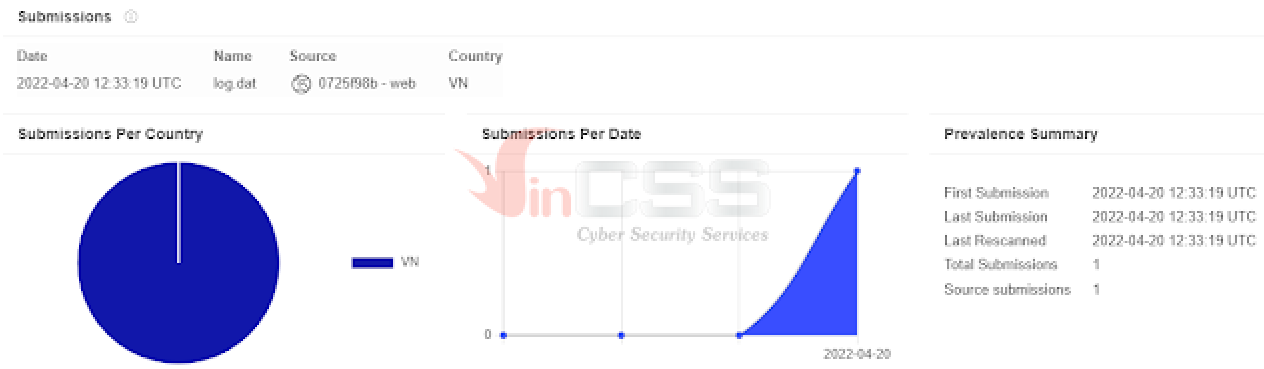


3. Shellcode analysis

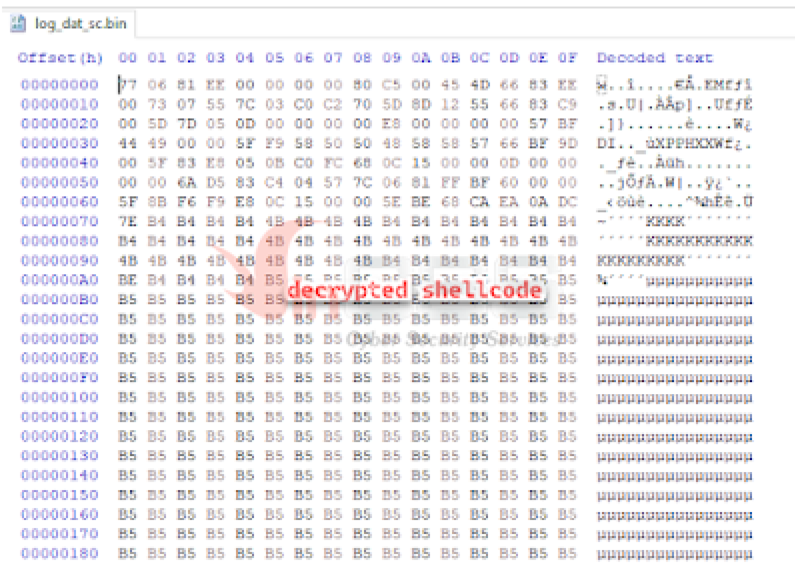
Based on the information analyzed above, we know that the **log.dll** file will read the content from the **log.dat** file and decrypt it into shellcode for further execution. Relying on this indicator, we continue to hunt **log.dat** file on VirusTotal which restrict the scope of submission source from Vietnam.

The results are following:

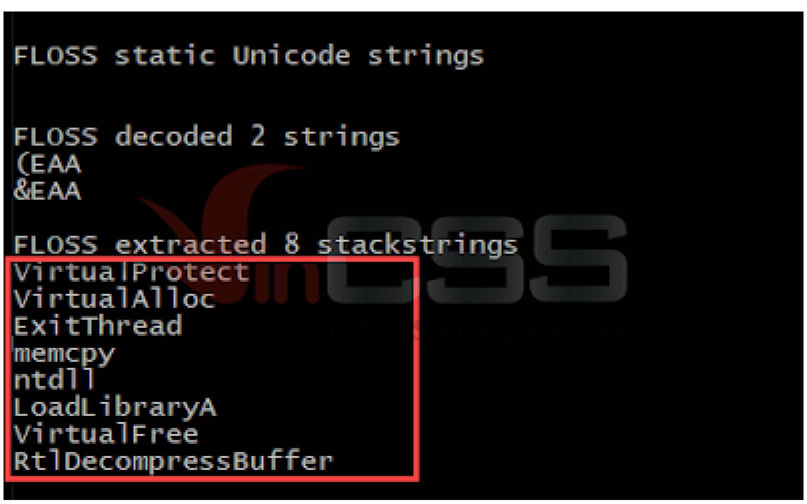
With the above results, at the time of analysis, we selected the **log.dat** file (2de77804e2bd9b843a826f194389c2605cfc17fd2fafde1b8eb2f819fc6c0c84) was submitted to VirusTotal on **2022-04-20 12:33:19 UTC** (5 days before the above **log.dll** file).

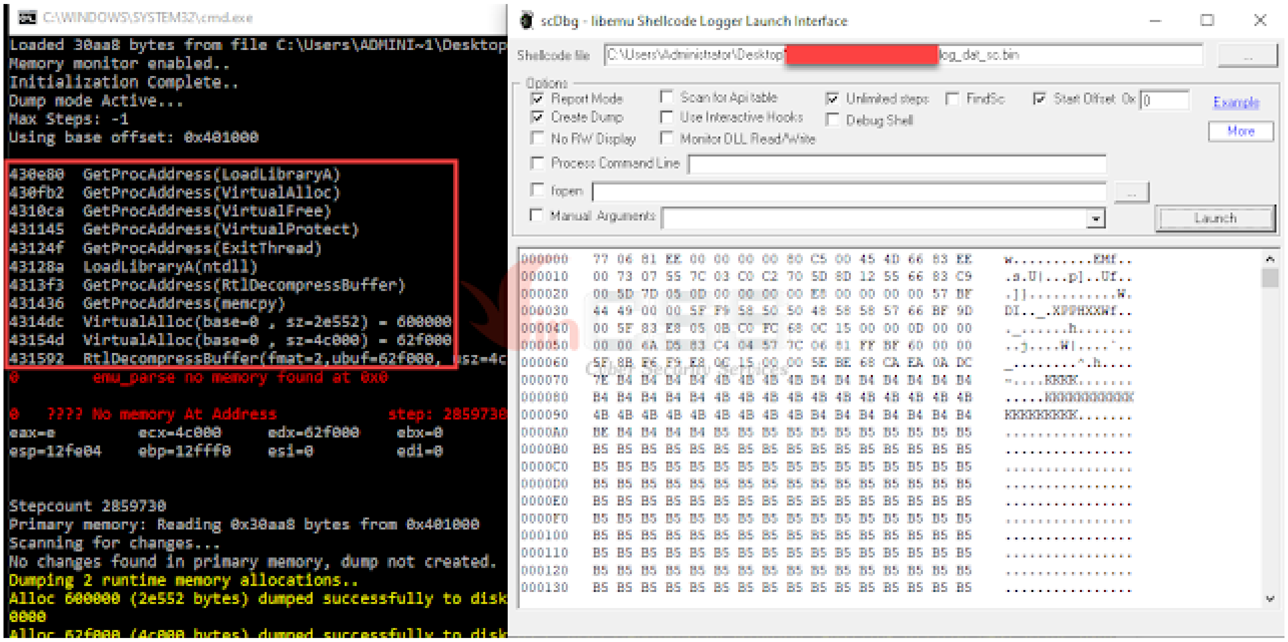


Debugging and dump the decrypted shellcode look like this:



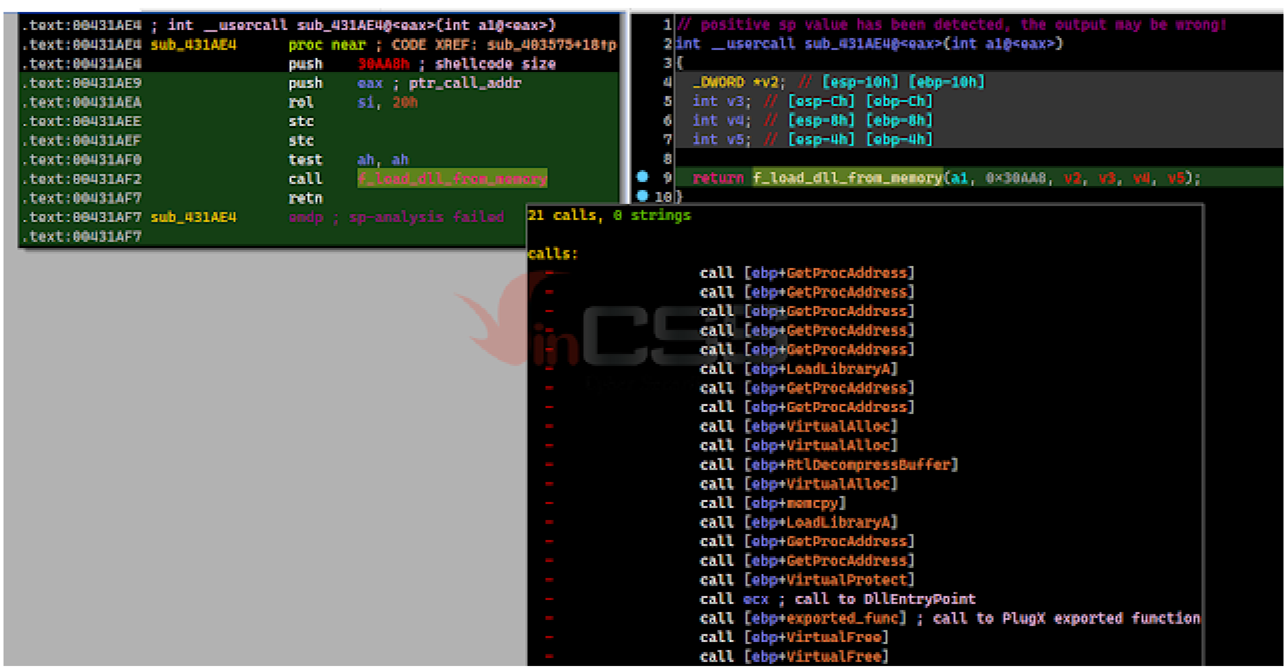
I use two tools, FLOSS and scdbg to get an overview of this shellcode. The results can be seen in the screenshots below:





With the results obtained above, it can be seen that this shellcode will perform memory allocation and then call the **RtlDecompressBuffer** function to decompress the data with the compression format is **COMPRESSION_FORMAT_LZNT1**.

By using IDA to analyze this shellcode, its main task is to decompress a Dll into memory and call the exported function of this Dll to execute. The function that does this task is named **f_load_dll_from_memory**:



The code in this function will first get the base address of **kernel32.dll** based on the pre-calculated hash value is **0x6A4ABC5B**. This hash value has also been mentioned by us in this analysis.

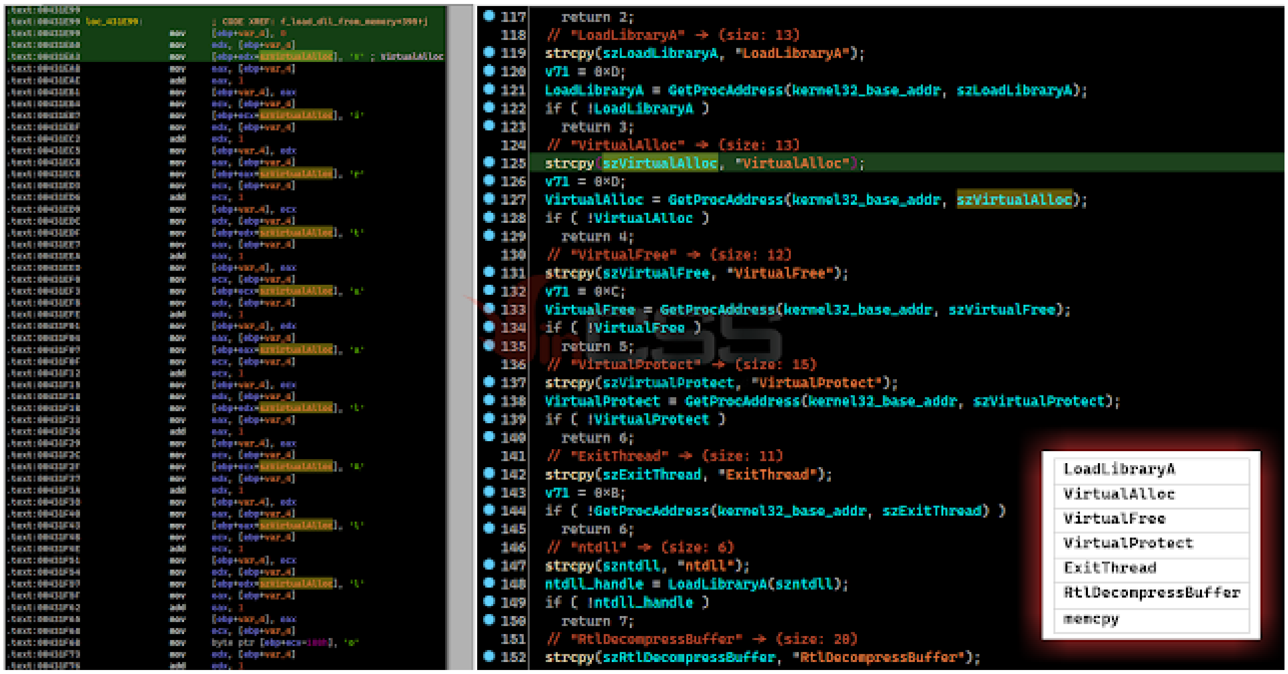
```
kernel32_base_addr = 0;
GetProcAddress = 0;
pLdr = NtCurrentPeb()->Ldr;
for ( ldr_entry = pLdr->InMemoryOrderModuleList.Flink; ldr_entry; ldr_entry = ADJ(ldr_entry)->InMemoryOrderLinks.Flink )
{
  wszDllName = ADJ(ldr_entry)->BaseDllName.Buffer;
  dll_name_length = ADJ(ldr_entry)->BaseDllName.Length;
  calced_hash = 0;
  do
  {
    calced_hash = __ROR4__(calced_hash, 13);
    if ( *wszDllName < 'a' )
      calced_hash += *wszDllName;                      // calced_hash + letter
    else
      calced_hash = calced_hash + *wszDllName - 0x20;  // calced_hash + upper_letter
    wszDllName = (wszDllName + 1);
    --dll_name_length;
  }
  while ( dll_name_length );
  if ( calced_hash == 0x6A4ABC5B )                     // kernel32.dll's hash
  {
    kernel32_base_addr = ADJ(ldr_entry)->DllBase;
    break;
  }
}
if ( !kernel32_base_addr )
  return 1;
```

```
python .\brute_force_Dll_name.py
Found dll kernel32.dll of 0x6a4abc5b
Found dll ntdll.dll of 0x3cfa685d
```

Next it will retrieve the address of **GetProcAddress**:

```
for ( i = 0; i < export_dir_va->NumberOfNames; ++i )
{
  szAPIName = kernel32_base_addr + pFuncsNamesAddr[i];
  if ( *szAPIName == 'G'
    && szAPIName[1] == 'e'
    && szAPIName[2] == 't'
    && szAPIName[3] == 'P'
    && szAPIName[4] == 'r'
    && szAPIName[5] == 'o'
    && szAPIName[6] == 'c'
    && szAPIName[7] == 'A'
    && szAPIName[8] == 'd'
    && szAPIName[9] == 'd' )
  {
    GetProcAddress = (kernel32_base_addr
                    + *(kernel32_base_addr
                      + 4 * *(kernel32_base_addr + 2 * i + export_dir_va->AddressOfNameOrdinals)
                      + export_dir_va->AddressOfFunctions));
    break;
  }
}
if ( !GetProcAddress )
  return 2;
```

By using the stackstring technique, the shellcode constructs the names of the APIs and gets the addresses of the following API functions:

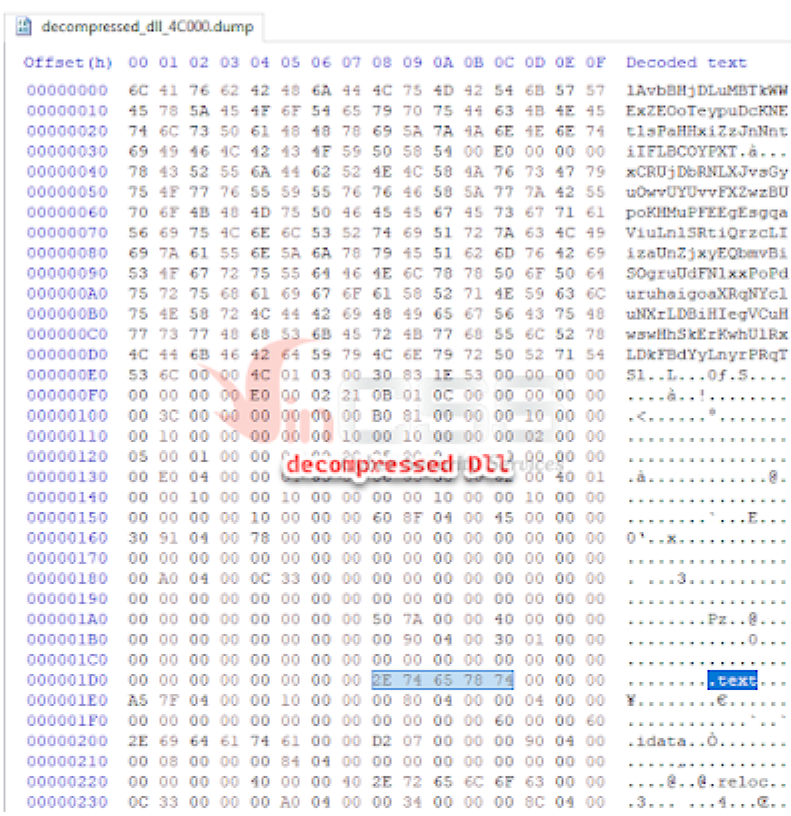


Next, the shellcode performs a memory allocation (**compressed_buf**) of size **0x2E552**, then reads data from offset **0x1592** (on disk) and executes an xor loop with a key is **0x72** to fill data into the **compressed_buf**. In fact, the size of **compressed_buf** is **0x2E542**, but its first 16 bytes are used to store information about **signature**, **uncompressed_size**, **compressed_size**, so **0x10** is added.

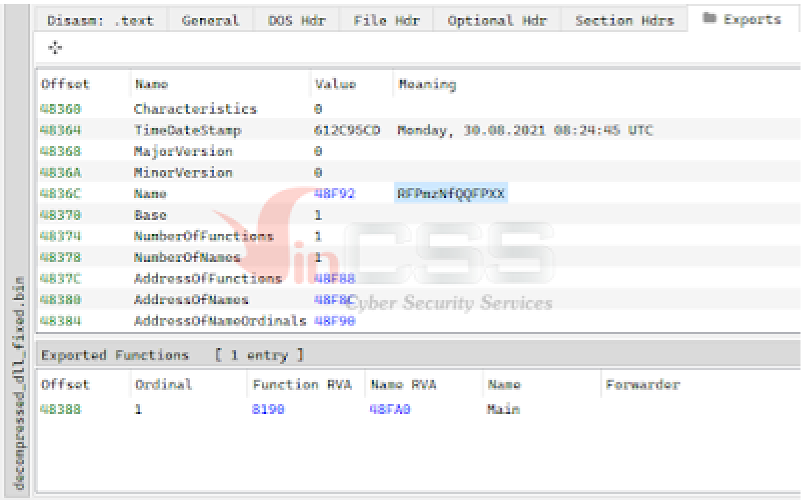
Shellcode continues to allocate memory (**uncompressed_buf**) of size **0x4C000** and calls the **RtlDecompressBuffer** function to decompress the data at the **compressed_buf** into **uncompressed_buf** with the compression format is **COMPRESSION_FORMAT_LZNT1**.

```
signature = *ptr_enc_compressed_dll_addr;                    // ptr_enc_compressed_dll_addr = 0x1592 (offset on disk)
                                                             // signature = 0xC7EA9B1C
xor_key = signature - 0x7979A9AA;                            // xor_key = 0x4E70F172
// dd 0B598E96Eh
// dd 0C7EA9B1Ch -> signature
// dd 0004C000h  -> uncompressed_size
// dd 2E542h     -> compressed_size;
for ( j = 0; j < 0x10; ++j )
  config_info_buf[j] = xor_key ^ ptr_enc_compressed_dll_addr[j];// xor_key = 0x72
if ( signature != computed_signature )
  return 0xA;
dwSize = computed_compressed_size + 0x10;                    // dwSize = 0x2E552
compressed_buf = VirtualAlloc(0, computed_compressed_size + 0x10, MEM_COMMIT, PAGE_READWRITE);
if ( !compressed_buf )
  return 0xB;
xor_key = signature - 0x7979A9AA;
// fill compressed buffer
for ( k = 0; k < dwSize; ++k )
  *(&compressed_buf->decoded_buffer + k) = xor_key ^ ptr_enc_compressed_dll_addr[k];
// uncompressed_buf_size = 0x4C000
uncompressed_buf = VirtualAlloc(0, uncompressed_buf_size, MEM_COMMIT, PAGE_READWRITE);
if ( !uncompressed_buf )
  return 0xC;
final_uncompressed_size = 0;
// decompress dll payload to memory
if ( RtlDecompressBuffer(
       COMPRESSION_FORMAT_LZNT1,
       uncompressed_buf,
       uncompressed_buf_size,                               // 0x4C000
       &compressed_buf->compressed_buf,
       compressed_buf->compressed_size,                     // 0x2E542
       &final_uncompressed_size) )
{
  return 0xD;
}
if ( uncompressed_buf_size != final_uncompressed_size )
```

Based on the above analysis results, it is easy to get the extracted Dll file (however, the file header information was destroyed):



Fix the header information and check with PE-bear, this Dll has the original name is **RFPmzNfQQFPXX** and only exports one function named **Main**:

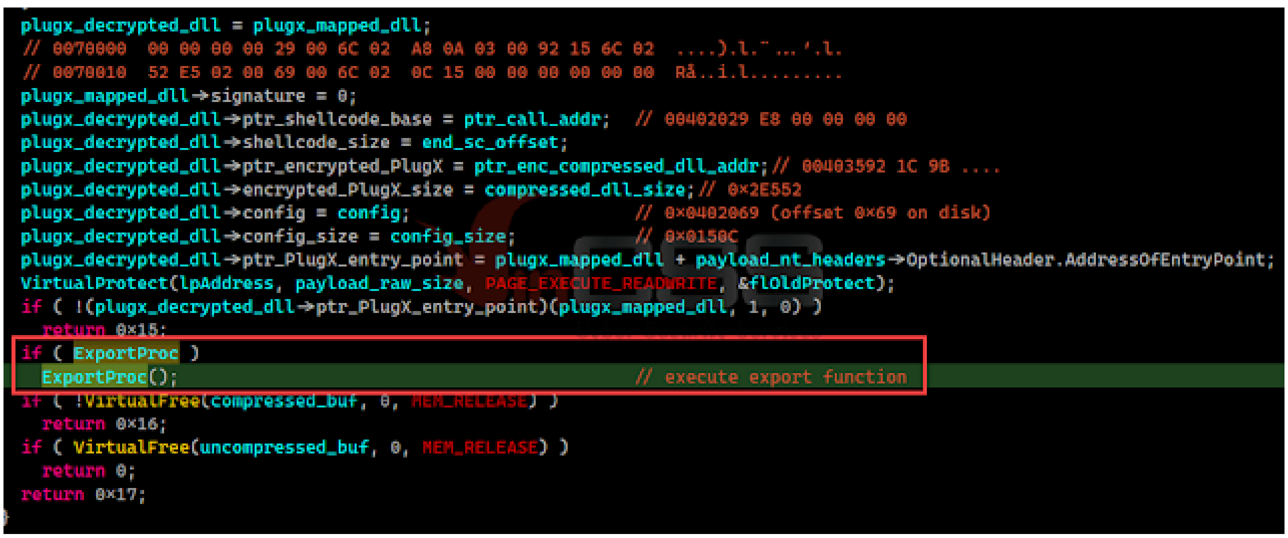


Offset	Name	Value	Meaning
48360	Characteristics	0	
48364	TimeDateStamp	612C95CD	Monday, 30.08.2021 08:24:45 UTC
48368	MajorVersion	0	
4836A	MinorVersion	0	
4836C	Name	48F92	RFPmzNfQQFPXX
48370	Base	1	
48374	NumberOfFunctions	1	
48378	NumberOfNames	1	
4837C	AddressOfFunctions	48F88	
48380	AddressOfNames	48F8C	
48384	AddressOfNameOrdinals	48F90	

Exported Functions [1 entry]

Offset	Ordinal	Function RVA	Name RVA	Name	Forwarder
48388	1	8190	48FA0	Main	

Back to the shellcode, after decompressing the Dll into memory, it will perform the task of a loader to map this Dll into a new memory region. Then, call to the exported function (here is the **Main** function) to perform the the main task of malware:



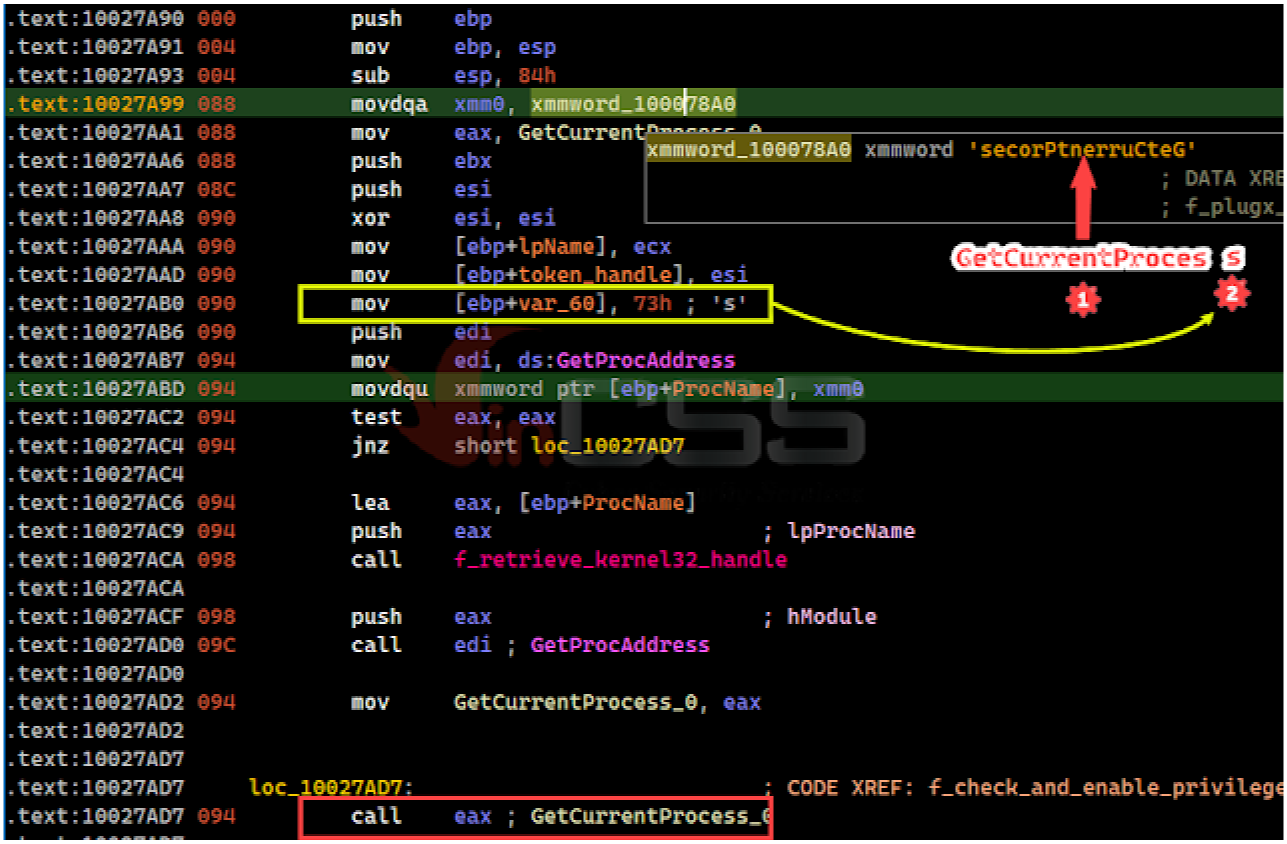
***Note**: At the time of analyzing this shellcode, we have not yet confirmed it is a variant of the PlugX malware, but only raised doubts about the relationship. It was only when we analyzed the above extracted Dll, then we confirmed for sure that this was a variant of PlugX and renamed the fields in the struct for understandable reasons as screenshot above.*

4. Analyze the extracted Dll

We will not go into detailed analysis of this Dll, but only provide the necessary information to prove that this is a PlugX variant as well as the process of decrypting the configuration information that the malware will be used.

4.1. How PlugX calls an API function

In this variant, information about API functions is stored in **xmmword**, then loaded into the **xmm0** (128-bit) register, the missing part of the function name will be loaded through the stack. The malicious code gets the handle of the Dll corresponding to these API functions, then uses **GetProcAddress** function to retrieve the address of the specified API function to use later:



4.2. Create main thread to execute

The malware adjusts the **SeDebugPrivilege** and **SeTcbPrivilege** tokens of its own process in order to gain full access to system processes. Then it creates its main thread, which is named “**bootProc**”:

```
f_create_unnamed_event(0)->dll_base = dll_base;
f_create_unnamed_event(0)->dll_base = dll_base;
f_create_unnamed_event(0)->dll_base = dll_base;
*wszSeDebugPrivilege = 'e\0S';
*&wszSeDebugPrivilege[2] = 'e\0D';
*&wszSeDebugPrivilege[4] = 'u\0b';
*&wszSeDebugPrivilege[6] = 'P\0g';
*&wszSeDebugPrivilege[8] = 'i\0r';
*&wszSeDebugPrivilege[0xA] = 'i\0v';
*&wszSeDebugPrivilege[0xC] = 'e\0l';
*&wszSeDebugPrivilege[0xE] = 'e\0g';
wszSeDebugPrivilege[0x10] = 0;
*wszSeTcbPrivilege = 'e\0S';
*&wszSeTcbPrivilege[2] = 'c\0T';
*&wszSeTcbPrivilege[4] = 'P\0b';
*&wszSeTcbPrivilege[6] = 'i\0r';
*&wszSeTcbPrivilege[8] = 'i\0v';
*&wszSeTcbPrivilege[0xA] = 'e\0l';
*&wszSeTcbPrivilege[0xC] = 'e\0g';
v6 = 0;
f_check_and_enable_privilege(wszSeDebugPrivilege);        // SeDebugPrivilege
f_check_and_enable_privilege(wszSeTcbPrivilege);          // SeTcbPrivilege
strcpy(szbootProc, "bootProc");
critical_section = sub_10007E50(0);
return f_spawn_thread(critical_section, &p_thread_handle, szbootProc, f_main_thread_func, 0);
```

4.3. Communicating with C2

The malware can communicate with C2 via TCP, HTTP or UDP protocols:

```
strcpy(szTCP_proto, "TCP");
strcpy(szHTTP_proto, "HTTP");
sz_protocol_info = L"*";
strcpy(szUDP_proto, "UDP");
strcpy(szICMP_proto, "ICMP");
switch ( choose_proto_flag )
{
  case 2:
    sz_protocol_info = szTCP_proto;
    break;
  case 3:
    sz_protocol_info = szHTTP_proto;
    break;
  case 4:
    sz_protocol_info = szUDP_proto;
    break;
  case 5:
    sz_protocol_info = szICMP_proto;
    break;
  default:
    break;
}
```

```
// Protocol:[%4s],
*szProto_Host_Proxy_format_str = _mm_load_si128(&xmmword_10007120);
strcpy(v15, "%s:%s]\r\n");
port_num_hi = HIWORD(src->f_retrieve_ip_address);
port_num_lo = LOWORD(src->f_retrieve_ip_address);
v8 = a2[1];
// Host: [%s:%d], P
v13 = _mm_load_si128(&xmmword_10007240);
// roxy: [%d:%s:%d:
v14 = _mm_load_si128(&xmmword_10007180);
// Protocol:[%4s], Host: [%s:%d], Proxy: [%d:%s:%d:%s:%s]\r\n
wsprintfA(
  szProto_Host_Proxy_full_str,
  szProto_Host_Proxy_format_str,
  sz_protocol_info,
  a2 + 2,
  v8,
  port_num_lo,
  &src->field_4,
  port_num_hi,
  &src->event_handle_1,
  &src->field_84);
f_send_str_to_debugger(szProto_Host_Proxy_full_str);
switch ( choose_proto_flag )
{
  case 2:
    result = f_connect_c2_over_TCP(this, arg0, a2, src);
    break;
  case 3:
    result = f_connect_c2_over_HTTP(this, arg0, a2, src);
    break;
  case 4:
    result = f_connect_c2_over_UDP(this, arg0, a2, src);
    break;
  case 5:
    result = 0x32;
```

4.4. Implemented commands

The malware will receive commands from the attacker to execute the corresponding functions related to *Disk*, *Network*, *Process*, *Registry*, etc.

The entire list of commands as shown in the table below that the attacker can execute through this malware sample:

Command Group	Sub-command	Description
Disk	0x3000	Get information about the drives (type, free space)
0x3001	Find file	
0x3002	Find file recursively	
0x3004	Read data from the specified file	
0x3007	Write data to the specified file	
0x300A	Create a new directory	
0x300C	Create a new process on hidden desktop	

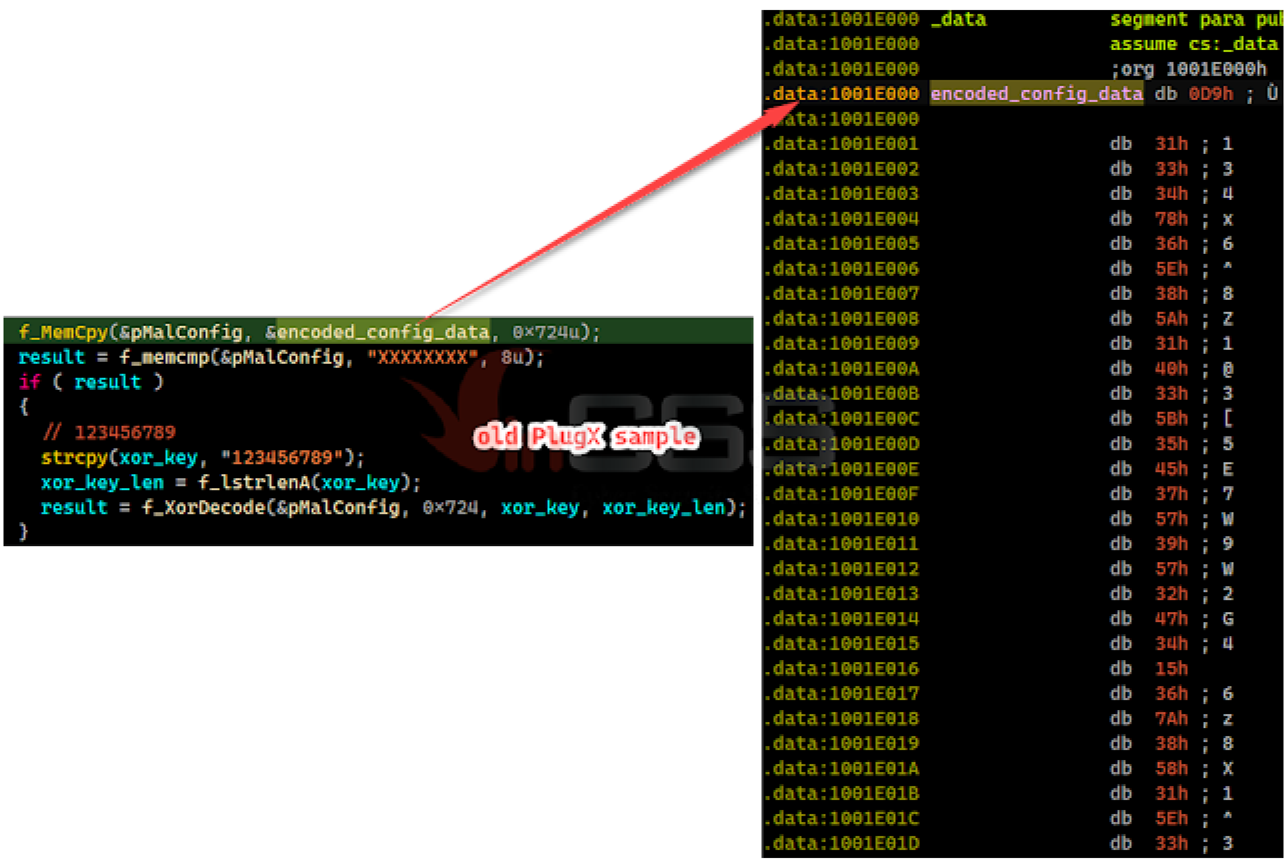
0x300D	File action (file copy/rename/delete/move)	
0x300E	Expand environment-variable strings	
Nethood	0xA000	Enumeration of network resources
Netstat	0xD000	Retrieve a table that contains a list of TCP endpoints
0xD001	Retrieve a table that contains a list of UDP endpoints	
0xD002	Set the state of a TCP connection	
Option	0x2000	Lock the workstation's display
0x2001	Force shut down the system	
0x2002	Restart the system	
0x2003	Shut down the system safety	
0x2005	Display massage box	
PortMap	0xB000	Perform port mapping
Process	0x5000	Retrieve processes info
0x5001	Retrieve modules info	
0x5002	Terminate specified process	
RegEdit	0x9000	Enumerate registry

0x9001	Create registry	
0x9002	Delete registry	
0x9003	Copy registry	
0x9004	Enumerates the values of the specified open registry key	
0x9005	Sets the data and type of a specified value under a registry key	
0x9006	Deletes a named value from the specified registry key	
0x9007	Retrieves a registry value	
Service	0x6000	Retrieves the configuration parameters of the specified service
0x6001	Changes the configuration parameters of a service	
0x6002	Starts a service	
0x6003	Sends a control code to a service	
0x6004	Delete service	
Shell	0x7002	Create pipe and execute command line
SQL	0xC000	Get SQL data sources
0xC001	Lists SQL drivers	
0xC002	Executes SQL statement	

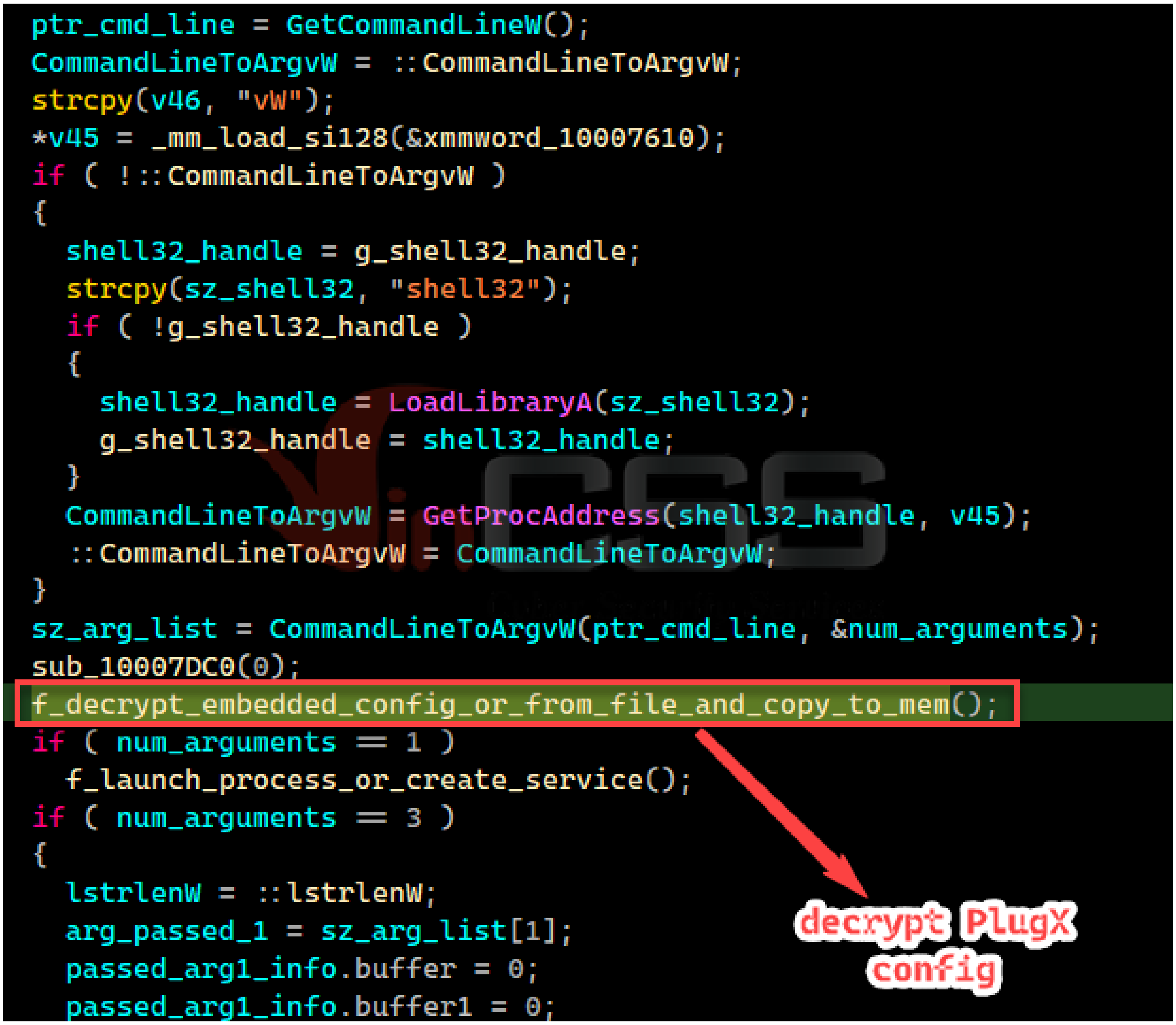
Telnet	0x7100	Start telnet server
Screen	0x4000	simulate working over the RDP Protocol
0x4100	Take screenshot	
KeyLog	0xE000	Perform key logger function, log keystrokes to file **"%allusersprofile%\MSDN\6.0\USER.DAT"**

4.5. Decrypt PlugX configuration

As analyzed above, the malware will connect to the C2 address via HTTP, TCP or UDP protocols depending on the specified configuration. So where is this config stored? With the old malware samples that we have analyzed (1, 2, 3, 4), the PlugX configuration is usually stored in the **.data** section with the size of **0x724 (1828)** bytes.



Going back to the sample we are analyzing, we see that before the step of checking the parameters passed when the malware executes, it will call the function that performs the task of decrypting the configuration:



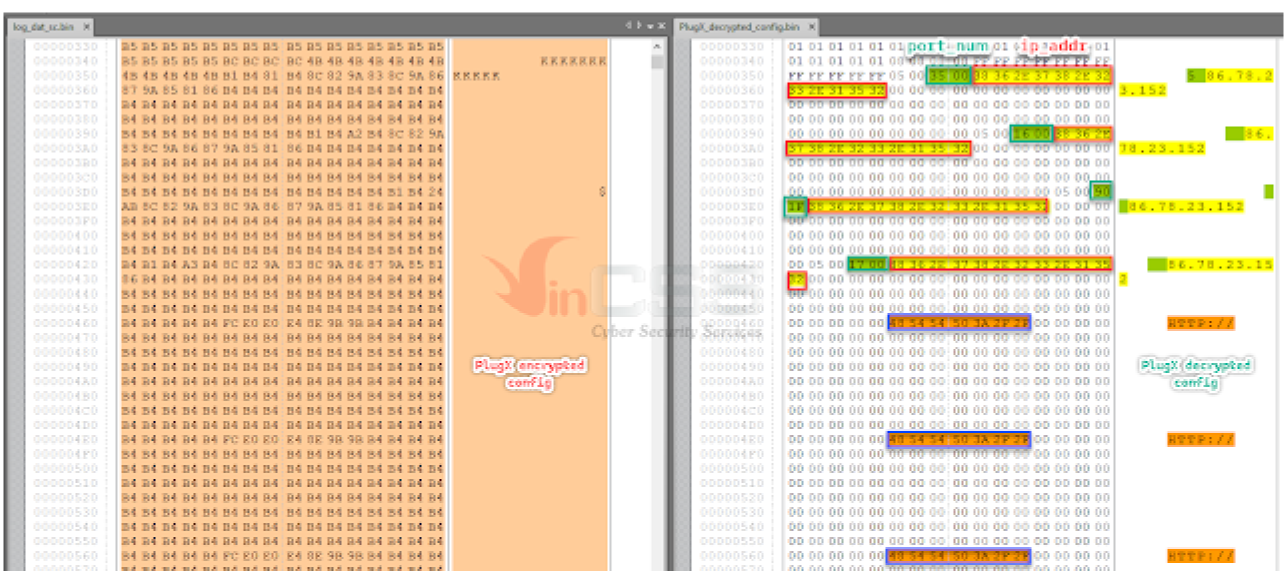
```
ptr_cmd_line = GetCommandLineW();
CommandLineToArgvW = ::CommandLineToArgvW;
strcpy(v46, "vW");
*v45 = _mm_load_si128(&xmmword_10007610);
if ( !::CommandLineToArgvW )
{
  shell32_handle = g_shell32_handle;
  strcpy(sz_shell32, "shell32");
  if ( !g_shell32_handle )
  {
    shell32_handle = LoadLibraryA(sz_shell32);
    g_shell32_handle = shell32_handle;
  }
  CommandLineToArgvW = GetProcAddress(shell32_handle, v45);
  ::CommandLineToArgvW = CommandLineToArgvW;
}
sz_arg_list = CommandLineToArgvW(ptr_cmd_line, &num_arguments);
sub_10007DC0(0);
f_decrypt_embedded_config_or_from_file_and_copy_to_mem();
if ( num_arguments == 1 )
  f_launch_process_or_create_service();
if ( num_arguments == 3 )
{
  lstrlenW = ::lstrlenW;
  arg_passed_1 = sz_arg_list[1];
  passed_arg1_info.buffer = 0;
  passed_arg1_info.buffer1 = 0;
```


Diving into this function, combined with additional debugging from shellcode, renaming the fields in the generated struct, we get the following information:

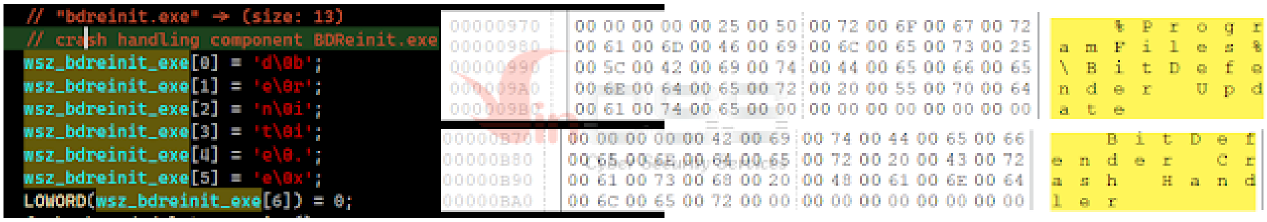
- PlugX's configuration is embedded in shellcode and starts at offset **0x69**.
- The size of the configuration is **0x0150C** (**5388**) bytes.
- Decryption key is **0xB4**.

With all the complete information as above, it is possible to recover the configuration information easily:

IP	Port
86.78.23.152	53
86.78.23.152	22
86.78.23.152	8080
86.78.23.152	23



In addition to the list of C2 addresses above, there is additional information related to the directory created on the victim machine to contain malware files as well as the name of the service that can be created:



To make our life easier, I wrote a python script to automatically extract configuration information for this variant. The output after running the script is as follows:

```
$ python plugx_extract_config.py plugx_decrypted_config.bin

[+] Config file: plugx_decrypted_config.bin
[+] Config size: 5388 bytes
[+] Folder name: %ProgramFiles%\BitDefender Update
[+] Service name: BitDefender Crash Handler
[+] Proto info: HTTP://
[+] C2 servers:
        86.78.23.152:53
        86.78.23.152:22
        86.78.23.152:8080
        86.78.23.152:23
[+] Campaign ID: 1234
```

5. Conclusion

CrowdStrike researchers first published information on Mustang Panda in June 2018, after approximately one year of observing malicious activities that shared unique Tactics, Techniques, and Procedures (TTPs). However, according to research and collect from many different cybersecurity companies, this group of APTs has existed for more than a decade with different variants found around the world. Mustang Panda, believed to be a APT group based in China, is evaluated as one of the highly detrimental APT groups, applying sophisticated techniques to infect malware, aiming to gain as much long-term access as possible to conduct espionage and information theft.

In this blog we have analyzed the different steps the infamous PlugX RAT follows to start execution and avoid detection. Thereby, it can be seen that this APT group is still active and constantly looking for ways to improve their techniques. VinCSS will continue to search for additional samples and variants that may be associated with this PlugX variant that we analyzed in this article.

6. References

7. Indicators of Compromise

log.dll - db0c90da56ad338fa48c720d001f8ed240d545b032b2c2135b87eb9a56b07721

---

log.dll - 84893f36dac3bba6bf09ea04da5d7b9608b892f76a7c25143deebe50ecbbdc5d

---

log.dll - 3171285c4a846368937968bf53bc48ae5c980fe32b0de10cf0226b9122576f4e

---

log.dll - da28eb4f4a66c2561ce1b9e827cb7c0e4b10afe0ee3efd82e3cc2110178c9b7a

---

log.dat - 2de77804e2bd9b843a826f194389c2605cfc17fd2fafde1b8eb2f819fc6c0c84

Decrypted config:

[+] Folder name: %ProgramFiles%\BitDefender Update

[+] Service name: BitDefender Crash Handler

[+] Proto info: HTTP://

[+] C2 servers:

86.78.23.152:53

86.78.23.152:22

86.78.23.152:8080

86.78.23.152:23

[+] Campaign ID: 1234

---

log.dat - 0e9e270244371a51fbb0991ee246ef34775787132822d85da0c99f10b17539c0

Decrypted config:

[+] Folder name: %ProgramFiles%\BitDefender Update

[+] Service name: BitDefender Crash Handler

[+] Proto info: HTTP://

[+] C2 servers:

86.79.75.55:80

86.79.75.55:53

86.79.75.46:80

86.79.75.46:53

[+] Campaign ID: 1234

---

log.dat - 3268dc1cd5c629209df16b120e22f601a7642a85628b82c4715fe2b9fbc19eb0

Decrypted config:

[+] Folder name: %ProgramFiles%\Common Files\ARO 2012

[+] Service name: BitDefender Crash Handler

[+] Proto info: HTTP://

[+] C2 servers:

86.78.23.152:23

86.78.23.152:22

86.78.23.152:8080

86.78.23.152:53

[+] Campaign ID: 1234

---

log.dat - 02a9b3beaa34a75a4e2788e0f7038aaf2b9c633a6bdbfe771882b4b7330fa0c5 (THOR PlugX)

Decrypted config:

[+] Folder name: %ProgramFiles%\BitDefender Handler

[+] Service name: BitDefender Update Handler

[+] Proto info: HTTP://

[+] C2 servers:

www.locvnpt.com:443

www.locvnpt.com:8080

www.locvnpt.com:80

www.locvnpt.com:53

[+] Campaign ID: 1234

Click here for Vietnamese version.

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