# Spear Phishing Campaign Delivers Buer and Bazar Malware

zscaler.com/blogs/research/spear-phishing-campaign-delivers-buer-and-bazar-malware



Zscaler ThreatLabZ became aware of a prevalent phishing campaign targeting employees of various organizations. During the past couple of weeks, many enterprise users have been getting spear phishing emails indicating that their employment with the company has been terminated.

These emails contain a Google document link that leads to the Bazar backdoor (from the TrickBot gang). What's interesting is that this campaign also used the Buer loader, which is the first time we have seen these two malware strains used together.

Use of the Buer loader by the TrickBot gang comes as no surprise as this group is known to work with different malware groups. In the past, the TrickBot gang has also worked with other botnets, such as Emotet.

### Campaign

In this email campaign, instead of relying on attachments, the attackers included links to what appeared to be a legitimate Google Docs document, which itself contained links to malicious files hosted on Google Drive or, in some cases, hosted elsewhere. In some previous phishing email campaigns, attackers leveraged SendGrid to distribute the initial emails to hide the Google Drive links in the documents behind a SendGrid URL as a way to bypass traditional defences.

Samples of emails that we have seen are shown in Figure 1 and Figure 2.



Good morning, when you will be in office today? Here is a copy of <u>termination</u> (in PDF) list for the next week. I am very sorry for that, you will get your two weeks payout. Also i will process a debit from your account now for the complaint.

What time i can call you?

Elvin Andrews Outsource HR specialist

Figure 1: One of the spear phishing email templates targeting an employee.

То	Tue 9/15/2020 10:27 PM Ethan Patrick <schandler@capitalseniorliving.net> RE: FYI: Employees Termination List – Confirmation Required</schandler@capitalseniorliving.net>
Good d Further Unfortu way a r Followi need to	lay, r to our meeting of September 15, I am sorry to confirm that your employment with us is terminated with effect from <u>09/15/2020</u> . Inately, your position was made redundant because of the current financial state of our company. Please note that this is in no eflection of your performance in your job, which has been entirely satisfactory. ing the link given here you will find a copy of the <u>PDF-file</u> that contains Employees Termination List as of September, 2020. You of ind your data, look them through and confirm that everything is correct in your reply email.
Waiting Ethan I Chief E	g for you reply, Patrick Executive of HR Department

Figure 2: Another spear phishing email template

The link in both emails is a Google Docs link claiming to host a PDF file with a list of employees that have been terminated, as shown in Figure 3.



Figure 3: The link to the fake Google Doc containing the download link.

The link in the Google Doc redirects to the URL unitedyfl[.]com/print\_preview.exe to download the malware payload.

Although, the use of target names with actuating themes is not new to this group, there has been a significant uptick in the number of emails received and this campaign has been persistently active for the past few weeks.

### Packer

In most cases, the payload that is downloaded is the Bazar malware but, in some cases, it is the Buer loader. The packer used in both malware payloads is identical. Most notably, the packed binaries are exe files with a randomly named export function. The export function is responsible for payload decryption and injection.

First, a shellcode is decrypted, which further decrypts a headerless PE loader that has the final payload in its overlay. The headersless loader allocates memory, maps the payload into memory with proper permissions, and finally transfers control to it. In this campaign, no process self-injection is used to load the payload.

Address	Hep	c –															ASCII	
001E0000	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00		
001E0010	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	<del>.</del>	
001E0020	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00		
001E0030	00	00	00	00	00	00	00	00	00	00	00	00	C8	00	00	00	È	
001E0040	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00		
001E0050	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00		
001E0060	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00		
001E0070	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00		
001E0080	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00		
001E0090	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00		
001E00A0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00		
001E00B0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00		
001E00C0	00	00	00	00	00	00	00	00	50	45	00	00	4C	01	04	00	PEL	
001E00D0	43	2F	6A	5F	00	00	00	00	00	00	00	00	EO	00	02	21	C/jà!	
001E00E0	OB	01	0C	00	00	1A	00	00	00	A2	00	00	00	00	00	00	¢	
001E00F0	BO	27	00	00	00	10	00	00	00	30	00	00	00	00	00	10	*'0	
001E0100	00	10	00	00	00	02	00	00	06	00	00	00	00	00	00	00		
001E0110	06	00	00	00	00	00	00	00	00	FO	00	00	00	04	00	00		
001E0120	00	00	00	00	02	00	40	01	00	00	10	00	00	10	00	00	@	
001E0130	00	00	10	00	00	10	00	00	00	00	00	00	10	00	00	00		
001E0140	00	00	00	00	00	00	00	00	60	30	00	00	3C	00	00	00	0<	
001E0150	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00		
001E0160	00	00	00	00	00	00	00	00	00	EO	00	00	88	00	00	00	a	
001E0170	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00		
001E0180	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00		
001E0190	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00		
001E01A0	00	30	00	00	SC	00	00	00	00	00	00	00	00	00	00	00	.0	
001E01B0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00		
001E01C0	1.2E	74	65	78	14	00	00	00	OC.	18	00	00	00	10	00	00	Text	

#### Figure 4: The decrypted header less PE loader.

001E3F80	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
001E3F90	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
001E3FA0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
001E3FB0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
001E3EC0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
001E3FD0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
001E3FE0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
001E3FF0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
001E4000	01	00	00	00	08	00	00	00	02	00	00	00	04	00	00	00	
001E4010	10	00	00	00	80	00	00	00	20	00	00	00	40	00	00	00	a
001E4020	45	72	72	6F	72	20	70	72	6F	74	65	63	74	69	6E	67	Error protecting
001E4030	20	60	65	60	6F	72	79	20	70	61	67	65	00	00	00	00	memory page
001E4040	47	65	74	4F	61	74	69	76	65	53	79	73	74	65	60	49	GetNativeSystemT
001E4050	6F	66	6E	00	6R	00	65	00	72	00	6F	00	65	00	60	00	nfo k e r n e l
001E4050	22	00	22	00	25	00	64	00	60	00	60	00	00	00	00	00	2 2 d 1 1
00154070	40	EA	60	00	62	00	00	00	04	00	00	00	20		00	00	M7 507
001E4070	100	20	00	00	0.0	00	00	200	40	00	00	00	66	00	00	200	M2
00124080	00	00	00	00	00	00	00	00	40	00	00	00	00	00	00	00	
001E4090	00	00	00	00	00	200	00	00	00	00	00	00	00	00	00	00	
001E40A0	00	40	00	00	00	00	00	00	00	00	00	40	00	24	20	00	A + + + + + + + + + + + + + + + + + + +
001E40B0	UCE	15	BA	UE	00	64	09	50	21	68	01	40	CD.	21	54	68	is magnet commo
001E40C0	69	13	20	20	144	6F	5/	12	61	60	20	65	61	6E	6E	6F	is program canno
001E40D0	14	20	62	65	20	12	15	6E	20	69	6E	20	44	41	53	20	t be run in DOS
00164060	6D	6F	64	65	ZE	OD	OD	0A	24	00	00	00	00	00	00	00	mode
001E40F0	28	13	9E	CB	6C	72	FO	98	6C	72	FO	98	6C	72	FO	98	(Eiro. iro. iro.
001E4100	37	1A	F1	99	64	72	F0	98	6C	72	F1	98	25	72	FO	98	7.n.dro. [rn.%rð.
001E4110	AF	7D	AD	98	6F	72	FO	98	E9	02	F9	99	4F	72	FO	98	}orð.e.u.orð.
001E4120	E9	02	F2	99	6D	72	FO	98	52	69	63	68	GC.	72	FO	98	e.o.mrð.Ríchlrð.
001E4130	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
001E4140	50	45	00	00	4C	01	04	00	96	D8	68	5 F	00	00	00	00	PELØh
001E4150	00	00	00	00	FO	00	02	01	OR.	01	OF	1A	00	70	00	00	a

Figure 5: The payload embedded at the end of the loader.

#### Bazar loader and Bazar backdoor

The Bazar backdoor is a new stealthy malware, part of the TrickBot group's toolkit arsenal and leveraged for high-value targets. The Bazar loader is used to download and execute the Bazar backdoor on the target system. The goal of this backdoor is to execute binaries, scripts, modules, kill processes, and then remove itself from the compromised machine. The samples used in this campaign heavily rely on control flow obfuscation. The detailed analysis report about this backdoor can be found <u>here</u>.

The Bazar loader downloads the Bazar backdoor from the C&C using the following URI format:  $\{C\&C\}/api/v\d{3}$ 

The downloaded payload is XOR-encrypted and can be decrypted using the script provided in the appendix.

The downloaded malware was successfully captured by the Zscaler Cloud Sandbox:

Cloud Sandbox

Report ID (MD5): 06F42898D5B2303C0B455D3152CED044		Analysis Performed: 9/15/2020 7:14:58 PM		File Type: exe64
CLASSIFICATION		VIRUS AND MALWARE	SECURITY BYPASS	00
Class Type Tr Malicious Category Malware & Botnet I	88	No known Malware found	Sample Steeps For A Long Time (Installer Files Shows These Property).     W Process Strings Found     Allocates Memory In Foreign Processes     Modifies The Context Of A Thread in Another Process     Writes To Foreign Memory Regions     Onceds For Kernel Debuggers     Executes Massive Amount Of Steeps In A Loop	Î
NETWORKING	55	STEALTH SS	SPREADING	
Performs Connections To IPs Without Corresponding DNS Lookups     Dominade Files From Web Servers Via HTTP     Ports Data to Web Server     URLs Found In Memory Or Binary Data     Uses HTTPS		Injects A PE File Into A Foreign Processes     Disables Application Error Messages	No suspicious activity detected	
INFORMATION LEAKAGE		EXPLOITING	PERSISTENCE	25
No suspicious activity detected		Sets Debug Register	Checks If Anti-Vinus Program Is Installed	
SYSTEM SUMMARY	55	DOWNLOAD SUMMARY	ORIGIN	-00
PE File Has An Invalid Cartificate     Classification Label     Contains Modern PE File Flags: Such As Dynamic Base Or NX     Sample May Offer Command Line Options     Oratins Moderns     PE File Contains A Valid Data Directory To Section Mapping	Î	Original file 251 KB Dropped files No dropped files Packet capture 253 KB		
PE File Contains A Valid Data Directory To Section Mapping     PE File Has A High Image Base. Often Used For DLLs			Long Rask Language: English Country: United States	

Figure 6: The Zscaler Cloud Sandbox report.

The C&C TLS communications of the Bazar backdoor have been using certificates created in the same manner that TrickBot certificates have been created. The C&C server TLS certificate is shown in Figure 7.

valid	dity		
subje	ect: rdnSequence (0)		
v n	dnSequence: 6 items (id-at-commonName=example.com,id	-at-organizationalUnitNam	e=IT Department,id-at-organizationName=Global Security,id-at-localityName=London,
	RDNSequence item: 1 item (id-at-countryName=GB)	-	· · · · · · · · · · · · · · · · · · ·
	V RelativeDistinguishedName item (id_at_countryN	ame-GR)	
	Tdi 2 5 4 6 (id at countralized)	dilic=db)	
	Iu. 2.5.4.6 (Iu-at-CountryName)		
<			
0000	0d 06 09 2a 86 48 86 f7 0d 01 01 0b 05 00 30 81	*.H0.	
0000	92 31 0b 30 09 06 03 55 04 06 13 02 55 53 31 13	.1.0UUS1.	
0980	30 11 06 03 55 04 08 0c 0a 43 61 6c 69 66 6f 72	0UCalifor	
00f0	6e 69 61 31 16 30 14 06 03 55 04 07 0c 0d 53 61	nia1.0USa	
0100	6e 20 46 72 61 6e 63 69 73 63 6f 31 2a 30 28 06	n Franci sco1*0(.	
0110	03 55 04 0a 0c 21 54 68 65 20 55 6e 69 76 65 72	.U!Th e Univer	
0120	73 65 20 53 65 63 75 72 69 74 79 20 43 6f 6d 70	se Secur ity Comp	
0130	61 6e 79 20 4c 74 64 31 2a 30 28 06 03 55 04 03	any Ltd1 *0(U	
0140	0c 21 54 68 65 20 55 6e 69 76 65 72 73 65 20 53	.!The Un iverse S	
0150	65 63 75 72 69 74 79 20 43 6f 6d 70 61 6e 79 20	ecurity Company	
0160	4c 74 64 30 1e 17 0d 32 30 30 39 31 34 31 33 34	Ltd02 00914134	
0170	39 32 37 5a 17 0d 32 31 30 39 31 34 31 33 34 39	927221 09141349	
0180	32 37 5a 30 77 31 0b 30 09 06 03 55 04 06 13 02	27Z0w1.0U	
0190	47 42 31 0f 30 0d 06 03 55 04 08 0c 06 4c 6f 6e	GB1.0 ULon	
01a0	64 6f 6e 31 0f 30 0d 06 03 55 04 07 0c 06 4c 6f	don1.0ULo	
01b0	6e 64 6f 6e 31 18 30 16 06 03 55 04 0a 0c 0f 47	ndon1.0UG	
01c0	6c 6f 62 61 6c 20 53 65 63 75 72 69 74 79 31 16	lobal Se curity1.	
01d0	30 14 06 03 55 04 0b 0c 0d 49 54 20 44 65 70 61	0UIT Depa	
01e0	72 74 6d 65 6e 74 31 14 30 12 06 03 55 04 03 0c	rtment1. 0U	
01f0	0b 65 78 61 6d 70 6c 65 2e 63 6f 6d 30 82 01 20	.example .com0	
0200	30 0d 06 09 2a 86 48 86 f7 0d 01 01 01 05 00 03	0*.H	

Figure 7: The Bazar/TrickBot TLS certificate.

Researchers also observed that the backdoor downloads and executes the Cobalt Strike pentesting and post-exploitation toolkit on the victim's machine within some period of time after the infection. By deploying Cobalt Strike, it is clear that this stealthy backdoor is being used to gain a foothold in corporate networks so that ransomware can be deployed, data can be stolen, or network access could be sold to other threat actors.

### **Buer loader**

The Buer loader was first discovered around the end of 2019. It is a very capable malware written in C and primarily sold on Russian underground forums for around US\$400. Notably, this malware does not function in the CIS. It has most of the important strings encrypted and APIs are loaded by hash, just like most of the sophisticated malware these days. We are not going to go into technical details because detailed analysis of this has already <u>published</u>.

SANDBOX DETAIL REPORT	High Risk     Moderate Risk     Low Risk	<b>⊖</b>
Report ID (MD5): 09BDF51971172CD64A181B654BDFE5FD	Analysis Performed: 9/24/2020 5:29:45 PM	File Type: exe
CLASSIFICATION	VIRUS AND MALWARE	SECURITY BYPASS
Clase Type Threat Score Malicious 84 Category 84 Maiware & Botnet Detected: Win32.Downloader.Buer	Win32.Downloader.Buer	Sample Sleeps For A Long Time (Installer Files Shows These Property).     Checks For Kernel Debuggers     Contains Long Sleeps     Found A High Number Of Window / User Specific System Calls     Executes Massive Amount Of Sleeps In A Loop     May Try To Detect The Virtual Machine To Hinder Analysis
NETWORKING	STEALTH	SPREADING
URLs Found In Memory Or Binary Data	Disables Application Error Messages	No suspicious activity detected
INFORMATION LEAKAGE	EXPLOITING	PERSISTENCE 50
No suspicious activity detected	No suspicious activity detected	Installs New ROOT Certificates     Creates Temporary Files     Monitors Certain Registry Keys / Values For Changes
SYSTEM SUMMARY	DOWNLOAD SUMMARY	ORIGIN
Sample Is Looking For USB Drives     Check Available System Drives And Hard Drive Free Space.     Checks For Available System Drives     Checks Free Space     Classification Label     Contains Modem PE File Flags Such As Dynamic Base Or NX     Sample May Offer Command Line Options	Original file     44 KB       Dropped files     23 KB       Packet capture     24 B	Origin information not identified

The Buer loader was captured by the Zscaler Cloud Sandbox.

Figure 8: The Zscaler Cloud Sandbox report for the Buer loader.

In addition to sandbox detections, Zscaler's multilayered cloud security platform detects indicators at various levels:

### Win32.Trojan.Buerloader Win32.Backdoor.Bazar

## Conclusion

The TrickBot group has been running similarly themed campaigns for some time. The targeted nature of the campaign with subject lines having the organization's name makes these campaign's highly effective compared to generic spray-and-pray attacks. But even these specially crafted attacks are not immune from a pair of vigilant eyes and the right set of tools. We at Zscaler ThreatLabZ are always on the lookout for bad stuff—be it for our company or for our customers—to provide protection against it.

Last but not the least, always be attentive while opening any email links or attachments. Even if there is a tiny bit of suspicion, verify the email or get it reviewed thoroughly by your security team before proceeding further.

# IOCs

MD5
Fa0322fb70610d6e67585588184eda39 (Buer loader)
06f42898d5b2303c0b455d3152ced044 (Bazar loader)
04a20c9f33023439b612935b6901917f (Bazar loader)
951acc18e4f14471f49235327e0c1ccc (Bazar loader)
4bb9a709958a1790a6bc257a9b5cb48e (Bazar loader)
03e699324d06bd3d597994f5df893048 (Bazar backdoor group: t1)
Distribution and document URLs
http://unitedyfl[.]com/print_preview.exe
https://docs.google[]com/document/u/1/d/e/2PACX

https://docs.google[.jcom/document/u/1/d/e/2PACX-1vTwnlt9tXcgRxaOME9G3yErRp50dGxW1EKoTeIAYZwkMEg4j8fOpU9kP7xMJ6pufKfzsoETJwX5ZMM5/pub

https://docs.google[.]com/document/u/1/d/e/2PACX-1vSE2BfEV4tOmHOpMzeBhWbyajWwjxajBvm1YpJSRWyDL-qXbnSsu-OHhyuT2Y4mbZ72uPT9uToZWvo2/pub

https://docs.google[.]com/document/u/1/d/e/2PACX-1vTCf1OgjnHoaohnZ0BMwCFRU62HyC85BfeiX7NGPiwvrqr8P-\_-Y\_5Mab9wAJjCIcIdWv8wvKVXFuiK/pub

https://docs.google[.]com/document/d/e/2PACX-1vQ4MCpbsYfwekk44caru7p05aOKswFPvyQNsyow1Qfg1exHrGZHaqOmWcnSeAxmDK2V1i3ml9DP8kYT/pub

https://docs.google[.]com/document/d/e/2PACX-1vRl0GvrO4JO8Rs4v1BTtXmsMThv1M413Z14onQl-TkrsXZEOOr1zF8gKu3GDOwFBN0kaw5g7oC7lbIE/pub

https://docs.google[.]com/document/d/e/2PACX-1vR0NwqguWEFX4ZilvsxKSaJQbUfXpfK5fvWxbxUBJfPzbmvGuxHS7bltp9cjpJ0RvrvdlAxeKpSjDKQ/pub

#### C&C

#### **Buer loader**

104.248.83[.]13

#### **Bazar loader**

164.68.107[.]165 91.235.129[.]64 37.220.6[.]126 195.123.241[.]194 82.146.37[.]128 85.143.221[.]85 164.132.76[.]76 54.37.237[.]253

#### Some of the URIs seen in this campaign include

- /api/v190 Download Updated Bazar loader(64 bit)
- /api/v192 Download Bazar backdoor(64 bit)
- /api/v202 (Server did not respond with payload at the time of analysis)
- /api/v207 (Server did not respond with payload at the time of analysis)

#### **PDB** string

c:\Users\Mr.Anderson\Documents\Visual Studio 2008\Projects\Anderson\x64\Release\Anderson.pdb

#### Some of the subject lines observed

Re: {Target Company Name} termination list

Re: {Target Company Name} avoiding

FW: Urgent: {Target Company Name}: A Customer Complaint Request – Prompt Action Required

RE: FYI: {Target Company Name} Employees Termination List – Confirmation Required

Re: complaint request

Re: my call, {Target Company Name}.

Re: {Target Company Name} - my visit

Re: can't call you

## **MITRE ATT&CK**

IDTechniqueT1566.002Phishing: Spearphishing LinkT1566.003Phishing: Spearphishing via Service

T1204.001 User Execution: Malicious Link

T1204.002	User Execution: Malicious File
T1547.001	Boot or Logon Autostart Execution: Registry Run Keys / Startup Folder
T1055.013	Process Injection: Process Doppelgänging
T1055.012	Process Injection: Process Hollowing
T1027.002	Obfuscated Files or Information: Software Packing
T1140	Deobfuscate/Decode Files or Information
T1036.005	Masquerading: Match Legitimate Name or Location
T1087	Account Discovery
T1010	Application Window Discovery
T1083	File and Directory Discovery
T1057	Process Discovery
T1012	Query Registry
T1018	Remote System Discovery
T1082	System Information Discovery
T1033	System Owner/User Discovery
T1124	System Time Discovery
T1119	Automated Collection
T1005	Data from Local System
T1053.002	Scheduled Task/Job: At (Windows)
T1547.004	Boot or Logon Autostart Execution: Winlogon Helper DLL
T1071.001	Application Layer Protocol: Web Protocols

T1568.002 Dynamic Resolution: Domain Generation Algorithms

T1020	Automated Exfiltration
T1041	Exfiltration Over C2 Channel
T1568.002	Dynamic Resolution: Domain Generation Algorithms

# **Appendix**

#### Script to decrypt downloaded Bazar backdoor

```
key = "20200915"
data = open("v190", 'rb').read()
out = ""
for i in range(len(data)):
    out += chr(ord(data[i]) ^ ord(key[i%len(key)]))
of = open('dec1', 'wb')
of.write(out)
of.close()
#Note: Key can vary between downloader samples
```

#### **Buer strings**

Uc3nakqfdpmcFjc powershell.exe -Command "& {Add-MpPreference -ExclusionPath update Kdc23icmQoc21f open .dll rundll32 regsvr32 powershell.exe "-Command" "if((Get-ExecutionPolicy ) -ne 'AllSigned') { Set-ExecutionPolicy -Scope Process Bypass }; & ' %02x POST Content-Type: application/x-www-form-urlencoded runas %s, "%s" Software\Microsoft\Windows\CurrentVersion\RunOnce {%s-%d-%d} ntdll.dll myyux?44659379=3=83684 myyux?44659379=3=83684 myyux?44659379=3=83684 myyux?44659379=3=83684 myyux?44659379=3=83684 UndefinedTypeError>>1I5480%C9#5=0=B8 hd00kaN3/Iqc7\_Kdh secinit.exe false true null https://104.248.83.13/ api/update/ https://104.248.83.13/ api/update/ X40Ivc07uWS update statusCode AccessToken method x64 exelocal memload memloadex api/download/ api/downloadmodule/ download\_and\_exec download\_and\_exec regsrv32 rundll rundllex parameters autorun explorer.exe api/module/ modules loaddllmem Admin User Windows 10 Windows Server 2019/Server 2016 Windows 8.1 Windows Server 2012 R2 Windows 8 Windows Server 2012 Windows 7

Windows Server 2008 R2 Windows XP SQCP]ICW X40Ivc07uWS Unknown x32 x64 LdrLoadDll **RtlCreateUserThread** LdrGetProcedureAddress RtlFreeUnicodeString RtlAnsiStringToUnicodeString RtlInitAnsiString Mozilla/5.0 (Apple-iPhone7C2/1202.466; U; CPU like Mac OS X; en) AppleWebKit/420+ (KHTML, like Gecko) Version/3.0 Mobile/1A543 Safari/419.3 X40Ivc07uWS dllhost.exe dllhost.exe Software\Microsoft\Windows NT\CurrentVersion\Winlogon Shell open akb,cvc %ALLUSERSPROFILE% Ostersin \AutoReg.exe " ensgJJ ensgJJ explorer.exe secinit.exe shell32.dll Winhttp.dll advapi32.dll user32.dll netapi32.dll NtWriteVirtualMemory Lr?jjma\_rcTgprs\_jKckmpw JbpEcrNpmacbspc?bbpcqq Lr0scpwTgprs\_jKckmpw LrDpccTgprs\_jKckmpw LrNpmrcarTgprs\_jKckmpw LrPc\_bTgprs\_jKckmpw LrEcrAmlrcvrRfpc\_b LrQcrAmlrcvrRfpc\_b

Buer loader API hashes and corresponding API names

0x69f7df2a -> advapi32\_GetTokenInformation 0xe79d18d6 -> kernel32\_OpenProcessToken 0x47979a8f -> advapi32 GetCurrentHwProfileW 0x19e1e0c2 -> kernel32\_RegCreateKeyExW 0xd45f73b5 -> kernel32\_RegCloseKey 0xcb5998e2 -> kernel32\_RegSetValueExW 0xce636ff5 -> advapi32\_GetSidSubAuthority 0xaf7f658e -> winhttp\_WinHttpOpen 0x20b4c051 -> winhttp\_WinHttpSetTimeouts 0x8ef04f02 -> winhttp WinHttpCrackUrl 0x9f47a05e -> winhttp WinHttpConnect 0x1dd1d38d -> winhttp WinHttpOpenRequest 0x26d17a4e -> winhttp\_WinHttpSendRequest 0xb20e6a35 -> winhttp\_WinHttpGetIEProxyConfigForCurrentUser 0x1ef97964 -> winhttp\_WinHttpGetProxyForUrl 0x8678c3f6 -> winhttp\_WinHttpSetOption 0xea74138b -> winhttp\_WinHttpWriteData 0x80cc5bd7 -> winhttp\_WinHttpReadData 0x6c3f3920 -> winhttp\_WinHttpReceiveResponse 0xde67ac3c -> winhttp\_WinHttpQueryHeaders 0x710832cd -> winhttp\_WinHttpQueryDataAvailable 0x9964b3dc -> winhttp\_WinHttpCloseHandle 0x302ebe1c -> kernel32\_VirtualAlloc 0x4247bc72 -> kernel32\_VirtualQuery 0x1803b7e3 -> kernel32\_VirtualProtect 0x1a4b89aa -> kernel32 GetCurrentProcess 0x8a8b4676 -> kernel32\_LoadLibraryA 0x1acaee7a -> kernel32\_GetProcAddress 0x61eebd02 -> kernel32\_GetModuleHandleW 0x8a8b468c -> kernel32\_LoadLibraryW 0xab489125 -> kernel32\_GetNativeSystemInfo 0x34590d2e -> kernel32\_GetLastError 0x5b3716c6 -> kernel32\_GlobalFree 0xe183277b -> kernel32\_VirtualFree 0x62f1df50 -> kernel32\_VirtualFreeEx 0xdd78764 -> kernel32\_VirtualAllocEx 0xf3cf5f6f -> kernel32\_GetModuleFileNameW 0xae7a8bda -> kernel32\_CloseHandle 0x29e91ba6 -> kernel32\_HeapSize 0xe3802c0b -> kernel32\_HeapAlloc 0x864bde7e -> kernel32 GetProcessHeap 0x12dfcc4e -> kernel32\_ExitProcess 0x7722b4b -> kernel32\_TerminateProcess 0xb4f0f46f -> kernel32\_CreateProcessW 0xff5ec2ce -> kernel32\_ExitThread 0x4b3e6161 -> kernel32\_TerminateThread 0xed619452 -> kernel32\_CreateMutexW 0x7bffe25e -> kernel32 OpenMutexW 0xf785ce6 -> kernel32\_ReadFile 0xe6886cef -> kernel32\_WriteFile 0x1a7f0bab -> kernel32\_CreateFileW 0xbdfa937d -> kernel32\_GetFileSize 0x617ea42b -> kernel32\_DeleteFileW 0x6659de75 -> kernel32\_WriteProcessMemory 0xc56e656d -> kernel32 GetCommandLineW 0x78c1ba50 -> kernel32\_ExpandEnvironmentStringsW 0x2e0ccb63 -> kernel32\_CreateDirectoryW 0x5c62ca81 -> kernel32\_WaitForSingleObject 0x8edf8b90 -> kernel32\_OpenProcess 0x8a62152f -> kernel32\_CreateToolhelp32Snapshot 0xc9112e01 -> kernel32\_Process32NextW 0x63f6889c -> kernel32\_Process32FirstW 0x4b9358fc -> kernel32\_DuplicateHandle 0x24e2968d -> kernel32\_GetComputerNameW

0x110e739a -> kernel32\_GetVolumeInformationW 0xf7643b99 -> kernel32\_GetThreadContext 0x3cc73360 -> kernel32\_ResumeThread 0x77643b9b -> kernel32\_SetThreadContext 0x1c2c653b -> ntdll\_memset 0x1c846140 -> ntdll\_memcpy 0x932d8a1a -> ntdll\_NtDelayExecution 0x9716d04e -> ntdll\_NtReleaseMutant 0x6f7f7a64 -> ntdll\_RtlGetVersion 0x996cc394 -> ntdll ZwUnmapViewOfSection 0xabf93436 -> ntdll\_strtoul 0x2bd04fd1 -> ntdll\_iswctype 0x26a5553c -> ntdll\_strstr 0x4117fd0e -> ntdll\_NtQueryDefaultLocale 0xd24c9118 -> ntdll\_RtlCreateUserThread 0xd52ff865 -> ntdll\_NtQueryVirtualMemory 0x339c09fb -> ntdll\_NtQueryInformationProcess 0x6a13016e -> ntdll\_NtSetInformationThread 0x6debaaa9 -> ntdll\_NtFilterToken 0xd584ba6c -> shell32\_SHGetFolderPathW 0x375eadf4 -> shell32\_CommandLineToArgvW 0xba1eb35b -> shell32\_ShellExecuteW 0xf674afe0 -> user32\_wsprintfW

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