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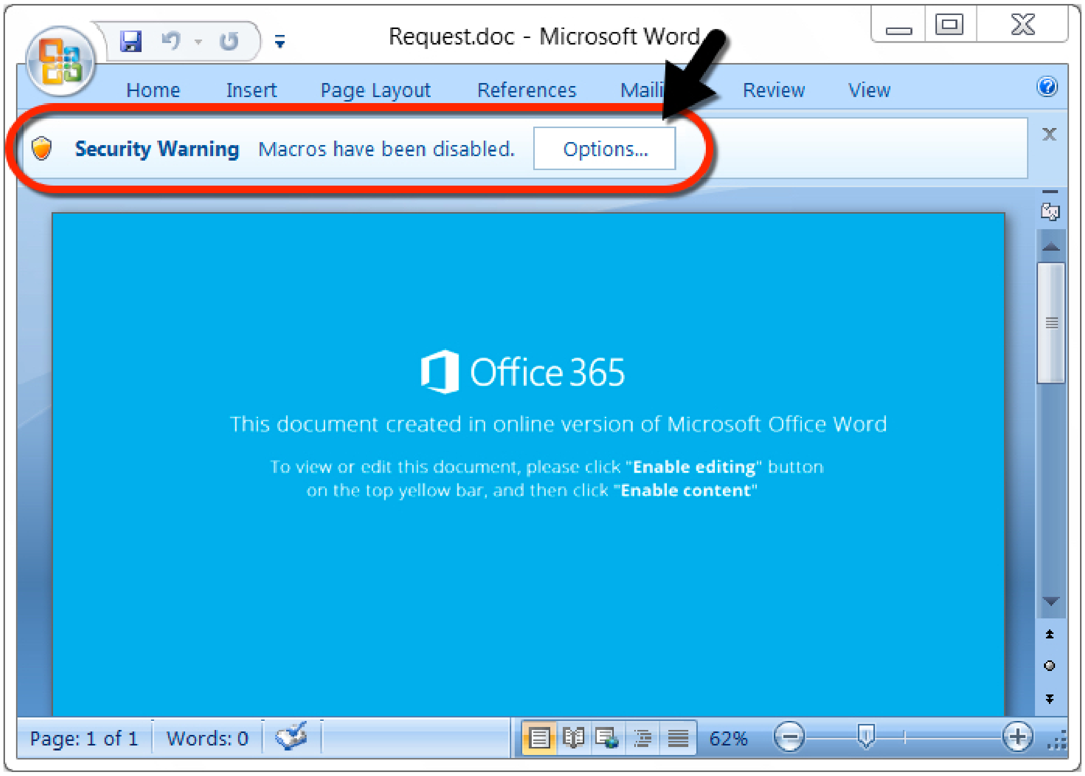
Reviewing the spam filters: Malspam pushing Gozi-ISFB

Brad
433 Posts
ISC Handler
Jan 17th 2018

Introduction

Researchers should review their spam filters to see what malware is getting caught. Security professionals should be aware of current practices used by criminals pushing malware, even if it has little chance of infecting anyone in their organizations. Reviewing the spam filters keeps provides a clearer picture of our cyber-threat landscape.

In today's trip through the spam filters, I found two emails with malicious attachments. These attachments are Word documents with malicious macros designed to infect a vulnerable Windows host with Gozi-ISFB.



Security Warning Macros have been disabled.

Office 365

This document created in online version of Microsoft Office Word

To view or edit this document, please click "**Enable editing**" button on the top yellow bar, and then click "**Enable content**"

Shown above: Never a good sign when the document asks you to enable macros.

Unfortunately, I cannot share the emails. Both emails appear to contain legitimate correspondence. They each include a chain of previous messages, and I could not easily redact the information like I normally do with other examples of malicious spam.

Therefore, this diary will focus on the attachments, follow-up malware, and network traffic.

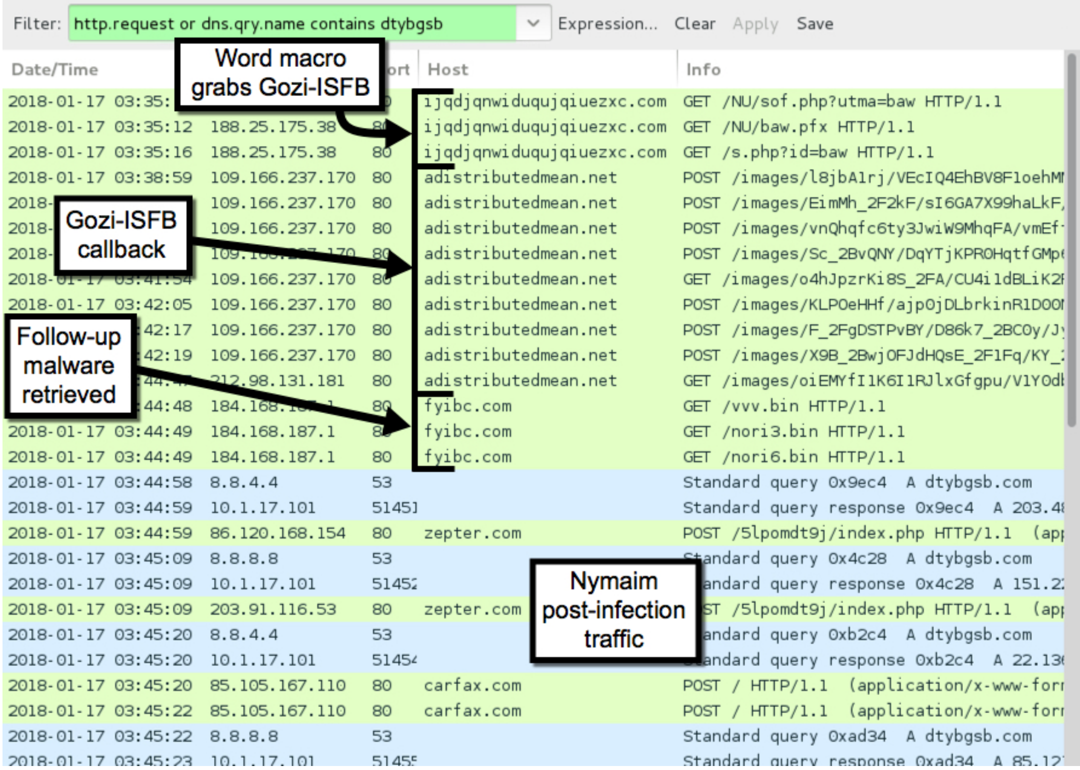
What is Gozi-ISFB?

Gozi-ISFB is a variant of Ursnif, and today's traffic looked like an example shared by @DynamicAnalysis in a blog post on malwarebreakdown.com.

I generated two infections using each of the Word documents. In today's activity, about 8 to 10 minutes after the initial infection, the infected Windows host downloaded follow-up malware. Here's what I saw:

- 1st Word document --> Gozi-ISFB --> Nymaim Trojan
- 2nd Word document --> Gozi-ISFB --> unknown malware

The first infection followed-up with the Nymaim Trojan, and I've documented Nymaim traffic back in November and December of 2017.


Expression...
Clear
Apply
Save
Word macro grabs Gozi-ISFB
Gozi-ISFB callback
Follow-up malware retrieved
Nymaim post-infection traffic

Filter: http.request or dns.qry.name contains dtybgsb

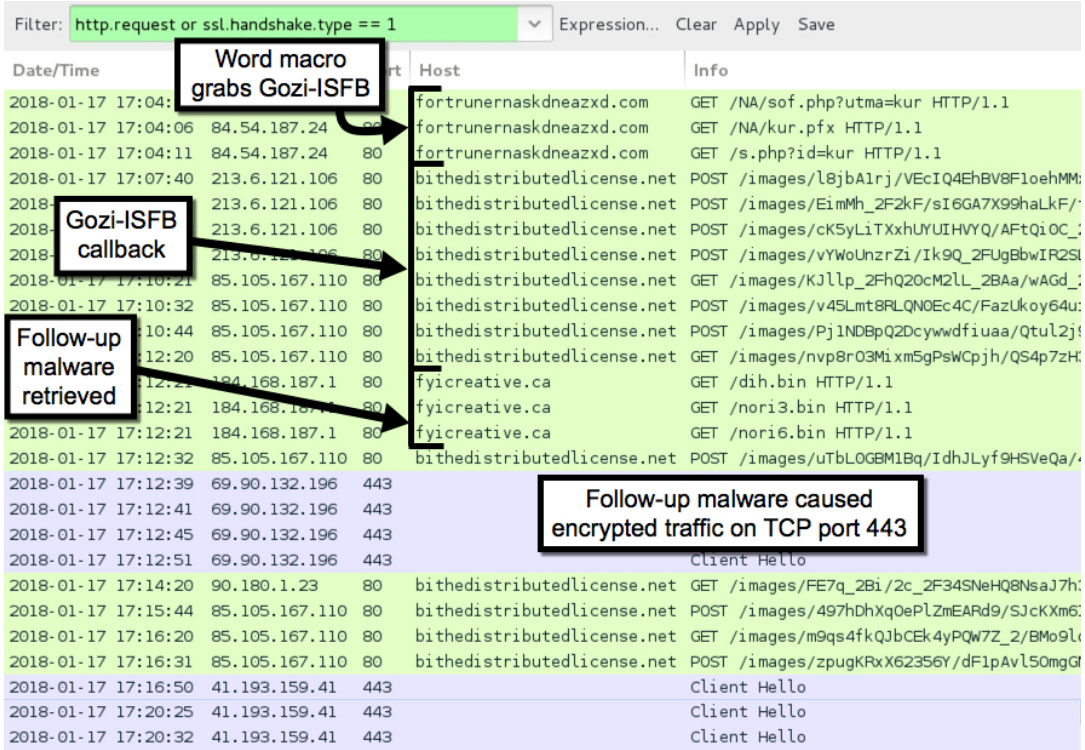
Date/Time		ort	Host	Info
2018-01-17 03:35:		0	ijqdjqnwiduqujqiuezxc.com	GET /NU/sof.php?utma=baw HTTP/1.1
2018-01-17 03:35:12	188.25.175.38	80	ijqdjqnwiduqujqiuezxc.com	GET /NU/baw.pfx HTTP/1.1
2018-01-17 03:35:16	188.25.175.38	80	ijqdjqnwiduqujqiuezxc.com	GET /s.php?id=baw HTTP/1.1
2018-01-17 03:38:59	109.166.237.170	80	adistributedmean.net	POST /images/l8jbA1rj/VEcIQ4EhBV8F1oehM
2018-	109.166.237.170	80	adistributedmean.net	POST /images/EimMh_2F2kF/sI6GA7X99haLkF/
2018-	109.166.237.170	80	adistributedmean.net	POST /images/vnQhqfc6ty3JwiW9MhqFA/vmEf
2018-	109.166.237.170	80	adistributedmean.net	POST /images/Sc_2BvQNY/DqYTjKPR0HqtfGMp
2018-01-17 03:41:54	109.166.237.170	80	adistributedmean.net	GET /images/o4hJpzrKi8S_2FA/CU4i1dBLiK2
2018-01-17 03:42:05	109.166.237.170	80	adistributedmean.net	POST /images/KLPOeHHf/ajp0jDLbrkinR1D00
42:17	109.166.237.170	80	adistributedmean.net	POST /images/F_2FgDSTPvBY/D86k7_2BC0y/J
42:19	109.166.237.170	80	adistributedmean.net	POST /images/X9B_2Bwj0FJdHQsE_2F1Fq/KY_
44:47	212.98.131.181	80	adistributedmean.net	GET /images/oiEMYfI1K6I1RJlxGfgpu/V1Y0d
44:48	184.168.187.1	80	fyibc.com	GET /vvv.bin HTTP/1.1
2018-01-17 03:44:49	184.168.187.1	80	fyibc.com	GET /nori3.bin HTTP/1.1
2018-01-17 03:44:49	184.168.187.1	80	fyibc.com	GET /nori6.bin HTTP/1.1
2018-01-17 03:44:58	8.8.4.4	53		Standard query 0x9ec4 A dtybgsb.com
2018-01-17 03:44:59	10.1.17.101	5145		Standard query response 0x9ec4 A 203.4
2018-01-17 03:44:59	86.120.168.154	80	zepter.com	POST /5lpomdt9j/index.php HTTP/1.1 (ap
2018-01-17 03:45:09	8.8.8.8	53		Standard query 0x4c28 A dtybgsb.com
2018-01-17 03:45:09	10.1.17.101	5145		andard query response 0x4c28 A 151.2
2018-01-17 03:45:09	203.91.116.53	80	zepter.com	ST /5lpomdt9j/index.php HTTP/1.1 (ap
2018-01-17 03:45:20	8.8.4.4	53		andard query 0xb2c4 A dtybgsb.com
2018-01-17 03:45:20	10.1.17.101	5145		andard query response 0xb2c4 A 22.13
2018-01-17 03:45:20	85.105.167.110	80	carfax.com	POST / HTTP/1.1 (application/x-www-for
2018-01-17 03:45:22	85.105.167.110	80	carfax.com	POST / HTTP/1.1 (application/x-www-for
2018-01-17 03:45:22	8.8.8.8	53		Standard query 0xad34 A dtybgsb.com
2018-01-17 03:45:23	10.1.17.101	5145		Standard query response 0xad34 A 85.12

Shown above: Traffic from the 1st infection filtered in Wireshark.

Since I've covered Nymaim before, I'm far more insterested in the second infection where I couldn't identify the follow-up malware.

The second infection

The second infection follows the same patterns as the first. However, this time the follow-up malware is different. I saw encrypted traffic with no associated DNS requests or domains. Two of the IP addresses had interesting certificate data as shown in the images below.



```
Filter: http.request or ssl.handshake.type == 1          Expression...  Clear  Apply  Save

Date/Time                                 rt  Host                         Info
2018-01-17 17:04:                             fortrunernaskdneazxd.com     GET /NA/sof.php?utma=kur HTTP/1.1
2018-01-17 17:04:06  84.54.187.24     80      fortrunernaskdneazxd.com     GET /NA/kur.pfx HTTP/1.1
2018-01-17 17:04:11  84.54.187.24     80      fortrunernaskdneazxd.com     GET /s.php?id=kur HTTP/1.1
2018-01-17 17:07:40  213.6.121.106    80      bithedistributedlicense.net  POST /images/l8jbA1rj/VEcIQ4EhBV8F1oehMM
2018-                213.6.121.106    80      bithedistributedlicense.net  POST /images/EimMh_2F2kF/sI6GA7X99haLkF/
2018-                213.6.121.106    80      bithedistributedlicense.net  POST /images/cK5yLiTXxhUYUIHVYQ/AFtQi0C_
2018-                213.6.121.106    80      bithedistributedlicense.net  POST /images/vYWoUnzrZi/Ik9Q_2FUgBbwIR2S
2018-01-17 17:10:21  85.105.167.110   80      bithedistributedlicense.net  GET /images/KJllp_2FhQ20cM2lL_2BAa/wAGd_
2018-01-17 17:10:32  85.105.167.110   80      bithedistributedlicense.net  POST /images/v45Lmt8RLQN0Ec4C/FazUkoy64u
           :10:44    85.105.167.110   80      bithedistributedlicense.net  POST /images/Pj1NDBpQ2Dcywwdfiuaa/Qtul2j
           :12:20    85.105.167.110   80      bithedistributedlicense.net  GET /images/nvp8r03Mixm5gPsWCpjh/QS4p7zH
           :12:21    184.168.187.1    80      fyicreative.ca               GET /dih.bin HTTP/1.1
           :12:21    184.168.187.1    80      fyicreative.ca               GET /nori3.bin HTTP/1.1
2018-01-17 17:12:21  184.168.187.1    80      fyicreative.ca               GET /nori6.bin HTTP/1.1
2018-01-17 17:12:32  85.105.167.110   80      bithedistributedlicense.net  POST /images/uTbL0GBM1Bq/IdhJLyf9HSVeQa/
2018-01-17 17:12:39  69.90.132.196    443
2018-01-17 17:12:41  69.90.132.196    443
2018-01-17 17:12:45  69.90.132.196    443
2018-01-17 17:12:51  69.90.132.196    443                                  Client Hello
2018-01-17 17:14:20  90.180.1.23      80      bithedistributedlicense.net  GET /images/FE7q_2Bi/2c_2F34SNeHQ8NsaJ7h
2018-01-17 17:15:44  85.105.167.110   80      bithedistributedlicense.net  POST /images/497hDhXq0ePlZmEARd9/SJcKXm6
2018-01-17 17:16:20  85.105.167.110   80      bithedistributedlicense.net  GET /images/m9qs4fkQJbCEk4yPQW7Z_2/BMo9l
2018-01-17 17:16:31  85.105.167.110   80      bithedistributedlicense.net  POST /images/zpugKRxX62356Y/dF1pAvl50mgG
2018-01-17 17:16:50  41.193.159.41    443                                  Client Hello
2018-01-17 17:20:25  41.193.159.41    443                                  Client Hello
2018-01-17 17:20:32  41.193.159.41    443                                  Client Hello
```

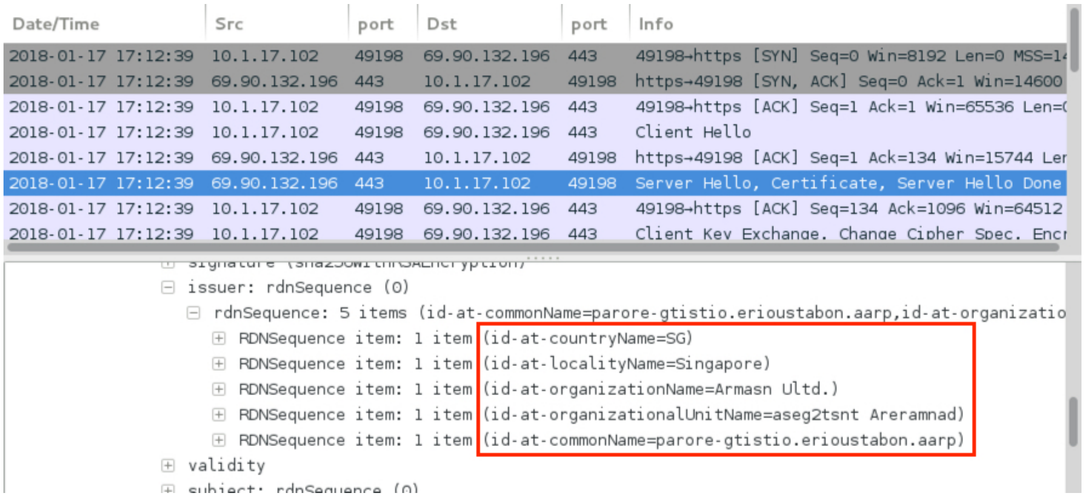
Word macro grabs Gozi-ISFB

Gozi-ISFB callback

Follow-up malware retrieved

Follow-up malware caused encrypted traffic on TCP port 443

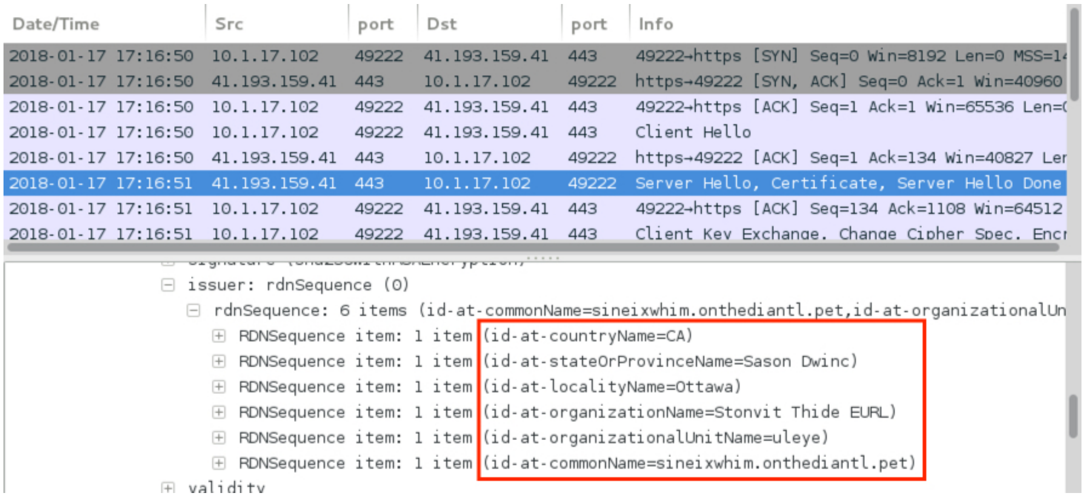
Shown above: Traffic from the 2nd infection filtered in Wireshark.



```
Date/Time            Src            port   Dst            port   Info
2018-01-17 17:12:39  10.1.17.102    49198  69.90.132.196  443    49198→https [SYN] Seq=0 Win=8192 Len=0 MSS=1
2018-01-17 17:12:39  69.90.132.196  443    10.1.17.102    49198  https→49198 [SYN, ACK] Seq=0 Ack=1 Win=14600
2018-01-17 17:12:39  10.1.17.102    49198  69.90.132.196  443    49198→https [ACK] Seq=1 Ack=1 Win=65536 Len=
2018-01-17 17:12:39  10.1.17.102    49198  69.90.132.196  443    Client Hello
2018-01-17 17:12:39  69.90.132.196  443    10.1.17.102    49198  https→49198 [ACK] Seq=1 Ack=134 Win=15744 Le
2018-01-17 17:12:39  69.90.132.196  443    10.1.17.102    49198  Server Hello, Certificate, Server Hello Done
2018-01-17 17:12:39  10.1.17.102    49198  69.90.132.196  443    49198→https [ACK] Seq=134 Ack=1096 Win=64512
2018-01-17 17:12:39  10.1.17.102    49198  69.90.132.196  443    Client Key Exchange, Change Cipher Spec, Encr

      ⊞ signature (sha256WithRSAEncryption)
      ⊟ issuer: rdnSequence (0)
        ⊟ rdnSequence: 5 items (id-at-commonName=parore-gtistio.erioustabon.aarp,id-at-organizatio
          ⊞ RDNSequence item: 1 item (id-at-countryName=SG)
          ⊞ RDNSequence item: 1 item (id-at-localityName=Singapore)
          ⊞ RDNSequence item: 1 item (id-at-organizationName=Armasn Ultd.)
          ⊞ RDNSequence item: 1 item (id-at-organizationalUnitName=aseg2tsnt Areramnad)
          ⊞ RDNSequence item: 1 item (id-at-commonName=parore-gtistio.erioustabon.aarp)
      ⊞ validity
      ⊞ subject: rdnSequence (0)
```

Shown above: One example of certificate data from the encrypted post-infection traffic.



Date/Time	Src	port	Dst	port	Info
2018-01-17 17:16:50	10.1.17.102	49222	41.193.159.41	443	49222→https [SYN] Seq=0 Win=8192 Len=0 MSS=1
2018-01-17 17:16:50	41.193.159.41	443	10.1.17.102	49222	https→49222 [SYN, ACK] Seq=0 Ack=1 Win=40960
2018-01-17 17:16:50	10.1.17.102	49222	41.193.159.41	443	49222→https [ACK] Seq=1 Ack=1 Win=65536 Len=
2018-01-17 17:16:50	10.1.17.102	49222	41.193.159.41	443	Client Hello
2018-01-17 17:16:50	41.193.159.41	443	10.1.17.102	49222	https→49222 [ACK] Seq=1 Ack=134 Win=40827 Le
2018-01-17 17:16:51	41.193.159.41	443	10.1.17.102	49222	Server Hello, Certificate, Server Hello Done
2018-01-17 17:16:51	10.1.17.102	49222	41.193.159.41	443	49222→https [ACK] Seq=134 Ack=1108 Win=64512
2018-01-17 17:16:51	10.1.17.102	49222	41.193.159.41	443	Client Key Exchange, Change Cipher Spec, Encr

```
⊟ issuer: rdnSequence (0)
  ⊟ rdnSequence: 6 items (id-at-commonName=sineixwhim.onthediantl.pet,id-at-organizationalUn
    ⊞ RDNSequence item: 1 item (id-at-countryName=CA)
    ⊞ RDNSequence item: 1 item (id-at-stateOrProvinceName=Sason Dwinc)
    ⊞ RDNSequence item: 1 item (id-at-localityName=Ottawa)
    ⊞ RDNSequence item: 1 item (id-at-organizationName=Stonvit Thide EURL)
    ⊞ RDNSequence item: 1 item (id-at-organizationalUnitName=uleye)
    ⊞ RDNSequence item: 1 item (id-at-commonName=sineixwhim.onthediantl.pet)
⊞ validity
```

Shown above: Another example of certificate data from the encrypted post-infection traffic.

Based on the network traffic and post-infection artifacts, I could not identify the follow-up malware. The follow-up malware is a malicious DLL named ***winmm.dll*** that's loaded by a legitimate Windows system file named ***presentationsettings.exe***. Both were found in a newly-created directory under the infected user's ***AppData\Roaming*** folder. See the indicators section below for details.

Indicators

Artifacts from the 1st infection:

SHA256 hash:
febb37762a92bedad337d0489ac482e356e2787533d65a757c3375fb147ff0a8

- File size: 55,248 bytes
- File name: ***Request.doc***
- File description: Word document with malicious macro

SHA256 hash:
14284152d53c119ad04c986a2a115485ae480d8012603679bf28ec27e3869929

- File size: 1,101,824 bytes
- File location: C:\Users\[username]\AppData\Roaming\52a8081a.exe
- File location: C:\Users\[username]\AppData\Roaming\Microsoft\Adsnsdmo\CRPPport.exe
- Associated Registry key: HKCU\Software\Microsoft\Windows\CurrentVersion\Run
- Value name: adprvmgr
- Value type: REG_SZ
- Value data: C:\Users\[username]\AppData\Roaming\Microsoft\Adsnsdmo\CRPPport.exe
- File description: Gozi-ISFB (an Ursnif variant)

SHA256 hash:
d254e82bdbfd16aa9f0037e2c536c3b9dddd6ec559d26a5af005d3a1f8199d59

- File size: 580,864 bytes

- File location: C:\Users\[username]\AppData\Local\molarity-24\molarity-12.exe
- Associated Registry key: HKCU\Software\Microsoft\Windows\CurrentVersion\Run
- Value name: molarity-96
- Value type: REG_SZ
- Value data: C:\Users\[username]\AppData\Local\molarity-24\molarity-12.exe -s0
- File description: Probable Nymaim Trojan

SHA256 hash:
f1c9544e8f1de92f60f13e29403fc459811b93a7a316d957cb30c1b4a61ba61d

- File size: 656,896 bytes
- File location: C:\ProgramData\wedge-46\wedge-6.exe
- Associated Registry key: HKCU\Software\Microsoft\WindowsNT\CurrentVersion\Winlogon
- Value name: shell
- Value type: REG_SZ
- Value data: C:\ProgramData\wedge-46\wedge-6.exe -46,explorer.exe
- File description: Probable Nymaim Trojan

SHA256 hash:
6e5faf4c3eb47a5218f173564fc1e5a8afc65a8126ff7f602e8dbfe98a2ba695

- File size: 651,776 bytes
- File location: C:\Users\[username]\AppData\Roaming\aliasing-40\aliasing-2.exe
- File description: Probable Nymaim Trojan

Artifacts from the 2nd infection:

SHA256 hash:
044e86936bfc30cd0c07186b6e270650f896f6a42e9b8015abc184d161880090

- File size: 55,012 bytes
- File name: ***NBS_Request.doc***
- File description: Word document with malicious macro

SHA256 hash:
f8bdb65d54ccab04a506e84f14bdbeef15f6266a7bd6e4e7dfde69de424dd10a

- File size: 1,010,688 bytes
- File location: C:\Users\[username]\AppData\Roaming\6d9be056.exe
- File location: C:\Users\[username]\AppData\Roaming\Microsoft\Bitsxapi\efsuvoas.exe
- Associated Registry key: HKCU\Software\Microsoft\Windows\CurrentVersion\Run
- Value name: dmusdBth
- Value type: REG_SZ
- Value data: C:\Users\[username]\AppData\Roaming\Microsoft\Bitsxapi\efsuvoas.exe
- File description: Gozi-ISFB (an Ursnif variant)

SHA256 hash:
208b94fd66a6ce266c3195f87029a41a0622fff47f2a5112552cb087adbb1258
(not malware)

- File size: 176,640 bytes
- File location: C:\Users\[username]\AppData\Roaming\XPIALj1\PresentationSettings.exe
- Associated Registry key: HKCU\Software\Microsoft\Windows\CurrentVersion\Run
- Value name: Ehlho
- Value type: REG_SZ
- Value data: "C:\Users\[username]\AppData\Roaming\XPIALj1\PresentationSettings.exe"
- Start menu shortcut: C:\Users\[username]\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\Startup\Ehlho
- File description: Legitimate system file that loads any DLL named ***winmm.dll*** in the same directory.

SHA256 hash:
018084df00799387be61c5f849af8fce093aab8f73420a2ece7b47d0f45fa07e

- File size: 176,640 bytes
- File location: C:\Users\[username]\AppData\Roaming\XPIALj1\WINMM.dll
- File description: Malicious component called by PresentationSettings.exe
- File description: Malware DLL loaded by legitimate system file ***PresentationSettings.exe*** in the same directory

1st run infection traffic:

- 188.25.175.38 port 80 - ***ijqdjqnwiduqujqiuezxc.com*** - GET /NU/sof.php?utma=baw
- 188.25.175.38 port 80 - ***ijqdjqnwiduqujqiuezxc.com*** - GET /NU/baw.pfx
- 188.25.175.38 port 80 - ***ijqdjqnwiduqujqiuezxc.com*** - GET /s.php?id=baw
- 109.166.237.170 port 80 - ***adistributedmean.net*** - GET /images/*[long string]*.gif
- 109.166.237.170 port 80 - ***adistributedmean.net*** - POST /images/*[long string]*.bmp
- 212.98.131.181 port 80 - ***adistributedmean.net*** - GET /images/*[long string]*.gif
- 212.98.131.181 port 80 - ***adistributedmean.net*** - POST /images/*[long string]*.bmp
- 86.120.77.221 port 80 - ***adistributedmean.net*** - GET /images/*[long string]*.gif
- 86.120.77.221 port 80 - ***adistributedmean.net*** - GET /images/*[long string]*.jpeg
- 86.120.77.221 port 80 - ***adistributedmean.net*** - POST /images/*[long string]*.bmp
- 80.80.165.93 port 80 - ***adistributedmean.net*** - GET /images/*[long string]*.gif
- 80.80.165.93 port 80 - ***adistributedmean.net*** - POST /images/*[long string]*.bmp

- 186.73.245.226 port 80 - ***adistributedmean.net*** - GET /images/*[long string]*.gif
- 188.237.190.24 port 80 - ***adistributedmean.net*** - GET /images/*[long string]*.gif
- 184.168.187.1 port 80 - ***fyibc.com*** - GET /vvv.bin
- 184.168.187.1 port 80 - ***fyibc.com*** - GET /nori3.bin
- 184.168.187.1 port 80 - ***fyibc.com*** - GET /nori6.bin
- DNS queries (using Google DNS) for ***dtybgsb.com***
- 86.120.168.154 port 80 - zepter.com - POST /5lpomdt9j/index.php
- 203.91.116.53 port 80 - zepter.com - POST /5lpomdt9j/index.php
- 155.133.93.30 port 80 - zepter.com - POST /5lpomdt9j/index.php
- 85.105.167.110 port 80 - carfax.com - POST /
- 85.105.167.110 port 80 - zepter.com - POST /
- NOTE: ***carfax.com*** and ***zepter.com*** are legitimate domains and not compromised. They just resolve to bad IP addresses for ***dtybgsb.com*** due to the nature of this Nymaim infection.

2nd run infection traffic:

- 84.54.187.24 port 80 - ***fortrunernaskdneazxd.com*** - GET /NA/sof.php?utma=kur
- 84.54.187.24 port 80 - ***fortrunernaskdneazxd.com*** - GET /NA/kur.pfx
- 84.54.187.24 port 80 - ***fortrunernaskdneazxd.com*** - GET /s.php?id=kur
- 213.6.121.106 port 80 - ***bithedistributedlicense.net*** - POST /images/*[long string]*.bmp
- 85.105.167.110 port 80 - ***bithedistributedlicense.net*** - POST /images/*[long string]*.bmp
- 85.105.167.110 port 80 - ***bithedistributedlicense.net*** - GET /images/*[long string]*.gif
- 90.180.1.23 port 80 - ***bithedistributedlicense.net*** - GET /images/*[long string]*.gif
- 184.168.187.1 port 80 - ***fyicreative.ca*** - GET /dih.bin
- 184.168.187.1 port 80 - ***fyicreative.ca*** - GET /nori3.bin
- 184.168.187.1 port 80 - ***fyicreative.ca*** - GET /nori6.bin
- 41.193.159.41 port 443 - Encrypted traffic both with and without cerificate data
- 69.90.132.196 port 443 - Encrypted traffic both with cerificate data
- 69.75.114.66 port 443 - Encrypted traffic (no certificate data)
- 74.50.133.9 port 443 - Encrypted traffic (no certificate data)
- 41.193.159.41 port 444 - attempted TCP connections, but no response from the server
- 95.150.74.40 port 443 - attempted TCP connections, but no response from the server
- 179.108.87.11 port 443 - attempted TCP connections, but no response from the server
- 190.208.42.36 port 443 - attempted TCP connections, but no response from the server

Of note, during the first infection, I rebooted the infected Windows host 3 or 4 times, which might account for multiple copies of what I assume are Nymaim. If you review the pcaps, the reboots are indicated any place you see an HTTP request to ***www.msftncsi.com***.

Malicious domains

Indicators are not a block list. If you feel the need to block web traffic based on this diary, I suggest the following domains:

- ijqdjqnwiduqujqiuezxc.com
- adistributedmean.net
- fyibc.com
- fortrunernaskdneazxd.com
- bithedistributedlicense.net
- fyicreative.ca

Final words

Pcaps and malware for today's diary can be found here.

Good spam filtering, proper Windows administration, and best security practices will ensure most people never see this malware. However, criminals are constantly tweaking their methods in an attempt to slip past our defenses. It pays to be aware of current malware indicators, so we're prepared if any ever make it into our network.

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Jan 17th 2018
4 years ago

Unfortunately this sometimes can be tricky to update filters to block preemptively in some organizations do not want to miss out on mail especially false positives. Many times security researchers are subjected to only employing filters reactively and specific to the malspam. These filters generally are very specific and only come after the fact of discovery which usually means someone opened the email and attachment. In todays business landscape businesses need to stand strong with their security policies and do due diligence to ensure that if false positives are caught, they have a process in place to allow audit of these emails and releasing of them. All to often the reaction is to turn off the filters because the emails get held up and impacts sales. Unfortunately this happens at the cost of security. Just my 2 cents.

ShadowITGroup
1 Posts

Quote

Jan 17th 2018
4 years ago

So how did the malware get attached to legitimate emails?

SasK
12 Posts

Quote

Jan 18th 2018
4 years ago

Brad
433 Posts
ISC Handler

> *Quoting SasK:*So how did the malware get attached to legitimate emails?

That's a very good question. If they are in fact legitimate emails, this implies a host used by the other email account (or perhaps the email account itself) communicating the with recipient is compromised. It's possible an infected host is using a local cache of an email client to send these messages. Unfortunately, without having access to the host at the other end of the conversation, I don't know how this is being done.

It's also possible these long email chains are completely fake, but what little I've seen indicates they are not. For example, signature blocks used by the recipient in previous correspondence from the email chain make me think these are legitimate conversations, and the host at the other end is somehow compromised. How this happened? I don't know.

Quote

Jan 18th 2018
4 years ago